OFFICE OF THE REGIONAL DIRECTOR OF EDUCATION, BHUBANESWAR

OFFICE ORDER

No. 5946 Date 12-4- 2004

In exercise of power conferred under sub-section 6 of section 6 of the O.E.Act, 1969, the Committee constituted in the Government Notification No. 27232/HE dated 27.05.2002 after careful consideration has been pleased to grant 1st temporary recognition for the academic session 2003-2004 (Degree Class)to the under named institution under sub-section 9 of section 6 of the O.E.Act, 1969.

1. Name of the Institution : KAPTIPADA COLLEGE, NUASAHI, P.O.NUASAHI
2. Address VIA-KAPTIPADA,
3. Name of Block KAPTIPADA Dist. MAYURBHANJ.

Stream	Compulsory subject with seats	Optional Subjects with seat
+3 Arts	English-96 M.I.L(O)-96	History-96 Pol.Sc. 96 Education-96 Philosophy-96
+3 Sc.		
+3 Com.		
Other Sub.		

This temporary recognition is subject to fulfilment of conditions as prescribed under section 6A (1) of the O.E. Act, 1969, the Orissa Higher Secondary Act and Regulations, 1982, the Universities First Statutes, 1990 and the Rules framed thereunder.

Application for extension of temporary recognition for the academic session 2004-2005 shall be submitted by the institution the prescribed format along with requisite fees in the Regional Directorate of Education, Bhubaneswar XXXXX by XXXXXXXXXXX immediately

While applying, the applicant institution shall file an AFFIDAVIT to the effect (i) that the conditions which they were deficient with have been fulfilled in the meantime, so as to enable them to meet the requirement of the Act. And the Rules for grant of recognition for the session 2004-2005

(ii) The Institution if continuing with temporary recognition for a period of seven academic sessions or more by March 2004 shall have to fulfill the conditions of recognition, laid down in the Orissa Education Act. Within 31st December 2005 failing which no further application for renewal of temporary recognition shall be entertained. Those colleges shall not admit students any further.

Sd/- XXXXXX B.P.Das
Regional Director of Education, I/C
Bhubaneswar and Prescribed Authority

Memo No 5947 date 12-4-2004
Copy forwarded to the Secretary, Governing Body Kaptipada College, At/P.O-Nuasahi, Dist-Mayurbhanj. for information and necessary action
Deputy Director
12.4.04

Memo No ______ date ______
Copy forwarded to Registrar XXXXXXXXXXXXXXXXXX North Orissa, Baripada for information and necessary action.
Deputy Director

Memo No ______ date ______
Copy submitted to the Commissioner-Cum-Secretary, Higher Education Department Govt. of Orissa, Bhubaneswar for kind information.
Deputy Director

Memo No ______ date ______
Copy submitted to the Director Higher Education, Orissa, Bhubaneswar for kind information.
Deputy Director

Principal
Kaptipada Degree College
Nuasahi, Mayurbhanj

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OFFICE OF THE REGIONAL DIRECTOR OF EDUCATION:BBSR-22.

-:0:-

OFFICE ORDER NO.__ 990 /RDE,DT _7/1/05

In exercise of powers conferred under Sub Section 6 of Section 6 of the O.E.Act 1969, the Committee constituted in Government Notification No.15643/HE,Dt.1.5.2004 after careful consideration has been pleased to grant [illegible] Temporary Recognition from the academic session 2004-2005 to ~~Higher Seconda~~ry/Degree Classes to the under named institution with the details mentioned therein.

1: Name of the Institution. **Kaptipada College, Nuasahi**

2: Address: **At: Nuasahi, P.O: Nuasahi,** District **Mayurbhanj**

3: Name of Block **Kaptipada**

Stream	Compulsory Subject with seats.	Optional subject with seats.
+3 Arts-	**English, MIL(O)-96**	**Hist., Pol.Sc., Education & Philosophy-96 seats each.**

Sd/-Dr.B.P.Das
Regional Director of Education, I/C,
& Prescribed Authority, Bhubaneswar.

Memo No. 991 /RDE,Dt.7/1/05

Copy forwarded to the Secretary, Governing Body of **Kapatipada College, Nuasahi, Kaptipada, Mayurbhanj** for information & necessary action.

7/01/05
Deputy Director.

Memo No. /RDE,Dt.

Copy forwarded to the ~~Secretary, C.H.S.E.(O), Bhubaneswar/ Registrar, Utkal University, Vani Vihar, Bhubaneswar/~~[illegible]/North Orissa University, Baripada, Mayurbhanj for information & necessary action.

Deputy Director.

Memo No. /RDE,Dt.

Copy submitted to the Commissioner-cum-Secy.to Govt. Deptt.of Higher Education, Orissa, Bhubaneswar for favour of information.

Deputy Director.

Memo No. /RDE,Dt.

Copy forwarded to the Director, Higher Education, Orissa, Bhubaneswar for favour of information.

Deputy Director.

Principal
Kaptipada Degree College
Nuasahi, Mayurbhanj

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OFFICE OF THE REGIONAL DIRECTOR OF EDUCATION, BHUBANESWAR

OFFICE ORDER

No. 2650 Date 7/12/ 2006

In exercise of power conferred under sub-section 6 of section 6 of the O.E. Act. 1969, the Committee constituted in the Government Notification No. 15641/HE.,dt.1.5.2004 after careful consideration has been pleased to grant temporary recognition for the academic session (2005-2006). (~~Higher Secondary Class~~/Degree Class) to the under named institution under sub-section 9 of section 6 of the O.E.Act. 1969.

1 Name of the Institute : Kaptipada College,Kaptipada,
2 Address : At: Nuasahi, P.O: Kaptipada,
3 Name of Block : Kaptipada, Dist. Mayurbhanj.

Stream	Compulsory Subject with seats	Optional Subjects with seat
+3 Arts	English,MIL(O)-96.	History,Pol.Science,Education, Philosophy-96 seats each.
Science	//	//
Commerce		
Other Sub.		

This temporary recognition is subject to fulfillment of conditions as prescribed under section 6A (1) of the O.E.Act, 1969, the Orissa Higher Secondary Act and Regulations, 1982, the Universities First Statutes, 1990 and the Rules framed thereunder.

Application for extension of temporary recognition for the academic session 2006-07 shall be submitted by the institution the prescribed format along with requisite fees in the Regional Directorate of Education, Bhubaneswar immediately.

While applying, the applicant shall file an AFFIDAVIT to the effect (i) that the conditions which they were deficient with have been fulfilled in the meantime, so as to enable them to meet the requirement of the Act. And the Rules for grant of recognition for the session________

(ii) The Institute if continuing with temporary recognition for a period of seven academic sessions or more by March ________ shall have to fulfill the conditions of recognition, laid down in the Orissa Education Act. Within ________ falling which no further application for renewal of temporary recognition shall be entertained. Those colleges shall not admit students any further.

Sd/-Dr.B.P. Das,
Regional Director of Education, I/C
Bhubaneswar and Prescribed Authority

Memo No. 2651 date 7/12/06

Copy forwards to the Secretary, Governing Body ,Kaptipada College,Kaptipada, Mayurbhanj for information and necessary action.

7/12/06
Deputy Director

Memo No. ________ date ________

Copy forwards to Registrar [illegible] University / North Orissa/Baripada /~~Secretary C.H.S.E.~~ Orissa, Bhubaneswar for information and necessary action.

Deputy Director

Memo No. ________ date ________

Copy submitted to the Commissioner - Cum - Secretary, Higher Education Department Govt. of Orissa, Bhubaneswar for kind informations & necessary action.

Deputy Director

Memo No. ________ date ________

Copy submitted to the Director, Higher Education, Orisa, Bhubaneswar for kind informations & necessary action.

Deputy Director

Principal
Kaptipada Degree College
Nuasahi ,Mayurbhanj

OFFICE OF THE REGIONAL DIRECTOR OF EDUCATION, BHUBANESWAR

OFFICE ORDER

No.............26327.../RDE. Dt.....26/12.......2006

In exercise of power conferred under sub-section 6 of section 6 of the O.E.Act.1969, the Committee constituted in the Govt. Notification No.15641/HE.. Date 1.5.04 . .after careful consideration has been pleased to grant temporary recognition for the academic session (..2006-07.......) to ~~Higher Second~~ary/Degree Class to the under named institution under sub-section 6 of the O.E.Act.1969.

1. Name of the Institute :- Kaptipada College, Nuasahi,
2. Address : :- At/P.O: Nuasahi,
3. Name of the Block :- Kaptipada, Dist.:- Mayurbhanj.

Stream	Comp.Subject with seats	Optional subject with seats
+3 Arts.	English, MIL(O)-96 seats. each.	History, Pol.Science, Education Philosophy-96 seats each.

This temporary recognition is subject to fulfillment of conditions as prescribed under section 6A(1) of the O.E.Act,1969, the Orissa Higher Secondary Act and Regulations, 1982, the Universities First Statutes, 1990 and the Rules framed thereunder.

Application for extention of temporary recognition for the academic session 2007-08 shall be submitted by the institution in the prescribed format along with requisite fees in the Regional Directorate of Education, Bhubaneswar immediately.

While applying, the applicant shall file an affidavit to the effect(i) that the conditions which they were deficient with have been fulfilled in the meantime, so as to enable them to meet the requirement of the Act. And the Rules for grant of recognition for the session __________

(ii) The Institute if continuing with temporary recognition for a period of seven academic sessions or more by March, 200.... shall have too fulfill the conditions of recognition, laid down in the Orissa Education Act. within __________ failing which no further application for renewal of temporary recognition shall be entertained. Those colleges shall not admit students any further.

Sd/-Dr.P.C.Patt

Regional Director of Education,
Bhubaneswar & Prescribed Authority.

Memo 26328 / Date 26/12/06

Copy forwarded to the Secretary, Governing Body Kaptipada College, Nuasahi, Mayurbhanj for information and necessary action.

26/12/06

Deputy Director.

Memo __________ / Date __________

Copy forwarded to the Registrar, North Orissa University, Baripada, Mayurbhanj ~~Secretary, CHSE~~, Orissa, Bhubaneswar for information and necessary action.

Deputy Director.

Memo __________ / Date __________

Copy submitted to the Commissioner-cum-Secretary to Govt., Deptt. Of Higher Education. Orissa, BBSR for information and necessary action.

Deputy Director.

Memo __________ / Date __________

Copy submitted to the Director of Higher Education, Orissa, Bhubaneswar for information

Deputy Director.

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OFFICE OF THE REGIONAL DIRECTOR OF EDUCATION, BHUBANESWAR,A-11, SUKA VIHAR, PUSTAK BHAWAN, 2ND FLOOR, BHUBANESWAR-22.

OFFICE ORDER NO............25724.......RDE, BHUBANESWAR. Dated....10/12/07

In exercise of powers conferred under Sub Section 6 of Section 6 of the O.E.Act, 1969, the committee constituted in the Govt. Notification No.15641/HE Dated 7.5.04........ After careful consideration has been pleased to grant of (Permanent) Recognition from the session 2007-08 (to ~~Higher Secondary classes/~~Degree classes) to the under named institution with the details mentioned therein:

1. Name of the Institution. Kaptipada College, Nuasahi,
2. Address Kaptipada
3. Name of the block Kaptipada
4. Name of the district Mayurbhanj

Stream	Comp.subjects/seats	Opt.subjects/seats
+3 Arts	English, MIL(O)-96 seats each.	History, Pol.Science, Educat & Philosophy with 96 seats each.

Sd/-S.Patnaik

R.D.E I/C, Bhubaneswar &
Prescribed Authority

Memo No.......25725........ the....10.12.07
Copy forwarded to the Secretary, Kaptipada College, Nuasahi, Kaptipada, Mayurbhanj............ for information and necessary action.

Dy.Director 10.12

Memo No..................................../ the.............
Copy forwarded to the Secretary, C.H.S.E., Orissa, BBSR/Registrar, ... [illegible] for information and necessary action.

Dy. Director

Memo No. ..../
Copy submitted to the Comm-cum-Secretary to Govt.Deptt of Higher Education, [illegible] Bhubaneswar for kind of information and necessary action

Dy. Director

Memo No..................................../
Copy forwarded to the Director, Higher Education, Orissa, Bhubaneswar for information [illegible]

Memo No.
Copy to guard file/Section

Principal
Kaptipada Degree College
Nuasahi, Mayurbhanj

OFFICE OF THE REGIONAL DIRECTOR OF EDUCATION, BHUBANESWAR

OFFICE ORDER

No........851..../RDE. Dated the 13 January,2011.

In exercise of power conferred under sub-section 6 of section 6 of the O.E.Act.1969, the Committee constituted in the Govt. Notification No15641/HE Dated 1.5.2004 in the H.P.C. held on 4th & 5th January, 2011 after careful consideration has been pleased to grant **temporary recognition** for the academic session **2010-11** to Degree Classes to the under named institution.

1. Name of the Institute :- **Kaptipada College**
2. Address :- Nuasahi
3. Name of the Block :- Dist.:- Mayurbhanj

Stream	Comp.Subject with seats	Optional subject with seats
+3 Arts	Hons. in Education, History & Political Science with 16 seats each.	

This temporary recognition is subject to fulfillment of conditions as prescribed under section 6A(1) of the O.E.Act,1969, the Orissa Higher Secondary Act and Regulations, 1982, the Universities First Statutes, 1990 and the Rules framed there under.

Application for extension of temporary recognition for the academic session **2010-11** shall be submitted by the institution in the prescribed format along with requisite fees in the Regional Directorate of Education, Bhubaneswar by end of August,2010.

While applying, the applicant shall file an affidavit to the effect (i) that the conditions which they were deficient with have been fulfilled in the meantime, so as to enable them to meet the requirement of the Act and the Rules for grant of recognition for the session 2010-11.
(ii) The Institute if continuing with temporary recognition for a period of seven academic sessions or more by March, 200.... shall have to fulfill the conditions of recognition, laid down in the Orissa Education Act, within __________ failing which no further application for renewal of temporary recognition shall be entertained. Those colleges shall not admit students any further.

Sd/- Dr.K.P.Mahapatra
Regional Director of Education,
Bhubaneswar & Prescribed Authority.

Memo No. 852 / Dated the 13 January,2011

Copy forwarded to the Secretary, Governing Body of Kaptipada College, Nuasahi, Dist-Mayurbhanj for information and necessary action. You are required to submit Annual Enrolment Return (AER) in every Academic session latest by 31st August.

13/1/11
Regional Director.

Memo No.______________/ Dated the January,2011

Copy forwarded to the Registrar, North Odisha University, Baripada, Dist-Mayurbhanj for information and necessary action.

Regional Director.

Memo No.______________/ Dated the January,2011

Copy submitted to the Joint Secretary to Govt., Deptt. Of Higher Education, Orissa, BBSR for information and necessary action.

Regional Director.

Memo No.______________/ Dated the November,2010

Copy submitted to the Director of Higher Education, Orissa, Bhubaneswar for information and necessary action.

Regional Director.

Principal
Kaptipada Degree College,
Mayurbhanj

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OFFICE OF THE REGIONAL DIRECTOR OF EDUCATION, BHUBANESWAR

OFFICE ORDER

No.......856..../RDE. Dated the 13 January,2011.

In exercise of power conferred under sub-section 6 of section 6 of the O.E.Act.1969, the Committee constituted in the Govt. Notification No15641/HE Dated 1.5.2004 in the H.P.C. held on 4th & 5th January, 2011 after careful consideration has been pleased to grant **first temporary recognition** for the academic session **2010-11** to Degree Classes to the under named institution.

1. Name of the Institute :- **Kaptipada College**
2. Address :- Nuasahi
3. Name of the Block :- Dist.:- Mayurbhanj

Stream	Comp.Subject with seats	Optional subject with seats
+3 Commerce-64 seats	(All other subjects as per permission order)	

This temporary recognition is subject to fulfillment of conditions as prescribed under section 6A(1) of the O.E.Act,1969, the Orissa Higher Secondary Act and Regulations, 1982, the Universities First Statutes, 1990 and the Rules framed there under.

Application for extension of temporary recognition for the academic session **2010-11** shall be submitted by the institution in the prescribed format along with requisite fees in the Regional Directorate of Education, Bhubaneswar by end of August,2010.

While applying, the applicant shall file an affidavit to the effect (i) that the conditions which they were deficient with have been fulfilled in the meantime, so as to enable them to meet the requirement of the Act and the Rules for grant of recognition for the session 2010-11.
(ii) The Institute if continuing with temporary recognition for a period of seven academic sessions or more by March, 200.... shall have to fulfill the conditions of recognition, laid down in the Orissa Education Act. within __________ failing which no further application for renewal of temporary recognition shall be entertained. Those colleges shall not admit students any further.

Sd/- Dr.K.P.Mahapatra
Regional Director of Education,
Bhubaneswar & Prescribed Authority.

Memo No. 857 / Dated the 13 January,2011

Copy forwarded to the Secretary, Governing Body of Kaptipada College, Nuasahi, Dist-Mayurbhanj for information and necessary action. You are required to submit Annual Enrolment Return (AER) in every Academic session latest by 31st August.

Regional Director.

Memo No.______________/ Dated the January,2011

Copy forwarded to the Registrar, North Odisha University, Baripada, Dist-Mayurbhanj for information and necessary action.

Regional Director.

Memo No.______________/ Dated the January,2011

Copy submitted to the Joint Secretary to Govt., Deptt. Of Higher Education. Orissa, BBSR for information and necessary action.

Regional Director.

Memo No.______________/ Dated the November,2010

Copy submitted to the Director of Higher Education, Orissa, Bhubaneswar for information and necessary action.

Regional Director.

Principal
Kaptipada Degree College
Nuasahi, Mayurbhanj

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OFFICE OF THE REGIONAL DIRECTOR OF EDUCATION, BHUBANESWAR

OFFICE ORDER

No. 13503 / RDE, Dated the 14/7/11

In exercise of power conferred under sub-section 6 of section 6 of the O.E.Act. 1969, the Committee constituted in the Govt. Notification No.15641 / HE Dated 01.05.2004 in the H.P.C. held on 23rd & 24th June, 2011 after careful consideration has been pleased to grant 1st **Temporary Recognition** for the academic session **2010-11** to Degree Classes to the under named institution.

1.Name of the Institution :- Kaptipada College, Nuasahi(**College Code -22214304)**
2.Address :- Nuasahi
3.Name of the Block :-Kaptipata Dist. :- **Mayurbhanj**

Stream	Comp. Subject with seats	Optional subject with seats
+3 Sc-64	English, MIL(O)-64 Seats	P.C.M. & C.B.Z.-32 Seats each

This temporary recognition is subject to fulfillment of conditions as prescribed under section 6 A (1) of the O.E. Act., 1969, the Orissa Higher Secondary Act and Regulations, 1982, the Universities First Statues, 1990 and the Rules framed there under.

Application for extension of temporary recognition for the academic session 2011-12 shall be submitted by the institution in the prescribed format along with requisite fees in the Regional Directorate of Education, Bhubaneswar by end of August, 2011

While applying the applicant shall file an affidavit to the effect (i) that the conditions which they were deficient with have been fulfilled in the meantime, so as to enable them to meet the requirement of the Act and the Rules for grant of recognition for the session 2011 (ii) The Institute if continuing with temporary recognition for a period of seven academic sessions or more by March, 20..... shall have to fulfill the conditions of recognition, laid down in the Orissa Education Act. Within ...... failing which no further application for renewal of temporary recognition shall be entertained.

Sd/- Dr. K.P. Mahapatra
Regional Director of Education
Bhubaneswar & Prescribed Authority

Memo No. 13504 / Dated the 14/7/11

Copy forwarded to the Secretary, Governing Body Kaptipada College, Nuasahi, Dist: Mayurbhanj for information and necessary action. You are required to submit Annual Enrolment Return (AER) of every Academic Session latest by 31 August.

12/7/11
Regional Director

Memo No. / Dated the

Copy forwarded to the Registrar, North Orissa **University, Baripda, Mayurbhanj** for information and necessary action.

Regional Director.

Memo No. / Dated the

Copy submitted to the Joint Secretary to Govt., Deptt. of Higher Education, Orissa, Bhubaneswar for information and necessary action.

Regional Director

Memo No. / Dated the

Copy submitted to the Director of Higher Education, Orissa, Bhubaneswar for information and necessary action.

Regional Director

Principal
Kaptipada Degree College
Nuasahi ,Mayurbhanj

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OFFICE OF THE REGIONAL DIRECTOR OF EDUCATION, BHUBANESWAR

OFFICE ORDER

No..24373../RDE. Dated the 19/12/11

In exercise of power conferred under sub-section 6 of section 6 of the O.E.Act.1969, the Committee constituted in the Govt. Notification No15641/HE Dated 1.5.2004 in the H.P.C. held on 25th November, 2011 after careful consideration has been pleased to grant 2nd **Temporary Recognition** to +3 Arts & +3 Science for the academic session 2011-12 to Degree classes to the under named institution.

1. Name of the Institute :- ***Kaptipada College***
2. Address :- Nuasahi
3. Name of the Block :-Kaptipada Dist.:- Mayurbhanj

Stream	Comp.Subject with seats	Optional subject with seats
+3 Science-64	Eng., MIL(O)-64 seats each.	PCM & CBZ – 32 seats each.
+3 Arts-	Hons. in History, Pol.Sc. & Education – 16 seats each.	

This temporary recognition is subject to fulfillment of conditions as prescribed under section 6A(1) of the O.E.Act,1969, the Orissa Higher Secondary Act and Regulations, 1982, the Universities First Statutes, 1990 and the Rules framed there under.

Application for extension of temporary recognition for the academic session **2012-13** shall be submitted by the institution in the prescribed format along with requisite fees in the Regional Directorate of Education, Bhubaneswar by end of August.

While applying, the applicant shall file an affidavit to the effect (i) that the conditions which they were deficient with have been fulfilled in the meantime, so as to enable them to meet the requirement of the Act and the Rules for grant of recognition for the session 2012-13.

(ii) The Institute if continuing with temporary recognition for a period of seven academic sessions or more by March, 200…. shall have to fulfill the conditions of recognition, laid down in the Orissa Education Act. within __________ failing which no further application for renewal of temporary recognition shall be entertained. Those colleges shall not admit students any further.

Sd/- Dr.K.P.Mahapatra
Regional Director of Education,
Bhubaneswar & Prescribed Authority.

Memo No. 24374 / Dated the 19/12/11

Copy forwarded to the Secretary, Governing Body of **Kaptipada College, Nuasahi, Dist-Mayurbhanj** for information and necessary action. You are required to submit Annual Enrolment Return (AER) in every Academic session latest by 31st August.

19/12/11
Regional Director.

Memo No.________________ / Dated the

Copy forwarded to the Registrar, North Odisha University, Takatpur, Baripada, Mayurbhanj for information and necessary action.

Regional Director.

Memo No.________________ / Dated the

Copy submitted to the Joint Secretary to Govt., Deptt. Of Higher Education, Orissa, BBSR for information and necessary action.

Regional Director.

Memo No.________________ / Dated the

Copy submitted to the Director, Higher Education, Orissa, Bhubaneswar for information and necessary action.

Regional Director.

Principal
Kaptipada Degree College
Nuasahi, Mayurbhanj

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OFFICE OF THE REGIONAL DIRECTOR OF EDUCATION, BHUBANESWAR

OFFICE ORDER

No....1972/RDE. Dated the 21/1/12

In exercise of power conferred under sub-section 6 of section 6 of the O.E.Act.1969, the Committee constituted in the Govt. Notification No15641/HE Dated 1.5.2004 in the H.P.C. held on 25th November, 2011 & Govt. Corrigendum Order No.863/HE, Dtd.12.01.2012 after careful consideration has been pleased to grant **Temporary recognition** for the academic session **2011-12** to Degree classes to the under named institution.

1. Name of the Institute :- **Kaptipada College**
2. Address :- Nuasahi
3. Name of the Block :-Kaptipada Dist.:- Mayurbhanj

Stream	Comp.Subject with seats	Optional subject with seats
+3 Commerce-64	(Other Comp. & Optional subjects as per University Syllabus)	

This temporary recognition is subject to fulfillment of conditions as prescribed under section 6A(1) of the O.E.Act,1969, the Orissa Higher Secondary Act and Regulations, 1982, the Universities First Statutes, 1990 and the Rules framed there under.

Application for extension of temporary recognition for the academic session 2012-13 shall be submitted by the institution in the prescribed format along with requisite fees in the Regional Directorate of Education, Bhubaneswar by end of August.

While applying, the applicant shall file an affidavit to the effect (i) that the conditions which they were deficient with have been fulfilled in the meantime, so as to enable them to meet the requirement of the Act and the Rules for grant of recognition for the session 2012-13.
(ii) The Institute if continuing with temporary recognition for a period of seven academic sessions or more by March, 200.... shall have to fulfill the conditions of recognition, laid down in the Orissa Education Act. within _________ failing which no further application for renewal of temporary recognition shall be entertained. Those colleges shall not admit students any further.

EA to acquire required land in the name of the college by 31.3.2012 failing which admission restriction shall be imposed from the session 2012-13.

Sd/- Dr.K.P.Mahapatra
Regional Director of Education,
Bhubaneswar & Prescribed Authority.

Memo No. 1973 / Dated the 21/1/12

Copy forwarded to the Secretary, Governing Body of **Kaptipada College, Nuasahi, Dist-Mayurbhanj** for information and necessary action. You are required to submit Annual Enrolment Return (AER) in every Academic session latest by 31st August.

20/1/12
Regional Director.

Memo No._______________/ Dated the

Copy forwarded to the Registrar, North Odisha University, Takatpur, Baripada, Dist-Mayurbhanj for information and necessary action.

Regional Director.

Memo No._______________/ Dated the

Copy submitted to the Joint Secretary to Govt., Deptt. Of Higher Education, Orissa, BBSR for information and necessary action.

Regional Director.

Memo No._______________/ Dated the

Copy submitted to the Director, Higher Education, Orissa, Bhubaneswar for information and necessary action.

Regional Director.

Principal
Kaptipada Degree College

Scanned with OKEN Scanner

OFFICE OF THE REGIONAL DIRECTOR OF EDUCATION, UNIT-II, BHUBANESWAR

OFFICE ORDER

No...7764.../RDE. Dated the 10/4/13

In exercise of power conferred under sub-section 6 of section 6 of the O.E.Act.1969, the Committee constituted in the Govt. Notification No15641/HE Dated 1.5.2004 in the H.P.C. held on 8.2.2013 after careful consideration has been pleased to grant **Temporary recognition** for the academic session **2012-13** to Degree classes to the under named institution.

1. Name of the Institute :- Kaptipada College
2. Address :- Nuasahi
3. Name of the Block :- Kaptipada Dist.:- Mayurbhanj

Stream	**Comp.Subject with seats**	**Optional subject with seats**
+3 Commerce-64 seats	(Other Compulsory & Optional subjects as per University Syllabus)	
+3 Science-64 seats	Eng., MIL(O)-64 seats each	PCM & CBZ-32 seats each.
+3 Arts-	Hons. in History, Pol.Sc. & Education – 16 seats each.	

This temporary recognition is subject to fulfillment of conditions as prescribed under section 6A(1) of the O.E.Act,1969, the Orissa Higher Secondary Act and Regulations, 1982, the Universities First Statutes, 1990 and the Rules framed there under.

Application for extension of temporary recognition for the academic session **2013-14** shall be submitted by the institution in the prescribed format along with requisite fees in the Regional Directorate of Education, Bhubaneswar by end of August.

While applying, the applicant shall file an affidavit to the effect (i) that the conditions which they were deficient with have been fulfilled in the meantime, so as to enable them to meet the requirement of the Act and the Rules for grant of recognition for the session **2013-14.**

(ii) The Institute if continuing with temporary recognition for a period of seven academic sessions or more by March, 200.... shall have to fulfill the conditions of recognition, laid down in the Orissa Education Act. within __________failing which no further application for renewal of temporary recognition shall be entertained. Those colleges shall not admit students any further.

Sd/- Dr. B.N.Dhal
Regional Director of Education,I/c.
Bhubaneswar & Prescribed Authority.

Memo No. 7765 / Dated the 10/4/13

Copy forwarded to the Principal-cum-Secretary, Governing Body of Kaptipada College Nuasahi, Dist-Mayurbhanj for information and necessary action. You are required to submit Annual Enrolment Return (AER) in every Academic session latest by 31st August.

10.4.13
Regional Director,I/c.

Memo No.________________/ Dated the

Copy forwarded to the Registrar, North Odisha University, Takatpur, Baripada, Dist-Mayurbhanj for information and necessary action.

Regional Director,I/c.

Memo No.________________/ Dated the

Copy submitted to the Addl. Secretary to Govt., Deptt. Of Higher Education, Orissa, BBSR for information and necessary action.

Regional Director,I/c.

Memo No.________________/ Dated the

Copy submitted to the Director, Higher Education, Orissa, Bhubaneswar / Steno to Director, I/c., RDE, Bhubaneswar for information and necessary action.

Regional Director,I/c.

Behera
Principal

[redacted]

OFFICE OF THE REGIONAL DIRECTOR OF EDUCATION, UNIT-II, BHUBANESWAR

OFFICE ORDER

No....8000../RDE. Dated 10/7/14

In exercise of power conferred under sub-section 6 of section 6 of the O.E.Act.1969, the Committee constituted in the Govt. Notification No15641/HE Dated 1.5.2004 in the H.P.C. held on 20.5.2014 after careful consideration has been pleased to grant of **Temporary Recognition** for the session 2013-14 to the under named institution:-

1. Name of the Institute :- Kaptipada (Degree) College
2. Address :- At-Nuasahi, P.O.-Kaptipada
3. Name of the Block :- Kaptipada Dist.:- Mayurbhanj

Stream	Comp.Subject with seats	Optional subject with seats
+3 Science-64 seats	Eng, MIL(O)-64 seats each	PCM & CBZ- 32 seats each
+3 Commerce-64 seats	(All other Compulsory & optional subjects as per permission order)	
	Hons. in Accountancy – 16 seats	
+3 Arts	Increase of seats from 96 to 128	
	Hons. in Education, Pol.Sc. & History – 16 seats each.	

This temporary recognition is subject to fulfillment of conditions as prescribed under section 6A(1) of the O.E.Act,1969, the Orissa Higher Secondary Act and Regulations, 1982, the Universities First Statutes, 1990 and the Rules framed there under.

Application for extension of temporary recognition for the academic session 2014-15 shall be submitted by the institution in the prescribed format along with requisite fees in the Regional Directorate of Education, Bhubaneswar by end of August.

While applying, the applicant shall file an affidavit to the effect (i) that the conditions which they were deficient with have been fulfilled in the meantime, so as to enable them to meet the requirement of the Act and the Rules for grant of recognition for the session 2014-15.

(ii) The Institute if continuing with temporary recognition for a period of seven academic sessions or more by March, 200.... shall have to fulfill the conditions of recognition, laid down in the Orissa Education Act, within ________ failing which no further application for renewal of temporary recognition shall be entertained. Those colleges shall not admit students any further.

D. 9/7/14

Sd/- Dr. D. Mohanty
Regional Director of Education,I/c.
Bhubaneswar & Prescribed Authority.

Memo No. 8001 / Dated the 10/7/14

Copy forwarded to the Secretary, Kaptipada (Degree) College, Nuasahi, Dist-Mayurbhanj for information and necessary action. You are required to submit Annual Enrolment Return (AER) in every Academic session latest by 31st August.

Regional Director,I/c.

Memo No. 8002 /Dated the 10/7/14

Copy forwarded to the Registrar, North Odisha University, Takatpur, Baripada, Dist-Mayurbhanj for information and necessary action.

Regional Director,I/c.

Memo No. 8003 / Dated the 10/7/14

Copy submitted to the Joint Secretary to Govt., Deptt. Of Higher Education, Orissa, BBSR for information and necessary action.

Regional Director,I/c.

Memo No. 8004 / Dated the 10/7/14

Copy submitted to the Director, Higher Education, Orissa, Bhubaneswar for information and necessary action.

Regional Director,I/c.

Principal
Kaptipada Degree College
Nuasahi ,Mayurbhanj

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OFFICE OF THE REGIONAL DIRECTOR OF EDUCATION, UNIT-II, BHUBANESWAR

ORDER NO. 14278 / RDE, Dated 7/10/15

In pursuance of the Letter No. 22245 / HE Dt 03.10.2015 of Govt. of Odisha, Department of Higher Education, BBSR ,Temporary Recognition in respect of following educational institution are hereby granted as a special case as to enable to students of their institutions to appear at the Annual CHSE/University Examination as per the detailed mentioned against each.

Sl No	Name of the college	Location	District	Temporary Recognition granted for the session.
1	K.C.D.K.College	Bijatala	Mayurbhanj	T.R to increase of seats from 64 to 128 in +2 Arts for the session 2014-15 is allowed.
2	Panchapir Womens College	Karanjiia	Mayurbhanj	T.R to increase of seats from 192 to 256 in +2 Arts for the session 2014-15 is allowed.
3	Panchpir Womens College	Karanjia	Mayurbhanj	T.R to +2 Science (PCMB) with 64 seats for the session 2014-15 is allowed.
4	Rairangpur College	Rairangpur	Mayurbhanj	T.R to increase of seats from 32 to 64 seats in +3 Commerce for the session 2014-15 is allowed .
5	C.P Degree College	Bhanjakia	Mayurbhanj	T.R to +3 Arts with 64 seats for the session 2014-15 & 2015-16 is allowed .
6	C.P Junior College	Bhanjakia	Mayurbhanj	T.R to increase of seats from 128 to 160 in +2 Arts & 64 to 128 (PCMB) in +2 Science for the session 2014-15 & 2015-16 is allowed .
7	Dhirajlal Degree College	Bahalad	Mayurbhanj	T.R to Hons in Pol. Sc with 16 seats in +3 Arts Arts for the session 2014-15 is allowed .
8	Kaptitada Degree College	Nuasahi	Mayurbhanj	T.R to +3 Science with 64 seats (PCM & CBZ 32 seats) each & Hons in Phy, Zoology 16 seats each & T.R to +3 Comm. with 64 seats,& Acct. Hons with 16 seats . Increase of seats from 96 to 128 with Odia 64 seats in +3 Arts & Hons in Hist, Pol.Sc & Education 16 seats each for the session 2014-15 is allowed .

6/x/15

Sd/- Dr. Debabrata Mohanty
Regional Director of Education
Bhubaneswar & Prescribed Authority

Memo No. 14279 / Dated 7/10/15

Copy forwarded to the Secretary, Governing Body of concerned colleges for information and necessary action. You are required to submit Annual Enrolment Return (AER) of every academic session.

Regional Director.

Memo No. 14280 /Dated 7/10/15

Copy forwarded to the Registrar, North OdishaUniversity, Takatpur, Baripada/Chairman,CHSE,Odisha,Bhubaneswar for information and necessary action.

Regional Director.

Memo No. 14281 /Dated 7/10/15

Copy submitted to the Addl. Secretary to Govt., Deptt. of Higher Education, Odisha, Bhubaneswar for information .

Regional Director.

Memo No. 14282 / Dated 7/10/15

Copy submitted to the Director of Higher Education, Odisha, Bhubaneswar for information and necessary action.

Regional Director

Principal
Kaptipada Degree College
Nuasahi ,Mayurbhanj

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OFFICE OF THE REGIONAL DIRECTOR OF EDUCATION, UNIT-II, BHUBANESWAR-09

OFFICE ORDER No. 17040 **/ RDE, Dated the** 17/12/15

In exercise of power conferred under sub-section 6 of section 6 of the O.E. Act. 1969, the Committee constituted in the Govt. Notification No.15641 / HE Dated 01.05.2004 in the H.P.C. held on 17.11.2015 after careful consideration has been pleased to grant **Permanent Recognition** from the academic session2015-16 (Degree classes) to the under named institution with the details mentioned therein.

5. Name of the Institution :- **Kaptipada Degree College**
6. Address :- **Nuasahi**
7. Name of the Block :- **Kaptipada**
8. Dist. :- **Mayurbhanj**

Stream	Comp. Subject with seat	Optional Subject with seats
+3 Arts	Hons in Pol.Sc , Education & History with 16 seats each.	
+3 Sc	Eng, MIL (O) – 64 seats	PCM & CBZ – 32 seats each.
+3 Comm.	Eng, MIL (O) & other Compulsory & Optional subjects permitted as per University syllabus – 64 seats.	

17-12-15

Sd/- Dr. D.Mohany,
Regional Director of Education
Bhubaneswar & Prescribed Authority.

Memo No. 17041 / Dated the 17/12/15

Copy forwarded to the Principal-cum-Secretary, Governing Body, **Kaptipada Degree College, Nuasahi, Dist: Mayurbhanj** for information and necessary action.

Regional Director

Memo No. 17042 / Dated the 17/12/15

Copy forwarded to the Registrar,North Odisha University,Takatpur,Baripada for information and necessary action.

Regional Director

Memo No. 17043 / Dated the 17/12/15

Copy submitted to the Addl. Secretary to Govt., Deptt. of Higher Education, Odisha, Bhubaneswar for information and necessary action.

Regional Director

Memo No 17044 / Dated the 17/12/15

Copy submitted to the Director of Higher Education, Odisha, Bhubaneswar for information and necessary action.

Regional Director

Principal
Kaptipada Degree College
Nuasahi ,Mayurbhanj

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OFFICE OF THE REGIONAL DIRECTOR OF EDUCATION, BHUBANESWAR

OFFICE ORDER No....17045/ RDE, Dated 17/12/15

In exercise of power conferred under sub-section 6 of section 6 of the O.E. Act. 1969, the Committee constituted in the Govt. Notification No.15641 / HE Dated 01.05.2004 in the H.P.C. held on 17.11.2015 after careful consideration has been pleased to grant Temporary Recognition for the academic session 2015-16 to Degree Classes to the under named institution.

A. Name of the Institution :- Kaptipada College
B. Address :- Nuasahi
C. Name of the Block :- Kaptipada Dist.:- Mayurbhanj

Stream	Comp. Subject with seats	Opt.Subject with seats
+3 Sc	Hons in Phy, Zoology -16 seats each	
+3 Arts	Odia with 64 seats .	
+3 Comm.	Hons in Acct. with 16 seats .	

This temporary recognition is subject to fulfillment of conditions as prescribed under section 6 A (1) of the O.E. Act., 1969, the Orissa Higher Secondary Act and Regulations, 1982, the Universities First Statues, 1990 and the Rules framed there under.

Application for extension of temporary recognition for the academic 2016-17 session shall be submitted by the institution in the prescribed format along with requisite fees in the Regional Directorate of Education, Bhubaneswar by end of August,

While applying the applicant shall file an affidavit to the effect (i) that the conditions which they were deficient with have been fulfilled in the meantime, so as to enable them to meet the requirement of the Act and the Rules for grant of recognition for the session 2016-17

(ii) The Institute if continuing with temporary recognition for a period of seven academic sessions or more by March, 20..... shall have to fulfill the conditions of recognition, laid down in the Orissa Education Act. Within ...... failing which no further application for renewal of temporary recognition shall be entertained.

Sd/- Dr. D. Mohanty
Regional Director of Education, Bhubaneswar &
Prescribed Authority

Memo No. 17046/ Dated the 17/12/15

Copy forwarded to the Secretary, Governing Body Kaptipada College, Nuasahi Dist: Mayurbhanj information and necessary action. You are required to submit Annual Enrolment Return (AER) of every Academic Session latest by 31 August.

Regional Director

Memo No. 17047/ Dated the 17/12/15

Copy forwarded to the Register, North Odisha University, Takatpur, Baripada for information and necessary action.

Regional Director

Memo No. 17048/ Dated the 17/12/15

Copy submitted to the Addl Secretary to Govt., Deptt. of Higher Education, Odisha, Bhubaneswar for information and necessary action.

Regional Director

Memo No. 17049/ Dated the 17/12/15

Copy submitted to the Director of Higher Education, Orissa, Bhubaneswar for information and necessary action

Regional Director

Principal
Kapitpada Degree College
Nuasahi ,Mayurbhanj

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OFFICE OF THE REGIONAL DIRECTOR OF EDUCATION, BHUBANESWAR

OFFICE ORDER No. 13213 /RDE, Dated 6/9/17

In exercise of powers conferred under sub-section 5 of section 6 of the O.E. Act, 1969 and to give [illegible] made by the Committee constituted in the Govt. Notification No. 15641 [illegible] Dated 07.05.2014 [illegible] held on 27.04.2016, The Temporary Recognition to Higher Secondary/ Degree Courses as detailed [illegible] below in favour of the under named institution is hereby granted for the academic session 2016-17 subject to the following conditions.

A. Name of the Institution :- Kaptipada Degree College,
B. Name of the Agency :- GB of Kaptipada Degree College ,
C. Address :- Nuasahi
D. Name of the Block/ULB :- Kaptipada Dist- Mayurbhanj

Stream	Comp. Subject with seats	Opt. Subject with seats
+3 Arts	Increase of Seats from 96 to 128 Seats with Odia Optional 64 seats (4th TR) Hons. in Pol. Sc. Hist. & Edn. from 16 to 32 Seats each & Odia & Philosophy with 16 Seats each (1st TR)	
+3 Sc.	Hons. in Phy. & Zool. with 16 Seats each (3rd TR) Hons. in C hem., Bot. & Math. with 08 Seats each (1st TR)	
+3 Com.	Hons. in Acct. Hons. with 16 Seats (3rd TR) Hons. in Acct. from 16 to 48 Seats (1st TR)	

(i) The temporary recognition is subject to fulfillment of conditions as prescribed under section 6-A (1) of the O.E. Act [illegible] the Orissa Higher Secondary Act and Regulations, 1982, the University First Statutes, 1990 and the [illegible]

Application for extension of temporary recognition for the academic 2017-18 session shall be [illegible] in the prescribed format along with requisite fees in the Regional Directorate of Education [illegible] end of August,

While applying, the applicant shall file an affidavit to the effect that the conditions which they were [illegible] have been fulfilled in the meantime, so as to enable them to meet the requirement of the Act and the Rules for grant of recognition for the session 2017-18.

[illegible] continuing with temporary recognition for a period of seven academic sessions or more by [illegible] have to fulfil the conditions of recognition, laid down in the Orissa Education Act. Within [illegible] failing which [illegible] application for renewal of temporary recognition shall be entertained.

Sd/- Dr. D. Mohanty
Regional Director of Education, Bhubaneswar &
Prescribed Authority

Memo No. 13214 / Dated 6/9/17

Copy forwarded to the Secretary, Governing Body Kaptipada Degree College, Nuasahi, Kaptipada, Dist- Mayurbhanj information and necessary action. You are required to submit Annual Enrolment Return (AER) of every academic session by 31 August.

Regional Director

Memo No. 13215 / Dated 6/9/17

Copy forwarded to the Registrar, North Odisha University, Takatpur, Baripada for information and necessary action.

Regional Director

Memo No. 13216 / Dated 6/9/17

Copy forwarded to the Joint Secretary to Govt., Deptt. Of Higher Education, Odisha, Bhubaneswar for information and necessary action.

Regional Director

Memo No. 13217 / Dated 6/9/17

Copy forwarded to the Director of Higher Education, Orissa, Bhubaneswar for information and necessary action.

Regional Director

Principal
Kaptipada Degree College
Nuasahi ,Mayurbhanj

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OFFICE OF THE REGIONAL DIRECTOR OF EDUCATION, BHUBANESWAR

OFFICE ORDER No. 13313 /RDE, Dated 6/9/17

In exercise of powers conferred under sub-section 6 of section 6 of the O.E. Act, 1969, and as per the delegation of powers made by the Committee, constituted in the Govt. Notification No. 15641 / HE Dated 07.05.2014 in their meeting held on 27.04.2016, The **Temporary Recognition** to Higher Secondary/ Degree Classes as details mentioned below in favour of the under named institution is hereby granted for the academic Session 2016-17 subject to the following conditions.

A. Name of the Institution :- **Kaptipada Degree College,**
B. Name of the Agency :- **GB of Kaptipada Degree College ,**
C. Address :- **Nuasahi**
D. Name of the Block/ULB :- **Kaptipada Dist- Mayurbhanj**

Stream	Comp. Subject with seats	Opt. Subject with seats
+3 Arts.	Increase of Seats from 96 to 128 Seats with Odia Optional 64 seats (4th TR)	
	Hons. in Pol. Sc. Hist. & Edn. from 16 to 32 Seats each & Odia & Philosophy with 16 Seats each (1st TR)	
+3 Sc.	Hons. in Phy. & Zool. with 16 Seats each (3rd TR)	
	Hons. in C hem., Bot. & Math. with 08 Seats each (1st TR)	
+3 Comm.	Hons. in Acct. Hons. with 16 Seats (3rd TR)	
	Hons. in Acct. from 16 to 48 Seats (1st TR)	

This temporary recognition is subject to fulfillment of conditions as prescribed under section 6 A (3) of the O.E. Act, 1969, the Orissa Higher Secondary Act and Regulations, 1982, the Universities First Statutes, 1990 and the Rules framed there under.

Application for extension of temporary recognition for the academic 2017-18 session shall be submitted by the institution in the prescribed format along with requisite fees in the Regional Directorate of Education, Bhubaneswar by end of August,

While applying the applicant shall file an affidavit to the effect (i) that the conditions which they were deficient with have been fulfilled in the meantime, so as to enable them to meet the requirement of the Act and the Rules for grant of recognition for the session 2017-18.
(ii) The Institute if continuing with temporary recognition for a period of seven academic sessions or more by March 20... shall have to fulfill the conditions of recognition, laid down in the Orissa Education Act. Within ... failing which no further application for renewal of temporary recognition shall be entertained.

Sd/- Dr. D. Mohanty
Regional Director of Education, Bhubaneswar &
Prescribed Authority

Memo No. 13314 / Dated 6/9/17

Copy forwarded to the Secretary Governing Body Kaptipada Degree College, Nuasahi, Kaptipada, Dist - Mayurbhanj information and necessary action. You are required to submit Annual Enrolment Return (AER) of every Academic Session latest by 31 August.

Regional Director

Memo No. 13315 / Dated 6/9/17

Copy forwarded to the **Registrar, North Odisha University, Takatpur, Baripada** for information and necessary action.

Regional Director

Memo No. 13316 / Dated 6/9/17

Copy submitted to the **Joint Secretary to Govt., Deptt. Of Higher Education,** Odisha, Bhubaneswar for information and necessary action.

Regional Director

Memo No. 13317 / Dated 6/9/17

Copy submitted to the **Director of Higher Education, Orissa, Bhubaneswar** for information and necessary action.

Regional Director

Sahoo
Principal
Kaptipada Degree College
Nuasahi ,Mayurbhanj

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OFFICE OF THE REGIONAL DIRECTOR OF EDUCATION, BHUBANESWAR

OFFICE ORDER No. 3700 /RDE. Dated 14/3/18

In exercise of powers conferred under sub-section 6 of section 6 of the O.E. Act. 1969, and as per the delegation of powers made by the Committee, constituted in the Govt. Notification No.15641 / HE Dated 01.05.2004, in their meeting held on **20.05.2014**, The **Temporary Recognition** for the session **2017-18** to the under nemed institution.

A. Name of the Institution :- Kaptipada Degree College,
B. Name of the Agency :- G.B of Kaptipada Degree College,
C. Address :- Nuasahi,
D. Name of the Block/U.B :- Kaptipada, Dist- Mayurbhanj

Stream	Comp. Subject with seats	Opt.Subject with seats
+3 Arts.	Increase of seats from 96 to 128 with Odia Optional 64 Seats (5th TR)	
	Hons. in Pol. Sc., Hist. & Edn. from 16 to 32 Seats each &	
	Hons. in Odia & Philosiophy with 16 Seats each (2nd TR)	
+3 Sc.	Hons. in Phy. & Zool. with 16 Seats each (4th TR)	
	Hons. in Chem., Bot. & Math. with 08 Seats each (2nd TR)	
+3 Comm.	Hons. in Acct. with 16 Seats (5th TR)	
	Hons. in Acct. from 16 to 48 Seats (2nd TR)	

This temporary recognition is subject to fulfillment of conditions as prescribed under section 6 A (1) of the O.E. Act., 1969, the Orissa Higher Secondary Act and Regulations, 1982, the Universities First Statues, 1990 and the Rules framed there under.

Application for extension of temporary recognition for the academic 2018-19 session shall be submitted by the institution in the prescribed format along with requisite fees in the Regional Directorate of Education, Bhubaneswar by end of August,

While applying the applicant shall file an affidavit to the effect (i) that the conditions which they were deficient with have been fulfilled in the meantime, so as to enable them to meet the requirement of the Act and the Rules for grant of recognition for the session 2018-19.
(ii) The institute if continuing with temporary recognition for a period of seven academic sessions or more by March. 20.... shall have to fulfill the conditions of recognition, laid down in the Orissa Education Act. Within ... failing which no further application for renewal of temporary recognition shall be entertained.

Sd/- Dr. D. Mohanty 12/3/18
Regional Director of Education, Bhubaneswar &
Prescribed Authority

Memo No. 3701 / Dated 14/3/18
Copy forwarded to the Secretary, Governing **Kaptipada Degree College, Nuasahi, Kaptipada, Dist: - Mayurbhanj** information and necessary action. You are required to submit Annual Enrolment Return (AER) of every Academic Session latest by 31 August.

Regional Director

Memo No. 3702 /Dated 14/3/18
Copy forwarded to the **Registrar, North Odisha University**, Takatpur, Baripada for information and necessary action.

Regional Director

Memo No. 3703 / Dated 14/3/18
Copy submitted to the **Joint Secretary to Govt., Deptt. Of Higher Education, Odisha**, Bhubaneswar for information and necessary action.

Regional Director

Memo No. 3704 / Dated 14/3/18
Copy submitted to the **Director of Higher Education, Orissa**, Bhubaneswar for information and necessary action.

Regional Director

Principal
Kaptipada Degree College
Nuasahi ,Mayurbh

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OFFICE OF THE REGIONAL DIRECTOR OF EDUCATION, BHUBANESWAR

OFFICE ORDER No...3700../RDE. Dated 14/2/18

In exercise of powers conferred under sub-section 6 of section 6 of the O.E. Act 1969, and as per the delegation of powers made by the Committee, constituted in the Govt. Notification No.15641 / HE Dated 01.05.2004, in their meeting held on **20.05.2014**, The **Temporary Recognition** for the session **2017-18** to the under nemed institution.

A. Name of the Institution :- **Kaptipada Degree College,**
B. Name of the Agency :- **G.B of Kaptipada Degree College,**
C. Address :- **Nuasahi,**
D. Name of the Block/ULB :- **Kaptipada,** **Dist- Mayurbhanj**

Stream	**Comp. Subject with seats** / **Opt.Subject with seats**
+3 Arts.	**Increase of seats from 96 to 128 with Odia Optional 64 Seats (5th TR)** **Hons. in Pol. Sc., Hist. & Edn. from 16 to 32 Seats each &** **Hons. in Odia & Philosiophy with 16 Seats each (2nd TR)**
+3 Sc.	**Hons. in Phy. & Zool. with 16 Seats each (4th TR)** **Hons. in Chem., Bot. & Math. with 08 Seats each (2nd TR)**
+3 Comm.	**Hons. in Acct. with 16 Seats (5th TR)** **Hons. in Acct. from 16 to 48 Seats (2nd TR)**

This temporary recognition is subject to fulfillment of conditions as prescribed under section 6 A (1) of the O.E. Act., 1969, the Orissa Higher Secondary Act and Regulations, 1982, the Universities First Statues, 1990 and the Rules framed there under.

Application for extension of temporary recognition for the academic 2018-19 session shall be submitted by the institution in the prescribed format along with requisite fees in the Regional Directorate of Education, Bhubaneswar by end of August,

While applying the applicant shall file an affidavit to the effect (i) that the conditions which they were deficient with have been fulfilled in the meantime, so as to enable them to meet the requirement of the Act and the Rules for grant of recognition for the session 2018-19.
(ii) The Institute if continuing with temporary recognition for a period of seven academic sessions or more by March, 20..... shall have to fulfill the conditions of recognition, laid down in the Orissa Education Act. Within ... failing which no further application for renewal of temporary recognition shall be entertained.

Sd/- Dr. D. Mohanty 12/3/18
Regional Director of Education, Bhubaneswar &
Prescribed Authority

Memo No. 3701 / Dated 14/3/18
Copy forwarded to the Secretary, Governing **Kaptipada Degree College, Nuasahi, Kaptipada, Dist: - Mayurbhanj** information and necessary action. You are required to submit Annual Enrolment Return (AER) of every Academic Session latest by 31 August.

Regional Director

Memo No. 3702 / Dated 14/3/18
Copy forwarded to the **Registrar, North Odisha University, Takatpur, Baripada** for information and necessary action.

Regional Director

Memo No. 3703 / Dated 14/3/18
Copy submitted to the **Joint Secretary to Govt., Deptt. Of Higher Education, Odisha, Bhubaneswar** for information and necessary action.

Regional Director

Memo No. 3704 / Dated 14/3/18
Copy submitted to the **Director of Higher Education, Orissa, Bhubaneswar** for information and necessary action.

Regional Director

Principal
Kaptipada Degree College
Nuasahi ,Mayurbhanj

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119

OFFICE OF THE REGIONAL DIRECTORATE OF EDUCATION, BALASORE

Tele -06782-263839, **E-MAIL:** rdebls2018@gmail.com.

OFFICEORDER No. 3829 / RDE. Dated 1/7/19

In exercise of powers conferred under sub-section 6 of section 6 of the O.E. Act 1969, and as per the delegation of powers made by the Committee, constituted in the Govt. Notification No.15641 / HE, Dated 01.05.2004, in their meeting held on **27.04.2016**, the **Temporary Recognition to Degree Classes** as details mentioned below in favour of the under named institution is hereby granted for the academic session **2018-19** subject to the following conditions.

a. Name of the Institution : Kaptipada Degree College, Nuasahi
b. Name of the agency : GB of Kaptipada Degree College, Nuasahi
c. Address : At/Po- Nuasahi
d. Name of the Block/ULB : Kaptipada Dist.:- Mayurbhanj

Stream	Comp. Subject with seats	Optional subject with seats
+3 Arts	Increase of seats from 96 to 128 with Odia optional 64 seats (6th TR), Hon's in Pol. Science, History & Education from 16 to 32 seats each and Hon's in odia & Philosophy-16 seats each (3rd TR),	
+3 Science	Hon's in Botany, Chemistry & Mathematics -08 seats each (3rd TR) and Hon's in Physics & Zoology -16 seats each (5th TR).	
+3 Commerce	Hon's in Accounting - 16 seats (6th TR) and Hon's in Accounting from 16 to 48 seats (3rd TR).	

This temporary recognition is subject to fulfilment of conditions as prescribed under section 6 A (1) of the
1982, the Universities First Statues, 1990 and the
O.E. Act 1969, the Orissa Higher Secondary Act and Regulations, the opening permission order of the college.
Rules framed there under and the conditions stipulated in shall be submitted by

Application for extension of temporary recognition for the academic session **2019-20** in the office of the Regional
the institution in the prescribed format along with requisite fees in shape of challan
Directorate of Education, Balasore by end of August.

While applying the applicant shall file an affidavit to the effect (i) that the conditions in which they were
deficient have been fulfilled in the meantime, so as to comply the requirement under the Act and relevant Rules for
grant of recognition for the session 2019-20.

(ii) The institution has to fulfill the conditions of recognition in all respect as per O.E. Act & Rules within 7th year of its
permission/Temporary Recognition, failing which no further application for renewal of temporary recognition shall
be entertained and action as deemed fit shall be taken against institution for closure/ derecognition of the
institution.

Sd/-
(Dr. Seetanshu Kumar Samal)
Regional Director of Education
Balasore & Prescribed Authority

Memo No. 3830 / Dated 1/7/19

Copy forwarded to the Secretary, Governing Body/Principal, Kaptipada Degree College, Nuasahi, Dist Mayurbhanj for information and necessary action. You are required to (i) submit Annual Enrolment Return (AER) of every session at least by 31st August, (ii) improve Laboratory infrastructure, get sufficient chemicals & equipments and engage required number of faculties before next inspection.

Regional Director

Memo No. 3831 / Dated 1/7/19

Copy forwarded to the Registrar, North Orissa University, Takatpur, Baripada, Dist- Mayurbhanj information and necessary action.

Regional Director

Memo No. 3832 / Dated 1/7/19

Copy submitted to the Joint Secretary to Government, Department of Higher Education, Odisha, Bhubaneswar for information and necessary action.

Regional Director

Memo No. 3833 / Dated 1/7/19

Copy submitted to the Director of Higher Education, Odisha, Bhubaneswar for information and necessary action.

Regional Director

Principal
Kaptipada Degree College
Nuasahi, Mayurbhanj

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Received
28-6-19

OFFICE OF THE REGIONAL DIRECTORATE OF EDUCATION, BALASORE
Tele -06782-263839, **E-MAIL:** rdebls2018@gmail.com.

OFFICE ORDER No. 2929 / RDE, Dated 22/5/19

In pursuance to Government in the Department of Higher Education, Odisha, Letter No.28772/HE,Dt.01.10.2016 and proposal submitted by the Principal, **Kaptipada Degree College, Nuasahi, Dist- Mayurbhanj** Vide letter No. 37, dated. 28.02.2019 the conversion of pass Subject to Honours Subjects is allowed provisionally from the Session **2019-20** in the following manner in favour of the said College in **Self Financing Mode.**

Stream/Sanctioned Strength	**Number of Hon's Seats allowed.**
+3 Science-64 seats (PCM-32 & CBZ-32)	**Hon's in Botany from 08 to 16 seats.**

The above permission is subject to fulfillment of the following terms and conditions.

i. The State Govt. shall not bear any financial liability at any point of time nor shall the agencies of the G.B. claim grant – in- aid from the State Government.
ii. Fire proof college building having required number of class and administrative rooms as prescribed in the O.E. Rules, 1991 has to be constructed in its own registered land in the name of the college.
iii. Qualified teaching and non-teaching staff shall be appointed as per the provisions of the O.E. Act. 1969.
iv. All conditions prescribed in Section 6 (A) of the O.E. Act. 1969 should be fulfilled to be eligible for recognition.
v. Necessary application for recognition Under Section 6 (I) in the O.E. Act. 1969 shall be made in duplicate in form No. II with requisite fees to the R.D.E., Balasore, every academic session from the date of functioning along with the affidavit attesting that all information furnished are true and correct to the best of the knowledge of the deponent.
vi. An affidavit swearing that institution shall not claim any additional financial aid from the Govt. at any point of time.

21.5.19
(Dr. Seetanshu Kumar Samal)
Regional Director of Education
Balasore & Prescribed Authority

Memo No. 2930 / Dated 22/5/19

Copy forwarded to the Secretary, Governing Body/Principal, **Kaptipada Degree College, Nuasahi, Dist- Mayurbhanj** for information and necessary action. You are required to submit Annual Enrolment Return (AER) of every Academic Session latest by 31st August.

21.5.19
Regional Director

Memo No. 2931 / Dated 22/5/19

Copy forwarded to the **Registrar, North Oriss University, Takhatpur, Baripada, Mayurbhanj** for information and necessary action.

21.5.19
Regional Director

Memo No. 2932 / Dated 22/5/19

Copy submitted to the **Joint Secretary to Government, Department of Higher Education, Odisha, Bhubaneswar** for information and necessary action.

21.5.19
Regional Director

Memo No. 2933 / Dated 22/5/19

Copy submitted to the **Director of Higher Education, Odisha, Bhubaneswar/DEO of this Directorate** for information and necessary action.

21.5.19
Regional Director

Behera
Principal
Kaptipada Degree College
Nuasahi Mayurbhanj

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[illegible]
Behera
23.10.20

OFFICE OF THE REGIONAL DIRECTORATE OF EDUCATION, BALASORE

Tele-06782-[illegible] E-MAIL-[illegible]

[illegible] 2020

OFFICE ORDER No 3730 / [illegible] Dated [illegible]

In exercise of powers conferred under the section 6 of [illegible] and as per the delegation of powers made by the Committee constituted in the [illegible] No. 13641 / HE, Dated 01.05.2004 in their meeting held on 27.04.2016, the Temporary Recognition to Degree Classes as details mentioned below in favour of the under named institution is hereby granted for the academic session 2019-20 subject to the following conditions

a. Name of the institution - Kaptipada Degree College, Nuasahi
b. Name of the agency - GB of Kaptipada Degree College, Nuasahi
c. Address - At/Po- Nuasahi Dist- Mayurbhanj
d. Name of the Block/ULB - Kaptipada

Stream	Comp. Subject with seats	Optional subject with seats
+3 Arts	Increase of seats from 96 to 128 with Odia optional 64 seats (7th TR), Hon's in Pol. Science, History & Education from 16 to 32 seats each and Hon's in odia & Philosophy-16 seats each (4th TR)	
+3 Science	Hon's in Botany, Chemistry & Mathematics -08 seats each (4th TR), Hon's in Physics & Zoology -16 seats each (6th TR) and Hon's in Botany from 08 to 16 seats (1st TR)	
+3 Commerce	Hon's in Accounting from 16 to 48 seats (4th TR).	

This temporary recognition is subject to fulfilment of conditions as prescribed under section 6 A (1) of the O.E. Act, 1969 the Orissa Higher Secondary Act and Regulations, 1982, the Universities First Statues, 1990 and the Rules framed there under and the conditions stipulated in the opening permission order of the college.

Application for extension of temporary recognition for the academic session 2020-21 shall be submitted by the institution in the prescribed format along with requisite fees in shape of challan in the office of the Regional Directorate of Education, Balasore by end of August.

While applying the applicant shall file an affidavit to the effect (i) that the conditions in which they were deficient have been fulfilled in the meantime, so as to comply the requirement under the Act and relevant Rules for grant of recognition for the session 2020-21

(ii) The institution has to fulfill the conditions of recognition in all respect as per O.E. Act & Rules within 7th year of its permission/Temporary Recognition, failing which no further application for renewal of temporar recognition shall be entertained and action as deemed fit shall be taken against institution for closure derecognition of the institution

22-10-20

(Dr. Seetanshu Kumar Samal)
Regional Director of Education
Balasore & Prescribed Authori

Memo No. 3731 / Dated 22/10/2020

Copy forwarded to the Secretary, Governing Body/Principal, Kaptipada Degree College, Nuasahi, Di Mayurbhanj for information and necessary action. You are required to (i) submit Annual Enrolment Return (AER) every Academic Session latest by 31st August (ii) improve infrastructure and Botany & Zoology laboratories (iii) enga required number of teaching staff in science subjects (iv) Procure more number of equipments & consumables a more number of books for new CBCS Syllabus (V) increase physical education facilities before next Inspection.

Regional Dire

Memo No 3732 / Dated 22/10/2020

Copy forwarded to the Registrar, North Orissa University, Takatpur, Baripada, Dist- Mayurbhanj informa and necessary action

Regional Dire

Memo No 3733 / Dated 22/10/2020

Copy submitted to the Joint Secretary to Government/Department of Higher Education, Odisha, Bhubane for information and necessary action

Regional Dire

Memo No. 3734 / Dated 22/10/2020

Copy submitted to the Director, Department of Higher Education, Campus-II, Heads of Department Buil Bhubaneswar for information and necessary action.

Behera
Principal
Kaptipada Degree Colle
Nuasahi Mayurbhanj

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+3 Renewal Recognition

OFFICE OF THE REGIONAL DIRECTORATE OF EDUCATION, BALASORE

Tele -06782-296939, **E-MAIL:** rdebls2018@gmail.com.

OFFICEORDER No. 2138 / RDE, Dated 27.4.2021

In exercise of powers conferred under sub-section 6 of section 6 of the O.E. Act. 1969, and as per the delegation of powers made by the Committee, constituted in the Govt. Notification No.15641 / HE, Dated 01.05.2004, in their meeting held on **27.04.2016**, the **Temparary Recognition to Degree Classes** as details mentioned belowin favour of the under named institution is hereby granted for the academic session **2020-21** subject to the following conditions.

a. Name of the Institution :- **Kaptipada Degree College, Nuasahi**
b. Name of the agency :- **GB of Kaptipada Degree College, Nuasahi**
c. Address :- **At/Po- Nuasahi** **Dist.:- Mayurbhanj**
d. Name of the Block/ULB :- **Kaptipada**

Stream	Comp. Subject with seats	Optional subject with seats
+3 Arts	**Hon's in Pol. Science, History & Education from 16 to 32 seats each and Hon's in odia & Philosophy-16 seats each (5th TR).**	
+3 Science	**Hon's in Botany, Chemistry & Mathematics -08 seats each (5th TR). Hon's in Physics & Zoology -16 seats each (7th TR). Hon's in Botany from 08 to 16 seats (2nd TR).**	
+3 Commerce	**Hon's in Accounting from 16 to 48 seats (5th TR).**	

This temporary recognition is subject to fulfillment of conditions as prescribed under section 6 A (1) of the O.E. Act., 1969, the Orissa Higher Secondary Act and Regulations, 1982, the Universities First Statues, 1990 and the Rules framed there under and the conditions stipulated in the opening permission order of the college.

Application for extension of temporary recognition for the academic session **2021-22** shall be submitted by the institution in the prescribed format along with requisite fees in shape of challan in the office of the Regional Directorate of Education, Balasore by end of August.

While applying the applicant shall file an affidavit to the effect (i) that the conditions in which they were deficient have been fulfilled in the meantime, so as to comply the requirement under the Act and relevant Rules for grant of recognition for the session **2021-22.** (ii) The Institution has to fulfill the conditions of recognition in all respect as per O.E. Act & Rules within 7th year of its permission/Temporary Recognition, failing which no further application for renewal of temporary recognition shall be entertained and action as deemed fit shall be taken against institution for closure/ derecognition of the institution.

26.4.21
(Dr. Seetanshu Kumar Samal)
Regional Director of Education
Balasore & Prescribed Authority

Memo No. 2139 / Dated 27/4/2021

Copy forwarded to the Secretary, Governing Body/Principal, **Kaptipada Degree College, Nuasahi,** Dist-Mayurbhanj for information and necessary action. You are required to (i) submit Annual Enrolment Return (AER) of every Academic Session latest by 31st August (ii) Settle Govt. land under possession (iii) engage required number of teaching faculty in Chemistry, Botany, Zoology to teach honours subject (iv)Laboratory room sizes are small than desired and provide students common rooms with more recreational facilities (iv) Procure more number of equipments & consumables and more number of books for new CBCS Syllabus (V) increase physical education facilities before next inspection.

26.4.21
Regional Director

Memo No. 2140 / Dated 27/4/2021

Copy forwarded to the Registrar, **Maharaja Sriram Chandra Bhanja Deo University, Takatpur, Baripada, Dist-Mayurbhan** Information and necessary action.

26.4.21
Regional Director

Memo No. 2141 / Dated 27/4/2021

Copy submitted to the Joint Secretary to Government, Department of Higher Education, Odisha, Bhubaneswar for information and necessary action.

26.4.21
Regional Director

Memo No. 2142 / Dated 27/4/2021

Copy submitted to the Director, Department of Higher Education, Campus-II, Heads of Department Building, Bhubaneswar for Information and necessary action.

26.4
Regional Director

Dhera
Principal
Kaptipada Degree Colleg
Nuasahi Mayurbhanj

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OFFICE OF THE REGIONAL DIRECTORATE OF EDUCATION, BALASORE
Tele -06782-296939, E-MAIL: rdebls2018@gmail.com.

OFFICEORDER

No 5380 / RDE, Dated 24/12/2021

In exercise of powers conferred under sub-section 6 of section 6 of the O.E. Act. 1969, and as per the delegation of powers made by the Committee, constituted in the Govt. Notification No.15641 / HE, Dated 01.05.2004, in their meeting held on 05.08.2021, the **Temporary Recognition to Degree Classes** as details mentioned below in favour of the under named institution is hereby granted for the academic session **2020-21** subject to the following conditions.

1. Name of the Institution :- **Kaptipada Degree College, Nuasahi**
2. Name of the agency :- **GB of Kaptipada Degree College, Nuasahi**
3. Address : - **At/Po- Nuasahi**
4. Name of the Block/ULB :- **Kaptipada** **Dist.:- Mayurbhanj**

Streamseats	*Comp. Subject with seats*	*Optional subject with seats*
+3 Arts	***Hon's in Education, Pol. Science & History from 16 to 32 seats each,*** ***Hon's in Odia & Philosophy-16 seats each.***	
+3 Science	**Hon's in Physics, Zoology & Botany-16 seats each,** **Hon's in Mathematics & Chemisitry-08 seats each.**	
+3 Commerce	**Hon's in Accounting from 16 to 48 seats**	

This temporary recognition is subject to fulfillment of conditions as prescribed under section 6 A (1) of the O.E. Act., 1969, the Orissa Higher Secondary Act and Regulations, 1982, the Universities First Statues, 1990 and the Rules framed there under and the conditions stipulated in the opening permission order of the college.

Application for extension of temporary recognition for the academic session 2021-22 shall be submitted by the institution in the prescribed format along with requisite fees in shape of challan in the office of the Regional Directorate of Education, Balasore by end of August.

While applying the applicant shall file an affidavit to the effect (i) that the conditions in which they were deficient have been fulfilled in the meantime, so as to comply the requirement under the Act and relevant Rules for grant of recognition for the session 2021-22 (ii) The Institution has to fulfill the conditions of recognition in all respect as per O.E. Act & Rules within 7th year of its permission/Temporary Recognition, failing which no further application for renewal of temporary recognition shall be entertained and action as deemed fit shall be taken against Institution for closure/ derecognition of the institution.

Gharai 23/12/2021
(Dr. Hemanta Kumar Gharai)
Regional Director of Education
Balasore & Prescribed Authority

Memo No. 5381 / RDE. BLS, Dated the 24/12/2021

Copy forwarded to the Secretary, Governing Body, Kaptipada Degree College, Nuasahi, Dist- Mayurbhanj for information and necessary action. You are required to (i) engage required number of teaching staff (ii) Procure more number of equipments & consumables and infrastructure.

Gharai 23/12/2021
Regional Director

Memo No. 5382 / RDE, BLS, Dated the 24/12/2021

Copy forwarded to the Registrar, Maharaja Sriram Chandra Bhanja Deo University, Takatpur, Baripada , Dist- Mayurbhanj for information and necessary action.

Gharai 23/12/2021
Regional Director

Memo No. 5383 / RDE. BLS, Dated the 24/12/2021

Copy submitted to the Additional Secretary to Government, Department of Higher Education, Orissa, Bhubaneswar for information and necessary action.

Gharai 23/12/2021
Regional Director

Memo No 5384 / RDE. BLS, Dated the 24/12/2021

Copy submitted to the Director, Department of Higher Education, Campus-II, Heads of Department Building, Bhubaneswar for information and necessary action.

Gharai 23/12/2021
Regional Director

Behera
Principal
Kaptipada Degree College
Nuasahi Mayurbhanj

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renewal recognition

OFFICE OF THE REGIONAL DIRECTORATE OF EDUCATION, BALASORE

Tele -06782-296939, **E-MAIL:** rdebls2018@gmail.com.

OFFICEORDER No....2138.../ RDE, Dated.......27/4/2021

In exercise of powers conferred under sub-section 6 of section 6 of the O.E. Act. 1969, and as per the delegation of powers made by the Committee, constituted in the Govt. Notification No.15641 / HE, Dated 01.05.2004, in their meeting held on **27.04.2016**, the **Temporary Recognition to Degree Classes** as details mentioned belowin favour of the under named institution is hereby granted for the academic session **2020-21** subject to the following conditions.

a. Name of the Institution :- **Kaptipada Degree College, Nuasahi**
b. Name of the agency :- **GB of Kaptipada Degree College, Nuasahi**
c. Address :- **At/Po- Nuasahi**
d. Name of the Block/ULB :- **Kaptipada** **Dist.:- Mayurbhanj**

Stream	Comp. Subject with seats	Optional subject with seats
+3 Arts	**Hon's in Pol. Science, History & Education from 16 to 32 seats each and** **Hon's in odia & Philosophy-16 seats each (5th TR).**	
+3 Science	**Hon's in Botany, Chemistry & Mathematics -08 seats each (5th TR).** **Hon's in Physics & Zoology -16 seats each (7th TR).** **Hon's in Botany from 08 to 16 seats (2nd TR).**	
+3 Commerce	**Hon's in Accounting from 16 to 48 seats (5th TR).**	

This temporary recognition is subject to fulfillment of conditions as prescribed under section 6 A (1) of the O.E. Act., 1969, the Orissa Higher Secondary Act and Regulations, 1982, the Universities First Statues, 1990 and the Rules framed there under and the conditions stipulated in the opening permission order of the college.

Application for extension of temporary recognition for the academic session **2021-22** shall be submitted by the institution in the prescribed format along with requisite fees in shape of challan in the office of the Regional Directorate of Education, Balasore by **end of August.**

While applying the applicant shall file an affidavit to the effect (i) that the conditions in which they were deficient have been fulfilled in the meantime, so as to comply the requirement under the Act and relevant Rules for grant of recognition for the session **2021-22.**
(ii) The Institution has to fulfill the conditions of recognition in all respect as per O.E. Act & Rules within 7th year of its permission/Temporary Recognition, failing which no further application for renewal of temporary recognition shall be entertained and action as deemed fit shall be taken against institution for closure/ derecognition of the institution.

26.4.21
(Dr. Seetanshu Kumar Samal)
Regional Director of Education
Balasore & Prescribed Authority

Memo No. 2139 / Dated 27/4/2021
Copy forwarded to the Secretary, Governing Body/Principal, **Kaptipada Degree College, Nuasahi,** Dist-Mayurbhanj for information and necessary action. You are required to (i) submit Annual Enrolment Return (AER) of every Academic Session latest by 31st August (ii) Settle Govt. land under possession (iii) engage required number of teaching faculty in Chemistry, Botany, Zoology to teach honours subject (iv)Laboratory room sizes are small than desired and provide students common rooms with more recreational facilities (iv) Procure more number of equipments & consumables and more number of books for new CBCS Syllabus (v) increase physical education facilities before next inspection.

26.4.21
Regional Director

Memo No. 2140 / Dated 27/4/2021
Copy forwarded to the **Registrar, Maharaja Sriram Chandra Bhanja Deo University, Takatpur, Baripada, Dist-Mayurbhan** information and necessary action.

26.4.21
Regional Director

Memo No. 2141 / Dated 27/4/2021
Copy submitted to the Joint Secretary to Government, Department of Higher Education, Odisha, Bhubaneswar for information and necessary action.

26.4.21
Regional Director

Memo No. 2142 / Dated 27/4/2021
Copy submitted to the Director, Department of Higher Education, Campus-II, Heads of Department Building, Bhubaneswar for information and necessary action.

26.4.21
Regional Director

Behera
Principal
Kaptipada Degree College
Nuasahi Mayurbhanj

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OFFICE OF THE REGIONAL DIRECTORATE OF EDUCATION, BALASORE

Tele -06782-296939, **E-MAIL:** rdebls2018@gmail.com.

OFFICE ORDER

No. 5375 / RDE.BLS, Dated the 24/12/2021

In exercise of power conferred under sub-section 6 of section 6 of the O.E. Act. 1969, the Committee constituted in the Govt. Notification No.15641 / HE Dated 01.05.2004 in the H.P.C. held on 05.08.2021 after careful consideration has been pleased to grant ***Permanent Recognition*** *from the academic session* ***Mentioned below to Degree Classes*** *to the under named institution.*

1. Name of the Institution :- **Kaptipada Degree College, Nuasahi**
2. Name of the agency :- **GB of Kaptipada Degree College, Nuasahi**
3. Address :- **At/Po- Nuasahi**
4. Name of the Block/ULB :- **Kaptipada** **Dist.:- Mayurbhanj**

Stream seats	*Comp. Subject with seats*	*Optional subject with seats*
+3 Arts	***Increase of seats from 96 to 128 seats (from the session 2020-21).***	
+3 Commerce	***Hon's in Accountancy-16 seats (from the session 2019-20).***	

23/12/2021

(Dr. Hemanta Kumar Gharai)
Regional Director of Education
Balasore & Prescribed Authority

Memo No. 5376 / RDE. BLS, Dated the 24/12/2021

Copy forwarded to the Secretary, Governing Body, Kaptipada Degree College, Nuasahi, Dist- Mayurbhanj for information and necessary action.

23/12/2021
Regional Director

Memo No. 5377 / RDE. BLS, Dated the 24/12/2021

Copy forwarded to the Registrar, Maharaja Sriram Chandra Bhanja Deo University, Takatpur, Baripada, Dist- Mayurbhanj for information and necessary action.

23/12/2021
Regional Director

Memo No. 5378 / RDE. BLS, Dated the 24/12/2021

Copy submitted to the Additional Secretary to Government, Department of Higher Education, Orissa, Bhubaneswar for information and necessary action.

23/12/2021
Regional Director

Memo No 5379 / RDE. BLS, Dated the 24/12/2021

Copy submitted to the Director, Department of Higher Education, Campus-II, Heads of Department Building, Bhubaneswar for information and necessary action.

23/12/2021
Regional Director

[illegible]

Principal
Kaptipada Degree College
Nuasahi Mayurbhanj

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OFFICE OF THE REGIONAL DIRECTOR OF EDUCATION, RAJABAGICHHA, BALASORE

Tele -06782-296939, **E-MAIL:** rdebls2018@gmail.com.

OFFICE ORDER

No.............1243........ / RDE.BLS / Dated..............19/4/2023

In exercise of power conferred under sub-section 6 of section 6 of the O.E. Act. 1969, the Committee constituted in the Govt. Notification No.15641 / HE Dated 01.05.2004 in the H.P.C. held on 09.11.2022 after careful consideration has been pleased to grant ***Permanent Recognition*** *from the academic session* ***2021-22*** *to* ***Degree Classes*** *to the under named institution.*

a. Name of the Institution : - **Kaptipada Degree College, Nuasahi**
b. Name of the agency :- **GB of Kaptipada Degree College, Nuasahi**
c. Address : - **At/Po- Kaptipada**
d. Name of the Block/ULB :- **Kaptipada** **Dist.:- Mayurbhanj**

Stream	Comp. Subject with seats	Optional subject with seats
+3 Arts-	**Hon's in Education, History & Pol. Science from 16 to 32 seats each and** **Hon's in odia & Philosophy-16 seats each.**	
+3 Science-	**Hon's in Physics & Zoology -16 seats each,** **Hon's in Chemistry, Mathematics & Botany -08 seats each,** **Hon's in Botany from 08 to 16 seats.**	
+3 Commerce-	**Hon's in Accounting from 16 to 48 seats.**	

Sd/-Dr. Hemanta Kumar Gharai
Regional Director of Education
Balasore & Prescribed Authority

Memo No 1244 / RDE. BLS/Dated. 19/4/2023

Copy forwarded to the Secretary, Governing Body, Kaptipada Degree College, Nuasahi, Dist-Mayurbhanj for information and necessary action.

19/04/2023
Regional Director

Memo No / RDE. BLS/Dated.

Copy submitted to the Registrar, Maharaja Sriram Chandra Bhanja Deo University, Takatpur, Baripada, Dist- Mayurbhanj for information and necessary action.

Regional Director

Memo No / RDE. BLS/Dated.

Copy submitted to the Additional Secretary to Government, Department of Higher Education, Odisha, Bhubaneswar for information and necessary action.

Regional Director

Memo No / RDE. BLS/Dated.

Copy submitted to the Director, Department of Higher Education, Campus-II, Heads of Department Building, Bhubaneswar for information and necessary action.

Regional Director

Principal
Kaptipada Degree Colle
Nuasahi Mayurbhanj

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NORTH ORISSA UNIVERSITY

SRIRAM CHANDRA VIHAR, TAKATPUR, BARIPADA-757003

N.O.U./Affiliation/ (30/2003-04) No ______________ /Date ______________

In pursuance of Statute-182 of Orissa Universities first Statute-1990, the Vice-Chancellor in exercise of powers conferred on him and the Syndicate has been pleased to grant fresh provisional affiliation / ~~renewal of temporary affiliation~~ to the under mentioned College for the session 2003-04 as detailed below.

1. Affiliation Particulars :

Name of the College	Stream	Subjects to Affiliation and seats			
		F. C.	Appl./ Ancillary	Core	
				Pass	Honours
Kaptipada College, Nuasahi, Mayurbhanj	+3 Arts =96 seats	English=96 seats MIL(O)=96 seats		History, Pol.Sc. Education and Philosophy =96 seats each.	

2. Conditions to be fulfilled by the College.

a) Balance amount of N/R academic fee of Rs.15,000/- should be deposite at the time of submission of proposal for grant of Temp. affiliatio

b) for the session 2004-05.

c) Library books worth Rs.15,000/- should be purchased during the session 2004-05.

d)

By order of Vice-Chancellor

Registrar

Memo No. 3029 (7) /NOU

Date 02.09.04

By Registered Post

Copy to :- (1) The Principal Kaptipada College, Nuasahi, Mayurbhanj. for favour of infrmation and necessary action.

(2) The Joint Secretary to Govt , Department of Higher Education, Govt. of Orissa, Bhubaneswar for favour of information.

(3) The Director, Higher Education, Orissa, Bhubaneswar for favour of information.

(4) The Secretary, U. G. C., Bahadur Shah Zafar Marg, New Delhi-110002 for favour of information.

(5) The Controller of Examinations, North Orissa University, Takatpur, Baripada for information and necessary action.

(6) The P. A to Vice-Chancellor / Guard File.

Registrar

NORTH ORISSA UNIVERSITY

SRIRAM CHANDRA VIHAR, TAKATPUR, BARIPADA-757003

N.O.U./Affiliation/ (7/2004-05) No ____________ /Date ____________

In pursuance of Statute-182 of Orissa Universities first Statute-1990, the Vice-Chancellor in exercise of powers conferred on him and the Syndicate has been pleased to grant ~~fresh provisional affiliation~~ / renewal of temporary affiliation to the under mentioned College for the session 2004-05 as detailed below.

1. Affiliation Particulars :

Name of the College	Stream	Subjects to Affiliation and seats		
		F. C.	Appl./ Ancillary	Core Pass / Honours
Kaptipada College, Nuasahi, Dist. Mayurbhanj	+3 Arts	-	-	Compulsory subject English, MIL(O) Optional subject History, Pol.Sc., Education, and Philosophy=96 seats each.

2. Conditions to be fulfilled by the College.

a) Proposal for grant Temporary affiliation for the session 2005-06 should be applied at an early date and to deposit the affiliation
b) fee, recognition order from Govt.
c)
d)

By order of Vice-Chancellor

Registrar

Memo No. 3356(7) /NOU

Date 3.5.05 /

By Registered Post

Copy to :- (1)

The Principal, Kaptipada College, Nuasahi, Dist. Mayurbhanj.
for favour of infrmation and necessary action.

(2) The Joint Secretary to Govt , Department of Higher Education, Govt. of Orissa, Bhubaneswar for favour of information.

(3) The Director, Higher Education, Orissa, Bhubaneswar for favour of information.

(4) The Secretary, U. G. C., Bahadur Shah Zafar Marg, New Delhi-110002 for favour of information.

(5) The Controller of Examinations, North Orissa University, Takatpur, Baripada for information and necessary action.

(6) The P. A to Vice-Chancellor / Guard File.

8/8/05

Registrar

1/8

NORTH ORISSA UNIVERSITY

SRIRAM CHANDRA VIHAR, TAKATPUR, BARIPADA-757003

N.O.U./Affiliation/ (21/2005-06) No ____________ /Date ____________

In pursuance of Statute-182 of Orissa Universities first Statute-1990, the Vice-Chancellor in exercise of powers conferred on him and the Syndicate has been pleased to grant ~~XXXX provisional affiliation~~/ renewal of temporary affiliation to the under mentioned College for the session 2005-06& 2006-07 as detailed below.

1. Affiliation Particulars :

Name of the College	Stream	Subjects to Affiliation and seats		
		F. C.	Appl./ Ancillary	Core Pass / ~~Honours~~
Kaptipada College. Nuasahi.	+3 Arts			Comp-English,M.I.L(O) =96seats. Opt-History,Pol.Science, Education& Philosophy =96 Seats each

2. Conditions to be fulfilled by the College.

a) To enrich the Library by procuring books & journals worth

b) of Rs20,000/- (Rupees Twenty Thousand)

c)

d)

By order of Vice-Chancellor

Registrar

Memo No. 3525(7) /NOU

Date 17.11.07. /

By Registered Post

Copy to :- (1) The Principal Kaptipada College,Nuasahi for favour of infrmation and necessary action.

(2) The Joint Secretary to Govt , Department of Higher Education, Govt. of Orissa, Bhubaneswar for favour of information.

(3) The Director, Higher Education, Orissa, Bhubaneswar for favour of information.

(4) The Secretary, U. G. C., Bahadur Shah Zafar Marg, New Delhi-110002 for favour of information.

(5) The Controller of Examinations, North Orissa University, Takatpur, Baripada for information and necessary action.

(6) The P. A to Vice-Chancellor / Guard File.

Registrar

NORTH ORISSA UNIVERSITY

SRIRAM CHANDRA VIHAR, TAKATPUR, BARIPADA-757003

N.O.U./Affiliation/ (04/2007-08) No 3639 /Date 16.11.09

In pursuance of Statute-182 of Orissa Universities first Statute-1990, the Vice-Chancellor in exercise of powers conferred on him and the Syndicate has been pleased to grant ~~provisional affiliation / renewal of temporary~~ PERMANENT affiliation to the under mentioned College ~~for~~ from the session 2007-08 as detailed below.

1. Affiliation Particulars :

Name of the College	Stream	Subjects to Affiliation and seats		
		F. C.	Appl./ Ancillary	Core Pass / Honours
Kaptipada College, Nuasahi, Mayurbhanj.	+3 Arts=96 Seats			Comp-English,M.I.L(O) = 96 Seats each. Opt.-History, Pol.Sc, Education,& Philosophy = 96 Seats each.

2. Conditions to be fulfilled by the College.

a) XX

b)

XX

c)

d)

XX

By order of Vice-Chancellor

Registrar

Memo No. 3640(7) /NOU Date 16.11.09 /

Copy to :- (1) By Registered Post

The Principal, Kaptipada College, Nuasahi, Mayurbhanj for favour of infrmation and necessary action.

(2) The Joint Secretary to Govt , Department of Higher Education, Govt. of Orissa, Bhubaneswar for favour of information.

(3) The Director, Higher Education, Orissa, Bhubaneswar for favour of information.

(4) The Secretary, U. G. C., Bahadur Shah Zafar Marg, New Delhi-110002 for favour of information.

(5) The Controller of Examinations, North Orissa University, Takatpur, Baripada for information and necessary action.

(6) The P. A to Vice-Chancellor / Guard File.

Registrar 16/11/09

NORTH ORISSA UNIVERSITY

SRIRAM CHANDRA VIHAR, TAKATPUR, BARIPADA -757003

NOU/Affiliation/ (04 / 2010-11) No. **2375** Date : **22.06.2011**

In pursuance of Statute-182 of Orissa Universities first Statute 1990, the Vice-Chancellor in exercise of powers conferred on him and the Syndicate has been pleased to grant **temporary affiliation** to the under mentioned College for the academic session **2010-11** as detailed below.

1. Affiliation Particulars :

Name of College	Stream	Subjects to Affiliation and seats
Kaptipada College, Nuasahi Mayurbhanj	**+3 Arts** +3 **Commerce**	**Honours in Education, History & Pol. Science with 16 seats each.** **+3 Commerce - 64 seats**

2. Conditions to be fulfilled by the College

(a) The college should buy library books worth Rs. 25,000/-.
(b)
(c)
(d)

By order of Vice-Chancellor

Registrar
North Orissa University

Memo No. **2376(07)** /NOU Date : **22.06.2011**

Copy to :-

1. The Principal, **Kaptipada College, Nuasahi, Mayurbhanj** for favour of information and necessary action.
2. The Joint Secretary to Govt. Department of Higher Education, Govt. of Orissa, Bhubaneswar for favour of information.
3. The Director, Higher Education, Orissa, Bhubaneswar for favour of information.
4. The Secretary, UGC Bahadur Shah Zafar Marg, New Delhi – 110002 for favour of information.
5. The Controller of Examinations, North Orissa University, Takatpur, Baripada for information and necessary action.
6. The PA to Vice- Chancellor / Guard File.

22/6/11

Registrar
North Orissa University

Registrar 16/11/09

NORTH ORISSA UNIVERSITY
SRIRAM CHANDRA VIHAR, TAKATPUR, BARIPADA -757003

NOU/Affiliation/ (24 / 2010-11) No. Date :

In pursuance of Statute-182 of Orissa Universities first Statute 1990, the Vice-Chancellor in exercise of powers conferred on him and the Syndicate has been pleased to grant **temporary affiliation** to the under mentioned College for the academic session **2010-11** as detailed below.

1. Affiliation Particulars :

Name of College	Stream	Subjects to Affiliation and seats
Kaptipada College, Nuasahi Mayurbhanj	**+3 Science 64 seats**	**Comp. English, MIL(O)-64 seats Opt. P.C.M. 32 & C.B.Z. 32 seats each**

2. Conditions to be fulfilled by the College

(a) Separate laboratories for +3 Science in Physics, Chemistry, Botany & Zoology to be constructed as +3 practical classes are being conducted in +2 laboratories.

(b) Required number of +3 Science books for Physics, Chemistry, Botany & Zoology need to be procured amounting to Rs. 40,000/- (approx.) as number of books presently available are not adequate.

By order of Vice-Chancellor

Sd/-
Registrar
North Orissa University
Date : 10-1-12

Memo No. 129 (07) /NOU

Copy to :-
1. The Principal, **Kaptipada College, Nuasahi, Mayurbhanj** for favour of information and necessary action.
2. The Joint Secretary to Govt. Department of Higher Education, Govt. of Orissa, Bhubaneswar for favour of information.
3. The Director, Higher Education, Orissa, Bhubaneswar for favour of information.
4. The Secretary, UGC Bahadur Shah Zafar Marg, New Delhi – 110002 for favour of information.
5. The Controller of Examinations, North Orissa University, Takatpur, Baripada for information and necessary action.
6. The PA to Vice- Chancellor / Guard File.

10.1.12
Registrar
North Orissa University

NORTH ORISSA UNIVERSITY
SRIRAM CHANDRA VIHAR, TAKATPUR, BARIPADA -757003

NOU/Affiliation/ (25 / 2011-12) No. Date :

In pursuance of Statute-182 of Orissa Universities first Statute 1990, the Vice-Chancellor in exercise of powers conferred on him and the Syndicate has been pleased to grant **temporary affiliation** to the under mentioned College for the academic session **2011-12** as detailed below.

1. Affiliation Particulars :

Name of College	Stream	Subjects to Affiliation and seats
Kaptipada College, Nuasahi Mayurbhanj	**+3 Arts** **+3 Science-64 seats** **+3 Commerce-64 seats**	**Honours in History,Pol.Science & Education with 16 seats each.** **Comp. English, MIL(O)-64 seats each.** **Opt. P.C.M. 32 & C.B.Z. 32 seats each.** **Compulsory and Optional as per University Syllabus.**

2. Conditions to be fulfilled by the College

-------------------NOT APPLICABLE-----------------------

By order of Vice-Chancellor

Registrar
North Orissa University
Date : 16.10.12

Memo No. 4645(07) /NOU

Copy to :-
1. The Principal, **Kaptipada College, Nuasahi, Mayurbhanj** for favour of information and necessary action.
2. The Joint Secretary to Govt. Department of Higher Education, Govt. of Orissa, Bhubaneswar for favour of information.
3. The Director, Higher Education, Orissa, Bhubaneswar for favour of information.
4. The Secretary, UGC Bahadur Shah Zafar Marg, New Delhi – 110002 for favour of information.
5. The Controller of Examinations, North Orissa University, Takatpur, Baripada for information and necessary action.
6. The PA to Vice- Chancellor / Guard File.

16/10/12
Registrar
North Orissa University

NORTH ORISSA UNIVERSITY
SRIRAM CHANDRA VIHAR, TAKATPUR, BARIPADA -757003

NOU/Affiliation/ (26 / 2012-13) No. Date :

In pursuance of Statute-182 of Orissa Universities first Statute 1990, the Vice-Chancellor in exercise of powers conferred on him and the Syndicate has been pleased to grant **temporary affiliation** to the under mentioned College for the academic session **2012-13** as detailed below.

1. Affiliation Particulars :

Name of College	Stream	Subjects to Affiliation and seats
Kaptipada College, Nuasahi Mayurbhanj	**+3 Arts**	**Honours in History,Pol.Science & Education with 16 seats each.**
	+3 Science-64 seats	**Comp. English, MIL(O)-64 seats each.** **Opt. P.C.M. 32 & C.B.Z. 32 seats each.**
	+3 Commerce-64 seats	**Compulsory and Optional as per University Syllabus.**

2. Conditions to be fulfilled by the College

(a) Purchase more books for the Library.
(b) College must provide basic minimum laboratory equipments to the students.

By order of Vice-Chancellor

Registrar
North Orissa University
Date : 28/12/2013

Memo No. 5586 (07) /NOU

Copy to :-

1. The Principal, **Kaptipada College, Nuasahi, Mayurbhanj** for favour of information and necessary action.
2. The Joint Secretary to Govt. Department of Higher Education, Govt. of Orissa, Bhubaneswar for favour of information.
3. The Director, Higher Education, Orissa, Bhubaneswar for favour of information.
4. The Secretary, UGC Bahadur Shah Zafar Marg, New Delhi – 110002 for favour of information.
5. The Controller of Examinations, North Orissa University, Takatpur, Baripada for information and necessary action.
6. The PA to Vice- Chancellor / Guard File.

28/12/13
Registrar
North Orissa University

NORTH ORISSA UNIVERSITY
SRIRAM CHANDRA VIHAR, TAKATPUR, BARIPADA -757003

NOU/Affiliation/ (13/ 2013-14) /2015/No.

Date :

In pursuance of Statute-182 of Orissa Universities first Statute 1990, the Vice-Chancellor in exercise of powers conferred on him and the Syndicate has been pleased to grant **temporary affiliation** to the under mentioned College for the academic session **2013-14** as detailed below.

1. Affiliation Particulars :

Name of College	Stream	Subjects to Affiliation and seats
Kaptipada Degree College, Nuasahi, Mayurbhanj	**+3 Arts**	**Honours in History, Pol. Science & Education with 16 seats each and increase of seats from 96 to 128 seats**
	+3 Science – 64 seats	**Compulsory - English, MIL(O) – 64 seats each** **Optional - PCM-32 & CBZ-32 seats.**
	+3 commerce 64 seats	**Compulsory & optional subjects as per University Syllabus and Hons. in Accountancy-16 seats.**

2. Conditions to be fulfilled by the College

(a) Purchase of books worth of Rs. 4 lakhs (especially for Hons. teaching)

(b) Laboratory facilities are to be improved for conduct of practical at +3 level with audio visual teaching aids.

By order of Vice-Chancellor

Registrar
North Orissa University
Date : 21/3/15

Memo No. 1178(7)/NOU
Copy to :-

1. The Principal, **Kaptipada Degree College, Nuasahi, Mayurbhanj** for favour of information and necessary action.
2. The Joint Secretary to Govt. Department of Higher Education, Govt. of Orissa, Bhubaneswar for favour of information.
3. The Director, Higher Education, Orissa, Bhubaneswar for favour of information.
4. The Secretary, UGC Bahadur Shah Zafar Marg, New Delhi – 110002 for favour of information.
5. The Controller of Examinations, North Orissa University, Takatpur, Baripada for information and necessary action.
6. The PA to Vice- Chancellor / Guard File.

L.N. Das
20.3.15
Registrar
North Orissa University

NORTH ORISSA UNIVERSITY
SRIRAM CHANDRA VIHAR, TAKATPUR, BARIPADA -757003

NOU/Affiliation/ (21/ 2014-15) /2016/No. Date :

In pursuance of Statute-182 of Orissa Universities first Statute 1990, the Vice-Chancellor in exercise of powers conferred on him and the Syndicate has been pleased to grant **temporary affiliation** to the under mentioned College for the academic session **2014-15** as detailed below.

1. Affiliation Particulars :

Name of College	Stream	Subjects to Affiliation and seats
Kaptipada Degree College, Nuasahi, Mayurbhanj	**+3 Arts**	**Increase of seats from 96 to 128 with Odia- 64 seats and Hons. in History, Pol. Science & Education with 16 seats each.**
	+3 Science – 64 seats	**Optional – PCM & CBZ-32 seats each & Hons. in Physics & Zoology-16 seats each.**
	+3 commerce-64 seats	**+3 Commerce - 64 seats with Hons. in Accountancy-16 seats.**

2. Conditions to be fulfilled by the College

____________NOT APPLICABLE____________

By order of Vice-Chancellor

Registrar
North Orissa University
Date : 21/3/2016

Memo No. 1155 (7) /NOU
Copy to :-

1. The Principal, **Kaptipada Degree College, Nuasahi, Mayurbhanj** for favour of information and necessary action.
2. The Joint Secretary to Govt. Department of Higher Education, Govt. of Odisha, Bhubaneswar for favour of information.
3. The Director, Higher Education, Odisha, Bhubaneswar for favour of information.
4. The Secretary, UGC Bahadur Shah Zafar Marg, New Delhi – 110002 for favour of information.
5. The Controller of Examinations, North Orissa University, Takatpur, Baripada for information and necessary action.
6. The P.S. to Vice- Chancellor / Guard File.

Registrar
North Orissa University

NORTH ORISSA UNIVERSITY
SRIRAM CHANDRA VIHAR, TAKATPUR, BARIPADA -757003

No- NOU/(Aff. 27 / 2015-16)/________ Date :

In pursuance of Statute-182 of Orissa Universities first Statute 1990, the Vice-Chancellor in exercise of powers conferred on him and the Syndicate has been pleased to grant **temporary affiliation** to the under mentioned College for the academic session **2015-16** as detailed below.

1. Affiliation Particulars :

Name of College	Stream	Subjects to Affiliation and seats
Kaptipada Degree College, Nuasahi, Mayurbhanj	**+3 Arts**	**Increase of seats from 96 to 128 with Odia- 64 seats.**
	+3 Science	**Hons. in Physics & Zoology-16 seats each.**
	+3 Commerce	**Hons. in Accountancy—16 seats.**

2. Conditions to be fulfilled by the College

Annual allotment for purchase of books for library should be increased.

By order of Vice-Chancellor

Registrar
North Orissa University
Date : 07/04/18

Memo No. 1513(E)/NOU
Copy to :-

1. The Principal, **Kaptipada Degree College, Nuasahi, Mayurbhanj** for favour of information and necessary action.
2. The Joint Secretary to Govt. Department of Higher Education, Govt. of Odisha, Bhubaneswar for favour of information.
3. The Director, Higher Education, Odisha, Bhubaneswar for favour of information.
4. The Secretary, UGC Bahadur Shah Zafar Marg, New Delhi – 110002 for favour of information.
5. The Controller of Examinations, North Orissa University, Takatpur, Baripada for information and necessary action.
6. The P.S. to Vice- Chancellor / Guard File.

7/4/18
Registrar
North Orissa University

NORTH ORISSA UNIVERSITY
SRIRAM CHANDRA VIHAR, TAKATPUR, BARIPADA -757003

No. NOU/(Aff. 27 / 2015-16)/________ Date :

In pursuance of Statute-182 of Orissa Universities first Statute 1990, the Vice-Chancellor in exercise of powers conferred on him and the Syndicate has been pleased to grant **permanent affiliation** to the under mentioned College from the academic session **2015-16** as detailed below.

1. Affiliation Particulars :

Name of College	Stream	Subjects to Affiliation and seats
Kaptipada Degree College, Nuasahi, Mayurbhanj	**+3 Arts**	**Hons. in History, Pol. Sc. & Education-16 seats each.**
	+3 Science – 64 seats	**Comp. Eng., MIL (O)-64 seats each, Optional-PCM & CBZ-32 seats each.**
	+3 Commerce – 64 seats	**Comp. Eng., MIL (O)-64 and other compulsory & optional subjects permitted as per University syllabus.**

2. Conditions to be fulfilled by the College

____________NOT APPLICABLE____________

By order of Vice-Chancellor

Registrar
North Orissa University
Date : 07/04/18

Memo No. 1513(7)/NOU
Copy to :-

1. The Principal, **Kaptipada Degree College, Nuasahi, Mayurbhanj** for favour of information and necessary action.
2. The Joint Secretary to Govt. Department of Higher Education, Govt. of Odisha, Bhubaneswar for favour of information.
3. The Director, Higher Education, Odisha, Bhubaneswar for favour of information.
4. The Secretary, UGC Bahadur Shah Zafar Marg, New Delhi – 110002 for favour of information.
5. The Controller of Examinations, North Orissa University, Takatpur, Baripada for information and necessary action.
6. The P.S. to Vice- Chancellor / Guard File.

4/18
Registrar
North Orissa University

NORTH ORISSA UNIVERSITY
SRIRAM CHANDRA VIHAR, TAKATPUR, BARIPADA -757003

No. NOU/(Aff. 39 / 2016-17)/ 1516

Date : 17-06-2020

In pursuance of Statute-182 of Orissa Universities first Statute 1990, the Vice-Chancellor in exercise of powers conferred on him and the Syndicate has been pleased to grant **temporary affiliation** to the under mentioned College for the academic session **2016-17** as detailed below.

1. Affiliation Particulars :

Name of College	Stream	Subjects to Affiliation and seats
Kaptipada Degree College, Nuasahi, Mayurbhanj	+3 Arts	**Increase of seats from 96 to 128 with Odia optional- 64 seats. Increase on Hons. Seats in Pol. Science, History and Education from 16 to 32 seats each, Hons. in Odia and Philosophy-16 seats each.**
	+3 Science	**Hons. in Physics & Zoology-16 seats each and Hons. in Chemistry, Botany & Math-08 seats each.**
	+3 Commerce	**Increase of Hons. in Accountancy from 16 to 48 seats**

2. Conditions to be fulfilled by the College before submitting the application for the next affiliation.

i) A separate Library for +3 Wings be set up before the next visit of LEC. The college should take steps to procure books for all subjects as per CBCS Syllabus & reading room be established for Library purposes.
ii) Adequate nos. of staff (minimum of 2(two)) teachers for each department be required.
iii) Conducting regular practical classes in each Science subject be ensured.
iv) Adequate furniture be provided to the ladies common Room with provision of basic amenities.

3. The affiliation status should be uploaded in the **AISHE** portal.

By order of Vice-Chancellor

Registrar
North Orissa University
Date : 17-06-2020

(8)
Memo No. 1517/NOU
Copy to :-

1. The Principal, **Kaptipada Degree College, Nuasahi, Mayurbhanj** for favour of information and necessary action.
2. The Joint Secretary to Govt. ,Department of Higher Education, Govt. of Odisha, Bhubaneswar for favour of information.
3. The Director, Higher Education, Odisha, Bhubaneswar for favour of information.
4. The Secretary, UGC Bahadur Shah Zafar Marg, New Delhi – 110002 for favour of information.
5. Member Secretary, Rehabilitation Council of India(A Statutory Body under the Ministry of Social Justice and Empowerment)B-22, Qutub Institutional Area, New Delhi-110016 for information and necessary action.
6. Deputy Secretary to Government, Deptt. of Women and Child Development, Govt of Odisha, Bhubaneswar for information and necessary action.
7. The Controller of Examinations, North Orissa University, Takatpur, Baripada for information and necessary action.
8. The P.S to Vice- Chancellor / Guard File.

Registrar
North Orissa University

MAHARAJA SRIRAM CHANDRA BHANJA DEO UNIVERSITY
SRIRAM CHANDRA VIHAR, TAKATPUR, BARIPADA, MAYURBHANJ, ODISHA

No. MSCBU/(Aff-57/2017-18 to 2020-21)/2023 1096 Date: 21-02-2023

In pursuance of Statute-182 of Orissa Universities first Statute 1990, the Vice-Chancellor in exercise of powers conferred on him and the Syndicate has been pleased to grant **temporary affiliation** to the under mentioned College for the academic session **2017-18,2018-19,2019-20 & 2020-21** as detailed below.

1.Affiliation Particulars:

Name of College	Stream	Subjects to Affiliation and seats
Kaptipada Degree College, Nuasahi, Mayurbhanj	+3 Arts	Increase of seats from 96 to 128 with Odia optional 64 seats, Hon's in Pol.Science, History & Education from 16 to 32 seats each and Hon's in odia & Philosophy with 16 seats each for 2017-18.
	+3 science	Hon's in Physics and zoology with 16 seats each Hon's in Chem.,Bot. & Math.with 08 seats each for 2017-18.
	+3 Commerce	Hon's in Acct.with 16 seats Hon's in Acct. from 16 to 48 seats for 2017-18.
	+3 Arts	Increase of seats from 96 to 128 with Odia optional 64 seats, Hon's in Pol.Science, History & Education from 16 to 32 seats each and Hon's in odia & Philosophy-16 seats each for 2018-19.
	+3 science	Hon's in Botany, Chemistry & Mathematics-08 seats each, Hon's in Physics & Zoology-16 seats each for 2018-19.
	+3 Commerce	Hon's in Accounting - 16 seats, and Hon's in Accounting from 16 to 48 seats for 2018-19.
	+3 Arts	Increase of seats from 96 to 128 with Odia optional 64 seats, Hon's in Pol.Science, History & Education from 16 to 32 seats each and Hon's in odia & Philosophy-16 seats each for 2019-20.
	+3 science	Hon's in Botany, Chemistry & Mathematics-08 seats each, Hon's in Physics & Zoology-16 seats each, Hon's in Botany from 08 to 16 seats for 2019-20.
	+3 Commerce	Hon's in Accounting from 16 to 48 seats for 2019-20.

cont...

	+3 Arts	Hon's in Pol.Science, History & Education from 16 to 32 seats each and Hon's in odia & Philosophy-16 seats each for 2020-21.
	+3 science	Hon's in Botany, Chemistry & Mathematics-08 seats each, Hon's in Physics & Zoology-16 seats each, Hon's in Botany from 08 to 16 seats for 2020-21.
	+3 Commerce	Hon's in Accounting from 16 to 48 seats for 2020-21.

2. The affiliation status should be uploaded in the AISHE portal.

By order of Vice-Chancellor

Registrar
MSCB University
Date: 21-02-2023

Memo No. 1097

The Principal, Kaptipada Degree College, Nuasahi, Mayurbhanj /The Joint Secretary to Govt. Department of Higher Education, Govt. of Orissa, Bhubaneswar /The Regional Director of Education, Balasore / The Controller of Examination, Maharaja Sriram Chandra Bhanjadeo University, Takatpur /Registration Desk, Examination Section/Co-ordinator AISHE,MSCB University/The P.S. to Vice-chancellor/Affl.Section/Guardfile for information and necessary action.

Registrar
MSCB University

12 (XXXVi)

OFFICE OF THE PRINCIPAL,
KAPTIPADA DEGREE COLLEGE, NUASAHI, MAYURBHANJ

ACADEMIC CALENDAR-2022-23

Sl.No.	Subject	Timeline
1	Reopening of College After Summer Vacation	20/06/2022
2	1st Year Admission	As per Notification of SAMS Odisha
3	Commencement of Class/ Induction or Welcome	
	+3 3rd Year	After Re-opening of Summer Vacation
	+3 2nd Year	After Re-opening of Summer Vacation
	+3 1st Year	As per D.H.E notification
4	Re-Admission	First Week of July-2022
5	1st Departmental Seminar	With in December 2022
6	Puja Vacation	01/10/2022 to 08/10/2022
7	Parent Teacher Meet	
	+3 1st Year	3rd Week of November-2022
	+3 2nd Year	3rd Week of November-2022
	+3 3rd Year	3rd Week of November-2022
8	2nd Departmental Seminar	With in March 2023
9	Midterm Examination odd Sem (1st, 3rd, 5th)	Second Week of October-2022
	Midterm Examination Even Sem (2nd, 4th, 6th)	Second Week of February-2023
	End Term Examination	As notified by University
10	Annual Sports/ Cultural Week/ Annual Day	02/01/2023 to 15/01/2023
11	Farewell to outgoing Batch	After Completion of End Term Examination (6th Semester)
12	Filling up Forms for University	As notified by University
13	Alumni Meet	1st Week of January-2023
14	Publication of Result(1st ,2nd,3rd,4th,5th & 6th sem.)	Within 45 days from last theory Exam of concerned Sem. Exam. Subject to Publication of last Sem exam in 2nd week of May-2023
15	Total No. of Holidays	72 Days vide DHE Odisha Letter No.52147/HE Dt:-21/12/2022 for the session 2022-23
16	Total No. of Reserve Holidays	Maximum 2 days
17	Total no of Teaching Days	180 Days
18	Summer Vacation	1st Week of May-2023 to 3rd Week of June-2023

*** The above time line may be modified by the Government when required.**

Principal
Kaptipada Degree College,
Nuasahi , Mayurbhanj

OFFICE OF THE PRINCIPAL,

KAPTIPADA DEGREE COLLEGE, NUASAHI, MAYURBHANJ

ACADEMIC CALENDAR-2019-20

Sl.No.	Subject	Timeline
1	Reopening of College After Summer Vacation	18/06/2019
2	1st Year Admission	As per Notification of SAMS Odisha
3	Commencement of Class/ Induction or Welcome	
	+3 3rd Year	After Re-opening of Summer Vacation
	+3 2nd Year	After Re-opening of Summer Vacation
	+3 1st Year	As per D.H.E notification
4	Re-Admission	First Week of July-2019
5	1st Departmental Seminar	Within December 2019
6	Puja Vacation	03/10/2019 to 13.10.2019
7	Parent Teacher Meet	
	+3 1st Year	07.09.2019
	+3 2nd Year	14.09.2019
	+3 3rd Year	21.09.2019
8	2nd Departmental Seminar	Within March 2020
9	Midterm Examination odd Sem (1st, 3rd, 5th)	Last week of September 2019
	Midterm Examination Even Sem (2nd, 4th, 6th)	1st week of February 2020
	End Term Examination	As notified by University
10	Annual Sports/ Cultural Week/ Annual Day	02.01.2020 to 15.01.2020
11	Farewell to outgoing Batch	After Completion of End Term Examination (6th Semester)
12	Filling up Forms for University	As notified by University
13	Alumni Meet	1st week of January 2020
14	Publication of Result(1st ,2nd,3rd,4th,5th & 6th sem.)	Within 45 days from last theory Exam of concerned Sem. Exam. Subject to Publication of last Sem exam in 2nd week of May-2021
15	Total No. of Holidays	72 Days vide DHE Odisha Letter No.35687/HE Dt:-28.12.2018 for the session 2019-20
16	Total No. of Reserve Holidays	Maximum 2 days
17	Total no of Teaching Days	180 Days
18	Summer Vacation	09th May-2020 to 16th June-2020

* The above time line may be modified by the Government when required.

Behera

Principal
Kaptipada Degree College
Nuasahi, Mayurbhanj

OFFICE OF THE PRINCIPAL,
KAPTIPADA DEGREE COLLEGE, NUASAHI, MAYURBHANJ

ACADEMIC CALENDAR-2020-21

Sl.No.	Subject	Timeline
1	Reopening of College After Summer Vacation	17/06/2020
2	1st Year Admission	As per Notification of SAMS Odisha
3	Commencement of Class/ Induction or Welcome	
	+3 3rd Year	After Re-opening of Summer Vacation
	+3 2nd Year	After Re-opening of Summer Vacation
	+3 1st Year	As per D.H.E notification
4	Re-Admission	First Week of July-2020
5	1st Departmental Seminar	As per SOP of COVID-19
6	Puja Vacation	21/10/2020 to 28/10/2020
7	Parent Teacher Meet	
	+3 1st Year	As per SOP of COVID-19
	+3 2nd Year	As per SOP of COVID-19
	+3 3rd Year	As per SOP of COVID-19
8	2nd Departmental Seminar	As per SOP of COVID-19
9	Midterm Examination odd Sem (1st, 3rd, 5th)	As per SOP of COVID-19
	Midterm Examination Even Sem (2nd, 4th, 6th)	As per SOP of COVID-19
	End Term Examination	As notified by University
10	Annual Sports/ Cultural Week/ Annual Day	As per SOP of COVID-19
11	Farewell to outgoing Batch	After Completion of End Term Examination (6th Semester)
12	Filling up Forms for University	As notified by University
13	Alumni Meet	As per SOP of COVID-19
14	Publication of Result(1st ,2nd,3rd,4th,5th & 6th sem.)	Within 45 days from last theory Exam of concerned Sem. Exam. Subject to Publication of last Sem exam in 2nd week of May-2021
15	Total No. of Holidays	72 Days vide DHE Odisha Letter No.31448/HE Dt:-23.12.2019 for the session 2020-21
16	Total No. of Reserve Holidays	Maximum 2 days
17	Total no of Teaching Days	180 Days
18	Summer Vacation	1st Week of May-2021 to 3rd Week of June-2021

*** The above time line may be modified by the Government when required.**

Principal
Kaptipada Degree College,
Nuasahi, Mayurbhanj

OFFICE OF THE PRINCIPAL,

KAPTIPADA DEGREE COLLEGE, NUASAHI, MAYURBHANJ

ACADEMIC CALENDAR-2021-22

Sl.No.	Subject	Timeline
1	Reopening of College After Summer Vacation	17/06/2021
2	1st Year Admission	As per Notification of SAMS Odisha
3	Commencement of Class/ Induction or Welcome	
	+3 3rd Year	After Re-opening of Summer Vacation
	+3 2nd Year	After Re-opening of Summer Vacation
	+3 1st Year	As per D.H.E notification
4	Re-Admission	First Week of July-2021
5	1st Departmental Seminar	With in December 2021
6	Puja Vacation	21/10/2021 to 28/10/2021
7	Parent Teacher Meet	
	+3 1st Year	3rd Week of November-2021
	+3 2nd Year	3rd Week of November-2021
	+3 3rd Year	3rd Week of November-2021
8	2nd Departmental Seminar	With in March 2022
9	Midterm Examination odd Sem (1st, 3rd, 5th)	Second Week of October-2021
	Midterm Examination Even Sem (2nd, 4th, 6th)	Second Week of February-2022
	End Term Examination	As notified by University
10	Annual Sports/ Cultural Week/ Annual Day	02/01/2022 to 15/01/2022
11	Farewell to outgoing Batch	After Completion of End Term Examination (6th Semester)
12	Filling up Forms for University	As notified by University
13	Alumni Meet	1st Week of January-2022
14	Publication of Result(1st ,2nd,3rd,4th,5th & 6th sem.)	Within 45 days from last theory Exam of concerned Sem. Exam. Subject to Publication of last Sem exam in 2nd week of May-2022
15	Total No. of Holidays	72 Days vide DHE Odisha Letter No.42825/HE Dt:-23.12.2020 for the session 2021-22
16	Total No. of Reserve Holidays	Maximum 2 days
17	Total no of Teaching Days	180 Days
18	Summer Vacation	1st Week of May-2022 to 3rd Week of June-2022

* The above time line may be modified by the Government when required.

Behera

Principal
Kaptipada Degree College,
Nuasahi

OFFICE OF THE PRINCIPAL,

KAPTIPADA DEGREE COLLEGE,

NUASAHI, MAYURBHANJ.

The list of Holidays have been prepared in accordance with the Government of Odisha, Department of Higher Education Govt. Notification No.-42825/ Dt.-23.12.2020 notified here under for the calendar year 2021which may in exigencies be modified by direction of the authority.

Common Holiday List for The Calendar year 2021

Sl. No.	Occasion	Date of Celebration	Day	No. Holidays excluding Sundays
1	New Year's Day	01.01.2021	Friday	1
2	Makar Sankranti/ Pongal	14.01.2021	Thursday	1
3	Netaji Jayanti	23.01.2021	Saturday	1
4	Republic Day	26.01.2021	Tuesday	1
5	Shree Panchami	16.02.2021	Tuesday	1
6	Panchayat Raj Divas	05.03.2021	Friday	1
7	Maha Shivaratri	11.03.2021	Thursday	1
8	Day Following Maha Shivaratri	12.03.2021	Friday	1 (Local Holiday)
9	Holi	29.03.2021	Monday	1
10	Utkal Divas	01.04.2021	Thursday	1
11	Good Friday	02.04.2021	Friday	1
12	Mahabishuba Sankranti	14.04.2021	Wednesday	1
13	Shree Ram Navami	21.04.2021	Wednesday	1
14	Summer Vacation	06.05.2021 to 16.06.2021	Thursday to Wednesday	35 (Excluding 6 Sundays)
15	Shree Gundicha	12.07.2021	Monday	1
16	Bahuda Yatra	20.07.2021	Tuesday	1
17	ID-UL-Juha	21.07.2021	Wednesday	1
18	Muharram	20.08.2021	Friday	1
19	Janmastami	30.08.2021	Monday	1
20	Ganesh Chatruthi	10.09.2021	Friday	1
21	Nuakhai	11.09.2021	Saturday	1
22	Gandhi Jayanti/ Sastri Jayanti	02.10.2021	Saturday	1
23	Mahalaya	06.10.2021	Wednesday	1
24	Puja Vacation	11.10.2021 to 20.10.2021	Saturday	9 (Excluding 1 Sunday)
25	Deepabali/ Kalipuja	04.11.2021	Thursday	1
26	Badaosha	17.11.2021	Friday	1
27	Rasa Purnima	19.11.2021	Wednesday	1
28	Prathamastami	27.11.2021	Saturday	1
29	Manabasa	09.12.2021	Thursday	1 (Local Holiday)
30	Christmas day	25.12.2021	Saturday	1

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The list of Holidays (Both Public and Reserve) have been prepared in accordance with the Government of Odisha, Department of Higher Education, Govt. notification No.-31448/ Dt.-23.12.19 notified here under for the calendar year 2020 which may in exigencies be modified by direction of the authority. The reserve holiday can be availed not exceeding one day.

Sl.No.	Name of the Holiday	Date	Day	No. of holidays excluding Sundays
1	New Years Day	01.01.2020	Wednesday	1
2	Makar Sankranti/ Pongal	15.01.2020	Wednesday	1
3	Netaji Jayanti	23.01.2020	Thursday	1
4	Shreepanchami	30.01.2020	Thursday	1
5	Maha Shibaratri	21.02.2020	Friday	1
6	Day Following Maha Shibaratri	22.02.2020	Saturday	1 (Reserve Holiday)
7	Panchayat Raj Divas	05.03.2020	Thursday	1
8	Dola Purnima	09.03.2020	Monday	1
9	Holi	10.03.2020	Tuesday	1
10	Utkal Divas	01.04.2020	Wednesday	1
11	Shree Ram Navami	02.04.2020	Thursday	1
12	Good Friday	10.04.2020	Friday	1
13	Mahabishuba Sankranti	13.04.2020	Monday	1
14	Dr. B.R Ambedkar Jayanti	14.04.2020	Tuesday	1
15	Budha Jayanti	07.05.2020	Thursday	1
16	Summer Vacation	11.05.2020 to 16.06.2020	Monday to Tuesday	32 (Excluding 4 Sundays)
17	Shree Gundicha	23.06.2020	Tuesday	1
18	Bahuda Yatra	01.07.2020	Wednesday	1
19	ID-UL-Juha	01.08.2020	Saturday	1
20	Rakshya Bandhan	03.08.2020	Monday	1
21	Janmastami	11.08.2020	Tuesday	1
22	Nandaostava	12.08.2020	Wednesday	1
23	Independence Day	15.08.2020	Saturday	1
24	Ganesh Chatruthi	22.08.2020	Saturday	1
25	Mahalaya	17.09.2020	Thursday	1
26	Gandhi Jayanti/ Shastri Jayanti	02.10.2020	Friday	1
27	Puja Vacation	22.10.2020 to 31.10.2020	Thursday to Saturday	9 (Excluding 1 Sundays)
28	Deepabali / Kalipuja	14.11.2020	Saturday	1
29	Badaosha	28.11.2020	Saturday	1
30	Rasa Purnima	30.11.2020	Monday	1
31	Prathamastami	08.12.2020	Tuesday	1
32	Manabasa Gurubar	24.12.2020	Thursday	1 (Reserve Holiday)
33	Christmas day	25.12.2020	Friday	1
Total Holidays including 02 Reserve Holidays				72 Days

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KAPTIPADA DEGREE COLLEGE NUASAHI

+3 ARTS TIME TABLE-2021-22 FOR 1ST SEM.,3RD SEM. & 5TH SEM.

TIME		10.15-11.00	11.00-11.45	11.45-12.30	12.30-1.15	1.15-2.00	2.00-2.45	2.45-3.30	3.30-4.15	4.15-5.00PM
MONDAY	1ST Sem			CCH-1 EDN-PR		ES	CCH-1	G.E.A-1	CCH-2	PROCTORIAL(Every week Paper rotate)(for all Sem)
	3RD Sem	CCH-5	CENG	CCH-7	G.E.A-2	CCH-6	CCH-7 EDN -PR			TUTORIAL(Every 16 Std –one group)CCH-5
	5TH Sem		DSE-1	DSE-2	CCH-11	CCH-12				
TUESDAY	1ST Sem					CCH-2	ES	G.E.A-1		
	3RD Sem		CCH-5	CENG	CCH-6		CCH-7	CCH-6 EDN-PR		TUTORIAL(Every 16 Std –one group)CCH-6
	5TH Sem	CCH-12	CCH-11	DSE-2	DSE-1	DSE-2 EDN-PR				TUTORIAL(Every 16 Std –one group)CCH-11
WEDNESDAY	1ST Sem		CCH-2 EDN-PR			CCH-1	CCH-2	G.E.A-1		TUTORIAL(Every 16 Std –one group)GE-A-1
	3RD Sem	CCH-6	CCH-7	CENG	CCH-5		G.E.A-2			
	5TH Sem	DSE-1	DSE-2	CCH-11	CCH-12 EDN-PR					TUTORIAL(Every 16 Std –one group)DSE-1
THURSDAY	1ST Sem					ES	CCH-2	CCH-1		TUTORIAL(Every 16 Std –one group)CCH-1
	3RD Sem		CCH-5	CCH-6	CENG	G.E.A-2	CCH-5 EDN-PR			TUTORIAL(Every 16 Std –one group)GE-A-2
	5TH Sem	CCH-12	DSE-2	DSE-1	CCH-11					
FRIDAY	1ST Sem					ES	G.E.A-1		CCH-2	
	3RD Sem		CCH-6	G.E.A-2		CCH-7	G.E.A-2 EDN-PR			TUTORIAL(Every 16 Std –one group)CCH-7
	5TH Sem	DSE-2	CCH-12	CCH-11 EDN-PR						TUTORIAL(Every 16 Std –one group)DSE-2
SATURDAY	1ST Sem		G.E.A-1 EDN-PR			ES	CCH-1		CCH-2	TUTORIAL(Every 16 Std –one group)CCH-2
	3RD Sem		G.E.A-2	CENG	CCH-7	CCH-5				TUTORIAL(Every 16 Std –one group)CCH-12
	5TH Sem	DSE-1	CCH-11	CCH-12	DSE-1 EDN-PR					

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KAPTIPADA DEGREE COLLEGE, NUASAHI

SCIENCE TIME TABLE – 2021 - 22

		10.15-11.00	11.00–11.45	11.45-12.30	12.30 – 1.15	1.15-2.00	2.00 – 2.45	2.45 – 3.30	3.30 – 4.15	4.15-5.00
MONDAY	1ST SEM			ES (NS)	CCH -I	GE A-1	CCH LAB- 1 PRACTICAL			PROCTORIAL(Every week Paper rotate)(for all sem)
	3RD SEM	CENG	CCH LAB- 5 PRACTICAL				CCH - 5		CCH - 6	TUTORIAL(Every 16 Std –one group)CCH-5
	5TH SEM	CCH-11			DSE-1			DSE-2		TUTORIAL(Every 16 Std –one group)CCH-11
TUESDAY	1ST SEM			ES (GS/SB)	CCH-2	G.E-A1	CCH -I			TUTORIAL(Every 16 Std –one group)CCH-2
	3RD SEM	G.E-A2	CENG				CCH-7	CCH-6		TUTORIAL(Every 16 Std –one group)CCH-6
	5TH SEM		CCH-11	CCH LAB-11 PRACTICAL				DSE-2	CCH-12	TUTORIAL(Every 16 Std –one group)CCH-12
WEDNESDAY	1ST SEM			ES (NS)	CCH-2		GE A-LAB 1 PRACTICAL			TUTORIAL(Every 16 Std –one group)GE-A-1
	3RD SEM	CCH-5	CENG			CCH-6		G.E-A2		TUTORIAL(Every 16 Std –one group)CCH-7
	5TH SEM		DSE LAB-1 PRACTICAL					DSE-1	CCH-12	TUTORIAL(Every 16 Std –one group)DSE-1
THRUSDAY	1ST SEM			ES (GS/SB)	CCH-2		CCH -I	G.E-A1		TUTORIAL(Every 16 Std –one group)CCH-1
	3RD SEM	CCH-6		CENG		CCH LAB-6 PRACTICAL			CCH-7	TUTORIAL(Every 16 Std –one group)
	5TH SEM		DSE LAB-2 PRACTICAL			CCH-12		DSE-2	CCH-11	TUTORIAL(Every 16 Std –one group)
FRIDAY	1ST SEM			ES (NS)	G.E-A1	CCH-1	CCH LAB -2 PRACTICAL			TUTORIAL(Every 16 Std –one group)
	3RD SEM	CCH-5	CENG	CCH LAB-7 PRACTICAL				CCH-7	G.E-A2	TUTORIAL(Every 16 Std –one group)
	5TH SEM			CCH-11			DSE-1	TUTORIAL(Every 16 Std –one group)	DSE-2	TUTORIAL(Every 16 Std –one group)
SATURDAY	1ST SEM			ES (NS)	G.E-A1		CCH-2	CCH-1		TUTORIAL(Every 16 Std –one group)
	3RD SEM	G.EA-LAB 2 PRACTICAL				CCH-5		CCH-7	G.E-A2	TUTORIAL(Every 16 Std –one group)
	5TH SEM	DSE-1		CCH-12		CCH LAB -12 PRACTICAL				TUTORIAL(Every 16 Std –one group)

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KAPTIPADA DEGREE COLLEGE, NUASAHI
COMMERCE TIME TABLE-2021-22 FOR 1ST SEM, 3RD SEM & 5TH SEM

TIME		10.00-10.45	10.45–11.30	11.30-12.15	12.15– 1.00	1.00-1.45	1.45– 2.30	2.30 – 3.15	3.15 – 4.00
MONDAY	1ST SEM				EVS-AECC-1	FA-CCH-1	BL-CCH-2	MICECO-G.E-A-1	PROCTORIAL(Every week Paper rotate)(for all Sem)
	3RD SEM	HRM-CCH-5	ITLP—CCH-6	MPA-CCH-7	BS-G.E-A-2	QLT-SEC-2			TUTORIAL(Every 16 Std –one group)CCH-5
	5TH SEM	POM-CCH-11	FM-CCH-12	FMIS-DSE-1	FSAR-DSE-2				
TUESDAY	1ST SEM				EVS-AECC-1	FA-CCH-1	BL-CCH-2	MICECO-G.E-A-1	
	3RD SEM	HRM-CCH-5	ITLP—CCH-6	MPA-CCH-7	BS-G.E-A-2	QLT-SEC-2			TUTORIAL(Every 16 Std –one group)CCH-6
	5TH SEM	POM-CCH-11	FM-CCH-12	FMIS-DSE-1	FSAR-DSE-2				TUTORIAL(Every 16 Std –one group)CCH-11
WEDNESDAY	1ST SEM				EVS-AECC-1	FA-CCH-1	BL-CCH-2	MICECO-G.E-A-1	TUTORIAL(Every 16 Std –one group)GE-A-1
	3RD SEM	HRM-CCH-5	ITLP—CCH-6	MPA-CCH-7	BS-G.E-A-2	QLT-SEC-2			
	5TH SEM	POM-CCH-11	FM-CCH-12	FMIS-DSE-1	FSAR-DSE-2				TUTORIAL(Every 16 Std –one group)DSE-1
THRUSDAY	1ST SEM				EVS-AECC-1	FA-CCH-1	BL-CCH-2	MICECO-G.E-A-1	TUTORIAL(Every 16 Std –one group)CCH-1
	3RD SEM	HRM-CCH-5	ITLP—CCH-6	MPA-CCH-7	BS-G.E-A-2	QLT-SEC-2			TUTORIAL(Every 16 Std –one group)GE-A-2
	5TH SEM	POM-CCH-11	FM-CCH-12	FMIS-DSE-1	FSAR-DSE-2				
FRIDAY	1ST SEM				EVS-AECC-1	FA-CCH-1	BL-CCH-2	MICECO-G.E-A-1	
	3RD SEM	HRM-CCH-5	ITLP—CCH-6	MPA-CCH-7	BS-G.E-A-2	QLT-SEC-2			TUTORIAL(Every 16 Std –one group)CCH-7
	5TH SEM	POM-CCH-11	FM-CCH-12	FMIS-DSE-1	FSAR-DSE-2				TUTORIAL(Every 16 Std –one group)DSE-2
SATURDAY	1ST SEM				EVS-AECC-1	FA-CCH-1	BL-CCH-2	MICECO-G.E-A-1	TUTORIAL(Every 16 Std –one group)CCH-2
	3RD SEM	HRM-CCH-5	ITLP—CCH-6	MPA-CCH-7	BS-G.E-A-2	QLT-SEC-2			TUTORIAL(Every 16 Std –one group)CCH-12
	5TH	POM-CCH-11	FM-CCH-12	FMIS-DSE-1	FSAR-DSE-2				

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	SEM								

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KAPTIPADA DEGREE COLLEGE, NUASAHI
SCIENCE TIME TABLE – 2021 - 22

	→	10.15-11.00	11.00–11.45	11.45-12.30	12.30 – 1.15	1.15-2.00	2.00 – 2.45	2.45 – 3.30	3.30 – 4.15	4.15-5.00
MONDAY	1ST SEM			ES(NS)	CCH -I	GE A-1	CCH LAB- 1 PRACTICAL			PROCTORIAL(Every week Paper rotate)(for all Sem)
	3RD SEM	CENG	CCH LAB- 5 PRACTICAL				CCH - 5		CCH - 6	TUTORIAL(Every 16 Std –one group)CCH-5
	5TH SEM	CCH-11			DSE-1			DSE-2		
TUESDAY	1ST SEM			ES(GS/SB)	CCH-2	G.E-A1	CCH -I			
	3RD SEM	G.E-A2	CENG				CCH-7	CCH-6		TUTORIAL(Every 16 Std –one group)CCH-6
	5TH SEM		CCH-11	CCH LAB-11 PRACTICAL				DSE-2	CCH-12	TUTORIAL(Every 16 Std –one group)CCH-11
WEDNESDAY	1ST SEM			ES(NS)	CCH-2		GE A-LAB 1 PRACTICAL			TUTORIAL(Every 16 Std –one group)GE-A-1
	3RD SEM	CCH-5	CENG			CCH-6		G.E-A2		
	5TH SEM		DSE LAB-1 PRACTICAL					DSE-1	CCH-12	TUTORIAL(Every 16 Std –one group)DSE-1
THRUSDAY	1ST SEM			ES(GS/SB)	CCH-2		CCH -I	G.E-A1		TUTORIAL(Every 16 Std –one group)CCH-1
	3RD SEM	CCH-6		CENG		CCH LAB-6 PRACTICAL			CCH-7	TUTORIAL(Every 16 Std –one group)GE-A-2
	5TH SEM		DSE LAB-2 PRACTICAL			CCH-12		DSE-2	CCH-11	
FRIDAY	1ST SEM			ES(NS)	G.E-A1	CCH-1	CCH LAB -2 PRACTICAL			
	3RD SEM	CCH-5	CENG	CCH LAB-7 PRACTICAL				CCH-7	G.E-A2	TUTORIAL(Every 16 Std –one group)CCH-7
	5TH SEM			CCH-11			DSE-1	TUTORIAL(Every 16 Std –one group)	DSE-2	TUTORIAL(Every 16 Std –one group)DSE-2
SATURDAY	1ST SEM			ES(NS)	G.E-A1		CCH-2	CCH-1		TUTORIAL(Every 16 Std –one group)CCH-2
	3RD SEM	G.EA-LAB 2 PRACTICAL				CCH-5		CCH-7	G.E-A2	TUTORIAL(Every 16 Std –one group)CCH-12
	5TH SEM	DSE-1		CCH-12		CCH LAB -12 PRACTICAL				

Behera

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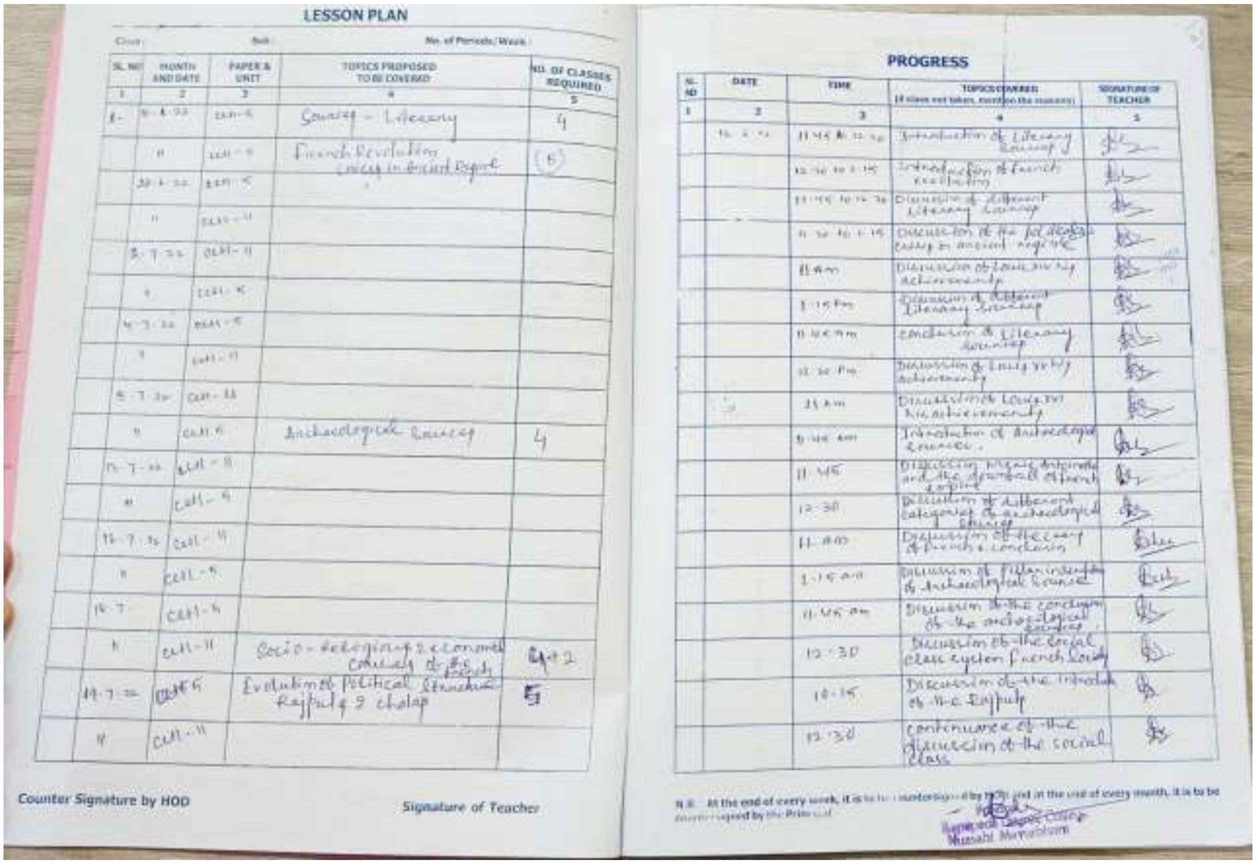
Kaptipada Degree College
Nuasahi, Mayurbhanj

1.1.1-The Institution ensures effective curriculum delivery through a well planned and documented process

TEACHING CLASS

TEACHING CLASS

LESSION PLAN AND PROGRES REGISTER



LESSON PLAN

Class : Sub : No. of Periods/Week :

SL. NO	MONTH AND DATE	PAPER & UNIT	TOPICS PROPOSED TO BE COVERED	NO. OF CLASSES REQUIRED
1	2	3	4	5
1.	[illegible]	CCH-5	Sources - Literary	4
	〃	CCH-11	French Revolution Crisis in Ancient Regime	5
	30-6-22	CCH-5		
	〃	CCH-11		
	3-7-22	CCH-11		
	〃	CCH-5		
	4-7-22	CCH-5		
	〃	CCH-11		
	5-7-22	CCH-11		
	〃	CCH-5	Archaeological Sources	4
	11-7-22	CCH-11		
	〃	CCH-5		
	16-7-22	CCH-11		
	〃	CCH-5		
	18-7-	CCH-5		
	〃	CCH-11	Socio-Religious & economic condition of French Society	4+2
	19-7-22	CCH-5	Evolution of Political Structure Rajput & Cholas	5
	〃	CCH-11		

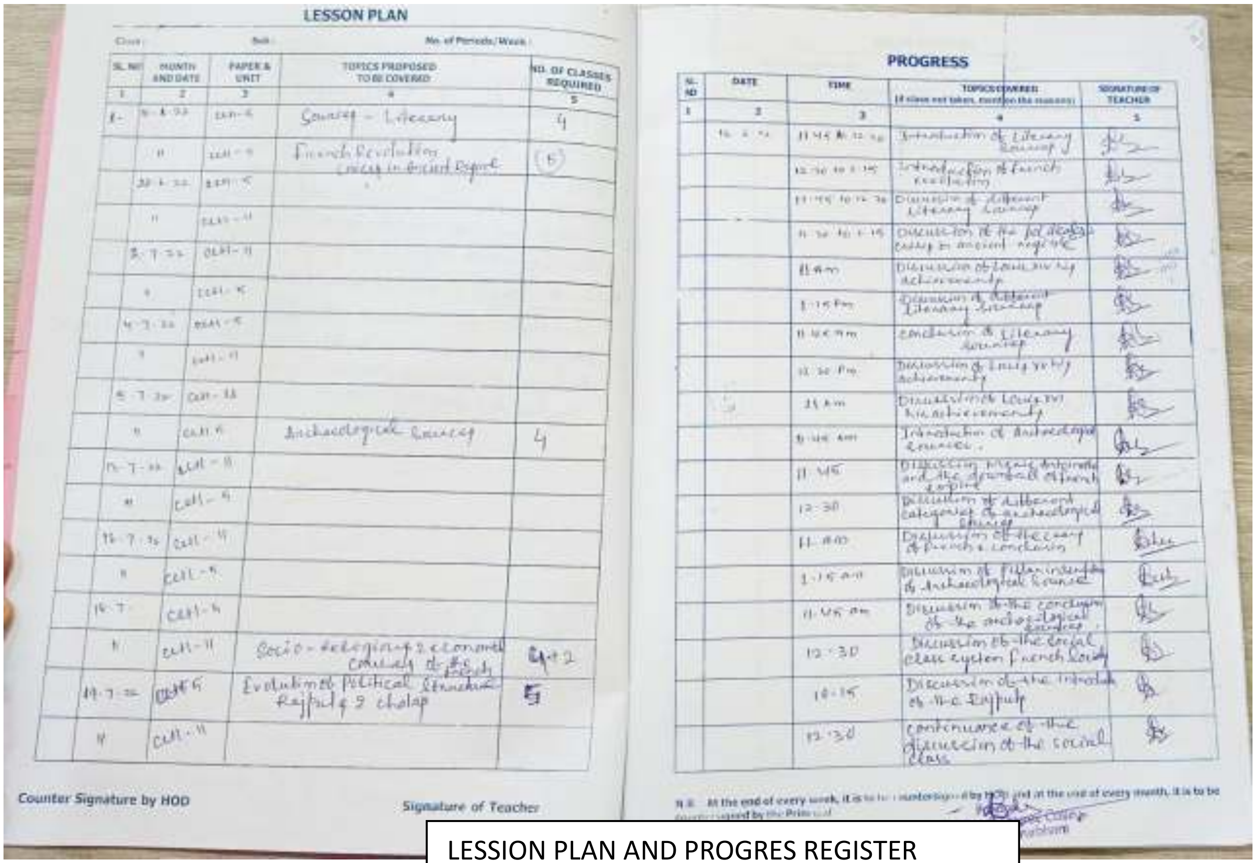
Counter Signature by HOD

Signature of Teacher

PROGRESS

SL. NO	DATE	TIME	TOPICS COVERED (If class not taken, mention the reasons)	SIGNATURE OF TEACHER
1	2	3	4	5
	16-6-22	11.45 to 12.30	Introduction of Literary Sources	
		12.30 to 1.15	Introduction of French Revolution	
		11.45 to 12.30	Discussion of different Literary Sources	
		12.30 to 1.15	Discussion of the Political Crisis in ancient regime	
		11 am	Discussion of Louis XIV his achievements	
		1.15 Pm	Discussion of different Literary Sources	
		11.45 am	Conclusion of Literary Sources	
		12.30 Pm	Discussion of Louis XV his achievements	
		11 Am	Discussion of Louis XVI his achievements	
		11.45 Am	Introduction of Archaeological Sources.	
		11.45	Discussion Marie Antoinette and the downfall of French Empire	
		12.30	Discussion of different categories of archaeological sources	
		11 AM	Discussion of the causes of French & conclusion	
		1.15 AM	Discussion of Pillar inscription of Archaeological Source	
		11.45 am	Discussion of the conclusion of the archaeological sources	
		12.30	Discussion of the social class system French Society	
		10.15	Discussion of the introduction of the Rajputs	
		12.30	Continuance of the discussion of the social class	

N.B. At the end of every week, it is to be countersigned by HOD and at the end of every month, it is to be countersigned by the Principal



LESSON PLAN

Class: Sub: No. of Periods/Week:

SL. NO	MONTH AND DATE	PAPER & UNIT	TOPICS PROPOSED TO BE COVERED	NO. OF CLASSES REQUIRED
1	2	3	4	5
1-	[illegible]	[illegible]	Sources - Literary	4
	"	[illegible]	French Revolution Crisis in Ancient Regime	(5)
	[illegible]	[illegible]		
	"	[illegible]		
	3-7-22	[illegible]		
	"	[illegible]		
	4-7-22	[illegible]		
	"	[illegible]		
	5-7-22	[illegible]		
	"	[illegible]	Archaeological Sources	4
	15-7-22	[illegible]		
	"	[illegible]		
	16-7-22	[illegible]		
	"	[illegible]		
	[illegible]	[illegible]		
	"	[illegible]	Socio-Religious & economic causes of the French	4+2
	19-7-22	[illegible]	Evolution of Political Structure Rajputs & [illegible]	5
	"	[illegible]		

Counter Signature by HOD

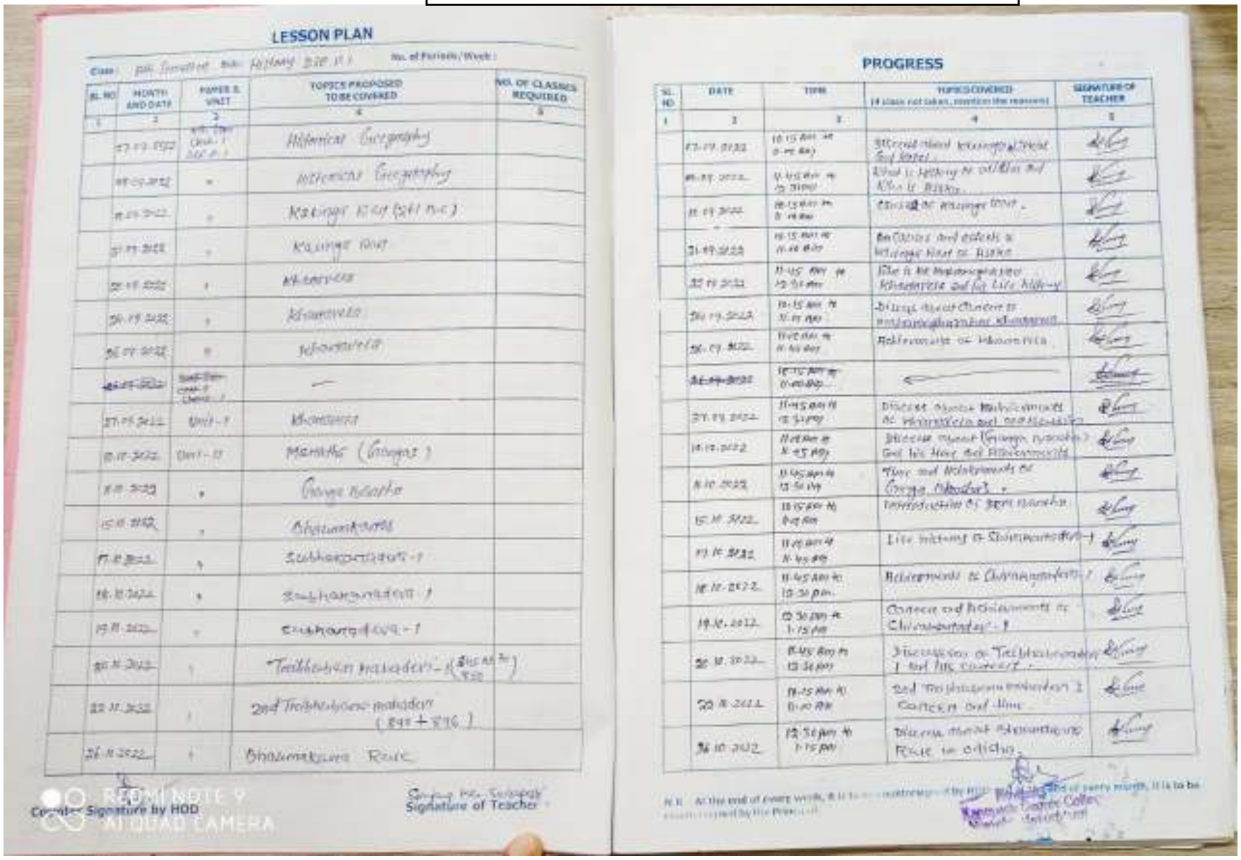
Signature of Teacher

PROGRESS

SL. NO	DATE	TIME	TOPICS COVERED (If class not taken, mention the reasons)	SIGNATURE OF TEACHER
1	2	3	4	5
	[illegible]	11.45 to 12.30	Introduction of Literary Sources	
		12.30 to 1.15	Introduction of French Revolution	
		11.45 to 12.30	Discussion of different Literary Sources	
		11.30 to 1.15	Discussion of the [illegible] crisis in ancient regime	
		11 Am	Discussion of Louis XIV & his achievements	
		1.15 Pm	Discussion of different Literary Sources	
		11.45 Am	Conclusion of Literary Sources	
		12.30 Pm	Discussion of Louis XV & his achievements	
		11 Am	Discussion of Louis XVI & his achievements	
		[illegible] Am	Introduction of Archaeological Sources.	
		11.45	Discussion Marie Antoinette and the downfall of French empire	
		12.30	Discussion of different categories of archaeological sources	
		11.00	Discussion of the crisis of French & conclusion	
		1.15 Am	Discussion of Pillar inscription of Archaeological Source	
		11.45 Am	Discussion of the conclusion of the archaeological sources	
		12.30	Discussion of the social class system French Society	
		10.15	Discussion of the introduction of the Rajputs	
		12.30	Continuance of the discussion of the social class	

N.B. At the end of every week, it is to be countersigned by HOD and at the end of every month, it is to be countersigned by the Principal

LESSION PLAN AND PROGRES REGISTER



LESSON PLAN

Class: [illegible] Sub: History [illegible] No. of Periods/Week:

SL. NO	MONTH AND DATE	PAPER & UNIT	TOPICS PROPOSED TO BE COVERED	NO. OF CLASSES REQUIRED
1	2	3	4	5
	[illegible]	[illegible]	Historical Geography	
	[illegible]	"	Historical Geography	
	[illegible]	"	Kalinga War (261 B.C)	
	[illegible]	"	Kalinga War	
	[illegible]	"	Kharavela	
	[illegible]	"	Kharavela	
	[illegible]	"	Kharavela	
	~~[illegible]~~	[illegible]	—	
	[illegible]	Unit-I	Kharavela	
	[illegible]	Unit-II	Mathara (Gangas)	
	[illegible]	"	Ganga [illegible]	
	[illegible]	"	Bhaumakaras	
	[illegible]	"	Subhakaradeva-I	
	[illegible]	"	Subhakaradeva-I	
	[illegible]	"	Subhakaradeva-I	
	[illegible]	"	Tribhuvana Mahadevi-I ([illegible])	
	[illegible]	"	2nd Tribhuvana Mahadevi (895+896)	
	26.11.2022	"	Bhaumakara Rule	

Counter Signature by HOD

Signature of Teacher

PROGRESS

SL. NO	DATE	TIME	TOPICS COVERED (If class not taken, mention the reasons)	SIGNATURE OF TEACHER
1	2	3	4	5
	[illegible]	[illegible]	[illegible]	
	[illegible]	[illegible]	What is History of [illegible] and Who is Asoka.	
	[illegible]	[illegible]	Causes of Kalinga War.	
	[illegible]	[illegible]	Causes and effects of Kalinga War of Asoka	
	[illegible]	[illegible]	Who is the [illegible] Kharavela and his Life History	
	[illegible]	[illegible]	[illegible]	
	[illegible]	[illegible]	Achievements of Kharavela	
	~~[illegible]~~	[illegible]	←	
	[illegible]	11.45 AM to 12.30 PM	Discuss about achievements of Kharavela and [illegible]	
	[illegible]	[illegible]	Discuss about (Ganga [illegible]) and his Rule and Achievements	
	[illegible]	[illegible]	Rise and achievements of [illegible].	
	[illegible]	[illegible]	Introduction of [illegible]	
	[illegible]	[illegible]	Life history of Subhakaradeva-I	
	[illegible]	11.45 AM to 12.30 pm.	Achievements of Subhakaradeva-I	
	[illegible]	12.30 pm to 1.15 PM	Career and achievements of [illegible]-I	
	[illegible]	[illegible]	Discussion on Tribhuvana Mahadevi I and his Career.	
	[illegible]	[illegible]	2nd Tribhuvana Mahadevi 2 Career and time	
	[illegible]	12.30 pm to 1.15 pm	Discuss about Bhaumakara Rule in odisha.	

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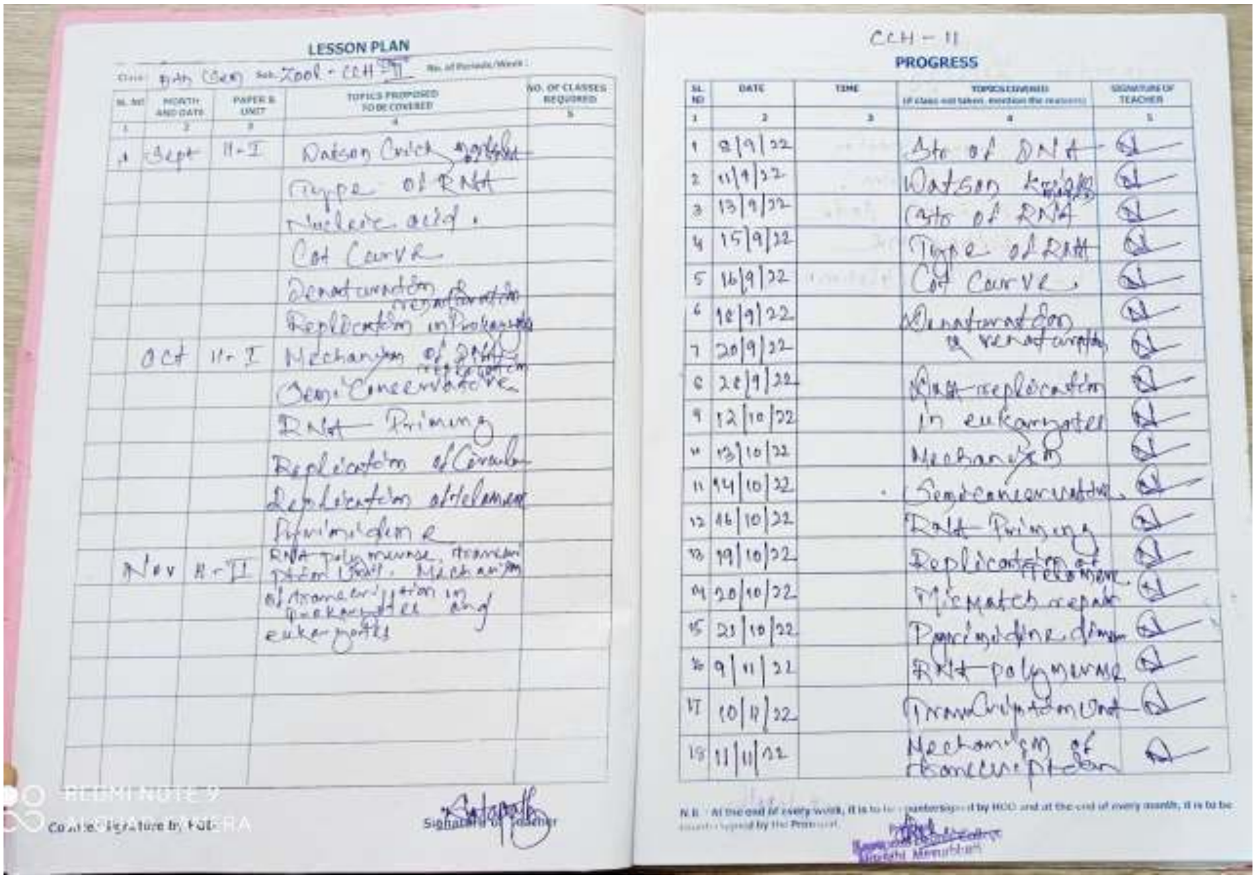

LESSON PLAN

Class: 5th Sem Sub: Zool - CCH-11 No. of Periods/Week :

SL. NO.	MONTH AND DATE	PAPER & UNIT	TOPICS PROPOSED TO BE COVERED	NO. OF CLASSES REQUIRED
1	2	3	4	5
1	Sept	II-I	Watson Crick model	
			Type of RNA	
			Nucleic acid.	
			Cot Curve	
			Denaturation & renaturation	
			Replication in Prokaryotes	
	Oct	II-I	Mechanism of DNA replication	
			Semi Conservative	
			RNA Priming	
			Replication of Circular	
			Replication of telomere	
			Pyrimidine dimer	
	Nov	II-II	RNA polymerase, transcription unit. Mechanism of transcription in prokaryotes and eukaryotes	

Counter Signature by HOD

Signature of Teacher

CCH – 11

PROGRESS

SL. NO	DATE	TIME	TOPICS COVERED (If class not taken, mention the reasons)	SIGNATURE OF TEACHER
1	2	3	4	5
1	8/9/22		Str of DNA	
2	11/9/22		Watson Krick model	
3	13/9/22		Str of RNA	
4	15/9/22		Type of RNA	
5	16/9/22		Cot Curve.	
6	18/9/22		Denaturation	
7	20/9/22		& renaturation	
8	28/9/22		DNA replication	
9	12/10/22		in eukaryotes	
10	13/10/22		Mechanism	
11	14/10/22		Semiconservative.	
12	16/10/22		RNA Priming	
13	19/10/22		Replication of telomere.	
14	20/10/22		Mismatch repair	
15	21/10/22		Pyrimidine dimer	
16	9/11/22		RNA polymerase	
17	10/11/22		Transcription Unit	
18	11/11/22		Mechanism of transcription	

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Principal
[illegible] Degree College
Nuasahi Menurbhan

REDMI NOTE 9
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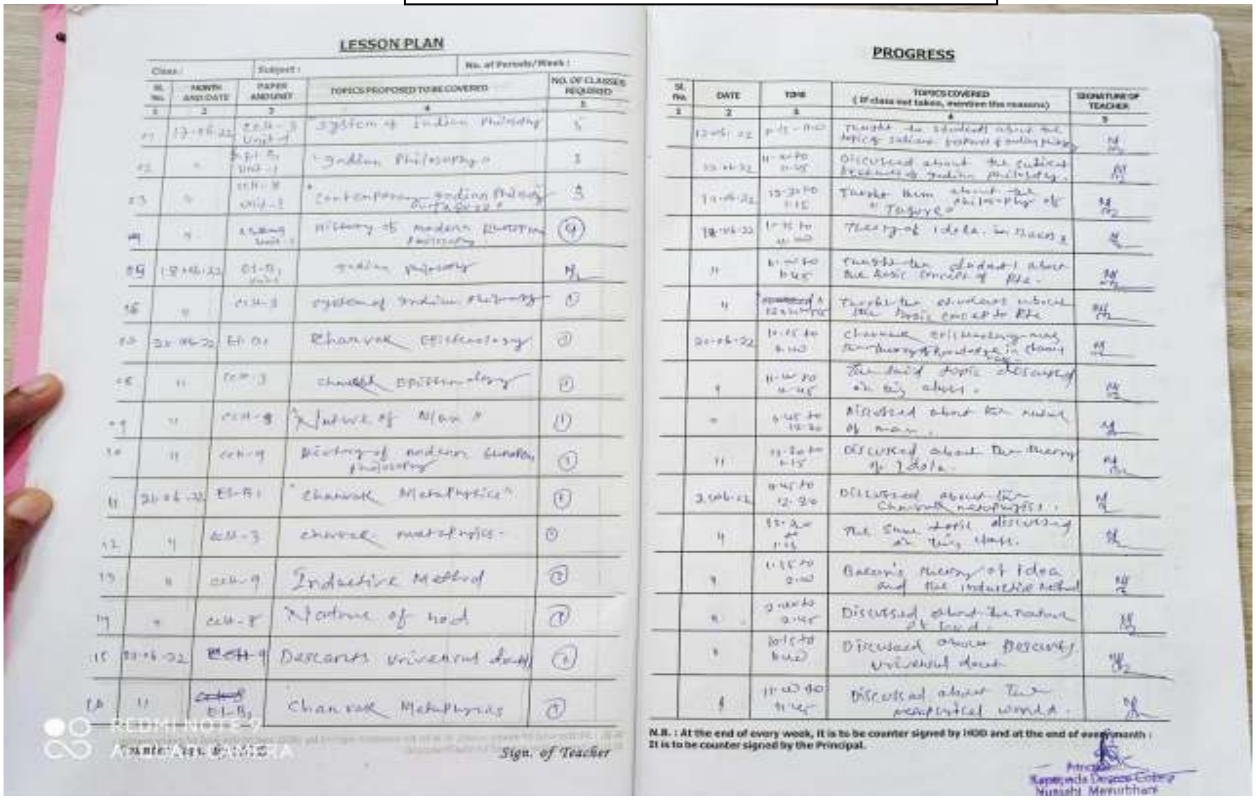

LESSON PLAN

Class : Subject : No. of Periods/Week :

SL. No.	MONTH AND DATE	PAPER AND UNIT	TOPICS PROPOSED TO BE COVERED	NO. OF CLASSES REQUIRED
1	2	3	4	5
01	17-06-22	CCH-3 Unit-1	"System of Indian Philosophy"	5
02	"	EE-B, Unit-1	"Indian Philosophy"	1
03	"	CCH-8 Unit-1	"Contemporary Indian Philosophy"	3
04	"	CCH-9 Unit-1	History of modern Western Philosophy	④
05	18-06-22	EE-B, Unit-1	Indian Philosophy	[illegible]
06	"	CCH-3	System of Indian Philosophy	①
07	20-06-22	EE-B1	Charvak Epistemology	②
08	"	CCH-3	Charvak Epistemology	②
09	"	CCH-8	"Nature of Man"	①
10	"	CCH-9	History of modern Western Philosophy	①
11	21-06-22	EE-B1	"Charvak Metaphysics"	①
12	"	CCH-3	Charvak metaphysics.	①
13	"	CCH-9	Inductive Method	②
14	"	CCH-8	Nature of God	①
15	22-06-22	~~CCH~~-9	Descartes universal doubt	①
16	"	~~CCH-3~~ EE-B1	Charvak Metaphysics	①

Sign. of Teacher

PROGRESS

SL. No.	DATE	TIME	TOPICS COVERED (If class not taken, mention the reasons)	SIGNATURE OF TEACHER
1	2	3	4	5
	17-06-22	[illegible]	Taught the students about the topic Indian systems of Indian Philosophy	
	17-06-22	11-30 to 11-45	Discussed about the cultural background of Indian philosophy.	
	17-06-22	12-30 to 1-15	Taught them about the philosophy of "Tagore"	
	18-06-22	10-15 to 11-00	Theory of idols. In Bacon's	
	"	11-00 to 11-45	Taught the students about the basic concept of Rta.	
	"	[illegible]	Taught the students about the basic concept to Rta	
	20-06-22	10-15 to 11-00	Charvak epistemology and theory of knowledge in Charvak	
	"	11-00 to 11-45	The same topic discussing in the class.	
	"	11-45 to 12-30	Discussed about the nature of man.	
	"	12-30 to 1-15	Discussed about the theory of Idols.	
	21-06-22	11-45 to 12-30	Discussed about the Charvak metaphysics.	
	"	12-30 to 1-15	The same topic discussing in the class.	
	"	1-15 to 2-00	Bacon's theory of Idea and the inductive method	
	"	2-00 to 2-45	Discussed about the nature of God.	
	"	10-15 to 11-00	Discussed about Descartes universal doubt	
	"	11-00 to 11-45	Discussed about the metaphysical world.	

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Principal
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Nuasahi Menurbhan

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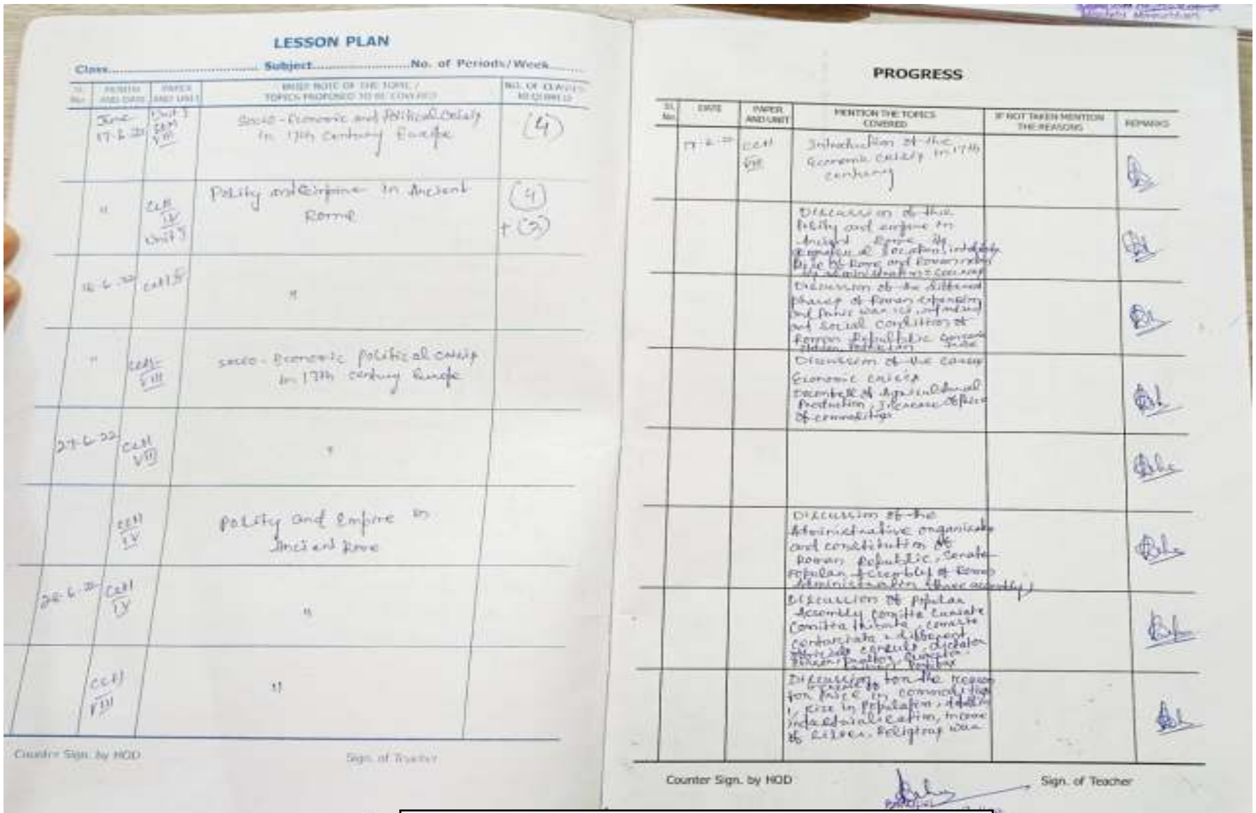


LESSON PLAN

Class........................ Subject........................ No. of Periods/Week........

Sl. No.	Month and Date	Paper and Unit	Brief note of the topic / Topics proposed to be covered	No. of classes required
	June 17-6-22	Unit I SEM VIII	Socio-Economic and Political Crisis in 17th Century Europe	(4)
	"	CC-II IV Unit I	Polity and Empire in Ancient Rome	(4) + (3)
	16-6-22	Unit I	"	
	"	CC-8 VIII	Socio-Economic Political Crisis in 17th century Europe	
	27-6-22	CC-11 VIII	"	
		CC-11 IV	Polity and Empire in Ancient Rome	
	28-6-22	CC-11 IV	"	
		CC-11 VIII	"	

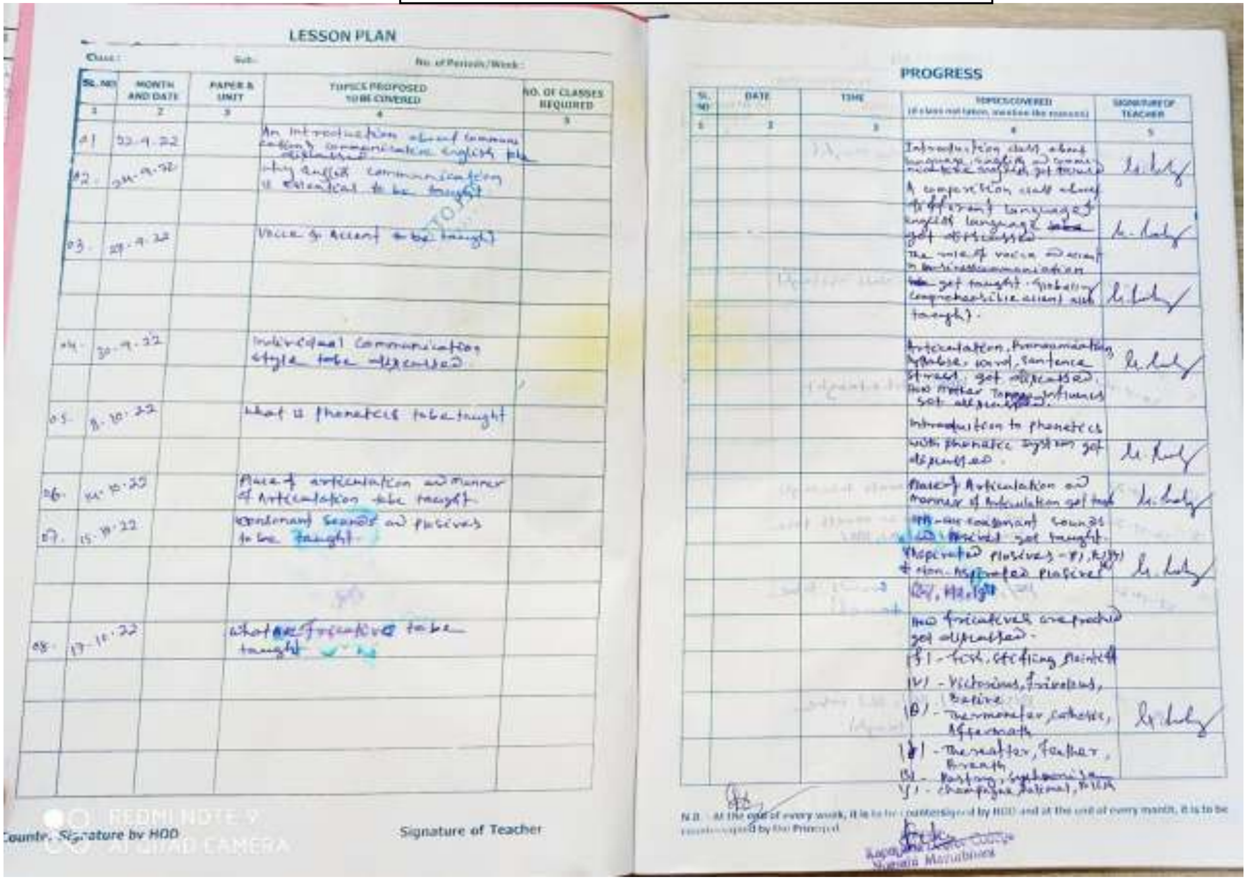
Counter Sign. by HOD Sign. of Teacher

PROGRESS

Sl. No.	Date	Paper and Unit	Mention the topics covered	If not taken mention the reasons	Remarks
	17-6-22	CC-11 VIII	Introduction of the Economic Crisis in 17th century		
			Discussion of the polity and empire in Ancient Rome, its geographical location, introduction [illegible] Rome and Roman [illegible] its administrative [illegible]		
			Discussion of the different phases of Roman expansion and Punic wars [illegible] and social condition of Roman Republic [illegible]		
			Discussion of the causes of economic crisis, decline of agricultural production, increase of price of commodities		
			Discussion of the administrative organisation and constitution of Roman Republic, Senate, Popular Assembly of Roman Administration (three assembly)		
			Discussion of Popular Assembly Comitia Curiata, Comitia Tributa, Comitia Centuriata, different [illegible] consuls, dictator, [illegible]		
			Discussion on the reasons for price in commodities, rise in population, [illegible] industrialisation, income of [illegible] Religious war		

Counter Sign. by HOD Sign. of Teacher

LESSION PLAN AND PROGRES REGISTER



LESSON PLAN

Class: Sub: No. of Periods/Week:

SL. NO	MONTH AND DATE	PAPER & UNIT	TOPICS PROPOSED TO BE COVERED	NO. OF CLASSES REQUIRED
1	2	3	4	5
01	22-9-22		An introduction about communication, communicative English to be discussed	
02	24-9-22		Why English communication is essential to be taught	
03	29-9-22		Voice & Accent to be taught	
04	30-9-22		Individual Communication style to be discussed	
05	8-10-22		What is phonetics to be taught	
06	14-10-22		Place of articulation and manner of articulation to be taught	
07	15-10-22		Consonant sounds and plosives to be taught	
08	17-10-22		What are fricatives to be taught	

Counter Signature by HOD Signature of Teacher

REDMI NOTE 9
AI QUAD CAMERA

PROGRESS

SL. NO	DATE	TIME	TOPICS COVERED (If class not taken, mention the reasons)	SIGNATURE OF TEACHER
1	2	3	4	5
			Introduction class about language, English and communicative English got discussed	
			A composition class about different languages, English language got discussed.	
			The role of voice and accent in communication got taught. Globally comprehensible accent also taught.	
			Articulation, pronunciation, syllable, word, sentence stress got discussed. How mother tongue influence got discussed.	
			Introduction to phonetics with phonetic system got discussed.	
			Place of articulation and manner of articulation got taught	
			The consonant sounds and plosives got taught. Aspirated plosives - /p/, /k/, /t/ & non-aspirated plosives [illegible]	
			How fricatives are produced got discussed. /f/ - fish, [illegible] /v/ - victorious, [illegible], native /θ/ - thermometer, catharsis, aftermath /ð/ - thereafter, feather, breath /s/ - [illegible] /ʃ/ - champagne, national, [illegible]	

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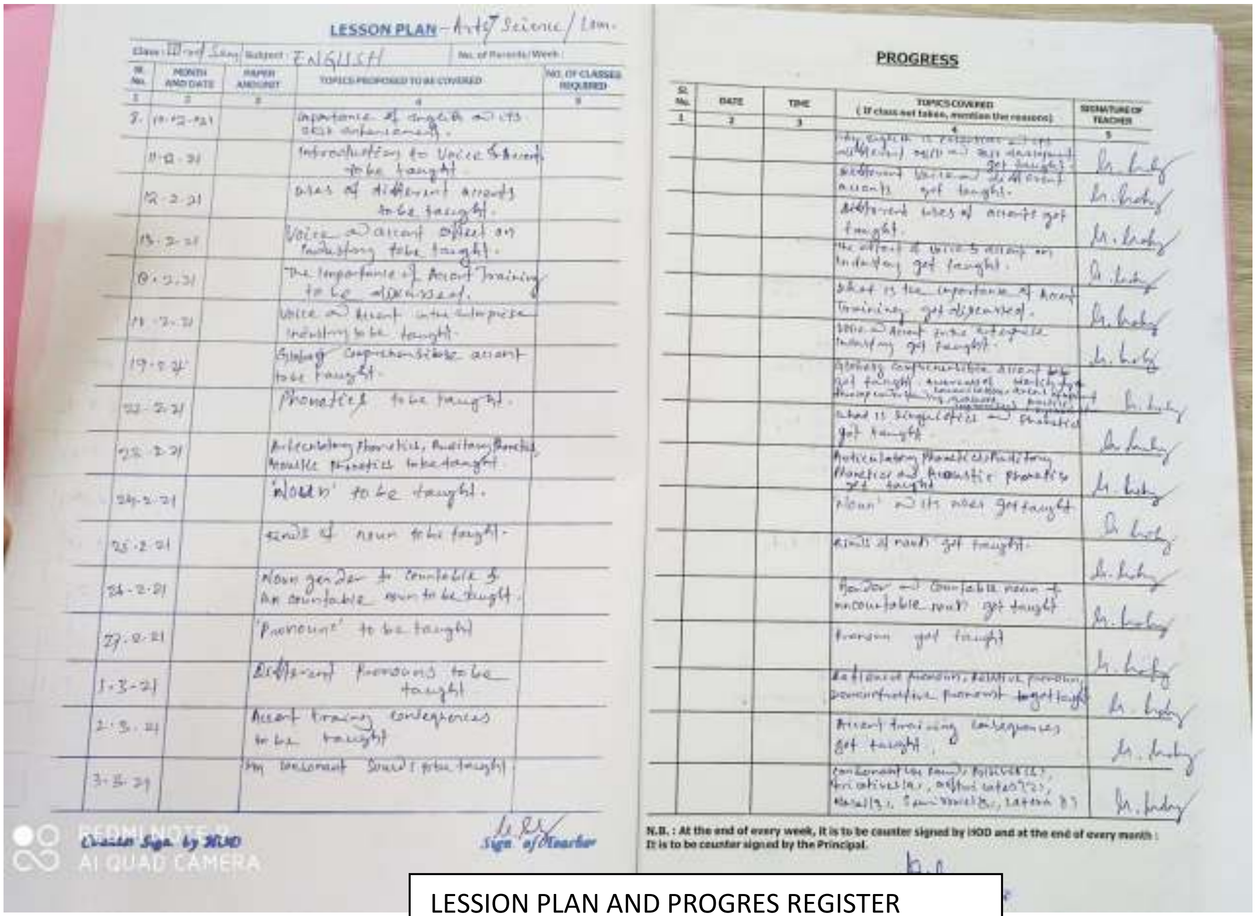
[illegible] Manubhrit



LESSON PLAN – Arts/Science/Com.

Class: III rd Sem | Subject: ENGLISH | No. of Periods/Week:

Sl. No.	MONTH AND DATE	PAPER AND UNIT	TOPICS PROPOSED TO BE COVERED	NO. OF CLASSES REQUIRED
1	2	3	4	5
1.	10-02-21		Importance of English and its skill enhancement.	
	11-2-21		Introduction to Voice & Accent to be taught	
	12-2-21		Uses of different accents to be taught.	
	13-2-21		Voice and accent effect on Industry to be taught.	
	18-2-21		The importance of Accent Training to be discussed.	
	17-2-21		Voice and Accent in the enterprise industry to be taught.	
	19-2-21		Globally comprehensible accent to be taught.	
	22-2-21		Phonetics to be taught.	
	23-2-21		Articulatory Phonetics, Auditory Phonetics, Acoustic Phonetics to be taught	
	24-2-21		'Noun' to be taught.	
	25-2-21		Kinds of noun to be taught.	
	26-2-21		Noun gender & countable & uncountable noun to be taught.	
	27-2-21		'Pronouns' to be taught	
	1-3-21		Different Pronouns to be taught	
	2-3-21		Accent training consequences to be taught	
	3-3-21		[illegible] Consonant Sounds to be taught	

Counter Sign. by HOD

Sign. of Teacher

PROGRESS

Sl. No.	DATE	TIME	TOPICS COVERED (If class not taken, mention the reasons)	SIGNATURE OF TEACHER
1	2	3	4	5
			Why English is important and its [illegible] skill and its development got taught.	
			Different Voice and different accents got taught.	
			Different uses of accents got taught.	
			The effect of voice & accent on Industry got taught.	
			What is the importance of Accent Training got discussed.	
			Voice and Accent in the enterprise industry got taught.	
			Globally comprehensible accent got taught [illegible]	
			What is [illegible] and Phonetics got taught	
			Articulatory Phonetics, Auditory Phonetics and Acoustic Phonetics got taught	
			Noun and its uses got taught	
			Kinds of noun got taught.	
			Gender and Countable noun & uncountable noun got taught	
			Pronoun got taught	
			Reflexive Pronouns, Relative Pronouns, Demonstrative Pronouns ~~to~~ got taught	
			Accent training consequences got taught.	
			Consonant Sounds [illegible]	

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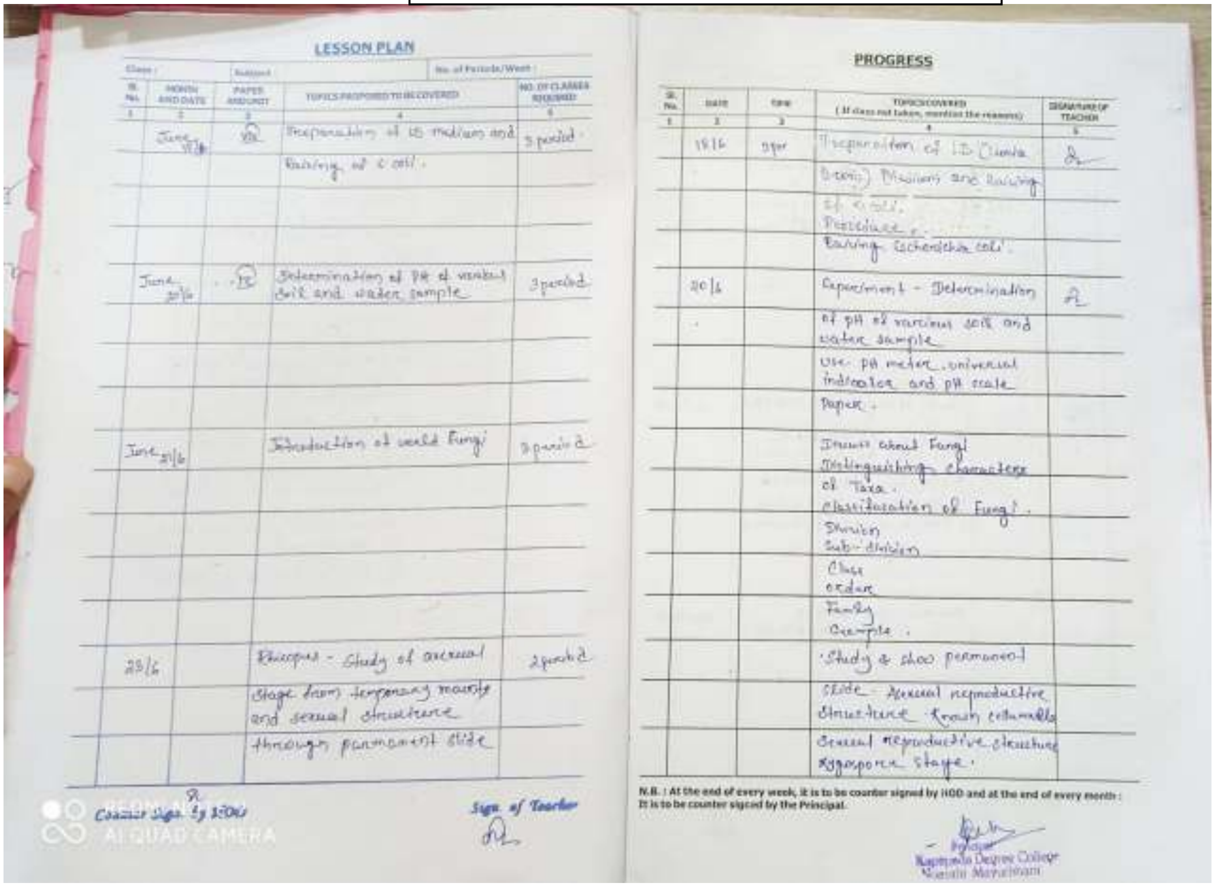
LESSION PLAN AND PROGRES REGISTER



LESSON PLAN

Class: | Subject: | No. of Periods/Week:

Sl. No.	MONTH AND DATE	PAPER AND UNIT	TOPICS PROPOSED TO BE COVERED	NO. OF CLASSES REQUIRED
1	2	3	4	5
	June 19/6	VIII	Preparation of LB medium and	3 period
			Raising of E coli.	
	June 20/6	IX	Determination of pH of various soil and water sample	3 period
	June 21/6		Introduction of world Fungi	3 period
	23/6		Rhizopus - Study of asexual	2 period
			stage from temporary mounts and sexual structure	
			through permanent slide	

Counter Sign. by HOD

Sign. of Teacher

PROGRESS

Sl. No.	DATE	TIME	TOPICS COVERED (If class not taken, mention the reasons)	SIGNATURE OF TEACHER
1	2	3	4	5
	18/6	9pm	Preparation of LB (Luria	
			Broth) Medium and Raising	
			of E coli. Procedure.	
			Raising Escherichia coli.	
	20/6		Experiment - Determination	
			of pH of various soil and water sample	
			Use pH meter, universal indicator and pH scale	
			Paper.	
			Discuss about Fungi Distinguishing characters	
			of Taxa. Classification of Fungi.	
			Division Sub-division	
			Class order	
			Family Example.	
			Study & show permanent	
			slide - Asexual reproductive structure through columella	
			Sexual reproductive structure Zygospore stage.	

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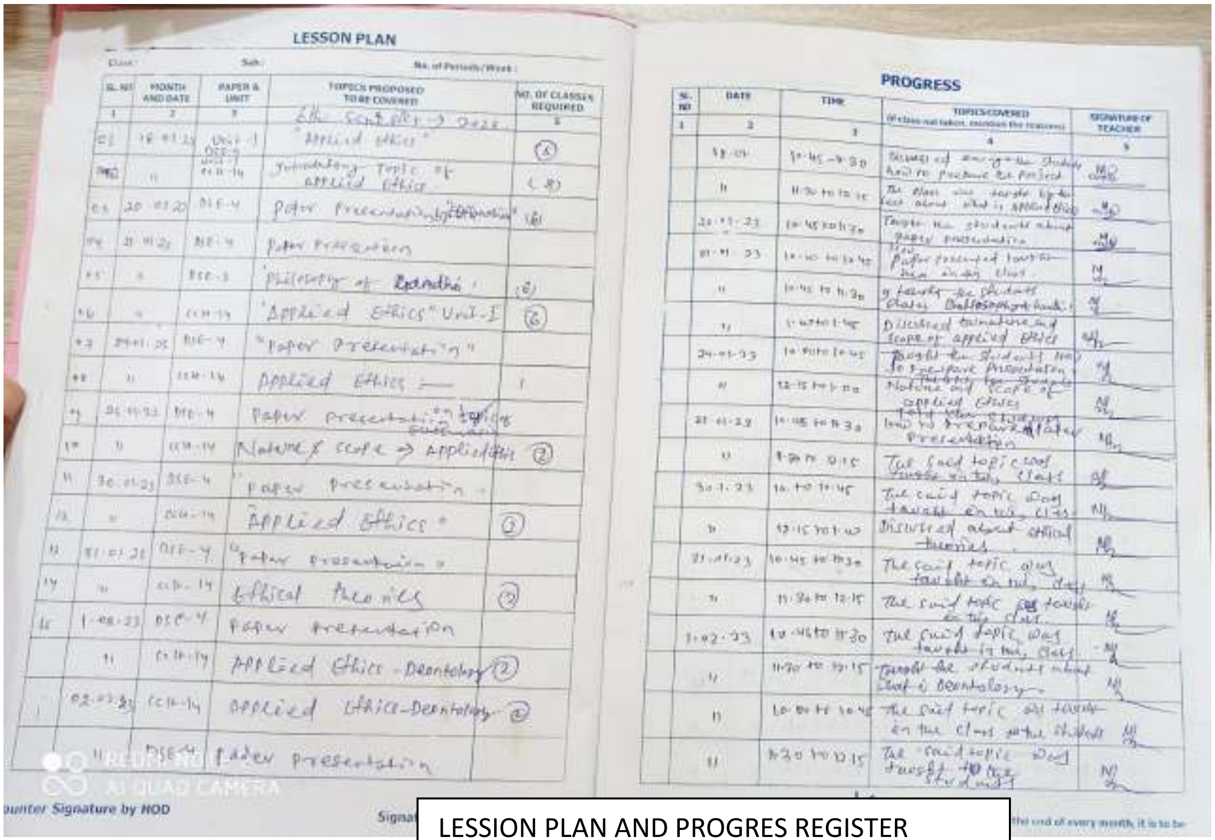
Principal
[illegible] Degree College



LESSON PLAN

Class : Sub : No. of Periods/Week :

Sl. No	Month and Date	Paper & Unit	Topics Proposed to be Covered	No. of Classes Required
1	2	3	4	5
			6th Semester → 2022.	
01	18-01-23	Unit-1 DSE-4	"Applied Ethics"	⑧
02	"	Unit-1 CCH-14	Introducing Topic of Applied Ethics	(8)
03	20-01-23	DSE-4	Paper Presentation "[illegible]"	(6)
04	21-01-23	DSE-4	Paper Presentation	
05	"	DSE-3	Philosophy of Gandhi	(6)
06	"	CCH-14	"Applied Ethics" Unit-I	⑥
07	24-01-23	DSE-4	"Paper Presentation"	
08	"	CCH-14	Applied Ethics —	1
09	25-01-23	DSE-4	Paper presentation on topics [illegible]	
10	"	CCH-14	Nature & Scope → Applied Ethics	②
11	30-01-23	DSE-4	"Paper Presentation"	
12	"	CCH-14	"Applied Ethics"	②
13	31-01-23	DSE-4	"Paper Presentation"	
14	"	CCH-14	Ethical theories	②
15	1-02-23	DSE-4	Paper Presentation	
	"	CCH-14	Applied Ethics - Deontology	②
	02-02-23	CCH-14	Applied Ethics-Deontology	②
	"	DSE-4	Paper Presentation	

Counter Signature by HOD

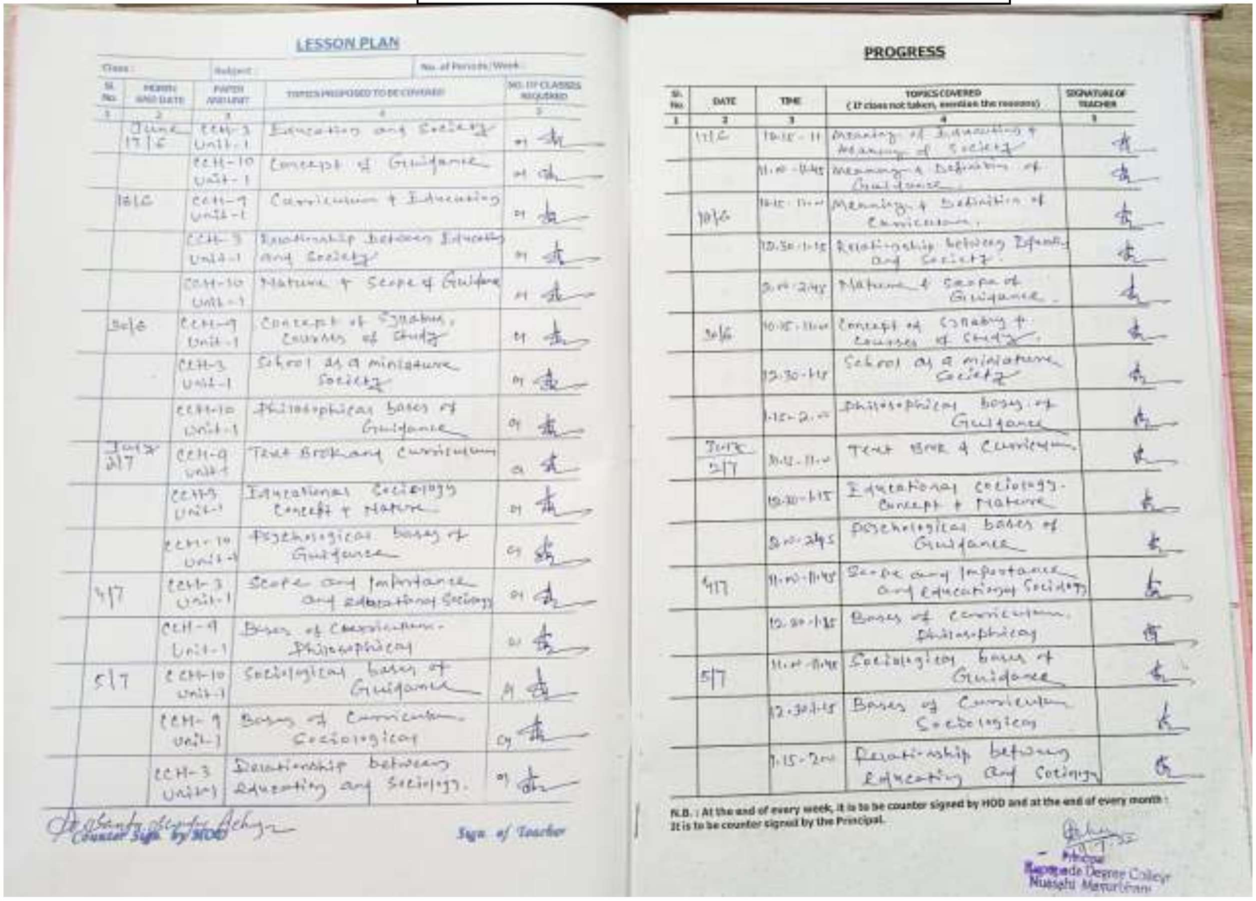
Signat

PROGRESS

Sl. No	Date	Time	Topics Covered (If class not taken, mention the reasons)	Signature of Teacher
1	2	3	4	5
	18-01	10-45 – 11-30	Discussed of among the students how to prepare the project	
	"	11-30 to 12-15	The class was taught by the teacher about what is Applied Ethics	
	20-01-23	10-45 to 11-30	Taught the students about paper presentation	
	21-01-23	10-40 to 12-45	How paper presented to them in the class	
	"	10-45 to 11-30	I taught the students about Philosophy of Gandhi	
	"	1-00 to 1-45	Discussed the nature and scope of applied Ethics	
	24-01-23	10-40 to 11-45	Taught the students how to prepare presentation	
	"	12-15 to 1-00	Nature and scope of applied Ethics	
	25-01-23	10-45 to 11-30	how to prepare a paper presentation	
	"	11-30 to 12-15	The said topic was taught in the class	
	30-1-23	10 to 10-45	The said topic was taught in the class	
	"	12-15 to 1-00	Discussed about ethical theories	
	31-01-23	10-45 to 11-30	The said topic was taught in the class	
	"	11-30 to 12-15	The said topic was taught in the class	
	1-02-23	10-45 to 11-30	The said topic was taught in the class	
	"	11-30 to 12-15	Taught the students about what is Deontology	
	"	10-00 to 10-45	The said topic was taught in the class to the students	
	"	11-30 to 12-15	The said topic was taught to the students	

the end of every month, it is to be

LESSION PLAN AND PROGRES REGISTER



LESSON PLAN

Class : Subject : No. of Periods/Week :

Sl. No.	Month and Date	Paper and Unit	Topics Proposed to be Covered	No. of Classes Required
1	2	3	4	5
	June 17/6	CCH-3 Unit-1	Education and Society	01
		CCH-10 Unit-1	Concept of Guidance	01
	18/6	CCH-9 Unit-1	Curriculum + Education	01
		CCH-3 Unit-1	Relationship between Education and Society	01
		CCH-10 Unit-1	Nature + Scope of Guidance	01
	30/6	CCH-9 Unit-1	Concept of Syllabus, Courses of Study	01
		CCH-3 Unit-1	School as a miniature Society	01
		CCH-10 Unit-1	Philosophical bases of Guidance	01
	July 3/7	CCH-9 Unit-1	Text Book and Curriculum	01
		CCH-3 Unit-1	Educational Sociology Concept + Nature	01
		CCH-10 Unit-1	Psychological bases of Guidance	01
	4/7	CCH-3 Unit-1	Scope and Importance and Educational Sociology	01
		CCH-9 Unit-1	Bases of Curriculum-Philosophical	01
	5/7	CCH-10 Unit-1	Sociological bases of Guidance	01
		CCH-9 Unit-1	Bases of Curriculum Sociological	01
		CCH-3 Unit-1	Relationship between Education and Sociology.	01

Counter Sign. by HOD

Sign. of Teacher

PROGRESS

Sl. No.	Date	Time	Topics Covered (If class not taken, mention the reasons)	Signature of Teacher
1	2	3	4	5
	17/6	10.15-11	Meaning of Education + Meaning of Society	
		11.00-11.45	Meaning + Definition of Guidance	
	18/6	10.15-11.00	Meaning + Definition of Curriculum.	
		12.30-1.15	Relationship between Education and Society.	
		2.00-2.45	Nature + Scope of Guidance.	
	30/6	10.15-11.00	Concept of Syllabus + Courses of Study.	
		12.30-1.15	School as a miniature Society	
		1.15-2.00	Philosophical bases of Guidance	
	July 3/7	10.15-11.00	Text Book & Curriculum.	
		12.30-1.15	Educational Sociology-Concept + Nature	
		2.00-2.45	Psychological bases of Guidance	
	4/7	11.00-11.45	Scope and Importance and Educational Sociology	
		12.30-1.15	Bases of Curriculum. Philosophical	
	5/7	11.00-11.45	Sociological bases of Guidance	
		12.30-1.15	Bases of Curriculum Sociological	
		1.15-2.00	Relationship between Education and Sociology	

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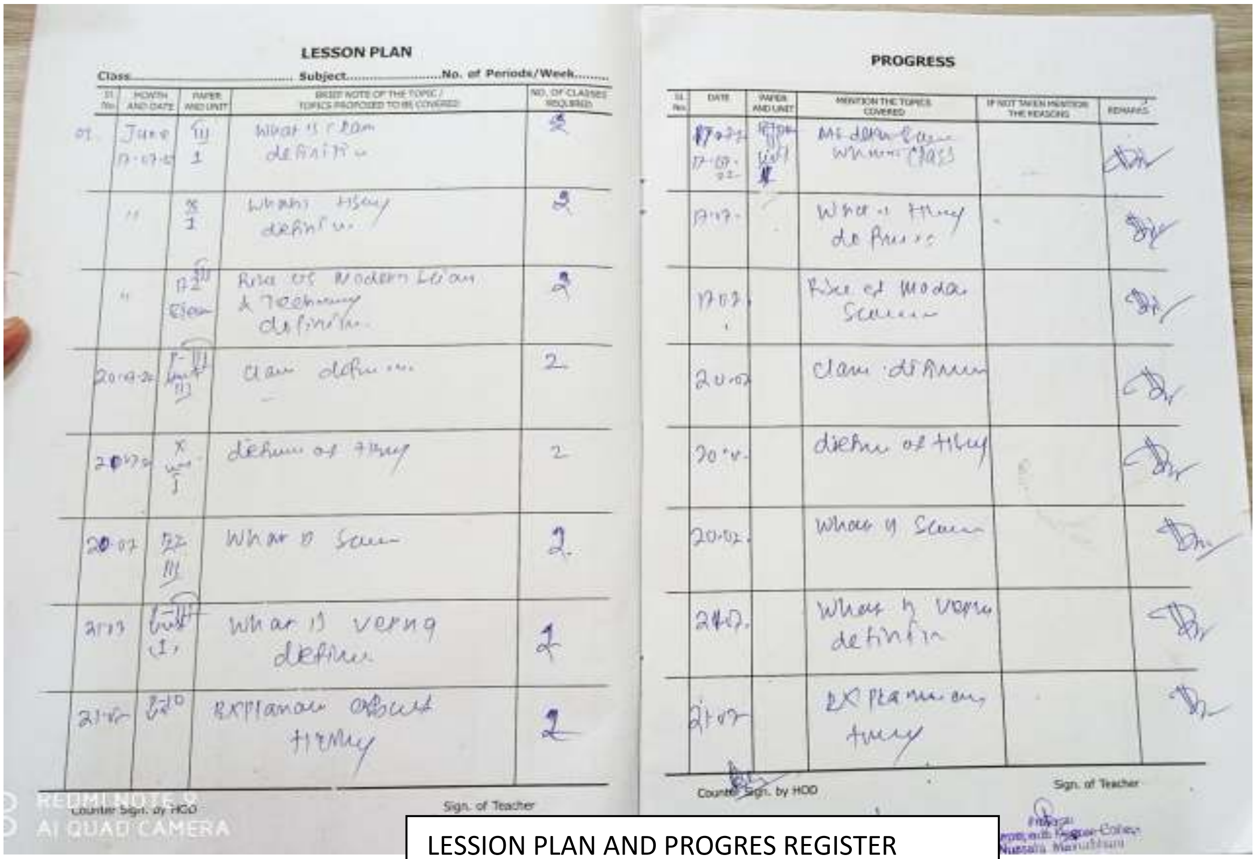
Principal
[illegible] Degree College
Nuasahi, Mayurbhanj



LESSON PLAN

Class............................ Subject......................No. of Periods/Week........

Sl. No.	MONTH AND DATE	PAPER AND UNIT	BRIEF NOTE OF THE TOPIC / TOPICS PROPOSED TO BE COVERED	NO. OF CLASSES REQUIRED

Counter Sign. by HOD

Sign. of Teacher

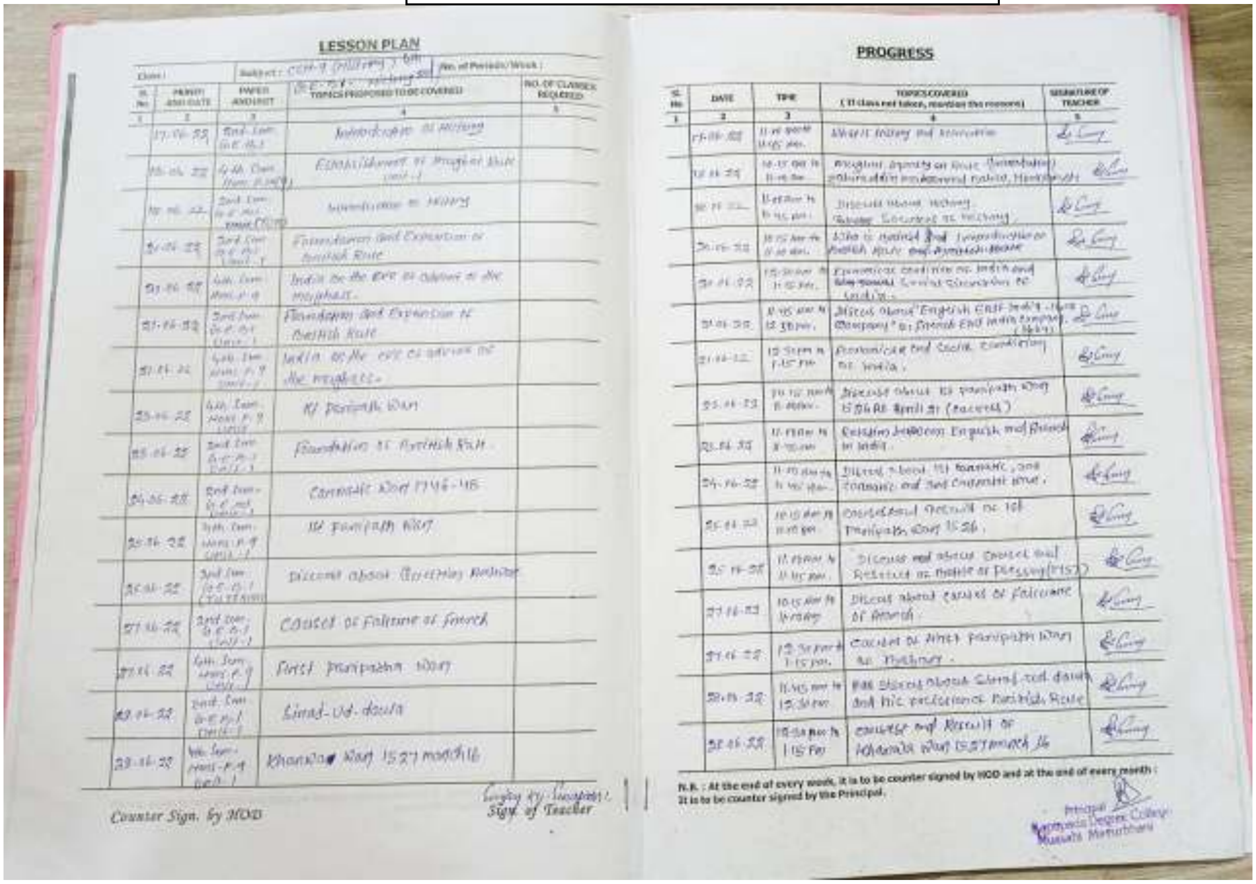
PROGRESS

Sl. No.	DATE	PAPER AND UNIT	MENTION THE TOPICS COVERED	IF NOT TAKEN MENTION THE REASONS	REMARKS

Counter Sign. by HOD

Sign. of Teacher

LESSION PLAN AND PROGRES REGISTER



LESSON PLAN

Class: Subject: No. of Periods/Week:

Sl. No.	MONTH AND DATE	PAPER AND UNIT	TOPICS PROPOSED TO BE COVERED	NO. OF CLASSES REQUIRED
1	2	3	4	5

Counter Sign. by HOD

Sign. of Teacher

PROGRESS

Sl. No.	DATE	TIME	TOPICS COVERED (If class not taken, mention the reasons)	SIGNATURE OF TEACHER
1	2	3	4	5

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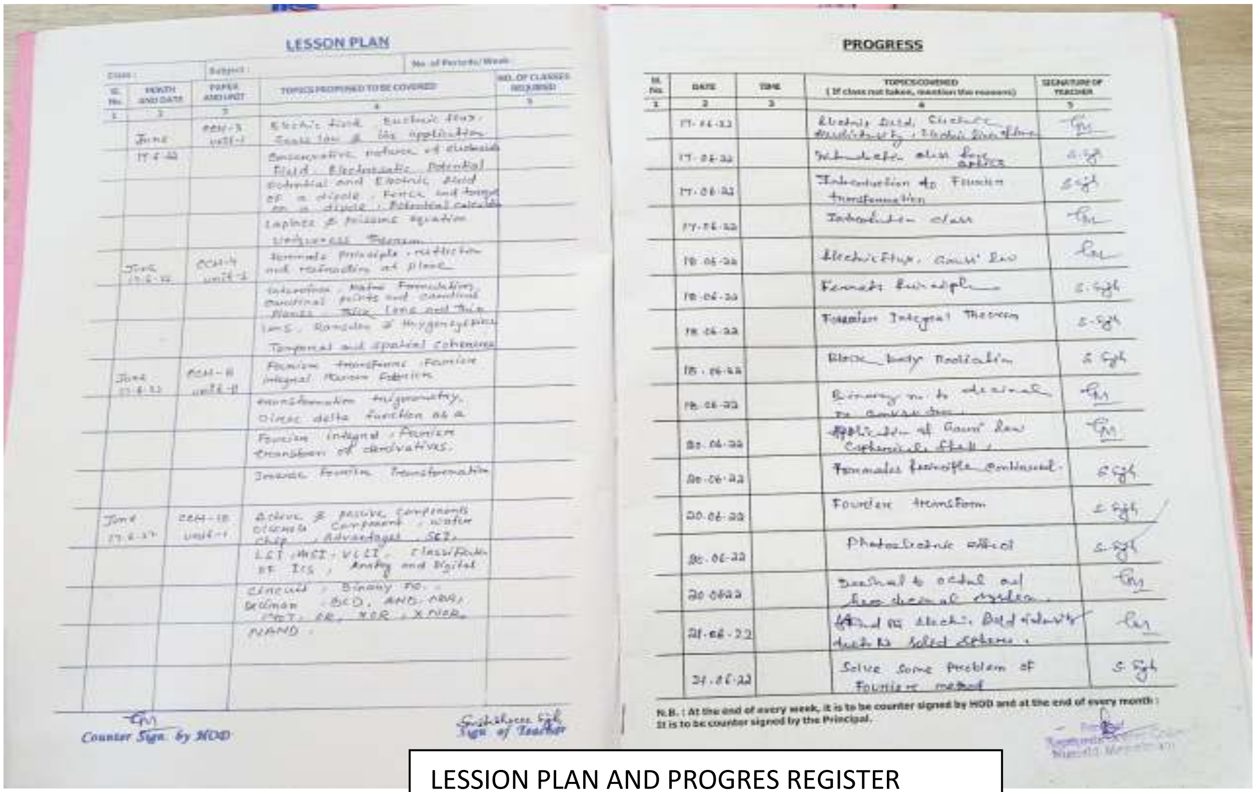

LESSON PLAN

Class : Subject : No. of Periods/Week

Sl. No.	MONTH AND DATE	PAPER AND UNIT	TOPICS PROPOSED TO BE COVERED	NO. OF CLASSES REQUIRED
1	2	3	4	5
	June 17-6-22	CCH-3 unit-1	Electric field, Electric flux, Gauss law & its application Conservative nature of electric field. Electrostatic Potential Potential and Electric field of a dipole. Force and torque on a dipole. Potential calculation Laplace & Poisson's equation Uniqueness Theorem	
	June 17-6-22	CCH-4 unit-1	Fermat's Principle, reflection and refraction at plane interface. Matrix Formulation, cardinal points and cardinal planes. Thick lens and thin lens. Ramsden & Huygens eyepiece Temporal and spatial coherence	
	June 17-6-22	CCH-8 unit-II	Fourier transforms, Fourier integral, Fourier [illegible] transformation trigonometry, Dirac delta function as a Fourier integral, Fourier transform of derivatives. Inverse Fourier transformation	
	June 17-6-22	CCH-10 unit-1	Active & passive components, discrete component, wafer chip, Advantages, SSI, LSI, MSI, VLSI, Classification of ICs, Analog and Digital circuit, Binary no., Decimal, BCD, AND, NOR, NOT, OR, XOR, XNOR, NAND.	

Counter Sign. by HOD

Sign of Teacher

PROGRESS

Sl. No.	DATE	TIME	TOPICS COVERED (If class not taken, mention the reasons)	SIGNATURE OF TEACHER
1	2	3	4	5
	17-06-22		Electric field, Electric [illegible], Electric lines of force	
	17-06-22		Introduction about the optics	S. Sgh
	17-06-22		Introduction to Fourier transformation	S. Sgh
	17-06-22		Introduction class	
	18-06-22		Electric Flux, Gauss' law	
	18-06-22		Fermat's Principle	S. Sgh
	18-06-22		Fourier Integral Theorem	S. Sgh
	18-06-22		Black body radiation	S. Sgh
	18-06-22		Binary no. to decimal no. conversion	
	20-06-22		Application of Gauss' law spherical shell	
	20-06-22		Fermat's principle continued	S. Sgh
	20-06-22		Fourier transform	S. Sgh
	20-06-22		Photoelectric effect	S. Sgh
	20-06-22		Decimal to octal and hexadecimal system	
	21-06-22		Field of electric field intensity due to solid sphere	
	21-06-22		Solve some problem of Fourier method	S. Sgh

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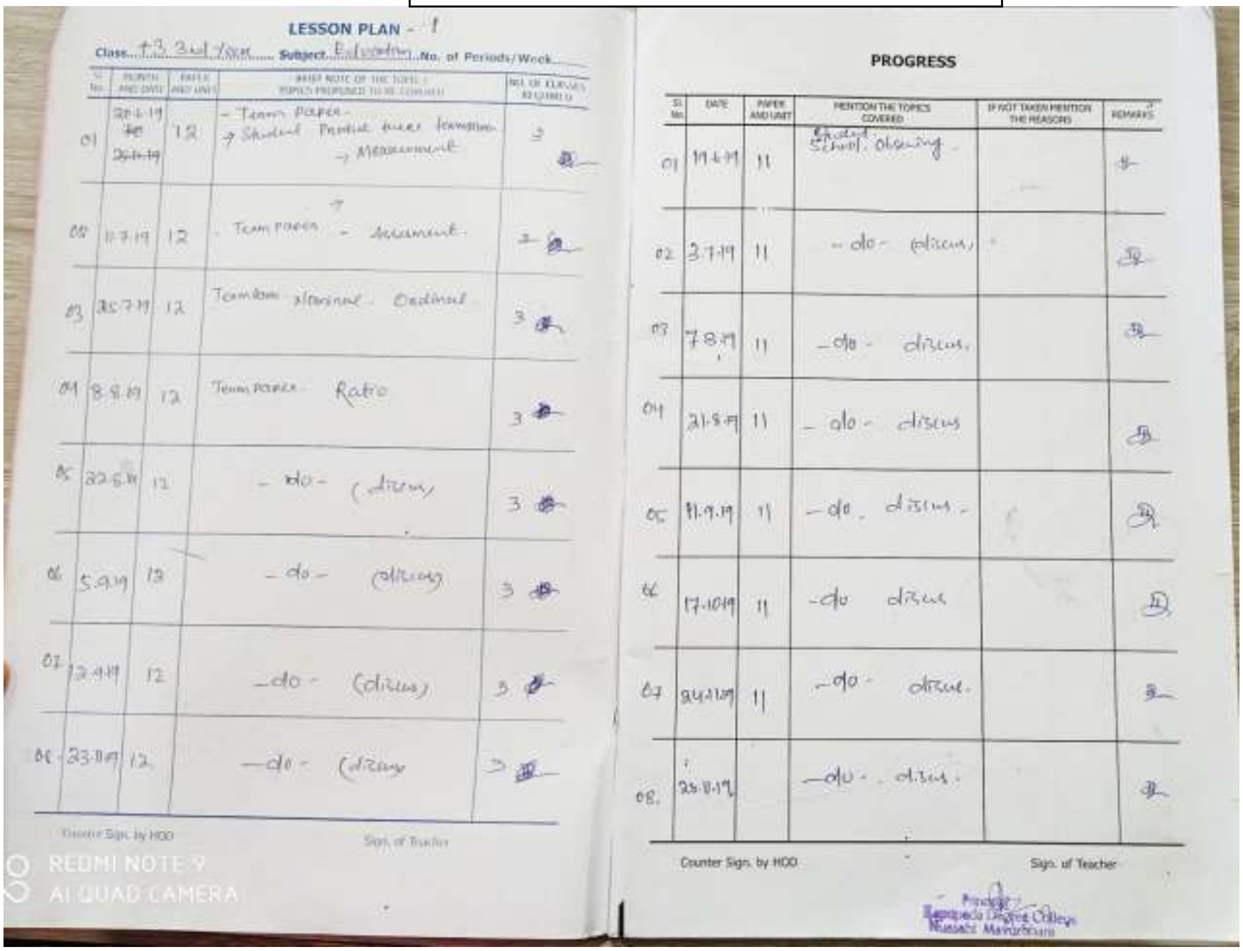
Principal

LESSION PLAN AND PROGRES REGISTER



LESSON PLAN - 1

Class +3 3rd Year Subject Education No. of Periods/Week

Sl. No.	MONTH AND DATE	PAPER AND UNIT	BRIEF NOTE OF THE TOPIC / TOPICS PROPOSED TO BE COVERED	NO. OF CLASSES REQUIRED
01	20-6-19 to 26-6-19	12	- Team paper - → Student Profile [illegible] formation → Measurement	3
02	11.7.19	12	Team paper - Assessment	3
03	25.7.19	12	Team paper Nominal Ordinal	3
04	8.8.19	12	Team paper Ratio	3
05	22.8.19	12	-do- (discuss)	3
06	5.9.19	12	-do- (discuss)	3
07	12.9.19	12	-do- (discuss)	3
08	23.11.19	12	-do- (discuss)	3

Counter Sign. by HOD

Sign. of Teacher

REDMI NOTE 9
AI QUAD CAMERA

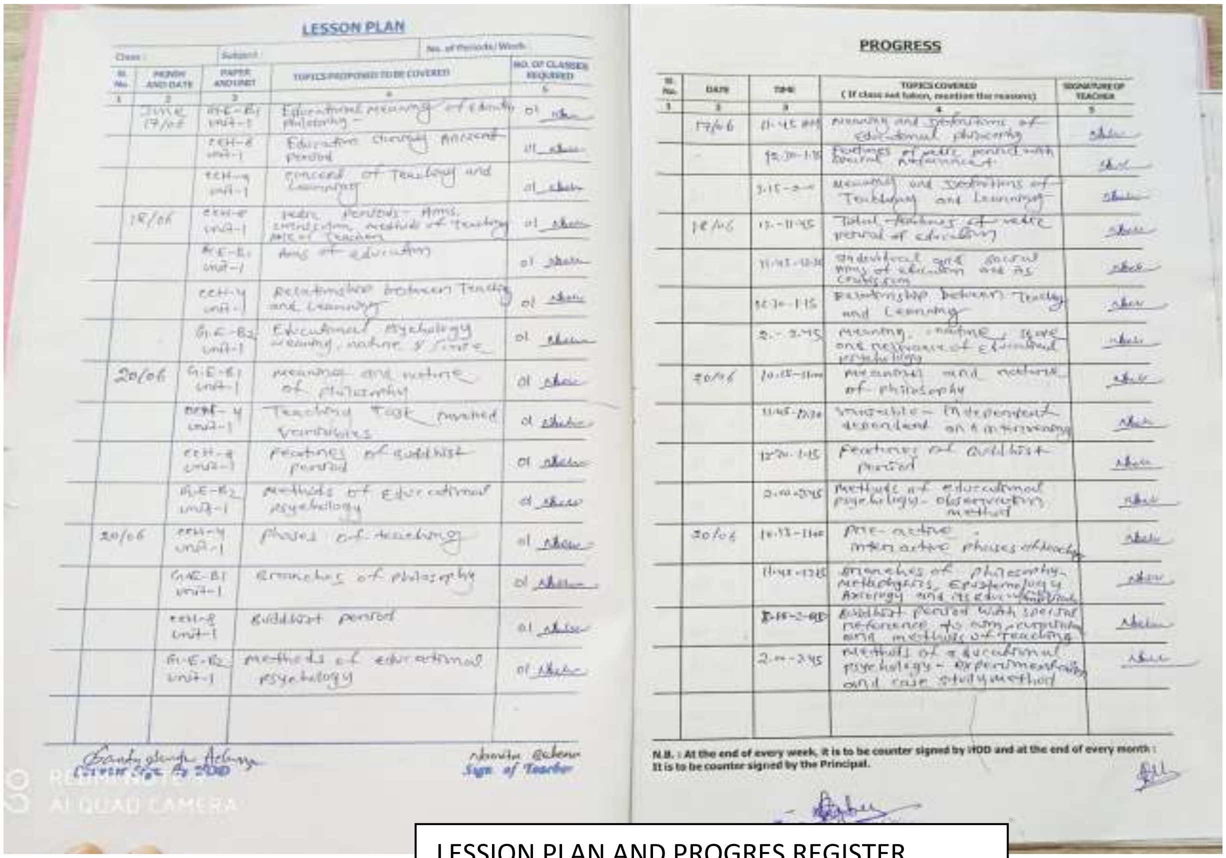
PROGRESS

Sl. No.	DATE	PAPER AND UNIT	MENTION THE TOPICS COVERED	IF NOT TAKEN MENTION THE REASONS	REMARKS
01	19.6.19	11	Student School Observing		
02	3.7.19	11	-do- (discuss)		
03	7.8.19	11	-do- discuss.		
04	21.8.19	11	-do- discuss		
05	11.9.19	11	-do- discuss.		
06	17.10.19	11	-do- discuss		
07	24.10.19	11	-do- discuss.		
08.	23.11.19		-do- discuss.		

Counter Sign. by HOD

Sign. of Teacher

Principal
[illegible] Degree College
[illegible] Mayurbhanj



LESSON PLAN

Class : Subject : No. of Periods/Week :

Sl. No.	Month and Date	Paper and Unit	Topics proposed to be covered	No. of classes required
1	2	3	4	5
	June 17/06	G-E-B1 Unit-1	Educational meaning of Education philosophy –	01
		CCH-8 Unit-1	Education during Ancient period	01
		CCH-4 Unit-1	Concept of Teaching and Learning	01
	18/06	CCH-8 Unit-1	Vedic Period – Aims, curriculum, method of teaching, role of teacher	01
		G-E-B1 Unit-1	Aims of education	01
		CCH-4 Unit-1	Relationship between Teaching and Learning	01
		G-E-B2 Unit-1	Educational psychology meaning, nature & scope	01
	20/06	G-E-B1 Unit-1	meaning and nature of philosophy	01
		CCH-4 Unit-1	Teaching task involved variables	01
		CCH-8 Unit-1	Features of Buddhist period	01
		G-E-B2 Unit-1	methods of Educational psychology	01
	20/06	CCH-4 Unit-1	phases of teaching	01
		G-E-B1 Unit-1	Branches of philosophy	01
		CCH-8 Unit-1	Buddhist period	01
		G-E-B2 Unit-1	methods of educational psychology	01

Counter Sign by HOD

Sign of Teacher

PROGRESS

Sl. No.	Date	Time	Topics covered (If class not taken, mention the reasons)	Signature of Teacher
1	2	3	4	5
	17/06	11-45 am	Meaning and Definitions of Educational philosophy	
		12.30-1.15	Features of vedic period with special reference	
		2.15-3.00	Meaning and Definitions of Teaching and Learning	
	18/06	11.-11.45	Total features of vedic period of education	
		11.45-12.30	Individual and social aims of education and its criticism	
		12.30-1.15	Relationship between Teaching and Learning	
		2.-2.45	Meaning, nature, scope and relevance of Educational psychology	
	20/06	10.15-11am	meaning and nature of philosophy	
		11.45-12.30	variable – Independent dependent and intervening	
		12.30-1.15	Features of Buddhist period	
		2.00-2.45	Methods of educational psychology – observation method	
	20/06	10.15-11.00	Pre-active, interactive phases of teaching	
		11.45-12.30	Branches of philosophy – metaphysics, Epistemology, Axiology and its educational	
		1.15-2.00	Buddhist period with special reference to aim, curriculum and methods of teaching	
		2.00-2.45	Methods of educational psychology – experimental and case study method	

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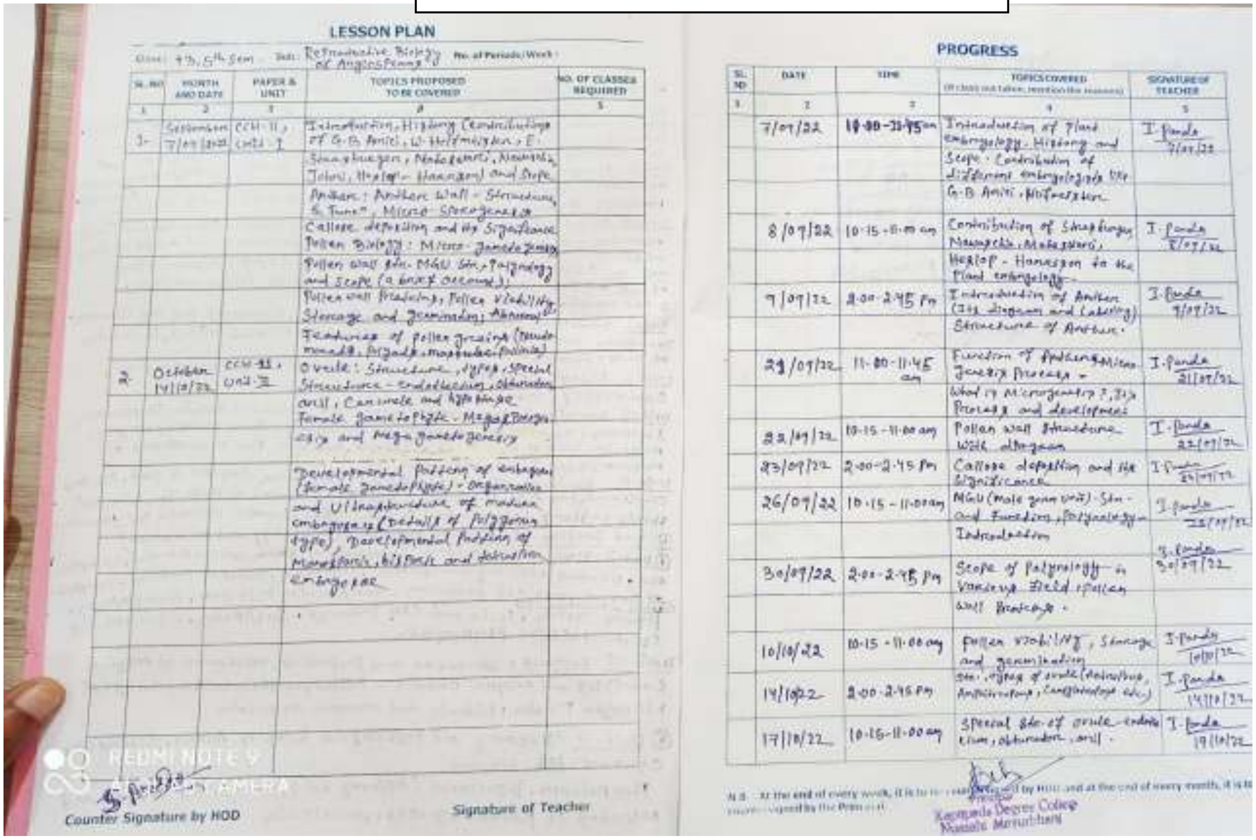
LESSION PLAN AND PROGRES REGISTER



LESSON PLAN

Class : +3, 5th Sem Sub : Reproductive Biology of Angiosperms No. of Periods/Week :

Sl. No.	Month and Date	Paper & Unit	Topics proposed to be covered	No. of classes required
1	2	3	4	5
1-	September 7/09/2022	CCH-11, Unit-I	Introduction, History (Contributions of G.B. Amici, W. Hofmeister, E. Strasburger, Maheshwari, Nawaschin, Johri, Heslop-Harrison) and Scope. Anther: Anther wall – Structure & Function, Microsporogenesis, Callose deposition and its significance. Pollen Biology: Microgametogenesis, Pollen wall str., MGU str., Palynology and scope (a brief account); Pollen wall proteins, Pollen viability, Storage and germination; Abnormal features of pollen grains (Pseudomonads, Polyads, Massulae, Pollinia)	
2	October 14/10/22	CCH-11, Unit-II	Ovule: Structure, types, special structures – endothelium, obturator, aril, Caruncle and hypostase. Female gametophyte – Megasporogenesis and mega gametogenesis. Developmental pattern of embryo sac (female gametophyte) – Organization and Ultrastructure of mature embryo sac (Details of Polygonum type), Developmental pattern of Monosporic, bisporic and tetrasporic embryo sac	

Counter Signature by HOD

Signature of Teacher

PROGRESS

Sl. No.	Date	Time	Topics covered (If class not taken, mention the reasons)	Signature of Teacher
1	2	3	4	5
	7/09/22	10.00-10.45 am	Introduction of Plant embryology, History and Scope. Contribution of different embryologists like G.B. Amici, Hofmeister	I. Panda 7/09/22
	8/09/22	10.15-11.00 am	Contribution of Strasburger, Nawaschin, Maheshwari, Heslop-Harrison to the Plant embryology.	I. Panda 8/09/22
	9/09/22	2.00-2.45 pm	Introduction of Anther (its diagram and labelling) Structure of Anther.	I. Panda 9/09/22
	21/09/22	11.00-11.45 am	Function of Anther, Microsporogenesis process – What is Microsporogenesis?, its process and development	I. Panda 21/09/22
	22/09/22	10.15-11.00 am	Pollen wall structure with diagram	I. Panda 22/09/22
	23/09/22	2.00-2.45 pm	Callose deposition and its significance	I. Panda 23/09/22
	26/09/22	10.15-11.00 am	MGU (male germ unit) Str. and Function, Palynology – Introduction	I. Panda 26/09/22
	30/09/22	2.00-2.45 pm	Scope of Palynology in various field, Pollen wall proteins.	I. Panda 30/09/22
	10/10/22	10.15-11.00 am	Pollen viability, Storage and germination	I. Panda 10/10/22
	14/10/22	2.00-2.45 pm	Str., types of ovule (Anatropous, Amphitropous, Campylotropous etc.)	I. Panda 14/10/22
	17/10/22	10.15-11.00 am	Special str. of ovule – endothelium, obturator, aril.	I. Panda 17/10/22

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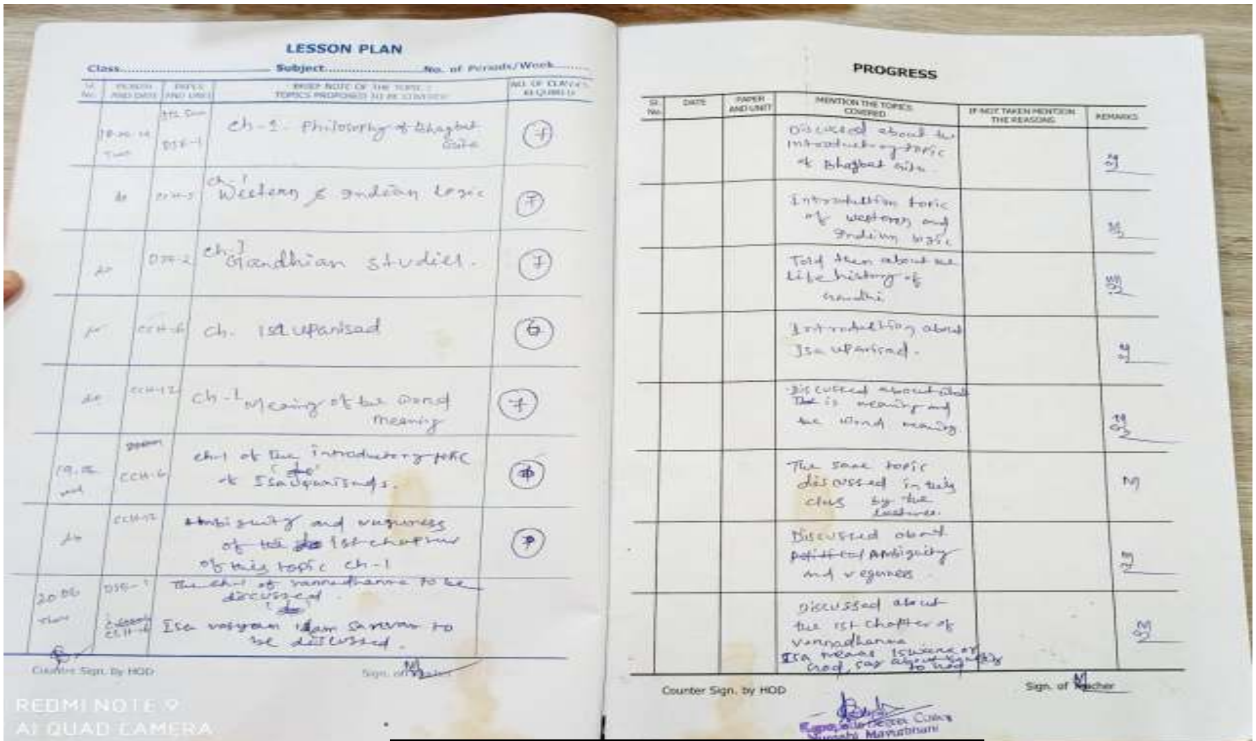
Principal
[illegible] Degree College
[illegible] Mayurbhanj



LESSON PLAN

Class.................... Subject.................... No. of Periods/Week..........

Sl. No.	Periods and Date	Paper and Unit	Brief note of the topic / Topics proposed to be covered	No. of classes required
	18.06.19 Tue	DSE-1	ch-1 Philosophy of Bhagbat Gita	7
	do	CCH-5	ch-1 Western & Indian logic	7
	do	DSE-2	ch-1 Gandhian studies.	7
	do	CCH-6	ch. Isa upanisad	6
	do	CCH-12	ch-1 Meaning of the word meaning	7
	19.06 Wed	CCH-6	ch-1 of the introductory topic of Isa Upanisads.	7
	do	CCH-12	Ambiguity and vagueness of the 1st chapter of this topic ch-1	7
	20.06 Thu	DSE-1 CCH-6	The ch-1 of vannadharma to be discussed. Isa vasyam idam sarvam to be discussed.	

Counter Sign. by HOD Sign. of Teacher

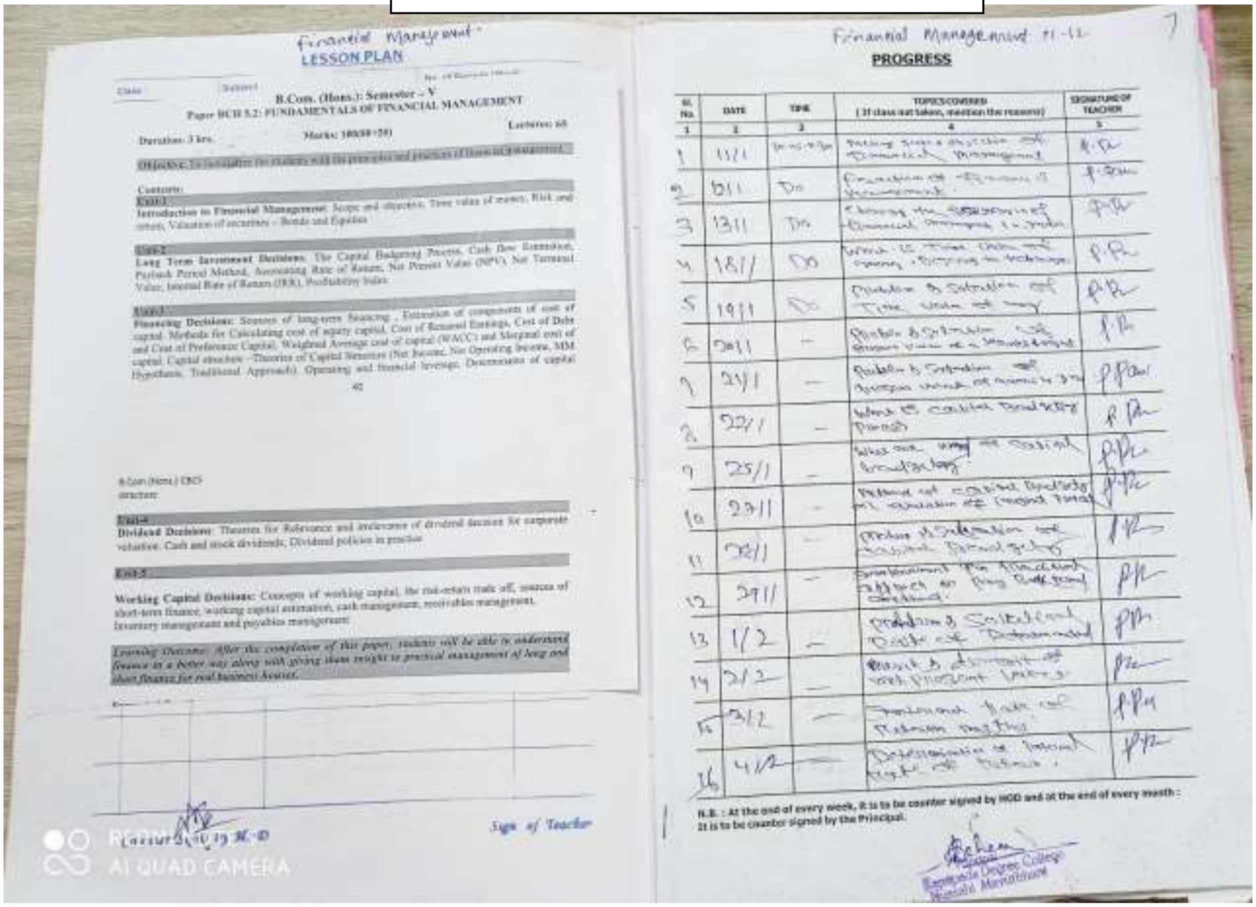
PROGRESS

Sl. No.	Date	Paper and Unit	Mention the topics covered	If not taken mention the reasons	Remarks
			Discussed about the introductory topic of Bhagbat Gita		
			Introduction topic of western and Indian logic		
			Told them about the life history of Gandhi		
			Introduction about Isa upanisad.		
			Discussed about what is meaning and the word meaning		
			The same topic discussed in this class by the lecturer.		M
			Discussed about ~~political~~ Ambiguity and vagueness		
			Discussed about the 1st chapter of vannadharma Isa means Isvara or God, say about [illegible]		

Counter Sign. by HOD Sign. of Teacher

[illegible] Degree College Manbhum

LESSION PLAN AND PROGRES REGISTER



Financial Management

LESSON PLAN

Class Subject No. of Periods/Week

B.Com. (Hons.): Semester – V

Paper BCH 5.2: FUNDAMENTALS OF FINANCIAL MANAGEMENT

Duration: 3 hrs. Marks: 100(80+20) Lectures: 65

Objective: To familiarize the students with the principles and practices of financial management.

Contents:

Unit-1

Introduction to Financial Management: Scope and objectives, Time value of money, Risk and return, Valuation of securities – Bonds and Equities

Unit-2

Long Term Investment Decisions: The Capital Budgeting Process, Cash flow Estimation, Payback Period Method, Accounting Rate of Return, Net Present Value (NPV), Net Terminal Value, Internal Rate of Return (IRR), Profitability Index.

Unit-3

Financing Decisions: Sources of long-term financing, Estimation of components of cost of capital. Methods for Calculating cost of equity capital, Cost of Retained Earnings, Cost of Debt and Cost of Preference Capital, Weighted Average cost of capital (WACC) and Marginal cost of capital. Capital structure – Theories of Capital Structure (Net Income, Net Operating Income, MM Hypothesis, Traditional Approach). Operating and financial leverage. Determinants of capital

40

B.Com (Hons.) CBCS structure

Unit-4

Dividend Decisions: Theories for Relevance and irrelevance of dividend decision for corporate valuation. Cash and stock dividends, Dividend policies in practice

Unit-5

Working Capital Decisions: Concepts of working capital, the risk-return trade off, sources of short-term finance, working capital estimation, cash management, receivables management, inventory management and payables management

Learning Outcome: After the completion of this paper, students will be able to understand finance in a better way along with giving them insight to practical management of long and short finance for real business houses.

Sign of Teacher

Financial Management 11-12

PROGRESS

Sl. No.	DATE	TIME	TOPICS COVERED (If class not taken, mention the reasons)	SIGNATURE OF TEACHER
1	2	3	4	5
1	11/1	10.45-11.30	Making students aware of financial management	
2	12/1	Do	Function of financial management	
3	13/1	Do	Changing the scenario of financial management in India	
4	18/1	Do	What is Time value of money, [illegible]	
5	19/1	Do	Problem & Solution of Time value of money	
6	20/1	–	Problem & Solution of present value of a [illegible]	
7	21/1	–	Problem & Solution of [illegible]	
8	22/1	–	What is capital budgeting process	
9	25/1	–	What are ~~[illegible]~~ of capital budgeting	
10	27/1	–	Method of capital budgeting [illegible]	
11	28/1	–	Problem & Solution of capital budgeting	
12	29/1	–	[illegible]	
13	1/2	–	Problem & Solution of [illegible]	
14	2/2	–	[illegible] net present value	
15	3/2	–	[illegible] rate of return method	
16	4/2	–	Determination of Internal Rate of Return.	

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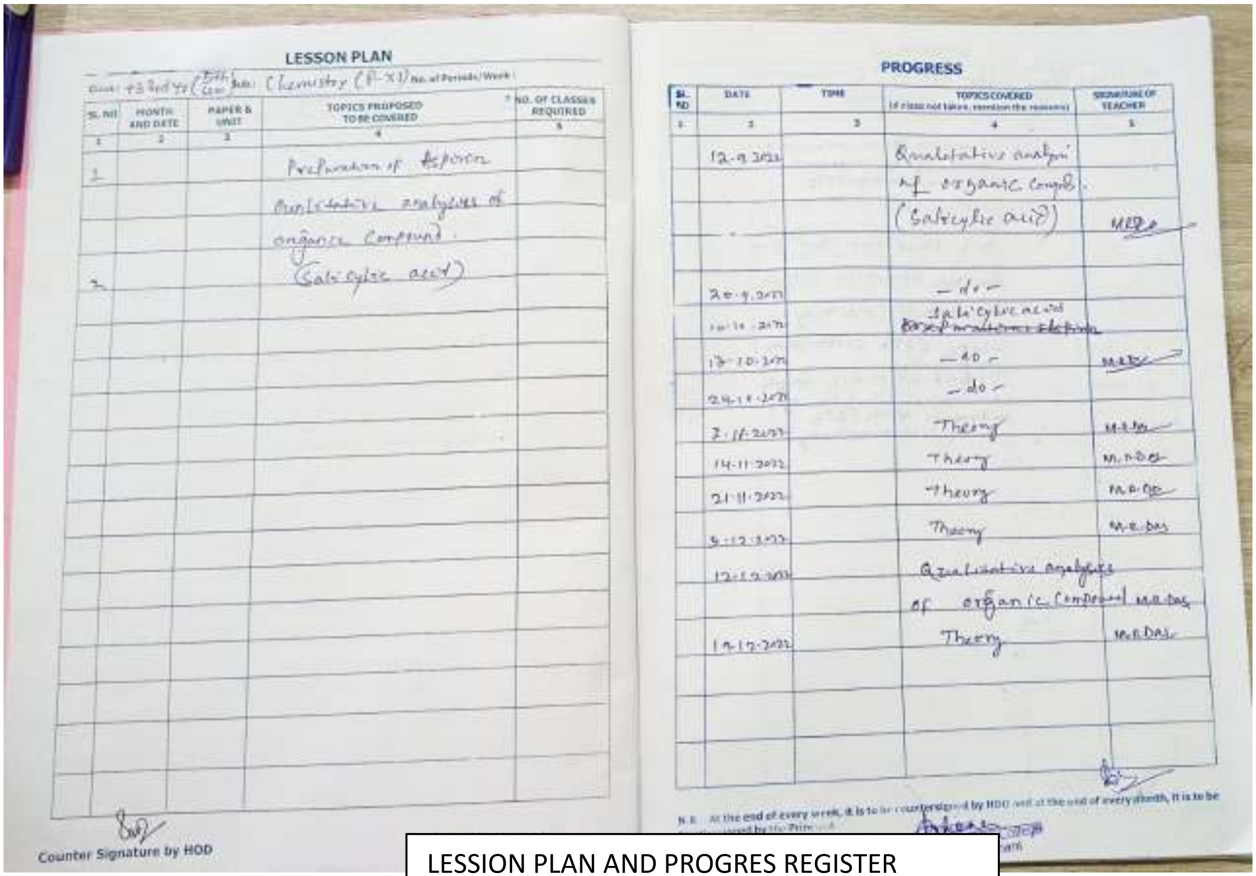
[illegible] Degree College Manbhum



LESSON PLAN

Class: +3 3rd Yr (5th Sem) Sub: Chemistry (P-XI) No. of Periods/Week:

SL. NO	MONTH AND DATE	PAPER & UNIT	TOPICS PROPOSED TO BE COVERED	NO. OF CLASSES REQUIRED
1	2	3	4	5
1			Preparation of Aspirin	
			Qualitative analysis of	
			organic Compound.	
2			(Salicylic acid)	

Counter Signature by HOD

PROGRESS

SL. NO	DATE	TIME	TOPICS COVERED (if class not taken, mention the reasons)	SIGNATURE OF TEACHER
1	2	3	4	5
	12-9-2022		Qualitative analysis	
			of organic compd.	
			(Salicylic acid)	M.R.Das
	20-9-2022		-do-	
	10-10-2022		Salicylic acid	
	17-10-2022		-do-	M.R.Das
	24-10-2022		-do-	
	7-11-2022		Theory	M.R.Das
	14-11-2022		Theory	M.R.Das
	21-11-2022		Theory	M.R.Das
	5-12-2022		Theory	M.R.DAS
	12-12-2022		Qualitative analysis	
			of organic compound	M.R.DAS
	19-12-2022		Theory	M.R.DAS

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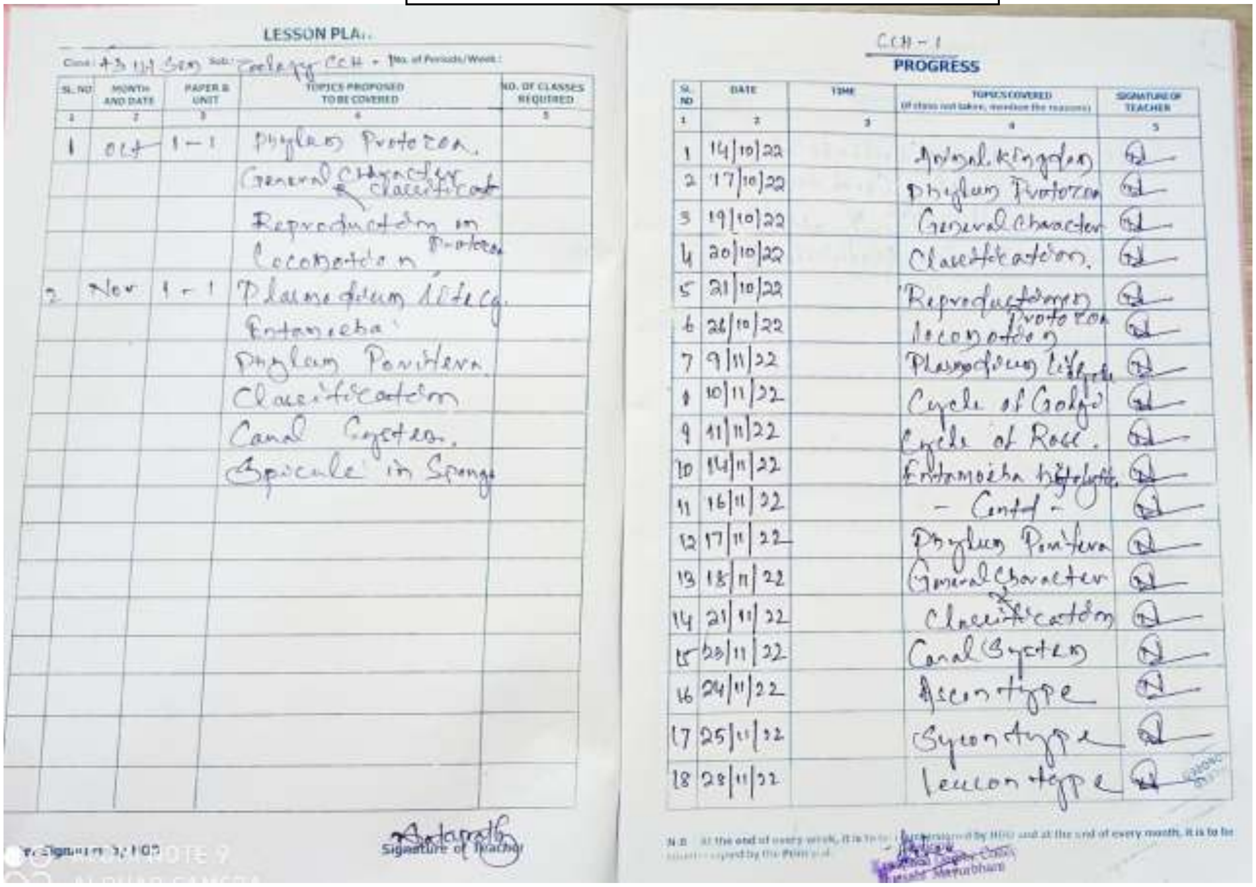
LESSION PLAN AND PROGRES REGISTER



LESSON PLAN

Class: +3 1st Sem Sub: Zoology CCH - 1 No. of Periods/Week:

SL. NO	MONTH AND DATE	PAPER & UNIT	TOPICS PROPOSED TO BE COVERED	NO. OF CLASSES REQUIRED
1	2	3	4	5
1	Oct	1 - 1	Phylum Protozoa.	
			General Character & Classification	
			Reproduction in	
			Locomotion, Protozoa	
2	Nov	1 - 1	Plasmodium life cy.	
			Entamoeba	
			Phylum Porifera.	
			Classification	
			Canal System.	
			Spicule in Sponge	

Counter Signature by HOD

Satapathy
Signature of Teacher

CCH - 1

PROGRESS

SL. NO	DATE	TIME	TOPICS COVERED (if class not taken, mention the reasons)	SIGNATURE OF TEACHER
1	2	3	4	5
1	14/10/22		Animal Kingdom	
2	17/10/22		Phylum Protozoa	
3	19/10/22		General Character	
4	20/10/22		Classification.	
5	21/10/22		Reproduction in Protozoa	
6	26/10/22		locomotion	
7	9/11/22		Plasmodium Life cycle	
8	10/11/22		Cycle of Golgi	
9	11/11/22		Cycle of Ross.	
10	14/11/22		Entamoeba histolytica.	
11	16/11/22		- Contd -	
12	17/11/22		Phylum Porifera	
13	18/11/22		General Character &	
14	21/11/22		Classification	
15	23/11/22		Canal System	
16	24/11/22		Ascon type	
17	25/11/22		Sycon type	
18	28/11/22		leucon type	

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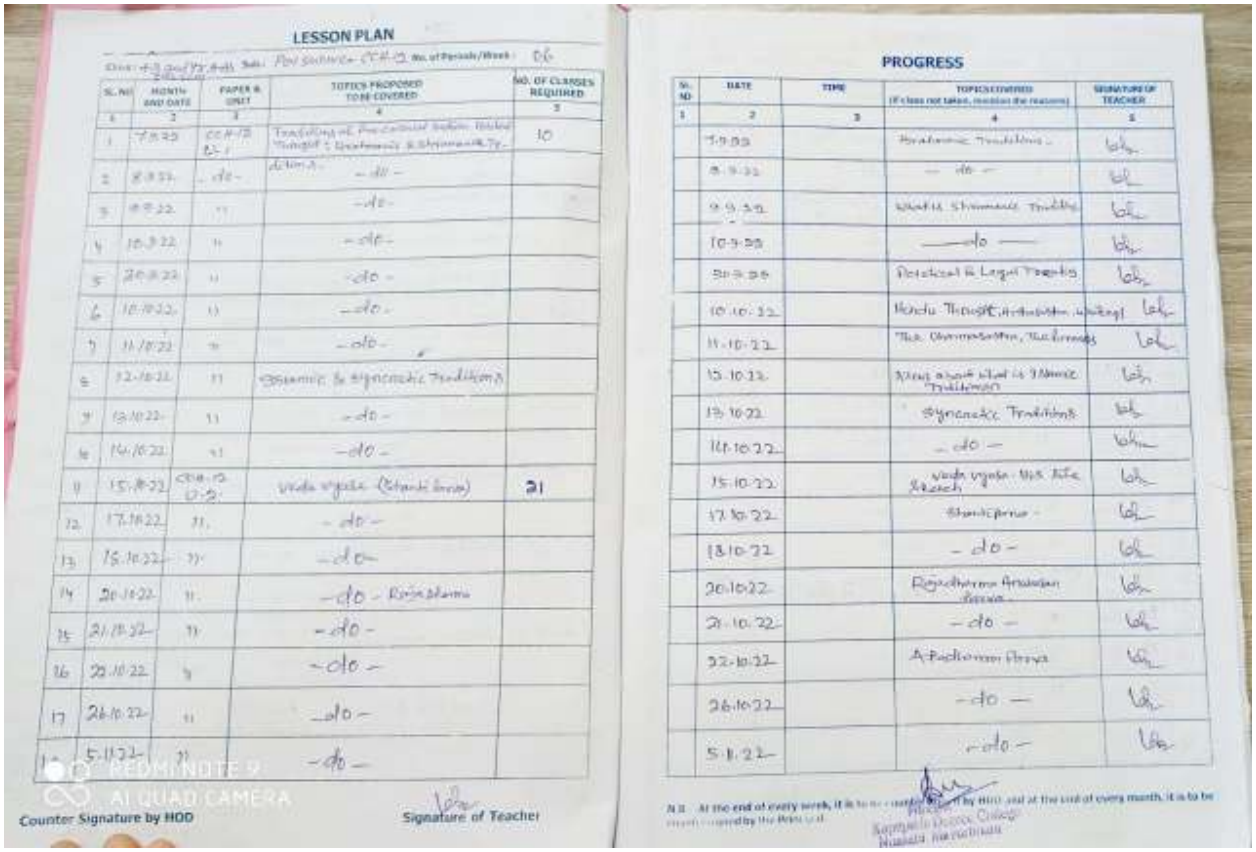

LESSON PLAN

Class: +3 2nd/3rd Arts Sub.: Pol Science CCH-12 No. of Periods/Week: 06

SL. NO	MONTH AND DATE	PAPER & UNIT	TOPICS PROPOSED TO BE COVERED	NO. OF CLASSES REQUIRED
1	2	3	4	5
1	7.9.22	CCH-12 U-1	Traditions of Pre-colonial Indian Political Thought: Brahmanic & Shramanic Tr-	10
2	8.9.22	-do-	ditions. -do-	
3	9.9.22	"	-do-	
4	10.9.22	"	-do-	
5	20.9.22	"	-do-	
6	10.10.22	"	-do-	
7	11.10.22	"	-do-	
8	12.10.22	"	Islamic & Syncretic Traditions	
9	13.10.22	"	-do-	
10	14.10.22	"	-do-	
11	15.10.22	CCH-12 U-2	Veda Vyasa (Shanti Parva)	21
12	17.10.22	"	-do-	
13	18.10.22	"	-do-	
14	20.10.22	"	-do- Rajadharma	
15	21.10.22	"	-do-	
16	22.10.22	"	-do-	
17	26.10.22	"	-do-	
18	5.11.22	"	-do-	

Counter Signature by HOD

Signature of Teacher

PROGRESS

SL. NO	DATE	TIME	TOPICS COVERED (If class not taken, mention the reasons)	SIGNATURE OF TEACHER
1	2	3	4	5
	7.9.22		Brahmanic Traditions	
	8.9.22		-do-	
	9.9.22		What is Shramanic Tradition	
	10.9.22		-do-	
	20.9.22		Political & Legal Thoughts	
	10.10.22		Hindu Thought, Arthashastra, [illegible]	
	11.10.22		The Dharmashastra, The [illegible]	
	13.10.22		Knows about what is Islamic Traditions	
	13.10.22		Syncretic Traditions	
	14.10.22		-do-	
	15.10.22		Veda Vyasa: His Life Sketch	
	17.10.22		Shanti Parva	
	18.10.22		-do-	
	20.10.22		Rajadharma Anushasan Parva	
	21.10.22		-do-	
	22.10.22		Apaddharma Parva	
	26.10.22		-do-	
	5.11.22		-do-	

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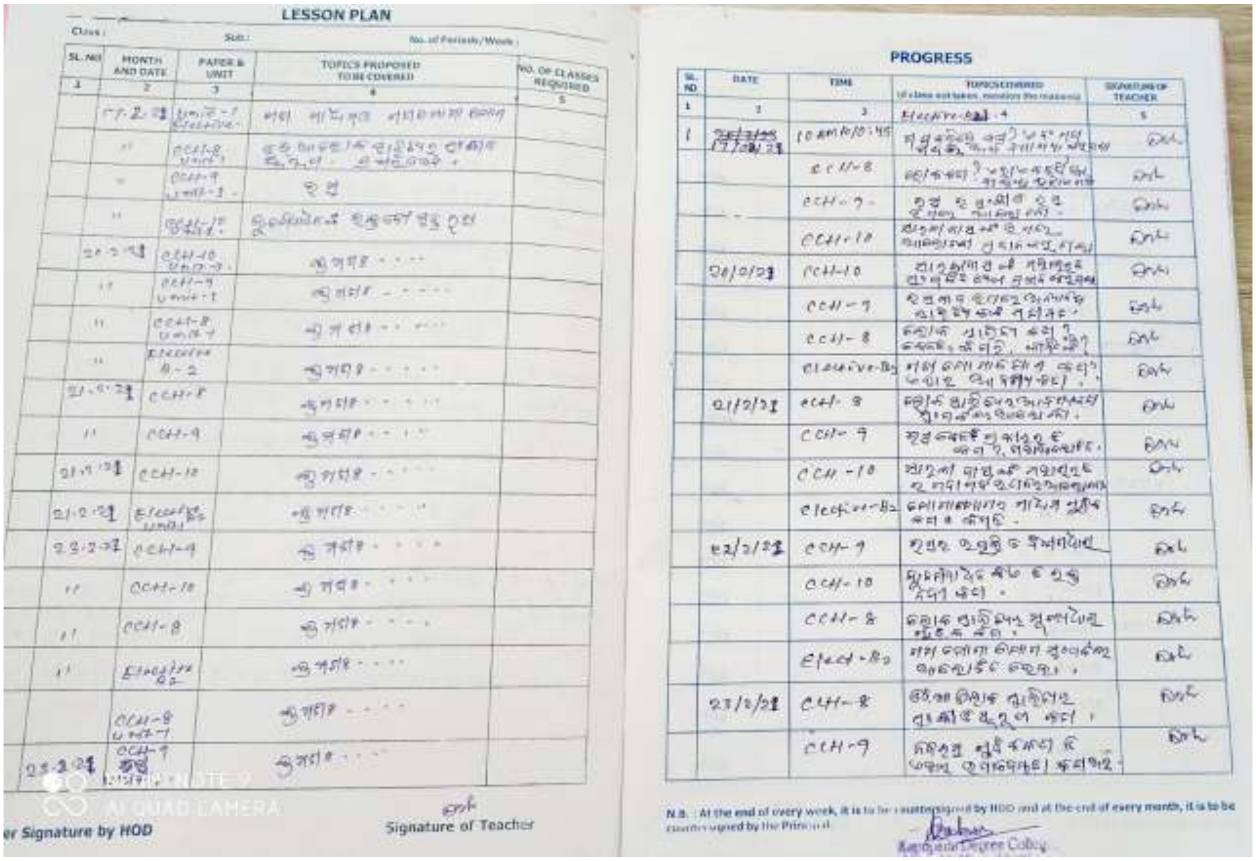
Principal
Kampada Degree College



LESSON PLAN

Class:
Sub.:
No. of Periods/Week:

SL. NO	MONTH AND DATE	PAPER & UNIT	TOPICS PROPOSED TO BE COVERED	NO. OF CLASSES REQUIRED
1	2	3	4	5
	17.2.23	Unit-1 Elective	[illegible]	
	"	CCH-8 Unit-1	[illegible]	
	"	CCH-9 Unit-1	[illegible]	
	"	[illegible]	[illegible]	
	20.2.23	CCH-10 Unit-1	[illegible]	
	"	CCH-9 Unit-1	[illegible]	
	"	CCH-8 Unit-1	[illegible]	
	"	Elective B-2	[illegible]	
	21.2.23	CCH-8	[illegible]	
	"	CCH-9	[illegible]	
	21.2.23	CCH-10	[illegible]	
	21.2.23	Elective B2 Unit-1	[illegible]	
	22.2.23	CCH-9	[illegible]	
	"	CCH-10	[illegible]	
	"	CCH-8	[illegible]	
	"	Elective B2	[illegible]	
		CCH-8 Unit-1	[illegible]	
	23.2.23	CCH-9 [illegible]	[illegible]	

Counter Signature by HOD

Signature of Teacher

PROGRESS

SL. NO	DATE	TIME	TOPICS COVERED (If class not taken, mention the reasons)	SIGNATURE OF TEACHER
1	2	3	Elective-B2-4	5
1	~~[illegible]~~ 17/02/23	10 AM to 10:45	[illegible]	
		CCH-8	[illegible]	
		CCH-9	[illegible]	
		CCH-10	[illegible]	
	20/02/23	CCH-10	[illegible]	
		CCH-9	[illegible]	
		CCH-8	[illegible]	
		Elective-B2	[illegible]	
	21/02/23	CCH-8	[illegible]	
		CCH-9	[illegible]	
		CCH-10	[illegible]	
		Elective-B2	[illegible]	
	22/02/23	CCH-9	[illegible]	
		CCH-10	[illegible]	
		CCH-8	[illegible]	
		Elect-B2	[illegible]	
	23/02/23	CCH-8	[illegible]	
		CCH-9	[illegible]	

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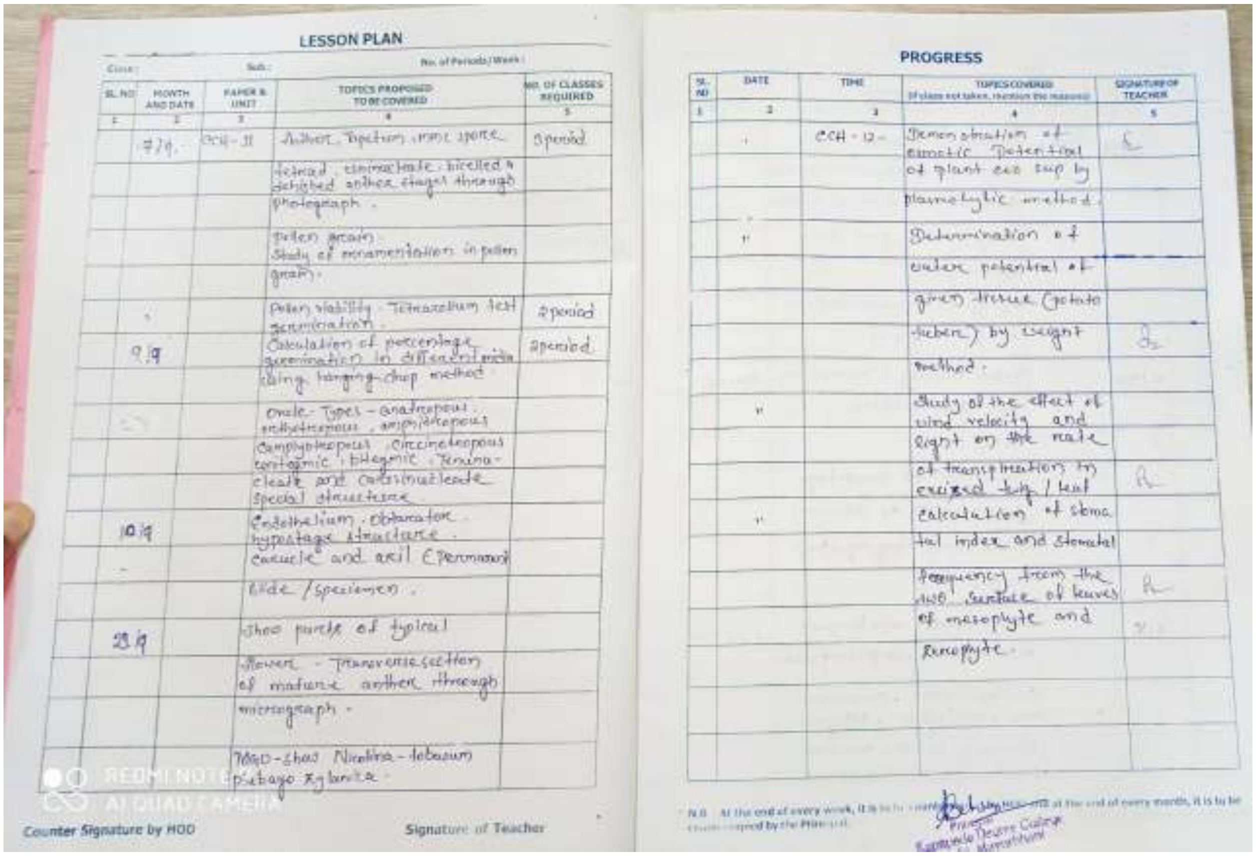

LESSON PLAN

Class : Sub. : No. of Periods / Week :

SL. NO	MONTH AND DATE	PAPER & UNIT	TOPICS PROPOSED TO BE COVERED	NO. OF CLASSES REQUIRED
1	2	3	4	5
	7/9.	CCH - II	Anther, Tapetum, micro spore.	3period
			Tetrad, uninucleate, bicelled & dehisced anther stages through	
			photograph.	
			Pollen grain. Study of ornamentation in pollen	
			grain.	
	"		Pollen viability - Tetrazolium test germination.	2period
	9/9		Calculation of percentage germination in different media	2period
			using hanging drop method.	
			Ovule - Types - anatropous, orthotropous, amphitropous	
			campylotropous, circinotropous unitegmic, bitegmic, Tenuinucellate	
			and crassinucellate special structure	
	10/9		Endothelium, obturator, hypostase structure.	
	-		caruncle and aril (permanent	
			slide / specimen.	
	23/9		Show parts of typical	
			flower - Transverse section of mature anther through	
			micrograph.	
			MGD - show Nicotina - tobacum Ptebayo Xylanita.	

Counter Signature by HOD

Signature of Teacher

PROGRESS

SL. NO	DATE	TIME	TOPICS COVERED (If class not taken, mention the reasons)	SIGNATURE OF TEACHER
1	2	3	4	5
	"	CCH - 12 -	Demonstration of osmotic potential of plant cell sap by	
			plasmolytic method.	
	"		Determination of	
			water potential of	
			given tissue (potato	
			tuber) by weight	
			method.	
	"		Study of the effect of wind velocity and light on the rate	
			of transpiration in excised twig / leaf	
	"		calculation of stomatal index and stomatal	
			frequency from the two surface of leaves	
			of mesophyte and	
			xerophyte.	

N.B. : At the end of every week, it is to be countersigned by the HOD and at the end of every month, it is to be countersigned by the Principal.

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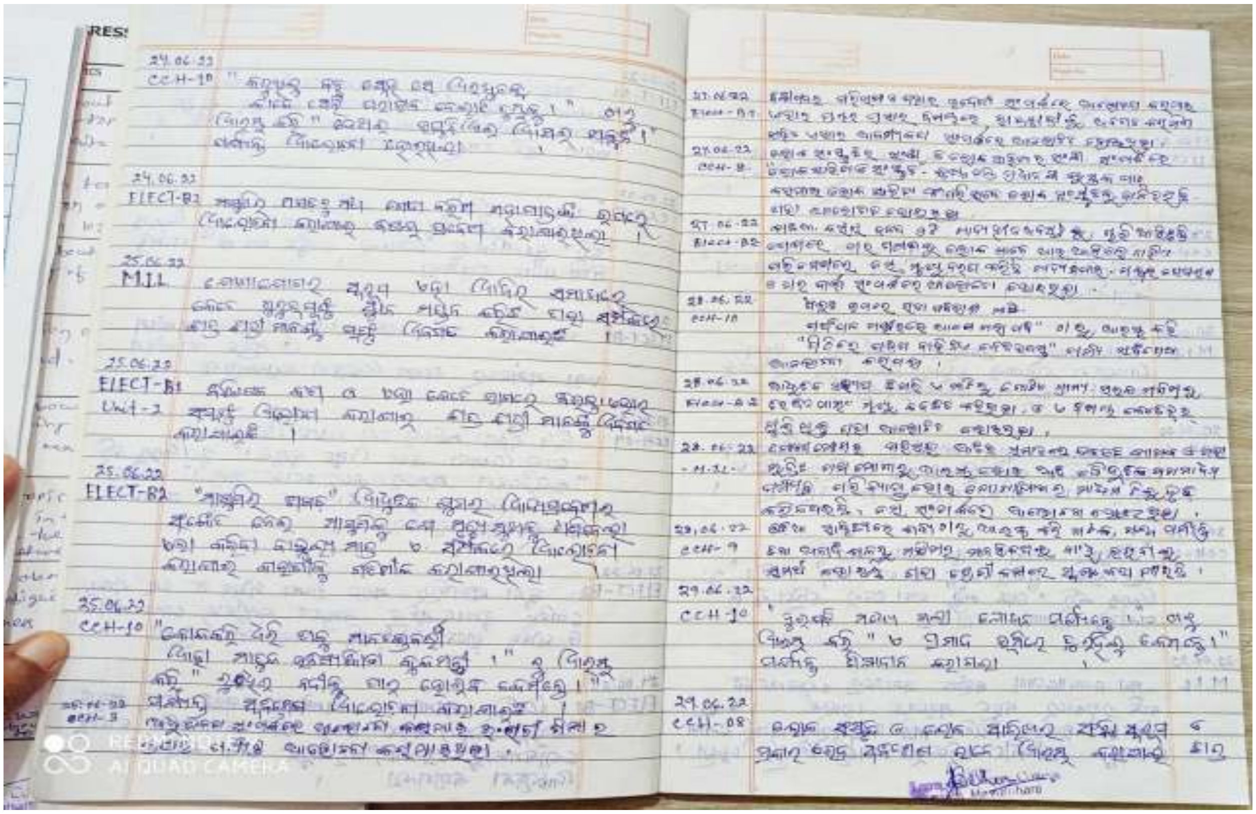


RES

24.06.22
CCH-10 [illegible]

24.06.22
ELECT-B2 [illegible]

25.06.22
MIL [illegible]

25.06.22
ELECT-B1
Unit-2 [illegible]

25.06.22
ELECT-B2 [illegible]

25.06.22
CCH-10 [illegible]

27.06.22 [illegible]

27.06.22
ELECT-B1 [illegible]

27.06.22
CCH-8 [illegible]

27.06.22
ELECT-B2 [illegible]

28.06.22
CCH-10 [illegible]

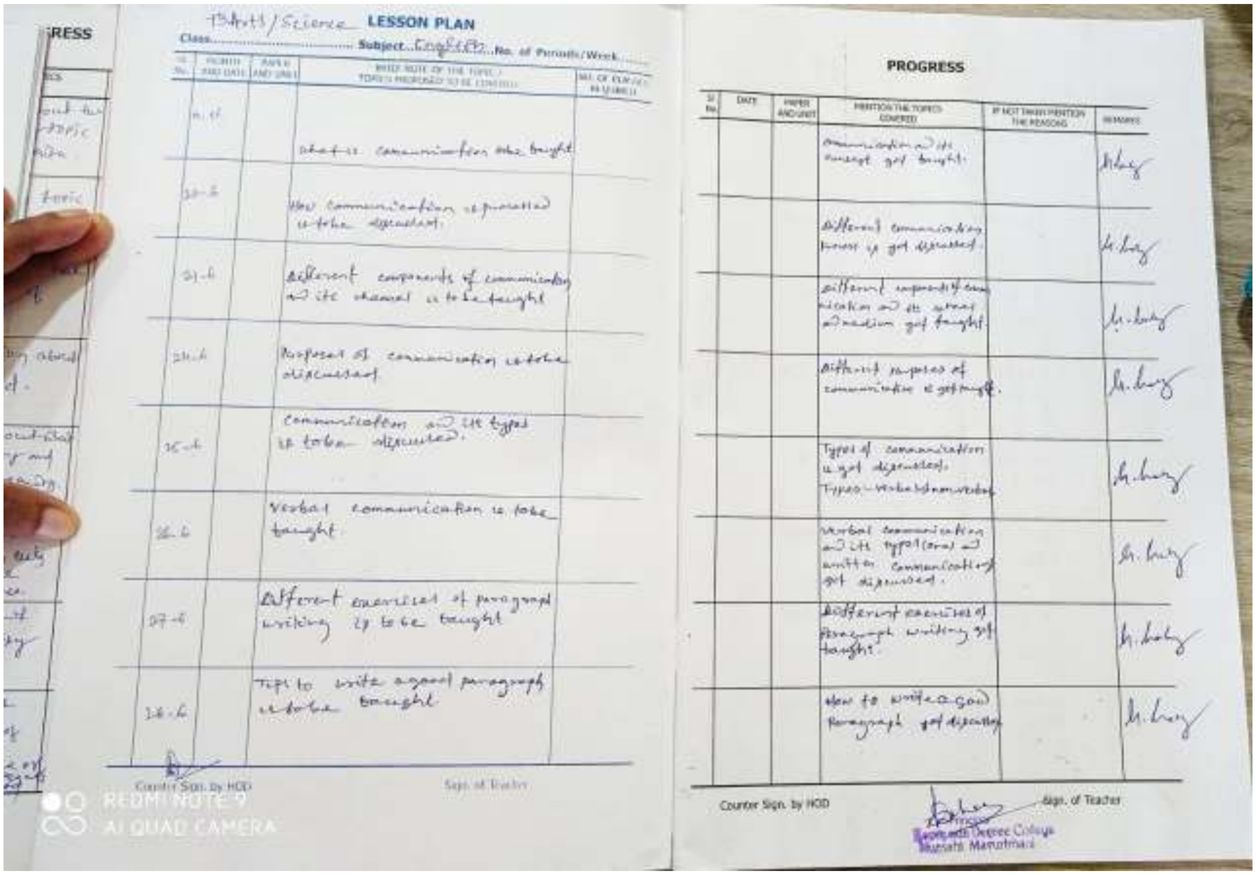
28.06.22
ELECT-A2 [illegible]

28.06.22
MIL [illegible]

29.06.22
CCH-9 [illegible]

29.06.22
CCH-10 [illegible]

29.06.22
CCH-08 [illegible]



LESSON PLAN

Class BA(H)/Science ...... Subject English No. of Periods/Week......

SL. No.	MONTH AND DATE	PAPER AND UNIT	BRIEF NOTE OF THE TOPIC / TOPICS PROPOSED TO BE COVERED	NO. OF CLASSES REQUIRED
	19-6		What is communication to be taught	
	20-6		How communication is processed is to be discussed.	
	21-6		Different components of communication and its channel is to be taught	
	24-6		Purposes of communication is to be discussed	
	25-6		Communication and its types is to be discussed.	
	26-6		Verbal communication is to be taught.	
	27-6		Different exercises of paragraph writing is to be taught	
	28-6		Tips to write a good paragraph is to be taught	

Counter Sign. by HOD

Sign. of Teacher

PROGRESS

SL No.	DATE	PAPER AND UNIT	MENTION THE TOPICS COVERED	IF NOT TAKEN MENTION THE REASONS	REMARKS
			Communication and its concept got taught.		
			Different communication process is got discussed.		
			Different components of communication and its channel and medium got taught.		
			Different purposes of communication is got taught.		
			Types of communication is got discussed. Types – verbal and non-verbal		
			Verbal communication and its types (oral and written communication) got discussed.		
			Different exercises of paragraph writing got taught.		
			How to write a good paragraph got discussed		

Counter Sign. by HOD

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[illegible] Degree College
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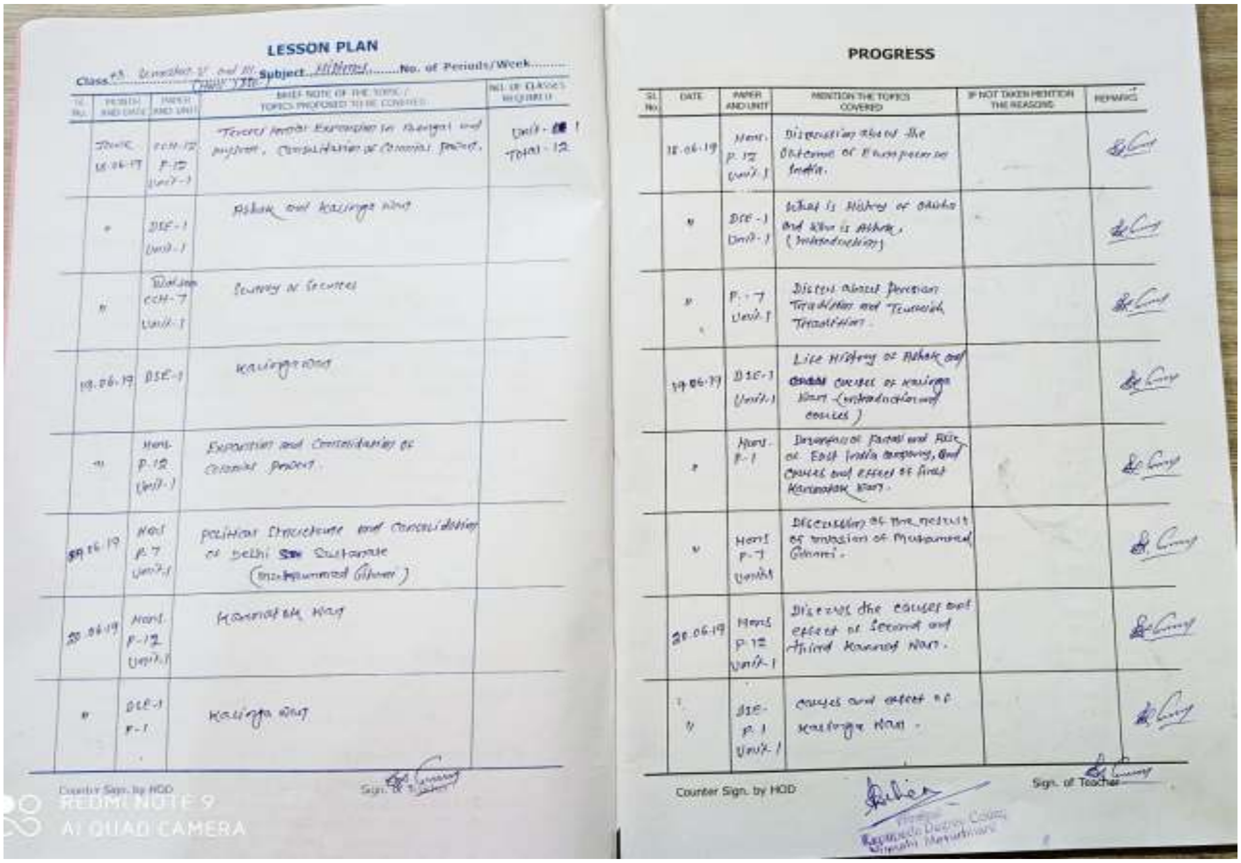

LESSON PLAN

Class H. Semester II and III (Hons. [illegible]) Subject History ......No. of Periods/Week........

SL. No.	MONTH AND DATE	PAPER AND UNIT	BRIEF NOTE OF THE TOPIC / TOPICS PROPOSED TO BE COVERED	NO. OF CLASSES REQUIRED
	June 18-06-19	CCH-12 P-12 Unit-1	Territorial Expansion in Bengal and Mysore, Consolidation of Colonial Power.	Unit-1 Total-12
	"	DSE-1 Unit-1	Ashok and Kalinga War	
	"	Hons. CCH-7 Unit-1	Survey of Sources	
	19.06.19	DSE-1	Kalinga War	
	"	Hons. P-12 Unit-1	Expansion and Consolidation of Colonial Power.	
	19.06.19	Hons. P.7 Unit-1	Political Structure and Consolidation of Delhi Sultanate (Muhammad Ghori)	
	20.06.19	Hons. P-12 Unit-1	Karnataka War	
	"	DSE-1 P-1	Kalinga War	

Counter Sign. by HOD

Sign. of Teacher

PROGRESS

SL No.	DATE	PAPER AND UNIT	MENTION THE TOPICS COVERED	IF NOT TAKEN MENTION THE REASONS	REMARKS
	18.06.19	Hons. P.12 Unit-1	Discussion about the Outcome of European in India.		
	"	DSE-1 Unit-1	What is History of Odisha and Who is Ashok. (Introduction)		
	"	P.-7 Unit-1	Discuss about Persian Tradition and Turkish Tradition.		
	19.06.19	DSE-1 Unit-1	Life History of Ashok and causes of Kalinga War (Introduction and causes)		
	"	Hons. P-1	Downfall of French and Rise of East India Company, and Causes and Effect of First Karnatak War.		
	"	Hons P-7 Unit-1	Discussion of the result of invasion of Muhammad Ghori.		
	20.06.19	Hons P.12 Unit-1	Discuss the causes and effect of Second and Third Karnatak War.		
	"	DSE- P.1 Unit-1	Causes and effect of Kalinga War.		

Counter Sign. by HOD

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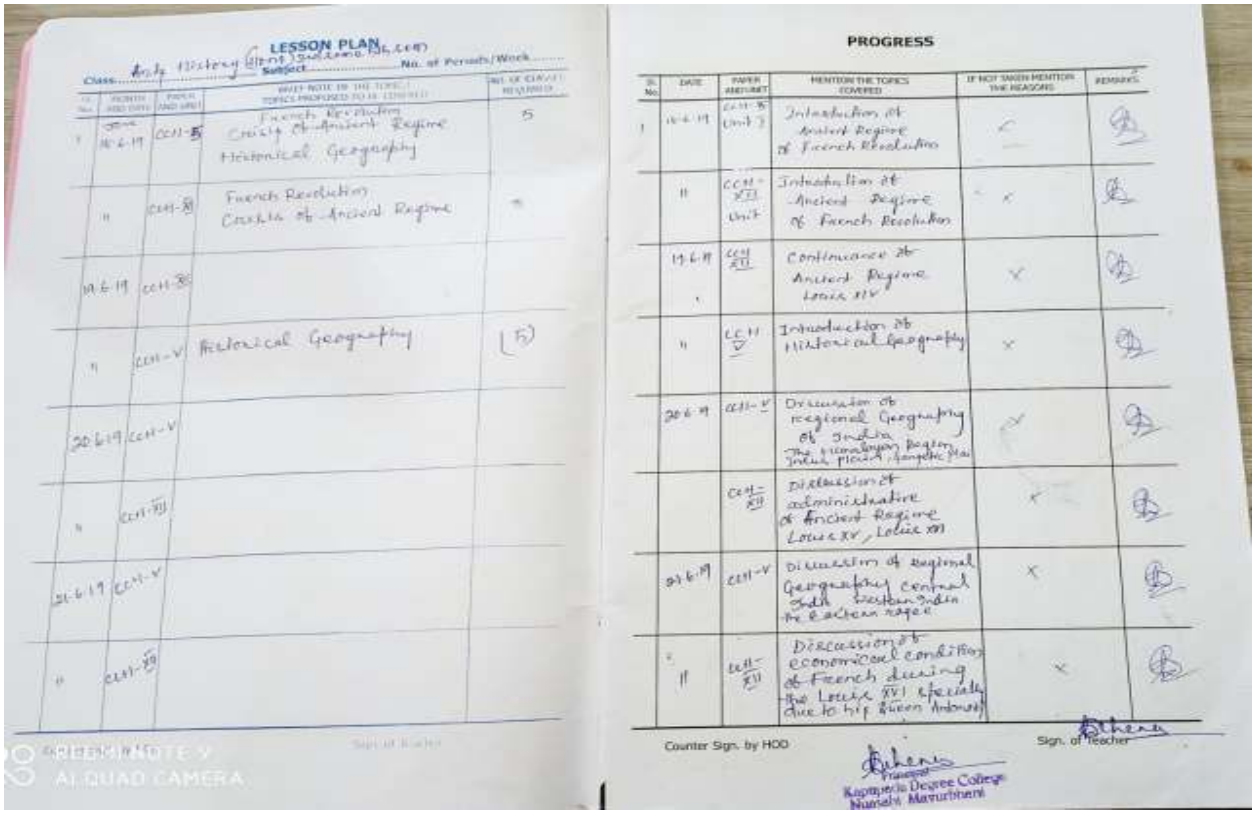

LESSON PLAN

Class: Arts History [illegible] 5th sem Subject .... No. of Periods/Week ....

Sl. No.	Month and Date	Paper and Unit	Brief note on the topic / Topics proposed to be covered	No. of classes required
1	June 18-6-19	CCH-XI	French Revolution Crisis of Ancient Regime Historical Geography	5
	"	CCH-XII	French Revolution Crisis of Ancient Regime	"
	19-6-19	CCH-XII		
	"	CCH-V	Historical Geography	(5)
	20-6-19	CCH-V		
	"	CCH-XII		
	21-6-19	CCH-V		
	"	CCH-XII		

Sign. of Teacher

REDMI NOTE 9
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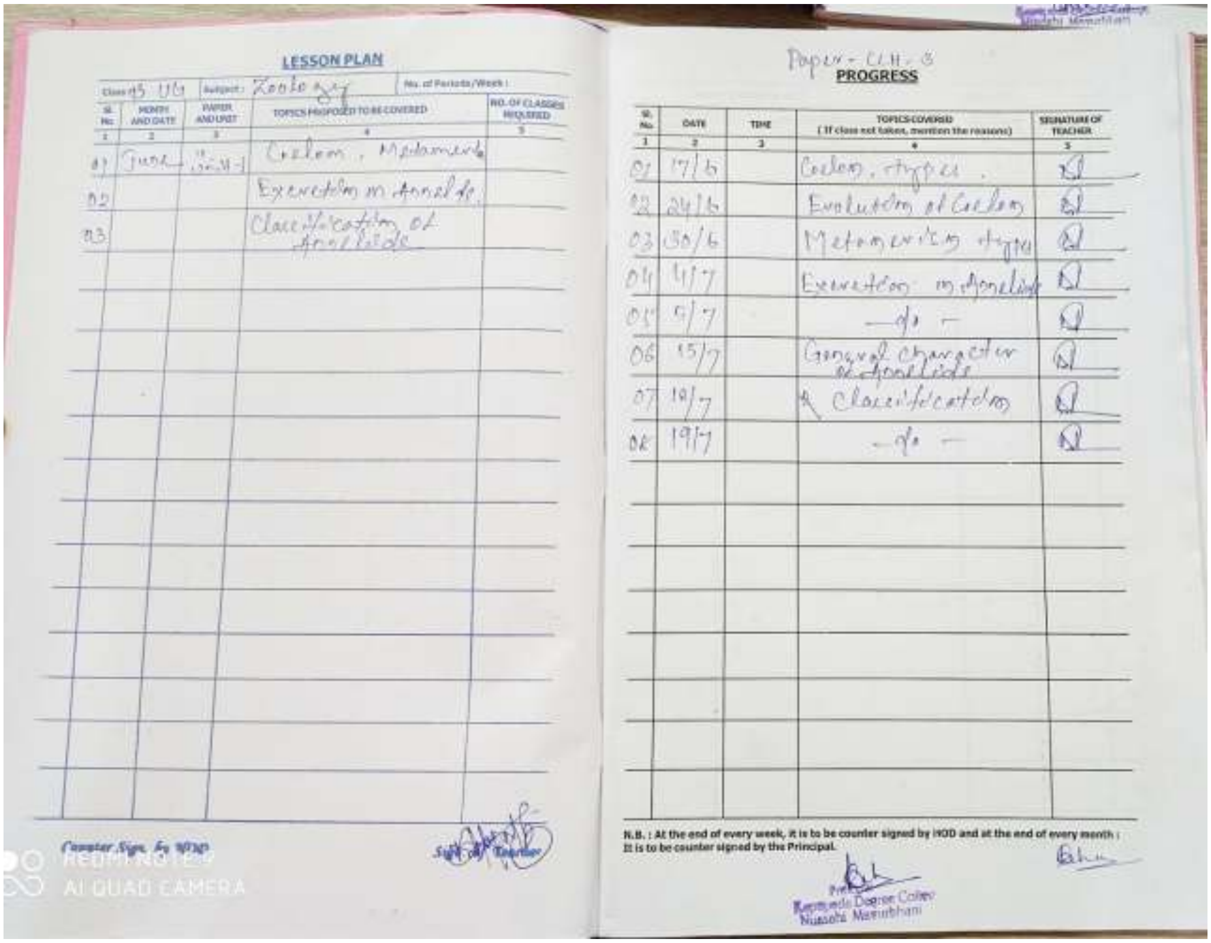
PROGRESS

Sl. No.	Date	Paper and Unit	Mention the topics covered	If not taken mention the reasons	Remarks
1	18-6-19	CCH-XI Unit I	Introduction of Ancient Regime of French Revolution	✓	
	"	CCH-XII Unit	Introduction of Ancient Regime of French Revolution	×	
	19-6-19	CCH XII	Continuance of Ancient Regime Louis XIV	×	
	"	CCH V	Introduction of Historical Geography	×	
	20-6-19	CCH-V	Discussion of regional Geography of India The Himalayan Region, Indus plain, Gangetic Plain	✓	
		CCH-XII	Discussion of administrative of Ancient Regime Louis XV, Louis XVI	×	
	21-6-19	CCH-V	Discussion of regional Geography central India, Western India the Eastern region	×	
	"	CCH-XII	Discussion of economical condition of French during the Louis XVI specially due to his Queen Antoinette	×	

Counter Sign. by HOD

Sign. of Teacher Behera

Behera
Principal
Kaptipada Degree College
Nuasahi Mayurbhanj



LESSON PLAN

Class: +3 UG	Subject: Zoology	No. of Periods/Week:

Sl. No.	Month and Date	Paper and Unit	Topics proposed to be covered	No. of classes required
1	2	3	4	5
01	June	CC-II-I	Coelom, Metamerism	
02			Excretion in Annelida.	
03			Classification of Annelida	

Counter Sign. by HOD

Sign. of Teacher

REDMI NOTE 9
AI QUAD CAMERA

Paper - CCH - 3

PROGRESS

Sl. No.	Date	Time	Topics covered (If class not taken, mention the reasons)	Signature of Teacher
1	2	3	4	5
01	17/6		Coelom, types.	
02	24/6		Evolution of Coelom	
03	30/6		Metamerism types	
04	4/7		Excretion in Annelida	
05	5/7		—do—	
06	15/7		General character of Annelida	
07	18/7		& Classification	
08	19/7		—do—	

N.B. : At the end of every week, it is to be counter signed by HOD and at the end of every month : It is to be counter signed by the Principal.

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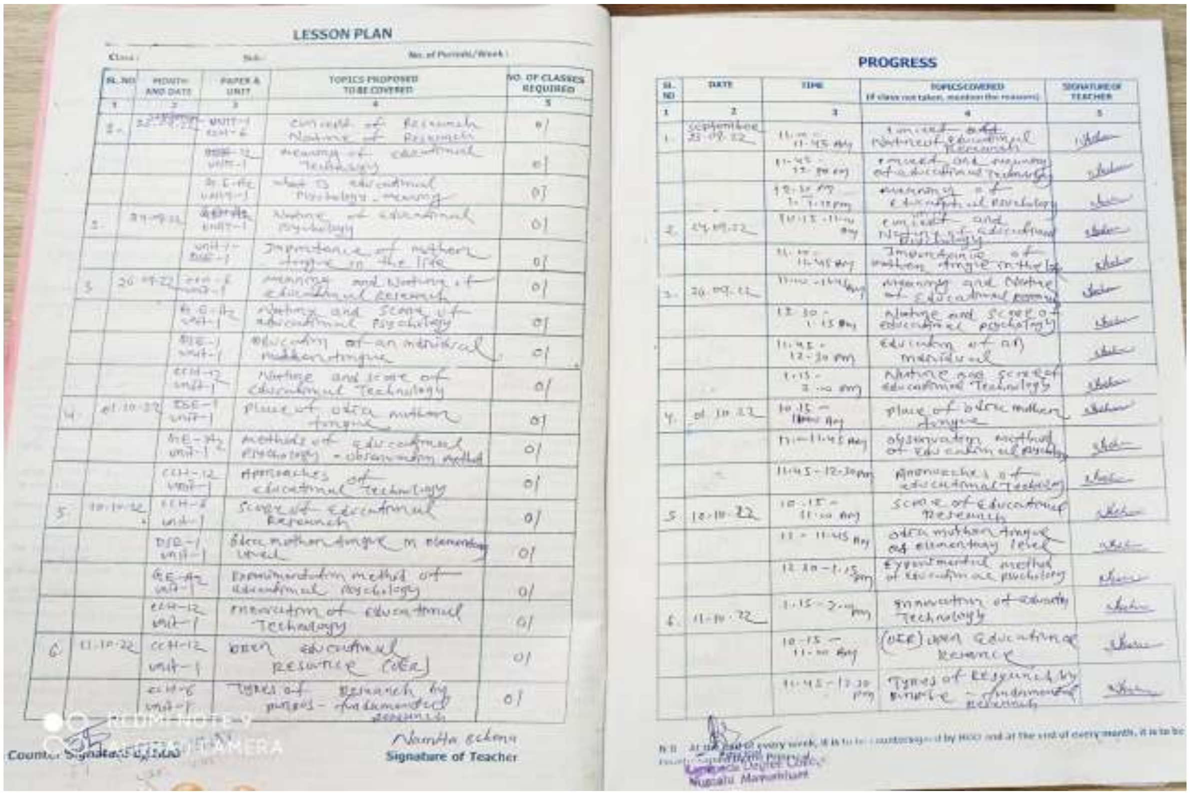
Kaptipada Degree College
Nuasahi Mayurbhanj



LESSON PLAN

Class: Sub: No. of Periods/Week:

SL. NO	MONTH AND DATE	PAPER & UNIT	TOPICS PROPOSED TO BE COVERED	NO. OF CLASSES REQUIRED
1	2	3	4	5
1.	22-09-22	UNIT-1 CCH-6	concept of Research Nature of Research	01
		CCH-12 UNIT-1	meaning of educational technology	01
		GE-A2 UNIT-1	what is educational psychology - meaning	01
2.	24-09-22	GE-A2 UNIT-1	Nature of educational psychology	01
		unit-1 DSE-1	Importance of mother tongue in the life	01
3	26-09-22	CCH-6 unit-1	meaning and Nature of educational research	01
		GE-A2 unit-1	Nature and Scope of educational psychology	01
		DSE-1 unit-1	education of an individual mother tongue	01
		CCH-12 unit-1	Nature and scope of educational Technology	01
4.	01-10-22	DSE-1 unit-1	Place of odia mother tongue	01
		GE-A2 unit-1	methods of educational psychology - observation method	01
		CCH-12 unit-1	Approaches of educational technology	01
5.	10-10-22	CCH-6 unit-1	Scope of educational Research	01
		DSE-1 unit-1	odia mother tongue in elementary level	01
		GE-A2 unit-1	Experimentation method of educational psychology	01
		CCH-12 unit-1	Innovation of educational Technology	01
6.	11-10-22	CCH-12 unit-1	open educational resource (OER)	01
		CCH-6 unit-1	Types of research by purpose - fundamental research	01

Counter Signature by HOD

Namita [illegible]
Signature of Teacher

PROGRESS

SL. NO	DATE	TIME	TOPICS COVERED (If class not taken, mention the reasons)	SIGNATURE OF TEACHER
1	2	3	4	5
1.	September 22-09-22	11.00 - 11.45 am	concept and Nature of educational Research	
		11.45 - 12.30 pm	concept and meaning of educational technology	
		12.30 pm - 1.15 pm	meaning of educational psychology	
2.	24-09-22	10.15 - 11.00 am	concept and Nature of educational psychology	
		11.00 - 11.45 am	Importance of mother tongue in the life	
3.	26-09-22	11.00 - 11.45 am	meaning and Nature of educational research	
		12.30 - 1.15 pm	Nature and scope of educational psychology	
		11.45 - 12.30 pm	Education of an individual	
		1.15 - 2.00 pm	Nature and scope of educational Technology	
4.	01-10-22	10.15 - 11.00 am	place of odia mother tongue	
		11 - 11.45 am	observation method of educational psychology	
		11.45 - 12.30 pm	Approaches of educational Technology	
5	10-10-22	10.15 - 11.00 am	Scope of educational Research	
		11 - 11.45 am	odia mother tongue of elementary level	
		12.30 - 1.15 pm	Experimental method of educational psychology	
6.	11-10-22	1.15 - 2.00 pm	Innovation of educational Technology	
		10.15 - 11.00 am	(OER) open Educational Resource	
		11.45 - 12.30 pm	Types of research by purpose - fundamental research	

N.B. At the end of every week, it is to be countersigned by HOD and at the end of every month, it is to be countersigned by the Principal.

Principal
[illegible] Degree College
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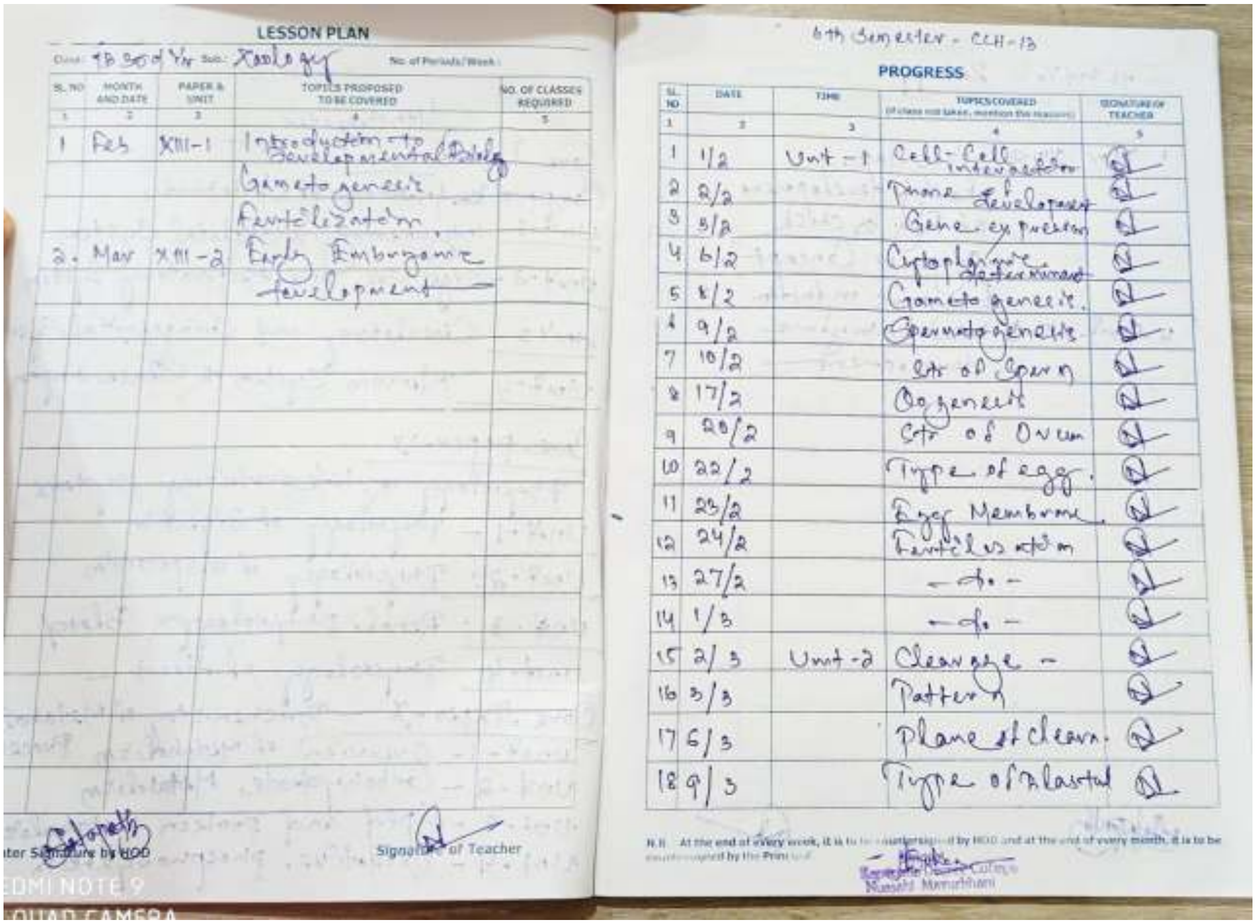


LESSON PLAN

Class: +3 3rd of Yr Sub: Zoology No. of Periods/Week:

SL. NO	MONTH AND DATE	PAPER & UNIT	TOPICS PROPOSED TO BE COVERED	NO. OF CLASSES REQUIRED
1	2	3	4	5
1	Feb	XIII-1	Introduction to Developmental Biology	
			Gametogenesis	
			Fertilization.	
2.	Mar	XIII-2	Early Embryonic development	

Counter Signature by HOD

Signature of Teacher

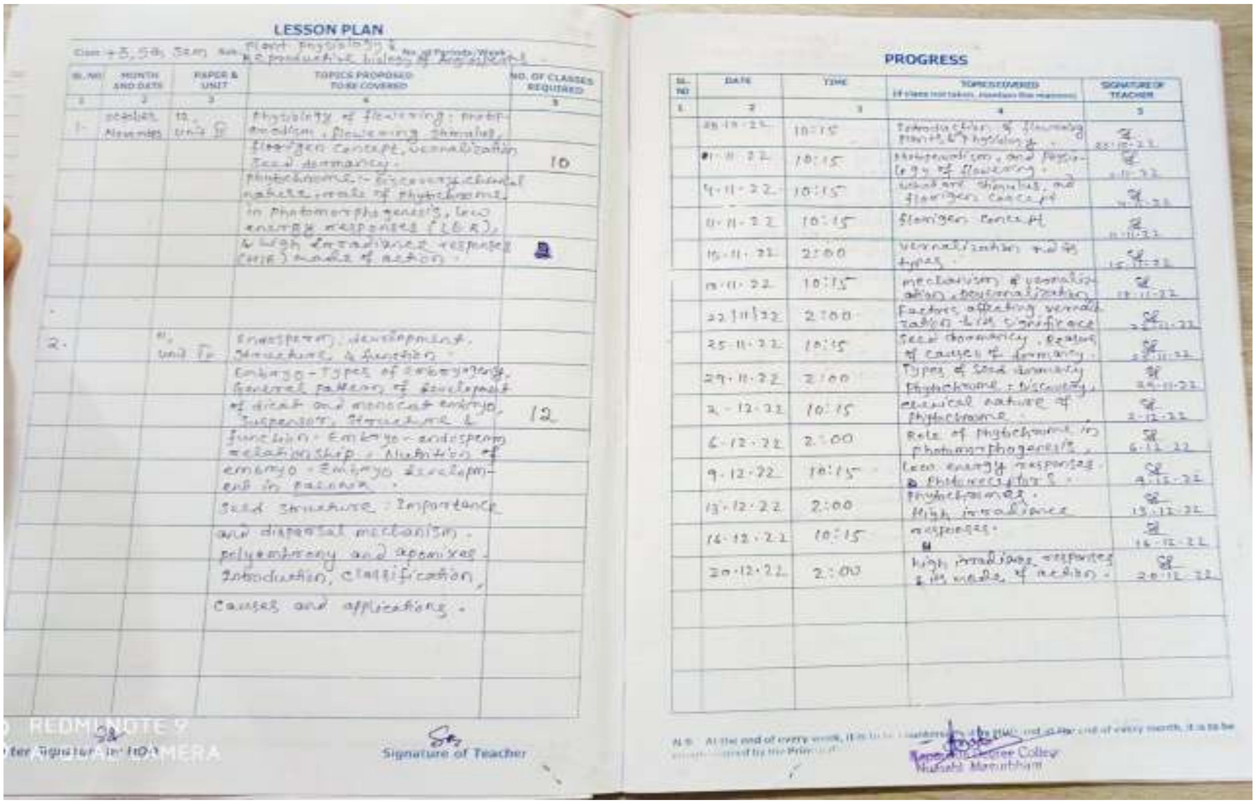
6th Semester - CCH-13

PROGRESS

SL. NO	DATE	TIME	TOPICS COVERED (If class not taken, mention the reasons)	SIGNATURE OF TEACHER
1	2	3	4	5
1	1/2	Unit-1	Cell-Cell interaction	
2	2/2		Phase of development	
3	3/2		Gene expression	
4	6/2		Cytoplasmic determinant	
5	8/2		Gametogenesis.	
6	9/2		Spermatogenesis	
7	10/2		Str of Sperm	
8	17/2		Oogenesis	
9	20/2		Str of Ovum	
10	22/2		Type of egg.	
11	23/2		Egg Membrane.	
12	24/2		Fertilisation	
13	27/2		-do-	
14	1/3		-do-	
15	2/3	Unit-2	Cleavage -	
16	3/3		Pattern	
17	6/3		Plane of cleavn.	
18	9/3		Type of blastula	

N.B. At the end of every week, it is to be countersigned by HOD and at the end of every month, it is to be countersigned by the Principal.

[illegible] Degree College
[illegible]



LESSON PLAN

Class: +3, 5th Sem. Sub: Plant Physiology & Reproductive biology of Angiosperms No. of Periods/Week:

SL. NO.	MONTH AND DATE	PAPER & UNIT	TOPICS PROPOSED TO BE COVERED	NO. OF CLASSES REQUIRED
1	2	3	4	5
1.	October, November	12, Unit III	Physiology of flowering: Photoperiodism, flowering stimulus, florigen concept, vernalization, Seed dormancy. Phytochrome:- Discovery, chemical nature, role of phytochrome in photomorphogenesis, low energy responses (LER), & high irradiance responses (HIR) mode of action.	10
2.		12, Unit IV	Endosperm, development, structure & function. Embryo - Types of embryogeny, General pattern of development of dicot and monocot embryo, Suspensor, structure & function. Embryo - endosperm relationship. Nutrition of embryo. Embryo development in Paeonia. Seed structure: Importance and dispersal mechanism. Polyembryony and apomixes: Introduction, classification, causes and applications.	12

Counter Signature by HOD

Signature of Teacher

PROGRESS

SL. NO.	DATE	TIME	TOPICS COVERED (If class not taken, mention the reasons)	SIGNATURE OF TEACHER
1	2	3	4	5
	28-10-22	10:15	Introduction of flowering plants & physiology.	28-10-22
	1-11-22	10:15	Photoperiodism, and Physiology of flowering.	1-11-22
	4-11-22	10:15	Flowering stimulus, and florigen concept	4-11-22
	11-11-22	10:15	florigen concept	11-11-22
	15-11-22	2:00	Vernalization and its types.	15-11-22
	18-11-22	10:15	mechanism of vernalization, devernalization	18-11-22
	22-11-22	2:00	Factors affecting vernalization & its significance	22-11-22
	25-11-22	10:15	Seed dormancy, Reasons & causes of dormancy.	25-11-22
	29-11-22	2:00	Types of seed dormancy, Phytochrome: Discovery.	29-11-22
	2-12-22	10:15	chemical nature of phytochrome.	2-12-22
	6-12-22	2:00	Role of phytochrome in photomorphogenesis.	6-12-22
	9-12-22	10:15	Low energy responses & photoreceptors.	9-12-22
	13-12-22	2:00	Phytochromes. High irradiance	13-12-22
	16-12-22	10:15	responses.	16-12-22
	20-12-22	2:00	High irradiance responses & its mode of action.	20-12-22

N.B. At the end of every week, it is to be countersigned by HOD and at the end of every month, it is to be countersigned by the Principal.

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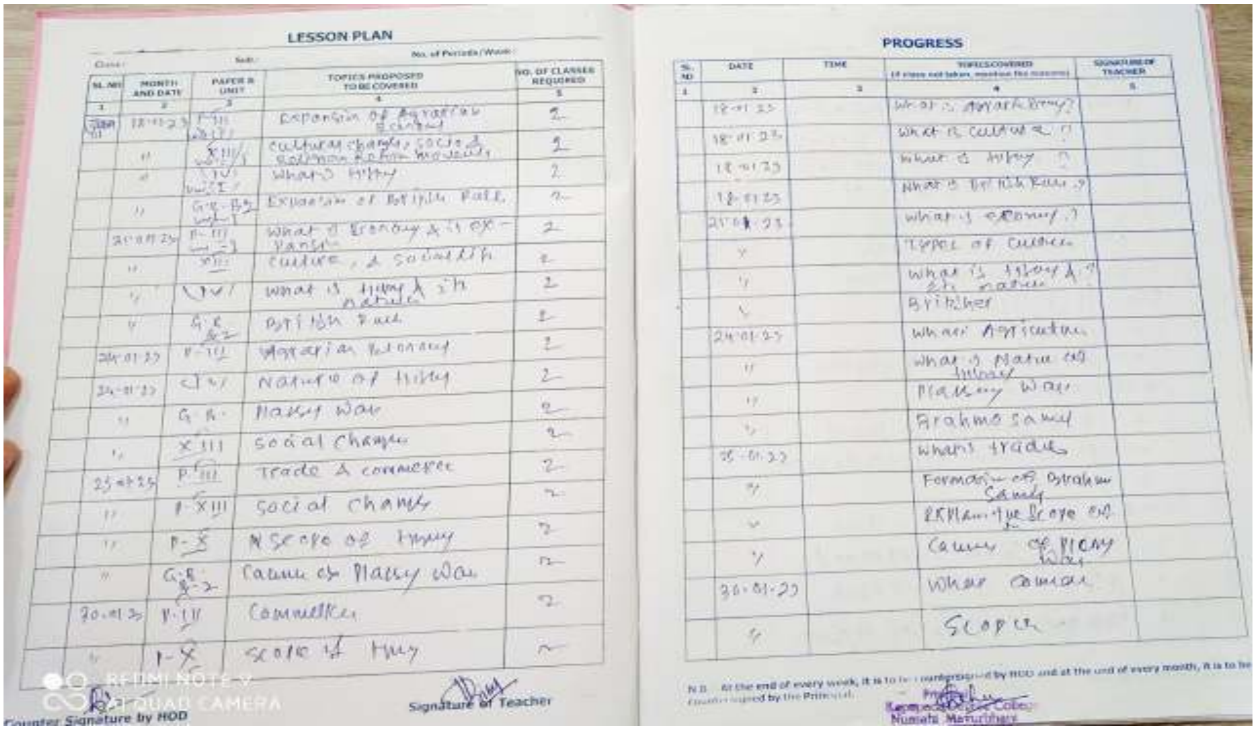

LESSON PLAN

Class: Sub: No. of Periods/Week:

SL. NO.	MONTH AND DATE	PAPER & UNIT	TOPICS PROPOSED TO BE COVERED	NO. OF CLASSES REQUIRED
1	2	3	4	5
[illegible]	18-01-23	P-III Unit-I	Expansion of Agrarian Economy	2
	"	XIII Unit-I	Cultural changes, social & religious reform movements	2
	"	IV Unit-I	What is History	2
	"	G.E.-B3 Unit-I	Expansion of British Rule.	2
	21-01-23	P-III Unit-I	What is Economy & its expansion	2
	"	XIII	Culture & social life	2
	"	IV	What is History & its nature	2
	"	G.E. B-2	British Rule	2
	24-01-23	P-III	Agrarian economy	2
	24-01-23	IV	Nature of History	2
	"	G.E.	Plassey War	2
	"	XIII	Social Changes	2
	25-01-23	P-III	Trade & commerce	2
	"	P-XIII	Social changes	2
	"	P-X	Scope of History	2
	"	G.E. B-2	Causes of Plassey War	2
	30-01-23	P-III	Commerce	2
	"	P-X	Scope of History	2

Counter Signature by HOD

Signature of Teacher

PROGRESS

SL. NO.	DATE	TIME	TOPICS COVERED (If class not taken, mention the reasons)	SIGNATURE OF TEACHER
1	2	3	4	5
	18-01-23		What is Agrarian economy?	
	18-01-23		What is culture?	
	18-01-23		What is History?	
	18-01-23		What is British Rule?	
	21-01-23		What is economy?	
	"		Types of culture	
	"		What is History & its nature	
	"		Britisher	
	24-01-23		What is Agriculture	
	"		What is Nature of History	
	"		Plassey War	
	"		Brahmo Samaj	
	25-01-23		What is trade	
	"		Formation of Brahmo Samaj	
	"		Explain the scope of	
	"		Causes of Plassey War	
	30-01-23		What commerce	
	"		Scope	

N.B. At the end of every week, it is to be countersigned by HOD and at the end of every month, it is to be countersigned by the Principal.

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Degree College

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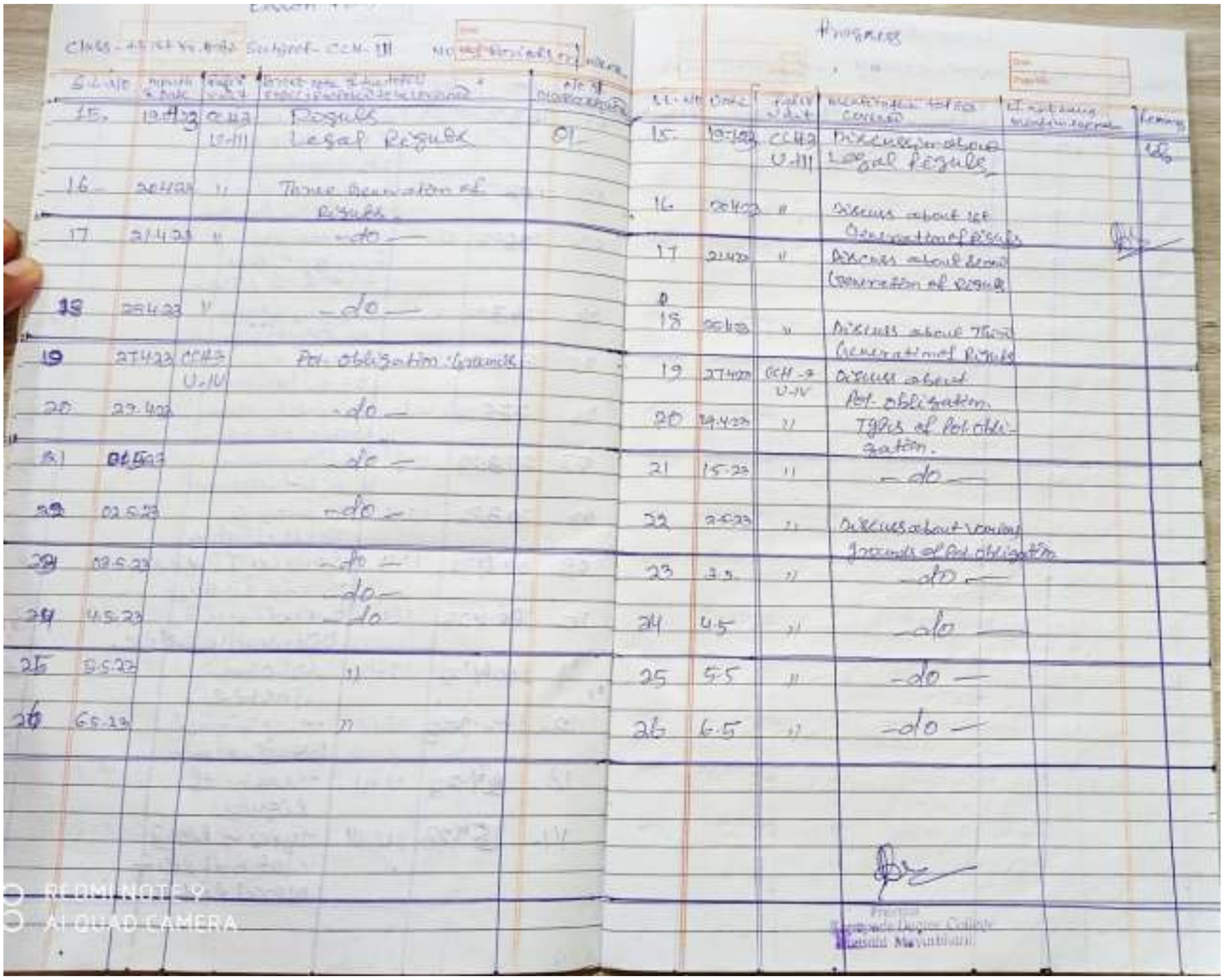

Class - [illegible] Subject - CCH-III No. of Periods [illegible] week

Sl. No	Month & Date	Paper & Unit	Brief note of the topic / topics proposed to be covered	No. of classes required
15.	19.4.23	CCH-3 U-III	Results Legal Results	01
16	20.4.23	"	Three Generation of Results	
17	21.4.23	"	-do-	
18	25.4.23	"	-do-	
19	27.4.23	CCH-3 U-IV	Pol. obligation Grounds	
20	29.4.23		-do-	
21	01.5.23		-do-	
22	02.5.23		-do-	
23	03.5.23		-do-	
24	4.5.23		-do- -do-	
25	5.5.23		"	
26	6.5.23		"	

Progress

Sl. No	Date	Paper & Unit	Mention the topics covered	If not taking mention the reasons	Remarks
15	19-4-23	CCH-3 U-III	Discussion about Legal Results		
16	20.4.23	"	Discuss about 1st Generation of Results		
17	21.4.23	"	Discuss about Second Generation of Results		
18	25.4.23	"	Discuss about Third Generation of Results		
19	27.4.23	CCH-3 U-IV	Discuss about Pol. obligation.		
20	29.4.23	"	Types of Pol. obligation.		
21	1.5.23	"	-do-		
22	2.5.23	"	Discuss about various grounds of Pol. obligation		
23	3.5	"	-do-		
24	4.5	"	-do-		
25	5.5	"	-do-		
26	6.5	"	-do-		

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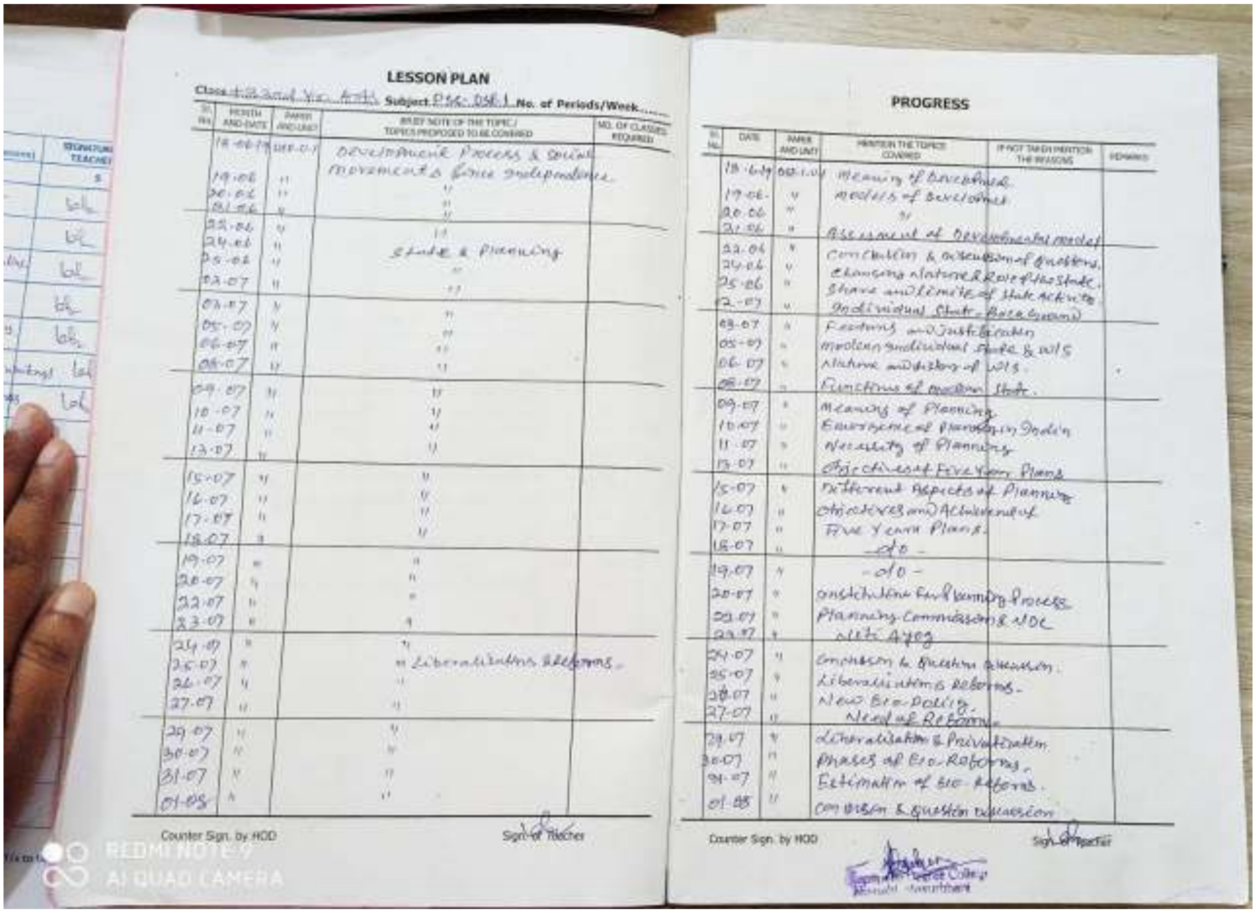
[illegible]



LESSON PLAN

Class +3 2nd Yr. Arts Subject PSC- DSE-1 No. of Periods/Week.......

Sl. No.	Month and Date	Paper and Unit	Brief note of the topic / topics proposed to be covered	No. of classes required
	18-06-23	DSE-1 U-I	Development Process & Social Movements Since Independence	
	19.06	"	"	
	20.06	"	"	
	21.06	"	"	
	22.06	"	"	
	24.06	"	State & Planning	
	25.06	"	"	
	02.07	"	"	
	03.07	"	"	
	05.07	"	"	
	06.07	"	"	
	08.07	"	"	
	09.07	"	"	
	10.07	"	"	
	11.07	"	"	
	13.07	"	"	
	15.07	"	"	
	16.07	"	"	
	17.07	"	"	
	18.07	"	"	
	19.07	"	"	
	20.07	"	"	
	22.07	"	"	
	23.07	"	"	
	24.07	"	"	
	25.07	"	" Liberalisation & Reforms.	
	26.07	"	"	
	27.07	"	"	
	29.07	"	"	
	30.07	"	"	
	31.07	"	"	
	01.08	"	"	

Counter Sign. by HOD

Sign. of Teacher

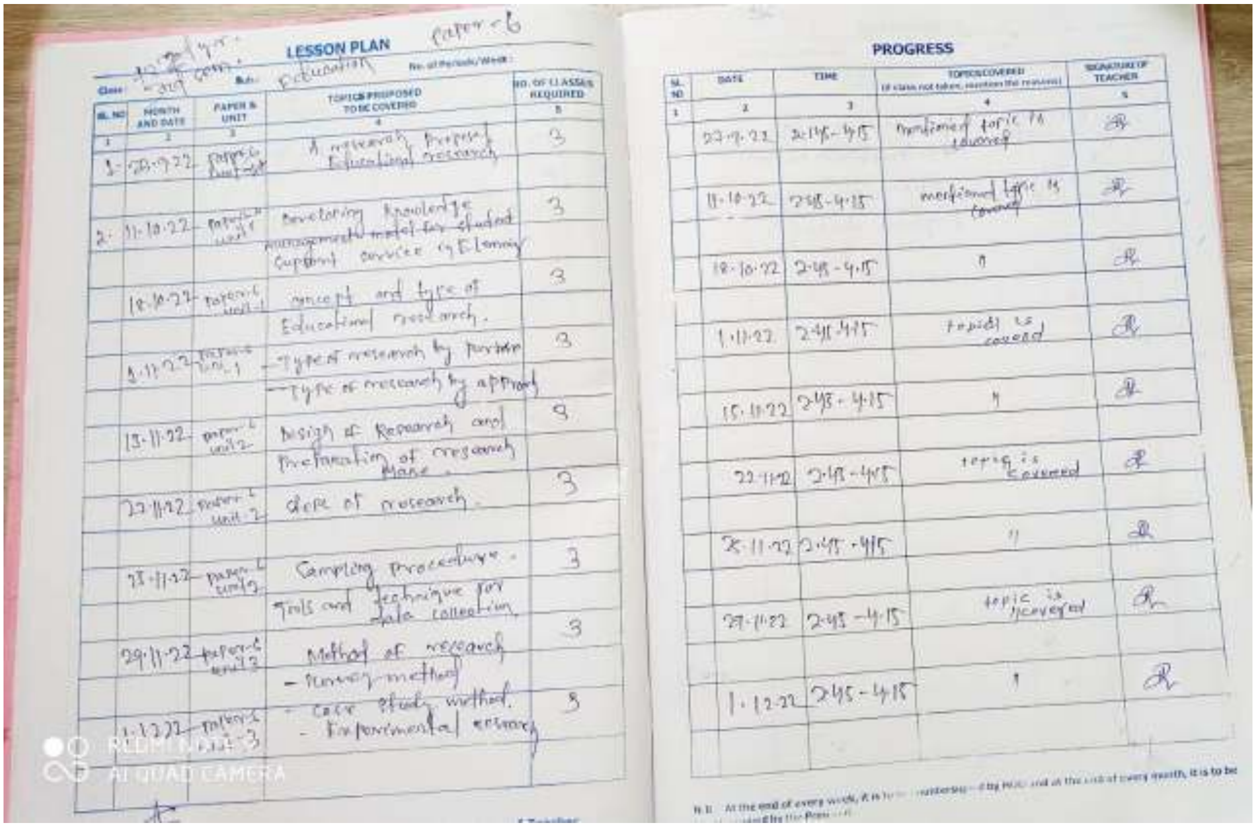
PROGRESS

Sl. No.	Date	Paper and Unit	Mention the topics covered	If not taken mention the reasons	Remarks
	18-6-23	DSE-1 U-I	Meaning of Development		
	19-06	"	Models of Development		
	20.06	"	"		
	21.06	"	Assessment of Developmental model		
	22.06	"	Conclusion & discussion of questions.		
	24.06	"	Changing Nature & Role of the State.		
	25.06	"	Share and limits of State Activity.		
	02-07	"	Individual State - Rule [illegible]		
	03-07	"	Features and Justification		
	05-07	"	Modern individual State & WIS		
	06-07	"	Nature and [illegible] of WIS.		
	08-07	"	Functions of modern State.		
	09-07	"	Meaning of Planning		
	10-07	"	Emergence of Planning in India		
	11-07	"	Necessity of Planning		
	13-07	"	Objectives of Five Year Plans		
	15-07	"	Different Aspects of Planning		
	16-07	"	Objectives and Achievement of		
	17-07	"	Five Years Plans.		
	18-07	"	-do-		
	19-07	"	-do-		
	20-07	"	Institutions for Planning Process		
	22-07	"	Planning Commission & NDC		
	23-07	"	Niti Ayog		
	24-07	"	Conclusion & Question discussion.		
	25-07	"	Liberalisation & Reforms.		
	26-07	"	New Eco-Policy.		
	27-07	"	Need of Reforms.		
	29-07	"	Liberalisation & Privatisation		
	30-07	"	Phases of Eco-Reforms.		
	31-07	"	Estimation of Eco-Reforms.		
	01-08	"	Conclusion & Question discussion		

Counter Sign. by HOD

Sign. of Teacher

[illegible] Degree College
[illegible]



LESSON PLAN

Paper - 6

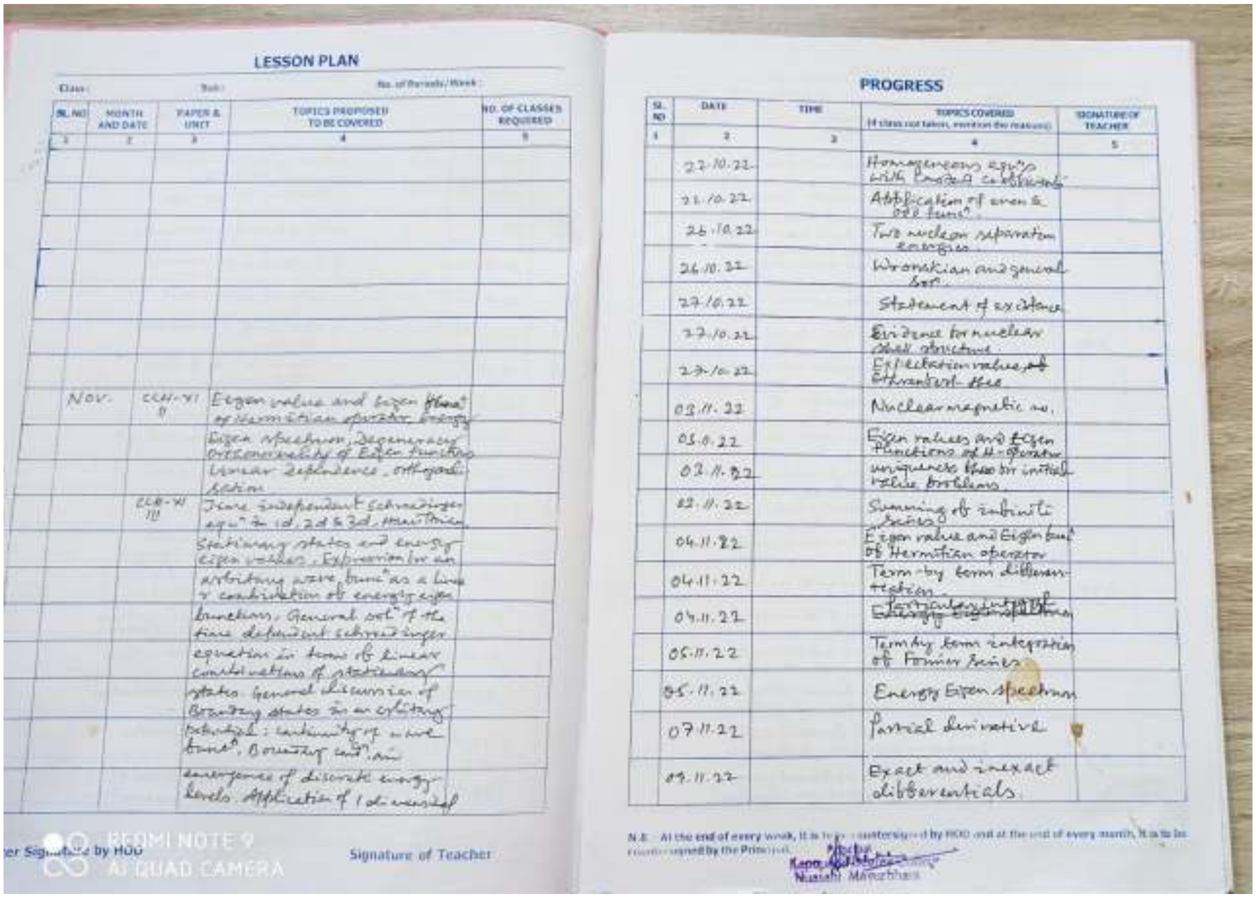
Class: 3rd yr. 3rd Sem. Sub: Education No. of Periods/Week:

SL. NO	MONTH AND DATE	PAPER & UNIT	TOPICS PROPOSED TO BE COVERED	NO. OF CLASSES REQUIRED
1	2	3	4	5
1-	28-9-22	paper-6 Unit-3	A research Proposal Educational research	3
2-	11-10-22	Paper-6 unit-1	Developing Knowledge management model for student support service in E-Learning	3
	18-10-22	paper-6 unit-1	concept and type of Educational research.	3
	1-11-22	Paper-6 unit-1	- Type of research by purpose - Type of research by approach	3
	15-11-22	paper-6 unit-2	Design of Research and Preparation of research plane.	9
	22-11-22	paper-6 unit-2	[illegible] of research.	3
	25-11-22	paper-6 unit-3	Sampling procedure. Tools and technique for data collection.	3
	29-11-22	paper-6 unit-3	Method of research - survey method	3
	1-12-22	paper-6 unit-3	- case study method. - Experimental research	3

PROGRESS

SL. NO	DATE	TIME	TOPICS COVERED (If class not taken, mention the reasons)	SIGNATURE OF TEACHER
1	2	3	4	5
	28-9-22	2-45-4-15	mentioned topic is covered	
	11-10-22	2-45-4-15	mentioned topic is covered	
	18-10-22	2-45-4-15	"	
	1-11-22	2-45-4-15	topics is covered	
	15-11-22	2-45-4-15	"	
	22-11-22	2-45-4-15	topic is covered	
	25-11-22	2-45-4-15	"	
	29-11-22	2-45-4-15	topic is covered	
	1-12-22	2-45-4-15	"	

N.B. At the end of every week, it is to be countersigned by HOD and at the end of every month, it is to be countersigned by the Principal.



LESSON PLAN

Class: Sub: No. of Periods/Week:

SL. NO	MONTH AND DATE	PAPER & UNIT	TOPICS PROPOSED TO BE COVERED	NO. OF CLASSES REQUIRED
1	2	3	4	5
	NOV.	CC4-XI II	Eigen value and Eigen func of Hermitian operator, Energy Eigen spectrum, Degeneracy, Orthonormality of Eigen functions, linear dependence, orthogonalisation	
		CC8-XI III	Time independent Schrodinger equ in 1d, 2d & 3d, Hamiltonian, Stationary states and energy eigen values. Expression for an arbitrary wave func as a linear combination of energy eigen functions. General sol of the time dependent Schrodinger equation in terms of linear combinations of stationary states. General discussion of Bounding states in an arbitrary potential: continuity of wave func, Boundary cond, and emergence of discrete energy levels. Application of 1 dimensional	

Signature by HOD

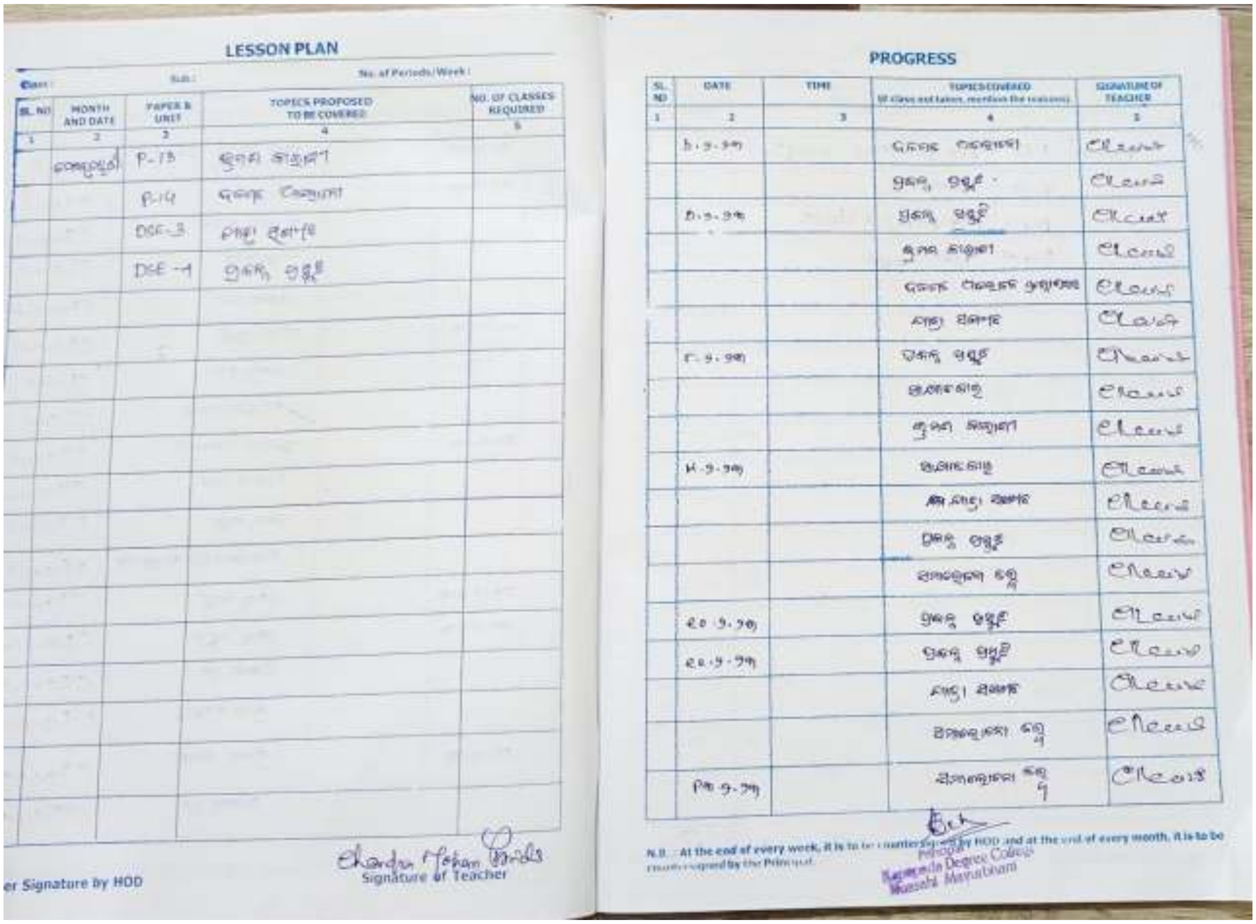
Signature of Teacher

PROGRESS

SL. NO	DATE	TIME	TOPICS COVERED (If class not taken, mention the reasons)	SIGNATURE OF TEACHER
1	2	3	4	5
	27.10.22		Homogeneous equ with constant coefficients	
	21.10.22		Application of even & odd func.	
	26.10.22		Two nucleon separation energies.	
	26.10.22		Wronskian and general sol.	
	27.10.22		Statement of existence	
	27.10.22		Evidence for nuclear shell structure	
	29.10.22		Expectation value of ~~of~~ [illegible]	
	03.11.22		Nuclear magnetic mo.	
	03.11.22		Eigen values and Eigen functions of H-operator	
	03.11.22		uniqueness theo for initial value problems.	
	03.11.22		Summing of infinite series	
	04.11.22		Eigen value and Eigen func of Hermitian operator	
	04.11.22		Term-by term differentiation.	
	04.11.22		~~Energy Eigen spectrum~~ Particular integral	
	05.11.22		Term by term integration of Fourier Series	
	05.11.22		Energy Eigen spectrum	
	07.11.22		Partial derivative	
	09.11.22		Exact and inexact differentials.	

N.B. At the end of every week, it is to be countersigned by HOD and at the end of every month, it is to be countersigned by the Principal.

Principal
Kanai Lal Bhattacharya [illegible]
Nabajit Mahavidyalaya



LESSON PLAN

Class: Sub: No. of Periods/Week:

SL. NO	MONTH AND DATE	PAPER & UNIT	TOPICS PROPOSED TO BE COVERED	NO. OF CLASSES REQUIRED
1	2	3	4	5
		P-13	[illegible]	
		P-14	[illegible]	
		DSE-3	[illegible]	
		DSE-4	[illegible]	

Counter Signature by HOD

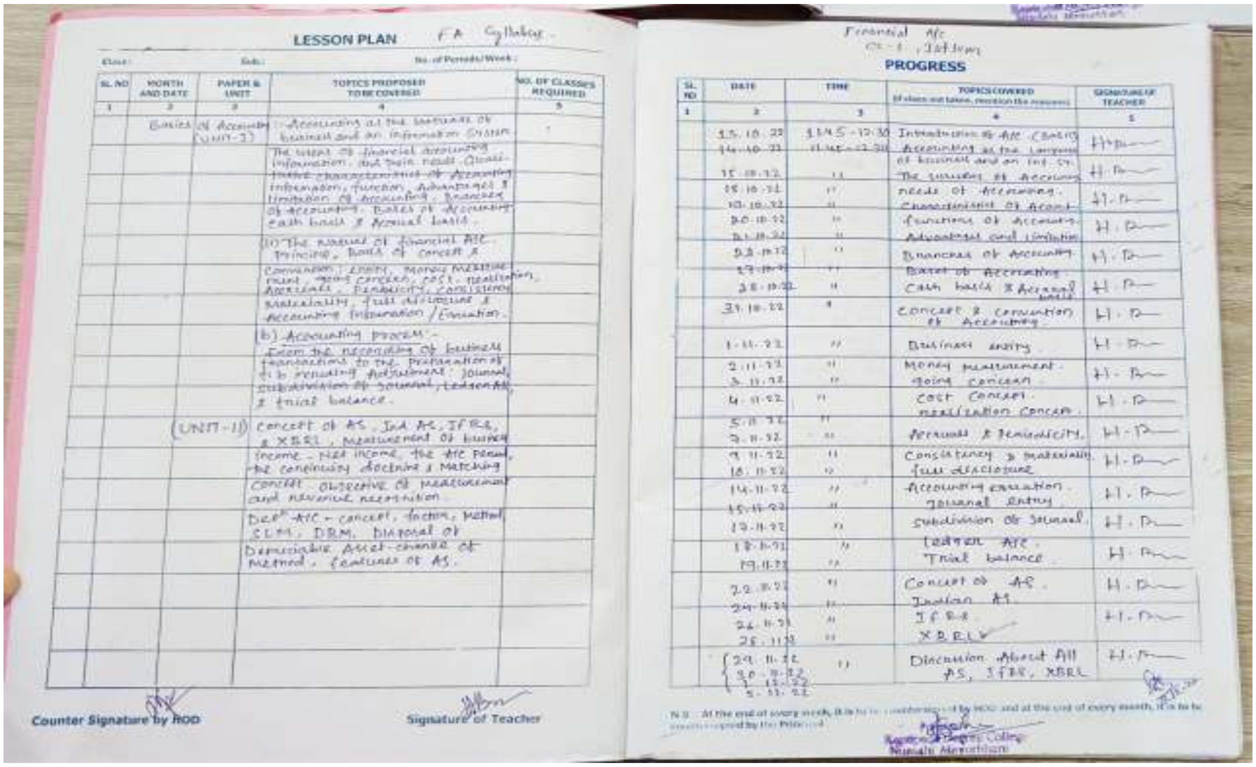
Signature of Teacher

PROGRESS

SL. NO	DATE	TIME	TOPICS COVERED (If class not taken, mention the reasons)	SIGNATURE OF TEACHER
1	2	3	4	5

N.B. : At the end of every week, it is to be countersigned by HOD and at the end of every month, it is to be countersigned by the Principal.

Principal
Degree College
Mayurbhanj



LESSON PLAN FA Syllabus.

Class: Sub: No. of Periods/Week:

SL. NO	MONTH AND DATE	PAPER & UNIT	TOPICS PROPOSED TO BE COVERED	NO. OF CLASSES REQUIRED
1	2	3	4	5
		Basics of Accounting (UNIT-I)	Accounting as the language of business and an information system.	
			The users of financial accounting information and their needs. Qualitative characteristics of Accounting information, function, Advantages & limitation of Accounting. Branches of Accounting. Bases of Accounting; cash basis & Accrual basis.	
			(ii) The nature of financial A/C. Principle, Basic concept & Convention: Entity, Money measurement, going concern, cost, realisation, Accruals, Periodicity, consistency, materiality, full disclosure & Accounting Information / Evaluation.	
			(b) Accounting process:- From the recording of business transactions to the preparation of trial balance including adjustment: journal, subdivision of journal, Ledger A/c, & trial balance.	
		(UNIT-II)	Concept of AS, Ind AS, IFRS, & XBRL, Measurement of business income - Net income, the A/C period, the continuity doctrine & Matching concept, objective of measurement and revenue recognition.	
			Depⁿ A/C - concept, factor, method, SLM, DRM, Disposal of Depreciable Asset - change of method, features of AS.	

Counter Signature by HOD

Signature of Teacher

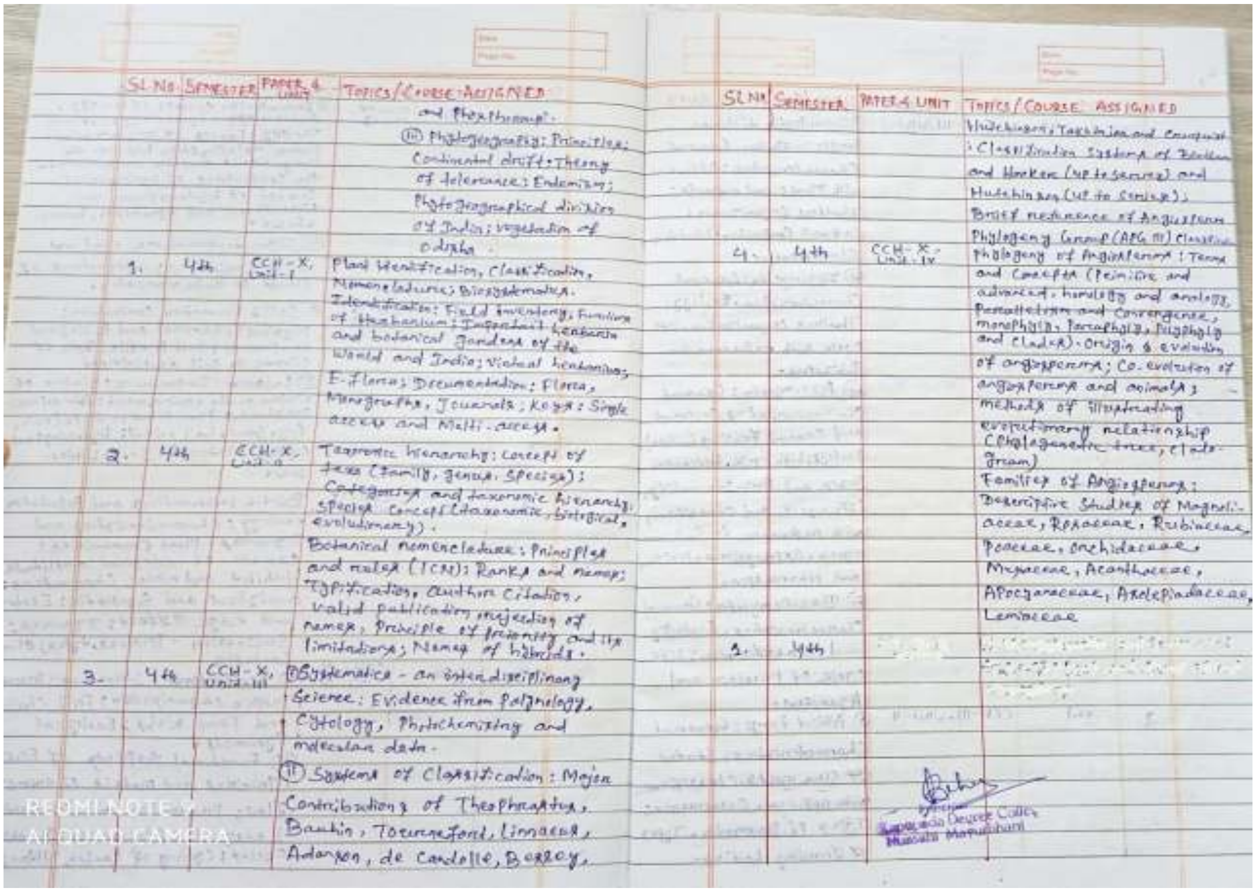
Financial A/c
CC-1, 1st Sem

PROGRESS

SL. NO	DATE	TIME	TOPICS COVERED (If class not taken, mention the reasons)	SIGNATURE OF TEACHER
1	2	3	4	5
	13.10.22 14.10.22	11.45-12.30 11.45-12.30	Introduction of A/C (Basic) Accounting as the language of business and an inf. sys.	H. P.
	15.10.22	"	The users of Accounting	H. P.
	18.10.22 19.10.22	" "	needs of Accounting. Characteristics of Account.	H. P.
	20.10.22 21.10.22	" "	functions of Accounting. Advantages and limitation	H. P.
	22.10.22 27.10.22 28.10.22	" " "	Branches of Accounting Bases of Accounting. Cash basis & Accrual basis	H. P.
	31.10.22	"	Concept & convention of Accounting.	H. P.
	1.11.22	"	Business entity.	H. P.
	2.11.22 3.11.22	" "	Money measurement. going concern.	H. P.
	4.11.22	"	cost concept. realisation concept.	H. P.
	5.11.22 7.11.22	" "	Accruals & periodicity.	H. P.
	9.11.22 10.11.22	" "	Consistency & materiality. full disclosure	H. P.
	14.11.22 15.11.22	" "	Accounting equation. journal entry.	H. P.
	17.11.22	"	subdivision of journal.	H. P.
	18.11.22 19.11.22	" "	Ledger A/c. Trial balance.	H. P.
	22.11.22 24.11.22	" "	Concept of AS. Indian AS.	H. P.
	26.11.22 28.11.22	" "	IFRS. XBRL	H. P.
	29.11.22 30.11.22 1.12.22 5.12.22	"	Discussion about All AS, IFRS, XBRL	H. P.

N.B. : At the end of every week, it is to be countersigned by HOD and at the end of every month, it is to be countersigned by the Principal.

Principal
Degree College
Mayurbhanj



SL.No.	SEMESTER	PAPER & UNIT	TOPICS/COURSE ASSIGNED
			and Phenotypes. (iii) Phytogeography: Principles; Continental drift; Theory of tolerance; Endemism; Phytogeographical divisions of India; Vegetation of Odisha.
1.	4th	CCH-X, Unit-I	Plant Identification, Classification, Nomenclature; Biosystematics. Identification: Field inventory; Functions of Herbarium; Important herbaria and botanical gardens of the World and India; Virtual herbarium; E-flora; Documentation: Flora, Monographs, Journals; Keys: Single access and Multi-access.
2.	4th	CCH-X, Unit-II	Taxonomic hierarchy: Concept of taxa (family, genus, species); Categories and taxonomic hierarchy; Species concept (taxonomic, biological, evolutionary). Botanical nomenclature: Principles and rules (ICN); Ranks and names; Typification, Author citation, Valid publication, rejection of names, Principle of priority and its limitations; Names of hybrids.
3.	4th	CCH-X, Unit-III	(i) Systematics - an interdisciplinary Science: Evidence from palynology, Cytology, Phytochemistry and molecular data. (ii) Systems of Classification: Major Contributions of Theophrastus, Bauhin, Tournefort, Linnaeus, Adanson, de Candolle, Bessey,

SL.No.	SEMESTER	PAPER & UNIT	TOPICS/COURSE ASSIGNED
			Hutchinson, Takhtajan and Cronquist; Classification systems of Bentham and Hooker (up to series) and Hutchinson (up to families); Brief reference of Angiosperm Phylogeny Group (APG III) classification.
4.	4th	CCH-X, Unit-IV	Phylogeny of Angiosperms: Terms and Concepts (primitive and advanced, homology and analogy, parallelism and convergence, monophyly, paraphyly, polyphyly and clades). Origin & evolution of angiosperms; Co-evolution of angiosperms and animals; Methods of illustrating evolutionary relationship (phylogenetic tree, cladogram) Families of Angiosperms: Descriptive studies of Magnoliaceae, Rosaceae, Rubiaceae, Poaceae, Orchidaceae, Myrtaceae, Acanthaceae, Apocynaceae, Asclepiadaceae, Lamiaceae
5.	4th		

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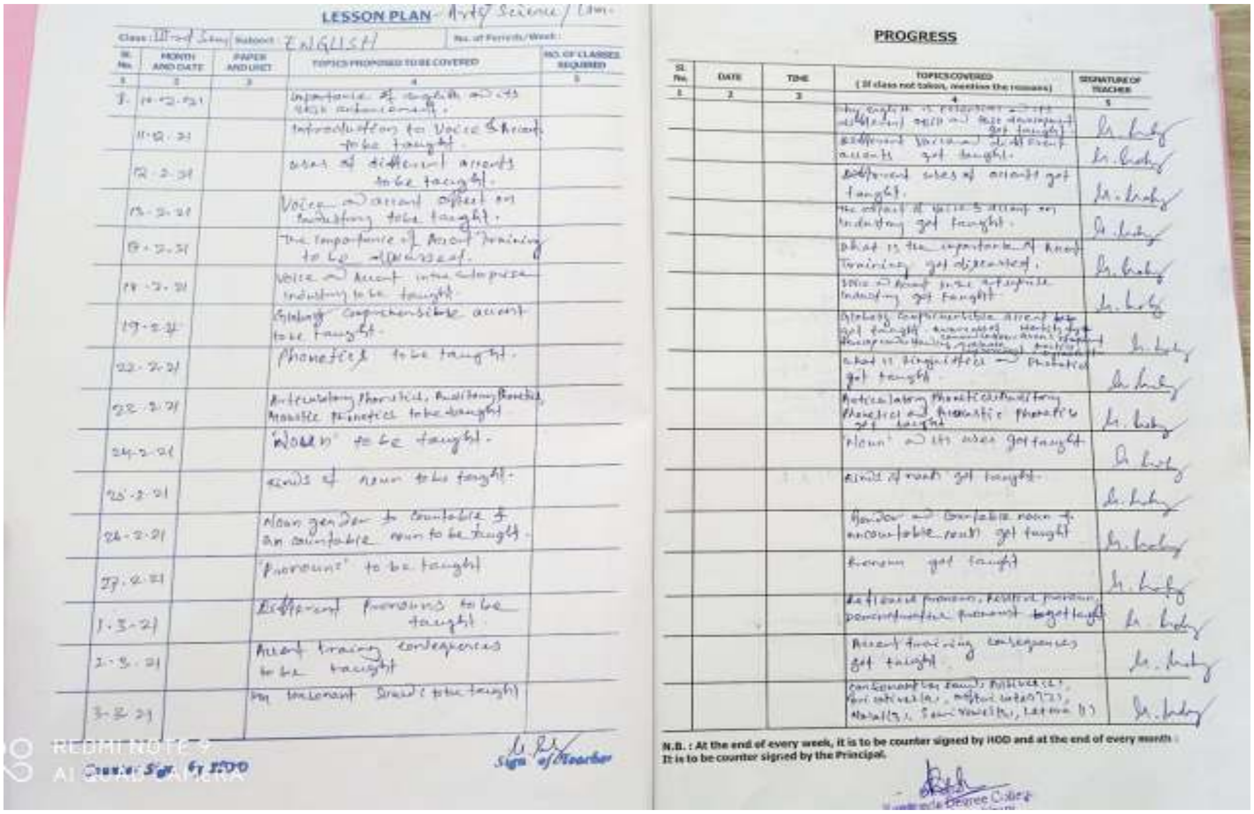
Mahulpali



LESSON PLAN- Arts/ Science / Com-

Class: IInd Sem | Subject: ENGLISH | No. of Periods/Week:

Sl. No.	MONTH AND DATE	PAPER AND UNIT	TOPICS PROPOSED TO BE COVERED	NO. OF CLASSES REQUIRED
1	2	3	4	5
1.	10-2-21		Importance of English and its skill enhancement.	
	11-2-21		Introduction to Voice & Accent to be taught.	
	12-2-21		Uses of different accents to be taught.	
	13-2-21		Voice and accent effect on industry to be taught.	
	15-2-21		The importance of Accent Training to be discussed.	
	18-2-21		Voice and Accent in the enterprise industry to be taught.	
	19-2-21		Globally comprehensible accent to be taught.	
	22-2-21		Phonetics to be taught.	
	23-2-21		Articulatory Phonetics, Auditory Phonetics, Acoustic Phonetics to be taught.	
	24-2-21		'Noun' to be taught.	
	25-2-21		Kinds of noun to be taught.	
	26-2-21		Noun gender & countable & uncountable noun to be taught.	
	27-2-21		'Pronouns' to be taught	
	1-3-21		Different pronouns to be taught.	
	2-3-21		Accent training consequences to be taught	
	3-3-21		[illegible] consonant sounds (to be taught)	

Counter Sign. by HOD

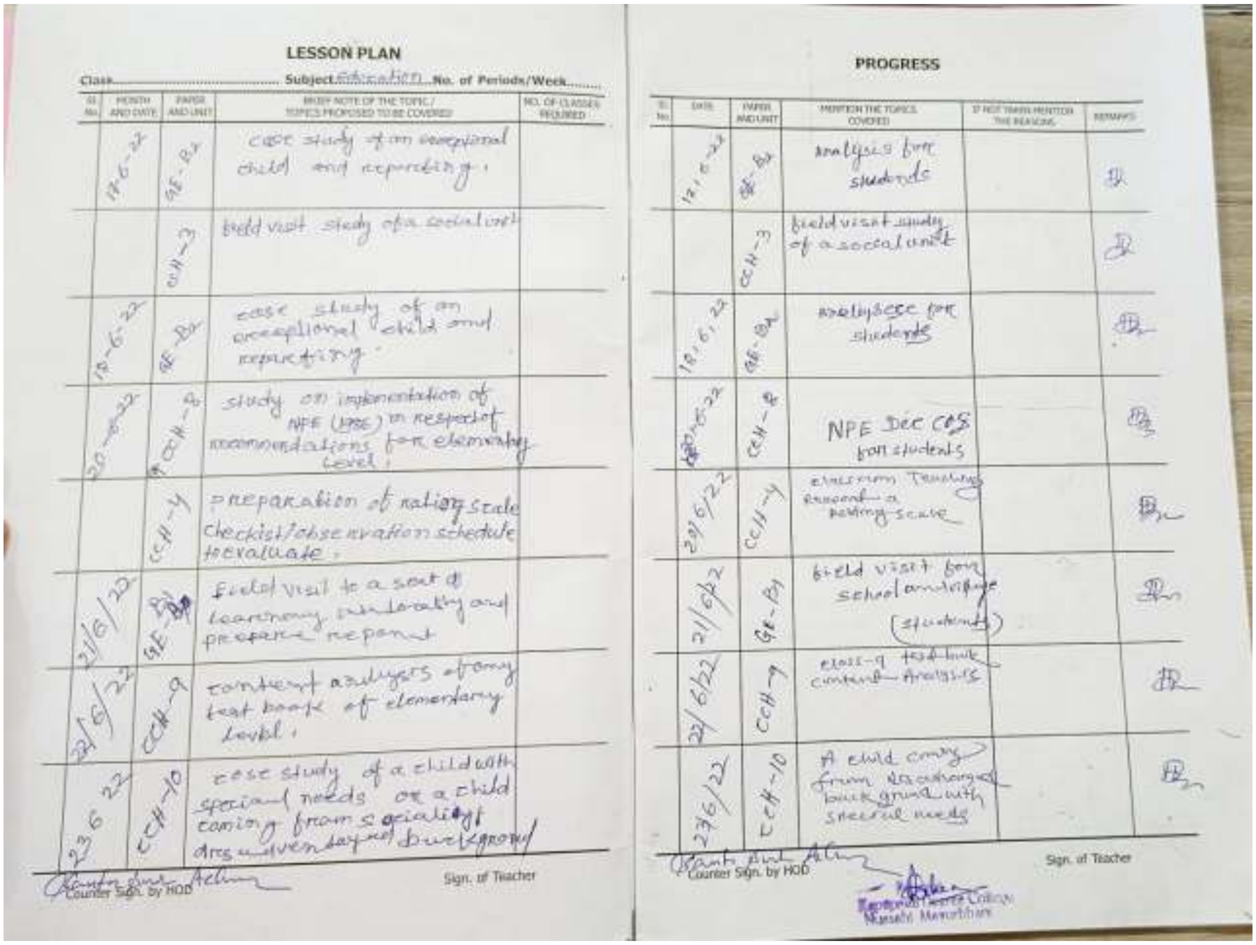
Sign. of Teacher

PROGRESS

SL. No.	DATE	TIME	TOPICS COVERED (If class not taken, mention the reasons)	SIGNATURE OF TEACHER
1	2	3	4	5
			Why English is important and its different skill and their development got taught.	
			Different voice and different accents got taught.	
			Different uses of accents got taught.	
			The effect of voice & accent on industry got taught.	
			What is the importance of Accent Training got discussed.	
			Voice and Accent in the enterprise industry got taught	
			Globally comprehensible accent got taught [illegible]	
			What is linguistics and phonetics got taught.	
			Articulatory phonetics, auditory phonetics and acoustic phonetics got taught	
			'Noun' and its uses got taught	
			Kinds of noun got taught.	
			Gender and countable noun & uncountable noun got taught	
			Pronoun got taught	
			Reflexive pronoun, relative pronoun, demonstrative pronouns got taught	
			Accent training consequences got taught	
			Consonant [illegible]	

N.B. : At the end of every week, it is to be counter signed by HOD and at the end of every month : It is to be counter signed by the Principal.

[illegible] Degree College



LESSON PLAN

Class.................................... Subject Education No. of Periods/Week.........

Sl. No.	MONTH AND DATE	PAPER AND UNIT	BRIEF NOTE OF THE TOPIC / TOPICS PROPOSED TO BE COVERED	NO. OF CLASSES REQUIRED
	17-6-22	GE-B2	case study of an exceptional child and reporting.	
		CCH-3	field visit study of a social unit	
	18-6-22	GE-B2	case study of an exceptional child and reporting.	
	20-6-22	CCH-8	study on implementation of NPE (1986) in respect of recommendations for elementary level.	
		CCH-4	preparation of rating scale checklist/observation schedule to evaluate.	
	21/6/22	GE-B3	Field visit to a seat of learning [illegible] and prepare report	
	22/6/22	CCH-9	content analysis of any text book of elementary level.	
	23 6 22	CCH-10	case study of a child with special needs or a child coming from socially disadvantaged background	

Counter Sign. by HOD

Sign. of Teacher

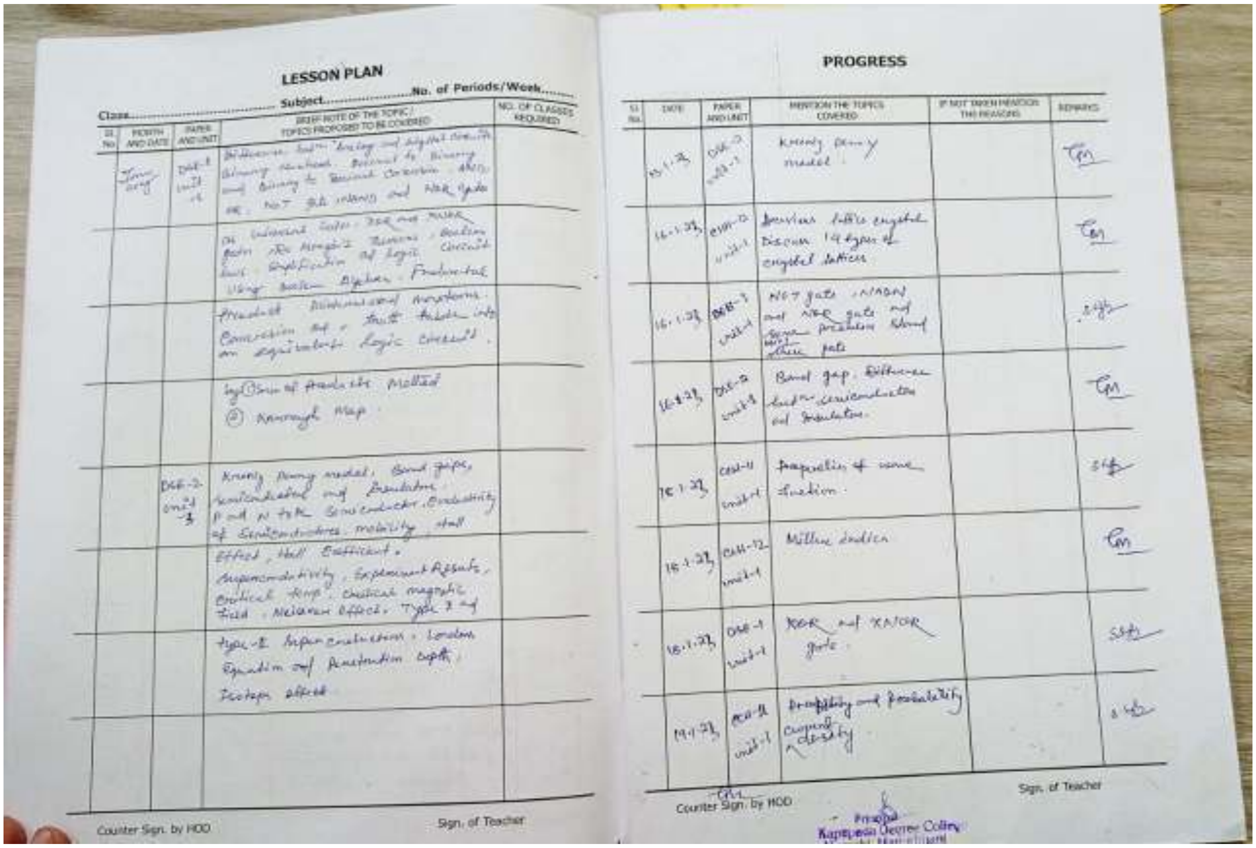
PROGRESS

Sl. No.	DATE	PAPER AND UNIT	MENTION THE TOPICS COVERED	IF NOT TAKEN MENTION THE REASONS	REMARKS
	17-6-22	GE-B2	analysis for students		
		CCH-3	field visit study of a social unit		
	18-6-22	GE-B2	analysis for students		
	20-6-22	CCH-8	NPE Rec COS for students		
	20/6/22	CCH-4	classroom Teaching Respond a Rating scale		
	21/6/22	GE-B3	field visit for school and village (students)		
	22/6/22	CCH-9	class-9 text book content Analysis		
	27/6/22	CCH-10	A child coming from disadvantaged background with special needs		

Counter Sign. by HOD

Sign. of Teacher

Principal
[illegible] Degree College
[illegible]



LESSON PLAN

Class.................................... Subject.................................... No. of Periods/Week.........

Sl. No.	MONTH AND DATE	PAPER AND UNIT	BRIEF NOTE OF THE TOPIC / TOPICS PROPOSED TO BE COVERED	NO. OF CLASSES REQUIRED
	[illegible]	DSE-1 unit-1	Difference between Analog and Digital circuits, Binary number, Decimal to Binary and Binary to Decimal Conversion. AND, OR, NOT gate, NAND and NOR gate	
			as universal gate. XOR and XNOR gate, De Morgan's Theorems, Boolean [illegible] Simplification of logic circuit using Boolean Algebra. Fundamental	
			Product [illegible] Conversion of a truth table into an equivalent logic circuit.	
			by ① Sum of products method ② Karnaugh map.	
		DSE-2 unit-3	Kronig Penney model, Band gaps, semiconductor and Insulator, P and N type semiconductor, Conductivity of semiconductors, mobility, Hall	
			Effect, Hall Coefficient. Superconductivity, Experimental Results, Critical temp, Critical magnetic field, Meissner effect. Type I and	
			type-II superconductors. London Equation and Penetration depth, Isotope effect	

Counter Sign. by HOD

Sign. of Teacher

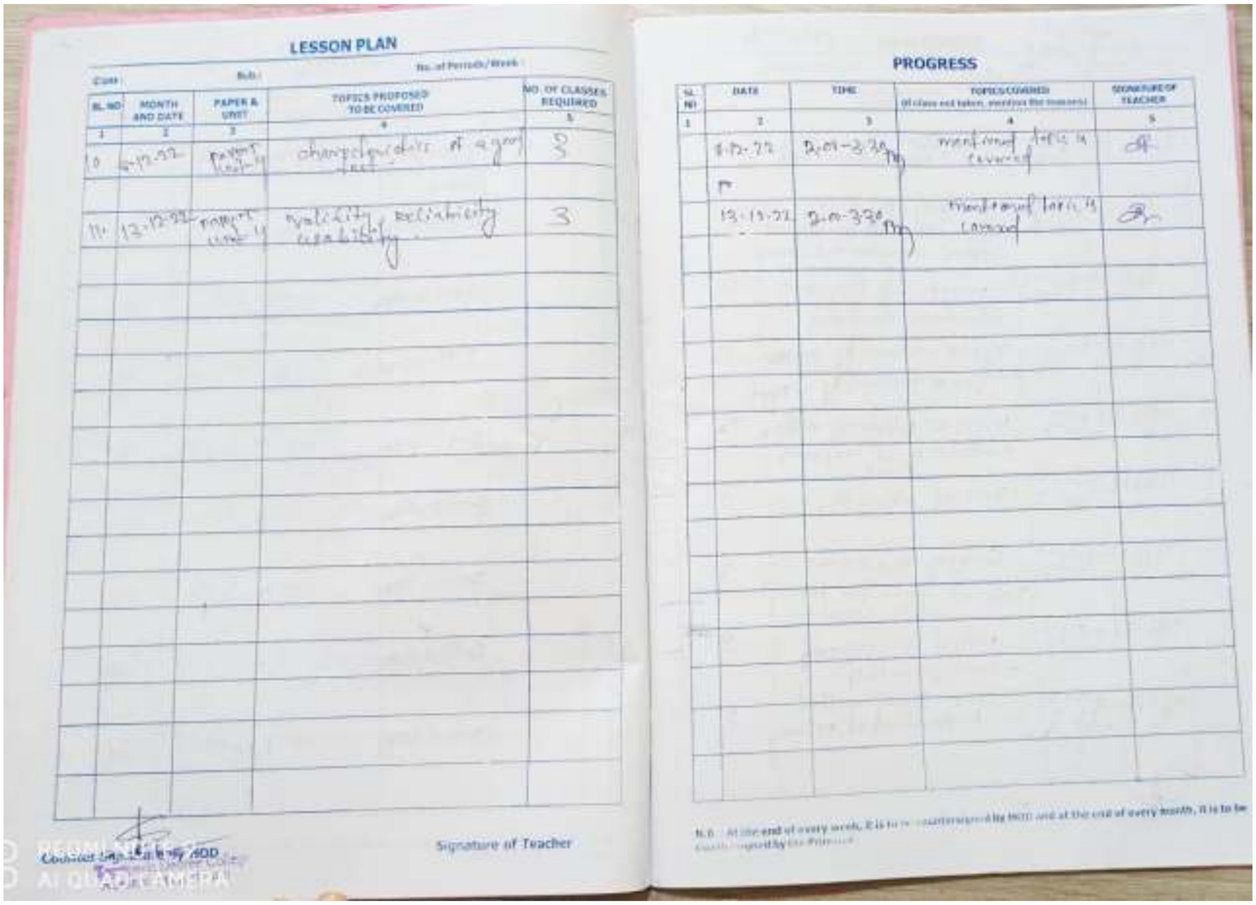
PROGRESS

Sl. No.	DATE	PAPER AND UNIT	MENTION THE TOPICS COVERED	IF NOT TAKEN MENTION THE REASONS	REMARKS
	15.1.23	DSE-2 unit-3	Kronig Penny model		
	16.1.23	DSE-2 unit-1	Bravais lattice crystal. Discuss 14 types of crystal lattices		
	16.1.23	DSE-1 unit-1	NOT gate, NAND and NOR gate and some problem [illegible] these gate		
	16.1.23	DSE-2 unit-3	Band gap. Difference between semiconductor and Insulator.		
	18.1.23	CC-11 unit-1	properties of some function.		
	18.1.23	CC-12 unit-1	Miller indices		
	18.1.23	DSE-1 unit-1	XOR and XNOR gate.		
	19.1.23	CC-11 unit-1	Probability and Probability current density		

Counter Sign. by HOD

Sign. of Teacher

Principal
[illegible] Degree College



LESSON PLAN

Class: Sub.: No. of Periods/Week:

SL. NO	MONTH AND DATE	PAPER & UNIT	TOPICS PROPOSED TO BE COVERED	NO. OF CLASSES REQUIRED
1	2	3	4	5
10	6-12-22	paper unit-4	characteristics of a good test	3
11	12-12-22	paper unit 4	validity, reliability usability	3

Counter sign. by HOD

Signature of Teacher

PROGRESS

SL. NO	DATE	TIME	TOPICS COVERED (if class not taken, mention the reasons)	SIGNATURE OF TEACHER
1	2	3	4	5
	6-12-22	2.00-3.30 pm	mentioned topic is covered	
	13-12-22	2.00-3.30 pm	mentioned topic is covered	

REDMI NOTE 9
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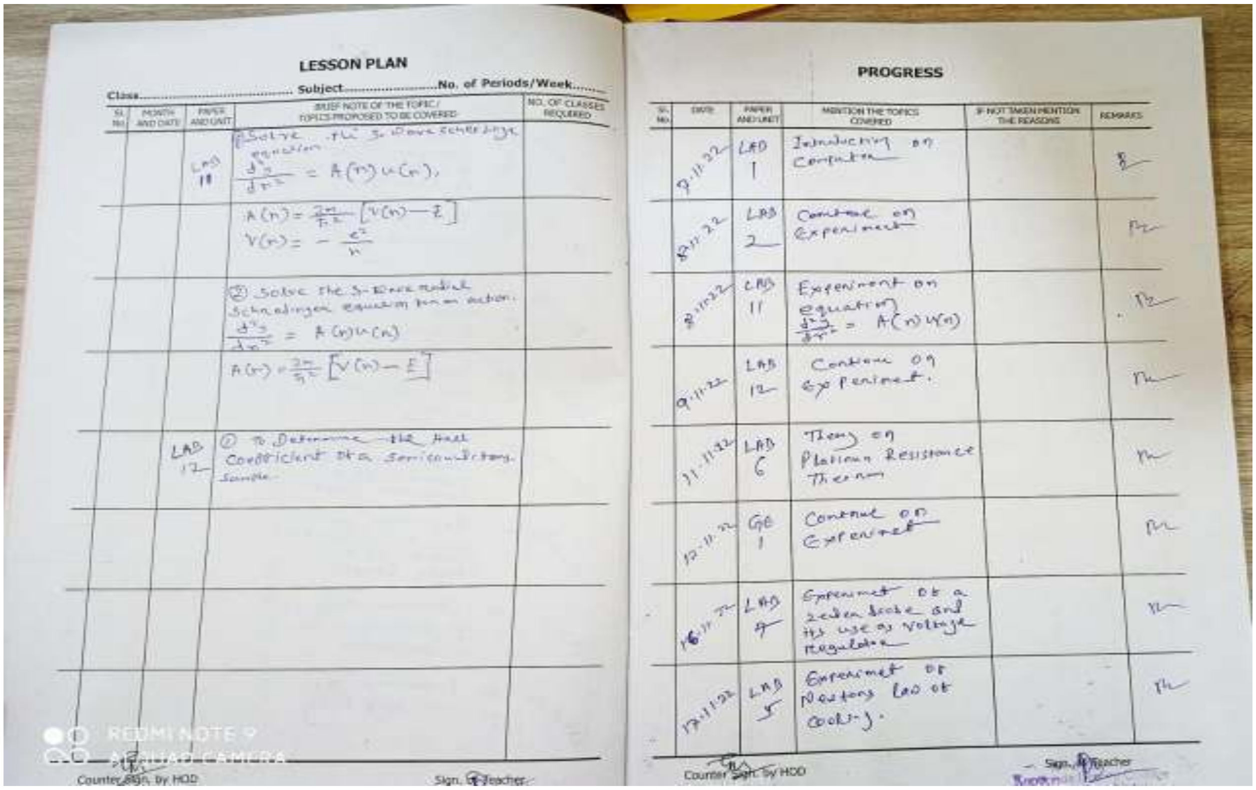

LESSON PLAN

Class.................................. Subject........................No. of Periods/Week.........

SL. NO.	MONTH AND DATE	PAPER AND UNIT	BRIEF NOTE OF THE TOPIC/ TOPICS PROPOSED TO BE COVERED	NO. OF CLASSES REQUIRED
		LAB 11	① Solve the S-wave Schrodinger equation $\frac{d^2y}{dr^2} = A(r)u(r)$,	
			$A(r) = \frac{2m}{\hbar^2}[V(r) - E]$ $V(r) = -\frac{e^2}{r}$	
			② Solve the S-wave radial Schrodinger equation for an atom. $\frac{d^2y}{dr^2} = A(r)u(r)$	
			$A(r) = \frac{2m}{\hbar^2}[V(r) - E]$	
		LAB 12	① To Determine the Hall coefficient of a semiconductory sample.	

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Sign. of Teacher

PROGRESS

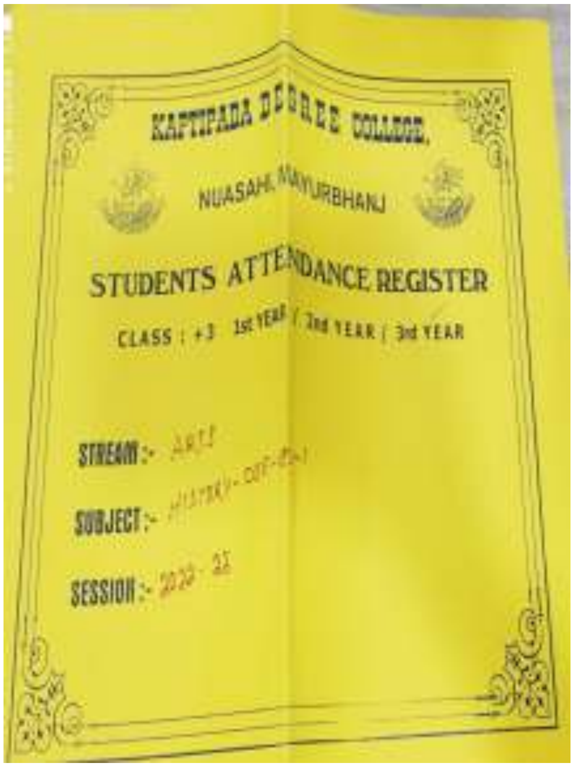
SL. No.	DATE	PAPER AND UNIT	MENTION THE TOPICS COVERED	IF NOT TAKEN MENTION THE REASONS	REMARKS
	9-11-22	LAB 1	Introduction on computer		
	8-11-22	LAB 2	Continue on Experiment		
	8-11-22	LAB 11	Experiment on equation $\frac{d^2y}{dr^2} = A(r)u(r)$		
	9-11-22	LAB 12	Continue on experiment.		
	11-11-22	LAB 6	Theory on Platinum Resistance Thermo		
	12-11-22	GE 1	Continue on Experiment		
	16-11-22	LAB 9	Experiment of a zener diode and its use as voltage regulator		
	17-11-22	LAB 5	Experiment of Newtons law of cooling.		

Counter Sign. by HOD

Sign. of Teacher

REDMI NOTE 9
AI QUAD CAMERA

STUDENT ATTANDANCE



KAPTIPADA DEGREE COLLEGE,

NUASAHI, MAYURBHANJ

STUDENTS ATTENDANCE REGISTER

CLASS : +3 1st YEAR / 2nd YEAR / 3rd YEAR

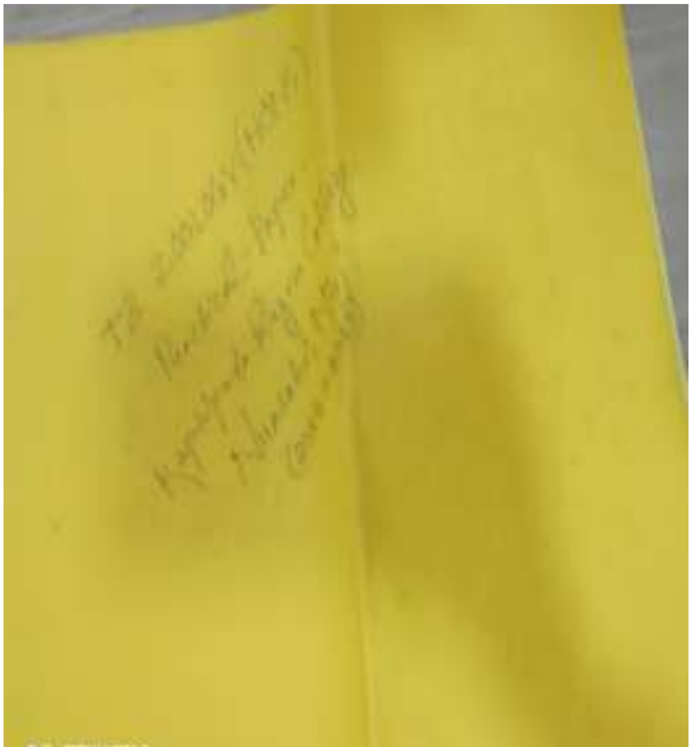
STREAM :- ARTS

SUBJECT :- HISTORY-DSF-[illegible]

SESSION :- 2020- 21

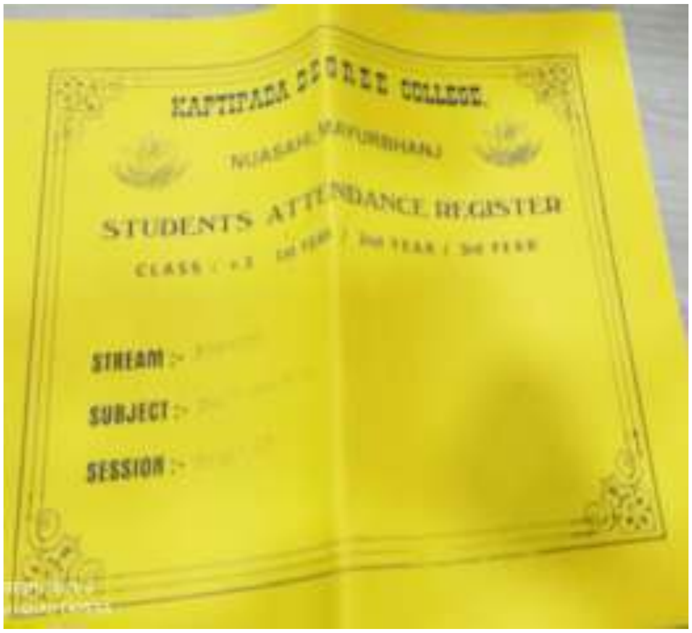
KAPTIPADA DEGREE COLLEGE, NUASAHI, MAYURBHANJ +3 ARTS / SCIENCE / COMMERCE

STUDENTS ATTENDANCE

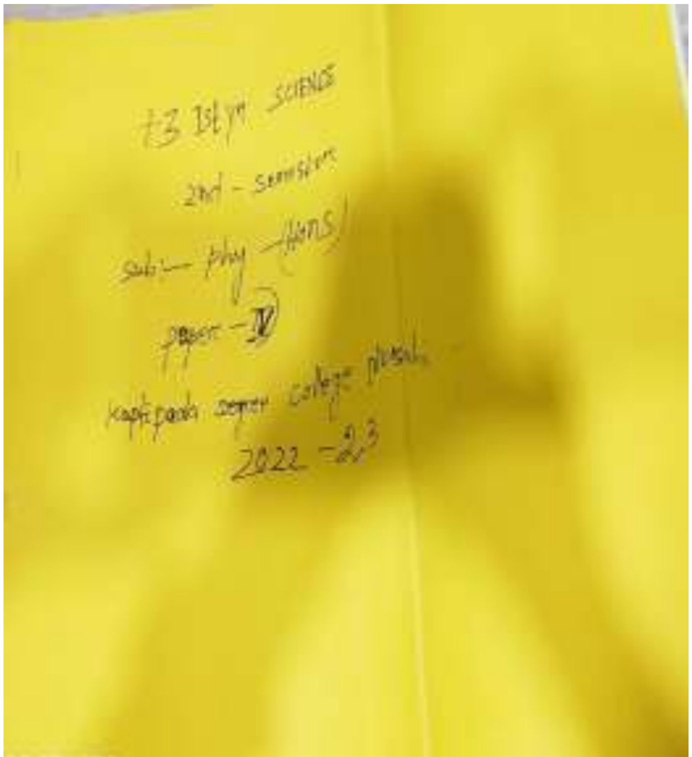


KAPTIPADA DEGREE COLLEGE, NUASAHI, MAYURBHANJ +3 ARTS / SCIENCE / COMMERCE

STUDENTS ATTENDANCE

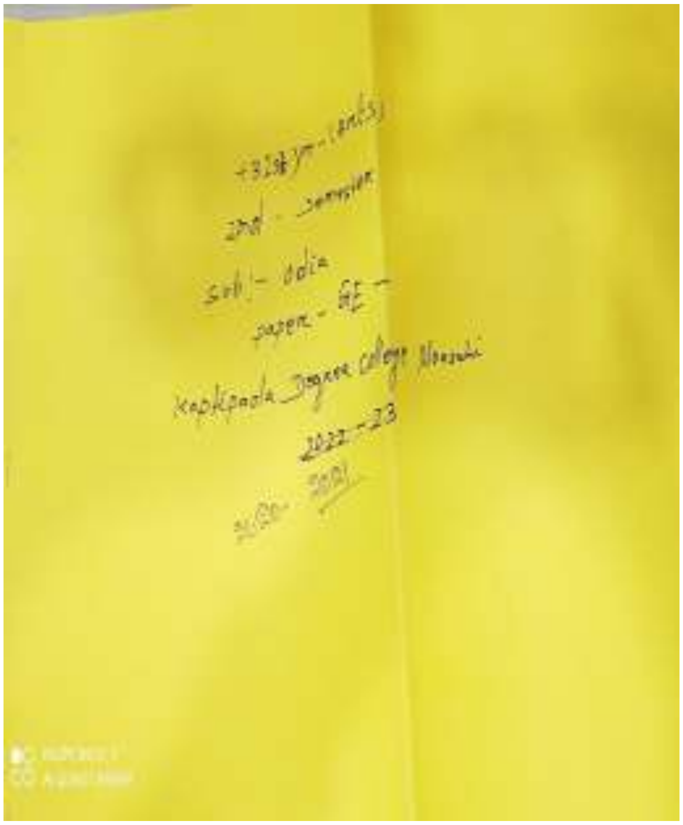


KAPTIPADA DEGREE COLLEGE.
NUASAHI, MAYURBHANJ
STUDENTS ATTENDANCE REGISTER
CLASS : +3 1st YEAR / 2nd YEAR / 3rd YEAR
STREAM :-
SUBJECT :-
SESSION :-

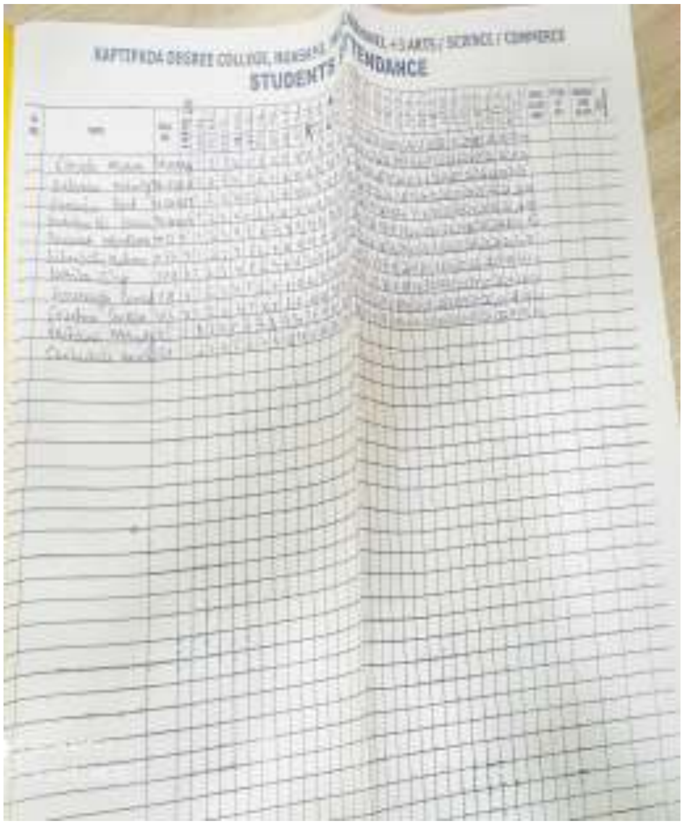


+3 Ist yr Science
2nd - Semester
Sub:- Phy (Hons)
paper - IV
kaptipada degree college Nuasahi
2022-23

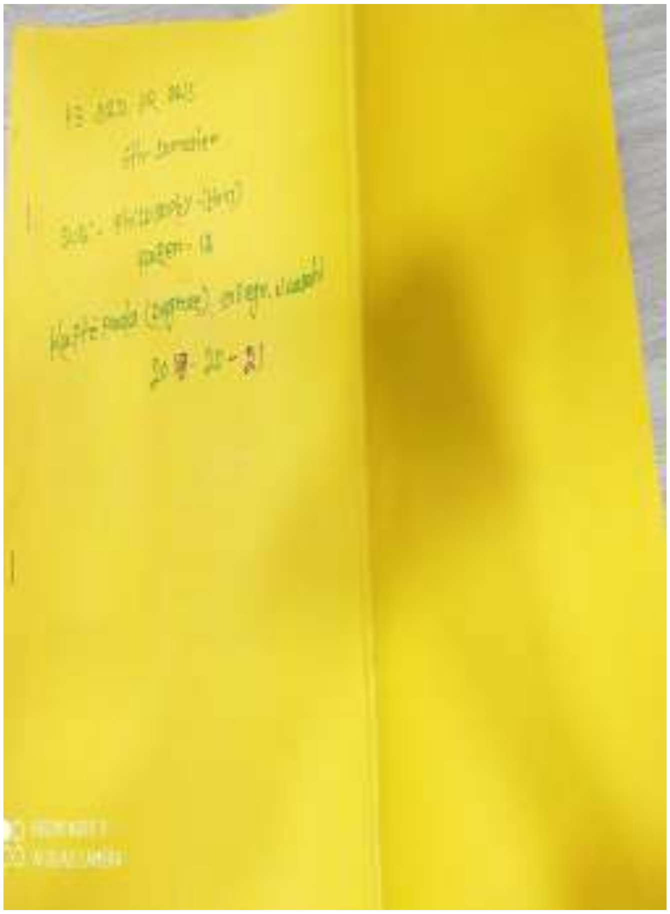
KAPTIPADA DEGREE COLLEGE, NUASAHI, MAYURBHANJ, +3 ARTS / SCIENCE / COMMERCE
STUDENTS ATTENDANCE



+3 3rd yr - (arts)
2nd - semester
Sub - odia
paper - GE -
Kaptipada Degree college Nuasahi
2022-23



KAPTIPADA DEGREE COLLEGE, NUASAHI [illegible] +3 ARTS / SCIENCE / COMMERCE
STUDENTS' ATTENDANCE



+3 3RD YR ARTS
6th Semester
Sub:- Philosophy (Hon)
paper - 13
Kaptipada (Degree) college, Nuasahi
20 20-21

KAPTIPADA DEGREE COLLEGE, NUASAHI [illegible] +3 ARTS / SCIENCE / COMMERCE
STUDENTS' ATTENDANCE

REDMI NOTE 9
AI QUAD CAMERA

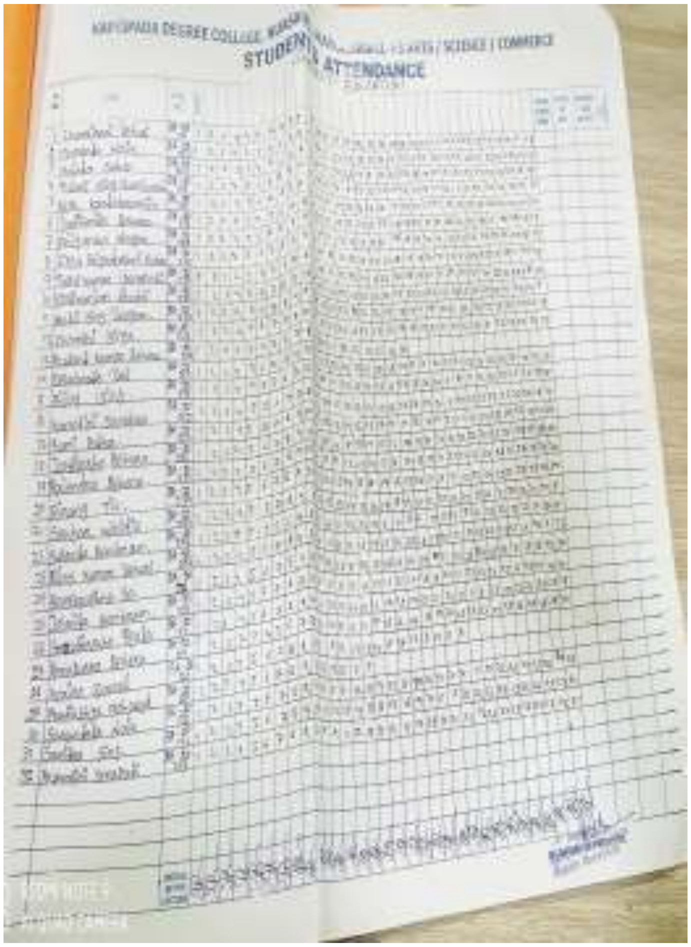
KAPTIPADA DEGREE COLLEGE, NUASA BHANJ, +3 ARTS / SCIENCE / COMMERCE

STUDENTS ATTENDANCE

3rd Semester

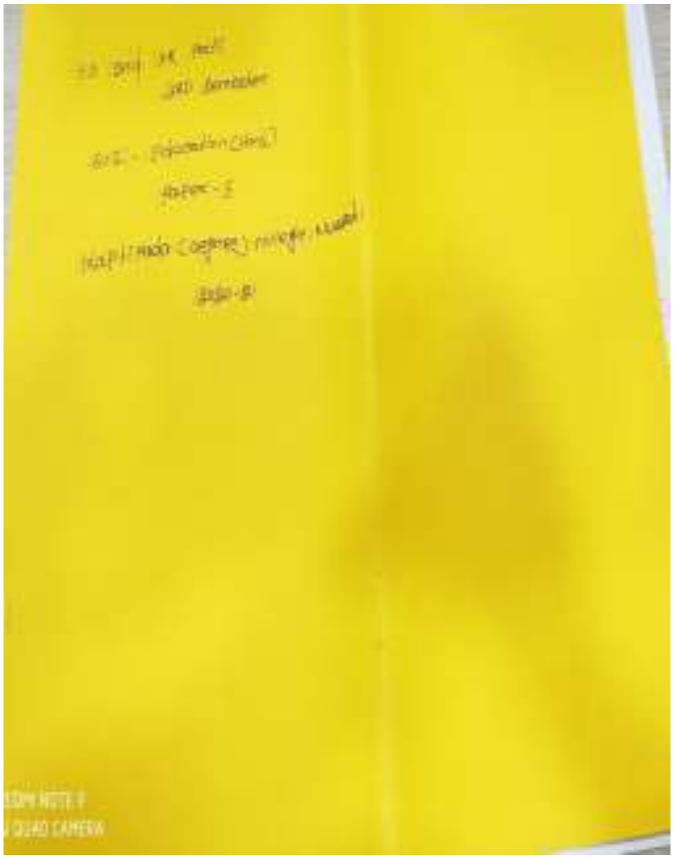
KAPTIPADA DEGREE COLLEGE, NUASA +3 ARTS / SCIENCE / COMMERCE

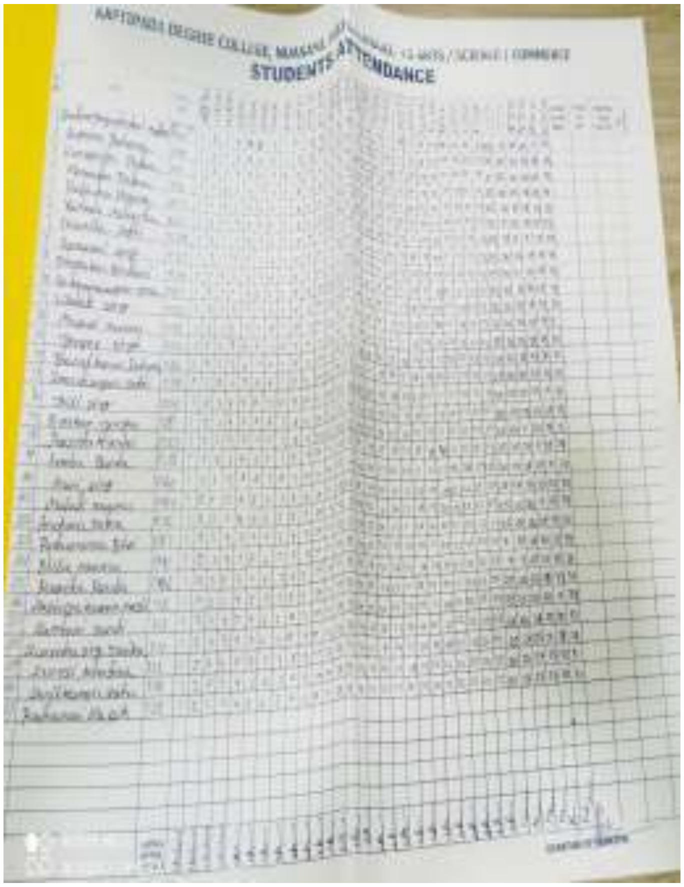
STUDENTS ATTENDANCE



KAPTIPADA DEGREE COLLEGE, +3 ARTS / SCIENCE / COMMERCE

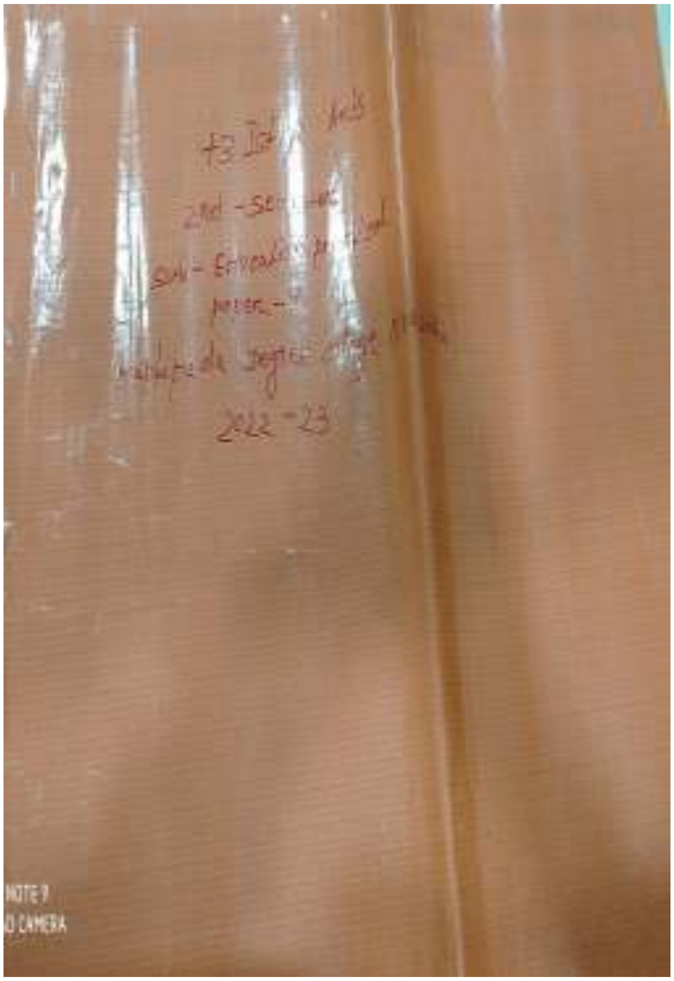
STUDENTS ATTENDANCE





KAPTIPADA DEGREE COLLEGE, +3 ARTS / SCIENCE / COMMERCE

STUDENTS ATTENDANCE



+3 Ist yr Arts

2nd - semester

Sub - Education paper

paper - 4

Kaptipada degree college Nuasahi

2022-23

NOTE 9
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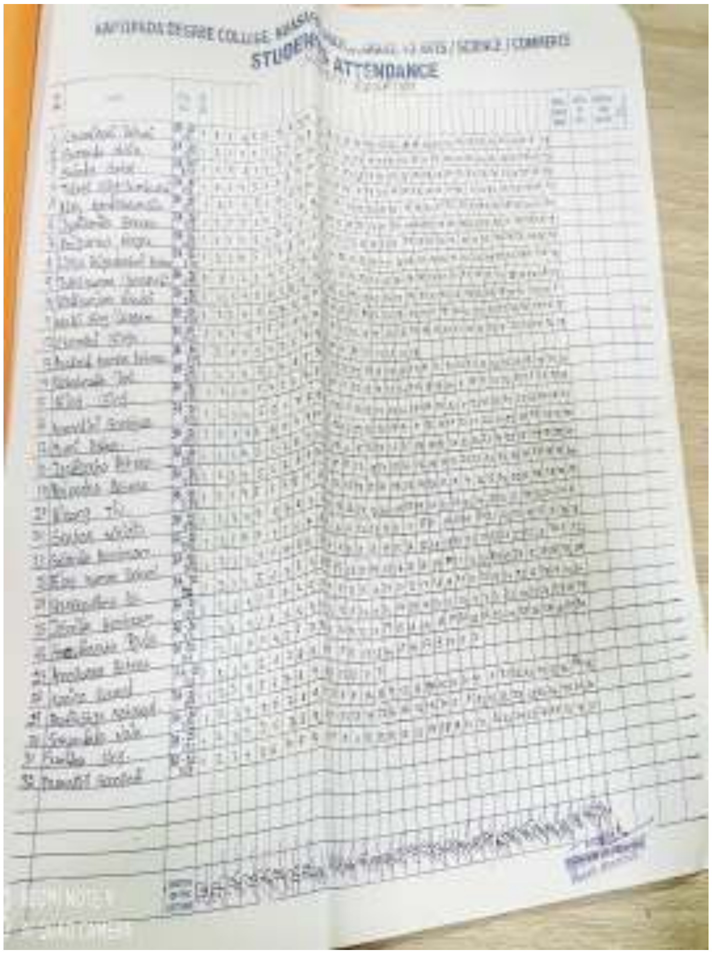

KAPTIPADA DEGREE COLLEGE, NUASAHI +3 ARTS / SCIENCE / COMMERCE

STUDENTS ATTENDANCE

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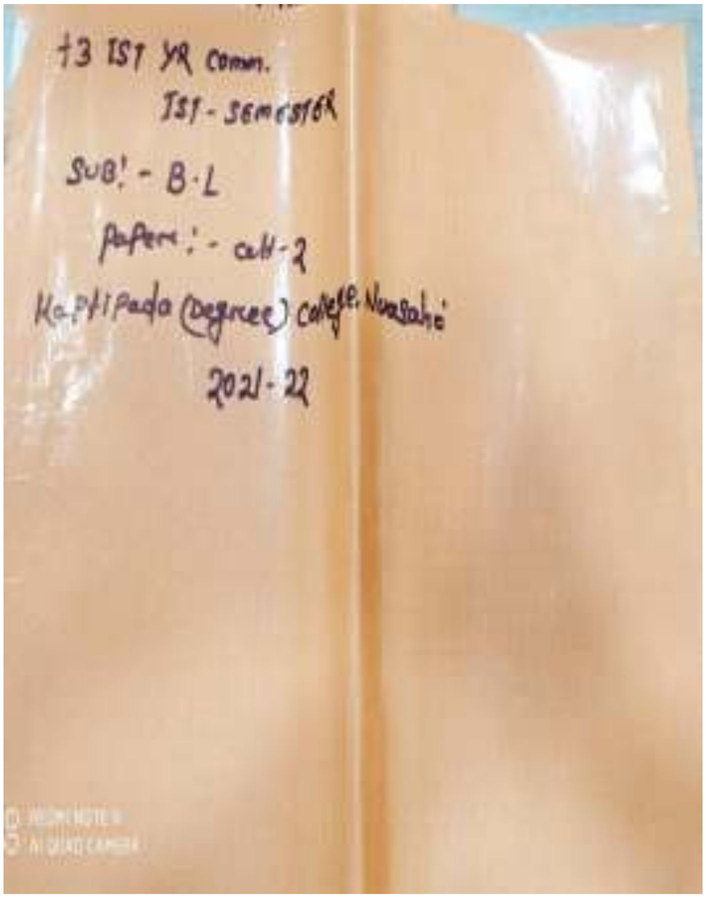

+3 IST YR Comm.

IST - SEMESTER

SUB:- B.L

Paper:- cc-2

Kaptipada (Degree) college. Nuasahi

2021-22

REDMI NOTE 9
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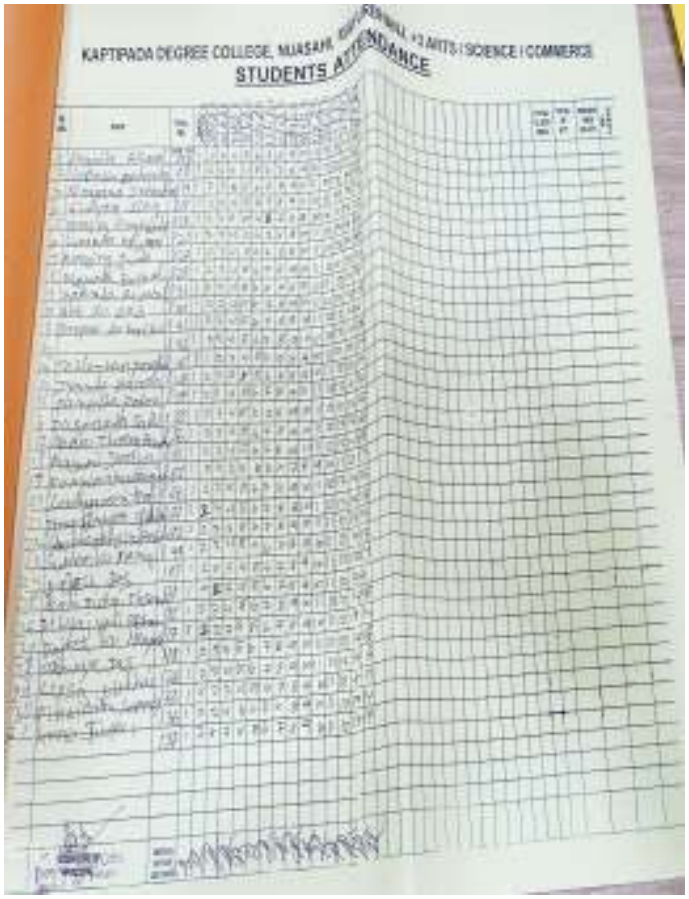
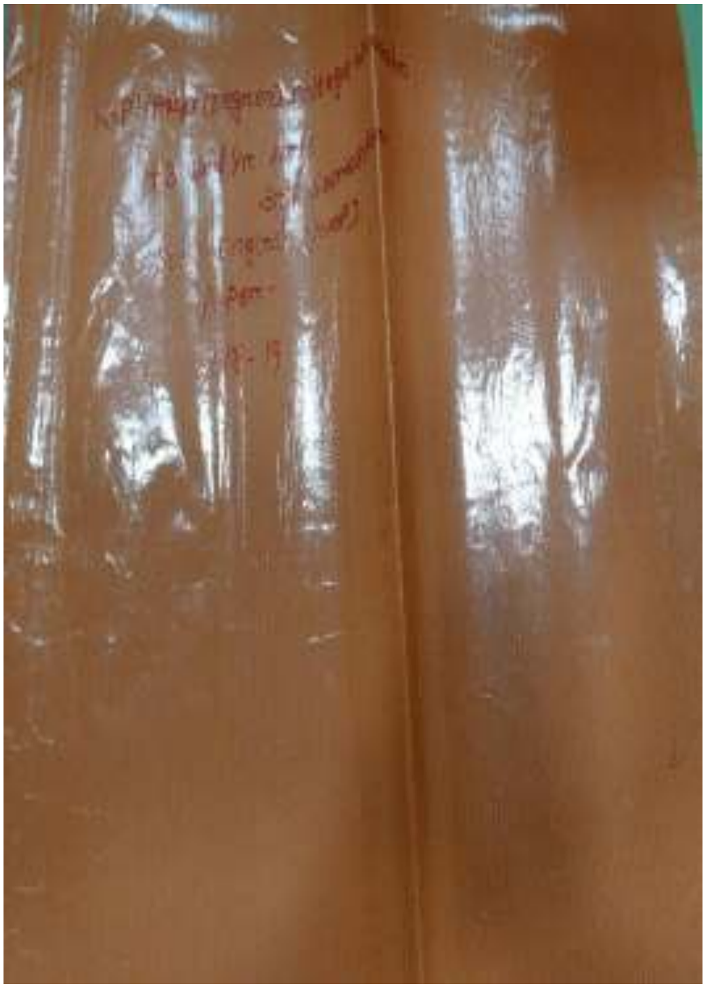


KAPTIPADA DEGREE COLLEGE, NUASAHI, +3 ARTS / SCIENCE / COMMERCE

STUDENTS ATTENDANCE



[illegible]

[illegible] DEGREE COLLEGE [illegible] ARTS | SCIENCE | COMMERCE

STUDENTS ATT[illegible]NCE

Model Syllabus of Courses

Ability/Skill Enhancement

STATE MODEL SYLLABUS FOR UNDER GRADUATE
COURSE IN
ABILITY/SKILL ENHANCEMENT
(+3 Arts, Science &Commerce Examination)

ENVIRONMENTAL STUDIES (AECC I)

SEMESTER – I

FOR UNDER GRADUATE ARTS, SCIENCE & COMMERCE – 2019-20

FULL MARKS: 100

TIME: 3 HOURS **END SEMESTER: 80**
TIME: 1 HOUR **MID SEMESTER: 20**

Unit – I

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Unit – II

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Unit- III

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Unit –IV

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Ability Enhancement Compulsory Course (AECC II)
MIL / Alternative English **

** The Detailed course is available in the respective language courses. For Example, MIL Odia is available in the Model Syllabus for Odia

SKILL ENHANCEMENT COURSES (SEC)

As per the CBCS regulation, the student registered under Honours course in any subject has to opt for two SEC courses and a student registered under Pass stream has to opt for four SEC courses. In this context, Some options are provided here. Syllabus of individual subjects also have listed additional skill based papers at the end. In addition, the combined board and Project OHEPEE has also formulated two skill papers in great detail keeping requirements of spoken English and quantitative as well as logical thinking abilities in mind. These two Special SEC papers are available as separate Model Syllabi.

Optional for SEC paper

Total Marks- 100

Skill Enhancement Courses (SEC Option-I)

ENGLISH COMMUNICATION

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UNIT 2: The Four Skills and Prospect of new material in language learning

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UNIT 3: Grammatical and Composition Skills

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UNIT 4: Exercises in Written Communication

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SEC Option II
MODERN OFFICE MANAGEMENT

Full marks – 100
Mid Term-20
End Term-80

Unit- I: Office

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Unit-II: Records Management

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Unit –III: Document/Report Writing

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Unit-IV: Supervisory Skills

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Communication

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Leadership & Motivation

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SEC OPTION III

Leadership and Personality Development

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Unit III: , $ $ " $ $"
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Unit IV: ($" ! $, $,
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SEC OPTION IV

FINANCIAL LITERACY AND BANKING

Full Marks – 100
(Mid Sem-20 + End Sem-80)
Credit Points - 4

Objectives- To make the students aware of the benefits of financial planning

Unit: I – Basics of Savings and Investment * $ # $ $ # $ A $ (0 ,) # * $)" & &; ! A ,"$,, ! M # $ **Tax saving Schemes** $ + / ! . $ $" $ # , !$ ()&" ! (:) (,, 8 $ # ! , ! . (% 0 (′

Unit:-II- Banking Activities $, . $ # $ 8 !!) : > !!) !) # !!) ! $" ! $ $ $ $! & $ 8 $! $,) ! , $ 8+ $ 8 #)!) $ 8 , $

Unit: III- Financial Markets $ $" $ 8 B $ 8 !) $ &) ($:( ))$" :) ,))$" :) 8 (! , & ! # $!$ $" $ 8

Unit:IV- Protection Related products) $! (" ! ,) $! , 0 (" ! ((" ! ($") $! $ ("$!

Output: It will make a more responsible individual with a disciplined approach to money and helps people from overspending and inculcates a habit of savings and investments.

Books for References

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STATE MODEL SYLLABUS FOR UNDERGRADUATE COURSE IN BOTANY

(Bachelor of Science Examination)

UNDER
CHOICE BASED CREDIT SYSTEM

Course Structure of U.G. Botany Honours

Semester	Course	Course Name	Credit	Total marks
Semester-I	AECC-I		4	100
	C-1 (Theory)	Microbiology and Phycology	4	75
	C-1 (Practical)	Microbiology and Phycology	2	25
	C-2 (Theory)	Biomolecules and Cell Biology	4	75
	C-2 (Practical)	Biomolecules and Cell Biology	2	25
	GE -1A (Theory)	Biodiversity (Microbes, Algae, Fungi & Archegoniate)	4	75
	GE -1A(Practical)	Biodiversity (Microbes, Algae, Fungi & Archegoniate)	2	25
Semester-II	AECC-II		4	100
	C-3 (Theory)	Mycology and Phytopathology	4	75
	C-3 (Practical)	Mycology and Phytopathology	2	25
	C-4 (Theory)	Archegoniate	4	75
	C-4 (Practical)	Archegoniate	2	25
	GE -2A (Theory)	Plant Physiology & Metabolism	4	75
	GE -2A(Practical)	Plant Physiology & Metabolism	2	25
Semester-III	C-5 (Theory)	Anatomy of Angiosperms	4	75
	C-5 (Practical)	Anatomy of Angiosperms	2	25
	C-6 (Theory)	Economic Botany	4	75
	C-6 (Practical)	Economic Botany	2	25
	C-7 (Theory)	Genetics	4	75
	C-7 (Practical)	Genetics	2	25
	SEC-1		4	100
	GE -1B (Theory)	Plant Ecology & Taxonomy	4	75
	GE -1B (Practical)	Plant Ecology & Taxonomy	2	25
Semester-IV	C-8 (Theory)	Molecular Biology	4	75
	C-8 (Practical)	Molecular Biology	2	25
	C-9 (Theory)	Plant Ecology & Phytogeography	4	75
	C-9 (Practical)	Plant Ecology & Phytogeography	2	25

	C-10 (Theory)	Plant Systematics	4	75
	C-10 (Practical)	Plant Systematics	2	25
	SEC II		4	100
	GE-2B (Theory)	Plant Anatomy , Embryology & Biotechnology	4	75
	GE-2B(Practical)	Plant Anatomy , Embryology & Biotechnology	2	25
Semester-V	C-11 (Theory)	Reproductive Biology of Angiosperms	4	75
	C-11 (Practical)	Reproductive Biology of Angiosperms	2	25
	C-12 (Theory)	Plant Physiology	4	75
	C-12 (Practical)	Plant Physiology	2	25
	DSE - 1 (Theory)	Analytical Techniques in Plants Sciences	4	75
	DSE - 1 (Practical)	Analytical Techniques in Plants Sciences	2	25
	DSE - 2 (Theory)	Natural Resource Management	4	75
	DSE - 2 (Practical)	Natural Resource Management	2	25
Semester-VI	C-13 (Theory)	Plant Metabolism	4	75
	C-13 (Practical)	Plant Metabolism	2	25
	C-14 (Theory)	Plant Biotechnology	4	75
	C-14 (Practical)	Plant Biotechnology	2	25
	DSE - 3 (Theory)	Horticulture Practices & Post Harvest Technology	4	75
	DSE-3 (Practical)	Horticulture Practices & Post Harvest Technology	2	25
	DSE – 4 Project work	Project Work	6	100
		Total	**148**	**2600**

BOTANY

HONOURS PAPERS:

Core course – 14 papers
Discipline Specific Elective – 4 papers
Generic Elective for non-Botany students – 4 papers. In case University offers 2 subjects as GE, then papers 1 and 2 will be the GE paper. The students has the option of taking any two.

Marks per paper – Mid term: 15 marks, End term: 60 marks (Theory) + 25 marks (Practical), Total – 100 marks
Credit per paper – 6
Teaching hours per paper – 40 hours (theory) + 10 hours (practical)

Core Paper I

MICROBIOLOGY AND PHYCOLOGY

Unit-I

Introduction to microbial world, microbial nutrition, growth and metabolism. **Viruses:-** Discovery, physicochemical and biological characteristics; classification (Baltimore), general structure with special reference to viroids and prions; replication (general account), DNA virus (T-phage), lytic and lysogenic cycle; RNA virus (TMV). Economic importance of viruses with reference to vaccine production, role in research, medicine and diagnostics, as causal organisms of plant diseases.

Unit–II

(i) **Bacteria: -** Discovery, general characteristics, types- archaebacteria, eubacteria, wall-less forms (mycoplasma and spheroplasts), cell structure, nutritional types, reproduction-vegetative, asexual and recombination (conjugation, transformation and transduction). Economic importance of bacteria with reference to their role in agriculture and industry (fermentation and medicine).

(ii) **Cyanobacteria:-**Ecology and occurrence, cell structure, heterocyst, reproduction, economic importance; role in biotechnology. Morphology and life-cycle of *Nostoc*. General characteristics of prochlorophyceae, Evolutionary significance of Prochloron.

Unit–III

(i) **Algae:-** General characteristics; Ecology and distribution; range of thallus organization; Cell structure and components; cell wall, pigment system, reserve food (of only groups represented in the syllabus), flagella and methods of reproduction, classification; criteria, system of Fritsch, and evolutionary classification of Lee (only upto groups); Role of algae in the environment, agriculture, biotechnology and industry.

(ii) **Chlorophyta:-** General characteristics, occurrence, range of thallus organization, cell structure and reproduction. Morphology and life-cycles of *Chlamydomonas*, *Volvox*, *Oedogonium* and *Coleochaete*.

Unit-IV

(i) **Charophyta:-** General characteristics; occurrence, morphology, cell structure and life-cycle of *Chara*; evolutionary significance.

(ii) Xanthophyta:- General characteristics; Occurrence, morphology and life- cycle of *Vaucheria*.

(iii) Phaeophyta:-Characteristics, occurrence, cell structure and reproduction. Morphology and life-cycles of *Ectocarpus* and *Fucus*.

(iv)Rhodophyta:-General characteristics, occurrence, cell structure and reproduction. Morphology and life-cycle of *Polysiphonia*.

PRACTICAL

Microbiology

(i) Electron micrographs/Models of viruses –T-Phage and TMV, Line drawings/ Photographs of Lytic and Lysogenic Cycle.

(ii) Types of Bacteria to be observed from temporary/permanent slides/photographs.

(iii) Examination of bacteria from bacterial culture by Gram's staining method.

(iv) Electron micrographs of bacteria, binary fission, endospore, conjugation, root Nodule (live materials and photographs).

Phycology

Study of vegetative and reproductive structures of Nostoc, Chlamydomonas (electron micrographs), Volvox, Oedogonium,Coleochaete, Chara, Vaucheria, Ectocarpus, Fucus and Polysiphonia, Procholoron, Diatoms through, temporary preparations and permanent slides.

Text Books:

1. Singh, V., Pandey, P.C., and Jain, D.K. (2017). Microbiology and Phycology, Rastogi Publication, Meerut.

Reference Books:

1. Lee, R.E. (2008). Phycology, Cambridge University Press, Cambridge. 4th edition.
2. Prescott, L.M., Harley J.P., Klein D. A. (2010). Microbiology, McGraw-Hill, India. 8th edition.
3. Kumar, H.D. (1999). Introductory Phycology. Affiliated East-West Press, Delhi.
4. Campbell, N.A., Reece J.B., Urry L.A., Cain M.L., Wasserman S.A. Minorsky P.V., Jackson R.B. (2008). Biology, Pearson Benjamin Cummings, USA. 8th edition.
5. Pelczar, M.J., Chan, E.C.S., Krieg, N.R. (2011) Microbiology, 8th edition, Tata McGraw-Hill Co, New Delhi.
6. Willey, Sherwood and Christopher. Laboratory exercises in Microbiology. McGraw-Hill, India. 9th edition.
7. Vasistha B.R. (2017) Botany for Degree student, Algae, S. Chand Publication, New Delhi.
8. Mishra B. K. (2018) Microbiology and Phycology, Kalyani Publishers, New Delhi.

Core Paper II

BIOMOLECULES AND CELL BIOLOGY

Unit-I

(i) Biomolecules and Bioenergenetics: Types and significance of chemical bonds; Structure and properties of water; pH and buffers. Laws of thermodynamics, concept of free energy, endergonic and exergonic reactions, coupled reactions, redox reactions.

(ii) Enzymes: Structure of enzyme: holoenzyme, apoenzyme, cofactors, coenzymes and prosthetic group; Classification of enzymes; Features of active site, substrate specificity, properties of enzymes, mechanism of action (activation energy, lock and key hypothesis, induced - fit theory), Michaelis – Menten equation, enzyme inhibition and factors affecting enzyme activity.

(iii) Carbohydrates: Nomenclature, classification, structure and function of Monosaccharides, Disaccharides, Oligosaccharides and polysaccharides

Unit –II

(i) Lipids: Definition and major classes of storage and structural lipids. Fatty acids structure and functions. Essential fatty acids. Triacyl glycerols structure, functions and properties.

(ii) Proteins: Structure and classification of amino acids; Peptide bonds; Levels of protein structure-primary, secondary, tertiary and quarternary; Isoelectric point; Protein denaturation and biological roles of proteins.

(iii) Nucleic acids: Structure of nitrogenous bases; Structure and function of nucleotides; Types of nucleic acids; Structure of A, B, Z types of DNA; Types of RNA; Structure of tRNA.

Unit –III

(i) The Cell: Cell as a unit of structure and function; Characteristics of prokaryotic and eukaryotic cells; Origin of eukaryotic cell (Endosymbiotic theory).

(ii) Cell wall and plasma membrane: Chemistry, structure and function of Plant Cell Wall. Overview of membrane function; fluid mosaic model; Chemical composition of membranes; Membrane transport – Passive, active and facilitated transport, endocytosis and exocytosis.

(i) Cell organelles: Nucleus; Structure-nuclear envelope, nuclear pore complex, nuclear lamina, molecular organization of chromatin; nucleolus.

Unit-IV

(i) Cytoskeleton: Role and structure of microtubules, microfilaments and intermediary filament.

(ii) Chloroplast, mitochondria and peroxisomes: Structural organization; Function; Semiautonomous nature of mitochondria and chloroplast. Endoplasmic Reticulum, Golgi Apparatus, Lysosomes.

(iii) Cell division: Eukaryotic cell cycle, different stages of mitosis and meiosis. Cell cycle, Regulation of cell cycle.

PRACTICAL

(i) Qualitative tests for carbohydrates, reducing sugars, non-reducing sugars, lipids and proteins.

(ii) Study of plant cell structure with the help of epidermal peel mount of Onion/*Rhoeo*

(iii) Demonstration of the phenomenon of protoplasmic streaming in *Hydrilla* leaf.

(iv) Counting the cells per unit volume with the help of haemocytometer. (Yeast/pollen grains).

(v) Study the phenomenon of plasmolysis and deplasmolysis.

(vi) Study of different stages of mitosis and meiosis using aceto carmine and aceto orcine method from Onion root tip and bud respectively.

Text Books:

1. Rastogi, V. B. (2016). Introductory Cytology, Kedar Nath & Ram Nath, Meerut
2. Gupta, P. K. (2017). Biomolecules and Cell Biology, Rastogi Publication, Meerut.

Reference Books:

1. Sahoo, K. (2017) Biomolecules and Cell Biology, Kalyani Publishers, New Delhi.
2. Tymoczko, J.L., Berg, J.M. and Stryer, L. (2012) Biochemistry: A short course, 2nd ed., W.H. Freeman
3. Nelson, D.L. and Cox, M.M. (2008) Lehninger Principles of Biochemistry, 5th Edition, W.H. Freeman and Company.
4. Cooper, G.M. and Hausman, R.E. 2009 The Cell: A Molecular Approach. 5th edition. ASM Press & Sunderland, Washington, D.C.; Sinauer Associates, MA.
5. Becker, W.M., Kleinsmith, L.J., Hardin. J. and Bertoni, G. P. 2009 The World of the Cell. 7th edition. Pearson Benjamin Cummings Publishing, San Francisco

Core Paper III

MYCOLOGY AND PHYTOPATHOLOGY

Unit-I

(i) Introduction to true fungi: Definition, General characteristics; Affinities with plants and animals; Thallus organization; Cell wall composition; Nutrition; Classification.

(ii) Zygomycota: General characteristics; Ecology; Thallus organisation; Life cycle with reference to *Rhizopus*.

(iii) Ascomycota: General characteristics (asexual and sexual fruiting bodies); Ecology; Life cycle, Heterokaryosis and parasexuality; life cycle and classification with reference to *Saccharomyces, Aspergillus*, *Penicillium,* and *Neurospora.*

(iv) Basidiomycota: General characteristics; Ecology and Classification; Life cycle of *Puccinia* and *Agaricus*.

Unit-II

(i) Allied Fungi: General characteristics; Status of Slime molds, Classification; Occurrence; Types of plasmodia; Types of fruiting bodies.

(ii) Oomycota: General characteristic; Ecology; Life cycle and classification with reference to *Phytophthora,* and *Albugo.*

(iii) Symbiotic associations: Lichen – Occurrence; General characteristics; Growth forms and range of thallus organization; Nature of associations of algal and fungal partners; Reproduction. Mycorrhiza-Ectomycorrhiza, Endomycorrhiza and their significance. Economic importance of Lichens.

Unit-III

Applied Mycology: Role of fungi in biotechnology, Mushroom cultivation, Application of fungi in food industry (Flavour & texture, Fermentation, Baking, Organic acids, Enzymes, Mycoproteins); Secondary metabolites (Pharmaceutical preparations); Agriculture (Biofertilizers); Mycotoxins; Biological control (Mycofungicides, Mycoherbicides, Mycoinsecticides, Myconematicides); Medical mycology.

Unit-IV

Phytopathology: Terms and concepts; General symptoms; Geographical distribution of diseases; etiology; symptomology; Host- Pathogen relationships; disease cycle and environmental relation; prevention and control of plant diseases, and role of quarantine. Bacterial diseases – Citrus canker and angular leaf spot disease of Cotton. Viral diseases – Tobacco Mosaic, Vein Clearing. Fungal diseases – Early blight of potato, Loose and covered smut.

PRACTICAL

(i) Introduction to the world of fungi (Unicellular, coenocytic/ septate mycelium, ascocarps & basidiocarps).

(ii) *Rhizopus*: study of asexual stage from temporary mounts and sexual structures through permanent slides.

(iii) *Aspergillus, Penicillium* and *Saccharomyces* : study of asexual stage from temporary mounts. Study of Sexual stage from permanent slides/photographs.

(iv) *Puccnia :* Study of different stages from temporary mounts and permanent slides.

(v) *Agaricus*: Specimens of button stage and full grown mushroom; sectioning of gills of *Agaricus*, and fairy rings are to be shown.

(vi) *Albugo:* Study of symptoms of plants infected with *Albugo*; asexual phase study through section/ temporary mounts and sexual structures through permanent slides.

(vii) *Phytopathology*: Herbarium specimens of bacterial diseases; Citrus Canker; Viral diseases: Mosaic disease of ladies finger, papaya, cucurbits, moong, black gram, Fungal diseases: Blast of rice, Tikka disease of ground nut, powdery mildew of locally available plants and White rust of crucifers.

Text Books:

1. Mishra, B. K. (2017), Mycology and Phytopathology, Kalynai Publishers, New Delhi.

Reference Books:

1. Sharma, P. D. (2017). Mycology and Phytopathology Rastogi Publication, Meerut.
2. Agrios, G.N. (1997) Plant Pathology, 4th edition, Academic Press, U.K.
3. Alexopoulos, C.J., Mims, C.W., Blackwell, M. (1996). Introductory Mycology, John Wiley &Sons (Asia) Singapore. 4th edition.
4. Webster, J. and Weber, R. (2007). Introduction to Fungi, Cambridge University Press, Cambridge. 3rd edition.
5. Sethi, I.K. and Walia, S.K. (2011). Text book of Fungi and Their Allies, Macmillan Publishers India Ltd.
6. Mehrotra, R. S.(2011). Plant Pathology. Tata Mc Graw-Hill Publishing Company Limited, New Delhi

Core Paper IV

ARCHEGONIATAE

Unit-I

(i) Introduction: Unifying features of archegoniates; Transition to land habit; Alternation of generations. General characteristics; Origin of land plants and Adaptations to land habit;

(ii) Bryophytes : Origin and Classification; Range of thallus organization. Classification (up to family). Structure, Reproduction and evolutionary trends in *Riccia*, *Marchantia*, *Anthoceros* and *Funaria* (developmental stages not included). Ecological and economic importance of bryophytes.

Unit-II

Pteridophytes: General characteristics, classification. Classification (up to family), morphology, anatomy and reproduction of *Psilotum*, *Selaginella*, *Equisetum, Pteris* and *Marsilea*. Apogamy, and apospory, heterospory and seed habit, telome theory, stellar evolution and economic importance.

Unit-III

Gymnosperms: General characteristics, classification (up to family), morphology, anatomy and reproduction of *Cycas*, *Pinus, Ginkgo* and *Gnetum*. (Developmental details not to be included).Ecological and economic importance.

Unit-IV

Palaeobotany: Geological time scale, fossils and fossilization process. Morphology, anatomy and affinities of Rhynia, Calamites, Lepidodendron, Lyginopteris, Cycadeoidea and Williamsonnia.

PRACTICAL

(i) Morphology, anatomy and reproductive structures of *Riccia, Marchantia*, *Anthoceros, Funaria*.

(ii) *Psilotum*- Study of specimen, transverse section of synangium (permanent slide).

(iii) *Selaginella*- Morphology, whole mount of leaf with ligule, transverse section of stem, whole mount of strobilus, whole mount of microsporophyll and megasporophyll (temporary slides), longitudinal section of strobilus (permanent slide).

(iv) *Equisetum*- Morphology, transverse section of internode, longitudinal section of strobilus, transverse section of strobilus, whole mount of sporangiophore, whole mount of spores (wet and dry) (temporary slide), transverse section of rhizome (permanent slide).

(v) Study of temporary preparations and permanent slides of *Marsilea*.

(vi) *Pteris*- Morphology, transverse section of rachis, vertical section of sporophyll, whole mount of sporangium, whole mount of spores (temporary slides), transverse section of rhizome, whole mount of prothallus with sex organs and young sporophyte (permanent slide).

(vii) *Cycas*- Morphology (coralloid roots, bulbil, leaf), whole mount of microsporophyll and megaspore, T.S root, leaflet, rachis

(viii) *Pinus*- Morphology (long and dwarf shoots, whole mount of dwarf shoot, male and female cones), T.S. Needle, stem, L.S. male cone, whole mount of microsporophyll, whole mount of Microspores (temporary slides), L.S.of female cone.

(ix) *Gnetum*- Morphology (stem, male & female cones), transverse section of stem, vertical section of ovule (permanent slide).

(x) Study of some fossil slides / photographs as per theory.

Text Books:

1. Vasistha, B. R. (2017) Botany for Degree student, Bryophyta, S. Chand Publication, New Delhi.
2. Singh, V., Pandey, P.C. and Jain, D.K. (2017). Archegoniate, Rastogi Publication, Meerut.

Reference Books:

1. Acharya, B. S. (2017), Archegoniate, Kalyani Publishers, New Delhi.
2. Vashistha, P.C., Sinha, A.K., Kumar, A. (2010). Pteridophyta. S. Chand. New Delhi, India.
3. Bhatnagar, S.P. & Moitra, A. (1996). Gymnosperms. New Age International (P) Ltd Publishers, New Delhi, India.
4. Raven, P.H., Johnson, G.B., Losos, J.B., Singer, S.R. (2005). Biology. Tata McGraw Hill, Delhi.

Core Paper V

ANATOMY OF ANGIOSPERMS

Unit-I

(i) Introduction and scope of Plant Anatomy: Applications in systematics, forensics and pharmacognosy.

(ii) Tissues: Classification of tissues; Simple and complex tissues (no phylogeny); cyto-differentiation of tracheary elements and sieve elements; Pits and plasmodesmata; Cell wall ingrowths and transfer cells, adcrustation and incrustation, Ergastic substances.

Unit-II

(i) Stem: Organization of shoot apex (Apical cell theory, Histogen theory, Tunica Corpus theory, continuing meristematic residue, cyto-histological zonation); Types of vascular bundles; Anatomy of dicot and monocot stem. Vascular Cambium: Structure, function and seasonal activity of cambium; secondary growth in stem (normal and anomalous). Root Stem transition.

(ii) Leaf: Anatomy of dicot and monocot leaf, Kranz anatomy.

Unit-III

(i) Root: Organization of root apex (Apical cell theory, Histogen theory, Korper-Kappe theory); Quiescent centre; Root cap; Anatomy of dicot and monocot root; Endodermis, exodermis and origin of lateral root. Secondary growth in roots.

(ii) Wood: Axially and radially oriented elements; Types of rays and axial parenchyma; Cyclic aspects and reaction wood; Sapwood and heartwood; Ring and diffuse porous wood; Early and late wood, tyloses; Dendrochronology.

(iii) Periderm: Development and composition of periderm, rhytidome and lenticels.

Unit –IV

(i) Adaptive and Protective Systems Epidermal tissue system, cuticle, epicuticular waxes, trichomes (uni-and multicellular, glandular and nonglandular: two examples of each), stomata (classification); Anatomical adaptations of xerophytes and hydrophytes.

(ii) Secretory System: Hydathodes, cavities, lithocysts and laticifers.

(iii) Mechanical tissue system.

PRACTICAL

1. Study of distribution and types of parenchyma, collenchyma and sclerenchyma, Xylem: Tracheary elements-tracheids, vessel elements; thickenings; perforation plates; xylem fibres, Phloem: Sieve tubes-sieve plates; companion cells; phloem fibres.
2. Wood: ring porous; diffuse porous; tyloses; heart- and sapwood.
3. Epidermal system: cell types, stomata types; trichomes: non-glandular and glandular.
4. Root: monocot, dicot, secondary growth.
5. Stem: monocot, dicot - primary and secondary growth (normal and anomalous); periderm; lenticels.

6. Leaf: isobilateral, dorsiventral, C_4 leaves (Kranz anatomy).
7. Ecological anatomy.

Text Books:

1. Singh, V., Pandey, P.C. and Jain, D.K. (2017). Anatomy of Angiosperms, Rastogi Publication, Meerut.

Reference Books:

1. Eames, A.J. and Mc Daniels, L.H., (1953). An introduction to plant anatomy, Tata Mc Grow Hills, New Delhi
2. Esau, K. (1977). Anatomy of Seed Plants. John Wiley & Sons, Inc., Delhi.
3. Tayal, M. S. (2012) Plant Anatomy Rajpal and Sons, New Delhi
4. Mishra, B. K. (2017). Anatomy of Angiosperms, Kalyani Publishers, New Delhi.
5. Pandey, B. P. (2017) Plant Anatomy, S. Chand Publication, New Delhi.

Core Paper VI

ECONOMIC BOTANY

Unit-I

(i) Origin of Cultivated Plants: Concept of Centres of Origin, their importance with reference to Vavilov's work. Examples of major plant introductions; Crop domestication and loss of genetic diversity; evolution of new crops/varieties, importance of germplasm diversity.

(ii) Cereals: Cultivation and brief account of Wheat, Rice and millets.

(iii) Legumes: General account, importance to man and ecosystem.

(iv) Sugars & Starches: Morphology, cultivation and processing of sugarcane, products and by-products of sugarcane industry. Potato – morphology, cultivation, propagation & uses.

Unit-II

(i) Spices: Listing of important spices, their family and part used, economic importance with special reference to fennel, saffron, clove and black pepper Beverages: Tea, Coffee (morphology, processing & uses)

(ii) Drug-yielding plants: Therapeutic and habit-forming drugs with special reference to Cinchona, Digitalis, Papaver and Cannabis.

(iii) Tobacco: Tobacco (Morphology, processing, uses and health hazards)

Unit-III

(i) Oils & Fats: General description, classification, extraction, their uses and health implications groundnut, coconut, linseed and *Brassica* (Botanical name, family & uses)

(ii) Essential Oils: General account, extraction methods, comparison with fatty oils &

their uses.

Unit-IV

(i) Natural Rubber: Para-rubber: tapping, processing and uses.

(ii) Timber plants: General account with special reference to teak and pine. Fibers: Classification based on the origin of fibers, Cotton and Jute (morphology, extraction and uses).

PRACTICAL

(i) Cereals: Rice (habit sketch, study of paddy and grain, starch grains).
(ii) Legumes: Soya bean/moong bean/black gram, Groundnut, (habit, fruit, seed structure, micro-chemical tests).
(iii) Sugars & Starches: Sugarcane (habit sketch; cane juice- micro-chemical tests), Potato (habit sketch, tuber morphology, T.S. tuber to show localization of starch grains, starch grains, micro-chemical tests).
(iv) Spice and Beverages: clove, black pepper ,Tea (plant specimen, tea leaves), Coffee (plant specimen, beans).
(v) Oils & Fats: Groundnut, Mustard–plant specimen, seeds; tests for fats in crushedseeds.
(vi) Drug-yielding plants: Specimens of *Digitalis, Papaver* and *Cannabis.*
(vii) Woods: *Tectona*, *Pinus/*Sal: Specimen, Section of young stem.
(viii) Fiber-yielding plants: Cotton (specimen, whole mount of seed to show lint and fuzz; whole mount of fiber and test for cellulose), Jute (specimen, transverse section of stem, test for lignin on transverse section of stem and fiber).

Text Books:

1. B. P. Pandey, (2017) Economic Botany. S. Chand Publication, New Delhi.

Reference Books:

1. Kochhar, S.L. (2012). Economic Botany in Tropics, MacMillan & Co. New Delhi, India.
2. Samba Murty, A.V.S.S. and Subrahmanyam, N.S. (2011). Text Book of Modern Economic Botany, CBS Publishers and Distributors, New Delhi.
3. Hill, Albert F. Economic Botany, Tata Mc Grow Hill Publishing Company, Ltd. New Delhi.
4. Wickens, G.E. (2001). Economic Botany: Principles & Practices. Kluwer Academic Publishers, The Netherlands.
5. Singh, V., Pandey, P.C. and Jain, D.K. (2017). Economic Botany, Rastogi Publication, Meerut.
6. Baruah, B. (2017). Economic Botany, Kalyani Publishers, New Delhi.

Core Paper VII

GENETICS

Unit-I

(i) Mendelian genetics and its extension Mendelism: History; Principles of inheritance; Chromosome theory of inheritance; Autosomes and sex chromosomes; Incomplete dominance and codominance; Multiple alleles, Lethal alleles, Interaction of genes, Pleiotropy, Recessive and Dominant traits, Polygenic inheritance.

(ii) Extrachromosomal Inheritance: Chloroplast mutation: Variegation in Four o'clock plant; Mitochondrial mutations in yeast; cytoplasmic male sterility; Maternal effects-shell coiling in snail; Infective heredity- Kappa particles in Paramecium.

Unit-II

Linkage, crossing over and chromosome mapping: Linkage and crossing over-Cytological basis of crossing over; Recombination frequency, two factor and three factor crosses; Interference and coincidence; Numericals based on gene mapping; Sex Linkage.

Unit-III

(i) Variation in chromosome number and structure: Deletion, Duplication, Inversion, Translocation, Position effect, Euploidy and Aneuploidy

(ii) Gene mutations: Types of mutations; Molecular basis of Mutations; Mutagens – physical and chemical (Base analogs, deaminating, alkylating and intercalating agents); Detection of mutations: CIB method. Role of Transposons in mutation. DNA repair mechanisms.

Unit-IV

(i) Fine structure of gene: Classical vs. molecular concepts of gene; Cis-Trans complementation test for functional allelism; Structure of Phage T4, rII Locus.

(ii) Population and Evolutionary Genetics: Gene pool, Allele frequencies, Genotype frequencies, Hardy-Weinberg Law, role of natural selection, mutation, genetic drift. Genetic variation and Speciation.

PRACTICAL

1. Analysis of allelic and genotypic frequencies.
2. Mendel's laws through seed ratios. Laboratory exercises in probability and chi-square analysis.
3. Chromosome mapping using test cross data.
4. Pedigree analysis for dominant and recessive autosomal and sex linked traits.
5. Incomplete dominance and gene interaction through seed ratios (9:7, 9:6:1, 13:3, 15:1, 12:3:1, 9:3:4).
6. Blood Typing: ABO groups & Rh factor.

7. Chromosome anomaly : Translocation Ring, Laggards and Inversion Bridge, break etc (through photographs).

Text Books:

1. Singh B. D. (2017). Fundamental of Genetics, Kalyani Publishers, New Delhi.
2. Gupta P. K. (2017). Genetics, Rastogi Publication, Meerut.

Reference Books:

1. Gardner, E.J., Simmons, M.J., Snustad, D.P. (1991). Principles of Genetics, John Wiley & Sons, India. 8th edition.
2. Sinnot, E.W., Dunn, L.C. and Dobzhansky, T. (1985) Principles of Genetics, Tata Mc Grow Hill, New Delhi
3. Klug, W.S., Cummings, M.R., Spencer, C.A. (2012). Concepts of Genetics. Benjamin Cummings, U.S.A. 10th edition.
4. Griffiths, A.J.F., Wessler, S.R., Carroll, S.B., Doebley, J. (2010). Introduction to Genetic Analysis. W.H. Freeman and Co., U.S.A. 10th edition.
5. Strickberger, M.W. Genetics, Pearson Publishers, 3rd Edition
6. Rastogi V. B. (2017). Genetics, Kedar Nath & Ram Nath, Meerut

Core Paper VIII

MOLECULAR BIOLOGY

Unit-I

Nucleic acids: Carriers of genetic information: Historical perspective; DNA as the carrier of genetic information (Griffith’s, Hershey & Chase, Avery, McLeod & McCarty), Types of genetic material, denaturation and renaturation, cot curves. Organization of DNA and structure of RNA- Prokaryotes, Viruses, Eukaryotes, Fraenkel-Conrat’s experiment. Organelle DNA - mitochondria and chloroplast DNA. The Nucleosome -Chromatin structure- Euchromatin, Heterochromatin- Constitutive and Facultative heterochromatin.

Unit-II

(i) The replication of DNA: Chemistry of DNA synthesis (Kornberg’s discovery); General principles – bidirectional, semi-conservative and semi discontinuous replication, RNA priming; Various models of DNA replication, including rolling circle, θ (theta) mode of replication, replication of linear ds-DNA, replication of the 5′ end of linear chromosome; Enzymes involved in DNA replication.

(ii) Central dogma and genetic code: Key experiments establishing-The Central Dogma (Adaptor hypothesis and discovery of mRNA template), Genetic code (deciphering & salient features)

(iii) Processing and modification of RNA: Split genes-concept of introns and exons, removal of introns, spliceosome machinery, splicing pathways, group I & group II intron splicing, alternative splicing eukaryotic mRNA processing (5′ cap, 3′

polyA tail); Ribozymes, exon shuffling; RNA editing and mRNA transport.

Unit-III

Mechanism of Transcription: Transcription in prokaryotes and eukaryotes;

Regulation of transcription in prokaryotes and eukaryotes: Principles of transcriptional regulation; Prokaryotes: Operon concept- Regulation of lactose metabolism and tryptophan synthesis in *E.coli.* Eukaryotes: transcription factors, heat shock proteins, steroids and peptide hormones; Gene silencing

Unit-IV

Translation (Prokaryotes and eukaryotes): Ribosome structure and assembly; Charging of tRNA, aminoacyl tRNA synthetases; Various steps in protein synthesis, proteins involved in initiation, elongation and termination of polypeptides; Fidelity of translation; Inhibitors of protein synthesis; Post-translational modifications of proteins.

PRACTICAL

1. Preparation of LB medium and raising E. coli.
2. Isolation of genomic DNA from suitable plant material.
3. RNA estimation by orcinol method.
4. DNA estimation by diphenylamine reagent/UV Spectrophotometry.
5. Photographs establishing nucleic acid as genetic material (Messelson and Stahl's, Avery et al, Griffith's, Hershey & Chase's and Fraenkel & Conrat's experiments)
6. Study of Barr body from buccal smear preparation.

Text Books:

1. Gupta P. K. (2017). Molecular Biology, Rastogi Publication, Meerut.

Reference Books:

1. Watson, J.D., Baker, T.A., Bell, S.P., Gann, A., Levine, M., Losick, R. (2007). Molecular Biology of the Gene, Pearson Benjamin Cummings, CSHL Press, New York, U.S.A. 6th edition.
2. Snustad, D.P. and Simmons, M.J. (2010). Principles of Genetics. John Wiley and Sons Inc., U.S.A. 5th edition.
3. Klug, W.S., Cummings, M.R., Spencer, C.A. (2009). Concepts of Genetics. Benjamin Cummings. U.S.A. 9th edition.
4. Sheeler, P. and Bianchi, D.E. (2009) Molecular Biology of the Cell, Willey Publisher, New Delhi
5. Griffiths, A.J.F., Wessler, S.R., Carroll, S.B., Doebley, J. (2010). Introduction to Genetic Analysis. W.H. Freeman and Co., U.S.A. 10th edition.
6. Alberts, B. et al. 2014. Molecular Biology of the cell Garland Science. 6th Edition
7. Power, C. B. (2017) Cell Biology, Himalaya Publishing House, New Delhi

8. Sahu, A.C. (2017). Essentials of Molecular Biology, Kalynai Publishers, New Delhi.

Core Paper IX

PLANT ECOLOGY & PHYTOGEOGRAPHY

Unit-I

(i) Introduction Concept of ecology, Autoecology, Synecology, system ecology, Levels of organization. Inter-relationships between the living world and the environment, the components of environment, concept of hydrosphere and lithosphere and dynamism, homeostasis.

(ii) Light, temperature, wind and fire: Variations; adaptations of plants to their variation.

Unit-II

(i) Soil: Formation; Composition; Physical; Chemical and Biological components; Soil profile; Role of climate in soil development.

(ii) Water: Importance: States of water in the environment; Atmospheric moisture; Precipitation types (rain, fog, snow, hail, dew); Hydrological Cycle; Water in soil; Water table.

Unit-III

Biotic interactions and Population ecology: Characteristics and Dynamics.

Plant communities: Concept of ecological amplitude; Habitat and niche; Characters: analytical and synthetic; Ecotone and edge effect; Dynamics: succession – processes, types; climax concepts.

Unit-IV

(i) Ecosystems: Structure; Processes; Trophic organisation; Food chains and Food webs; Ecological pyramids.

(ii) Functional aspects of ecosystem: Principles and models of energy flow; Production and productivity; Ecological efficiencies; Biogeochemical cycles; Cycling of Carbon, Nitrogen and Phosphorus.

(iii) Phytogeography: Principles; Continental drift; Theory of tolerance; Endemism; Phytogeographical division of India; Vegetation of Odisha.

PRACTICAL

1. Determination of pH of various soil and water samples (pH meter, universal indicator/Lovibond comparator and pH paper)
2. Analysis for carbonates, chlorides, nitrates, sulphates, organic matter and base deficiency from two soil samples by rapid field tests.
3. Determination of dissolved oxygen of water samples from polluted and unpolluted sources.
4. Study of morphological adaptations of hydrophytes, xerophytes, halophyles (two

each).

5. Determination of minimal quadrat size for the study of herbaceous vegetation in the college campus, by species area curve method (species to be listed).
6. Quantitative analysis of herbaceous vegetation for frequency, density and abundance in the college campus.
7. Field visit to familiarize students with ecology of different sites.

Text Books:

1. Sharma, P.D. (2017). Fundamentals of Ecology. Rastogi Publications, Meerut, India.

Reference Books:

1. Odum, E.P. (2005). Fundamentals of ecology. Cengage Learning India Pvt. Ltd., New Delhi. 5thedition.
2. Singh, J.S., Singh, S.P., Gupta, S. (2006). Ecology Environment and Resource Conservation. Anamaya Publications, New Delhi, India.
3. Wilkinson, D.M. (2007). Fundamental Processes in Ecology: An Earth Systems Approach. Oxford University Press. U.S.A.
4. Kormondy, E.J. (1996). Concepts of ecology. PHI Learning Pvt. Ltd., Delhi, India. 4th edition.
5. Santra, S. C. (2015) Environmental Science. New Central Book Agency (P) Ltd. Kolkata.
6. Das M. C. and Das S. P. (2009). Fundamental of Ecology. Tata MGrow Hill, New Delhi.
7. Shukla R.S. and Chandel P.S. (2016). A Text Book of Plant Ecology. S Chand Publication, New Delhi

Core Paper X

PLANT SYSTEMATICS

Unit-I

Plant identification, Classification, Nomenclature; Biosystematics. Identification: Field inventory; Functions of Herbarium; Important herbaria and botanical gardens of the world and India; Virtual herbarium; E-flora; Documentation: Flora, Monographs, Journals; Keys: Single access and Multi-access

Unit-II

Taxonomic hierarchy: Concept of taxa (family, genus, species); Categories and taxonomic hierarchy; Species concept (taxonomic, biological, evolutionary).

Botanical nomenclature: Principles and rules (ICN); Ranks and names; Typification, author citation, valid publication, rejection of names, principle of priority and its limitations; Names of hybrids.

Unit-III

(i) Systematics- an interdisciplinary science: Evidence from palynology, cytology, phytochemistry and molecular data.

(ii) Systems of classification: Major contributions of Theophrastus, Bauhin, Tournefort, Linnaeus, Adanson, de Candolle, Bessey, Hutchinson, Takhtajan and Cronquist; Classification systems of Bentham and Hooker (up to series) and Hutchinson (up to series); Brief reference of Angiosperm Phylogeny Group (APG III) classification.

Unit-IV

Phylogeny of Angiosperms: Terms and concepts (primitive and advanced, homology and analogy, parallelism and convergence, monophyly, Paraphyly, polyphyly and clades). Origin& evolution of angiosperms; co- evolution of angiosperms and animals; methods of illustrating evolutionary relationship (phylogenetic tree, cladogram).

Families of Angiosperms : Descriptive studies of Magnoliaceae, Rosaceae, Rubiacae, Poaceae, Orchidaceae, Musaceae, Acanthaceae, Apocynaceae, Asclepiadaceae, Lamiaceae.

PRACTICAL

(i) Study of vegetative and floral characters of available materials of the families included in theory syllabus (Description, V.S. flower, section of ovary, floral diagram/s, floral formula/e and systematic position according to Bentham & Hooker's system of classification).

(ii) Field visit, plant collection and herbarium preparation and submission. Mounting of properly dried and pressed specimen of at least fifteen wild plants with herbarium label (to be submitted in the record book)

Text Books:

1. Sharma O. P. (2009) Plant Taxonomy, Tata Mc Grow Hill, New Delhi

Reference Books:

1. Singh, G. (2012). *Plant Systematics:* Theory and Practice. Oxford & IBH Pvt. Ltd., New Delhi.3rdedition.
2. Jeffrey, C. (1982). An Introduction to *Plant Taxonomy.* Cambridge University Press, Cambridge.
3. Judd, W.S., Campbell, C.S., Kellogg, E.A., Stevens, P.F. (2002). Plant Systematics-A Phylogenetic Approach. Sinauer Associates Inc., U.S.A. 2nd edition.
4. Saxena, H. O. and Brahman, M..The Flora of Orissa, CSIR Publication.
5. Bose T. K. (2009). Trees of the World, Regional Plant Resource Centre, Bhubaneswar, Odisha, India
6. Radford, A.E. (1986). Fundamentals of *Plant Systematics*. Harper and Row, New York.
7. Hanes, H. H. (2009). Botany of Bihar and Orissa,

8. Mohanty, C. R. (2017). Text Book of Plant Systematics, Kalynai Publisher, New Delhi.
9. Subrahmainayam, M. S. (2011) Modern Plant Taxonomy, Vikash Publishing House, New Delhi
10. Pandey, B. P., (2017). Taxonomy of Angiosperm. S. Chand Publication.

Core Paper XI

REPRODUCTIVE BIOLOGY OF ANGIOSPERMS

Unit-I

(i) Introduction: History and scope.

(ii) Anther: Anther wall: Structure and functions, micro-sporogenesis, callose deposition and its significance.

(iii) Pollen biology: Micro-gametogenesis; Pollen wall structure, MGU (male germ unit) structure, NPC system; Palynology and scope (a brief account); Pollen wall proteins; Pollen viability, storage and germination; Abnormal features: Pseudomonads, polyads, massulae, pollinia.

Unit-II

Ovule: Structure; Types; Special structures–endothelium, obturator, aril, caruncle and hypostase; Female gametophyte– mega-sporogenesis and mega-gametogenesis; Types and ultrastructure of different mature embryo sacs (Details of *Polygonum* type), Developmental pattern of mono-, bi- and tetrasporic embryo sacs.

Unit-III

(i) Pollination and fertilization: Pollination types and significance; adaptations; structure of stigma and style; path of pollen tube in pistil; double fertilization.

(ii) Self incompatibility: Basic concepts; Methods to overcome self- incompatibility: mixed pollination, bud pollination, stub pollination; Intraovarian and *in vitro* pollination; Modification of stigma surface.

Unit-IV

(i) Endosperm: development, structure and functions

(ii) Embryo: Types of embryogeny; General pattern of development of dicot and monocot embryo; Suspensor: structure and functions; Embryo- endosperm relationship; Nutrition of embryo; Embryo development in *Paeonia*.

(iii) Seed: Structure, importance and dispersal mechanisms

(iv) Polyembryony and apomixes: Introduction; Classification; Causes and applications.

PRACTICAL

(i) Anther: Wall and its ontogeny; Tapetum (amoeboid and glandular); MMC, spore tetrads, uninucleate, bicelled and dehisced anther stages through slides/micrographs, male germ unit (MGU) through photographs and schematic representation.

(ii) Pollen grains: Fresh and acetolyzed showing ornamentation and aperture, psuedomonads, polyads, pollinia (slides/photographs, fresh material), ultrastructure of pollen wall (micrograph); Pollen viability: Tetrazolium test, Germination: Calculation of percentage germination in different media using hanging drop method.

(iii) Ovule: Types-anatropous, orthotropous, amphitropous/ campylotropous, circinotropous, unitegmic, bitegmic; Tenuinucellate and crassinucellate; Special structures: Endothelium, obturator, hypostase, caruncle and aril (permanent slides/specimens/photographs). Female gametophyte through permanent slides/ photographs: Types, ultrastructure of mature egg apparatus.

(iv) Embryogenesis: Study of development of dicot embryo through permanent slides/photographs; dissection of developing seeds for embryos at various developmental stages; Study of suspensor through electron micrographs.

(v) Tracing the path of pollen tube.

(vi) Study of haustorial endosperm.

Text Books:

1. Singh, V., Pandey, P.C, and Jain, D.K. (2017). Reproductive Biology of Angiosperms, Rastogi Publications, Meerut

Reference Books:

1. Maheswari, P. (2009). Embryology of Angiosperms.
2. Shivanna, K.R. (2003). Pollen Biology and Biotechnology. Oxford and IBH Publishing Co. Pvt. Ltd. Delhi.
3. Raghavan, V. (2000). Developmental Biology of Flowering plants, Springer, Netherlands.
4. Johri, B.M. l (1984). Embryology of Angiosperms, Springer-Verlag, Netherlands.
5. Bhojwani, S.S. and Bhatnagar, S.P. (2011). The Embryology of Angiosperms, Vikas Publishing House. Delhi. 5th edition.
6. Mishra, B. K. (2017). Reproductive Biology of Angiosperms, Kalyani Publishers, New Delhi.

Core Paper XII

PLANT PHYSIOLOGY

Unit-I

(i) Plant water relationship: Water Potential and its components, plasmolysis and imbibitions, water absorption by roots, aquaporins, pathway of water movement, symplast, apoplast, trans-membrane pathways, root pressure, guttation. Ascent of sap–cohesion-tension theory. Transpiration and factors affecting transpiration, anti-transpirants, mechanism of stomatal movement.

(ii) Translocation in the phloem: Experimental evidence in support of phloem as the site of sugar translocation. Pressure–Flow Model; Phloem loading and unloading; Source–sink relationship.

Unit-II

(i) Mineral nutrition: Essential and beneficial elements, macro and micronutrients, methods of study and use of nutrient solutions, criteria for essentiality, mineral deficiency symptoms, roles of essential elements, chelating agents.

(ii) Nutrient Uptake: Soil as a nutrient reservoir, transport of ions across cell membrane, passive absorption, electrochemical gradient, facilitated diffusion, active absorption, role of ATP, carrier systems, proton ATPase pump and ion flux, uniport, co-transport, symport, and antiport.

Unit-III

Plant growth regulators: Discovery, chemical nature (basic structure), bioassay and physiological roles of Auxin, Gibberellins, Cytokinin, Abscisic acid, Ethylene. Brassinosteroids and Jasmonic acid.

Unit-IV

(i) Physiology of flowering: Photoperiodism, flowering stimulus, florigen concept, vernalization, seed dormancy. Senescence: Types and causes.

(ii) Phytochrome: Discovery, chemical nature, role of phytochrome in photo-morphogenesis, low energy responses (LER) and high irradiance responses (HIR), mode of action.

PRACTICAL

1. Determination of osmotic potential of plant cell sap by plasmolytic method.
2. Determination of water potential of given tissue (potato tuber) by weight method.
3. Study of the effect of wind velocity and light on the rate of transpiration in excised twig/leaf.
4. Calculation of stomatal index and stomatal frequency from the two surfaces of leaves of a mesophyte and xerophyte.
5. To calculate the area of an open stoma and percentage of leaf area open through stomata in a mesophyte and xerophyte (both surfaces).
6. To study the phenomenon of seed germination (effect of light).
7. To study the induction of amylase activity in germinating barley grains
8. To demonstrate suction due to transpiration.
9. Measurement of relation between transpiration and transpiring surface.
10. Measurement of cuticular resistance to transpiration.

Text Books:

1. Sinha, R. K. (2015). Modern Plant Physiology, Narosa Publishing House, New

Delhi.

Reference Books:

1. Hopkins, W.G. and Huner, A. (2008). Introduction to Plant Physiology. John Wiley and Sons. U.S.A. 4th edition.
2. Taiz, L., Zeiger, E., MØller, I.M. and Murphy, A (2015). Plant Physiology and Development. Sinauer Associates Inc. USA. 6th edition.
3. Bajracharya D. (1999). Experiments in Plant Physiology-A Laboratory Manual. Narosa Publishing House, New Delhi.
4. Salisbury, F. B. and Ross, C. W. Plant Physiology Wadsworth Publishing Company, California
5. Sahoo, A. C. (2018). Outlines of Plant Physiology Kalynai Publishers, New Delhi.
6. Srivastava, N. K.. (2017). Plant Physiology, Rastogi Publications, Meerut.
7. Pandey and Sinha (2011). Plant Physiology, Vikash Publishing House, New Delhi

Core Paper XIII

PLANT METABOLISM

Unit-I

(i) Concept of metabolism: Introduction, anabolic and catabolic pathways, regulation of metabolism, role of regulatory enzymes (allosteric ,covalent modulation and Isozymes).

(ii) Mechanisms of signal transduction: Calcium, phospholipids, cGMP, NO.

Unit-II

Carbon assimilation: Historical background, photosynthetic pigments, role of photosynthetic pigments, Red drop and Emerson Enhancement Effect, antenna molecules and reaction centres, photochemical reactions, photosynthetic electron transport, PSI, PSII, Q cycle, C_3, C_4 pathways; Crassulacean acid metabolism; Factors affecting CO_2 reduction. Photorespiration.

Unit-III

(i) Carbon Oxidation: Glycolysis, fate of pyruvate, regulation of glycolysis, oxidative pentose phosphate pathway, oxidative decarboxylation of pyruvate, regulation of PDH, NADH shuttle; TCA cycle, amphibolic role, anaplerotic reactions, regulation of the cycle, mitochondrial electron transport, oxidative phosphorylation, cyanide-resistant respiration, factors affecting respiration.

(ii) ATP-Synthesis: Mechanism of ATP synthesis, substrate level phosphorylation, chemiosmotic mechanism (oxidative and photo- phosphorylation), ATP synthase, Boyers conformational model, Racker’s experiment, Jagendorf’s experiment; role of uncouplers.

Unit-IV

(i) Lipid metabolism: Synthesis and breakdown of triglycerides, β-oxidation, glyoxylate cycle, gluco-neogenesis and its role in mobilisation of lipids during seed germination, α oxidation.

(ii) Nitrogen metabolism: Nitrate assimilation, free living and symbiotic biological nitrogen fixation (examples of legumes and non-legumes); Nitrification, Physiology and biochemistry of nitrogen fixation; Ammonia assimilation and trans-amination.

PRACTICAL

1. Isolation and quantitization of photosynthetic pigments.
2. Experimental demonstration of Hill's reaction.
3. To study the effect of light intensity on the rate of photosynthesis.
4. Effect of carbon dioxide on the rate of photosynthesis.
5. To compare the rate of respiration in different parts of a plant.
6. Demonstration of absorption spectrum of photosynthetic pigments.
7. Assay of the enzyme Catalase.
8. Photoreduction of dye by isolated chloroplasts.

Text Books:

1. Gupta, S, K. (2017). Plant Metabolism, Rastogi Publication, Meerut.

Reference Books:

1. Hopkins, W.G. and Huner, A. (2008). Introduction to Plant Physiology. John Wiley and Sons. U.S.A. 4th edition.
2. Taiz, L., Zeiger, E., Møller, I.M. and Murphy, A (2015). Plant Physiology and Development. Sinauer Associates Inc. USA. 6th edition.
3. Harborne, J.B. (1973). Phytochemical Methods. John Wiley & Sons. New York.
4. Sahoo, A. C. (2018). Outlines of Plant Metabolism, Kalynai Publishers, New Delhi.

Core Paper XIV

PLANT BIOTECHNOLOGY

Unit-I

Plant Tissue Culture: Historical perspective; Aseptic tissue culture techniques, Composition of media; Nutrient and hormone requirements (role of vitamins and hormones). Totipotency; Organogenesis; Embryogenesis (somatic and zygotic); Protoplast isolation, culture and fusion; Tissue culture applications (micropropagation, androgenesis, virus elimination, secondary metabolite production, haploids, triploids and hybrids;Cryopreservation; Germplasm Conservation).

Unit-II

Recombinant DNA technology-I: Restriction Endonucleases (History, Types I-IV, biological role and application); Restriction Mapping (Linear and Circular); Cloning Vectors: Prokaryotic (pUC 18 and pUC19, pBR322, Ti plasmid, BAC); Lambda phage, M13 phagemid, Cosmid, Shuttle vector; Eukaryotic Vectors (YAC and briefly PAC, MAC, HAC).Gene Cloning (Recombinant DNA, Bacterial Transformation and selection of recombinant clones, PCR-mediated gene cloning).

Unit-III

Recombinant DNA technology-II: Gene Construct; construction of genomic and cDNA libraries, screening DNA libraries to obtain gene of interest by genetic selection; complementation, colony hybridization; Probes-oligonucleotide, heterologous, Methods of gene transfer- *Agrobacterium*-mediated, Direct gene transfer by Electroporation, Microinjection, Microprojectile bombardment; Selection of transgenics– selectable marker and reporter genes (Luciferase, GUS, GFP).

Unit-IV

Applications of Biotechnology: Pest resistant (Bt-cotton); herbicide resistant plants (RoundUp Ready soybean); Transgenic crops with improved quality traits (Flavr Savr tomato, Golden rice); Improved horticultural varieties (Moondust carnations); Role of transgenics in bioremediation (Superbug); edible vaccines; Industrial enzymes (Aspergillase, Protease, Lipase); Genetically Engineered Products–Human Growth Hormone; Humulin; Biosafety concerns.

PRACTICAL

1. a) Preparation of tissue culture (MS) medium.
   (b) Demonstration of *in vitro* sterilization and inoculation methods using leaf and nodal explants of tobacco, *Datura*, *Brassica* etc.
2. Study of another culture through photographs.
3. Preparation of artificial seeds.
4. Study of Bt cotton through photographs.
5. Isolation of plasmid DNA.
6. Gel electrophoresis (demonstration).

Text Books:

1. Chawla, H. S. (2010). Introduction to Plant Biotechnology. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.

Reference Books:

1. Bhojwani, S.S. and Razdan, M.K., (1996). Plant Tissue Culture: Theory and Practice. Elsevier Science Amsterdam. The Netherlands.
2. Glick, B.R., Pasternak, J.J. (2003). Molecular Biotechnology- Principles and Applications of recombinant DNA. ASM Press, Washington.

3. Stewart, C.N. Jr. (2008). Plant Biotechnology & Genetics: Principles, Techniques and Applications. John Wiley & Sons Inc. U.S.A.
4. Singh, B. D. (2018). Plant Biotechnology Kalynai Publishers, New Delhi.
5. Gupta, P. K. (2017). Plant Biotechnology, Rastogi Publication, Meerut.
6. Dubey, R. C. (2017). Advanced Biotechnology, S, Chand Publication, New Delhi

Discipline Specific Elective Paper-I

ANALYTICAL TECNIQUES IN PLANT SCIENCES

Unit-I

Imaging and related techniques: Principles of microscopy; Light microscopy; Fluorescence microscopy; Flow cytometry (FACS); Transmission and Scanning electron microscopy – sample preparation for electron microscopy, cryofixation, negative staining, shadow casting, freeze fracture, freeze etching.

Unit-II

Cell fractionation: Centrifugation: Differential and density gradient centrifugation, sucrose density gradient, $CsCl_2$gradient, analytical centrifugation, ultracentrifugation. Radioisotopes: Use in biological research, auto-radiography, pulse chase experiment. Spectrophotometry: Principle and its application in biological research.

Unit-III

Chromatography: Principle; Paper chromatography; Column chromatography, TLC, GLC, HPLC, Ion-exchange chromatography; Molecular sieve chromatography; Affinity chromatography. Characterization of proteins and nucleic acids: Mass spectrometry; X-ray diffraction; X-ray crystallography; Characterization of proteins and nucleic acids; Electrophoresis: AGE, PAGE, SDS-PAGE

Unit-IV

Biostatistics: Statistics, data, population, samples, variables, parameters; Representation of Data: Tabular, Graphical; Measures of frequency and central tendency: Arithmetic mean, mode, median; Measures of dispersion: Range, mean deviation, variance, standard deviation; Chi-square test for goodness of fit. Test of significance: comparison of large, small and paired samples (T-Test) and correlation.

PRACTICAL

1. Study of different microscopic techniques for chromosome study
2. Study of PCR Demonstration.
3. To separate pigments by paper chromatography.
4. To separate phytochemicals by thin layer chromatography.
5. To estimate protein through Lowry’s methods.
6. To separate proteins using PAGE.

7. To separate DNA (marker) using AGE.
8. Spectrometric estimation of total sugar by Anthrone method.
9. Chi-square analysis of mendelian ratio.
10. T-Test.

Text Books:

1. Patil, C. S. (2017). Advanced Analytical Techniques, ABE Books, New Delhi.

Reference Books:

1. Plummer, D.T. (1996). An Introduction to Practical Biochemistry. Tata McGraw-Hill Publishing Co. Ltd. New Delhi. 3rd edition.
2. Ruzin, S.E. (1999). Plant Micro technique and Microscopy, Oxford University Press, New York. U.S.A.
3. Ausubel, F., Brent, R., Kingston, R. E., Moore, D.D., Seidman, J.G., Smith, J.A., Struhl, K. (1995). Short Protocols in Molecular Biology. John Wiley & Sons. 3rd edition.
4. Zar, J.H. (2012). Biostatistical Analysis. Pearson Publication. U.S.A. 4th edition.
5. Aneja, K. R. (2014). Laboratory manual of microbiology and biotechnology, Medtech, New Delhi

Discipline Specific Elective Paper-II

NATURAL RESOURCE MANAGEMENT

Unit-I

(i) Natural resources: Definition and types.

(ii) Sustainable utilization :Concept, approaches (economic, ecological and socio-cultural).

(iii) Land: Utilization (agricultural, horticultural, silvicultural); Soil degradation and management.

(iv) Water: Fresh water (rivers, lakes, groundwater, water harvesting technology, rain water storage and utilization.

Unit-II

Biological Resources: Biodiversity-definition and types; Significance; Threats; Management strategies; Bioprospecting; IPR; CBD; National Biodiversity Action Plan).

Forests: Definition, Cover and its significance (with special reference to India); Major and minor forest products; Depletion; Management.

Unit-III

(i) Energy: Renewable and non-renewable sources of energy-solar, wind, tidal, geothermal and bioenergy resources.

(ii) Contemporary practices in resource management: EIA, GIS, Participatory Resource Appraisal, Ecological Footprint with emphasis on carbon footprint.

Unit-IV

Resource Accounting; Waste management. National and international efforts in resource management and conservation

PRACTICAL

i. Estimation of solid waste generated by a domestic system (biodegradable and non-biodegradable) and its impact on land degradation.
ii. Collections of data on forest cover of specific area.
iii. Measurement of dominance of woody species by DBH (diameter at breast height) method.
iv. Calculation and analysis of ecological footprint.
v. Ecological modeling.
vi. Estimation of soil moisture content and soil texture.
vii. Estimation of soil porosity
viii. Estimation of soil water-holding capacity.
ix. Estimation of soil organic matter and soil carbon

Text Books:

1. Pandey, B. W. 2005. Natural Resource Management. Mittal Publication, New Delhi

Reference Books:

1. Vasudevan, N. (2006). Essentials of Environmental Science. Narosa Publishing House, New Delhi.
2. Singh, J. S., Singh, S.P. and Gupta, S. (2006). Ecology, Environment and Resource Conservation. Anamaya Publications, New Delhi.
3. Rogers, P.P., Jalal, K.F. and Boyd, J.A. (2008). An Introduction to Sustainable Development. Prentice Hall of India Private Limited, New Delhi.

Discipline Specific Elective Paper-III

HORTICULTURAL PRACTICES AND POST-HARVEST TECHNOLOGY

Unit-I

(i) Introduction: Scope and importance, Branches of horticulture; Role in rural economy and employment generation; Importance in food and nutritional security; Urban horticulture and ecotourism.

(ii) Ornamental plants: Types, classification (annuals, perennials, climbers and trees); Identification and salient features of some ornamental plants [rose, marigold, gladiolus, carnations, orchids, poppies, gerberas, tuberose, sages, cacti and succulents (*Opuntia*, *Agave* and spurges)]

Unit-II

(i) Fruit and vegetable crops: Production, origin and distribution; Description of plants and their economic products; Management and marketing of vegetable and fruit crops.

(ii) Horticultural techniques: Application of manure, fertilizers, nutrients and PGRs; Weed control; Biofertilizers, biopesticides; Irrigation methods (drip irrigation, surface irrigation, furrow and border irrigation); Hydroponics; Propagation Methods: asexual (grafting, cutting, layering, budding), sexual (seed propagation), Scope and limitations.

(iii) Landscaping and garden design :Planning and layout (parks and avenues); gardening traditions - Ancient Indian, European, Mughal and Japanese Gardens; Urban forestry; policies and practices.

Unit-III

(i) Post-harvest technology: Importance of post harvest technology in horticultural crops; Evaluation of quality traits; Harvesting and handling of fruits, vegetables and cut flowers; Principles, methods of preservation and processing; Methods of minimizing loses during storage and transportation;

(ii) Disease control and management : Field and post-harvest diseases; Identification of deficiency symptoms; remedial measures and nutritional management practices; Crop sanitation; IPM strategies (genetic, biological and chemical methods for pest control); Quarantine practices;

Unit-IV

Horticultural crops - conservation and management: Documentation and conservation of germplasm; Role of micropropagation and tissue culture techniques; Varieties and cultivars of various horticultural crops; IPR issues; National, international and professional societies and sources of information on horticulture.

PRACTICAL

i. Identification and description of salient features of ornamental plants included in the syllabus.
ii. Horticultural techniques (Drip irrigation, surface irrigation, furrow and border irrigation).
iii. Study of practice of asexual propagation methods (grafting, cutting, layering, budding)
iv. Planning and layout of parks and avenues
v. Handing of harvested fruits, vegetables and cut flowers
vi. Methods of fruit preservation
vii. Basic tissue cultures technique

Text Books:

1. Peter, K. V. (2009). Basics of Horticulture, Kalyani Publishers, New Delhi.

Reference Books:

1. Singh, D. & Manivannan, S. (2009). Genetic Resources of Horticultural Crops. Ridhi International, Delhi, India.
2. Swaminathan, M.S. and Kochhar, S.L. (2007). Groves of Beauty and Plenty: An Atlas

of Major Flowering Trees in India. Macmillan Publishers, India.
3. NIIR Board (2005). Cultivation of Fruits, Vegetables and Floriculture. National Institute of Industrial Research Board, Delhi.
4. Kader, A.A. (2002). Post-Harvest Technology of Horticultural Crops. UCANR Publications, USA.
5. Capon, B. (2010). Botany for Gardeners. 3rd Edition. Timber Press, Portland, Oregon.
6. Pandey, P. H. (2007). Principles and Practices of Post Harvest Technology, Kalyani Publishers, New Delhi.

Discipline Specific Elective Paper-IV

INDUSTRIAL AND ENVIRONMENTAL MICROBIOLOGY

Unit-I

(i) Scope of microbes in industry and environment: Bioreactors/Fermenters and fermentation processes: Solid-state and liquid-state (stationary and submerged) fermentations; Batch and continuous fermentations. Components of a typical bioreactor, Types of bioreactors- laboratory.

(ii) Microbial production of industrial products: Microorganisms involved, media, fermentation conditions, downstream processing and uses; Filtration, centrifugation, cell disruption, solvent extraction, precipitation and ultrafiltration, lyophilization, spray drying.

Unit-II

Microbial enzymes of industrial interest and enzyme immobilization: Microorganisms for industrial applications and hands on screening microorganisms for casein hydrolysis; starch hydrolysis; cellulose hydrolysis. Methods of immobilization, advantages and applications of immobilization, large scale applications of immobilized enzymes (glucose isomerase and penicillin acylase).

Unit-III

Microbes and quality of environment: Distribution of microbes in air; Isolation of microorganisms from soil, air and water.

Microbial flora of water: Water pollution, role of microbes in sewage and domestic waste water treatment systems. Determination of BOD, COD, TDS and TOC of water samples; Microorganisms as indicators of water quality.

Unit-IV

Microbes in agriculture and remediation of contaminated soils: Biological fixation; Mycorrhizae; Bioremediation of contaminated soils. Isolation of root nodulating bacteria, arbuscular mycorrhizal colonization in plant roots.

PRACTICAL

1.Principles and functioning of instruments in microbiology laboratory
2.Hands on sterilization techniques and preparation of culture media
3. Screening microorganisms for industrial use.
4. Mycorrhiza, arbuscular mycorrhizal colonization in plant roots
5. Determination of BOD, COD, TDS and TOC of water samples;
6. Microorganisms as indicators of water quality

Text Books:

1. P. D. Sharma. (2017) Environmental Microbiology. Rastogi Publications, Meerut.

Suggested Readings

1. Pelzar, M.J. Jr., Chen E.C. S., Krieg, N.R. (2010). Microbiology: An application based approach. Tata McGraw Hill Education Pvt. Ltd., Delhi.
2. Tortora, G.J., Funke, B.R., Case. C.L. (2007). Microbiology. Pearson Benjamin Cummings, San Francisco, U.S.A. 9th edition.
3. Pradipta K. Mohapatra (2008). Text Book of Environmental Microbiology, I. K. International Publishing House, New Delhi
4. A. K. Rath (2018). Industrial and Environmental Microbiology, Kalyani Publishers, New Delhi.

OR

Discipline Specific Elective Paper-IV

DISSERTATION / PROJECT WORK

Identification of problem	Review of Literature	Methodology	Findings	Analysis	Viva-Voce	Total
10	10	10	25	25	20	100

** = Students who score more than ≥60% in aggregate are eligible for project work

Generic Elective Paper I A

BIODIVERSITY (MICROBES, ALGAE, FUNGI AND ARCHEGONIATES)

Unit-I

Microbes :Viruses – Discovery, general structure, replication (general account), DNA virus (T-phage); Lytic and lysogenic **cycle**, RNA virus (TMV); Economic importance; Bacteria – Discovery, General characteristics and cell structure; Reproduction – vegetative, asexual and recombination (conjugation, transformation and transduction); Economic importance.

Unit-II

(i) Algae: General characteristics; Ecology and distribution; Range of thallus organization and reproduction; Morphology and life- cycles of the following: *Chlamydomonas, Oedogonium*, *Nostoc and Fucus, Vaucheria, Polysiphonia,* Economic importance of algae.

(ii) Fungi : Introduction- General characteristics, ecology and significance, range of thallus organization, cell wall composition , nutrition, reproduction and classification; True Fungi- General characteristics, ecology and significance, life cycle of *Rhizopus* (Zygomycota) *Penicillium* (Ascomycota), *Puccnia, Agaricus* Basidiomycota); Symbiotic Associations-Lichens:

Unit-III

(i) **Bryophytes:** General characteristics, adaptations to land habit, Classification, Range of thallus organization, Classification (up to family), morphology, anatomy and reproduction of *Marchantia* and *Funaria* (Developmental details not to be included).

(ii) **Pteridophytes:** General characteristics, classification, early land plants (*Rhynia*). Classification (up to family), morphology, anatomy and reproduction of *Selaginella*, *Equisetum* and *Pteris* (Developmental details not to be included).Heterospory and seed habit, stellar evolution. Ecological and economical importance of Pteridophytes.

Unit-IV

Gymnosperms: General characteristics, classification. Classification (up to family), morphology, anatomy and reproduction of *Cycas*, *Pinus* and *Gnetum*. (Developmental details not to be included).Ecological and economical importance.

PRACTICAL

1. Gram staining
2. Study of vegetative and reproductive structures of *Nostoc, Chlamydomonas, Oedogonium, Vaucheria, Fucus* and *Polysiphonia* through temporary preparations and permanent slides.
3. *Rhizopus and Penicillium*: Asexual stage from temporary ounts and sexual structures through permanent slides.
4. *Puccinia* and *Agaricus*: Specimens of button stage and full grown mushroom; Sectioning of gills of *Agaricus*.

5. *Marchantia and Funaria*- morphology of thallus, w.m. rhizoids and scales, v.s. thallus through gemma cup, w.m. gemmae (all temporary slides), v.s. antheridiophore, archegoniophore, l.s. sporophyte (all permanent slides).
6. *Selaginella*- morphology, w.m. leaf with ligule, t.s. stem, w.m. strobilus, w.m.microsporophyll and megasporophyll (temporary slides), l.s. strobilus (permanent slide).
7. *Equisetum*- morphology, t.s. internode, l.s. strobilus, t.s. strobilus, w.m. sporangiophore, w.m. spores (wet and dry)(temporary slides); t.s rhizome (permanent slide).
8. *Cycas*- morphology (coralloid roots, bulbil, leaf), t.s. coralloid root, t.s. rachis, v.s. leaflet, v.s. microsporophyll, w.m. spores (temporary slides), l.s. ovule, t.s. root (permanent slide).
9. *Pinus*- morphology (long and dwarf shoots, w.m. dwarf shoot, male and female), w.m. dwarf shoot, t.s. needle, t.s. stem, , l.s./t.s. male cone, w.m. microsporophyll, w.m. microspores (temporary slides), l.s. female cone, t.l.s. & r.l.s. stem (permanent slide).

Text Books:

1. Mitra, J.N., Mitra, D. and Choudhury, S.K. Studies in Botany Volume 1. Moulik Publisher, Kolkata. Ninth Revised Edition

Reference Books:

1. Kumar, H.D. (1999). Introductory Phycology. Affiliated East-West. Press Pvt. Ltd. Delhi.2nd edition.
2. Tortora, G.J., Funke, B.R., Case, C.L. (2010). Microbiology: An Introduction, Pearson Benjamin Cummings, U.S.A. 10th edition.
3. Sethi, I.K. and Walia, S.K. (2011). Text book of Fungi & Their Allies, Mac Millan Publishers Pvt. Ltd., Delhi.
4. Alexopoulos, C.J., Mims, C.W., Blackwell, M. (1996). Introductory Mycology, John Wiley and Sons (Asia), Singapore. 4th edition.
5. Raven, P.H., Johnson, G.B., Losos, J.B., Singer, S.R., (2005). Biology. Tata McGraw Hill, Delhi, India.
6. Vashishta, P.C., Sinha, A.K., Kumar, A., (2010). Pteridophyta, S. Chand. Delhi, India.
7. Bhatnagar, S.P. and Moitra, A. (1996). Gymnosperms. New Age International (P) Ltd Publishers, New Delhi, India.
8. Parihar, N.S. (1991). An introduction to Embryophyta. Vol. I. Bryophyta. Central Book Depot, Allahabad.
9. Pandey, B. P. (2017), Botany for degree studies (as per CBCS). S. Chand
10. Acharya, B. S. and Mishra, B. K. (2018). Plant Biodiversity, Kalyani Publishers, New Delhi.

Generic Elective Paper IIA

PLANT PHYSIOLOGY AND METABOLISM

Unit-I

(i) Plant-water relations: Importance of water, water potential and its components; Transpiration and its significance; Factors affecting transpiration; Root pressure and guttation.
(ii) Mineral nutrition: Essential elements, macro and micronutrients; Criteria of essentiality of elements; Role of essential elements; Transport of ions across cell membrane, active and passive transport, carriers, channels and pumps.
(iii) Translocation in phloem.: Composition of phloem sap, girdling experiment; Pressure flow model; Phloem loading and unloading

Unit-II

(i) Photosynthesis: Photosynthetic Pigments (*Chl* a, b, xanthophylls, carotene); Photosystem I and II, reaction center, antenna molecules; Electron transport and mechanism of ATP synthesis; C_3, C_4 and CAM pathways of carbon fixation.
(ii) Respiration: Glycolysis, anaerobic respiration, TCA cycle; Oxidative Phosphorylation.

Unit-III

(i) Enzymes: Structure and properties; Mechanism of enzyme catalysis and enzyme inhibition.
(ii) Nitrogen metabolism: Biological nitrogen fixation; Nitrate and ammonia assimilation.

Unit-IV

(i) Plant growth regulators: Discovery and physiological roles of auxins, gibberellins, cytokinins, ABA, ethylene.
(ii) Plant response to light and temperature: Photoperiodism (SDP, LDP, Day neutral plants); Phytochrome (discovery and structure), red and far red light responses on hotomorphogenesis; Vernalization.

PRACTICAL

1. Determination of osmotic potential of plant cell sap by plasmolytic method.
2. To study the effect of two environmental factors (light and wind) on transpiration by excised twig.
3. Calculation of stomatal index and stomatal frequency of a mesophyte and a xerophyte.
4. Demonstration of Hill reaction.
5. Demonstrate the activity of catalase and study the effect of pH and enzyme concentration.
6. To study the effect of light intensity and bicarbonate concentration on O_2 evolution in photosynthesis.
7. Comparison of the rate of respiration in any two parts of a plant.

Text Books:

1. A. C. Sahu (2018). Plant Physiology and Metabolism. Kalyani Publishers, New Delhi.

Reference Books:

1. Taiz, L., Zeiger, E., MØller, I.M. and Murphy, A (2015). Plant Physiology and Development. Sinauer Associates Inc. USA. 6th edition.
2. Hopkins, W.G., Huner, N.P., (2009). Introduction to Plant Physiology. John Wiley & Sons, U.S.A. 4th Edition.
3. Bajracharya, D., (1999). Experiments in Plant Physiology- A Laboratory Manual. Narosa Publishing House, New Delhi.
4. H. S. Srivatava. Plant Physiology, Rastogi Publications, New Delhi

Generic Elective Paper IB

PLANT ECOLOGY AND TAXONOMY

Unit-I

(i) Ecological factors: Soil: Origin, formation, composition, soil profile. Water: States of water in the environment, precipitation types. Light and temperature: Variation Optimal and limiting factors; Shelford law of tolerance. Adaptation of hydrophytes and xerophytes

(ii) Plant communities : Characters; Ecotone and edge effect; Succession; Processes and types

Unit-II

(i) Ecosystem : Structure; Biotic and abiotic components, energy flow trophic organisation; Food chains and food webs, Ecological pyramids production and productivity; Biogeochemical cycling; Cycling of carbon, nitrogen and Phosphorous

(ii) Phytogeography: Principal biogeographical zones, Endemism.

Unit-III

(i) Introduction to plant taxonomy: Identification, Classification, Nomenclature.

(ii) Identification : Functions of Herbarium, important herbaria and botanical gardens of the world and India; Documentation: Flora, Keys: single access and multi-access

Unit-IV

(i) Taxonomic hierarchy: Ranks, categories and taxonomic groups

(ii) Botanical nomenclature: Principles and rules (ICN); ranks and names; binominal system, typification, author citation, valid publication, rejection of names, principle of priority and its limitations.

(iii) Classification: Types of classification-artificial, natural and phylogenetic. Bentham and Hooker (upto series), Hutchinson (upto series).

(iv) Taxonomic description of the families : Malvaceae, Fabaceae, Asteraceae and Poaceae, Apocynaceae, Lamiaceae and Musaceae.

PRACTICAL

1. Study of instruments used to measure microclimatic variables: Soil thermometer, maximum and minimum thermometer, anemometer, psychrometer/hygrometer, rain gauge and lux meter.
2. Determination of pH, and analysis of two soil samples for carbonates, chlorides, nitrates, sulphates, organic matter and base deficiency by rapid field test.
3. Comparison of bulk density, porosity and rate of infiltration of water in soil of three habitats.
4. (a) Study of morphological adaptations of hydrophytes and xerophytes (four each). (b)Study of biotic interactions of the following: Stem parasite (*Cuscuta)*, Root parasite
5. (*Orobanche*), Epiphytes, Predation (Insectivorous plants)
6. Determination of minimal quadrat size for the study of herbaceous vegetation in the college campus by species area curve method. (species to be listed)
7. Quantitative analysis of herbaceous vegetation in the college campus for frequency and comparison with Raunkiaer's frequency distribution law .
8. Study of vegetative and floral characters of the families as in theory syllabus (Description, V.S. flower, section of ovary, floral diagram/s, floral formula/e and systematic position according to Bentham & Hooker's system of classification).
9. Mounting of properly dried and pressed specimen of any ten wild plant's with herbarium label (to be submitted in the record book).

Text Books:

1. Sharma, P.D. (2017). Fundamentals of Ecology. Rastogi Publications, Meerut, India.

Reference Books:

1. Kormondy, E.J. (1996). Concepts of Ecology. Prentice Hall, U.S.A. 4th edition.
2. Sharma, P.D. (2010) Ecology and Environment. Rastogi Publications, Meerut, India. 8th edition.
3. Simpson, M.G. (2006). *Plant Systematics.* Elsevier Academic Press, San Diego, CA, U.S.A.
4. Singh, G. (2012). *Plant Systematics:* Theory and Practice. Oxford & IBH Pvt. Ltd., New Delhi. 3rd edition.
5. Sahu, A. C. (2017). Plant Ecology and Phytogeography, Kalyani Publishers, New Delhi.
6. Das, M. C. and Das, S. P. (2009). Fundamental of Ecology. Tata MGrow Hill, New Delhi.
7. Shukla, R.S. and Chandel, P.S. (2016). A text book of Plant Ecology. S Chand Publication, New Delhi
8. Mohanty, C. R. (2017). Text Book of Plant Systematics, Kalynai Publisher, New Delhi.

Generic Elective Paper IIB

PLANT ANATOMY AND EMBRYOLOGY

Unit-I

(i) Meristematic and permanent tissues : Root and shoot apical meristems; Simple and complex tissues
(ii) Organs :Anatomy of dicot and monocot root stem and leaf.

Unit-II

(i) Secondary Growth: Vascular cambium – structure and function, seasonal activity. Secondary growth in and stem, Wood (heartwood and sapwood)
(ii) Adaptive and protective systems: Epidermis, cuticle, stomata; General account of adaptations in xerophytes and hydrophytes.

Unit-III

(i) Structural organization of flower: Structure of anther and pollen; Structure and types of ovules; Types of embryo sacs, organization and ultrastructure of mature embryo sac.
(ii) Pollination and fertilization : Pollination mechanisms and adaptations; Double fertilization;

Unit-IV

(i) Endosperm: Endosperm types, structure and functions.
(ii) Embryo: Dicot and monocot embryo; Structure and development, Embryo endosperm relationship.
(iii) Seed-structure and development, appendages and dispersal mechanisms.

PRACTICAL

1. Study of meristems through permanent slides and photographs.
2. Tissues (parenchyma, collenchyma and sclerenchyma); Macerated xylary elements, Phloem (Permanent slides, photographs)
3. Stem: Monocot: *Zea mays;* Dicot: *Helianthus*; Secondary: *Helianthus* (only Permanent slides).
4. Root: Monocot: *Zea mays*; Dicot: *Helianthus*; Secondary: *Helianthus* (only Permanent slides).
5. Leaf: Dicot and Monocot leaf (only Permanent slides).
6. Adaptive anatomy: Xerophyte (*Nerium* leaf); Hydrophyte (*Hydrilla* stem).
7. Structure of anther (young and mature), tapetum (amoeboid and secretory) (Permanent slides).
8. Types of ovules: anatropous, orthotropous, circinotropous, amphitropous/ campylotropous**.**

Text Books:

1. Singh, Pandey and Jain (2017). Anatomy of Angiosperms, Rastogi Publication, Meerut.

Reference Books:

1. Bhojwani, S.S. & Bhatnagar, S.P. (2011). Embryology of Angiosperms. Vikas Publication House Pvt. Ltd. New Delhi. 5th edition.
2. Mauseth, J.D. (1988). Plant Anatomy. The Benjamin/Cummings Publisher, USA.
3. C. R. Mohanty (2018). Plant Anatomy and Embryology. Kalyani Publishers, New Delhi.

BOTANY Papers for PASS students

Discipline Specific Core – 4 papers
Discipline Specific Elective – 2 papers
Marks per paper – Mid term: 15 marks, End term: 60 marks, Practical: 25 marks,
Total – 100 marks

Credit per paper – 6
Teaching hours per paper – 40 hours (theory) + 20 hours (practical)

Semester	Course Opted	Course Name	Credit	Marks
Semester-I	DSC-1(Theory),	Paper-I, Biodiversity (Microbes, Algae, Fungi and Archegoniate)	4	75
	DSC-1 (Practical)	Paper –I, Biodiversity (Microbes, Algae, Fungi and Archegoniate)	2	25
Semester -II	DSC-2(Theory),	Paper-II, Plant Ecology and Taxonomy	4	75
	DSC-2 (Practical),	Paper-II, Plant Ecology and Taxonomy	2	25
Semester-III	DSC-3(Theory),	Paper-III, Plant Anatomy and Embryology	4	75
	DSC-3 (Practical),	Paper-III, Plant Anatomy and Embryology	2	25
Semester-IV	DSC-4(Theory),	Paper-IV, Plant Physiology and Metabolism	4	75
	DSC-4 (Practical)	Paper-IV, Plant Physiology and Metabolism	2	25
Semester-V	DSE-1(Theory),	Botany Paper-I – Economic Botany and Biotechnology	4	75
	DSE-1 (Practical),	Botany paper-I – Economic Botany and Biotechnology	2	25
Semester-VI	DSE-2(Theory),	Botany paper-II – Cell and Molecular Biology	4	75
	DSE-2 (Practical),	Botany paper-II – Cell and Molecular Biology	2	25
		Total:	36	600

Discipline Specific Core Paper I

Biodiversity (Microbes, Algae, Fungi and Archegoniate)

THEORY

Unit 1: Microbes:

Viruses – Discovery, general structure, replication (general account), DNA virus (T-phage); Lytic and lysogenic cycle, RNA virus (TMV); Economic importance; Bacteria – Discovery, General characteristics and cell structure; Reproduction – vegetative, asexual and recombination, Economic importance. **Algae:** General characteristics; Ecology and distribution; Range of thallus organization and reproduction; Classification of algae; Morphology and life-cycles of the following: *Nostoc*, *Chlamydomonas, Oedogonium*, *Fucus*. Economic importance of algae.

Unit 2: Fungi

General characteristics of fungi, ecology and significance, range of thallus organization, cell wall composition, nutrition, reproduction and classification; True Fungi- General characteristics, ecology and significance, life cycle of *Rhizopus* (Zygomycota) *Penicillium, Alternaria* (Ascomycota), *Puccinia, Agaricus* (Basidiomycota); Symbiotic Associations-Lichens: General account, reproduction and significance; Mycorrhiza: ectomycorrhiza and endomycorrhiza and their significance.

Unit 3: Archegoniate and Bryophyte

Unifying features of archegoniates, Transition to land habit, Alternation of generations.

General characteristics, adaptations to land habit, Classification, Range of thallus organization. Classification (up to family), morphology, anatomy and reproduction of *Marchantia* and *Funaria*. (Developmental details not to be included). Ecology and economic importance of bryophytes with special mention of *Sphagnum*.

Unit 5: Pteridophytes & Gymnosperms

General characteristics, classification, Early land plants (*Cooksonia* and *Rhynia*). Classification (up to family), morphology, anatomy and reproduction of *Selaginella*, *Equisetum* and *Pteris*. (Developmental details not to be included). Heterospory and seed habit, stelar evolution. Ecological and economical importance of Pteridophytes.

General characteristics, classification. Classification (up to family), morphology, anatomy and reproduction of *Cycas* and *Pinus*. (Developmental details not to be included). Ecological and economical importance.

PRACTICAL

1. EMs/Models of viruses – T-Phage and TMV, Line drawing/Photograph of Lytic and Lysogenic Cycle.
2. Types of Bacteria from temporary/permanent slides/photographs; EM bacterium, Gram staining
3. Study of vegetative and reproductive structures of *Nostoc, Chlamydomonas* (electron micrographs), *Oedogonium, Fucus** (* *Fucus* - Specimen and permanent slides)
4. ***Penicillium***: Asexual stage from temporary mounts and sexual structures through permanent slides.

5. ***Puccinia***: Herbarium specimens of Black Stem Rust of Wheat and infected Barberry leaves; section/tease mounts of spores on Wheat and permanent slides of both the hosts.
6. ***Agaricus***: Specimens of button stage and full grown mushroom; Sectioning of gills of *Agaricus*.
7. **Mycorrhiza**: ecto mycorrhiza and endo mycorrhiza (Photographs)
8. ***Marchantia*** & ***Funaria***- morphology of thallus, w.m. rhizoids and scales, v.s. thallus through gemma cup, w.m. gemmae (all temporary slides), v.s. of reproductive organ l.s. sporophyte .
9. ***Selaginella & Equisetum***- morphology, w.m. leaf with ligule, t.s. stem, ts/l.s of reproductive organ
10. ***Cycas & Pinus*** - morphology (roots, bulbil, leaf), t.s. root, v.s. leaflet, whole mount or v.s. of reproductive organs

Text Books

1. Singh, Pandey and Jain (2017). Microbiology and Phycology, Rastogi Publication, Meerut.
2. B. K. Mishra (2017), Mycology and Phytopathology, Kalynai Publishers, New Delhi.
3. Singh, Pandey and Jain (2017). Archegoniate, Rastogi Publication, Meerut.

Suggested Readings

a. Kumar, H.D. (1999). Introductory Phycology. Affiliated East-West. Press Pvt. Ltd. Delhi. 2nd edition.
b. Tortora, G.J., Funke, B.R., Case, C.L. (2010). Microbiology: An Introduction, Pearson Benjamin Cummings, U.S.A. 10th edition.
c. Sethi, I.K. and Walia, S.K. (2011). Text book of Fungi & Their Allies, MacMillan Publishers Pvt. Ltd., Delhi.
d. Alexopoulos, C.J., Mims, C.W., Blackwell, M. (1996). Introductory Mycology, John Wiley and Sons (Asia), Singapore. 4th edition.
e. Raven, P.H., Johnson, G.B., Losos, J.B., Singer, S.R., (2005). Biology. Tata McGraw Hill, Delhi, India.
f. Vashishta, P.C., Sinha, A.K., Kumar, A., (2010). Pteridophyta, S. Chand. Delhi, India.
g. Bhatnagar, S.P. and Moitra, A. (1996). Gymnosperms. New Age International (P) Ltd Publishers, New Delhi, India.
h. Parihar, N.S. (1991). An introduction to Embryophyta. Vol. I. Bryophyta. Central Book Depot, Allahabad.

Discipline Specific Core Paper II
Plant Ecology and Taxonomy
THEORY

Unit 1: Ecological factors
Introduction to plant ecology and taxonomy. Soil: Origin, formation, composition, soil profile. Water: States of water in the environment, precipitation types. Light and temperature: Variation Optimal and limiting factors; Shelford law of tolerance. Adaptation of hydrophytes and xerophytes.

Unit 2: Plant communities and Ecosystems
Characters; Ecotone and edge effect; Succession; Processes and types. Structure; energy flow trophic organisation; Food chains and food webs, Ecological pyramids production and productivity; Biogeochemical cycling; Cycling of carbon, nitrogen and Phosphorous

Unit 3: Phytogeography and Plant Taxonomy
Principle biogeographical zones; Endemism. Identification, Classification, Nomenclature. Functions of Herbarium, important herbaria and botanical gardens of the world and India; Documentation: Flora, Keys: single access and multi-access, Taxonomic evidences from palynology, cytology, phytochemistry and molecular data. Taxonomic hierarchy: Ranks, categories and taxonomic groups

Unit 4: Classification & Botanical nomenclature
Principles and rules (ICN); ranks and names; binominal system, typification, author citation, valid publication, rejection of names, principle of priority and its limitations.

Classification: Types of classification-artificial, natural and phylogenetic. Bentham and Hooker (upto series), Engler and Prantl (upto series). Biometrics, numerical taxonomy and cladistics: cluster analysis; phenograms, cladograms (definitions and differences).

PRACTICAL

1. Study of instruments used to measure microclimatic variables: Soil thermometer, maximum and minimum thermometer, anemometer, psychrometer/hygrometer, rain gauge and lux meter.
2. Determination of pH, and analysis of two soil samples for carbonates, chlorides, nitrates, sulphates, organic matter and base deficiency by rapid field test.
3. (a) Study of morphological adaptations of hydrophytes and xerophytes (four each). (b)Study of biotic interactions of the following: Stem parasite (*Cuscuta)*, Root parasite (Orobanche), Epiphytes, Predation (Insectivorous plants)
4. Determination of minimal quadrat size for the study of herbaceous vegetation in the college campus by species area curve method. (species to be listed)
5. Quantitative analysis of herbaceous vegetation in the college campus for frequency and comparison with Raunkiaer's frequency distribution law
6. Study of vegetative and floral characters of the following families (Description, V.S. flower, section of ovary, floral diagram/s, floral formula/e and systematic position

according to Bentham & Hooker's system of classification): Brassicaceae, Asteraceae, Solanaceae, Lamiaceae, Liliaceae

7. Mounting of a properly dried and pressed specimen of any wild plant with herbarium label (to be submitted in the record book).

Text Books

1. Sharma, P.D. (2017). Fundamentals of Ecology. Rastogi Publications, Meerut, India.
2. O. P. Sharma (2009) Plant Taxonomy, Tata M Grow Hill, New Delhi

Suggested Readings

1. Kormondy, E.J. (1996). Concepts of Ecology. Prentice Hall, U.S.A. 4th edition.
2. Sharma, P.D. (2010) Ecology and Environment. Rastogi Publications, Meerut, India. 8th edition.
3. Simpson, M.G. (2006). *Plant Systematics.* Elsevier Academic Press, San Diego, CA, U.S.A.
4. Singh, G. (2012). *Plant Systematics:* Theory and Practice. Oxford & IBH Pvt. Ltd., New Delhi. 3rd edition.

Discipline Specific Core Paper III
Plant Anatomy and Embryology
THEORY

Unit 1: Tissues, Organs and special tissues

Root and shoot apical meristems; Simple and complex tissues. Structure of dicot and monocot root stem and leaf. Vascular cambium – structure and function, seasonal activity. Secondary growth in root and stem, Wood (heartwood and sapwood). Epidermis, cuticle, stomata; General account of adaptations in xerophytes and hydrophytes.

Unit 2: Structural organization of flower

Structure of anther and pollen; Structure and types of ovules; Types of embryo sacs, organization and ultrastructure of mature embryo sac.

Unit 3: Pollination and fertilization

Pollination mechanisms and adaptations; Double fertilization; Seed-structure appendages and dispersal mechanisms. Apomixis and polyembryony**:** Definition, types and practical applications.

Unit 4: Embryo and endosperm

Endosperm types, structure and functions; Dicot and monocot embryo; Embryoendosperm relationship.

PRACTICAL

1. Study on different types of tissues: parenchyma, collenchymas, sclerenchyma, Xylary elements, Phloem

3. Stem, root and leaf anatomy: Monocot, Dicot, Secondary growth.
4. Adaptive anatomy: Xerophyte (*Nerium* leaf); Hydrophyte (*Hydrilla* stem).
5. Structure of anther (young and mature), tapetum (amoeboid and secretory).

6. Types of ovules: anatropous, orthotropous, circinotropous, amphitropous/ campylotropous.
7. Female gametophyte: *Polygonum* (monosporic) type of Embryo sac Development.
8. Calculation of percentage of germinated pollen in a given medium.

Text Books

1. Singh, Pandey and Jain (2017). Anatomy of Angiosperms, Rastogi Publication, Meerut.
2. Singh, Pandy and Jain (2017). Reproductive Biology of Angiosperms, Rastogi Publications, Meerut

Suggested Readings

1. Bhojwani, S.S. & Bhatnagar, S.P. (2011). Embryology of Angiosperms. Vikas Publication House Pvt. Ltd. New Delhi. 5th edition.
2. Mauseth, J.D. (1988). Plant Anatomy. The Benjamin/Cummings Publisher, USA.

Discipline Specific Core Paper IV
Plant Physiology and Metabolism
THEORY

Unit 1: Plant-water relations and nitrogen metabolism

Importance of water, water potential and its components; Transpiration and its significance; Factors affecting transpiration; Root pressure and guttation. Biological nitrogen fixation; Nitrate and ammonia assimilation.

Unit **2: Mineral nutrition and Phloem translocation**

Essential elements, macro and micronutrients; Criteria of essentiality of elements; Role of essential elements; Transport of ions across cell membrane, active and passive transport, carriers, channels and pumps. Translocation in phloem: Composition of phloem sap, girdling experiment; Pressure flow model; Phloem loading and unloading.

Unit 3: Photosynthesis and respiration

Photosynthetic Pigments (Chl a, b, xanthophylls, carotene); Photosystem I and II, reaction center, antenna molecules; Electron transport and mechanism of ATP synthesis; C3 and C4. Glycolysis, anaerobic respiration, TCA cycle; Oxidative phosphorylation.

Unit 4: Enzyme, Plant growth regulators and Plant response

Enzymes: Structure and properties; Mechanism of enzyme catalysis and enzyme inhibition. Discovery and physiological roles of auxins, gibberellins, cytokinins, ABA, ethylene.Plant response to light and temperature: Photoperiodism (SDP, LDP, Day neutral plants); Phytochrome (discovery and structure), red and far red light responses on photomorphogenesis; Vernalization.

PRACTICAL

1. Determination of osmotic potential of plant cell sap by plasmolytic method.
2. To study the effect of two environmental factors (light and wind) on transpiration by

excised twig.

3. Calculation of stomatal index and stomatal frequency of a mesophyte and a xerophyte.
4. Demonstration of Hill reaction.
5. To study the effect of light intensity and bicarbonate concentration on O2 evolution in photosynthesis.
7. Comparison of the rate of respiration in any two parts of a plant.
8. Suction due to transpiration.

Text Books

1. R. K. Sinha, (2015). Modern Plant Physiology, Narosa Publishing House, New Delhi.
2. S, K. Gupta (2017). Plant Metabolism, Rastogi Publication, Meerut.

Suggested Readings

1. Taiz, L., Zeiger, E., (2010). Plant Physiology. Sinauer Associates Inc., U.S.A. 5th Edition.
2. Hopkins, W.G., Huner, N.P., (2009). Introduction to Plant Physiology. John Wiley & Sons, U.S.A. 4th Edition.
3. Bajracharya, D., (1999). Experiments in Plant Physiology- A Laboratory Manual. Narosa Publishing House, New Delhi.

Discipline Specific Elective Paper I
Economic Botany and Biotechnology
THEORY

Unit 1: Origin of Cultivated Plants, Cereals and Legumes

Concept of centres of origin, their importance with reference to Vavilov’s work. Rice cultivation process, Economic importance. Cereals:- Wheat -Origin, morphology, uses. Legumes: General account with special reference to Gram and soybean

U nit 2: Spices and Beverages

General account with special reference to clove and black pepper (Botanical name, family, part used, morphology and uses). Tea (morphology, processing, uses)

U nit 3: Oils and Fats and Fibre Yielding Plants

General description with special reference to groundnut. General description with special reference to Cotton (Botanical name, family, part used, morphology and uses)

U nit 4: Plant tissue culture and molecular techniques

Introduction to biotechnology. Micropropagation; Anther culture, haploid production through androgenesis and gynogenesis; brief account of embryo & endosperm culture with their applications. Protoplast culture, Hybrid and Cybrids. DNA Fingerprinting; Molecular DNA markers i.e. PCR, RAPD, RFLP.

PRACTICAL

1. Study of economically important plants: Wheat, Gram, Soybean, Black pepper, Clove Tea,

Cotton, Groundnut through specimens, sections and microchemical tests
2. Familiarization with basic equipments in tissue culture.
3. Study through photographs: Anther culture, somatic embryogenesis, endosperm and embryo culture; micropropagation.
4. Study of molecular techniques: PCR, Blotting techniques, AGE and PAGE.

Text Books:

1. B. P. Pandey (2017) Economic Botany. S. Chand Publication, New Delhi.
2. H. S. Chawla (2010). Introduction to Plant Biotechnology. Oxford & IBH Publishing Co.Pvt. Ltd., New Delhi.

Suggested Readings

1. Kochhar, S.L. (2011). Economic Botany in the Tropics, MacMillan Publishers India Ltd., New Delhi. 4th edition.
2. Bhojwani, S.S. and Razdan, M.K., (1996). Plant Tissue Culture: Theory and Practice. Elsevier Science Amsterdam. The Netherlands.
3. Glick, B.R., Pasternak, J.J. (2003). Molecular Biotechnology- Principles and Applications of recombinant DNA. ASM Press, Washington.

Discipline Specific Elective Paper II
Cell and Molecular Biology
THEORY

Unit 1: Techniques in Biology

Principles of microscopy; Light Microscopy; Phase contrast microscopy; Fluorescence microscopy; Confocal microscopy; Sample Preparation for light microscopy; Electron microscopy (EM)- Scanning EM and Scanning Transmission EM (STEM); Sample Preparation for electron microscopy.

Unit 2: Cell and Cell Organelles

The Cell Theory; Prokaryotic and eukaryotic cells; Cell size and shape; Eukaryotic Cell components. Mitochondria: Structure, marker enzymes, composition; Semiautonomous nature; Symbiont hypothesis; Proteins synthesized within mitochondria; mitochondrial DNA. Chloroplast - Structure, marker enzymes, composition; semiautonomous nature, chloroplast DNA. ER, Golgi body & Lysosomes: Structures and roles. Peroxisomes and Glyoxisomes:_Structures, composition, functions in animals and plants and biogenesis. Nucleus:_Nuclear Envelope- structure of nuclear pore complex; chromatin; molecular organization.

Unit 3: Cell Membrane, Cell Wall and Cell Cycle

The functions of membranes; Models of membrane structure; The fluidity of membranes; Membrane proteins and their functions; Carbohydrates in the membrane; Faces of the membranes; Selective permeability of the membranes; Cell wall.

Unit 4: Genetic material, transcription, gene expression and Cell Cycle

DNA: Miescher to Watson and Crick- historic perspective, DNA structure, types of DNA, types of genetic material. DNA replication (Prokaryotes and eukaryotes), Types of structures of RNA (mRNA, tRNA, rRNA), RNA polymerase- various types; Translation (Prokaryotes and eukaryotes), genetic code. Regulation of gene expression: Prokaryotes: Lac operon and Tryptophan operon; and in Eukaryotes. Overview of Cell cycle, Mitosis and Meiosis; Molecular controls.

PRACTICAL

1) To study prokaryotic cells (bacteria), viruses, eukaryotic cells with the help of light and electron micrographs.
2) Study of the photomicrographs of cell organelles
3) To study the structure of plant cell through temporary mounts.
4) To study the structure of animal cells by temporary mounts-squamous epithelial cell and nerve cell.
5) Preparation of temporary mounts of striated muscle fiber
6) Study of mitosis and meiosis (temporary mounts and permanent slides).
7) Study of plasmolysis and deplasmolysis on *Rhoeo* leaf.
8) Measure the cell size (either length or breadth/diameter) by micrometry.
9) Study the structure of nuclear pore complex by photograph (from Gerald Karp)
10) Study of special chromosomes (polytene & lampbrush) either by slides or photographs.
11) Study DNA packaging by micrographs.
12) Preparation of the karyotype and ideogram from given photograph of somatic metaphase chromosome.

Text Books

1. B. D. Singh (2017). Fundamental of Genetics, Kalynai Publishers, New Delhi.
2. H. S. Chawla (2010). Introduction to Plant Biotechnology. Oxford & IBH Publishing Co.Pvt. Ltd., New Delhi.

Suggested Readings

1) Karp, G. 2010. Cell and Molecular Biology: Concepts and Experiments. 6th Edition. John Wiley & Sons. Inc.
2) De Robertis, E.D.P. and De Robertis, E.M.F. 2006. Cell and Molecular Biology. 8th edition. Lippincott Williams and Wilkins, Philadelphia.
3) Cooper, G.M. and Hausman, R.E. 2009. The Cell: A Molecular Approach. 5th edition. ASM Press & Sunderland, Washington, D.C.; Sinauer Associates, MA.
4) Becker, W.M., Kleinsmith, L.J., Hardin. J. and Bertoni, G. P. 2009. The World of the Cell. 7th edition. Pearson Benjamin Cummings Publishing, San Francisco.

OPTIONAL FOR SECC II PAPER
SKILL ENHANCEMENT COURSE (SECC II Option I)
BIO-FERTILIZERS

Unit-I

General account about the microbes used as biofertilizer – Rhizobium – isolation, identification, mass multiplication, carrier based inoculants, Actinorrhizal symbiosis. Azospirillum: isolation and mass multiplication, Azotobacter: classification, characteristics – crop response to Azotobacter inoculums, maintenance and mass multiplication.

Unit-II

Cyanobacteria (blue green algae), *Azolla* and *Anabaena azollae* association, nitrogen fixation, factors affecting growth, blue green algae and *Azolla* in rice cultivation.

Unit-III

Mycorrhizal association, types of mycorrhizal association, taxonomy, occurrence and distribution, phosphorus nutrition, growth and yield – colonization of VAM – isolation and inoculum production of VAM, and its influence on growth and yield of crop plants.

Unit-IV

Organic farming – Green manuring and organic fertilizers, Recycling of biodegradable municipal, agricultural and Industrial wastes – biocompost making methods, types and method of vermicomposting – field Application.

Text Books:

1. Mahendra Rai, (2006). Hand book of Microbial Bio-fertilizers. CRC Press.

Reference Books:

1. Dubey, R.C., 2005 A Text book of Biotechnology S. Chand & Co, New Delhi.
2. Kumaresan, V. 2005, Biotechnology, Saras Publications, New Delhi.
3. John Jothi Prakash, E. 2004. Outlines of Plant Biotechnology. Emkay Publication, New Delhi.
4. Sathe, T.V. 2004 Vermiculture and Organic Farming. Daya publishers.
5. Subha Rao, N.S. 2000, Soil Microbiology, Oxford & IBH Publishers, New -Delhi.
6. Vayas, S.C, Vayas, S. and Modi, H.A. 1998 Bio-fertilizers and organic. Farming Akta Prakashan, Nadiad
7. Pravin Chandra Dwivedi. (2008). Biofertilizers. Pointer Publishers.

SKILL ENHANCEMENT COURSE (SECC II Option II)

NURSERY AND GARDENING

Unit-I

Nursery: definition, objectives and scope and building up of infrastructure for nursery, planning and seasonal activities - Planting - direct seeding and transplants.

Seed: Structure and types - Seed dormancy; causes and methods of breaking dormancy - Seed storage: Seed banks, factors affecting seed viability, genetic erosion – Seed production technology - seed testing and certification.

Unit-II

Vegetative propagation: air-layering, cutting, selection of cutting, collecting season, treatment of cutting, rooting medium and planting of cuttings - Hardening of plants – green house - mist chamber, shed root, shade house and glass house.

Unit-III

Gardening: definition, objectives and scope - different types of gardening – landscape and home gardening - parks and its components - plant materials and design – computer applications in landscaping - Gardening operations: soil laying, manuring, watering, management of pests and diseases and harvesting.

Unit-IV

Sowing/raising of seeds and seedlings - Transplanting of seedlings - Study of cultivation of different vegetables: cabbage, brinjal, lady's finger, onion, garlic, tomatoes, and carrots - Storage and marketing procedures.

Text Books:

1. Saidaiah Pidigam, Sindhuja S., Geetha Amarapalli. (2018)Text Book of Nursery, Gardening and Floriculture, Kalyani Publishers, New Delhi.

Reference Books:

1. Bose T.K. & Mukherjee, D., 1972, Gardening in India, Oxford & IBH Publishing Co., New Delhi.
2. Sandhu, M.K., 1989, Plant Propagation, Wile Eastern Ltd., Bangalore, Madras.
3. Kumar, N., 1997, Introduction to Horticulture, Rajalakshmi Publications, Nagercoil.
4. Edmond Musser & Andres, Fundamentals of Horticulture, McGraw Hill Book Co., New Delhi.
5. Agrawal, P.K. 1993, Hand Book of Seed Technology, Dept. of Agriculture and Cooperation, National - Seed Corporation Ltd., New Delhi.
6. Janick Jules. 1979. Horticultural Science. (3rd Ed.), W.H. Freeman and Co., San Francisco, USA.

SKILL ENHANCEMENT COURSE (SECC II Option III)

ETHNOBOTANY

Unit-I

(i) Introduction, concept, scope and objectives; Ethnobotany as an interdisciplinary science. The relevance of ethnobotany in the present context; Major and minor ethnic groups or Tribals of India, and their life styles. Plants used by the tribals: a) Food plants b) intoxicants and beverages c) Resins and oils and miscellaneous uses.

(ii) Methodology of Ethnobotanical studies a) Field work b) Herbarium c) Ancient Literature d) Archaeological findings e) temples and sacred places.

Unit-II

Role of ethnobotany in modern Medicine Medico-ethnobotanical sources in India; Significance of the following plants in ethno botanical practices (along with their habitat and morphology) a) Azadiractha indica b) Ocimum sanctumc) Vitex negundo. d) Gloriosa superba e) Tribulus terrestris f) Pongamia pinnata g) Cassia auriculata h) Indigofera tinctoria. Role of ethnobotany in modern medicine with special example Rauvolfia sepentina, Trichopus zeylanicus, Artemisia, Withania.

Unit-III

Role of ethnic groups in conservation of plant genetic resources. Endangered taxa and forest management (participatory forest management).

Unit-IV

Ethnobotany and legal aspects Ethnobotany as a tool to protect interests of ethnic groups. Sharing of wealth concept with few examples from India. Biopiracy, Intellectual Property Rights and Traditional Knowledge.

Text Books:

1. Faulks, P.J. 1958.An introduction to Ethnobotany, Moredale pub. Ltd

Reference Books:

1. S.K. Jain, Manual of Ethnobotany, Scientific Publishers, Jodhpur, 1995.
2. S.K. Jain (ed.) Glimpses of Indian. Ethnobotny, Oxford and I B H, New Delhi – 1981
3. Lone et al, Palaeo ethnobotany
4. S.K. Jain (ed.) 1989. Methods and approaches in Ethnobotany. Society of Ethnobotanists, Lucknow, India.
5. S.K. Jain, 1990. Contributions of Indian ethnobotny. Scientific publishers, Jodhpur.
6. Colton C.M. 1997. Ethnobotany – Principles and applications. John Wiley and sons – Chichester
7. Rama Ro, N and A.N. Henry (1996). The Ethnobotany of Eastern Ghats in Andhra Pradesh, India. Botanical Survey of India. Howrah.
8. Rajiv K. Sinha – Ethnobotany The Renaissance of Traditional Herbal Medicine –

INA –SHREE Publishers, Jaipur-1996
9. Rath, A. K. and Mishra, S. R. (2017). Ethnobotany, Kalyani Publishers, New Delhi..

SKILL ENHANCEMENT COURSE (SECC II Option IV)
MUSHROM CULTIVATION

Unit-I

Introduction, history. Nutritional and medicinal value of edible mushrooms; Poisonous mushrooms. Types of edible mushrooms available in India - *Volvariella volvacea, Pleurotus citrinopileatus, Agaricus bisporus*. Cultivation Technology : Infrastructure: substrates (locally available) Polythene bag, vessels, Inoculation hook, inoculation loop, low cost stove, sieves, culture rack, mushroom unit (Thatched house) water sprayer, tray, small polythene bag.

Unit-II

Pure culture: Medium, sterilization, preparation of spawn, multiplication. Mushroom bed preparation - paddy straw, sugarcane trash, maize straw, banana leaves. Factors affecting the mushroom bed preparation - Low cost technology, Composting technology in mushroom production.

Unit-III

Storage and nutrition : Short-term storage (Refrigeration - upto 24 hours) Long term Storage (canning, pickles, papads), drying, storage in salt solutions. Nutrition - Proteins - amino acids, mineral elements nutrition - Carbohydrates, Crude fiber content - Vitamins.

Unit-IV

Food Preparation: Types of foods prepared from mushroom. Research Centers - National level and Regional level. Cost benefit ratio - Marketing in India and abroad, Export Value.

Text Books:

1. B. C. Suman and V. P. Sharma. (2007). Mushroom Cultivation in India. Daya Publishing House, New Delhi.

Reference Books:

1. Marimuthu, T. Krishnamoorthy, A.S. Sivaprakasam, K. and Jayarajan. R (1991) Oyster Mushrooms, Department of Plant Pathology, Tamil Nadu Agricultural University, Coimbatore.
2. Swaminathan, M. (1990) Food and Nutrition. Bappco, The Bangalore Printing and Publishing Co. Ltd., No. 88, Mysore Road, Bangalore - 560018.
3. Tewari, Pankaj Kapoor, S.C., (1988). Mushroom cultivation, Mittal Publications, Delhi.
4. Nita Bahl (1984-1988) Hand book of Mushrooms, II Edition, Vol. I & Vol. II.
5. Anon. (2010).The Cultivation of Mushrooms - An Outline of Mushroom Culture, Read Book Design, New Delhi

CAPACITY BUILDING OF FACULTY

Following modules have been proposed for training of faculties:

- Isolation and quantification of nucleic acids following spectrophotometric and gel electrophoresis techniques
- Techniques of Chromatography
- Micrometry and Haemocytometry
- Tissue Culture Techniques
- PCR techniques
- Chromosome techniques

The above module may be of 3-4 weeks duration with 30 participants.

LIST OF EQUIPMENTS

Sl. No.	List of Equipments	Quantity
01	Dissecting Microscope (Indian Make)	2 no.
02	Compound Microscope (Indian Make) with photographic attachment	2 no.
03	Occular and Stage Micrometer (Indian Make)	1 no.
04	Uv Spectrophotometer (Indian Make)	1 no.
05	Cold Centrifuge (Indian Make)	1 no.
06	Refrigerator (Indian Make)	1 no.
07	Soil Thermometer (Indian Make)	1 no.
08	Anemometer (Indian Make)	1 no.
09	Psychrometer (Indian Make)	1 no.
10	Rain gauge (Indian Make)	1 no.
11	pH meter (Indian Make)	1 no.
12	Herbarium Press (Indian Make)	1 set
13	Hot air Oven (Indian Make)	1 no.
14	Electronic Balance (Indian Make)	1no.
15	Gel Electrophoresis (Indian Make) Vertical and submarine	1 no.

16.	Power Pack for electrophoresis	1 no.
17	Blood Testing Kit (Indian Make)	1 no.
18	Laminar Flow (Indian Make)	1 no.
19	BOD Incubator (Indian Make)	1 no.
20	Autoclave (Indian Make)	1 no.

STATE MODEL SYLLABUS FOR UNDER GRADUATE
COURSE IN CHEMISTRY
(Bachelor of Science Examination)

UNDER
CHOICE BASED CREDIT SYSTEM

Course structure of UG Chemistry Honours

Semester	Course	Course Name	Credits	Total marks
I	AECC-I	AECC-I	04	100
	C-I	Inorganic Chemistry-I	04	75
	C-I Practical	Inorganic Chemistry-I Lab	02	25
	C-II	Physical Chemistry-I	04	75
	C-II Practical	Physical Chemistry-I Lab	02	25
	GE-I	GE-I	04	75
	GE-I Practical	GE-I Lab	02	25
			22	**400**
II	AECC-II	AECC-II	04	100
	C-III	Organic Chemistry-I	04	75
	C-III Practical	Organic Chemistry-I Lab	02	25
	C-IV	Physical Chemistry-II	04	75
	C-IV Practical	Physical Chemistry-II	02	25
	GE-II	GE-II	04	75
	GE-II Practical	GE-II Lab	02	25
			22	**400**
III	C-V	Inorganic Chemistry-II	04	75
	C-V Practical	Inorganic Chemistry-II Lab	02	25
	C-VI	Organic Chemistry-II	04	75
	C-VI Practical	Organic Chemistry-II Lab	02	25
	C-VII	Physical Chemistry-III	04	75
	C-VII Practical	Physical Chemistry-III Lab	02	25
	GE-III	GE-III	04	75
	GE-III Practical	GE-III Lab	02	25
	SECC-I	SECC-I	04	100
			28	**500**
IV	C-VIII	Inorganic Chemistry-III	04	75
	C-VIII Practical	Inorganic Chemistry-III Lab	02	25

	C-IX	Organic Chemistry-III	04	75
	C-IX Practical	Organic Chemistry-III Lab	02	25
	C-X	Physical Chemistry-IV	04	75
	C-X Practical	Physical Chemistry-IV Lab	02	25
	GE-IV	GE-IV (Theory)	04	75
	GE-IV Practical	GE-IV (Practical)	02	25
	SECC-II	SECC-II	04	100
			28	**500**
V	C-XI	Organic Chemistry-IV	04	75
	C-XI Practical	Organic Chemistry-IV	02	25
	C-XII	Physical Chemistry-V	04	75
	C-XII Practical	Physical Chemistry-V	02	25
	DSE-I	DSE-I	04	75
	DSE-I Practical	DSE-I Lab	02	25
	DSE-II	DSE-II	04	75
	DSE-II Practical	DSE-II Lab	02	25
			24	**400**
VI	C-XIII	Inorganic Chemistry- IV	04	75
	C-XIII Practical	Inorganic Chemistry-IV	02	25
	C-XIV	Organic Chemistry-V	04	75
	C-XIV Practical	Organic Chemistry-V	02	25
	DSE-III	DSE-III	04	75
	DSE-III Practical	DSE-III Lab	02	25
	DSE-IV	DSE-IV	04	75
	DSE-IV Practical	DSE-IV Lab	02	25
	OR			
	DSE-IV	Dissertation	06	100*
			24	**400**
		TOTAL	**148**	**2600**

Discipline Specific Elective Papers: (Credit: 06 each)

(4 papers to be selected by students of Chemistry Honours): DSE (1-IV)

1. Polymer Chemistry
2. Green Chemistry
3. Industrial Chemicals & Environment
4. Inorganic Materials of Industrial Importance
5. *Dissertation (can be opted as alternative of DSE-IV only and of 6 credits. **Dissertation content: 60, Seminar cum Viva: 20)**
6. Analytical Methods in Chemistry (Alternative)

CHEMISTRY

HONOURS PAPERS:

Core course – 14 papers

Discipline Specific Elective – 4 papers (out of the 6 papers suggested)

Generic Elective for non-Chemistry students – 4 papers. Incase the University offers 2 subjects as GE, then papers 1 and 2 will be the GE paper.

Marks per paper - Midterm : 15 marks, End term : 60 marks, Practical- 25 marks

Total – 100 marks Credit per paper – 6

Teaching hours per paper – 40 hours Theory classes + 20 hours Practical classes

CORE PAPER 1

INORGANIC CHEMISTRY-I

Unit-I

Atomic structure

Bohr's theory, its limitations and atomic spectrum of hydrogen atom, Sommerfeld's modification. Wave mechanics: de Broglie equation, Heisenberg's Uncertainty Principle, Schrödinger's wave equation (time independent) and its significance, Derivation of Schrödinger's wave equation (for hydrogen atom) in Cartesian coordinate, significance of ψ and ψ^2. Normalized and orthogonal wave functions. Sign of wave functions; Setting of Schrödinger's equation in polar coordinates (derivation not required), radial and angular wave functions for hydrogen atom. Radial and angular distribution curves; Shapes of s, p, d and f orbitals; Quantum numbers and their significance. Pauli's Exclusion principle, Hund's rule of maximum multiplicity, Aufbau's principle and its limitations.

Unit-II

Periodicity of elements

Periodicity of Elements: s, p, d, f block elements, the long form of periodic table. Detailed discussion of the following properties of the elements, with reference to s & p-blocks. (a) Effective nuclear charge, shielding or screening effect, Slater rules, variation of effective nuclear charge in periodic table. (b) Atomic radii (van der Waals) (c) Ionic and crystal radii. (d) Covalent radii (octahedral and tetrahedral) (e) Ionization enthalpy, Successive ionization enthalpies and factors affecting ionization energy. Applications of ionization enthalpy. (f) Electron gain enthalpy, trends of electron gain enthalpy. (g) Electronegativity, Pauling's/ Mulliken's electronegativity scales. Variation of electronegativity with bond order, partial charge, hybridization. Sanderson's electron density ratio.

Unit-III

Chemical bonding-I

(i) Ionic bond: General characteristics, types of ions, size effects, radius ratio rule and its limitations. Packing of ions in crystals. Born-Landé equation with derivation. Madelung constant, Born-Haber cycle and its application, Solvation energy.

(ii) Covalent bond: Valence Bond theory (Heitler-London approach). Hybridization with suitable examples of linear, trigonal planar, square planar, tetrahedral, trigonal bipyramidal and octahedral arrangements, equivalent and non-equivalent hybrid orbitals, Resonance and resonance energy.

Molecular orbital theory. Molecular orbital diagrams of diatomic and simple polyatomic molecules N_2, O_2, C_2, B_2, F_2, CO, NO, and their ions (CO^+, NO^+, NO^-).

Unit-IV

Chemical bonding-II

VSEPR theory, shapes of simple molecules and ions containing lone and bond pairs of electrons, multiple bonding (σ and π bond approach) and bond lengths. Covalent character in ionic compounds, polarizing power and polarizability. Fajan's rules and consequences of polarization. Ionic character in covalent compounds: Bond moment and dipole moment. Percentage ionic character from dipole moment and electronegativity difference.

(i) Metallic Bond: Qualitative idea of valence bond and band theories. Semiconductors and insulators.
(ii) Weak Chemical Forces: van der Waals forces, ion-dipole forces, dipole-dipole interactions, induced dipole interactions, Instantaneous dipole-induced dipole interactions. Repulsive forces, Hydrogen bonding (theories of hydrogen bonding, valence bond treatment) Effects of chemical force, melting and boiling points, solubility energetics of dissolution process**.**

Oxidation-reduction: Redox equations, standard electrode potential and its applications to inorganic reactions. Principles involved in some volumetric analyses (iron and copper).

Recommended Text Books:

1. Lee J. D., Concise Inorganic Chemistry Wiley India, 5th Edn., 2008.
2. Huheey J. E., Keiter E. A. and Keiter R. L., Inorganic Chemistry – Principles of structure and reactivity, , Pearson Education, 4th Ed. 2002.
3. Puri, Sharma, Kalia, Principles of Inorganic Chemistry, Vishal Pub. Co., 33rd ed., 2017
4. Malik, Tuli, Madan Selected Topic in Inorganic Chemistry, S. Chand, New Delhi, 17th Ed., 2010.

Reference books

1. Das Asim K., Fundamentals of Inorganic Chemistry, Vol. I, CBS Publications, 2nd Ed. 2010.
2. Pradeep's Inorganic Chemistry, Vol. I & II, Universal Book seller, 14th Ed. 2017.

CORE PAPER I LAB

Students are required to learn the followings:

i. Calibration and use of apparatus
ii. Preparation of solutions of different Molarity/Normality of titrants.

List of experiments

(A) Acid-Base Titrations

i. Estimation of carbonate and hydroxide present together in mixture.
ii. Estimation of carbonate and bicarbonate present together in a mixture.
iii. Estimation of free alkali present in different soaps/detergents

(B) Oxidation-Reduction Titrimetry

i. Standardization of $KMnO_4$ with standard sodium oxalate and estimation of Fe (II) using standardized $KMnO_4$ solution.
ii. Estimation of percentage of oxalic acid and sodium oxalate in a given mixture.
iii. Estimation of Fe (II) and Fe (III) in a mixture by standard $K_2Cr_2O_7$ solution.

Reference text Books:

1. J. Mendham, A. I. Vogel's Quantitative Chemical Analysis 6th Ed., Pearson, 2009.
2. Gulati Shikha , Sharma Gulati JL and Manocha, Shagun, Practical Inorganic Chemistry, 1stEdn., CBS Publishers & Distributors Pvt Ltd., (2017).

CORE PAPER II

PHYSICAL CHEMISTRY- I

Unit-I

Gaseous state-I

Kinetic molecular model of a gas: postulates and derivation of the kinetic gas equation; collision frequency; collision diameter; mean free path and viscosity of gases, including their temperature and pressure dependence, relation between mean free path and coefficient of viscosity, calculation of σ from η; variation of viscosity with temperature and pressure.

Maxwell distribution and its use in evaluating molecular velocities (average, root mean square and most probable) and average kinetic energy, law of equipartition of energy, degrees of freedom and molecular basis of heat capacities.

Behaviour of real gases: Deviations from ideal gas behaviour, compressibility factor, Z, and its variation with pressure for different gases. Causes of deviation from ideal behaviour. van der Waal's equation of state, its derivation and application in explaining real gas behaviour. Isotherms of real gases and their comparison with van der Waals isotherms, continuity of states, critical state, relation between critical constants and van der Waals constants, law of corresponding states.

Unit-II

Liquid state

Qualitative treatment of the structure of the liquid state; physical properties of liquids; vapour pressure, surface tension and coefficient of viscosity, and their determination. Effect of addition of various solutes on surface tension and viscosity. Explanation of cleansing action of detergents. Temperature variation of viscosity of liquids and comparison with that of gases. Qualitative discussion of structure of water.

Ionic equilibria- I

Strong, moderate and weak electrolytes, degree of ionization, factors affecting degree of ionization, ionization constant and ionic product of water. Ionization of weak acids and bases, pH scale, common ion effect; dissociation constants of mono- and diprotic acids.

Unit- III: Solid state

Nature of the solid state, law of constancy of interfacial angles, law of rational indices, Miller indices, elementary ideas of symmetry, symmetry elements and symmetry operations, seven crystal systems and fourteen Bravais lattices; X-ray diffraction, Bragg's law, a simple account of rotating crystal method and powder pattern method. Analyses of powder diffraction patterns of NaCl, CsCl and KCl. Defects in crystals (stoichiometric and non- stoichiometric). Glasses and liquid crystals.

Unit-IV

Ionic equilibria - II

Salt hydrolysis-calculation of hydrolysis constant, degree of hydrolysis and pH for different salts. Buffer solutions; derivation of Henderson equation and its applications; buffer capacity, buffer range, buffer action and applications of buffers in analytical chemistry and biochemical processes in the human body. Solubility and solubility product of sparingly soluble salts – applications of solubility product principle. Qualitative treatment of acid – base titration curves (calculation of pH at various stages). Theory of acid–base indicators; selection of indicators and their limitations.

Multistage equilibria in polyelectrolyte systems; hydrolysis and hydrolysis constants.

Recommended Text Books:

1. Atkins P. W. & Paula, J. de, Elements of Physical Chemistry, Oxford University Press, 6th Ed., (2006).
2. Puri, Sharma & Pathania, Principles of Physical Chemistry, Vishal Publishing Co, 47th Edn. 2017.
3. Kapoor K. L., Text Book of Physical Chemistry, McGraw Hill, 3rd Edn. 2017
4. Castellan G. W. Physical Chemistry 4thEdn. Narosa (2004).

Reference Books:

1. Kheterpal S.C., Pradeep's Physical Chemistry, Vol. I & II, Pradeep Publications
2. Mortimer R. G., Physical Chemistry, Elsevier (Academic Press), 3rd Ed (2008).
3. Ball D. W. Physical Chemistry Thomson Press, India (2007).
4. Engel T. & Reid P., Physical Chemistry, 3rd Ed. Pearson (2013)

CORE PAPER II LAB

Surface tension measurements.

a. Determine the surface tension by (i) drop number (ii) drop weight method.
b. Study the variation of surface tension of detergent solutions with concentration.

Viscosity measurement using Ostwald's viscometer.

a. Determination of viscosity of aqueous solutions of (i) polymer (ii) ethanol and (iii) sugar at room temperature.
b. Study the variation of viscosity of sucrose solution with the concentration of solute.

pH- metry

a. Study the effect on pH of addition of HCl/NaOH to solutions of acetic acid, sodium acetate and their mixtures.
b. Preparation of buffer solutions of different pH (i) Sodium acetate-acetic acid (ii) Ammonium chloride-ammonium hydroxide.
c. pH metric titration of (i) strong acid vs. strong base, (ii) weak acid vs. strong base.
d. Determination of dissociation constant of a weak acid.

Ionic equilibria

a. Determination of solubility product of PbI_2 by titrimetric method.

Reference Books

1. Khosla, B. D. Garg, V. C. & Gulati, A. Senior Practical Physical Chemistry, R. Chand & Co., New Delhi (2011).
2. Garland, C. W., Nibler, J. W. & Shoemaker, D. P. Experiments in Physical Chemistry, 8th Ed.; McGraw-Hill, New York (2003).
3. Viswanathan, B., Raghavan, P.S. Practical Physical Chemistry, Viva Books (2009).
4. Halpern, A. M. & McBane, G. C. Experimental Physical Chemistry 3rd Ed.; W.H. Freeman & Co., New York (2003).

CORE PAPER – III

ORGANIC CHEMISTRY I

Unit –I:

Basics of organic chemistry

Electronic Displacements: Inductive, electromeric, resonance and mesomeric effects, hyperconjugation and their applications; Dipole moment; Organic acids and bases; their relative strength.

Homolytic and heterolytic fission with suitable examples. Curly arrow rules; Electrophiles and Nucleophiles; Nucleophilicity and basicity; Types, shape and relative stability of carbocations, carbanions, free radicals and carbenes.

Introduction to types of organic reactions and their mechanism: Addition, Elimination and Substitution reactions.

Carbon-carbon sigma bonds

Chemistry of alkanes: Formation of alkanes, Wurtz Reaction, Wurtz-Fittig Reactions, Free radical substitutions: Halogenation -relative reactivity and selectivity.

Unit – II:

Stereochemistry

Fischer Projection, Newmann and Sawhorse Projection formulae; Geometrical isomerism: cis–trans and, syn-anti isomerism, E/Z notations with C.I.P rules.

Optical Isomerism: Optical Activity, Specific Rotation, Chirality/Asymmetry, Enantiomers, Molecules with one and two chiral-centres, Distereoisomers, meso-structures, Racemic mixture and resolution, inversion. Relative and absolute configuration: D/L and R/S designations.

Unit – III:

Chemistry of aliphatic hydrocarbons

Carbon-Carbon pi bonds:

Formation of alkenes and alkynes by elimination reactions, Mechanism of E1, E2, E1cb reactions. Saytzeff and Hofmann eliminations.

Reactions of alkenes: Electrophilic additions their mechanisms (Markownikoff/ Anti Markownikoff addition), mechanism of oxymercuration- demercuration, hydroboration oxidation, ozonolysis, reduction (catalytic and chemical), syn and anti-hydroxylation (oxidation). 1,2- and 1,4-addition reactions in conjugated dienes and, Diels-Alder reaction; Reactions of alkynes: Acidity, Electrophilic and Nucleophilic additions. Hydration to form carbonyl compounds, Alkylation of terminal alkynes.

Cycloalkanes and Conformational Analysis

Types of cycloalkanes and their relative stability, Baeyer strain theory, Conformational analysis of alkanes (ethane and n-butane): Relative stability with energy diagrams. Energy diagrams of cyclohexane: Chair, Boat and Twist boat forms.

Unit – IV:

Aromatic hydrocarbons

Aromaticity: Hückel's rule, aromatic character of arenes, cyclic carbocations/ carbanions and heterocyclic compounds with suitable examples. Electrophilic aromatic substitution: halogenation, nitration, sulphonation and Friedel-Craft's alkylation/acylation with their mechanism. Directing effects of the groups

Recommended Text Books:

1. Morrison, R. N. & Boyd, R. N., Organic Chemistry, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
2. Bhal and Bhal, Advanced Organic Chemistry, 2nd Edition, S. Chand Publisher, 2012.
3. Kalsi, P. S., Stereochemistry Conformation and Mechanism; 8thEdn, New Age International, 2015.

Reference Books:

1. Graham Solomons T. W., Fryhle, Craig B., Snyder Scott A, Organic Chemistry, Wiley Student Ed, 11th Edition (2013)
2. Jonathan Clayden, Nick Greeves, Stuart Warren, Organic Chemistry, 2nd Edition, Oxford Publisher, 2014.
3. Dhawan, S.N., Pradeep's Organic Chemistry, (Vol. I and II), Pradeep Publications

CORE PAPER III LAB

Students are required to learn the followings:

- Checking the calibration of the thermometer

- Determination of melting point, effect of impurities on the melting point – mixed melting point of two unknown organic compounds
- Determination of boiling point of liquid compounds [boiling point lower than and more than 100°C (up to 160°C) by distillation and capillary method respectively](**e**.g., ethanol, cyclohexane, ethyl methyl ketone, cyclohexanone, acetylacetone, anisole, crotonaldehyde, mesityl oxide etc.).

List of experiments

1. Functional group tests for alcohols, phenols, carbonyl and carboxylic acid groups and identification of unknown organic compounds of CHO system (without element detection).
2. Separation and purification of any one component of following binary solid mixture based on the solubility in common laboratory reagents like water (cold, hot), dil. HCl, dil. NaOH, dil. $NaHCO_3$, etc. and determination of melting point.
   Benzoic acid/p-Toluidine; p-Nitrobenzoic acid/p-Aminobenzoic acid; p-Nitrotolune/p-Anisidine etc.
3. Chromatography
   - Separation of a mixture of two amino acids by ascending and horizontal paper chromatography
   - Separation of a mixture of two sugars by ascending paper chromatography
   - Separation of a mixture of o-and p-nitrophenol or o-and p-aminophenol by thin layer chromatography (TLC)

Reference Books:

1. Mann, F.G. & Saunders, B.C. Practical Organic Chemistry, Pearson Education (2009)
2. Furniss, B.S.; Hannaford, A.J.; Smith, P.W.G.; Tatchell, A.R. Practical Organic Chemistry, 5th Ed., Pearson (2012)

CORE PAPER IV

PHYSICAL CHEMISTRY II

Unit-I:

Chemical thermodynamics

Intensive and extensive variables; state and path functions; isolated, closed and open systems; zeroth law of thermodynamics.

First law: Concept of heat(q), work(w), internal energy(U) and statement of first law; enthalpy(H), relation between heat capacities, calculations of q, w, U and H for reversible, irreversible and free expansion of gases (ideal and van der Waals) under isothermal and adiabatic conditions.

Thermochemistry: Heats of reactions: standard states; enthalpy of formation of molecules and ions and enthalpy of combustion and its applications; calculation of bond energy, bond dissociation energy and resonance energy from thermochemical data, effect of temperature (Kirchhoff's equations) and pressure on enthalpy of reactions.

Unit-II

Carnot cycle, efficiency of heat engine, Carnot theorem

Second Law: Concept of entropy; thermodynamic scale of temperature, statement of the second law of thermodynamics; molecular and statistical interpretation of entropy. Calculation of entropy change for reversible and irreversible processes.

Third Law: Statement of third law, concept of residual entropy, calculation of absolute entropy of molecules.

Free Energy Functions: Gibbs and Helmholtz energy; variation of S, G, A with T, V, P; Free energy change and spontaneity. Relation between Joule-Thomson coefficient and other thermodynamic parameters, inversion temperature, Gibbs-Helmholtz equation, Maxwell relations, thermodynamic equation of state.

Unit-III

Systems of variable composition

Partial molar quantities, dependence of thermodynamic parameters on composition; Gibbs Duhem equation, chemical potential of ideal mixtures, change in thermodynamic functions in mixing of ideal gases.

Chemical equilibrium

Criteria of thermodynamic equilibrium, degree of advancement of reaction, chemical equilibria in ideal gases, concept of fugacity. Thermodynamic derivation of relation between Gibbs free energy of reaction and reaction quotient (Vant Hoff's reaction). Equilibrium constants and their quantitative dependence on temperature, pressure and concentration. Free energy of mixing and spontaneity; thermodynamic derivation of relations between the various equilibrium constants K_p, K_c and K_x. Le Chatelier principle (quantitative treatment) and its applications.

Unit-IV

Solutions and Colligative Properties

Dilute solutions; lowering of vapour pressure, Raoult's and Henry's Laws and their applications. Thermodynamic derivation using chemical potential to derive relations between the four colligative properties: (i) relative lowering of vapour pressure, (ii) elevation of boiling point, (iii) Depression of freezing point, (iv) osmotic pressure and amount of solute. Applications in calculating molar masses of normal, dissociated and associated solutes in solution.

Recommended Text Books:

1. Atkins P. W. & Paula, J. de, Elements of Physical Chemistry, Oxford University Press, 6th Ed., (2006).
2. Puri, Sharma & Pathania, Principles of Physical Chemistry, Vishal Publishing Co, 47th Edn., 2017.
3. K. L. Kapoor, Text Book of Physical Chemistry, Mac Grow Hill, 3rdEdn. 2017
4. Castellan G. W. Physical Chemistry 4th Ed. Narosa (2004).

Reference Books:

1. Engel T. & Reid P., Physical Chemistry 3rd Ed. Pearson (2013).
2. McQuarrie, D. A. & Simon, J. D. Molecular Thermodynamics Viva Books Pvt. Ltd.: New Delhi (2004).
3. Kheterpal S.C., Pradeep's Physical Chemistry, Vol. I & II, Pradeep Publications.

CORE PAPER IV LAB

THERMOCHEMISTRY

a) Determination of heat capacity of a calorimeter for different volumes using change of enthalpy data of a known system (method of back calculation of heat capacity of calorimeter from known enthalpy of solution or enthalpy of neutralization).

b) Determination of heat capacity of the calorimeter and enthalpy of neutralization of hydrochloric acid with sodium hydroxide.

c) Calculation of the enthalpy of ionization of ethanoic acid.

d) Determination of heat capacity of the calorimeter and integral enthalpy (endothermic and exothermic) solution of salts.

e) Determination of basicity/ proticity of a polyprotic acid by the thermochemical method in terms of the changes of temperatures observed in the graph of temperature versus time for different additions of a base. Also calculate the enthalpy of neutralization of the first step.

f) Determination of enthalpy of hydration of copper sulphate.

g) Determination of heat of solution (ΔH) of oxalic acid/benzoic acid from solubility measurement.

Reference Books

1. Khosla, B. D.; Garg, V. C. & Gulati, A., Senior Practical Physical Chemistry, R. Chand & Co.: New Delhi (2011).
2. Athawale, V. D. & Mathur, P. Experimental Physical Chemistry, New Age International: New Delhi (2001).
3. Viswanathan, B., Raghavan, P.S. Practical Physical Chemistry, Viva Books (2009)

CORE PAPER V

INORGANIC CHEMISTRY-II

Unit-I

General Principles of Metallurgy

Chief modes of occurrence of metals based on standard electrode potentials. Ellingham diagrams for reduction of metal oxides using carbon and carbon monoxide as reducing agent. Electrolytic Reduction, Hydrometallurgy. Methods of purification of metals: Electrolytic process, Parting process, van Arkel-de Boer process and Mond’s process, Zone refining.

Acids and Bases

Brönsted-Lowry concept of acid-base reactions, solvated proton, relative strength of acids, types of acid-base reactions, Lewis acid-base concept, Classification of Lewis acids, Hard and Soft Acids and Bases (HSAB) application of HSAB principle.

Unit-II

Chemistry of *s* and *p* Block Elements - I

Inert pair effect, Relative stability of different oxidation states, diagonal relationship and anomalous behaviour of first member of each group. Allotropy and catenation. Complex formation tendency of *s* and *p* block elements.

Hydrides and their classification ionic, covalent and interstitial.

Basic beryllium acetate and nitrate.

Unit-III

Chemistry of *s* and *p* Block Elements - II

Study of the following compounds with emphasis on structure, bonding, preparation, properties and uses.

Boric acid and borates, boron nitrides, borohydrides (diborane) carboranes and graphitic compounds, silanes. Oxides and oxoacids of nitrogen, Phosphorus and chlorine. Peroxo acids of sulphur, interhalogen compounds, polyhalide ions, pseudohalogens and basic properties of halogens.

Unit-IV

Noble Gases

Occurrence and uses, rationalization of inertness of noble gases, clathrates; preparation and properties of XeF_2, XeF_4 and XeF_6; Nature of bonding in noble gas compounds (Valence bond treatment and MO treatment for XeF_2). Molecular shapes of noble gas compounds (VSEPR theory).

Inorganic Polymers:

Types of inorganic polymers, comparison with organic polymers, synthesis, structural aspects and applications of silicones and siloxanes. Borazines, silicates and phosphazenes, and polysulphates.

Recommended Text Books:

1. Lee J. D., Concise Inorganic Chemistry Wiley India, 5th Edn., 2008.
2. Huheey J. E., Keiter E. A. and Keiter R. L., Inorganic Chemistry – Principles of structure and reactivity, , Pearson Education, 4th Ed. 2002.
3. Puri, Sharma, Kalia, Principles of Inorganic Chemistry, Vishal Pub. Co., 33rd ed., 2017.
4. Shriver D. E., Atkins P. W., Inorganic Chemistry, Oxford University Press, 5th Edn.(2010).

Reference books

1. Das Asim K., Fundamentals of Inorganic Chemistry, Vol. I, CBS Publications, 2nd Ed. 2010.
2. Pradeep's Inorganic Chemistry, Vol. I & II, Universal Book seller, 14th Ed. 2017.

CORE PAPER V LAB

Iodometric / Iodimetric titrations

(i) Standardization of sodium thiosulphate solution by standard of $K_2Cr_2O_7$ solution.
(ii) Estimation of Cu(II) using standard sodium thiosulphate solution (Iodimetrically).
(iii) Estimation of available chlorine in bleaching powder iodometrically.

Inorganic preparations

(i) Cuprous oxide (Cu_2O)
(ii) Cuprous chloride(Cu_2Cl_2)
(iii) Manganese(III) phosphate($MnPO_4.H_2O$)
(iv) Aluminium potassium sulphate (K_2SO_4. $Al_2(SO_4)_2.24H_2O$ - Potash alum).
(v) Lead chromate ($PbCrO_4$)

Reference Books:

1. Mendham, J., A. I. Vogel's Quantitative Chemical Analysis, 6th Ed., Pearson, 2009.
2. Ahluwalia, V.K., Dhingra, S. and Gulati A, College Practical Chemistry, University Press (2005).
3. Gulati Shikha , Sharma Gulati JL and Manocha, Shagun, Practical Inorganic Chemistry, 1stEdn., CBS Publishers & Distributors Pvt. Ltd., (2017).

CORE PAPER VI

ORGANIC CHEMISTRY-II

Unit-I

Chemistry of Halogenated Hydrocarbons

Alkyl halides: Methods of preparation, nucleophilic substitution reactions – SN_1, SN_2 and SN_i mechanisms with stereochemical aspects and effect of solvent etc.; nucleophilic substitution vs. elimination.

Aryl halides: Preparation, including preparation from diazonium salts, nucleophilic aromatic substitution; SNAr, Benzyne mechanism.

Relative reactivity of alkyl, allyl/benzyl, vinyl and aryl halides towards nucleophilic substitution reactions.

Organometallic compounds of Mg and Li – Use in synthesis of organic compounds.

Unit-II

Alcohols, Phenols, Ethers and Epoxides

Alcohols: preparation, properties and relative reactivity of 1°, 2°, 3° alcohols, Bouvaelt-Blanc Reduction; Preparation and properties of glycols: Oxidation by periodic acid and lead tetraacetate, Pinacol-Pinacolone rearrangement;

Phenols: Preparation and properties; Acidity and factors effecting it, Ring substitution reactions, Reimer–Tiemann and Kolbe's–Schmidt Reactions, Fries and Claisen rearrangements with mechanism;

Ethers and Epoxides: Preparation and reactions with acids. Reactions of epoxides with alcohols, Ammonia derivatives and $LiAlH_4$.

Unit-III

Carbonyl Compounds

Structure, reactivity and preparation:

Nucleophilic additions, Nucleophilic addition-elimination reactions with ammonia derivatives with mechanism; Mechanisms of Aldol and Benzoin condensation, Knoevenagel condensation, Perkin, Cannizzaro and Wittig reaction, Beckmann rearrangements, α halo form reaction and Baeyer Villiger oxidation, - substitution reactions, oxidations and reductions (Clemmensen, Wolff-Kishner, $LiAlH_4$, $NaBH_4$, MPV.; Addition reactions of unsaturated carbonyl compounds: Michael addition.

Active methylene compounds: Keto-enol tautomerism. Preparation and synthetic applications of diethyl malonate and ethyl acetoacetate.

Unit-IV

Carboxylic Acids and their Derivatives

Preparation, physical properties and reactions of monocarboxylic acids: Typical reactions of dicarboxylic acids, hydroxy acids and unsaturated acids: succinic, lactic, malic, tartaric, citric, maleic and fumaric acids;

Preparation and reactions of acid chlorides, anhydrides, esters and amides; Comparative study of nucleophilic substitution at acyl group -Mechanism of acidic and alkaline hydrolysis of esters, Claisen condensation, Dieckmann and Reformatsky reactions, Hofmann-bromamide degradation and Curtius rearrangement.

Sulphur containing compounds: Preparation and reactions of thiols and thioethers**.**

Recommended Text Books:

1. Morrison, R. N. & Boyd, R. N., Organic Chemistry, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
2. Bhal and Bhal, Advanced Organic Chemistry, 2nd Edition, S. Chand Publisher, 2012.
3. Mendham, J.,et al, A. I. Vogel's Quantitative Chemical Analysis, 6th Ed., Pearson, 2009.

Reference Books:

1. Graham Solomons T. W., Fryhle, Craig B., Snyder Scott A, Organic Chemistry, Wiley Student Ed, 11th Edition (2013)
2. Jonathan Clayden, Nick Greeves, Stuart Warren, Organic Chemistry, 2nd Edition, Oxford Publisher, 2014.
3. Dhawan, S.N., Pradeep's Organic Chemistry, (Vol. I and II), Pradeep Publications

CORE PAPER VI LAB

Organic preparations:

i. Acetylation of one of the following compounds: amines (aniline, *o*-, *m*-, *p*-toluidines and *o*-, *m*-, *p*-anisidine) and phenols (β-naphthol, vanillin, salicylic acid) by any one method:
   a. Using conventional method.
   b. Using green approach

ii. Benzolyation of one of the following amines (aniline, *o*-, *m*-, *p*- toluidines and *o*-, *m*-, *p*-anisidine) and one of the following phenols (β-naphthol, resorcinol, p-cresol) by Schotten-Baumann reaction.

iii. Bromination of any one of the following:
   a. Acetanilide by conventional methods
   b. Acetanilide using green approach (Bromate-bromide method)

iv. Nitration of any one of the following:
   a. Acetanilide/nitrobenzene by conventional method
   b. Salicylic acid by green approach (using ceric ammonium nitrate).

The above derivatives should be prepared using 0.5-1g of the organic compound.

Calculate percentage yield, based upon isolated yield (crude) and theoretical yield.

Purification of the crude product by recrystallisation from water/alcohol, or sublimation, whichever is applicable and determination of melting point.

Reference Books

1. Vogel, A. I. Elementary Practical Organic Chemistry, Part 1: Small scale Preparations, Pearson (2011)
2. Mann, F.G. & Saunders, B.C. *Practical Organic Chemistry,* Pearson Education (2009)
3. Furniss, B.S.; Hannaford, A.J.; Smith, P.W.G.; Tatchell, A.R. *Practical OrganicChemistry, 5th Ed.,* Pearson (2012)
4. Ahluwalia, V.K. & Aggarwal, R. *Comprehensive Practical Organic Chemistry:Preparation and Quantitative Analysis,* University Press (2000).
5. Ahluwalia, V.K. & Dhingra, S. *Comprehensive Practical Organic Chemistry: QualitativeAnalysis,* University Press (2000).

CORE PAPER VII

PHYSICAL CHEMISTRY-III

Unit-I

Phase Equilibria-I

Concept of phases, components and degrees of freedom, derivation of Gibbs Phase Rule for nonreactive and reactive systems, Clausius- Clapeyron equation and its applications to solid-liquid, liquid-vapour and solid-vapour equilibria, phase diagram for one component systems, with applications (H_2O and sulphur system).

Phase diagrams for systems of solid-liquid equilibria involving eutectic (Pb-Ag system, desilverisation of lead), congruent (ferric chloride-water) and incongruent (sodium sulphate-water) melting points, completely miscible solid solutions (intermediate, medium, maximum freezing points).

Unit-II

Phase Equilibria-II

Three component systems, water-chloroform-acetic acid system, triangular plots.

Binary solutions: Gibbs-Duhem-Margules equation, its derivation and applications to fractional distillation of binary miscible liquids (ideal and non-ideal), azeotropes, partial miscibility of liquids, CST, miscible pairs, steam distillation.

Nernst distribution law: its derivation and applications.

Unit-III

Chemical Kinetics

Order and molecularity of a reaction, rate laws in terms of the advancement of a reaction, differential and integrated form of rate expressions up to second order reactions, experimental methods of the determination of orders.

Kinetics of complex reactions (integrated rate expressions up to first order only): (i) Opposing reactions (ii) parallel reactions (iii) consecutive reactions and their differential rate equations (steady-state approximation in reaction mechanisms) (iv) chain reactions.

Temperature dependence of reaction rates; Arrhenius equation; activation energy. Collision theory of reaction rates, qualitative treatment of the theory of absolute reaction rates.

Unit-IV

Catalysis

Types of catalyst, specificity and selectivity, mechanisms of catalyzed reactions at solid surfaces; effect of particle size and efficiency of nanoparticles as catalysts. Enzyme catalysis, Michaelis-Menten mechanism, acid-base catalysis.

Surface chemistry:

Physical adsorption, chemisorption, adsorption isotherms (Langmuir, Freundlich and Gibb's isotherms), nature of adsorbed state.

Recommended Text Books:

1. Atkins P. W. & Paula, J. de, Elements of Physical Chemistry, Oxford University Press, 6th Ed., (2006).
2. Puri, Sharma & Pathania, Principles of Physical Chemistry, Vishal Publishing Co, 47th Edn., 2017.
3. Kapoor K. L., Text Book of Physical Chemistry, McGraw Hill, 3rd Edn. 2017
4. Castellan G. W. Physical Chemistry 4th Edn. Narosa (2004).

Reference Books:

1. Kheterpal S.C., Pradeep's Physical Chemistry, Vol. I & II, Pradeep Publications.
2. Levine, I. N. *Physical Chemistry 6th Ed.,* Tata McGraw-Hill (2011).
3. Ball D. W. Physical Chemistry Thomson Press, India (2007).
4. Engel T. & Reid P., Physical Chemistry 3rd Ed. Pearson (2013)

CORE PAPER VII LAB

1. Determination of distribution coefficients of:
   - (a) Iodine between water and carbon tetrachloride.
   - (b) Acetic/ benzoic acid between water and cyclohexane.
2. Study the equilibrium of at least one of the following reactions by the distribution method:
   - $I_2\,(aq) + I^- \rightarrow I_3^-(aq)$
   - $Cu^{2+}(aq) + nNH_3 \rightarrow Cu(NH_3)_n$
3. Study the kinetics of the following reactions.
   - (i) Integrated rate method:
     - a) Acid hydrolysis of methyl acetate with hydrochloric acid.

b) Saponification of ethyl acetate.

(ii) Compare the strengths of HCl and H_2SO_4 by studying kinetics of hydrolysis of methyl acetate.

4. Verify the Freundlich and Langmuir isotherms for adsorption of acetic acid on activated charcoal.

Reference Books:

1. Khosla, B. D.; Garg, V. C. & Gulati, A. *Senior Practical Physical Chemistry,* R. Chand & Co.: New Delhi (2011).
2. Garland, C. W., Nibler, J. W. & Shoemaker, D. P. *Experiments in Physical Chemistry 8th Ed.*; McGraw-Hill: New York (2003).
3. Halpern, A. M. & McBane, G. C. *Experimental Physical Chemistry 3rd Ed.;* W.H. Freeman & Co.: New York (2003).

CORE PAPER VIII

INORGANIC CHEMISTRY-III

Unit-I

Coordination Chemistry

Werner's theory, valence bond theory (inner and outer orbital complexes), electroneutrality principle and back bonding.

IUPAC nomenclature of coordination compounds, isomerism in coordination compounds. Stereochemistry of complexes with 4 and 6 coordination numbers. Chelate effect, Labile and inert complexes.

Crystal field theory, measurement of CFSE weak and strong fields, pairing energies, factors affecting the magnitude of 10 Dq in octahedral vs. tetrahedral coordination, tetragonal distortions from octahedral geometry, Jahn-Teller theorem, square planar geometry. Qualitative aspect of ligand field and MO Theory.

Unit-II

Transition Elements-I

General group trends with special reference to electronic configuration, colour, variable valency, magnetic and catalytic properties, and ability to form complexes. Stability of various oxidation states and e.m.f. (Latimer & Ebsworth diagrams). Difference between the first, second and third transition series.

Unit-III

Transition Elements-II

Chemistry of Ti, V, Cr, Mn, Fe and Co in various oxidation states (excluding their metallurgy).

Lanthanoids and Actinoids

Electronic configuration, oxidation states, colour, spectral and magnetic properties,lanthanide contraction, separation of lanthanides (ion-exchange method only).

General features of actinoids, separation of Np, Pm, Am from U.

Unit-IV

Bioinorganic Chemistry

Metal ions present in biological systems, classification of elements according to their action in biological system. Na/K-pump, carbonic anhydrase and carboxypeptidase. Excess and deficiency of some trace metals. Toxicity of metal ions (Hg, Pb, Cd and As), reasons for toxicity, Use of chelating agents in medicine.

Iron and its application in bio-systems, Haemoglobin and myoglobin.

Recommended Text Books:

1. Lee J. D., Concise Inorganic Chemistry, Wiley India, 5th Edn., 2008.
2. Huheey J. E., Keiter E. A. and Keiter R. L., Inorganic Chemistry – Principles of structure and reactivity, , Pearson Education, 4th Ed. 2002.
3. Puri, Sharma, Kalia, Principles of Inorganic Chemistry, Vishal Pub. Co., 33rd ed., 2017.
4. Shriver D. E. Atkins P. W., Inorganic Chemistry, Oxford University Press, 5th Edn..

Reference books

1. Das Asim K., Fundamentals of Inorganic Chemistry, Vol. II, CBS Publications, 2nd Ed. 2010.
2. Bioinorganic Chemistry, Asim Kumar Das, Books & Allied (P) Ltd. 1st Ed. 2015.
3. Selected Topic in Inorganic Chemistry, Mallick, Madan and Tuli, S. Chand Publisher. 17th Ed. 2010.

4. Pradeep's Inorganic Chemistry, Vol. I & II, Universal Book seller, 14th Ed. 2017.

CORE PAPER VIII LAB

Inorganic preparations

Preparation of complexes:

- i. Hexamine nickel(II), $[Ni(NH_3)_6]Cl_2$
- ii. Potassium trioxalatoferrate (III) trihydrate
- iii. Tetraamminecopper (II) sulphate, $[Cu(NH_3)_4]SO_4.H_2O$
- iv. Tetraamminecarbonatocobalt (III) nitrate

Complexometric titration

- i. Estimation of Ca by EDTA
- ii. Estimation of Mg by EDTA

Gravimetric Analysis:

- i. Estimation of nickel (II) using dimethylglyoxime (DMG).
- ii. Estimation of copper as CuSCN
- iii. Estimation of iron as Fe_2O_3 by precipitating iron as $Fe(OH)_3$.
- iv. Estimation of Al(III) by precipitating with oxine and weighing as $Al(oxine)_3$ (Aluminium Oxinate).

Chromatography of metal ions

Principles involved in chromatographic separations. Paper chromatographic separation of following metal ions:

- i. Ni(II) and Co(II)
- ii. Fe(III) and Al(III)

Reference Books:

1. Vogel, A.I. A Textbook of Quantitative Inorganic Analysis, ELBS (1978).
2. Ahluwalia, V.K., Dhingra, S. and Gulati A, College Practical Chemistry, University Press (2005).
3. Gulati Shikha , Sharma Gulati JL and Manocha, Shagun, Practical Inorganic Chemistry, 1stEdn., CBS Publishers & Distributors Pvt Ltd., (2017).

CORE PAPER IX
ORGANIC CHEMISTRY-III

Unit-I

Nitrogen Containing Functional Groups

Preparation and important reactions of nitro and compounds, nitriles.

Amines: Effect of substituent and solvent on basicity; Preparation and properties: Gabriel phthalimide synthesis, Carbylamine reaction, Mannich reaction, Hoffmann's exhaustive methylation, Hofmann-elimination reaction; Distinction between 1°, 2° and 3° amines with Hinsberg reagent and nitrous acid.

Unit-II

Diazonium Salts

Preparation and their synthetic applications.

Polynuclear Hydrocarbons

Reactions of naphthalene and anthracene Structure, Preparation and structure elucidation and important derivatives of naphthalene and anthracene. Polynuclear hydrocarbons.

Unit-III

Heterocyclic Compounds

Classification and nomenclature, Structure, aromaticity in 5-numbered and 6-membered rings containing one heteroatom; Synthesis, reactions and mechanism of substitution reactions of: Furan, Pyrrole (Paal-Knorr synthesis, Knorr pyrrole synthesis, Hantzsch synthesis), Thiophene, Pyridine (Hantzsch synthesis), Pyrimidine. Fischer indole synthesis and Madelung synthesis, Derivatives of furan: Furfural and furoic acid (preparation only).

Unit-IV

Alkaloids

Natural occurrence, General structural features, Isolation and their physiological action.

Hoffmann's exhaustive methylation, Emde's modification, Structure elucidation and synthesis of Hygrine and Nicotine. Medicinal importance of Nicotine, Hygrine, Quinine, Morphine, Cocaine, and Reserpine.

Terpenes

Occurrence, classification, isoprene rule; Elucidation of structure and synthesis of Citral, Neral and α- terpineol.

Recommended Text Books:

1. Morrison, R. N. & Boyd, R. N., Organic Chemistry, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
2. Advanced Organic Chemistry, 2nd Edition, Arun Bahl & B S Bahl, S. Chand Publisher, 2012.

Reference Books:

1. Graham Solomons T. W., Fryhle, Craig B., Snyder Scott A, Organic Chemistry, Wiley Student Ed, 11th Edition (2013)
2. Jonathan Clayden, Nick Greeves, Stuart Warren, Organic Chemistry, 2nd Edition, Oxford Publisher, 2014.
3. Dhawan, S.N., Pradeep's Organic Chemistry, (Vol. I and II), Pradeep Publications

CORE PAPER IX LAB

Qualitative organic analysis of organic compounds

1. Detection of extra elements (N, X, S) in organic compounds by Lassaigne's test.
2. Qualitative analysis of unknown organic compounds containing simple functional groups under CHN system (amine, nitro, amide and imide), determination of melting/ boiling point, and preparation of their derivative.

Reference Books

1. Mann, F.G. & Saunders, B.C. Practical Organic Chemistry, Pearson Education (2009).
2. Furniss, B.S.; Hannaford, A.J.; Smith, P.W.G.; Tatchell, A.R. Practical Organic Chemistry, 5th Ed., Pearson (2012)
3. Ahluwalia, V.K. & Dhingra, S. Comprehensive Practical Organic Chemistry: Qualitative Analysis, University Press (2000).
4. Ghoshal, A., Mahapatra, B., Nad, A. K. An Advanced Course in Practical Chemistry, New Central Book Agency (2007).

CORE PAPER X

PHYSICAL CHEMISTRY-IV

Unit-I

Conductance-I

Arrhenius theory of electrolytic dissociation. Conductivity, equivalent and molar conductivity and their variation with dilution for weak and strong electrolytes. Molar conductivity at infinite dilution. Kohlrausch law of independent migration of ions. Debye-Hückel-Onsager equation, Wien effect, Debye-Falkenhagen effect, Walden's rules.

UNIT-II

Conductance-II

Ionic velocities, mobilities and their determinations, transference numbers and their relation to ionic mobilities, determination of transference numbers using Hittorf and Moving Boundary methods. Applications of conductance measurement: (i) degree of dissociation of weak electrolytes, (ii) ionic product of water (iii) solubility and solubility product of sparingly soluble salts, (iv) conductometric titrations, and (v) hydrolysis constants of salts.

Unit-III

Electrochemistry-I

Quantitative aspects of Faraday's laws of electrolysis, rules of oxidation/reduction of ions based on half-cell potentials, applications of electrolysis in metallurgy and industry.

Chemical cells, reversible and irreversible cells with examples. Electromotive force of a cell and its measurement, Nernst equation; Standard electrode (reduction) potential and its application to different kinds of half-cells. Application of EMF measurements in determining free energy, enthalpy and entropy of a cell reaction, (ii) equilibrium constants, and (iii) pH values, using hydrogen, quinone-hydroquinone, glass electrodes.

Unit-IV

Electrochemistry-II

Concentration cells with and without transference, liquid junction potential; determination of activity coefficients and transference numbers. Qualitative discussion of potentiometric titrations (acid-base, redox, precipitation).

Electrical properties of atoms and molecules

Basic ideas of electrostatics, Electrostatics of dielectric media. Clausius-Mosotti equation and Lorenz-Laurentz equation (no derivation), Dipole moment and molecular polarizabilities and their measurements.

Recommended Text Books:

1. Atkins P. W. & Paula, J. de, Elements of Physical Chemistry, Oxford University Press, 6th Ed., (2006).
2. Puri, Sharma & Pathania, Principles of Physical Chemistry, Vishal Publishing Co, 47th Edn., 2017.
3. Kapoor, K. L., Text Book of Physical Chemistry, Mac Grow Hill, 3rdEdn., 2017
4. Castellan G. W. Physical Chemistry 4th Ed. Narosa (2004).

Reference Books:

1. Engel T. & Reid P., Physical Chemistry 3rd Ed. Pearson (2013).
2. Levine, I. N. Physical Chemistry 6th Ed., Tata McGraw-Hill (2011).
3. McQuarrie, D. A. & Simon, J. D. Molecular Thermodynamics Viva Books Pvt. Ltd.: New Delhi (2004).
4. Kheterpal S.C., Pradeep's Physical Chemistry, Vol. I & II, Pradeep Publications.

CORE PAPER X LAB

Conductometry

I. Determination of cell constant.

II. Determination of equivalent conductance, degree of dissociation and dissociation constant of a weak acid.

III. Perform the following conductometric titrations:

  i. Strong acid vs. strong base

  ii. Weak acid vs. strong base

  iii. Strong acid vs. weak base

Potentiometry

I Perform the following potentiometric titrations:

i. Strong acid vs. strong base
ii. Weak acid vs. strong base
iii. Dibasic acid vs. strong base

Reference Books:

1. Khosla, B. D., Garg, V. C. & Gulati, A., Senior Practical Physical Chemistry, R. Chand & Co., New Delhi (2011).
2. Garland, C. W. Nibler, J. W. & Shoemaker, D. P., Experiments in Physical Chemistry 8th Ed.; McGraw-Hill: New York (2003).
3. Halpern, A. M. & McBane, G. C., Experimental Physical Chemistry 3rd Ed.; W.H. Freeman & Co., New York (2003).
4. Viswanathan, B., Raghavan, P.S., Practical Physical Chemistry, Viva Books (2009).

CORE PAPER XI
ORGANIC CHEMISTRY-IV

Unit-I

Organic Spectroscopy-I

UV Spectroscopy: Types of electronic transitions, λ_{max}, Lambert-Beer's law and its limitations, Chromophores and Auxochromes, Bathochromic and Hypsochromic shifts, Intensity of absorption; Application of Woodward rules for calculation of λ_{max} for the following systems: α, β the unsaturated aldehydes: ketones, carboxylic acids and esters; Conjugated dienes: alicyclic, homoannular and heteroannular; Extended conjugated systems (aldehydes, ketones and dienes); distinction between cis and trans isomers.

Unit-II

Organic Spectroscopy-II

IR Spectroscopy: Fundamental and non-fundamental molecular vibrations; IR absorption positions of O and N containing functional groups; Effect of H-bonding, conjugation, resonance and ring size on IR absorptions; Fingerprint region and its significance; application in simple functional group analysis.

Unit-III

Organic Spectroscopy-III

NMR Spectroscopy: Basic principles of Proton Magnetic Resonance, chemical shift andfactors influencing it; Spin-spin coupling and coupling constant; Anisotropic effects in alkene, alkyne, aldehydes and aromatics; Interpretation of NMR spectra of simple compounds.

Mass Spectroscopy- Basic principle, Fragmentation pattern, instrumentation, determination of m/e ratio. Application of mass spectroscopy on CH_4, C_2H_6, *n*-butane and *neo*-pentane.

Applications of IR, UV & NMR for identification of simple organic molecules.

Unit-IV

Carbohydrates

Occurrence, classification and their biological importance.

Monosaccharides: Constitution and absolute configuration of glucose and fructose, epimers and anomers, mutarotation, determination of ring size of glucose and fructose, Haworth projections and conformational structures; Interconversions of aldoses and ketoses; Killiani-Fischer synthesis and Ruff degradation;

Disaccharides – Structure elucidation of maltose; Polysaccharides – Elementary treatment of starch, cellulose.

Recommended Text Books:

1. Kemp William, Organic Spectroscopy, 3rd Edition, Palgrave Publisher, 1991.
2. Davis, B. G., Fairbanks, A. J., Carbohydrate Chemistry, Oxford Chemistry Primer, Oxford University Press.
3. J Kalsi P. S., Spectroscopy of Organic Compounds, 5th Edition, New Age International Publishers, 2016.
4. Advanced Organic Chemistry, 2nd Edition, Arun Bahl & B S Bahl, S. Chand Publisher, 2012.

Reference Books:

1. Y R Sharma, Elementary Organic Spectroscopy, 5th Edition, S. Chand & Company, 2013.
2. Jag Mohan, Organic Spectroscopy and Applications, Narosa Publishers, 2012.
3. Graham Solomons T. W., Fryhle, Craig B., Snyder Scott A, Organic Chemistry, Wiley Student Ed, 11th Edition (2013).

4. Jonathan Clayden, Nick Greeves, Stuart Warren, Organic Chemistry, 2nd Edition, Oxford Publisher, 2014.
5. Dhawan, S.N., Pradeep's Organic Chemistry, (Vol. I and II), Pradeep Publications

CORE PAPER XI LAB

1. Qualitative analysis of carbohydrate: aldoses and ketoses, reducing and non-reducing sugars.
2. Qualitative analysis of unknown organic compounds containing simple bifunctional groups, for e.g. salicylic acid, cinnamic acid, nitrophenols etc.
3. Quantitative estimation of sugars:
   (c) Estimation glucose by titration with Fehling's solution.
   (d) Estimation of sucrose by titration with Fehling's solution.
   (e) Estimation glucose and sucrose in a given mixture.
4. Identification of labelled peaks in the ^{1}H NMR spectra of the known organic compounds explaining the relative δ-values and splitting pattern.
5. Identification of labelled peaks in the IR spectrum of the same compound explaining the relative frequencies of the absorptions (CORE PAPERH, O-H, N-H, CORE PAPERO, CORE PAPERN, CORE PAPERX, C=C, C=O, N=O, C≡C, C≡N stretching frequencies; characteristic bending vibrations are included).

Reference Books:

1. Vogel, A.I. *Quantitative Organic Analysis,* Part 3, Pearson (2012).
2. Mann, F.G. & Saunders, B.C. *Practical Organic Chemistry,* Pearson Education (2009)
3. Furniss, B.S.; Hannaford, A.J.; Smith, P.W.G.; Tatchell, A.R. *Practical Organic Chemistry, 5th Ed.,* Pearson (2012)
4. Ahluwalia, V.K. & Aggarwal, R. *Comprehensive Practical Organic Chemistry: Preparation and Quantitative Analysis,* University Press (2000).
5. Ahluwalia, V.K. & Dhingra, S. *Comprehensive Practical Organic Chemistry: Qualitative Analysis,* University Press (2000).

CORE PAPER XII

PHYSICAL CHEMISTRY V

Unit-I

Quantum Chemistry-I

Quantum mechanical operators, Postulates of quantum mechanics, Schrödinger equation and its application to particle in one-dimensional box (complete solution) - quantization of energy levels, zero-point energy, normalization of wave functions, probability distribution functions, nodal properties. Extension to three-dimensional boxes, separation of variables, degeneracy.

Qualitative treatment of simple harmonic oscillator model of vibrational motion: Setting up of Schrödinger equation and discussion of solution and wave functions. Vibrational energy of diatomic molecules and zero-point energy.

Angular momentum: Commutation rules, quantization of square of total angular momentum and z-component.

Rigid rotator model of rotation of diatomic molecule: Schrödinger equation, transformation to spherical polar coordinates. Separation of variables (Preliminary treatment).

Unit-II

Chemical Bonding

Chemical bonding: Covalent bonding, valence bond and molecular orbital approaches, LCAO-MO treatment of H_2^+. Bonding and antibonding orbitals. Qualitative extension to H_2. Comparison of LCAO-MO and VB treatments of H_2 (only wave functions, detailed solution not required) and their limitations. Localized and non-localized molecular orbitals treatment of triatomic (BeH_2, H_2O) molecules. Qualitative MO theory and its application to AH_2 type molecules.

Unit-III

Molecular Spectroscopy-I

Interaction of electromagnetic radiation with molecules and various types of spectra; Born-Oppenheimer approximation.

Rotation spectroscopy: Selection rules, intensities of spectral lines, determination of bond lengths of diatomic and linear triatomic molecules, isotopic substitution.

Vibrational spectroscopy: Classical equation of vibration, computation of force constant, amplitude of diatomic molecular vibrations, anharmonicity, Morse potential, dissociation energies, fundamental frequencies, overtones, hot bands, degrees of freedom for polyatomic molecules, modes of vibration. Vibration-rotation spectroscopy: diatomic vibrating rotator, P, Q, R branches.

Unit-IV

Molecular Spectroscopy-II

Raman spectroscopy: Qualitative treatment of Rotational Raman effect; Effect of nuclear spin, Vibrational Raman spectra, Stokes and anti-Stokes lines; their intensity difference, rule of mutual exclusion.

Electronic spectroscopy: Franck-Condon principle, electronic transitions, singlet and triplet states, fluorescence and phosphorescence, dissociation and predissociation.

Photochemistry

Characteristics of electromagnetic radiation, physical significance of absorption coefficients. Laws of photochemistry, quantum yield, actinometry, examples of low and high quantum yields, photochemical equilibrium and the differential rate of photochemical reactions, photosensitised reactions, quenching, chemiluminescence.

Recommended Text Books:

1. McQuarie D., Quantum Chemistry, University Science Publishers, 2007
2. Chandra, A. K. Introductory Quantum Chemistry Tata McGraw-Hill (2001).
3. Banwell, C. N. & McCash, E. M. Fundamentals of Molecular Spectroscopy 4th Ed. Tata McGraw-Hill: New Delhi (2010).
4. Prasad R K., Quantum Chemistry, New Age International Publishers, 4th Edn, 2010.
5. Rohatagi Mukherjee K K., Fundamentals of Photochemistry, Wiley Eastern Ltd., 1992.

Reference Books:

1. Puri, Sharma & Pathania, Principles of Physical Chemistry, Vishal Publishing Co, 47th Edn., 2017.
2. Kapoor, K. L., Text Book of Physical Chemistry, McGraw Hill, Vol. II, IV.
3. Levine, I. N. Quantum Chemistry, PHI.

CORE PAPER XII LAB

Spectroscopy/Colorimetry

1. Study of absorption spectra (visible range) of $KMnO_4$ and determine the λ_{max}

value. Calculate the energies of the transitions in kJ mol^{-1}, cm^{-1}, and eV.

2. Verify Lambert-Beer's law and determine the concentration of $CuSO_4$/ $KMnO_4$/ $K_2Cr_2O_7$ in a solution of unknown concentration.
3. Determine the dissociation constant of an indicator (phenolphthalein).

Spectrophotometric titration

1. Determine the concentration of HCl against 0.1 N NaOH spectrophotometrically.
2. To find the strength of given ferric ammonium sulfate solution of (0.05 M) by using EDTA spectrophotometrically.
3. To find out the strength of $CuSO_4$ solution by titrating with EDTA spectrophotometrically.
4. To determine the concentration of Cu(II) and Fe(III) solution photometrically by titrating with EDTA.

Reference Books

1. Khosla, B. D.; Garg, V. C. & Gulati, A., *Senior Practical Physical Chemistry,* R. Chand & Co.: New Delhi (2011).
2. Garland, C. W., Nibler, J. W. & Shoemaker, D. P. *Experiments in Physical Chemistry 8th Ed.;* McGraw-Hill: New York (2003).
3. Halpern, A. M. & McBane, G. C. *Experimental Physical Chemistry 3rd Ed.;* W.H. Freeman & Co.: New York (2003).
4. J. N. Gurtu, R. Kapoor, Experimental Physical Chemistry.

CORE PAPER XIII

INORGANIC CHEMISTRY-IV

Unit-I

Organometallic Compounds-I

Definition and classification of organometallic compounds on the basis of bond type. Concept of hapticity of organic ligands.

Metal carbonyls: 18 electron rule, electron count of mononuclear, polynuclear and substituted metal carbonyls of 3d series. General methods of preparation (direct combination, reductive carbonylation, thermal and photochemical decomposition) of mono and binuclear carbonyls of

3d series. Structures of mononuclear and binuclear carbonyls of Cr, Mn, Fe, Co and Ni using VBT. π-acceptor behaviour of CO (MO diagram of CO to be discussed), synergic effect and use of IR data to explain extent of back bonding.

Zeise's salt: Preparation and structure, evidences of synergic effect and comparison of synergic effect with that in carbonyls.

Unit-II

Organometallic Compounds-II

Metal Alkyls: Important structural features of methyl lithium (tetramer) and trialkyl aluminium (dimer), concept of multicentre bonding in these compounds. Role of triethyl aluminium in polymerisation of ethene (Ziegler – Natta Catalyst). Species present in ether solution of Grignard reagent and their structures.

Ferrocene: Preparation and reactions (acetylation, alkylation, metallation, Mannich Condensation), structure and aromaticity, comparison of aromaticity and reactivity with that of benzene.

Unit-III

Catalysis by Organometallic Compounds

Study of the following industrial processes and their mechanism:

1. Alkene hydrogenation (Wilkinson's Catalyst)
2. Hydroformylation (Co salts)
3. Wacker Process
4. Synthetic gasoline (Fischer Tropsch reaction)

Theoretical Principles in Qualitative Analysis (H_2S Scheme)

Basic principles involved in analysis of cations and anions and solubility products, common ion effect. Principles involved in separation of cations into groups and choice of group reagents. Interfering anions (fluoride and phosphate) and need to remove them after Group II.

Unit-IV

Thermodynamic & kinetic aspects and reaction mechanism of metal complexes

Thermodynamic and kinetic stability, Stepwise and overall formation constants and their relationship, factors affecting stability. Introduction to inorganic reaction mechanisms-types of reaction and classification of substitution reaction. Substitution reaction of square planar complexes, Trans effect and its applications, theories of trans-effect (electrostatic polarization and Static π-Bonding Theory). Kinetics of octahedral substitution (classification of metal ions based on water exchange rate), General mechanism of ligand substitution reactions in octahedral complexes (D, I, I_d, I_a).

Recommended Text Books:

1. Huheey J. E., Keiter E. A. and Keiter R. L., Inorganic Chemistry – Principles of structure and reactivity, , Pearson Education, 4th Ed. 2002.
2. Puri, Sharma, Kalia, Principles of Inorganic Chemistry, Vishal Pub. Co., 33rd Ed., 2017.
3. Shriver D. E. Atkins P. W., Inorganic Chemistry, Oxford University Press, 5th Edn.
4. Svehla, G. *Vogel's Qualitative Inorganic Analysis*, 7th Edition, Prentice Hall, 1996-0307.

Reference books

1. Das Asim K., Fundamentals of Inorganic Chemistry, Vol. II, CBS Publications, 2nd Ed. 2010.
2. Selected Topic in Inorganic Chemistry, Mallick, Madan and Tuli, S. Chand Publisher. 17th Ed. 2010.
3. Mehrotra R.C. and Singh, A. *Organometallic Chemistry,* New Age International Publishers, 2nd Edn, 2000.
4. Gupta B. D. and Elias A. J., Basic Organometallic Chemistry, 2nd Edn., University Press (2013).

CORE PAPER XIII LAB

- Qualitative analysis of mixtures containing 4 radicals (2 anions and 2 cations). Emphasis should be given to the understanding of the chemistry of different reactions. The following radicals are suggested:

  CO_3^{2-}, NO_2^-, S^{2-}, SO_3^{2-}, F^-, Cl^-, Br^-, I^-, NO_3^-, PO_4^{3-}, NH_4^+, K^+, Pb^{2+}, Cu^{2+}, Cd^{2+}, Bi^{3+}, Sn^{2+}, Sb^{3+}, Fe^{3+}, Al^{3+}, Cr^{3+}, Zn^{2+}, Mn^{2+}, Co^{2+}, Ni^{2+}, Ba^{2+}, Sr^{2+}, Ca^{2+}, Mg^{2+}.
- Mixtures may contain one insoluble component ($BaSO_4$, $SrSO_4$, $PbSO_4$, CaF_2 or Al_2O_3) or

combination of interfering anions e.g. CO_3^{2-} and SO_3^{2-}, NO_2^- and NO_3^-, Cl^- and Br^-, Cl^- and I^-, Br^- and I^-, NO_3^- and Br^- , NO_3^- and I^-.

- Spot tests should be done whenever possible.

Reference Books:

1. Vogel's Qualitative Inorganic Analysis, 7th Ed, Revised by G. Svehela, 4th Ed., Person (2007).
2. Gulati Shikha , Sharma Gulati JL and Manocha, Shagun, Practical Inorganic Chemistry, 1st Edn., CBS Publishers & Distributors Pvt Ltd., (2017).

CORE PAPER XIV

ORGANIC CHEMISTRY-V

Unit-I

Amino Acids, Peptides and Proteins

Amino acids: Classification; α-Amino acids - Synthesis, ionic properties and reactions.

Zwitterions, pK_a values, isoelectric point and electrophoresis.

Peptides: Classification, Determination of their primary structures-end group analysis, methods of peptide synthesis. Synthesis of peptides using N-protecting, CORE PAPER protecting and CORE PAPER activating groups - Solid-phase synthesis.

Proteins: Structure of proteins, protein denaturation and renaturation

Unit-II

Enzymes

Introduction, classification and characteristics of enzymes. Salient features of active site of enzymes. Mechanism of enzyme action (taking trypsin as example), factors affecting enzyme action, coenzymes and cofactors and their role in biological reactions, specificity of enzyme action (including stereo specificity), enzyme inhibitors and their importance, phenomenon of inhibition (competitive, uncompetitive and non-competitive inhibition including allosteric inhibition).

Nucleic Acids

Components of nucleic acids, Nucleosides and nucleotides;

Structure, synthesis and reactions of: Adenine, Guanine, Cytosine, Uracil and Thymine;

Structure of polynucleotides.

Unit-III

Lipids

Introduction to oils and fats; common fatty acids present in oils and fats, Hydrogenation of fats and oils, Saponification value, acid value, iodine number. Reversion and rancidity.

Concept of Energy in Biosystems

Cells obtain energy by the oxidation of foodstuff (organic molecules). Introduction to metabolism (catabolism and anabolism).

Overview of catabolic pathways of fat and protein.

Interrelationship in the metabolic pathways of protein, fat and carbohydrate. Caloric value of food, standard caloric content of food types.

Unit-IV

Pharmaceutical Compounds: Structure and Importance

Classification, structure and therapeutic uses of antipyretics: Paracetamol (with synthesis), Analgesics: Ibuprofen (with synthesis), Antimalarials: Chloroquine (with synthesis). An elementary treatment of Antibiotics and detailed study of chloramphenicol, Medicinal values of curcumin (haldi), azadirachtin (neem), vitamin C and antacid (ranitidine).

Dyes

Classification, colour and constitution; Mordant and Vat dyes; Chemistry of dyeing. Synthesis and applications of: *Azo dyes* – Methyl orange and Congo red (mechanism of Diazo Coupling); *Triphenylmethane dyes* - Malachite Green, and crystal violet; *Phthalein dyes* – Phenolphthalein and Fluorescein.

Recommended Text books

1. Nelson, D.L., Cox, M.M. and Lehninger, A.L. Principles of Biochemistry. 6th Edn. W.H. Freeman and Co. (2013).
2. Kar Ashutosh, Medicinal chemistry, New Age International (P) Ltd., (2007)
3. Debojyoti Das, Biochemistry, (Part-I) Academic Publishers (1979)

Reference Books:

1. Talwar, G.P. & Srivastava, M. Textbook of Biochemistry and Human Biology, 3rd Ed. PHI Learning.

2. Berg, J.M., Tymoczko, J.L. & Stryer, L. Biochemistry, W.H. Freeman, 2002.
4. Murray, R.K., Granner, D.K., Mayes, P.A. and Rodwell, V.W. (2009) Harper's Illustrated Biochemistry. XXVIII edition. Lange Medical Books/ McGraw-Hill.
5. Berg, J.M., Tymoczko, J.L. and Stryer, L. (2006) Biochemistry, 6th Edition. W.H. Freeman and Co. (2002).
6. Wilson, K. & Walker, J. Practical Biochemistry. Cambridge University Press (2009).
7. The Tools of Biochemistry (1977; Reprint 2011) Cooper, T.G., Wiley India Pvt. Ltd. (New Delhi), ISBN: 978-81-265-3016-8.

CORE PAPER XIV LAB

1. Preparations of the following compounds
    i. Aspirin
    ii. Methyl orange
2. Estimation of phenol and aniline by bromination method.
3. Saponification value of an oil/ fat/ ester.
4. Estimation of glycine by Sorenson's formalin method.
5. Estimation formaldehyde (formalin).
6. Estimation of ascorbic acid in fruit juices/Vitamin C tablet (Iodometric method)
7. Determination of Iodine number of an oil/ fat.

Reference Books:

1. Arthur, I. Vogel, Elementary Practical Organic Chemistry, Part-1 Small scale preparations, Indian Edition, Pearson (2011).
2. Manual of Biochemistry Workshop, 2012, Department of Chemistry, University of Delhi.
3. Arthur, I. Vogel, *Quantitative Organic Analysis,* Pearson.
4. Wilson, K. & Walker, J. Practical Biochemistry. Cambridge University Press (2009).

Discipline Specific Elective Paper-1

POLYMER CHEMISTRY

Unit-I

Introduction and history of polymeric materials:

Different schemes of classification of polymers, Polymer nomenclature, Molecular forces and chemical bonding in polymers, Texture of Polymers.

Functionality and its importance:

Criteria for synthetic polymer formation, classification of polymerization processes, Relationships between functionality, extent of reaction and degree of polymerization. Bi-functional systems, Poly-functional systems.

Unit-II

Mechanism & Kinetics of Polymerization:

Polymerization reactions – addition and condensation, mechanism and kinetics of step growth, radical chain growth, ionic chain (both cationic and anionic) and coordination polymerizations, Mechanism and kinetics of copolymerization, polymerization techniques.

Crystallization and crystallinity:

Determination of crystalline melting point and degree of crystallinity, Morphology of crystalline polymers, Factors affecting crystalline melting **point**.

Unit-III

Molecular weight of polymers and their determination (M_n, M_w, M_v, M_z) by end group analysis, viscometry and osmotic pressure methods. Molecular weight distribution and its significance. Polydispersity index.

Glass transition temperature (T_g) and it determination: WLF equation, Outlines of factors affecting glass transition temperature (T_g).

Unit-IV

Properties of polymers (physical, thermal and mechanical properties)

Preparation, structure, properties and applications of the following polymers: polyolefins (polyethylene, polypropylene), polystyrene, polyvinyl chloride, polyvinyl acetate, polyacrylamide, fluoro polymers (Teflon), polyamides (nylon-6 and nylon 6, 6). Thermosetting polymers - phenol formaldehyde resins (Bakelite, Novalac), polyurethanes, conducting polymers (polyacetylene, polyaniline). Brief outline of biodegradable polymers.

Recommended Text Books:

1. V. R. Gowarikar, Jayadev Sreedhar, N. V. Viswanathan, Polymer Science 1st Edition, New Age International Publishers, 1986.

2. Premamoy Ghosh, Polymer Science and Technology: Plastics, Rubber, Blends and Composites, 3rd Edition, McGraw Hill Education, 2010.
3. P. Bahadur & N.V.Sastry, Principles of polymer science, Narosa Publishing house, New Delhi 2002.
4. Fred W. Billmeyer, Textbook of Polymer Science, 3rd ed. Wiley- Interscience (1984)

Reference books

1. L.H. Sperling, Introduction to Physical Polymer Science, 4th ed. John Wiley & Sons (2005)
2. Malcolm P. Stevens, Polymer Chemistry: An Introduction, 3rd ed. Oxford University Press (2005)
3. Seymour/ Carraher's Polymer Chemistry, 9th ed. by Charles E. Carraher, Jr. (2013).
4. Nayak P.L., Polymer Chemistry, Kalyani Publisher (2017).

Discipline Specific Elective Paper I LAB

Polymer synthesis (At least three experiments)

1. Preparation of nylon-6,6 / Polyaniline.
2. Preparations of phenol-formaldehyde resin-novalac/ phenol-formaldehyde resin resold.
3. Preparation of urea-formaldehyde resin.
4. Free radical solution polymerization of styrene (St) / Methyl Methacrylate (MMA) / Methyl Acrylate (MA) / Acrylic acid (AA).
    a. Purification of monomer.
    b. Polymerization using benzoyl peroxide (BPO) / 2,2'-azo-bis-isobutylonitrile (AIBN).
5. Redox polymerization of acrylamide.
6. Precipitation polymerization of acrylonitrile.

Polymer characterization/analysis (At least two different experiments)

1. Determination of molecular weight by viscometry:
    a. Polyacrylamide / Polystyrene
    b. Polyvinyl pyrolidine (PVP)
2. Determination of acid value/ saponification value of a resin.

3. Determination of hydroxyl number of a polymer using colorimetric method.
4. Estimation of the amount of HCHO in the given solution by sodium sulphite method
5. Analysis of some IR spectra of polymers – Identification of labelled peaks in IR spectra of known polymer.

Reference Books:

1. Hundiwale G.D., Athawale V.D., Kapadi U.R. and Gite V. V., Experiments in Polymer Science, New Age Publications (2009).
2. Malcohm P. Stevens, Polymer Chemistry: An Introduction, 3rd Ed.
3. Joel R. Fried, Polymer Science and Technology, 2nd Ed. Prentice-Hall (2003).
4. Petr Munk and Tejraj M. Aminabhavi, Introduction to Macromolecular Science, 2nd Ed. John Wiley & Sons (2002).
5. Malcolm P. Stevens, Polymer Chemistry: An Introduction, 3rd ed. Oxford University Press (2005).

Discipline Specific Elective Paper-II

GREEN CHEMISTRY

Unit-I

Introduction to Green Chemistry

What is Green Chemistry? Need for Green Chemistry. Goals of Green Chemistry. Limitations/ Obstacles in the pursuit of the goals of Green Chemistry.

Principles of Green Chemistry and Designing a Chemical synthesis- I

Twelve principles of Green Chemistry. Explanations of principle with special emphasis on - Designing green synthesis processes: Prevention of Waste/ by-products; maximize the incorporation of the materials used in the process into the final products (Atom Economy) with reference to rearrangement, addition, substitution and elimination reactions; Prevention/ minimization of hazardous/ toxic products; Designing safer chemicals; Use of safer solvents and auxiliaries (e.g. separating agent) - green solvents (supercritical CO_2, water, ionic liquids), solvent less processes, immobilized solvents.

Unit-II

Principles of Green Chemistry and Designing a Chemical synthesis-II

Explanation of green chemistry principles with special emphasis on:

Energy efficient processes for synthesis - use of microwaves and ultrasonic energy. Selection of starting materials (use of renewable feedstock); avoidance of unnecessary derivatization (e.g. blocking group, protection groups, deprotection); Use of catalytic reagents (wherever possible) in preference to stoichiometric reagents; designing of biodegradable products use of chemically safer substances for prevention of chemical accidents, inherent safer design greener - alternative to Bhopal Gas Tragedy (safer route to carcarbaryl) and Flixiborough accident (safer route to cyclohexanol); real-time, in-process monitoring and control to prevent the formation of hazardous substances; development of green analytical techniques to prevent and minimize the generation of hazardous substances in chemical processes.

Unit-III

Examples of Green Synthesis/ Reactions and some real world cases-I

Green Synthesis of the following compounds: adipic acid, catechol, methyl methacrylate, urethane, disodium iminodiacetate (alternative to Strecker synthesis), paracetamol, furfural.

Microwave assisted reactions: Applications to reactions (i) in water: Hofmann Elimination, hydrolysis (of benzyl chloride, methyl benzoate to benzoic acid), Oxidation (of toluene, alcohols); (ii) reactions in organic solvents: Diels-Alder reaction and Decarboxylation reaction.

Ultrasound assisted reactions: Applications to esterification, saponification, Simmons-Smith Reaction (Ultrasonic alternative to Iodine).

Unit-IV

Examples of Green Synthesis/ Reactions and some real world cases- II

Surfactants for carbon dioxide – replacing smog producing and ozone depleting solvents with CO_2 for precision cleaning and dry cleaning of garments; Designing of Environmentally safe marine antifoulant; Right fit pigment: synthetic azopigments to replace toxic organic and inorganic pigments; Synthesis of a compostable and widely applicable plastic (poly lactic acid) from corn; Development of Fully Recyclable Carpet: Cradle to Cradle Carpeting

Future Trends in Green Chemistry

Oxidizing and reducing reagents and catalysts; multifunctional reagents; Combinatorial green chemistry; Proliferation of solvent less reactions; Green chemistry in sustainable development. (Bio-diesel, bio-ethanol and biogas).

Recommended Text Books:

1. Anastas P.T. & Warner J.K.: Green Chemistry- Theory and Practical, Oxford University Press (2000).
2. Ahluwalia V.K. & Kidwai M.: New Trends in Green Chemistry, Anamalaya Publishers, New Delhi (2004).
3. Kumar V., An Introduction to Green Chemistry, Vishal Publishing Co., (2015).

Reference Books:

1. Matlack A.S. Introduction to Green Chemistry, Marcel Dekker (2001).
2. Das Asim K. amd Das Mahua , Environment Chemistry with Green Chemistry, Books and Allied (P) Ltd. (2010)

Discipline Specific Elective Paper II LAB

At least five experiments should be done:

1. Acetylation of primary amine (Aniline to N-phenylacetamide) using Zn dust.
2. Nitration of salicylic acid by green method (Using calcium nitrate and acetic acid).
3. Bromination of acetanilide using ceric ammonium nitrate/KBr.
4. Microwave assisted nitration of Phenols using $Cu(NO_3)_2$.
5. Detection of elements in organic compounds by green method (Sodium carbonate fusion).
6. Base catalyzed Aldol condensation (Synthesis of dibenzalpropanone).
7. Vitamin C clock reaction using vitamin C tablets, tincture of iodine, hydrogen peroxide and liquid laundry starch. Effect of concentration on clock reaction.
8. Photoreduction of benzophenone to benzopinacol in the presence of sunlight.
9. Diels Alder reaction in water: Reaction between furan and maleic acid in water and at room temperature rather than in benzene and reflux.
10. Preparation and characterization of nanoparticles (Cu, Ag) using plant extract.
11. Preparation of propene by following two methods or any other reactions like addition, elimination, substitution showing atomic economy can be studied
    (I) Triethylamine ion + OH^- → Propene + Trimethylpropene + water

(II) 1-propanol $\xrightarrow{H_2SO_4/\Delta}$ propene + water

Reference Books:

1. Monograph on Green Chemistry Laboratory Experiments, edited and published by Green Chemistry Task Force Committee, DST Govt. of India, p. 1-79.
2. Kirchoff, M. & Ryan, M.A. *Greener approaches to undergraduate chemistry experiment*. American Chemical Society, Washington DC (2002).
3. Sharma, R.K.; Sidhwani, I.T. & Chaudhari, M.K. I.K. *Green Chemistry Experiment:A monograph International Publishing House Pvt Ltd. New Delhi*. Bangalore CISBN978-93-81141-55-7 (2013).

Discipline Specific Elective Paper-III

INDUSTRIAL CHEMICALS AND ENVIRONMENT

Unit-I

Industrial Gases and Inorganic Chemicals

Industrial Gases: Large scale production uses storage and hazards in handling of the following gases: oxygen, nitrogen, argon, hydrogen, acetylene, carbon monoxide, chlorine, sulphur dioxide.

Inorganic Chemicals: Manufacture, application and hazards in handling the following chemicals: hydrochloric acid, nitric acid, sulphuric acid, caustic soda, common salt, bleaching powder, sodium thiosulphate, hydrogen peroxide, potash alum, potassium dichromate and potassium permanganate.

Industrial Metallurgy

Preparation of metals (ferrous and nonferrous) and ultrapure metals for semiconductor technology.

Unit-II

Environment and its segments

Ecosystems. Biogeochemical cycles of carbon, nitrogen and sulphur.

Air Pollution: Major regions of atmosphere. Chemical and photochemical reactions in atmosphere. Air pollutants: types, sources, particle size and chemical nature; Photochemical smog: its constituents and photochemistry. Environmental effects of ozone. Major sources of air pollution.

Pollution by SO_2, CO_2, CO, NO_x, and H_2S and control procedures.

Effects of air pollution on living organisms and vegetation. Greenhouse effect and global warming, Ozone depletion by oxides of nitrogen, chlorofluorocarbons and halogens, removal of sulphur from coal.

Unit-III

Water Pollution: Hydrological cycle, water resources, aquatic ecosystems, Sources and nature of water pollutants, Techniques for measuring water pollution, Impacts of water pollution on hydrological and ecosystems.

Water purification methods. Effluent treatment plants (primary, secondary and tertiary treatment). Industrial effluents from the following industries and their treatment: electroplating, textile, tannery, dairy, petroleum and petrochemicals, fertilizer. Sludge disposal.

Industrial waste management: incineration of waste. Water treatment and purification (reverse osmosis, ion exchange). Water quality parameters for wastewater, industrial water and domestic water.

Unit-IV

Energy and Environment

Sources of energy: Coal, petrol and natural gas. Nuclear fusion/fission, solar energy, hydrogen, geothermal, tidal and hydel.

Nuclear Pollution: Disposal of nuclear waste, nuclear disaster and its management.

Biocatalysis

Introduction to biocatalysis: Importance in green chemistry and chemical industry.

Recommended Text Books:

1. De, A. K. *Environmental Chemistry*: New Age International Pvt., Ltd, New Delhi, 2010.
2. Stocchi E., *Industrial Chemistry*, Vol-I, Ellis Horwood Ltd. UK.
3. Sharma, B.K. & Gaur, H. Industrial Chemistry, Goel Publishing House, Meerut (1996).

Reference Books:

1. Felder R.M. and Rousseau R.W., *Elementary Principles of Chemical Processes*, Wiley Publishers, New Delhi.
2. Dara S. S., *A Textbook of Engineering Chemistry*, S. Chand & Company Ltd. New Delhi.
3. Miller G.T., Environmental Science, 11th edition. Brooks/ Cole (2006).
4. Mishra, Environmental Studies, Selective and Scientific Books, New Delhi (2005).

Discipline Specific Elective Paper III LAB

1. Determination of Dissolved Oxygen (DO) in water.
2. Determination of Chemical Oxygen Demand (COD)
3. Determination of Biological Oxygen Demand (BOD)
4. Percentage of available chlorine in bleaching powder.
5. Measurement of chloride, sulphate and salinity of water samples by simple titration method ($AgNO_3$ and potassium chromate).
6. Estimation of total alkalinity of water samples (CO_3^{2-}, HCO_3^-) using double titration method.
7. Measurement of dissolved CO_2.
8. Study of some of the common bio-indicators of pollution.
9. Estimation of SPM in air samples.
10. Preparation of borax/ boric acid.

Reference Books:

1. Dara S. S., A Textbook on Experiments and Calculations in Engineering Chemistry S Chand & Company; 9th revised edition (2015).
2. E. Stocchi: *Industrial Chemistry*, Vol-I, Ellis Horwood Ltd. UK.
3. R.M. Felder, R.W. Rousseau: *Elementary Principles of Chemical Processes*, Wiley Publishers, New Delhi.
4. A. Kent: Riegel's *Handbook of Industrial Chemistry*, CBS Publishers, New Delhi.
5. S. M. Khopkar, *Environmental Pollution Analysis*: Wiley Eastern Ltd, New Delhi.

Discipline Specific Elective Paper-IV

INORGANIC MATERIALS OF INDUSTRIAL IMPORTANCE

Unit I

Silicate Industries

Glass: Glassy state and its properties, classification (silicate and nonsilicate glasses). Manufacturing and processing of glass. Composition and properties of the following types of glasses: Soda lime glass, lead glass, armoured glass, safety glass, borosilicate glass, fluorosilicate, coloured glass, photosensitive glass.

Ceramics: Important clays and feldspar, ceramic, their types and manufacture. High technology ceramics and their applications, superconducting and semiconducting oxides, fullerenes carbon nanotubes and carbon fibre.

Cements: Classification of cement, ingredients and their role, Manufacture of cement and the setting process, quick setting cements.

Unit II

Fertilizers: Different types of fertilizers. Manufacture of the following fertilizers: Urea, ammonium nitrate, calcium ammonium nitrate, ammonium phosphates; polyphosphate, superphosphate, compound and mixed fertilizers, potassium chloride, potassium sulphate.

Batteries: Primary and secondary batteries, battery components and their role, Characteristics of Battery. Working of following batteries: Pb acid, Li-Battery, Solid state electrolyte battery. Fuel cells, Solar cell and polymer cell.

Unit III

Surface Coatings:

Objectives of coatings surfaces, preliminary treatment of surface, classification of surface coatings. Paints and pigments-formulation, composition and related properties. Oil paint, Vehicle, modified oils, Pigments, toners and lakes pigments, Fillers, Thinners, Enamels, emulsifying agents. Special paints (Heat retardant, Fire retardant, Eco-friendly paint, Plastic paint), Dyes, Wax polishing, Water and Oil paints, additives, Metallic coatings, metal spraying and anodizing.

Unit IV

Alloys: Classification of alloys, ferrous and non-ferrous alloys, Specific properties of elements in alloys. Manufacture of Steel (removal of silicon, decarbonization, demanganization, desulphurization, dephosphorisation) and surface treatment (argon treatment, heat treatment nitriding, carburizing). Composition and properties of different types of steels.

Chemical explosives: Origin of explosive properties in organic compounds, preparation and explosive properties of lead azide, PETN, cyclonite (RDX). Introduction to rocket propellants.

Recommended Text Books:

1. Stocchi E., *Industrial Chemistry*, Vol-I, Ellis Horwood Ltd. UK.
2. Sharma, B.K. & Gaur, H. Industrial Chemistry, Goel Publishing House, Meerut (1996).
3. P. C. Jain, M. Jain: Engineering Chemistry, Dhanpat Rai & Sons, Delhi.

Reference Books:

1. Felder R.M. and Rousseau R.W., *Elementary Principles of Chemical Processes*, Wiley Publishers, New Delhi.
2. Dara S. S., *A Textbook of Engineering Chemistry*, S. Chand & Company Ltd. New Delhi.
3. A. Kent: Riegel's Handbook of Industrial Chemistry, CBS Publishers, New Delhi.
4. R. Gopalan, D. Venkappayya, S. Nagarajan: Engineering Chemistry, Vikas Publications, New Delhi.

Discipline Specific Elective Paper-IV LAB

List of Practicals

1. Determination of free acidity in ammonium sulphate fertilizer.
2. Estimation of Calcium in Calcium ammonium nitrate fertilizer.
3. Estimation of phosphoric acid in superphosphate fertilizer.
4. Determination of composition of dolomite (by complexometric titration).
5. Analysis of (Cu, Ni); (Cu, Zn) in alloy or synthetic samples.
6. Analysis of Cement.
7. Estimation of Iron from Cement Volumetrically
8. Preparation of pigment (zinc oxide).

Reference Books

1. Dara S. S., A Textbook on Experiments and Calculations in Engineering Chemistry S Chand & Company; 9th revised edition (2015).
2. E. Stocchi: Industrial Chemistry, Vol-I, Ellis Horwood Ltd. UK.
3. R. M. Felder, R. W. Rousseau: Elementary Principles of Chemical Processes, Wiley

Publishers, New Delhi.

4. W. D. Kingery, H. K. Bowen, D. R. Uhlmann: Introduction to Ceramics, Wiley Publishers, New Delhi.
5. J. A. Kent: Riegel's Handbook of Industrial Chemistry, CBS Publishers, New Delhi.
6. P. C. Jain, M. Jain: Engineering Chemistry, Dhanpat Rai & Sons, Delhi.
7. R. Gopalan, D. Venkappayya, S. Nagarajan: Engineering Chemistry, Vikas Publications, New Delhi.

Alternative to DSC CORE PAPER IV

Discipline Specific Elective Paper- V

DISSERTATION

A project work is to be carried out by the student in consultation with the teachers of the department. The report of work (dissertation) in a standard format is to be submitted and presented for evaluation.

Distribution of marks

(a) Project Report/Dissertation (Proper documentation of literature, data, discussion etc. and logical flow of work undertaken): 50 Marks

(b) Seminar/Presentation: 30 marks

(c) Viva voce: 20 marks

Brief Guidelines to Project Work:

1. Students shall undertake the project work (experimental/theoretical) related to any branch of chemistry/Chemical science under the guidance of teacher(s) from the department or jointly with teachers/research personnel of other institutes.
2. The following activities have been outlined as guidelines (not exhaustive):
   - Physiochemical studies (pH, conductivity, turbidity, etc.) of different wetlands (ponds, lakes, river etc.)
   - Analysis of iron in pond / tube well / river water.
   - Analysis of Hardness of water samples.
   - Adulteration detection activities in food stuff and other edible items.
   - Extraction and preliminary characterization of useful chemicals (as far as possible) from plants.
   - Solubility, surface tension, and viscosity measurements of some solution of practical

relevance, (cough syrup, soap solution, pesticides, fertilizers.. etc.)

- Pollution related activities (Industrial/Agricultural/Municipal etc.)
- Nutrition related activities, (essential metal detection in food, cereals, pulses, fruits etc.).
- Small synthetical work (inorganic/Organic/Polymeric compounds)

2. The UG level project work is a group activity, maximum number of students being limited to three. HOD to notify the name of teacher(s) for supervising the project work of each group. A teacher can guide more than one group, if necessary.
4. No two groups in the same institution are permitted to do project work on the same problem.
5. Each student shall prepare and submit the project report separately for evaluation. Two copies of project report are required to be submitted in bound form (spiral/paperback).
6. The project report shall be divided as:

Chapter I:	Introduction (Introduction on the topic, review of literature, objective and scope of the work)
Chapter II:	Materials and methods
Chapter II:	Results and discussion
Chapter IV:	Conclusions and Scope of future studies
Chapter V:	References

Reference Books:

1. M. A. Malati, An Investigative, Integrated Approach to Practical Project Work; Mid-Kent College of Higher/Further Education, UK (October 1999); Imprint: Woodhead Publishing; ISBN: 978-1-898563-47-1.
2. Dean, J. R., Jones, A. M., Holmes, D., Reed, R., Weyers, J. & Jones, A. (2011) Practical skills in chemistry. 2nd Ed., Prentice-Hall, Harlow.

Alternative for Discipline Specific Elective (DSE) Papers

Discipline Specific Elective Paper-VI

ANALYTICAL METHODS IN CHEMISTRY

Unit I

UV-Visible and IR Spectrometry

Origin of spectra, interaction of radiation with matter, fundamental laws of spectroscopy and selection rules, validity of Beer-Lambert's law.

UV-Visible Spectrometry: Basic principles, instrumentation (choice of source, monochromator and detector) for single and double beam instrument; Basic principles of quantitative analysis: estimation of metal ions from aqueous solution, geometrical isomers, keto-enol tautomers. Determination of composition of metal complexes using Job's method of continuous variation and mole ratio method.

Infrared Spectrometry: Basic principles of instrumentation (choice of source, monochromator & detector) for single and double beam instrument; sampling techniques. Structural illustration through interpretation of data, Effect and importance of isotope substitution.

Unit II

Qualitative and quantitative aspects of analysis

Sampling, evaluation of analytical data, errors, accuracy and precision, methods of their expression, normal law of distribution if indeterminate errors, statistical test of data; F, Q and t test, rejection of data, and confidence intervals.

Flame Atomic Absorption Spectrometry

Basic principles of instrumentation (choice of source, monochromator, detector, choice of flame and Burner designs. Techniques of atomization and sample introduction; Method of background correction, sources of chemical interferences and their method of removal. Techniques for the quantitative estimation of trace level of metal ions from water samples.

Unit III

Thermal and electro-analytical methods of analysis

Theory of thermo-gravimetry (TG), basic principle of instrumentation. Techniques for quantitative estimation of Ca and Mg from their mixture.

Classification of electro-analytical methods, basic principle of pH metric, potentiometric and conductometric titrations. Techniques used for the determination of equivalence points.

Unit IV

Separation techniques

Solvent extraction: Classification, principle and efficiency of the technique. Mechanism of extraction: extraction by solvation and chelation. Technique of extraction: batch, continuous and counter current extractions.

Chromatography: Classification, principle and efficiency of the technique. Mechanism of separation: adsorption, partition & ion exchange. Development of chromatograms: frontal, elution and displacement methods. Qualitative and quantitative aspects of chromatographic methods of analysis: TLC and HPLC.

Recommended text books:

1. Vogel, Arthur I: A Test book of Quantitative Inorganic Analysis (Rev. by G.H. Jeffery and others) 5th Ed., The English Language Book Society of Longman.
2. Skoog, Holler and Crouch, Principles of Instrumental Analysis, Cengage Learning, 6th Indian Reprint (2017).
3. Christian, Gary D; Analytical Chemistry, 6th Ed., John Wiley & Sons, New York, 2004.

Reference books

1. Harris, Daniel C: Exploring Chemical Analysis, Ed. New York, W. H. Freeman, 2001.
2. Willard, Hobert H. et al.: Instrumental Methods of Analysis, 7th Ed., Wardsworth Publishing Company, Belmont, California, USA, 1988.
3. Mikes, O. & Chalmes, R.A. Laboratory Hand Book of Chromatographic & Allied Methods, Elles Harwood Ltd. London.
4. Pavia, Lamman, Kriz and Vyvyan, Introduction to Spectroscopy, Cengage Learning, 3rd Indian Reprint (2017).
5. Dash U N , Analytical Chemistry.

Discipline Specific Elective Paper -VI LAB

1. Paper chromatographic separation of Fe^{3+}, Al^{3+}, and Cr^{3+}.
2. Separation and identification of the monosaccharides present in the given mixture (glucose & fructose) by paper chromatography. Reporting the R_f values.
3. Separate a mixture of Sudan yellow and Sudan Red by TLC technique and identify them on the basis of their R_f values.

4. Chromatographic separation of the active ingredients of plants, flowers and juices by TLC.
5. Determine the pH of the given aerated drinks fruit juices, shampoos and soaps.
6. Determination of Na, Ca, Li in cola drinks and fruit juices using flame photometric techniques.
7. Analysis of soil: determination of pH of soil, total soluble salt, estimation of calcium, magnesium, phosphate, nitrate.
8. Separation of metal ions from their binary mixture.
9. Separation of amino acids from organic acids by ion exchange chromatography.
10. Determination of dissolved oxygen in water.
11. Determination of chemical oxygen demand (COD).

Reference Books:

1. Vogel, Arthur I: A Test book of Quantitative Inorganic Analysis (Rev. by G. H. Jeffery and others) 5th Ed., The English Language Book Society of Longman.
2. Willard, Hobert H. et al.: Instrumental Methods of Analysis, 7th Ed., Wardsworth Publishing Company, Belmont, California, USA, 1988.
3. Khopkar, S.M. Basic Concepts of Analytical Chemistry. New Age, International Publisher, 2009.

GENERIC ELECTIVE (GE)

Generic Elective Paper I (Theory)

ATOMIC STRUCTURE, BONDING, GENERAL ORGANIC CHEMISTRY & ALIPHATIC HYDROCARBONS

Section A: Inorganic Chemistry-I

Unit-I

Atomic Structure

Review of: Bohr's theory and its limitations, dual behaviour of matter and radiation, de-Broglie's relation, Heisenberg Uncertainty principle. Hydrogen atom spectra.

Quantum mechanics: Time independent Schrodinger equation and meaning of various terms in it. Significance of ψ and ψ^2, Schrödinger equation for hydrogen atom. Radial and angular parts of the hydogenic wave functions (atomic orbitals) and their variations for 1s, 2s, 2p, 3s, 3p and 3d orbitals (Only graphical representation). Quantum numbers and their significance, shapes of s, p and d atomic orbitals, nodal planes.

Rules for filling electrons in various orbitals, Electronic configurations of the atoms. Stability of half-filled and completely filled orbitals, concept of exchange energy. Relative energies of atomic orbital, Anomalous electronic configurations.

Unit-II

Chemical Bonding and Molecular Structure

Ionic Bonding: General characteristics, energy considerations. Lattice energy and solvation energy and their importance in the context of stability and solubility of ionic compounds. Statement of Born-Landé equation for calculation of lattice energy, Born-Haber cycle and its applications, polarizing power and polarizability. Fajan's rules and its applications.

Covalent bonding: VB Approach: Shapes of some inorganic molecules and ions on the basis of VSEPR and hybridization with suitable examples of linear, trigonal planar, square planar, tetrahedral, trigonal bipyramidal and octahedral arrangements.

Concept of resonance and resonating structures in various inorganic and organic compounds.

MO Approach: Rules for the LCAO method, bonding and antibonding MOs and their characteristics for *s-s*, *s-p* and *p-p* combinations of atomic orbitals, nonbonding combination of orbitals, MO treatment of homonuclear diatomic molecules (N_2, O_2) and heteronuclear diatomic molecules (CO, NO). Comparison of VB and MO approaches.

Section B: Organic Chemistry-I

Unit- III

Fundamentals of Organic Chemistry

Physical Effects, Electronic Displacements: Inductive effect, Electrometric effect, Resonance and hyperconjugation. Cleavage of bonds: Homolysis and heterolysis.

Structure, shape and reactivity of organic molecules: Nucleophiles and electrophiles. Reactive Intermediates: Carbocations, Carbanions and free radicals.

Strength of organic acids and bases: Comparative study with emphasis on factors affecting pK values. Aromaticity: Hückel's rule.

Stereochemistry

Conformations with respect to ethane, butane and cyclohexane. Interconversion of Wedge Formula, Newmann, Sawhorse and Fischer representations. Concept of chirality (up to two carbon atoms). Configuration: Geometrical and Optical isomerism; Enantiomerism, Diastereomerism and Meso compounds). D and L; cis-trans nomenclature; CIP Rules: R/ S (for one chiral carbon atoms) and E / Z Nomenclature (for up to two C=C systems).

Unit-IV

Aliphatic Hydrocarbons

Functional group approach for the following reactions (preparations & reactions) to be studied in context to their structure.

Alkanes: (Up to 5 Carbons) *Preparation:* Catalytic hydrogenation, Wurtz reaction,Kolbe's synthesis, from Grignard reagent. *Reactions:* Free radical Substitution: Halogenation.

Alkenes: (Up to 5 Carbons) *Preparation:* Elimination reactions: Dehydration of alkenes and dehydrohalogenation of alkyl halides (Saytzeff's rule); cis-alkenes (Partial catalytic hydrogenation) and trans-alkenes (Birch reduction). *Reactions:* cis-addition (alk. $KMnO_4$) and trans-addition (bromine), Addition of HX (Markownikoff's and anti- Markownikoff's addition), Hydration, Ozonolysis.

Alkynes: (Up to 5 Carbons) *Preparation:* Acetylene from CaC_2 and conversion into higher alkynes; by dehalogenation of tetra halides and dehydrohalogenation of vicinal-dihalides.

Reactions: formation of metal acetylides, addition of bromine and alkaline $KMnO_4$,ozonolysis.

Recommended Text Books:

1. Lee J. D., Concise Inorganic Chemistry, Wiley India, 5th Edn., 2008.

2. Puri, Sharma, Kalia, Principles of Inorganic Chemistry, Vishal Pub. Co., 33rd Ed., 2017.
3. Shriver D. E., Atkins P. W., Inorganic Chemistry, Oxford University Press, 5th Edn.
4. Huheey J. E., Keiter E. A. and Keiter R. L., Inorganic Chemistry – Principles of structure and reactivity, Pearson Education, 4th Ed. 2002.
5. Morrison, R. N. & Boyd, R. N., Organic Chemistry, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
6. Bhal Arun & Bhal B S , Advanced Organic Chemistry, 2nd Edition, S. Chand Publisher, 2012.
7. Kalsi, P. S. Stereochemistry Conformation and Mechanism; 8th Edn, New Age International, 2015.

Reference books

1. Das Asim K., Fundamentals of Inorganic Chemistry, Vol. II, CBS Publications, 2nd Ed. 2010.
2. Pradeep's Inorganic Chemistry, Vol. I & II, Universal Book seller, 14th Ed. 2017.
3. Mallick, Madan and Tuli, S. Chand Selected Topic in Inorganic Chemistry, 17thEdn. 2010.
4. Dhawan, S.N., Pradeep's Organic Chemistry, (Vol. I and II), Pradeep Publications.

Generic Elective Paper I LAB

Section A: Inorganic Chemistry

Volumetric Analysis

1. Estimation of sodium carbonate and sodium hydrogen carbonate present in a mixture.
2. Estimation of oxalic acid by titrating it with $KMnO_4$.
3. Estimation of water of crystallization in Mohr's salt by titrating with $KMnO_4$.
4. Estimation of Fe(II) ions by titrating it with $K_2Cr_2O_7$ using internal indicator.
5. Estimation of Cu(II) ions iodometrically using $Na_2S_2O_3$.

Section B: Organic Chemistry

1. Detection of extra elements (N, S, Cl) in organic compounds (containing up to two extra elements)

2. Separation of mixtures by Chromatography: Measure the R_f value in each case (combination of two compounds to be given)
   (a) Identify and separate the components of a given mixture of 2 amino acids (glycine, aspartic acid, glutamic acid, tyrosine or any other amino acid) by paper chromatography.
   (b) Identify and separate the sugars present in the given mixture by paper chromatography.

Reference Books:

1. Mendham, J., A. I. Vogel's Quantitative Chemical Analysis 6th Ed., Pearson, 2009.
2. Mann, F.G. & Saunders, B.C. Practical Organic Chemistry, Pearson Education (2009)
3. Ahluwalia, V.K., Dhingra, S. and Gulati A, College Practical Chemistry, University Press (2005).

Generic Elective Paper II (Theory)

CHEMICAL ENERGETICS, EQUILIBRIA & FUNCTIONAL ORGANIC CHEMISTRY

Section A: Physical Chemistry-I

Unit-I

Chemical Energetics

Review of thermodynamics and the Laws of Thermodynamics.

Important principles and definitions of thermochemistry. Concept of standard state and standard enthalpies of formations, integral and differential enthalpies of solution and dilution. Calculation of bond energy, bond dissociation energy and resonance energy from thermochemical data. Variation of enthalpy of a reaction with temperature – Kirchhoff's equation.

Statement of Third Law of thermodynamics.

Chemical Equilibrium

Free energy change in a chemical reaction. Thermodynamic derivation of the law of chemical equilibrium. Distinction between ΔG and ΔG^o, Le Chatelier's principle. Relationships between K_p, K_c and K_x for reactions involving ideal gases.

Unit- II

Ionic Equilibria

Strong, moderate and weak electrolytes, degree of ionization, factors affecting degree of ionization, ionization constant and ionic product of water. Ionization of weak acids and bases, pH scale, common ion effect. Salt hydrolysis-calculation of hydrolysis constant, degree of hydrolysis and pH for different salts. Buffer solutions. Solubility and solubility product of sparingly soluble salts – applications of solubility product principle.

Section B: Organic Chemistry-II

Unit- III

Functional group approach for the following reactions (preparations & reactions) to be studied in context to their structure.

Aromatic hydrocarbons

Preparation (Case benzene): from phenol, by decarboxylation, from acetylene, from benzene sulphonic acid. Reactions: (Case benzene): Electrophilic substitution: nitration, halogenation and sulphonation. Friedel-Craft's reaction (alkylation and acylation) (up to 4 carbons on benzene). Side chain oxidation of alkyl benzenes (up to 4 carbons on benzene).

Alkyl and Aryl Halides

Alkyl Halides (Up to 5 Carbons) Types of Nucleophilic Substitution (SN_1, SN_2 and SN_i) reactions.

Preparation: from alkenes and alcohols. Reactions: hydrolysis, nitrite & nitro formation, nitrile & isonitrile formation. Williamson's ether synthesis: Elimination vs substitution.

Aryl Halides Preparation: (Chloro, bromo and iodo-benzene case): from phenol, Sandmeyer & Gattermann reactions.

Reactions (Chlorobenzene): Aromatic nucleophilic substitution (replacement by –OH group) and effect of nitro substituent. Benzyne Mechanism: KNH_2/NH_3 (or $NaNH_2/NH_3$).

Unit- IV

Alcohols, Phenols and Ethers (Up to 5 Carbons)

Alcohols: Preparation: Preparation of 1°, 2° and 3° alcohols: using Grignard reagent, Ester hydrolysis, Reduction of aldehydes and ketones, carboxylic acid and esters.

Reactions: With sodium, HX (Lucas test), esterification, oxidation (with PCC, Alk. $KMnO_4$, acidic dichromate, conc. HNO_3). Oppeneauer oxidation Diols: (Up to 6 Carbons) oxidation of diols. Pinacol-Pinacolone rearrangement.

Phenols: (Phenol case) Preparation: Cumene hydroperoxide method, from diazonium salts. Reactions: Electrophilic substitution: Nitration, halogenation and sulphonation. Reimer Tiemann Reaction, Gattermann -Koch Reaction,

Ethers (aliphatic and aromatic): Cleavage of ethers with HI.

Aldehydes and ketones (aliphatic and aromatic): Formaldehyde, acetaldehyde, acetone and benzaldehyde

Preparation: from acid chlorides and from nitriles.

Reactions – Reaction with HCN, ROH, $NaHSO_3$, NH_2-G derivatives. Iodoform test. Aldol Condensation, Cannizzaro's reaction, Benzoin condensation. Clemensen reduction and Wolff Kishner reduction.

Recommended Text Books:

1. Atkins P. W. & Paula, J. de, Elements of Physical Chemistry, Oxford University Press, 6th Ed., (2006).
2. Principles of Physical Chemistry, Puri, Sharma & Pathania, Vishal Publishing Co, 47th Edn., 2017.
3. K. L. Kapoor, Text Book of Physical Chemistry, Mac Grow Hill, 3rdEdn. 2017.
4. Morrison, R. N. & Boyd, R. N., Organic Chemistry, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
5. Arun Bahl & B S Bahl, Advanced Organic Chemistry, 2nd Edition, S. Chand Publisher, 2012.

Reference Books:

1. Kheterpal S.C., Pradeep's Physical Chemistry, Vol. I & II, Pradeep Publications.
2. Dhawan, S.N., Pradeep's Organic Chemistry, (Vol. I and II), Pradeep Publications

Generic Elective Paper II LAB

Section A: Physical Chemistry

Thermochemistry (any three)

1. Determination of heat capacity of calorimeter for different volumes.
2. Determination of enthalpy of neutralization of hydrochloric acid with sodium hydroxide.
3. Determination of enthalpy of ionization of acetic acid.
4. Determination of integral enthalpy of solution of salts (KNO_3, NH_4Cl).
5. Determination of enthalpy of hydration of copper sulphate.

6. Study of the solubility of benzoic acid in water and determination of ΔH.

Ionic equilibria

pH measurements

a) Measurement of pH of different solutions like aerated drinks, fruit juices, shampoos and soaps (use dilute solutions of soaps and shampoos to prevent damage to the glass electrode) using pH-meter.

b) Preparation of buffer solutions:
   - Sodium acetate-acetic acid
   - Ammonium chloride-ammonium hydroxide

   Measurement of the pH of buffer solutions and comparison of the values with theoretical values.

Section B: Organic Chemistry

1. Purification of organic compounds by crystallization (from water) and determination of melting.
2. Preparations, recrystallisation, determination of melting point and calculation of quantitative yields of the followings:
   (a) Bromination of Phenol/Aniline
   (b) Benzoylation of amines/phenols
   (c) Oxime and 2,4 dinitrophenylhydrazone of aldehyde/ketone

Reference Books

1. A.I. Vogel: Textbook of Practical Organic Chemistry, 5th edition, Prentice-Hall.
2. Mann, F.G. & Saunders, B.C. Practical Organic Chemistry, Pearson Education (2009).
3. Khosla, B. D.; Garg, V. C. & Gulati, A. Senior Practical Physical Chemistry, R. Chand & Co., New Delhi (2011).
4. Ahluwalia, V.K., Dhingra, S. and Gulati A, College Practical Chemistry, University Press (2005).

Generic Elective Paper III (Theory)

CHEMISTRY OF S- AND P-BLOCK ELEMENTS, STATES OF MATTER & CHEMICAL KINETICS

Section A: Inorganic Chemistry-II

Unit-I

General Principles of Metallurgy

Chief modes of occurrence of metals based on standard electrode potentials. Ellingham diagrams for reduction of metal oxides using carbon as reducing agent.

Hydrometallurgy, Methods of purification of metals (Al, Pb, Fe, Cu, Ni): electrolytic, oxidative refining, Parting process, van Arkel-de Boer process and Mond’s process.

s- and *p*-Block Elements

Periodicity in *s*- and *p*-block elements with respect to electronic configuration, atomic and ionic size, ionization enthalpy, electronegativity (Pauling & Mulliken scales). Allotropy in C, S, and P.

Oxidation states with reference to elements in unusual and rare oxidation states like carbides and nitrides), inert pair effect, diagonal relationship and anomalous behaviour of first member of each group.

Unit-II

Compounds of *s*- and *p*-Block Elements

Hydrides and their classification (ionic, covalent and interstitial), structure and properties with respect to stability of hydrides of p- block elements.

Concept of multicentre bonding (diborane).

Structure, bonding and their important properties like oxidation/reduction, acidic/basic nature of the following compounds and their applications in industrial, organic and environmental chemistry.

Hydrides of nitrogen (NH_3, N_2H_4, N_3H, NH_2OH); Oxoacids of P, S and Cl; Halides and oxohalides: PCl_3, PCl_5, $SOCl_2$.

Section B: Physical Chemistry- II

Unit-III

Kinetic Theory of Gases

Postulates of Kinetic Theory of Gases and derivation of the kinetic gas equation.

Deviation of real gases from ideal behaviour, compressibility factor, causes of deviation. van der Waals equation of state for real gases. Boyle temperature (derivation not required). Critical phenomena, critical constants and their calculation from van der Waals equation.

Maxwell Boltzmann distribution laws of molecular velocities and molecular energies (graphic representation – derivation not required) and their importance.

Temperature dependence of these distributions. Most probable, average and root mean square velocities (no derivation). Collision cross section, collision number, collision frequency, collision diameter and mean free path of molecules. Viscosity of gases and effect of temperature and pressure on coefficient of viscosity (qualitative treatment only).

Liquids

Surface tension and its determination using stalagmometer. Viscosity of a liquid and determination of coefficient of viscosity using Ostwald viscometer. Effect of temperature on surface tension and coefficient of viscosity of a liquid (qualitative treatment only).

Unit-IV

Solids

Forms of solids. Symmetry elements, unit cells, crystal systems, Bravais lattice types and identification of lattice planes. Laws of Crystallography - Law of constancy of interfacial angles, Law of rational indices. Miller indices. X–Ray diffraction by crystals, Bragg's law. Structures of NaCl, and CsCl (qualitative treatment only). Defects in crystals.

Chemical Kinetics

The concept of reaction rates. Effect of temperature, pressure, catalyst and other factors on reaction rates. Order and molecularity of a reaction. Derivation of integrated rate equations for zero, first and second order reactions (both for equal and unequal concentrations of reactants). Half–life of a reaction. General methods for determination of order of a reaction. Concept of activation energy and its calculation from Arrhenius equation.

Theories of Reaction Rates: Collision theory and Activated Complex theory of bimolecular reactions. Comparison of the two theories (qualitative treatment only).

Recommended Text Books:

1. Lee J. D., Concise Inorganic Chemistry, Wiley India, 5th Edn., 2008.

2. Puri, Sharma, Kalia, Principles of Inorganic Chemistry, Vishal Pub. Co., 33rd ed., 2017.
3. Shriver D. E., Atkins P. W., Inorganic Chemistry, Oxford University Press, 5th Edn.
4. Principles of Physical Chemistry, Puri, Sharma & Pathania, Vishal Publishing Co, 47th Edn., 2017.
5. K. L. Kapoor, Text Book of Physical Chemistry, Mac Grow Hill, 3rdEdn. 2017.

Reference Books:

1. Kheterpal S.C., Pradeep's Physical Chemistry, Vol. I & II, Pradeep Publications.
2. Pradeep's Inorganic Chemistry, Vol. I & II, Universal Book seller, 14th Ed. 2017.

Generic Elective Paper -III LAB

Section A: Inorganic Chemistry

Qualitative analysis of inorganic slat mixture using H_2S: not more than four ionic species (two anions and two cations and excluding insoluble salts) out of the following:

Cations : NH_4^+, Pb^{2+}, Ag^+, Bi^{3+}, Cu^{2+}, Cd^{2+}, Sn^{2+}, Fe^{3+}, Al^{3+}, Co^{2+}, Cr^{3+}, Ni^{2+}, Mn^{2+}, Zn^{2+}, Ba^{2+}, Sr^{2+}, Ca^{2+}, K^+

Anions: CO_3^{2-}, S^{2-}, SO_3^{2-}, NO_3^-, Cl^-, Br^-, I^-, NO_3^-, SO_4^{2-}, PO_4^{3-}, F^-

(Spot tests should be carried out wherever feasible)

Section B: Physical Chemistry

Chemical Kinetics

Study the kinetics of the following reactions.

1. Initial rate method: Iodide-persulphate reaction
2. Integrated rate method:
    a. Acid hydrolysis of methyl acetate with hydrochloric acid.
    b. Saponification of ethyl acetate.
    c. Compare the strengths of HCl and H_2SO_4 by studying kinetics of hydrolysis of methyl acetate

Reference Books:

1. Svehla, G, Vogel's Qualitative Inorganic Analysis, 7th Ed, 4th Ed., Pearson Education (2007).

2. Khosla, B. D.; Garg, V. C. & Gulati, A. Senior Practical Physical Chemistry, R. Chand & Co., New Delhi (2011).
3. Gulati Shikha , Sharma Gulati JL and Manocha, Shagun, Practical Inorganic Chemistry, 1st Edn., CBS Publishers & Distributors Pvt Ltd., (2017).

Generic Elective Paper- IV (Theory)

ORGANOMETALLICS, BIOINORGANIC CHEMISTRY, POLYNUCLEAR HYDROCARBONS AND UV, IR SPECTROSCOPY

Section A: Inorganic Chemistry- III

Unit-I

Chemistry of 3d metals

Oxidation states displayed by Cr, Fe, Co, Ni and Co.

A study of the following compounds (including preparation and important properties);

Peroxo compounds of Cr, $K_2Cr_2O_7$, $KMnO_4$, $K_4[Fe(CN)_6]$, sodium nitroprusside, $[Co(NH_3)_6]Cl_3$, $Na_3[Co(NO_2)_6]$.

Organometallic Compounds

Definition and Classification with appropriate examples based on nature of metal-carbon bond (ionic, s, p and multicentre bonds). Structures of methyl lithium, Zeiss salt and ferrocene. EAN rule as applied to carbonyls. Preparation, structure, bonding and properties of mononuclear and polynuclear carbonyls of 3d metals. π-acceptor behaviour of carbon monoxide. Synergic effects (VB approach).

Unit-II

Bio-Inorganic Chemistry

A brief introduction to bio-inorganic chemistry. Role of metal ions present in biological systems with special reference to Na^+, K^+ and Mg^{2+} ions: Na/K pump; Role of Mg^{2+} ions in energy production and chlorophyll. Role of Ca^{2+} in blood clotting, and structural role (bones).

Section B: Organic Chemistry- III

Unit-III

Polynuclear and heteronuclear aromatic compounds

Properties of the following compounds with reference to electrophilic and nucleophilic substitution: Naphthalene, Anthracene, Furan, Pyrrole, Thiophene, and Pyridine.

Active methylene compounds

Preparation: Claisen ester condensation. Keto-enol tautomerism.

Reactions: Synthetic uses of ethylacetoacetate (preparation of non-heteromolecules having up to 6 carbon).

Unit-IV

Application of Spectroscopy (UV-Visible, IR) to Simple Organic Molecules

Electromagnetic radiations, electronic transitions, λ_{max} & ε_{max}, chromophore, auxochrome, bathochromic and hypsochromic shifts. Application of electronic spectroscopy and Woodward rules for calculating λ_{max} of conjugated dienes and α, β – unsaturated compounds.

Infrared radiation and types of molecular vibrations, functional group and fingerprint region. IR spectra of alkanes, alkenes and simple alcohols (inter and intramolecular hydrogen bonding), aldehydes, ketones, carboxylic acids and their derivatives (effect of substitution on >C=O stretching absorptions).

Recommended Text Books:

1. Puri, Sharma, Kalia, Principles of Inorganic Chemistry, Vishal Pub. Co., 33rd ed., 2017.
2. Shriver D. E., Atkins P. W., Inorganic Chemistry, Oxford University Press, 5th Edn.
3. Huheey J. E., Keiter E. A. and Keiter R. L., Inorganic Chemistry – Principles of structure and reactivity, , Pearson Education, 4th Ed. 2002.
4. Morrison, R. N. & Boyd, R. N., Organic Chemistry, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
5. Arun Bahl & B S Bahl, Advanced Organic Chemistry, 2nd Edition, S. Chand Publisher, 2012.

Reference books

1. Das Asim K., Fundamentals of Inorganic Chemistry, Vol. II, CBS Publications, 2nd Ed. 2010.
2. Das Asim K., Bioinorganic Chemistry, Books & Allied (P) Ltd. 1st ed. 2015.
3. Pradeep's Inorganic Chemistry, Vol. I & II, Universal Book seller, 14th Ed. 2017.
4. Dhawan, S.N., Pradeep's Organic Chemistry, (Vol. I and II), Pradeep Publications

Generic Elective Paper IV LAB

Section A: Inorganic Chemistry

1. Preparation of following compounds (Any two)

a. Cuprous oxide (Cu_2O)

b. Cuprous chloride, Cu_2Cl_2

c. Manganese(III) phosphate, $MnPO_4.H_2O$

d. Lead chromate ($PbCrO_4$)

2. Separation of mixtures by chromatography: Measure the R_f value in each case. (Combination of two ions to be given)

- Paper chromatographic separation of Fe^{3+}, $A1^{3+}$ and Cr^{3+} or
- Paper chromatographic separation of Ni^{2+}, Co^{2+}, Mn^{2+} and Zn^{2+}

Section B: Organic Chemistry

Systematic qualitative organic analysis of organic compounds possessing mono-functional groups (-COOH, phenolic, aldehyde, ketone, amide, nitro, amines) and preparation of one derivative.

Reference Books

1. Mendham, J., A. I. Vogel's Quantitative Chemical Analysis 6th Edn, Pearson, 2009.
2. Mann, F.G. & Saunders, B.C. Practical Organic Chemistry, Pearson Education (2009).
3. Ahluwalia, V.K., Dhingra, S. and Gulati A, College Practical Chemistry, University Press (2005).
4. Gulati Shikha , Sharma Gulati JL and Manocha, Shagun, Practical Inorganic Chemistry, 1st Edn., CBS Publishers & Distributors Pvt. Ltd., (2017).

Course structure of UG Chemistry Pass

Semester	Course	Course Name	Credits	Total marks
I	DSC-I	Atomic structure, bonding, general organic chemistry &aliphatic hydrocarbons	04	75
	DSC-I Practical		02	25
II	DSC-II	Chemical energetics, equilibria & functional organicchemistry	04	75
	DSC-II Practical		02	25
III	DSC-III	Chemistry of s- and p-block elements, states of matter &chemical kinetics	04	75
	DSC-III Practical		02	25
IV	DSC-IV	Organometallics, bioinorganic chemistry, polynuclear hydrocarbons and UV, IR spectroscopy	04	75
	DSC-IV Practical		02	25
V	DSE-I	Polymer chemistry	04	75
	DSE-I Practical		02	25
VI	DSE-II	Industrial chemicals and Environment	04	75
	DSE-II Practical		02	25
			36	**600**

CHEMISTRY PAPERS FOR PASS STUDENTS

Discipline Specific Core – 4 papers

Discipline Specific Elective – 2 papers

Marks per paper - Midterm : 15 marks, End term : 60 marks, Practical: 25 marks

Total – 100 marks Credit per paper – 6

Teaching hours per paper – 40 hours theory classes + 20 hours practical classes

Discipline Specific Core Paper I (Theory)

ATOMIC STRUCTURE, BONDING, GENERAL ORGANIC CHEMISTRY & ALIPHATIC HYDROCARBONS

Section A: Inorganic Chemistry-1

Unit-I

Atomic Structure

Review of: Bohr's theory and its limitations, dual behaviour of matter and radiation, de-Broglie's relation, Heisenberg Uncertainty principle. Hydrogen atom spectra.

Quantum mechanics: Time independent Schrodinger equation and meaning of various terms in it. Significance of ψ and ψ^2, Schrödinger equation for hydrogen atom. Radial and angular parts of the hydogenic wave functions (atomic orbitals) and their variations for 1s, 2s, 2p, 3s, 3p and 3d orbitals (Only graphical representation). Quantum numbers and their significance, shapes of s, p and d atomic orbitals, nodal planes.

Rules for filling electrons in various orbitals, Electronic configurations of the atoms. Stability of half-filled and completely filled orbitals, concept of exchange energy. Relative energies of atomic orbitals, Anomalous electronic configurations.

Unit-II

Chemical Bonding and Molecular Structure

Ionic Bonding: General characteristics, energy considerations. Lattice energy and solvation energy and their importance in the context of stability and solubility of ionic compounds. Statement of Born-Landé equation for calculation of lattice energy, Born-Haber cycle and its applications, polarizing power and polarizability. Fajan's rules and its applications.

Covalent bonding: VB Approach: Shapes of some inorganic molecules and ions on the basis of VSEPR and hybridization with suitable examples of linear, trigonal planar, square planar, tetrahedral, trigonal bipyramidal and octahedral arrangements.

Concept of resonance and resonating structures in various inorganic and organic compounds.

MO Approach: Rules for the LCAO method, bonding and antibonding MOs and their characteristics for *s-s*, *s-p* and *p-p* combinations of atomic orbitals, nonbonding combination of orbitals, MO treatment of homonuclear diatomic molecules (N_2, O_2) and heteronuclear diatomic molecules (CO, NO). Comparison of VB and MO approaches.

Section B: Organic Chemistry-1

Unit- III

Fundamentals of Organic Chemistry

Physical Effects, Electronic Displacements: Inductive effect, Electrometric effect, Resonance and hyperconjugation. Cleavage of bonds: Homolysis and heterolysis.

Structure, shape and reactivity of organic molecules: Nucleophiles and electrophiles. Reactive Intermediates: Carbocations, Carbanions and free radicals.

Strength of organic acids and bases: Comparative study with emphasis on factors affecting pK values. Aromaticity: Hückel's rule.

Stereochemistry

Conformations with respect to ethane, butane and cyclohexane. Interconversion of Wedge Formula, Newmann, Sawhorse and Fischer representations. Concept of chirality (up to two carbon atoms). Configuration: Geometrical and Optical isomerism; Enantiomerism, Diastereomerism and Meso compounds). D and L; cis-trans nomenclature; CIP Rules: R/ S (for one chiral carbon atoms) and E / Z Nomenclature (for up to two C=C systems).

Unit-IV

Aliphatic Hydrocarbons

Functional group approach for the following reactions (preparations & reactions) to be studied in context to their structure.

Alkanes: (Up to 5 Carbons) *Preparation:* Catalytic hydrogenation, Wurtz reaction, Kolbe's synthesis, from Grignard reagent. *Reactions:* Free radical Substitution: Halogenation.

Alkenes: (Up to 5 Carbons) *Preparation:* Elimination reactions: Dehydration of alkenesand dehydrohalogenation of alkyl halides (Saytzeff's rule); cis-alkenes (Partial catalytic hydrogenation) and trans-alkenes (Birch reduction). *Reactions:* cis-addition (alk. $KMnO_4$) and trans-addition (bromine), Addition of HX (Markownikoff's and anti-Markownikoff's addition), Hydration, Ozonolysis,

Alkynes: (Up to 5 Carbons) *Preparation:* Acetylene from $CaC_2$and conversion intohigher

alkynes; by dehalogenation of tetra halides and dehydrohalogenation of vicinal-dihalides.
Reactions: formation of metal acetylides, addition of bromine and alkaline $KMnO_4$,ozonolysis.

Recommended Text Books:

1. Lee J. D., Concise Inorganic Chemistry, Wiley India, 5th Edn., 2008.
2. Puri, Sharma, Kalia, Principles of Inorganic Chemistry, Vishal Pub. Co., 33rd ed., 2017.
3. Shriver D. E. Atkins P. W., Inorganic Chemistry, Oxford University Press, 5th Edn..
4. Huheey J. E., Keiter E. A. and Keiter R. L., Inorganic Chemistry – Principles of structure and reactivity, , Pearson Education, 4th Ed. 2002.
5. Morrison, R. N. & Boyd, R. N., Organic Chemistry, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
6. Bhal Arun & Bhal B S, Advanced Organic Chemistry, 2nd Edition, S. Chand Publisher, 2012.
7. Kalsi, P. S. Stereochemistry Conformation and Mechanism; 8thEdn, New Age International, 2015.

Reference books

1. Das Asim K., Fundamentals of Inorganic Chemistry, Vol. II, CBS Publications, 2nd Ed. 2010.
2. Pradeep's Inorganic Chemistry, Vol. I & II, Universal Book seller, 14th Ed. 2017.
3. Mallick, Madan and Tuli, S. Chand Selected Topic in Inorganic Chemistry, , 17thEdn. 2010.
4. Dhawan, S.N., Pradeep's Organic Chemistry, (Vol. I and II), Pradeep Publications

Discipline Specific Core Paper-I LAB

Section A: Inorganic Chemistry

Volumetric Analysis

1. Estimation of sodium carbonate and sodium hydrogen carbonate present in a mixture.
2. Estimation of oxalic acid by titrating it with KMnO4.
3. Estimation of water of crystallization in Mohr's salt by titrating with KMnO4.

4. Estimation of Fe(II) ions by titrating it with K2Cr2O7 using internal indicator.
5. Estimation of Cu(II) ions iodometrically using $Na_2S_2O_3$.

Section B:Organic Chemistry

1. Detection of extra elements (N, S, Cl) in organic compounds (containing up to two extra elements)
2. Separation of mixtures by Chromatography: Measure the R_f value in each case (combination of two compounds to be given)
   - (c) Identify and separate the components of a given mixture of 2 amino acids (glycine, aspartic acid, glutamic acid, tyrosine or any other amino acid) by paper chromatography.
   - (d) Identify and separate the sugars present in the given mixture by paper chromatography.

Reference Books:

1. Mendham, J., A. I. Vogel's Quantitative Chemical Analysis 6th Ed., Pearson, 2009.
2. Mann, F.G. & Saunders, B.C. Practical Organic Chemistry, Pearson Education (2009).
3. Ahluwalia, V.K., Dhingra, S. and Gulati A, College Practical Chemistry, University Press

Discipline Specific Core Paper II (Theory)

CHEMICAL ENERGETICS, EQUILIBRIA & FUNCTIONAL ORGANIC CHEMISTRY

Section A: Physical Chemistry-1

Unit-I

Chemical Energetics

Review of thermodynamics and the Laws of Thermodynamics.

Important principles and definitions of thermochemistry. Concept of standard state and standard enthalpies of formations, integral and differential enthalpies of solution and dilution. Calculation of bond energy, bond dissociation energy and resonance energy from thermochemical data. Variation of enthalpy of a reaction with temperature – Kirchhoff's equation.

Statement of Third Law of thermodynamics.

Chemical Equilibrium

Free energy change in a chemical reaction. Thermodynamic derivation of the law of chemical equilibrium. Distinction between ΔG and ΔG°, Le Chatelier's principle. Relationships between K_p, K_c and K_x for reactions involving ideal gases.

Unit- II

Ionic Equilibria

Strong, moderate and weak electrolytes, degree of ionization, factors affecting degree of ionization, ionization constant and ionic product of water. Ionization of weak acids and bases, pH scale, common ion effect. Salt hydrolysis-calculation of hydrolysis constant, degree of hydrolysis and pH for different salts. Buffer solutions. Solubility and solubility product of sparingly soluble salts – applications of solubility product principle

Section B: Organic Chemistry-II

Unit- III

Functional group approach for the following reactions (preparations & reactions) to be studied in context to their structure.

Aromatic hydrocarbons

Preparation (Case benzene): from phenol, by decarboxylation, from acetylene, from benzene sulphonic acid. Reactions: (Case benzene): Electrophilic substitution: nitration, halogenation and sulphonation. Friedel-Craft's reaction (alkylation and acylation) (up to 4 carbons on benzene). Side chain oxidation of alkyl benzenes (up to 4 carbons on benzene).

Alkyl and Aryl Halides

Alkyl Halides (Up to 5 Carbons) Types of Nucleophilic Substitution (SN_1, SN_2 and SN_i) reactions.

Preparation: from alkenes and alcohols. Reactions: hydrolysis, nitrite & nitro formation, nitrile & isonitrile formation. Williamson's ether synthesis: Elimination vs substitution.

Aryl Halides Preparation: (Chloro, bromo and iodo-benzene case): from phenol, Sandmeyer & Gattermann reactions.

Reactions (Chlorobenzene): Aromatic nucleophilic substitution (replacement by –OH group) and effect of nitro substituent. Benzyne Mechanism: KNH_2/NH_3 (or $NaNH_2/NH_3$).

Unit- IV

Alcohols, Phenols and Ethers (Up to 5 Carbons)

Alcohols: Preparation: Preparation of 1°, 2° and 3° alcohols: using Grignard reagent, Ester hydrolysis, Reduction of aldehydes and ketones, carboxylic acid and esters.

Reactions: With sodium, HX (Lucas test), esterification, oxidation (with PCC, alk. $KMnO_4$, acidic dichromate, conc. HNO_3). Oppeneauer oxidation Diols: (Up to 6 Carbons) oxidation of diols. Pinacol-Pinacolone rearrangement.

Phenols: (Phenol case) Preparation: Cumene hydroperoxide method, from diazonium salts. Reactions: Electrophilic substitution: Nitration, halogenation and sulphonation. Reimer Tiemann Reaction, Gattermann-Koch Reaction,

Ethers (aliphatic and aromatic): Cleavage of ethers with HI.

Aldehydes and ketones (aliphatic and aromatic): Formaldehyde, acetaldehyde, acetone and benzaldehyde

Preparation: from acid chlorides and from nitriles.

Reactions – Reaction with HCN, ROH, $NaHSO_3$, NH_2-G derivatives. Iodoform test. Aldol Condensation, Cannizzaro's reaction, Benzoin condensation. Clemensen reduction and Wolff Kishner reduction.

Recommended Text Books:

1. Atkins P. W. & Paula, J. de, Elements of Physical Chemistry, Oxford University Press, 6th Ed., (2006).
2. Principles of Physical Chemistry, Puri, Sharma & Pathania, Vishal Publishing Co, 47th Edn., 2017.
3. K. L. Kapoor, Text Book of Physical Chemistry, Mac Grow Hill, 3rd Edn. 2017.
4. Morrison, R. N. & Boyd, R. N., Organic Chemistry, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
5. Arun Bahl & B S Bahl, Advanced Organic Chemistry, 2nd Edition, S. Chand Publisher, 2012.

Reference Books:

1. Kheterpal S.C., Pradeep's Physical Chemistry, Vol. I & II, Pradeep Publications.
2. Dhawan, S.N., Pradeep's Organic Chemistry, (Vol. I and II), Pradeep Publications

Discipline Specific Core Paper II LAB

Section A: Physical Chemistry

Thermochemistry (any three)

1. Determination of heat capacity of calorimeter for different volumes.
2. Determination of enthalpy of neutralization of hydrochloric acid with sodium hydroxide.
3. Determination of enthalpy of ionization of acetic acid.
4. Determination of integral enthalpy of solution of salts (KNO_3, NH_4Cl).
5. Determination of enthalpy of hydration of copper sulphate.
6. Study of the solubility of benzoic acid in water and determination of ΔH.

Ionic equilibria

1. pH measurements

   Measurement of pH of different solutions like aerated drinks, fruit juices, shampoos and soaps (use dilute solutions of soaps and shampoos to prevent damage to the glass electrode) using pH-meter.
2. Preparation of buffer solutions:
   - Sodium acetate-acetic acid
   - Ammonium chloride-ammonium hydroxide

   Measurement of the pH of buffer solutions and comparison of the values with theoretical values.

Section B: Organic Chemistry

1. Purification of organic compounds by crystallization (from water) and determination of melting.
2. Preparations, recrystallisation, determination of melting point and calculation of quantitative yields of the followings:

   (a) Bromination of Phenol/Aniline

   (b) Benzoylation of amines/phenols

   (c) Oxime and 2,4 dinitrophenylhydrazone of aldehyde/ketone

Reference Books

1. A.I. Vogel: Textbook of Practical Organic Chemistry, 5th edition, Prentice-Hall.
2. Mann, F.G. & Saunders, B.C. Practical Organic Chemistry, Pearson Education (2009).

3. Khosla, B. D.; Garg, V. C. & Gulati, A. Senior Practical Physical Chemistry, R. Chand & Co., New Delhi (2011).
4. Ahluwalia, V.K., Dhingra, S. and Gulati A, College Practical Chemistry, University Press (2005).

Discipline Specific Core Paper III (Theory)

CHEMISTRY OF S- AND P-BLOCK ELEMENTS, STATES OFMATTER & CHEMICAL KINETICS

Section A: Inorganic Chemistry-II

Unit-I

General Principles of Metallurgy

Chief modes of occurrence of metals based on standard electrode potentials. Ellingham diagrams for reduction of metal oxides using carbon as reducing agent.

Hydrometallurgy, Methods of purification of metals (Al, Pb, Fe, Cu, Ni): electrolytic, oxidative refining, Parting process, van Arkel-de Boer process and Mond's process.

***s*- and *p*-Block Elements**

Periodicity in *s*- and *p*-block elements with respect to electronic configuration, atomic and ionic size, ionization enthalpy, electronegativity (Pauling & Mulliken scales). Allotropy in C, S, and P.

Oxidation states with reference to elements in unusual and rare oxidation states like carbides and nitrides), inert pair effect, diagonal relationship and anomalous behaviour of first member of each group.

Unit-II

Compounds of *s*- and *p*-Block Elements

Hydrides and their classification (ionic, covalent and interstitial), structure and properties with respect to stability of hydrides of p- block elements.

Concept of multicentre bonding (diborane).

Structure, bonding and their important properties like oxidation/reduction, acidic/basic nature of the following compounds and their applications in industrial, organic and environmental chemistry.

Hydrides of nitrogen (NH_3, N_2H_4, N_3H, NH_2OH); Oxoacids of P, S and Cl; Halides and oxohalides: PCl_3, PCl_5, $SOCl_2$.

Section B: Physical Chemistry- II

Unit-III

Kinetic Theory of Gases

Postulates of Kinetic Theory of Gases and derivation of the kinetic gas equation.

Deviation of real gases from ideal behaviour, compressibility factor, causes of deviation. van der Waals equation of state for real gases. Boyle temperature (derivation not required). Critical phenomena, critical constants and their calculation from van der Waals equation.

Maxwell Boltzmann distribution laws of molecular velocities and molecular energies (graphic representation – derivation not required) and their importance.

Temperature dependence of these distributions. Most probable, average and root mean square velocities (no derivation). Collision cross section, collision number, collision frequency, collision diameter and mean free path of molecules. Viscosity of gases and effect of temperature and pressure on coefficient of viscosity (qualitative treatment only).

Liquids

Surface tension and its determination using stalagmometer. Viscosity of a liquid and determination of coefficient of viscosity using Ostwald viscometer. Effect of temperature on surface tension and coefficient of viscosity of a liquid (qualitative treatment only).

Unit-IV

Solids

Forms of solids. Symmetry elements, unit cells, crystal systems, Bravais lattice types and identification of lattice planes. Laws of Crystallography - Law of constancy of interfacial angles, Law of rational indices. Miller indices. X–Ray diffraction by crystals, Bragg's law. Structures of NaCl, and CsCl (qualitative treatment only). Defects in crystals.

Chemical Kinetics

The concept of reaction rates. Effect of temperature, pressure, catalyst and other factors on reaction rates. Order and molecularity of a reaction. Derivation of integrated rate equations for zero, first and second order reactions (both for equal and unequal concentrations of reactants). Half–life of a reaction. General methods for determination of order of a reaction. Concept of activation energy and its calculation from Arrhenius equation.

Theories of Reaction Rates: Collision theory and Activated Complex theory of bimolecular reactions. Comparison of the two theories (qualitative treatment only).

Recommended Text Books:

1. Lee J. D., Concise Inorganic Chemistry, Wiley India, 5th Edn., 2008.
2. Puri, Sharma, Kalia, Principles of Inorganic Chemistry, Vishal Pub. Co., 33rd ed., 2017.
3. Shriver D. E. Atkins P. W., Inorganic Chemistry, Oxford University Press, 5th Edn..
4. Principles of Physical Chemistry, Puri, Sharma & Pathania, Vishal Publishing Co, 47th Edn., 2017.
5. K. L. Kapoor, Text Book of Physical Chemistry, Mac Grow Hill, 3rd Edn. 2017.

Reference Books:

1. Kheterpal S.C., Pradeep's Physical Chemistry, Vol. I & II, Pradeep Publications.
2. Pradeep's Inorganic Chemistry, Vol. I & II, Universal Book seller, 14th Ed. 2017.

Discipline Specific Core Paper III LAB

Section A: Inorganic Chemistry

Qualitative analysis of inorganic slat mixture using H_2S: not more than four ionic species (two anions and two cations and excluding insoluble salts) out of the following:

Cations : NH_4^+, Pb^{2+}, Ag^+, Bi^{3+}, Cu^{2+}, Cd^{2+}, Sn^{2+}, Fe^{3+}, Al^{3+}, Co^{2+}, Cr^{3+}, Ni^{2+}, Mn^{2+}, Zn^{2+}, Ba^{2+}, Sr^{2+}, Ca^{2+}, K^+

Anions: CO_3^{2-}, S^{2-}, SO_3^{2-}, NO_3^-, Cl^-, Br^-, I^-, NO_3^-, SO_4^{2-}, PO_4^{3-}, F^-

(Spot tests should be carried out wherever feasible)

Section B: Physical Chemistry

1. Chemical Kinetics
2. Study the kinetics of the following reactions.
3. Initial rate method: Iodide- persulphate reaction
4. Integrated rate method:
   a. Acid hydrolysis of methyl acetate with hydrochloric acid.
   b. Saponification of ethyl acetate.
   c. Compare the strengths of HCl and H_2SO_4 by studying kinetics of hydrolysis of methyl acetate

Reference Books:

1. Svehla, G, Vogel's Qualitative Inorganic Analysis, 7th Ed, 4th Ed., Pearson Education (2007).
2. Khosla, B. D.; Garg, V. C. & Gulati, A. Senior Practical Physical Chemistry, R. Chand & Co., New Delhi (2011).
3. Gulati Shikha , Sharma Gulati JL and Manocha, Shagun, Practical Inorganic Chemistry, 1stEdn., CBS Publishers & Distributors Pvt Ltd., (2017).

Discipline Specific Core Paper - IV (Theory)

ORGANOMETALLICS, BIOINORGANIC CHEMISTRY, POLYNUCLEAR HYDROCARBONS AND UV, IR SPECTROSCOPY

Section A: Inorganic Chemistry- III

Unit-I

Chemistry of 3d metals

Oxidation states displayed by Cr, Fe, Co, Ni and Co.

A study of the following compounds (including preparation and important properties);

Peroxo compounds of Cr, $K_2Cr_2O_7$, $KMnO_4$, $K_4[Fe(CN)_6]$, sodium nitroprusside, $[Co(NH_3)_6]Cl_3$, $Na_3[Co(NO_2)_6]$.

Organometallic Compounds

Definition and Classification with appropriate examples based on nature of metal-carbon bond (ionic, s, p and multicentre bonds). Structures of methyl lithium, Zeiss salt and ferrocene. EAN rule as applied to carbonyls. Preparation, structure, bonding and properties of mononuclear and polynuclear carbonyls of 3d metals. π-acceptor behaviour of carbon monoxide. Synergic effects (VB approach).

Unit-II

Bio-Inorganic Chemistry

A brief introduction to bio-inorganic chemistry. Role of metal ions present in biological systems with special reference to Na^+, K^+ and Mg^{2+} ions: Na/K pump; Role of Mg^{2+} ions in energy production and chlorophyll. Role of Ca^{2+} in blood clotting, and structural role (bones).

Section B: Organic Chemistry-III

Unit-III

Polynuclear and heteronuclear aromatic compounds

Properties of the following compounds with reference to electrophilic and nucleophilic substitution: Naphthalene, Anthracene, Furan, Pyrrole, Thiophene, and Pyridine.

Active methylene compounds

Preparation: Claisen ester condensation. Keto-enol tautomerism.

Reactions: Synthetic uses of ethylacetoacetate (preparation of non-heteromolecules having up to 6 carbon).

Unit-IV

Application of Spectroscopy (UV-Visible, IR) to Simple Organic Molecules

Electromagnetic radiations, electronic transitions, λ_{max} & ε_{max}, chromophore, auxochrome, bathochromic and hypsochromic shifts. Application of electronic spectroscopy and Woodward rules for calculating λ_{max} of conjugated dienes and α, β – unsaturated compounds.

Infrared radiation and types of molecular vibrations, functional group and fingerprint region. IR spectra of alkanes, alkenes and simple alcohols (inter and intramolecular hydrogen bonding), aldehydes, ketones, carboxylic acids and their derivatives (effect of substitution on >C=O stretching absorptions).

Recommended Text Books:

1. Puri, Sharma, Kalia, Principles of Inorganic Chemistry, Vishal Pub. Co., 33rd ed., 2017.
2. Shriver D. E. Atkins P. W., Inorganic Chemistry, Oxford University Press, 5th Edn..
3. Huheey J. E., Keiter E. A. and Keiter R. L., Inorganic Chemistry – Principles of structure and reactivity, , Pearson Education, 4th Ed. 2002.
4. Morrison, R. N. & Boyd, R. N., Organic Chemistry, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
5. Arun Bahl & B S Bahl, Advanced Organic Chemistry, 2nd Edition, S. Chand Publisher, 2012.

Reference books

1. Das Asim K., Fundamentals of Inorganic Chemistry, Vol. II, CBS Publications, 2nd Ed. 2010.

2. Das Asim K., Bioinorganic Chemistry, Books & Allied (P) Ltd. 1st ed. 2015.
3. Pradeep's Inorganic Chemistry, Vol. I & II, Universal Book seller, 14th Ed. 2017.
4. Dhawan, S.N., Pradeep's Organic Chemistry, (Vol. I and II), Pradeep Publications

Discipline Specific Core Paper -IV LAB

Section A: Inorganic Chemistry

1. Preparation of following compounds (Any two)

   a. Cuprous oxide (Cu_2O)
   b. Cuprous chloride, Cu_2Cl_2
   c. Manganese(III) phosphate, $MnPO_4.H_2O$
   d. Lead chromate ($PbCrO_4$)

2. Separation of mixtures by chromatography: Measure the R_f value in each case. (Combination of two ions to be given)

- Paper chromatographic separation of Fe^{3+}, $A1^{3+}$ and Cr^{3+} or
- Paper chromatographic separation of Ni^{2+}, Co^{2+}, Mn^{2+} and Zn^{2+}

Section B: Organic Chemistry

Systematic qualitative organic analysis of organic compounds possessing mono-functional groups (-COOH, phenolic, aldehyde, ketone, amide, nitro, amines) and preparation of one derivative.

Reference Books

1. Mendham, J., A. I. Vogel's Quantitative Chemical Analysis 6th Edn, Pearson, 2009.
2. Mann, F.G. & Saunders, B.C. Practical Organic Chemistry, Pearson Education (2009).
3. Ahluwalia, V.K., Dhingra, S. and Gulati A, College Practical Chemistry, University Press (2005).
4. Gulati Shikha , Sharma Gulati JL and Manocha, Shagun, Practical Inorganic Chemistry, 1stEdn., CBS Publishers & Distributors Pvt. Ltd., (2017).

Discipline Specific Elective (DSE) - Pass

Discipline Specific Elective Paper –I

POLYMER CHEMISTRY

Unit-I

Introduction and history of polymeric materials:

Different schemes of classification of polymers, Polymer nomenclature, Molecular forces and chemical bonding in polymers, Texture of Polymers.

Functionality and its importance:

Criteria for synthetic polymer formation, classification of polymerization processes, Relationships between functionality, extent of reaction and degree of polymerization. Bi-functional systems, Poly-functional systems.

Unit-II

Mechanism & Kinetics of Polymerization:

Polymerization reactions – addition and condensation, mechanism and kinetics of step growth, radical chain growth, ionic chain (both cationic and anionic) and coordination polymerizations, Mechanism and kinetics of copolymerization, polymerization techniques.

Crystallization and crystallinity:

Determination of crystalline melting point and degree of crystallinity, Morphology of crystalline polymers, Factors affecting crystalline melting point.

Unit-III

Molecular weight of polymers and their determination (M_n, M_w, M_v, M_z) by end group analysis, viscometry and osmotic pressure methods. Molecular weight distribution and its significance. Polydispersity index.

Glass transition temperature (T_g) and it determination: WLF equation, Outlines of factors affecting glass transition temperature (T_g).

Unit-IV

Properties of polymers (physical, thermal and mechanical properties).

Preparation, structure, properties and applications of the following polymers: polyolefins (polyethylene, polypropylene), polystyrene, polyvinyl chloride, polyvinyl acetate, polyacrylamide, fluoro polymers (Teflon), polyamides (nylon-6 and nylon 6,6). Thermosetting polymers - phenol formaldehyde resins (Bakelite, Novalac), polyurethanes, conducting polymers (polyacetylene, polyaniline). Brief outline of biodegradable polymers.

Recommended Text Books:

1. V. R. Gowarikar, Jayadev Sreedhar, N. V. Viswanathan, Polymer Science 1st Edition, New Age International Publishers, 1986.

2. Premamoy Ghosh, Polymer Science and Technology: Plastics, Rubber, Blends and Composites, 3rd Edition, McGraw Hill Education, 2010.
3. P. Bahadur & N.V.Sastry, Principles of polymer science, Narosa Publishing house, New Delhi 2002.
4. Fred W. Billmeyer, Textbook of Polymer Science, 3rd ed. Wiley- Interscience (1984)

Reference books

1. L.H. Sperling, Introduction to Physical Polymer Science, 4th ed. John Wiley & Sons (2005)
2. Malcolm P. Stevens, Polymer Chemistry: An Introduction, 3rd ed. Oxford University Press (2005)
3. Seymour/ Carraher's Polymer Chemistry, 9th ed. by Charles E. Carraher, Jr. (2013).
4. Nayak P.L., Polymer Chemistry, Kalyani Publisher (2017).

Discipline Specific Elective Paper -I LAB

Polymer synthesis (Any three)

1. Preparation of nylon-6,6 / Polyaniline
2. Preparations of novalac resin/resold resin.
3. Preparation of urea-formaldehyde resin
4. Free radical solution polymerization of styrene (St) / Methyl Methacrylate (MMA) / Methyl Acrylate (MA) / Acrylic acid (AA).
5. Purification of monomer
6. Polymerization using benzoyl peroxide (BPO) / 2,2'-azo-bis-isobutylonitrile (AIBN)
7. Redox polymerization of acrylamide
8. Precipitation polymerization of acrylonitrile

Polymer characterization/analysis

1. Determination of molecular weight by viscometry:
   Polyacrylamide/Polystyrene
   Poly vinyl pyrolidine (PVP) in water
2. Determination of acid value / saponification value of a resin
3. Determination of hydroxyl number of a polymer using colorimetric method.
4. Estimation of the amount of HCHO in the given solution by sodium sulphite method

5. Analysis of some IR spectra of polymers

Reference Books:

1. Malcohm P. Stevens, Polymer Chemistry: An Introduction, 3rd Ed.
2. Joel R. Fried, Polymer Science and Technology, 2nd ed. Prentice-Hall (2003)
3. Petr Munk and Tejraj M. Aminabhavi, Introduction to Macromolecular Science, 2nd ed. John Wiley & Sons (2002)
4. L.H. Sperling, Introduction to Physical Polymer Science, 4th ed. John Wiley & Sons (2005)
5. Malcolm P. Stevens, Polymer Chemistry: An Introduction, 3rd ed. Oxford University Press (2005)
6. Seymour/Carraher's Polymer Chemistry, 9th ed. by Charles E. Carraher, Jr. (2013).

Discipline Specific Elective Paper –II

INDUSTRIAL CHEMICALS AND ENVIRONMENT

Unit-I

Industrial Gases and Inorganic Chemicals

Industrial Gases: Large scale production, uses, storage and hazards in handling of the following gases: oxygen, nitrogen, argon, hydrogen, acetylene, carbon monoxide, chlorine, sulphur dioxide.

Inorganic Chemicals: Manufacture, application and hazards in handling the following chemicals: hydrochloric acid, nitric acid, sulphuric acid, caustic soda, common salt, bleaching powder, sodium thiosulphate, hydrogen peroxide, potash alum, potassium dichromate and potassium permanganate.

Industrial Metallurgy

Preparation of metals (ferrous and nonferrous) and ultrapure metals for semiconductor technology.

Unit-II

Environment and its segments

Ecosystems. Biogeochemical cycles of carbon, nitrogen and sulphur.

Air Pollution: Major regions of atmosphere. Chemical and photochemical reactions in atmosphere. Air pollutants: types, sources, particle size and chemical nature; Photochemical smog: its constituents and photochemistry. Environmental effects of ozone. Major sources of air pollution.

Pollution by SO_2, CO_2, CO, NO_x, and H_2S and control procedures.

Effects of air pollution on living organisms and vegetation. Greenhouse effect and global warming, Ozone depletion by oxides of nitrogen, chlorofluorocarbons and halogens, removal of sulphur from coal.

Unit-III

Water Pollution: Hydrological cycle, water resources, aquatic ecosystems, Sources andnature of water pollutants, Techniques for measuring water pollution, Impacts of water pollution on hydrological and ecosystems.

Water purification methods. Effluent treatment plants (primary, secondary and tertiary treatment). Industrial effluents from the following industries and their treatment: electroplating, textile, tannery, dairy, petroleum and petrochemicals, fertilizer. Sludge disposal.

Industrial waste management: incineration of waste. Water treatment and purification (reverse osmosis, ion exchange). Water quality parameters for wastewater, industrial water and domestic water.

Unit-IV

Energy and Environment

Sources of energy: Coal, petrol and natural gas. Nuclear fusion/fission, solar energy, hydrogen, geothermal, tidal and hydel.

Nuclear Pollution: Disposal of nuclear waste, nuclear disaster and its management.

Biocatalysis

Introduction to biocatalysis: Importance in green chemistry and chemical industry.

Recommended Text Books:

1. De, A. K. *Environmental Chemistry*: New Age International Pvt., Ltd, New Delhi, 2010.
2. Stocchi E., *Industrial Chemistry*, Vol-I, Ellis Horwood Ltd. UK.
3. Sharma, B.K. & Gaur, H. Industrial Chemistry, Goel Publishing House, Meerut (1996).

Reference Books:

1. Felder R.M. and Rousseau R.W., *Elementary Principles of Chemical Processes*, Wiley Publishers, New Delhi.
2. Dara S. S., *A Textbook of Engineering Chemistry*, S. Chand & Company Ltd. New Delhi.
3. Miller G.T., Environmental Science, 11th edition. Brooks/ Cole (2006).
4. Mishra, Environmental Studies, Selective and Scientific Books, New Delhi (2005).

Discipline Specific Elective Paper II LAB

INDUSTRIAL CHEMICALS & ENVIRONMENT

1. Determination of Dissolved Oxygen (DO) in water.
2. Determination of Chemical Oxygen Demand (COD)
3. Determination of Biological Oxygen Demand (BOD)
4. Percentage of available chlorine in bleaching powder.
5. Measurement of chloride, sulphate and salinity of water samples by simple titration method ($AgNO_3$ and potassium chromate).
6. Estimation of total alkalinity of water samples (CO_3^{2-}, HCO_3^-) using double titration method.
7. Measurement of dissolved CO_2.
8. Study of some of the common bio-indicators of pollution.
9. Estimation of SPM in air samples.
10. Preparation of borax/ boric acid.

Reference Books:

1. Dara S. S., A Textbook on Experiments and Calculations in Engineering Chemistry S Chand & Company; 9th Revised edition (2015).
2. E. Stocchi: *Industrial Chemistry*, Vol-I, Ellis Horwood Ltd. UK.
3. R.M. Felder, R.W. Rousseau: *Elementary Principles of Chemical Processes*, Wiley Publishers, New Delhi.
4. A. Kent: Riegel's *Handbook of Industrial Chemistry*, CBS Publishers, New Delhi.
5. S. M. Khopkar, *Environmental Pollution Analysis*: Wiley Eastern Ltd, New Delhi

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SKILL ENHANCEMENT COMPULSORY COURSES (SECC)

Optional for SECC II paper

Skill Enhancement Compulsory Courses (SECC Option-I)

PESTICIDE CHEMISTRY

(Credits-02) Max. Marks: 50

THEORY (Each class 1 hr.): (Mid Sem – 10; End Sem – 40)

30 Lectures

Unit-I

General introduction to pesticides (natural and synthetic), benefits and adverse effects, changing concepts of pesticides, structure activity relationship.

Unit- II

Synthesis and technical manufacture and uses of representative pesticides in the following classes: Organochlorines (DDT, Gammexene); Organophosphates (Malathion, Parathion).

Unit- III

Synthesis and technical manufacture and uses of representative pesticides in the following classes:

Carbamates (Carbofuran and carbaryl); Quinones (Chloranil), Anilides (Alachlor and Butachlor).

Unit-IV

Ecofriendly pesticides.

Safety measures: Environmental aspects and degradability.

Reference Book:

1. R. J. W. Cremlyn: *Pesticides:* John Wiley and Sons Ltd (1978)
2. D.S. Reddy, M. Pushpa Latha, Pesticides, New Vishal Publications (2015).
3. Roy N. K., Chemistry of Pesticides. CBS Publisher & Distributors P Ltd; 1st Ed. (2010)

Skill Enhancement Courses (SECC Option-II)

FUEL CHEMISTRY

(Credits-02)-Max. Marks: 50

THEORY (Each class 1 hr.): (Mid Sem – 10; End Sem – 40)

30 Lectures

Unit- I

Review of energy sources (renewable and non-renewable). Classification of fuels and their calorific value

Unit- II

Coal: Uses of coal (fuel and nonfuel) in various industries, its composition, carbonization of coal. Coal gas, producer gas and water gas—composition and uses. Fractionation of coal tar, uses of coal tar bases chemicals, requisites of a good metallurgical coke, Coal gasification (Hydro gasification and Catalytic gasification), Coal liquefaction and Solvent Refining.

Unit -III

Petroleum and Petrochemical Industry: Composition of crude petroleum, Refining and different types of petroleum products and their applications.

Fractional Distillation (Principle and process), Cracking (Thermal and catalytic cracking), Reforming Petroleum and non-petroleum fuels (LPG, CNG, LNG, bio-gas, fuels derived from biomass), fuel from waste, synthetic fuels (gaseous and liquids), clean fuels. Petrochemicals: Vinyl acetate, Propylene oxide, Isoprene, Butadiene, Toluene and its derivatives Xylene.

Unit- IV

Lubricants: Classification of lubricants, lubricating oils (conducting and non-conducting) Solid and semisolid lubricants, synthetic lubricants.

Properties of lubricants (viscosity index, cloud point, pore point) and their determination.

Reference Books:

1. E. Stocchi: *Industrial Chemistry*, Vol -I, Ellis Horwood Ltd. UK.
2. P.C. Jain, M. Jain: *Engineering Chemistry*, Dhanpat Rai & Sons, Delhi.
3. B.K. Sharma: *Industrial Chemistry,* Goel Publishing House, Meerut.

List of topics included in CBCS syllabus requiring training of College Teachers for 21 days

Theory (15 days)

1. Quantum Chemistry
2. Organometallics
3. Coordination Chemistry
4. Polymer Chemistry
5. Green Chemistry
6. Organic Chemistry

Practical (6 days)

1. Green chemistry and other new practical’s introduced in the new CBCS syllabus

List of minimum instrument required for undertaking practical classes of UG-CBCS in Chemistry (Core and DSC Practicals)

Sl.	Name of the instrument	Numbers
1.	Ostwald’s viscometer	02
2.	Tensiometer (Surface tension measurements)	01
3.	Digital pH-meter with accessories	02
4.	Digital Conductivity meter with accessories	02

5.	Potentiometer with accessories	01
6.	Colorimeter	01
7.	Calorimeter with accessories (precision thermometer)	01
8.	Visible spectrophotometer (single beam)	01
9.	Magnetic stirrer (with/without hot plate)	02
10.	Heating mantle	01
11.	Melting point apparatus	02
12.	Vacuum pump for filtration	01
13.	Single distillation units (All glass) 2lit/hr capacity	02
14.	Single pan digital balance with precision 0.01 gm and 0.001 gm	02
15.	Water bath (Electrical)	01
16.	Fume hood	01
17.	Kipp’s apparatus (PP)	02
18.	Fire extinguishers	02
19.	Aspirator for chromatographic developer	01
20.	Air oven (up to 300ºC)	01
21.	Microwave oven (kitchen quality)	01

22.	Small lab accessories like glassware, plastic wares, laboratory wires and other small accessories as per requirement.	

STATE MODEL SYLLABUS FOR UNDERGRADUATE COURSE IN COMMERCE

(Bachelor of Commerce Examination)

UNDER

CHOICE BASED CREDIT SYSTEM

U.G. Commerce Common Syllabus, Odisha

Paper	Subject	Paper Code	Full Marks	End-term Marks	Mid-term Marks	Credit Points
	Semester I					
1.1	Environmental Science	AECC -1	100	80	20	4
1.2	Financial Accounting	CORE-1	100	80	20	6
1.3	Business Law	CORE-2	100	80	20	6
1.4	Micro Economics	GE-1	100	80	20	6
	Total		**400**			**22**
	Semester II					
2.1	MIL	AECC-2	100	80	20	4
2.2	Cost Accounting	CORE-3	100	80	20	6
2.3	Corporate Law	CORE-4	100	80	20	6
2.4	Macro & Indian Economy	GE-2	100	80	20	6
	Total		**400**			**22**
	Semester III					
3.1	Corporate Accounting	CORE-5	100	80	20	6
3.2	Income-tax Law and Practice	CORE-6	100	80	20	6
3.3	Management Principles and Application	CORE-7	100	80	20	6
3.4	Business Statistics	GE-3	100	80	20	6
3.5	E-Commerce	SEC-1	100	80	20	4
	Total		**500**			**28**
	Semester IV					
4.1	GST and Indirect Taxes	CORE-8	100	80	20	6
4.2	Fundamentals of Data Management (End Term Exam = 60, Practical = 25, Mid-term = 15	CORE-9	100	60 25 Practical	15	6
4.3	Management Accounting	CORE-10	100	80	20	6
4.4	Principles of Marketing	GE-4	100	80	20	6
4.5	Entrepreneurship Development and Business Ethics	SEC-2	100	80	20	4
	Total		**500**			**28**
	Semester V					
5.1	Computerized Accounting & E-filling of Tax Returns (End Term Exam = 60, Practical = 25, Mid-term = 15	CORE-11	100	60 25 Practical	15	6
5.2	Fundamentals of Financial	CORE-12	100	80	20	6

	Management						
5.3	Elective I (Any *one* of the following)		DSE-1	100	80	20	6
	A. Accounting and Finance	Financial Markets, Institutions &Services					
	B. Banking and Insurance	Indian Banking and Insurance System					
	C. Management	Human Resource Management					
5.4	Elective II (Any *one* of the following)		DSE-2	100	80	20	6
	A. Accounting and Finance	Financial Statement Analysis and Reporting					
	B. Banking and Insurance	Merchant Banking and Financial Services					
	C. Management	International Business					
	Total			**400**			**24**
	Semester VI						
6.1	Auditing and Corporate Governance		CORE-13	100	80	20	6
6.2	Business Mathematics		CORE-14	100	80	20	6
6.3	Elective III (Any *one* of the following)		DSE-3	100	80	20	6
	A. Accounting and Finance	Fundamentals of Corporate Tax Planning					
	B. Banking and Insurance	Fundamentals of Investment					
	C. Management	Consumer Affairs and Customer Care					
6.4	Business Research Methods and Project work	End Term Exam = 50 Project = 30 Viva-voce = 20	DSE-4	100	50 30 Project 20 Viva-voce		6
	Total			**400**			**24**
	Grand Total			**2600**			**148**

COMMERCE

HONOURS PAPERS:

Core course – 14 papers
Discipline Specific Elective – 4 papers
Generic Elective for Non Commerce students – 4 papers. (Universities can exercise option of prescribing 2 GE in which case GE from Commerce will have two papers, GE1 and GE2 only)
Marks per paper - Midterm : 20 marks, End term : 80 marks, Total – 100 marks
Credit per paper – 6
Teaching hours per paper – 50 hours + 10 hours tutorial

(CORE – 1)

FINANCIAL ACCOUNTING

Objectives: The objective of this paper is to help students to acquire conceptual knowledge of financial accounting and to impart skills for recording various kinds of business transactions.

Unit - I. (a) Basics of Accounting

i. Accounting as the language of business and an information system, the users of financial accounting information and their needs. Qualitative characteristics of accounting information, Functions, advantages and limitations of accounting. Branches of accounting. Bases of accounting: cash basis and accrual basis.
ii. The nature of financial accounting principles – Basic concepts and conventions: entity, money measurement, going concern, cost, realization, accruals, periodicity, consistency, prudence (conservatism), materiality and full disclosures and Accounting Equation.

(b)Accounting Process

From recording of business transactions to the preparation of trial balance including adjustments: journal, sub-division of journal, ledger accounts, trial balance

Unit – II: Reporting Standards &Business Income

i. Concepts of AS, Ind AS (Indian Accounting Standards), IFRS (International Financial Reporting Standards) & XBRL (extensible Business Reporting Language)
ii. Measurement of business income-Net income: the accounting period, the continuity doctrine and matching concept. Objectives of measurement and revenue recognition.
iii. Depreciation Accounting: The accounting concept of depreciation. Factors in the measurement of depreciation. Methods of computing depreciation: straight line method and

diminishing balance method; Disposal of depreciable assets-change of method. Salient features of Accounting Standard 6 (AS- 6) issued by ICAI

Unit – III: Final Accounts

Capital and revenue expenditures and receipts, Preparation of financial statements of Sole Trade and Partnership Business with adjustments

Accounting for Partnership Firm: Accounting of Admission of partner, Retirement and Death of partner and Dissolution of the Partnership Firm Including Insolvency of partners

Unit – IV:

i. Hire Purchase and Instalment Systems and Accounting for Branch & Department
ii. Concepts of operating and financial lease (theory only)
iii. Departmental Accounting and Branch Accounting including foreign branch (Theory and Problem)

iv. Hire purchase and Instalment System

Learning Outcomes: The course structure of this paper would equip the students to get in-depth knowledge of financial accounting along with its practical application thereby giving an opportunity to gain easy access to this competitive business world.

Text Books Recommended

1. Financial Accounting I and Financial Accounting II: Mukherjee, Oxford University Press
2. Jain, S.P. and K.L. Narang. Financial Accounting, Kalyani Publishers, New Delhi

Suggested Readings:

1. Financial Accounting, R.K. Mittal , M.R. Bansal, V.K, Global Publication.
2. Bal Ranjan Kumar, Financial Accounting – S. Chand
3. Text Book of Financial Accounting-Anil Kumar and Mariappa- Himalaya Publishing House
4. Financial Accounting - P. C. Tulsiani, Pearson Publication

5. Anthony, R.N. Hawkins, and Merchant, Accounting: Text and Cases. McGraw-Hill Education.
6. Bansal.K.M- Financial Accounting – Taxman Publication
7. Horngren, Introduction to Financial Accounting, Pearson Education.
8. Maheshwari, S.N. and. S. K. Maheshwari. Financial Accounting. Vikas Publishing House, New Delhi.
9. Compendium of Statements and Standards of Accounting. The Institute of Chartered Accountants of India, New Delhi
10. N.Godwin and D. Sanyal, Financial ACCT, Cengage Learning

(CORE – 2)

BUSINESS LAW

Objective: The objective of the course is to impart basic knowledge of the important business laws along with relevant case laws.

Unit I: The Indian Contract Act, 1872

1. Contract – meaning, characteristics and kinds, Essentials of a valid contract
2. Offer and acceptance (Definition, Rules, Communication and Revocation of offer and acceptance)
3. Consideration (Definition, Elements, Types, Rules), "No Consideration No Contract" and its exceptions; Capacity to Parties (Definition and Types)
4. Consent, Free consent, Coercion, Undue Influence, Fraud, Misrepresentation, Mistake
5. Legality of objects and Consideration
6. Void and Voidable agreements – Definition, Types and Distinction
7. Discharge of a contract – Modes of discharge, Breach and Remedies against breach of contract
8. Specific Contracts - Contingent contracts, Quasi, Contract of Indemnity, Guarantee, Bailment, Pledges

Unit II: The Sale of Goods Act, 1930

1. Contract of sale, meaning and difference between sale and agreement to sell
2. Conditions and warranties
3. Transfer of ownership in goods including sale by a non-owner
4. Unpaid seller – meaning, rights of an unpaid seller against the goods and the buyer

Consumers Protection Act, 1986 and Right to Information Act

a. Objectives and features of Consumers Protection Act
b. Definitions – Complainant, Complaint, Consumer, Consumer Dispute, Defect, Deficiency, District Forum, Person
c. Unfair trade practices
Consumer Protection Council (Central, State and District – their constitutions and objectives

Unit III: Partnership Laws

A. The Partnership Act, 1932
a. Definition – Partner, Partnership
b. Nature and Characteristics of Partnership
c. Types of Partners
d. Registration of a Partnership Firms and consequences of non-registration
e. Rights and Duties of Partners
f. Dissolution of firms – meaning and grounds
B. The Limited Liability Partnership Act, 2008
a. Definition
b. Salient Features of LLP

c. Advantages and disadvantages of LLP
d. Differences between: LLP and Partnership, LLP and Company
e. Incorporation of LLP

Unit IV: The Negotiable Instruments Act 1881

a. Definition, Features, Types, Parties of Negotiable Instruments: Promissory Note, bill of exchange, Cheque (Definition and Types)
b. Endorsement: Meaning and Types of Endorsement
c. Holder and Holder in Due Course, Privileges of Holder in Due Course.
d. Dishonour of Negotiable Instruments: Modes, Consequences, Notice of Dishonour; Noting and Protesting
e. Discharge of Negotiable Instruments: Meaning and Modes

Learning Outcomes: The students would be able to deal with the legal aspect of different business situations.

Text Books Recommended

1. Business Law, Garg K.C., Saareen,Sharma, Kalyani Publishers
2. Kumar, R. Legal Aspects of Business, Cengage Learning

Suggested Readings:

1. Arora Sushma – Business Law – Taxmann Publication
2. A Book of Business Laws-Jena B and Mohapatra-Himalaya Publishing House
3. Business Law, Ashok Sharma, V.K. Global Publication.
4. Business Laws: Das & Roy, Oxford University Press
5. Business Law- S K Matta, Geetika Matta, Vrinda Publications (P) Ltd
6. Business Law - Tejpal Singh, Pearson Publication
7. Kuchhal, M.C. and Vivek Kuchhal, Business Law, Vikas Publishing House, New Delhi.
8. Tulsian, P.C, Business Law, S.Chand
9. Maheshwari & Maheshwari, Business Law, National Publishing House, New Delhi.

(Core-3)

COST ACCOUNTING

Objective: To acquaint the students with basic concepts used in cost accounting, various methods involved in cost ascertainment.

CONTENTS:

Unit- 1:

Introduction to Cost Accounting: Meaning, concept, scope, objectives, principles, importance and limitations of cost accounting; Implementation of costing system; Methods & Techniques of costing; Cost concepts and Cost Sheet, Job costing and Batch Costing.

Unit – II:

Accounting for Material: Concept and technique of accounting for material; Methods of pricing of materials issues – FIFO, LIFO and Average; Treatment of material losses; Techniques of material control – level setting, Economic Ordering Quantity, ABC Analysis, VED Analysis, Perpetual inventory system, & Just-In-Time.

Unit – III:

Accounting for Labour:

Accounting for labour cost, control procedure, labour turnover, idle time, overtime, Methods of wage payment and the Incentive schemes- Halsey, Rowan, Taylor's Differential piece wage plan.

Accounting for Overheads:

Classification, Allocation & Apportionment of production overheads; Re-apportionment of Service department overheads; Absorption of overheads, methods of absorption – actual and predetermined rates, blanket and multiple rates, choice of an overhead absorption rate; Administration, selling and distribution overheads; Under absorption and over absorption of overheads.

Unit – IV:

Methods of Costing: Contract costing: Features and procedure of contract costing, uncompleted contract profit determination, Escalation clause, cost plus contracts.Process costing: Meaning and characteristics of Process costing, Procedure for process costing, treatment of process losses and wastages.

Learning Outcome: After the completion of this paper, the students will be able to have confidence in managing cost issues and also to keep a check on cost control and taking managerial decisions.

Text Books Recommended

1. Cost Accounting-Arora MN A- Himalaya Publishing House
2. Nigam, B.M. Lall and I.C. Jain. Cost Accounting: Principles and Practice. Prentice Hall of India, New Delhi.

Suggested Reading:

1. Jain, S.P. and K.L. Narang. Cost Accounting: Principles and Methods. Kalyani Publishers, Jalandhar.
2. Cost accounting, S.P. Gupta/ A Sharma- V.K. Global Publishing Pvt. Ltd.
3. Cost & Management Accounting I: Mitra, Oxford University Press.
4. Cost & Management Accouning, Taxmann Publications
5. Colin Drury, Management and Cost Accounting, Cengage Learning

6. Lal, Jawahar. Cost Accounting. Tata McGraw Hill Publishing Co., New Delhi.
7. Arora, M.N. Cost Accounting – Principles and Practice. Vikas Publishing House, New Delhi.
8. Lal, Jawahar. Advanced Management Accounting Text and Cases. S. Chand & Co., New Delhi.
9. Cost Accounts - Datar and Rajan, Pearson Publication

(Core-4)

CORPORATE LAWS

Objectives: The objective of the course is to impart basic knowledge of the provisions of the Companies Act, 2013 and the Depositories Act, 1996. Case studies involving issues in corporate laws are required to be discussed.

Contents:

Unit – I: INTRODUCTION TO COMPANY

Meaning and Definition – Features –, High Lights of Companies Act 2013 - Body Corporate ,Kinds of Companies (Concept, Definition and Features) – One Person Company, Private Company, Public Company, Company limited by Guarantee, Company limited by Shares, Holding Company, Subsidiary Company, Government Company, Associate Company, Small Company, Foreign Company, Listed Company, Dormant company

FORMATION OF A COMPANY

Steps in formation of a Company, Promotion Stage, Meaning of Promoter, Position of Promoter & Functions of Promoter, Incorporation Stage – Meaning, Contents, Forms of Memorandum of Association & Articles of Association and its alteration, Distinction between Memorandum of Association and Articles of Association, Certificate of Incorporation, Subscription Stage – Meaning & contents of Prospectus, Types, Mis-statement in prospectus and its consequences.

Unit - II: COMPANY ADMINISTRATION

Director (Concept and Definition), DIN, Qualification, Disqualification, Appointment, Position, Rights, Duties, Power, Resignation, Liabilities, Removal and Resignation of director, Key Managerial Personnel (Definition, Appointment and Qualifications) – Managing Director, Whole time Directors, the Companies Secretary, Chief Financial Officer, Resident Director, Independent Director, Women director.

Unit - III: SHARE CAPITAL & DEBENTURE

Share and Share Capital - Types and Definition, Allotment and Forfeiture, Calls on Shares, ESOP, Buyback, Sweat Equity, Bonus, Right, Capital Reduction, Share Certificate, D-mat System, Transfer and Transmission, Redemption of Preference Shares, Debenture – Definition, Types, Rules Regarding Issue of Debenture, Rules regarding Dividend and distribution of dividend.

Unit - IV: CORPORATE MEETINGS

Corporate Meetings - Shareholder and Board, Types of Meetings – Annual General Meeting Extraordinary General meeting, Minutes of Proceedings of General Meeting, Meeting of BOD and other meetings (Section 118), Requisite of Valid Meeting- Notice, Agenda, Chairman, Quorum, Proxy, Resolutions, Minutes, Postal Ballot, E- voting, Video Conferencing,

Learning Outcomes: Students would acquire knowledge about the legal framework and the ways and means to deal with the legal aspect of different situations of corporate sector.

Text Books Recommended

1. Corporate Laws-Maheswari, Maheswari- Himalaya Publishing House
2. Corporate Law, Ashok Sharma, V.K. Global Publishing Pvt. Ltd., New Delhi

Suggested Readings:

1. **A** Compendium of Companies Act 2013, along with Rules, by Taxmann Publications.
2. Corporate Law, Gupta,Garg,Dhingra, Kalyani Publication
3. Company Law: Roy & Das, Oxford University Press.
4. Kumar, R., Legal Aspects of Business, Cengage Learning
5. Corporate Law– S K Matta, Geetika Matta, Vrinda Publications (P) Ltd
6. Arora &Banshal, Corporate Law – Vikash Publication
7. Gogna, P.P.S – Company Law, S. Chand
8. MC KuchhalCorporate Laws, Shri Mahaveer Book Depot. (Publishers).
9. GK Kapoor& Sanjay Dhamija, Company Law, Bharat Law House.

(Core-5)

CORPORATE ACCOUNTING

Objectives: To help the students to acquire the conceptual knowledge of the corporate accounting and to learn the techniques of preparing the financial statements.

Contents:

Unit – I

Meaning of Company; Maintenance of Books of Accounts; Statutory Books; Annual Return Company – Issue of Shares – issue, forfeiture, reissue, issue other than cash consideration and issue to the promoters; Pro-rata issue of shares. Issue of Right and Bonus Share – Rules,

Accounting for debentures: Issue of debenture, Underwriting of shares and debentures: Determination of Underwriters Liability – with marked, unmarked & firm underwriting; Accounting of Employee Stock Option Plan – meaning; rules; Vesting Period; Exercise Period, Accounting for ESOP and Accounting of ESPS.

Unit – II: Redemption of Preference shares & Debentures

Buy Back of Securities: meaning, rules and accounting. Redemption of Preference Shares – Rules and Accounting (with and without Bonus Shares) ; Redemption of Debenture – Important Provisions, Redemption of debenture

Accounting for Redemption: by conversion, by lot, by purchase in the open market (cum and ex-interest), held as Investment and Use of Sinking Fund

Unit – III: Company's Final Accounts

Introduction to Schedule III of Companies Act 2013; Treatment of Tax; transfer to reserve, Dividend and applicable tax (out of current profit, out of past reserve); Preparation of Statement of Profit & Loss and Balance Sheet. (tax on net profit without recognizing deferred tax)

Valuation of Goodwill & Shares

Goodwill – valuation using different methods, i.e., Average Profit, Super Profit, Capitalization and Annuity.
Shares – Valuation using different methods: Asset approach, Earnings approach, Dividend Yield, Earnings-Price, Cum-div and Ex-div, Majority and Minority view and Fair Value

Unit – IV: Liquidation

Meaning of liquidation, modes of winding up, consequences of winding up, statement of affairs, liquidator's final statement of account, list 'B' contributories

Learning Outcomes: This paper can provide conceptual clarity about the techniques to prepare financial statements of companies along with accounting treatment of various situations viz. floating of shares, amalgamation and liquidation of companies.

Text Books Recommended

1. Jain, S.P. and K.L. Narang. Corporate Accounting. Kalyani Publishers, New Delhi.
2. Maheshwari, S.N. and S. K. Maheshwari. Corporate Accounting. Vikas Publishing House, New Delhi.

Suggested Readings:

1. Sehgal, Ashok and Deepak Sehgal. Corporate Accounting. Taxman Publication, New Delhi.
2. Corporate Accounting, R.K. Mittal? S. Ahuja- V .K. Global Pub. Pvt. Ltd, New Delhi.
3. Corporate Accounting – Anil Kumar, Mariappa- Himalaya Publishing House
4. Tulsian, P.C, Corporate Accounting, S. Chand
5. Monga, J.R. Fudamentals of Corporate Accounting. Mayur Paper Backs, New Delhi.
6. Gupta, Nirmal. Corporate Accounting. SahityaBhawan, Agra.
7. Bhushan Kumar Goyal, Fundamentals of Corporate Accounting, International Book House

(Core-6)

INCOME TAX LAW AND PRACTICE

Objective: To provide basic knowledge and equip students with the application of principles and provisions of Income Tax Act 1961.

Contents:

Unit I :

a. Basic Concepts and Definitions under IT Act: Assessee, Previous year, Assessment year, Person, Income, Sources of income, Heads of income, Gross total income, Total income, Maximum marginal rate of tax, Tax Evasion, Tax avoidance and Tax planning

b. Residential Status and Incidence of Tax, Residential status of all persons except company

c. Incomes which do not form part of Total Income Except section 10AA.

d. Agricultural Income Definition, determination of agricultural and non-agricultural Income, assessment of tax liability when there is both agricultural and non-agricultural income

Unit II:

Heads of Income and Provisions governing Heads of Income

a) Income from Salary
b) Income from House property

Unit III:Heads of Income and Provisions governing Heads of Income

a) Profits and Gains of Business and Profession Special emphasis on sec. 32, 32AC, 32AD, 35, 35D, 36(i)(ib), (ii), (iii), (iv), (vii), 37, 37(2B), 40A(2), 40A(3), 43B, (Excluding presumptive taxation)

b) Capital Gains

Meaning and types of capital assets, basic concept of transfer, cost of acquisition, cost of improvement and indexation, computation of STCG and LTCG, exemptions u/s 54, 54B, 54EC and 54F, capital gain on transfer of bonus shares, right entitlement and right shares, taxability of STCG and LTCG.

c) Income from Other Sources

Basis of charge excluding deemed dividend

Unit IV:

a)**Income of other Persons** included in Assessee's Total Income Remuneration of spouse, income from assets transferred to spouse and Son's wife, income of minor.

b) Set off and Carry Forward of Losses

Mode of set off and carry forward, inter source and inter head set off, carry forward and set off of losses u/s 71B, 72, 73, 74, 74A.

c) Deductions from Gross Total Income

Basic concepts, deductions u/s 80C, 80CCC, 80CCD, 80CCE, 80D, 80DD, 80DDB, 80E, 80G, 80GG, 80GGC, 80TTA, 80U

d) Rebate u/s 87A

Computation of Total Income and Tax Payable

a) Rate of tax applicable to individual assessee
b) Computation of tax liability of an individual
c) Provision for Filing of Return Date of filing of return, relevant forms of return, different types of returns, return by whom to be signed, PAN, TAN
d) Assessment of Return Self assessment u/s140A, Summary assessment u/s 143(1), Scrutiny assessment u/s 143(3) and Best judgement assessment u/s 144.
e) Advance Tax Who is liable to pay, due dates and computation of advance tax (excluding corporate assessees)
f) Interest & Fees Section 234A, 234B, 234C, 234F
g) TDS Provisions regarding TDS from salary, interest on securities, horse racing, lottery.

Learning Outcomes: This paper would provide the understanding of various provisions of Income Tax Act as well as equip the students to make practical applications of the provisions for taxation purpose.

Text Books Recommended

1. Gour and Narang, Income tax: Law and practice, kalyani Publishers
2. Dr. Vinod Kumar Singhania, e-filing of Income Tax Returns and Computation ofTax,
3. Taxmann Publication Pvt. Ltd, New Delhi. Latest version.

Suggested readings:

1. Income tax Law and practice, Makta Jain/ Rakesh Jain, V.K. Global Pub. Pvt. Ltd., New Delhi
2. Income Tax Law and Pratcice-Saha, Dash- Himalaya Publishing House.
3. Pagare, Dinkar. Law and Practice of Income Tax. Sultan Chand and Sons, New Delhi.
4. Lal, B.B. Income Tax Law and Practice. Konark Publications, New Delhi.

(Core-7)

MANAGEMENT PRINCIPLES &APPLICATIONS

Objective:

The objective of the course is to provide the student with an understanding of basic management concepts, principles and practices.

Unit-I: Introduction:

Management-definition, importance, functions, nature-as profession, science and art, universality of management; levels of management; managerial tasks and skills

Different Schools of Thoughts: Classical School-contributions of Taylor and Henri Fayol; Neo-classical school-Human Relations approach and Behavioral Science Approach; Modern School; System approach and Contingency approach

Unit-II: Planning:

Concept, importance, steps, types, premises, barriers to effective planning and remedial measures; strategic planning-concept forecasting –concept, techniques.

Organizing:

Concept, importance, principles, different organization models-line and staff; Functional; Departmentation-need, basis, principles, Delegation of Authority-elements, steps barriers; Centralization and Decentralization of Authority; Span of Management; concept and determining factors

Unit-III: Directing and Staffing:

Directing: concepts, importance of directing,

Leadership: Concept, importance, types, leadership traits, Tannenbaum & Schmidt's Model and Blake & Mouton's Model.

Staffing: concepts, importance

Unit- IV: Motivation, Co-ordination and Control:

Motivation: Concept, importance, importance of need theory, and contributions of McGregor, Maslow, Herzberg.

Coordination: concepts, importance, principles and implementation techniques. Control: concepts, importance and tools of control.

Learning Outcomes: Students would be able to make use of different management principles in the course of decision making in different forms of business organizations.

Text Books Recommended

1. Pany Tushar K , Management Principles and Application, Kalyani
2. Prasad, L.M. Principles and Practice of Management, Sulatan Chand

Suggested Readings:

1. Sharma gupta , Management: Principles and application , Kalyani Publishers
2. R. K . Singhal, Management Principle and application, V.K. Global Pub. Pvt. Ltd, New Delhi.
3. Management Principles and Applications-Jhunjhunwala J Mohanty- Himalaya Publishing House
4. Principles of Management: Mitra, Oxford University Press.
5. Griffin, R.W. – Management :Principles& Practices, Cengage Learning
6. Gupta R.N - Principles & Practice of Management – S. Chand
7. A K Jha, Management Principles and Application - Vrinda Publications (P) Ltd.
8. Chandan J.S – Management Concepts of Strategy – Vikash Publication
9. B.P. Singh and A.K.Singh, Essentials of Management, Excel Books
10. TN Chhabra, Management Concepts and Practice, DhanpatRai& Co. (Pvt. Ltd.), New Delhi

11. Peter F Drucker, Practice of Management, Mercury Books, London

(Core-8)

GST & INDIRECT TAX

OBJECTIVE:

The objective is to equip students with the principles and provisions of Goods and Services Tax (GST), which is, implemented from 2017 under the notion of One Nation, One Tax and One Market and to acquaint students with basic provisions of GST Law and basic working knowledge.

Unit I- INTRODUCTION TO GOODS AND SERVICES TAX (GST)

Introduction to GST : Introduction, Constitutional provisions regarding Taxation In India, Pre-GST Indirect Taxation Structure in India, What is GST, Need for GST in India, Overview and Genesis of GST IN INDIA, GST objectives, Scope of GST, Salient features of GST, GST and Centre-State Financial Relations, The Constitution (122nd Amendment) Bill, Constitutional Amendments required for introduction of GST Indirect Taxes subsumed Post-GST : Principles for subsuming taxes under Goods & Services Tax (GST) in India, Indirect Taxes and Levies subsumed in GST, Events that have led to the introduction of GST, DUAL GST : Benefits of Dual GST, Structure Of Dual Model of GST , Key Features of Dual Model of GST, Benefits of implementing GST, CENTRAL GST – STATE / UNION TERRITORY GST – INTEGRATED GST and GST Cess, Pre-GST Regime Vs. GST Regime, Indirect Taxes

Unit II- GST ACTS: (Structure & Terminology)

Salient features of CGST Act, SGST Act (Odisha State), IGST Act, Meaning and Definition of various terms used under GST

(Coverage- Provisions and Illustration)

PROCEDURE RELATING TO LEVY OF, COLLECTION AND EXEMPTION FROM, TAX

PROCEDURE RELATING TO LEVY OF, COLLECTION AND EXEMPTION FROM, TAX: (CGST & SGST)- Meaning and Scope of ‘Supply’ under GST Law, Taxable Person, Time of supply, Place of supply and Value of supply. Computation of Taxable Value and Tax Liability, Composition scheme; INPUT TAX CREDIT; PROCEDURE RELATING TO LEVY, COLLECTION AND EXEMPTION OF IGST; PAYMENT OF TAX, TCS, TDS; PRACTICAL PROBLEMS.

(Coverage- Provisions and Illustration)

Unit III- REGISTRATION, RETURNS AND ASSESSEMENT

REGISTRATION - Persons liable for registration, Persons not liable for registration, Types: Compulsory registration, Voluntary registration, Deemed registration - Procedure for registration, Special provisions for Casual taxable persons and Non-resident taxable persons;

CLASSIFICATION OF GOODS & SERVICES- HSN, SAC; TAX INVOICE AND OTHER SUCH INSTRUMENTS IN GST - Debit Note, Credit Note, Vouchers, Invoice; ACCOUNTS AND RECORDS; RETURN- Process of Return Filing, Furnishing details of outward supplies and inward supplies, First return, Claim of input tax credit, Matching reversal and reclaim of input tax credit, Annual return and Final return; REFUND; OFFENCES AND PENALTIES; ASSESSMENT; AUDIT; APPEALS AND REVISION.

Unit IV- GST Council AND REGULATORY FRAMEWORK

GST COUNCIL: Structure, Powers and Functions. Provisions for amendments; ROLE OF CBEC; Division of Administrative Powers; GST AND TECHNOLOGY- GST Network, GST ECO SYSTEM, GSP, ASP; NATIONAL ANTI-PROFITEERING AUTHORITY IN GST; COMPLIANCE RATING.

Text Books Recommended

1. Swain AK & Agrawal – GST: Concepts and Applications, Himalayan Publishing House.
2. GST Manual:Taxman's Publication Ltd., New Delhi.

Suggested Books:

1. GST and Indirect Taxes,Sanjeet Sharma, V.K. Global Pub. Pvt. Ltd, New Delhi.
2. Mishra, Padhi and Bera – Text Books on GST & Practice, Vikash Publishing House Pvt. Ltd. New Delhi.

(Core-9)

FUNDAMENTALS OF DATA MANAGEMENT

Unit I: Word Processing

Working with word document- Editing text, Find and Replace text, Formatting, Spell check, Autocorrect, Auto text; Bullets and numbering, Tabs, Paragraph Formatting, Indent, Page Formatting, Header and footer, Macros, Drop cap; Tables: Inserting, Filling and formatting a Table, Inserting Pictures and Video; Mail Merge- including linking with Database, Printing documents. Creating Business Documents using the above facilities

Preparing Presentations

Basics of presentations: Slides, Fonts, Drawing, Editing; Inserting: Tables, Images, texts, Symbols, Media; Design; Transition; Animation, Hyperlink and Slideshow. Creating Business Presentations using above facilities

Unit II: Spreadsheet and its Business Applications

Managing worksheets- Formatting, Entering data, Editing, and Printing a worksheet; handling operators in formula, Project involving multiple spreadsheets, Organizing Charts and graphs, Pivot Table

Spreadsheet Functions: Mathematical [SUMIF, SQRT, SUBTOTAL, SUMPRODUCT etc.], Statistical [AVERAGE, STDEV, VAR, CORRELATION, REGRESSION etc.], Financial [PMT, RATE, PV, FV, NPER, IRR, NPV, Data Table Etc.] Logical [AND, OR, IF etc.], Date and Time, lookup and reference, Database and Text functions.

Creating Spreadsheet in the area of: Loan and Lease statement; Ratio Analysis; Payroll Statements; Capital Budgeting; Depreciation Accounting; Graphical Representation of Data; Frequency Distribution and its Statistical Parameters; Correlation and Regression

Unit III: Database Management System

Creation of Tables, Multiple Table Handling-Defining Relationship [Foreign Key], Simple and Conditional Queries, Types of Queries [Update, Delete, Append], Forms, Reports, Introduction to SQL through Basic Commands.

Applying DBMS in the areas of Accounting, Inventory, HRM and its accounting, managing the data records of Employees, Suppliers and Customers

Unit IV: Website Designing

Introduction to HTML; Tags and Attributes: Text Formatting, Fonts, Hypertext Links, Tables, Images, Lists, Forms, Frames, Cascading Style Sheets

Text Books Recommended

1. Coronel and Rob, Database Principles, Cengage Learning
2. Fundamentals of Data Managemnet –Saha RG- Himalaya Publishing House

Suggested Readings

1. Thareja, IT & Application, Oxford
2. Aurora, Computer Fundamentals, Vikash
3. Sinha & Sinha, Fundamentals of Computers, BPB Publications
4. Dhar, P., Fundamental of IT and Its Application in Business, APH

(Core-10)

MANAGEMENT ACCOUNTING

Objective: To acquaint the students with basic concepts of management accounting, and basic understanding of tools and techniques used for managerial decision making.

CONTENTS: `

Unit – I:

Management Accounting: Meaning, nature, scope, and importance of management accounting; Role of management accounting; management accounting vs. financial accounting; Role of management accounting in modern business; Tools and techniques of management accounting.

Unit – II: Ratio Analysis & Cash flow statement

Ratio Analysis:

Meaning and utility of ratios; significance of Ratio analysis; Classification of Ratios – Profitability ratios, Efficiency Ratios, Liquidity Ratios, Solvency Ratios; Advantages and limitations of Ratio Analysis.

Cash flow Statements:

Cash Flow Statements: Meaning and utility of Cash flow statements; Preparation of Cash flow statements – Indirect method; Limitations of Cash flow statements; Cash flow statements vs. Funds flow statements. (Reference to Revised AS-3 and Ind AS-7)

Unit – III:

Absorption & Marginal Costing: P/V Ratio, Break-even analysis, Margin of safety, angle of incidence; Marginal and differential costing as a tool for decision making – make or buy, change of product mix, exploring new markets, shut down decisions.

Unit – IV:

Budgeting & Standard Costing: Concept of budget and budgetary control; objectives, merits and limitations of budgetary system; Master budget, Functional budget, Fixed and Flexible budgets; Zero based budgeting. Standard Costing & Variance Analysis: Meaning of standard cost and standard costing, Advantages and disadvantages of standard costing and variance analysis: Material, Labour, & Overhead.

Learning Outcome: After the completion of this paper, the students will be able to have confidence in managing cost issues and also to keep a check on cost control and taking managerial decisions.

Text Books Recommended

1. Management Accounting, S swain/ S.P. Gupta/ A Sharma, V.K. Global Pub. Pvt. Ltd.,
2. Horngreen, Charles T., Gary L. Sundem. Introduction to Management Accounting.
3. Prentice Hall.

Suggested Reading:

1. Jain & Narang, Management Accounting, Kalyani Publications
2. Management Accounting-M Wilson- Cost Accounting-Jena B,Bal S and Das A-Himalaya Publishing House
3. Narasimhan M.S. , Management Accounting, Cengage Learning
4. Cost & Management Accouning, Taxmann Publications
5. Arora, M.N. Cost Accounting – Principles and Practice. Vikas Publishing House, New Delhi.
6. Maheshwari, S.N. and S.N. Mittal. Cost Accounting: Theory and Problems. Shri

Mahabir Book Depot, New Delhi.

7. Lal, Jawahar. Advanced Management Accounting Text and Cases. S. Chand & Co., New Delhi.
8. Khan, M.Y. and P.K. Jain. Management Accounting. Tata McGraw Hill, Publishing

(Core-11)

COMPUTERIZED ACCOUNTING & E-FILING OF TAX RETURNS

Unit – I: Computerized Accounting Package: Using Generic Software

(a) Company creation, ledger creation, order processing, accounting voucher, inventory voucher, memorandum voucher, invoicing, multiple godown handling, Transfer of materials across godowns, Bank Reconciliation
(b) Cost Centre, Cost Category, Bill of Material (BoM), Budget and Controls
(c) Payroll Accounting
(d) TDS, GST
(e) Back up & Restore, Export and Import data

Unit II: Designing Computerized Accounting System

(a) Introduction to DBMS Package – Table, Query, Form and Report
(b) Designing Computerized Accounting System using DBMS Package
Creating a voucher entry Form, Preparing ledgers, trial balance, profit & loss a/c, and Balance Sheet with Form wizard and Report
(c) Designing Payroll System for Accounting using Form, Query, and Report

Unit-III: E-filing of Tax return

(a) Preparation and submission of the Income Tax Return (ITR) offline/online for individual Taxpayer [e-filing without using DSC and with using DSC, EVC]
(b) View form 26AS, Upload return, View e-file returns, e-verification
(c) Use of e-tax calculator (including interest calculation u/s 234A, 234B, 234C)
(d) E-Pay tax (Challan No./ITNS 280, ITNS 281)
(e) Preparation and submission online form 10E [Relief u/s 89(1)]

Text Books Recommended

1. Software: Singhania, V.K., E-Filing of Income Tax Returns and Computations of Tax, Taxmann

2. Book of Computerized Accoounting and E Filling of Tax Returns-Mohanty R, Dash ALN- Cost Accounting-Jena B,Bal S and Das A- Himalaya Publishing House

Suggested Readings

1. Software: “Excel Utility”, incometaxindiaefiling.gov.in

(Core-12)

FUNDAMENTALS OF FINANCIAL MANAGEMENT

Objective: To familiarize the students with the principles and practices of financial management.

Contents:

Unit – I: Introduction & Basic Concepts

Important functions of Financial Management, Objectives of the firm: Profit maximization vs. Value maximization, Role of Chief Financial Officer. Financial environment in which a firm has to operate, Time Value of Money: concept and reasons, Compounding and Discounting techniques, Concepts of Annuity and Perpetuity. Risk-return relationship (concepts only)

Unit – II: Sources of Finance and Cost of Capital/ Financing Decisions

Different sources of finance; long term and short term sources, Cost of capital: concept, relevance of cost of capital, Implicit and Explicit cost, specific costs (its computation) and weighted average cost (its computation) , rationale of after tax weighted average cost of capital, marginal cost of capital (its computation).

Unit – III: Capital Expenditure Decisions / Long term Financial Decisions & Dividend Decisions

Capital Expenditure Decisions / Long term Financial Decisions

Objectives of Capital Budgeting Process, Concept of Cash flow, Methods of long term investment decisions - Discounted Payback Period, Net Present Value, Profitability Index, Average Rate of Return / Accounting Rate of Return, Internal Rate of Return (Including relative merits and demerits of each of the methods)

Dividend Decisions

Meaning, Natureand Types of Dividend, concept of pay-out ratio, retention ratio Decisions and growth, Dividend policies and formulating a dividend policy, Dividend Theories: Walter’s Model, Gordon’s Model

Unit – IV: Working Capital Management/ Liquidity Management

Meaning and various concepts of Working Capital, Management of Working Capital and Issues in Working Capital, Estimating Working Capital Needs; Operating or Working Capital Cycle,Policies relating to Current Assets – Conservative, Aggressive and Balance, Various sources of finance to meet working capital requirements

Learning Outcome: After the completion of this paper, students will be able to understand finance in a better way along with giving them insight to practical management of long and short finance for real business houses.

Text Books Recommended

1. Rostogi, Fundamentals of Financial Management, Taxmann Publications
2. Fundamental of Financial Management, Sharma, Gupta, Kalyani Publishers**, New Delhi.**

Suggested Readings

1. Fundamentals of Financial Management, Vandana Dangi, V.K. Global Pvt. Ltd., New Delhi
2. Parasuraman – Financial Management : A Step by Step Approach, Cengage Learning
3. Pandey, I.M. Financial Management. Vikas Publications.
4. Financial Management, Himalaya Publishing House
5. BhallaV.K – Financial Management – S.Chand
6. Horne, J.C. Van and Wackowich. Fundamentals of Financial Management. 9thed. New Delhi Prentice Hall of India.

(Core-13)

AUDITING AND CORPORATE GOVERNANCE

Objective: To provide knowledge of auditing principles, procedures and techniques in accordance with current legal requirements and professional standards and to give an overview of the principles of Corporate Governance and Corporate Social Responsibility

Unit-I

Auditing: Introduction, Meaning, Objects, Basic Principles and Techniques; Classification of Audit, Audit Planning, Internal Control – Internal Check and Internal Audit; Audit Procedure – Vouching and verification of Assets & Liabilities

Unit-II

Audit of Limited Companies:

Company Auditor- Qualifications and disqualifications, Appointment, Rotation, Removal, Remuneration, Rights and Duties Auditor's Report-Contents and Types. Liabilities of Statutory Auditors under the Companies Act 2013

Special Areas of Audit:

Special features of Cost audit, Tax audit, and Management audit; Recent Trends in Auditing: Basic considerations of audit in EDP Environment; Standard on Auditing(SA); Relevant Case Studies/Problems;

Unit-III

Corporate Governance: Conceptual framework of Corporate Governance, Corporate Governance Reforms. Major Corporate Scandals in India and Abroad: Common Governance

Problems Noticed in various Corporate Failures. Codes & Standards on Corporate Governance

Unit-IV

Corporate Social Responsibility (CSR): Strategic Planning and Corporate Social Responsibility; Corporate Philanthropy, Meaning of CSR, CSR and CR, CSR and Corporate Sustainability, CSR and Business Ethics, CSR and Corporate Governance, Environmental Aspect of CSR, CSR provision under the Companies Act 2013, CSR Committees

Learning Outcome: At the end of the paper student will have detail knowledge about principles and techniques of audit in accordance with current legal requirement and as per the guidelines of different statutory authorities.

Text Books Recommended

1. Gupta, Kamal and Ashok Arora. Fundamentals of Auditing. Tata Mc-Graw Hill Publishing Co. Ltd., New Delhi.
2. Auditing and corporate governance, Pradeep kumar , Klayani Publishers , New Delhi.

Suggested Readings:

1. Auditing and corporate governance, A. Sharma, V.K. Global Pvt. Ltd.,New Delhi
2. SATHEESH KUMAR Corporate Governance, Oxford University Press.
3. Shikha, N. and Sharma, G. Corporate Governance in India : Principles and Policies, CENGAGE Learning

4. Jha, Aruna. Auditing. Taxmann.
5. Tandon, B. N., S. Sudharsanam and S. Sundharabahu. A Handbook of Practical Auditing. S. Chand and Co. Ltd., New Delhi.
6. Ghatalia, S.V. Practical Auditing. Allied Publishers Private Ltd., New Delhi.
7. Singh, A. K. and Gupta Lovleen. Auditing Theory and Practice. Galgotia Publishing Company.
8. Alvin Arens and James Loebbecke, Auditing: an Integrated Approach
9. MC KuchhalCorporate Laws, Shri Mahaveer Book Depot. (Publishers). (Relevant Chapters)
10. Khanka – Business Ethics & Corporate Governance – Vikash Publication
11. Auditing Principles and Techniques - S. K. Basu, Pearson Publication

(Core-14)

BUSINESS MATHEMATICS

Objective: The objective of this course is to familiarize the students with the basic mathematical tools with emphasis on applications to business and economic situations.

Contents:

Unit I Matrices and Determinant

Algebra of matrices., Inverse of a matrix, Matrix Operation – Business Application Solution of system of linear equations (having unique solution and involving not more than three variables) using matrix inversion Method and Cremer's Rule.

Unit II Calculus

Calculus I

Mathematical functions and their types- linear, quadratic, polynomial, exponential, logarithmic and logistic function. Concepts of limit and continuity of a function, Concept and rules of differentiation, Maxima and Minima involving second or higher order derivatives

Calculus II

Integration: Standard forms. Methods of integration – by substitution, by parts and by use of partial fractions, definite integration, Finding areas in simple cases, Application of Integration to marginal analysis. Consumer's and Producer's Surplus, Rate of Sales and the Learning Curve.

Unit III Mathematics of Finance

Compounding and discounting of a sum using different types of rates. Types of annuities, like ordinary, due, deferred, continuous, perpetual, and their future and present values using different types of rates of interest. Depreciation of Assets (General annuities to be excluded)

Unit IV Linear Programming (Use of Excel spreadsheet & Other mathematical software)

Formulation of linear programming problems (LPP): Graphical solution to LPPs. Cases of unique and multiple optimal solutions, Unbounded solutions and infeasibility, Solution to LPPs using Simplex method – maximization and minimization cases, PERT and CPM (simple Problem)

Learning Outcome: After reading this subject the students will be able to understand basic concepts in the areas of business calculus and financial mathematics and to connect acquired knowledge with practical problems in economic practice.

Text Books Recommended

1. Business Mathematics, Patri and Patri, Kalyani Publishers, New Delhi
2. Business Mathematics - S K Sahoo, Vrinda Publications (P) Ltd.

Suggested Readings:

1. Arora P.N. Business Mathematics – S.Chand
2. Business Mathematics, S.C. Agarwal, V.K. Global Pub. Pvt. Ltd., New delhi.

3. GHOSH & SINHA BUSINESS MATHEMATICS & STATISTICS, Oxford university press.
4. Francis, J. Business Statistics, Cengage Learning
5. Anthony, M. and N. Biggs. Mathematics for Economics and Finance. Cambridge University Press.
6. Arora S.R & Gupta K. – Business Mathematics – Taxmann Publication
7. Ayres, Frank Jr. Theory and Problems of Mathematics of Finance. Schaum's Outlines Series. McGraw Hill Publishing Co.
8. Mizrahi and John Sullivan. Mathematics for Business and Social Sciences. Wiley and Sons.
9. Zamirudeen&Bhambri – Business Statistics – Vikash Publication
10. Wikes, F.M. Mathematics for Business, Finance and Economics. Thomson Learning.
11. Prasad, Bindra and P.K. Mittal. Fundamentals of Business Mathematics. Har-Anand Publications.
12. Thukral, J.K. Mathematics for Business Studies. Mayur Publications.
13. Soni, R.S. Business Mathematics. Pitambar Publishing House.
14. Singh J. K. Business Mathematics. Himalaya Publishing House

DSE – 1

Elective – I (Any one of the following Groups)

Group – A: Accounting & Finance

Financial Markets, Institutions, & Services

Objectives: To enable the students to understand the financial institutions operating in India and services provided by them.

Unit-I

Basic Theoretical Framework: The financial system and its technology; The factors affecting the stability of the financial system; Development finance vs. universal banking; Financial intermediaries and Financial Innovation; RBI-Central Banking.

Unit-II: Financial Institutions & Non-Banking Financial Institutions

Financial Institutions:

A brief historical perspective. An update on the performance of IDBI, ICICI, IFCI and SFCs, LIC &GIC, Banking Institutions: Commercial banks - the public and the private sectors - structure and comparative performance, problems of competition; interest rates, spreads, and NPAs. Bank capital - adequacy norms and capital market support.

Non-banking financial institutions:

Evolution, control by RBI and SEBI. A perspective on future role, Unit Trust of India and Mutual Funds, Reserve bank of India Framework for/Regulation of Bank Credit . Commercial paper: Features and advantages, Framework of Indian CP Market, effective cost/interest yield.

Unit-III

Financial services: Asset/fund based Financial services - lease finance, consumer credit and hire purchase finance, factoring definition, functions, advantages, evaluation and forfeiting, bills discounting, housing finance, venture capital financing. Fee-based / Advisory services: Stock broking, credit rating.

Unit-IV

Operations: Financial Assets/ Instruments Rights issues, issue of Debentures, issue of Equity shares - pre-issue activity, post-issue activities. The regulatory framework: SEBI and Regulation of Primary and Secondary Markets, Company Law provisions.

Learning Outcome: After completion of this paper, the students will be able to understand the role and benefits of financial institution and services.

Text Books Recommended

1. Financial Markets, Institutions & Services-Gordon, Natrajan-Himalaya Publishing House
2. Pathak: Indian Financial Systems Pearson Education

Suggested Readings

1. Financial Market and Int. , A. goyal and M. Goyal, V.K. Global Pvt. Ltd., New Delhi
2. Financial Markets , Institutions and Services, Kaur, Talwar, KAlyani Publishers, New Delhi.
3. BHATTACHARYYA INDIAN FINANCIAL SYSTEM 2e, Oxford University Press.
4. M.Y.Khan, Financial Services, Tata McGraw-Hill, New Delhi, 2004.
5. H.R Machiraju, Indian Financial Systems, Vikas Publishing House Pvt. Ltd.2002.
6. Madura, J., Financial Institutions and Markets; Sharma R. and Mehta K. Financial Services, Cengage Learning

DSE – 1

Group B: Banking & Insurance

INDIAN BANKING AND INSURANCE SYSTEM

Objectives: To enable the students to acquire knowledge about basics of banking and insurance.

Unit-I: Concept of Bank and Banking & Types of Customers and Account holders
Concept of Bank and Banking:
Historical Evolution of Banking: Origin and Development of Banking - Structure of Banking in India – Banks and Economic Development –Functions of Commercial banks (conventional and innovative functions) – Central Bank – RBI – functions – Emerging trends in Banking.

Types of Customers and Account holders:
Procedure and practice in opening and operating the accounts of customers - individuals including minors - joint account holders -Partnership firms - joint stock companies - executors and trustees-clubs and associations

Unit-II
Introduction to insurance: Purpose and need of insurance, insurance as a social security tool - insurance and economic development - Principles of insurance -various kinds of insurance - life, marine, fire, medical, general insurance - features.

Unit-III
Life Insurance - Law relating to life Insurance; General Principles of Life Insurance Contract; Proposal and policy; assignment and nomination; title and claims; General Insurance - Law relating to general insurance; different types of general insurance; general insurance Vs life insurance – Insurance business in India.

Unit-IV
Fundamentals of Agency Law: Definition of an agent; Agents regulations; Insurance intermediaries; Agents' compensation. Procedure for Becoming an Agent: Pre-requisite for obtaining a license; Duration of license; Cancellation of license; Revocation or suspension/termination of agent appointment; Code of conduct; Unfair practices. Functions of the Agent: Proposal form and other forms for grant of cover; Financial and medical underwriting; Material information; Nomination and assignment; Procedure regarding settlement of policy claims.

Learning Outcome: After the completion of this paper, the student will acquired practical knowledge of working mechanism of banking and insurance industries in India.

Text Books Recommended

1. M.N. Mishra: Insurance Principles and Practice, S. Chand & Company Ltd, Delhi.
2. Indian Institute of Bankers (Pub) Commercial Banking Vol-I/Vol-II (part I&II) Vol- III.
3. Hota P.K., and Das S.K. Financial Literacy and Banking, Kalyani Publishers

Suggested Readings

1. Dr. P. Periasamy: Principles and Practice of Insurance, Himalaya Publishing House, Delhi.
2. Mishra S. Banking Law and Practice – S Chand
3. Prasad – Banking Insurance – Vikash Publication
4. Inderjit Singh, RakeshKatyal& Sanjay Arora: Insurance Principles and Practices, Kalyani Publishers, Chennai.
5. Sheldon H.P :Practice and Law of Banking.
6. Bedi. H.L :Theory and Practice of Banking.
7. Maheshwari. S.N. :Banking Law and Practice.
8. Shekar. K.C :Banking Theory Law and Practice.
9. Pannandikar&Mithami': Banking in India.
10. Radhaswamy&Vasudevan: Text Book of Banking.
11. Varshaney: Banking Law and Practice.
12. G. Krishnaswamy : Principles & Practice of Life Insurance
13. Kothari &Bahl : Principles and Pratices of Insurance.

DSE – 1

Group – C: Management

Human Resource Management

Objective: The objective of the course is to acquaint students with the techniques and principles to manage human resource of an organization.

Contents:

Unit I: Nature and Scope & Human Resource Planning

Nature and Scope

Concept and meaning of IR &HR, Understanding the Nature and Scope of IR & HRM, Functions and importance

Human Resource Planning

Definition, Need and Features of Human Resource Planning, factors affecting Human Resource Planning

Unit II: Recruitment and Selection

Definition of Recruitment, Source, need and importance of Recruitment, Recruitment Policy process – sources of Recruitment Definition of Selection, Steps in selection.

Unit III: Training and Development

Training and Development Meaning and purpose of training, Benefits of training to organizationand employees -Training methods

Unit IV: Job Evaluation and Performance Appraisal

Job evaluation - objectives, scope, method, Job analysis, Job description, Job Specification - basic concept and significance, Performance Appraisal - Concept

Learning Outcomes: This paper can enhance the capability of the students to manage the most important assets of organization i.e. human beings which is much needed to ensure growth of that organization.

Text Books Recommended

1. Rao V.S.P - Human Resource Management. Vikash Publication
2. Human Resource Management, Sagun Ahuja, V.K. Global Pvt. Ltd., New Delhi

Suggested Readings:

1. Human Resource Management- Satapathy, Taheer and Mohanty—Himalaya Publishing House P Ltd.
2. Human Resource Management, Gupta, Joshi. Kalyani Publishers, New Delhi
3. Marketing Management & Human Resource Management: Verma et.al, Oxford University press.
4. Sinha, P. R. N. Shekhar, S.P.Human Resource Management, Cengage Learning
5. Human Resource Management -Gajendran, A K Jha, Vrinda Publications (P) Ltd
6. DeCenzo, D.A. and S.P. Robbins, "Personnel/Human Resource Management", Prentice Hall of India, New Delhi.
7. Khanka S.S. Human Resource Management. S Chand.
8. Ivancevich, John M. Human Resource Management. McGraw Hill.
9. Wreather and Davis. Human Resource Management. Pearson Education.

DSE-2

Group B: Banking & Insurance

MERCHANT BANKING AND FINANCIAL SERVICES

Objectives: To enable the students to understand the basic knowledge about the financial services available in India.

Unit-I

Merchant Banking: Nature and scope of Merchant Banking - Regulation of Merchant Banking Activity - overview of current Indian Merchant Banking scene - structure of Merchant Banking industry - primary Markets in India and Abroad - professional Ethics and code of conduct - current Development

Unit-II

Financial Services: Meaning and Definition, Role of Financial Services in a financial system. Leasing: Meaning and features. Introduction to equipment leasing: Types of Leases, Evolution of Indian Leasing Industry. Legal Aspects of Leasing: present Legislative Framework. Hire purchase: concept and characteristics of Hire purchase. Difference between hire purchase and leasing

Unit-III

Factoring: concept, nature and scope of Factoring - Forms of Factoring - Factoring vis-à-vis Bills Discounting - Factoring vis-à-vis credit Insurance Factoring vis-à-vis Forfeiting-Evaluation of a Factor - Evaluation of Factoring - Factoring in India current Developments.

Unit-IV

Securitization / Mortgages: Meaning, nature and scope of securitization, securitization as a Funding Mechanism, securitization of Residential Real Estate - whole Loans - Mortgages - Graduated-payment. Depository: Meaning, Evolution, Merits and Demerits of Depository. Process of Dematerialization and Dematerialization, Brief description of NSDL and CDSL

Security Brokerage:

Meaning of Brokerage, types of brokers. Difference between broker and jobber, SEBI Regulations relating to brokerage business in India.

Learning Outcome: After the completion of this course, the student will be able to understand the structure and function of mercantile banking and various financial services available in the present business world.

Text Books Recommended

1. Machiraju, Indian Financial System, Vikas Publishing House, 2nd Edition, 2002.
2. Merchant banking and financial services, Gupta /Gupta, Kalyani Publishers, New delhi

Suggested Readings:

1. M.Y.Khan, Financial Services, Tata McGraw-Hill, 11th Edition, 2008
2. Gopal C.R – Management Financial Service – S.Chand
3. NaliniPravaTripathy, Financial Services, PHI Learning, 2008
4. J.C.Verma, A Manual of Merchant Banking, Bharath Publishing House, New Delhi.
5. Varshney P.N. & Mittal D.K., Indian Financial System, Sultan Chand & Sons, New Delhi.
6. Sasidharan, Financial Services and System, Tata Mcgraw Hill, New Delhi, 1st Edition, 2008.
7. Website of SEBI.

8. Merchant Banking and Financial Services-Sharma M--Himalaya Publishing House

9. Sharma R. and Mehta K. Financial Services, Cengage Learning

DSE – 2

Group – C: Management

INTERNATIONAL BUSINESS

Objective: The objective of the course is to familiarize the students with the concepts, importanceand dynamics of international business and India's involvement with global business. The coursealso seeks to provide theoretical foundations of international business to the extent these arerelevant to the global business operations and developments.

Unit I: Introduction to International Business

a. Introduction to International Business: Globalization and its importance in world economy; Impact of globalization; International business vs. domestic business: Complexities of international business; Modes of entry into international business
b. International Business Environment: National and foreign environments and their components - economic, cultural and political-legal environments,
Issues in International Trade

Unit –II Theories of International Trade and International Organizations

a. Theories of International Trade – an overview (Classical Theories, Product Life Cycle theory, Theory of National Competitive Advantage); Commercial Policy Instruments -tariff and non-tariff measures – difference in Impact on trade, types of tariff and non tariff barriers (Subsidy, Quota and Embargo in detail) ; Balance of payment account and its components.
b. International Organizations and Arrangements: WTO – Its objectives, principles, organizational structure and functioning; An overview of other organizations – UNCTAD,; Commodity and other trading agreements (OPEC).

Unit –III International Financial Environment

a. Regional Economic Co-operation: Forms of regional groupings; Integration efforts among in Europe, North America and Asia (NAFTA, EU , ASEAN and SAARC) .
b. International Financial Environment: International financial system and institutions (IMF and World Bank – Objectives and Functions) ; Foreign exchange markets and risk management; Foreign investments - types and flows; Foreign investment in Indian perspective

Unit –IV Foreign Trade Promotion and Financing of foreign trade

a. Foreign Trade Promotion Measures and Organizations in India; Special economic zones(SEZs) and export oriented units (EOUs), ; Measures for promoting foreign investments into and from India; Indian joint ventures and acquisitions abroad.
b. Financing of foreign trade and payment terms – sources of trade finance (Banks, factoring, for faiting, Banker's Acceptance and Corporate Guarantee) and forms of payment (Cash in advance, Letter of Credit, Documentary Collection, Open Account)

Text Books Recommended

1. Daniels John, D. Lee H. Radenbaugh and David P. Sullivan. International Business.
2. Pearson Education
3. Cherunilam, Francis. International Business: Text and Cases. PHI Learning

Suggested Readings:

1. Charles W.L. Hill and Arun Kumar Jain, International Business. New Delhi: McGraw Hill
    a. Education
2. Johnson, Derbe., and Colin Turner. International Business - Themes & Issues in the Modern
3. Global Economy. London: Roultedge.
4. Michael R. Czinkota. et al. International Business. Fortforth: The Dryden Press.
5. Peng and Srivastav, Global Business, Cengage Learning
6. Subba Rao P – International Business-Himalaya Publishing House
7. JOSHI INTERNATIONAL BUSINESS SITKIN INTERNATIONAL BUSINESS, Oxford University Press.

DSE – 3

Elective – III (Any one of the following Groups)

Group – A: Accounting & Finance

Fundamentals of Corporate Tax Planning

Objective: To provide a conceptual idea about the various provisions of tax planning related to corporate sector.

Contents

Unit-I:

Corporate Tax in India–Concept of Tax planning, Tax management, Tax avoidance, Tax evasion, Assessment year and Financial Year

Residential status of corporate and its incidence of tax, Minimum Alternate Tax, Calculation of Tax Liability.

Unit-II:

Carryforward and set-off of losses and unabsorbed depreciation (headwise)

Unit-III:

Tax Planning with reference to Depreciation, Capital Gain and Scientific Research

Unit-IV:

Corporate Tax returns–Assessment, Return Filing, Penal provision, Double taxation Relief

Learning outcome: After completion of this paper, students will be able to help tax consultants in tax planning, assessment and filing income tax returns of corporate sector, thereby they can get themselves self-employed.

Text Books Recommended

1. Bhagabati Prasad, Direct Tax Laws & Practices
2. Corporate Tax Planning, V.K. Global Publications

Suggested Readings

1. Singhania V.K. Direct Taxes: Law & Practices, Taxmann Publication.
2. Corporate Tax Planning, Kalyani Publishers

DSE – 3

Group B: Banking & Insurance

Fundamentals of Investment

Objective: To familiarize the students with different investment alternatives, introduce them to the framework of their analysis and valuation and highlight the role of investor protection.

Contents

Unit-I:

The Investment Environment- The investment decision process, Types of Investments – Commodities, Real Estate and Financial Assets, the Indian securities market, the market participants and trading of securities, security market indices, sources of financial information, Concept of return and risk, Impact of Taxes and Inflation on return.

Investor Protection

Role of SEBI and stock exchanges in investor protection; Investor grievances and their redressal system, insider trading, investors' awareness and activism.

Unit-II:

Fixed Income Securities- Bond features, types of bonds, estimating bond yields, Bond Valuation types of bond risks, default risk and credit rating

Unit-III:

Approaches to Equity Analysis: Introductions to Fundamental Analysis, Technical Analysis and Efficient Market Hypothesis, dividend capitalization models, and price-earnings multiple approach to equity valuation.

Unit-IV:

Portfolio Analysis and Financial Derivatives:(a) Portfolio and Diversification, Portfolio Risk and Return. (b) Mutual Funds. (c) Introduction to Financial Derivatives, Financial Derivatives Markets in India.

Learning outcome: After completion of this paper, this paper will educate the students about various aspect of investment in detail along with understandability of stock market operation, focusing on need for common investor protection.

Text Books Recommended

1. Bhalla – Fundamentals of Investment – S.Chand
2. Rustogi, R.P., Fundamentals of Investment, Sultan Chand & Sons, New Delhi**.**

Suggested Readings

3. Pandian P. – Security Analysis & Portfolio Management – Vikash Publication
4. Jones, C.P., “Investments Analysis and Management”, Wiley, 8thed.
5. Prasanna, Chandra., “Investment Analysis and Portfolio Management”, Tata McGraw Hill.
6. Vohra, N.D., and B.R. Bagri, “Futures and Options”, McGraw Hill Publishing
7. Mayo, An Introduction to Investment,Cengage Learning.
8. Fundamentals of Investment, Sashi Gupta, Kalyani Publishers, New Delhi,
9. Fundamentals of Investment, Vandana Dangi, V.K. Globa. Pub. Pvt. Ltd. New delhi.
10.

DSE-3

Group – C: Management

Consumer Affairs & Customer Care

Objective: This paper seeks to familiarise the students with of their rights as a consumer, the social framework of consumer rights and legal framework of protecting consumer rights. It also provides an understanding of the procedure of redress of consumer complaints, and the role of different agencies in establishing product and service standards. The student should be able to comprehend the business firms’ interface with consumers and the consumer related regulatory and business environment.

Unit I: Conceptual Framework

Consumer and Markets: Concept of Consumer, Nature of markets, Concept of Price in Retail and Wholesale, Maximum Retail Price (MRP) and Local Taxes, Fair Price, labeling and packaging Experiencing and Voicing Dissatisfaction: Consumer Satisfaction/dissatisfaction-Grievances- complaint, Consumer Complaining Behaviour: Alternatives available to Dissatisfied Consumers; Internal and External Complaint handling: Corporate Redress Systems and Public Redress Systems

Unit II: The Consumer Protection Act, 1986 (CPA) Objectives and Basic Concepts: Consumer, goods, service, defect in goods, deficiency in service, spurious goods and services, unfair trade practice, restrictive trade practice.

Organizational set-up under the Consumer Protection Act: Advisory Bodies: Consumer Protection Councils at the Central, State and District Levels, Basic Consumer Rights; Adjudicatory Bodies: District Forums, State Commissions, National Commission: Their Composition, Powers, and Jurisdiction (Pecuniary and Territorial), Role of Supreme Court under the CPA.

RTI Act

Unit III: Grievance Redress Mechanism under the Consumer Protection Act, 1986:

Who can file a complaint? Grounds of filing a complaint; Limitation period; Procedure for filing and hearing of a complaint; Disposal of cases, Relief/Remedy to be provided; Temporary Injunction, Enforcement of order, Appeal, frivolous and vexatious complaints; Offences and penalties.

Unit IV: Industry Regulators and Consumer Complaint Redress Mechanism

i. Banking: RBI and Banking Ombudsman
ii. Insurance: IRDA and Insurance ombudsman
iii. Telecommunication: TRAI
iv. Food Products: FSSAI (an overview)
v. Electricity Supply: Electricity Regulatory commission
vi. Advertising: ASCI

Text Books Recommended

1. The Consumer Protection Act, 1986
2. Bhatta KG- Customer Care Management-Himalaya Publishing House

Suggested Readings:

1. Khanna, Sri Ram, Savita Hanspal, Sheetal Kapoor, and H.K. Awasthi. Consumer Affairs"
2. (2007) Delhi University Publication. 334 pp.
3. Aggarwal, V. K. (2003). Consumer Protection: Law and Practice. 5th ed. Bharat Law
4. House, Delhi, or latest edition.
5. Girimaji, Pushpa (2002). Consumer Right for Everyone Penguin Books.
6. Nader, Ralph (1973). The Consumer and Corporate Accountability. USA, Harcourt Brace

7. Jovanovich, Inc.
8. Sharma, Deepa (2011).Consumer Protection and Grievance-Redress in India: A Study of
9. Insurance Industry (LAP LAMBERT Academic Publishing GmbH & Co.KG,
10. Saarbrucken, Germany. 263 pp.
11. Empowering Consumers e-book, www.consumeraffairs.nic.in
12. ebook, www.bis.org
13. Nair Suja – Consumer Behaviour – Himalaya Publishing House

DSE-4

B.Com. (Hons.): Semester – VI

Business Research Methods and Project Work

Objective: This course aims at providing the general understanding of business research and the methods of business research. The course will impart learning about how to collect, analyze, present and interpret data.

Section A: Business Research Methods 50 Marks

Unit-I

Introduction: Meaning of research; Scope of Business Research; Purpose of Research – Exploration, Description, Explanation; Unit of Analysis – Individual, Organization, Groups, and Data Series; Conception, Construct, Attributes, Variables, and Hypotheses.

Unit-II

Research Process: An Overview; Problem Identification and Definition; Selection of Basic Research Methods- Field Study, Laboratory Study, Survey Method, Observational Method Existing Data Based Research, Longitudinal Studies, Panel Studies

Unit-III

Measurement: Definition; Designing and writing items; Uni-dimensional and Multi-dimensional scales; Measurement Scales- Nominal, Ordinal, Interval, Ratio; Ratings and Ranking Scale, Thurst one, Likert and Semantic Differential scaling, Paired Comparison; Sampling –Steps, Types, Sample Size Decision; Secondary data sources

Hypothesis Testing: Tests concerning means and proportions; ANOVA, Chi-square test and other Non-parametric tests; testing the assumptions of Classical Normal Linear Regression.

Section B – Project Report Marks (30 + 20)

Unit-IV Report Preparation: Meaning, types and layout of research report; Steps in report writing; Citations, Bibliography and Annexure in report; JEL Classification

Note:

1. There shall be a written examination of 50% Marks on the basis of Unit I to III.

2. The student will write a project report under the supervision of a faculty member assigned by the college/institution based on field work. The Project Report carries 50% Marks and will be evaluated by University appointed examiners.

Learning Outcome: After completion of this paper, the students will be able to assess and apply a range of research method on a practical project.

Text Books Recommended

1. Mishra Business Research Methods , Oxford University Press.
2. Business Research Methods and Project work, Priyaranjan Dash, VrindaPublications (P) Ltd

Suggested Readings:

1. Business Research methods, S.C. Agarwal, V.K. Global Pub. Pvt. Ltd., New Delhi.
2. Upagade& Shende – Research Methodology – S. Chand
3. A.K.P.C. Swain, Business Research methods and Project work, Kalyani Publishers, New Delhi
4. Dangi, H.K. Business Research methods, Cengage Learning
5. Chawla Deepak – Research Methodology – Vikash Publication

(GE – 1)

MICRO ECONOMICS

Objective: Objective of the course is to acquaint the students with the concepts of micro-economics dealing with consumer behavior. The course also makes the student understand the supply side of the market through the production and cost behavior of firms.

Unit: I Demand and Consumer behaviour

Concept of demand: demand function, law of demand, derivation of individual and market demand curves, shifting of the demand curve, elasticity of demand, Consumer behavior, Marshallian utility approach and Indifference Curve approach; utility maximization conditions . Income-Consumption Curve (ICC) and Price-Consumption Curve (PCC)

Unit: II Production and Cost

Production function: Short-run and Long-run; Total Product, Average Product and Marginal Product, Law of returns to a variable factor, Law of Returns to Scale; Concepts of Iso-quant and iso-cost line;
Cost: Accounting and Economic Costs; Social and Private Costs; Short-run and Long-run Costs; Relation between Average and Marginal

Unit: III Perfect Competition

Concept of Perfectly Competitive market: Assumptions, Profit maximization conditions; Related concepts of Total Revenue, Average Revenue and Marginal Revenue, Short-run and Long- run equilibrium of a firm; determination of short-run supply curve of a firm, measuring producer surplus under perfect competition

Unit: IV Imperfect Competition

Monopoly

Concept of Monopoly: Sources of monopoly power; Short-run and Long-run equilibrium of a monopoly firm; Price discrimination; Social Cost of Monopoly (concept only).

Monopolistic Competition

Concept of Imperfectly Competitive market; Monopolistic Competition: Features and examples; Oligopoly: Non-Collusive Oligopoly: Sweezy's Kinked demand Curve Model, Collusive Oligopoly: Cartel (concept with example)

Learning Outcomes: The students would be able to apply tools of consumer behaviour and firm theory to business situations.

Text Books Recommended

1. Micro Economics-K C Dash- Himalaya Publishing House
2. Ahuja, H.L, Micro Economics, S.Chand

Suggested Readings:

1. Mehta P.K, Singh M. – Micro Economics – Taxmann Publication
2. Micro Economics-T.R. Jain , B.D. Majhi, V.K. Global

3. Browining, E.K. and J.M. Browning; Microeconomic Theory and Applications,
4. Kalyani Publishers, New Delhi.
5. Microeconomics I and Statistics: Das & Sengupta, Oxford University Press
6. N. Gregory mankiw, Principles of Micro Economics, Cengage Learning

7. Dwivedi, D.N. Micro Economics, Vikash Publication
8. Pindyck, R.S., D. L. Rubinfeld and P. L. Mehta; Microeconomics, Pearson Education.
9. N. Gregory mankiw, Principles of Micro Economics, Cengage Learning
10. Maddala G.S.and E.Miller; Microeconomics: Theory and Applications,
11. MCGraw-Hill International.

(GE-2)

Macro & Indian Economy

Objectives: The course aims at providing the student with knowledge of basic concepts of the macro economics. The modern tools of macro-economic analysis are discussed and the policy framework is elaborated, including the open economy.

Contents:

Unit I Introduction to Macro Economics

Introduction: Meaning and definition of Microeconomics and macroeconomics, Difference between Microeconomics and macroeconomics, macro-economic goals, components of Macroeconomics, Economic Systems: Mixed economy, Socialism economy, Capitalism economy and Islamic economy (only meaning and characteristics)

Unit II National Income Accounting

Definition of National Income, Concepts of National Income,GDP and GNP, Methods of Measuring National Income, Uses of National Income, Difficulties in calculating National Income, Real Income, Per Capita Income and Growth Rate

Unit:III National Income Equilibrium

I Concepts of Equilibrium, Consumptions & Savings, Investment Theory, Government Sector, Foreign Sector, Determination of Equilibrium, Multiplier Concept, Inflationary Gap and Deflationary Gap, Summary of Two-, Three- and Four-sector Economies

Unit:IV Role of Government

Economic functions of Government, Types of Budget, Government Revenue, Government Expenditure, Public Debt, and Government Policy

Macroeconomic Problems

Introduction, Business cycle, Unemployment, Inflation, Deflation, Depression, RBI and monetary policy

Learning Outcomes: Students would be able to apply the modern tools of macro-economic analysis so as to minimize the adverse impact of macro-economic factors on business.

Text Books Recommended

3. Macro & Indian Economy, M. Treheran, T Treheran, V.K. Global publishing Pvt. Ltd., New Delhi
4. Ahuja H.L – Macro Economics – S.Chand

Suggested Readings

5. Mankiw, N. Gregory. Principles Macroeconomics.Cengage Learning
6. Macro and Indian economy, P.K. Dhar, Kalyani Publishers
7. Macro and Indian Economy-V K Puri- Himalaya Publishing House
8. Dornbusch, Rudiger., Stanley. Fischer and Richard Startz, Macroeconomics. Irwin/McGraw-Hill.
9. Vaish – Macro Economics – Vikash Publication
10. Macroeconomics & Indian Economy: Bhattacharyya, Oxford University Press.

(GE-3)

Business Statistics

Objective: The objective of this course is to familiarize students with the basic statistical toolsused for managerial decision-making.

Contents:

Unit I:

Statistical Data and Descriptive Statistics (With the use of Excel and other statistical software)

Nature and Classification of data: Univariate, Bivariate and multivariate data; time-series and cross-sectional data
Measures of Central Tendency
a) Mathematical averages including arithmetic mean, geometric mean and harmonic mean. Properties and applications.
b) Positional Averages
Mode and Median and other partition values including quartiles, deciles, and percentiles

Unit II:

Measures of Variation (With the use of Excel and other statistical software)

Absolute and relative, Range, quartile deviation, mean deviation, standard deviation, and their coefficients, Properties of standard deviation/variance Skewness: Meaning, Measurement using Karl Pearson and Bowley's measures; Concept of Kurtosis

Unit III:

Simple Correlation and Regression Analysis (With the use of Excel and other latest software)

Correlation Analysis: Meaning of Correlation: simple, multiple and partial; linear and non-linear, Correlation and Causation, Scatter diagram, Pearson's co-efficient of correlation; calculation and properties (proofs not required). Correlation and Probable error; Rank Correlation

Regression Analysis: Principle of least squares and regression lines, Regression equations and estimation; Properties of regression coefficients; Relationship between Correlation and Regression coefficients; Standard Error of Estimate

Unit IV:

Index Numbers (With the use of Excel and other latest software)

Meaning and uses of index numbers: Construction of index numbers: fixed and chain base: univariate and composite. Aggregative and average of relatives – simple and weighted

Tests of adequacy of index numbers, Base shifting, splicing and deflating. Problems in the construction of index numbers

Construction of consumer price indices, important share price indices

Time Series Analysis (With the use of Excel and other latest software)

Components of time series, Additive and multiplicative models Trend analysis, Fitting of trend line using principle of least squares – linear, second degree parabola and exponential, Conversion of annual linear trend equation to quarterly/monthly basis and vice-versa; Moving averages Seasonal variations- Calculation of Seasonal Indices using Simple averages, Ratio-to-trend, and Ratio-to-moving averages methods. Uses of Seasonal Indices

Learning Outcomes: Students would be armed with the knowledge of using different statistical tools very much required in the decision making process in any business as well as business research.

Text Books Recommended

1. Gupta, S.P., and Archana Gupta. Statistical Methods. Sultan Chand and Sons, New Delhi.
2. Business Statistics - Levine and Viswanathan, Pearson Publication

Suggested Readings:

1. Business statistics, S.C. Agarwal, V.K. Global Pub. Pvt. Ltd, New Delhi.
2. Patri and Patri, Business statistics , Kalyani Publishers New Delhi.
3. Keller G, and Arora H, BSTAT, Cengage Learning
4. Gupta, S.C. Fundamentals of Statistics. Himalaya Publishing House.
5. Business Statistics– S K Sahoo, P K Prusty, Vrinda Publications (P) Ltd
6. Microeconomics I and Statistics: Das & Sengupta, Oxford University Press.
7. Sharma J K, Fundamentals of Business Statistics – Vikash Publication
8. Vohra N. D., Business Statistics, McGraw Hill.

(GE-4)

Principles of Marketing

Objective: The objective of this course is to provide basic knowledge of concepts, principles, tools and techniques of marketing.

Contents:

Unit I: Introduction:

Nature, scope and importance of marketing; Selling vs Marketing; Marketing mix, Marketing environment: concept, importance, and components (Economic, Demographic, Technological, Natural, Socio-Cultural and Legal).

Consumer Behaviour and Market segmentation:

Consumer Behaviour: Nature and Importance, Factors influencing consumer buying behaviour. Market segmentation: concept, importance and bases; Product differentiation vs. market segmentation.

Unit II: Product:

Concept and importance, Product classifications; Concept of product mix; Branding, packaging and labeling; Product life-cycle; New Product Development Process

Unit III: Pricing, Distribution Channels and Physical Distribution

Pricing: Significance, Factors affecting price of a product, Pricing policies and strategies, Distribution Channels and Physical Distribution: Channels of distribution - meaning and importance; Types of distribution channels; Factors affecting choice of distribution channel

Unit IV: Promotion and Recent developments in marketing:

Promotion: Nature and importance of promotion; Communication process; Types of promotion: advertising, personal selling, public relations & sales promotion, and their distinctive characteristics. Recent developments in marketing: Social Marketing, online marketing, direct marketing, services marketing, green marketing, Rural marketing; Consumerism

Learning outcome: After the completion of this paper, the students will able to identify marketing components and fit them in the value chain along with the various marketing strategies.

Text Books Recommended

Marketing Principles and Management-Sherleker and Pany-- Himalaya Publishing House
Kotler, Philip, Gary Armstrong, Prafulla Agnihotri and AhsanUlHaque. Principlesof Marketing. 13th edition. Pearson Education.

Suggested Readings:

1. Principles of Marketing, Bajaj, Kaur, Kalyani Publishers, New Delhi.
2. Principles of Marketing , R.K. Mittal , A. Sharma, V .K. Global Pub. Pvt. Ltd, New Delhi.
3. Marketing Management & Human Resource Management: Verma et.al, Oxford University Press.
4. Lamb, C. W., Hair, J.F. and Sharma, D. MKTG, Cengage Learning
5. Principles of Marketing M K Nabi, K C Raut, Vrinda Publications (P) Ltd
6. Arun Kumar – Marketing management – Vikash Publication
7. Rudani R.B – Basics of Marketing Management – S. Chand
8. Majaro, Simon. The Essence of Marketing. Prentice Hall, New Delhi.
9. Zikmund William G. and Michael D'Amico. Marketing; Creating and Keeping Customers in an E-Commerce World. Thomson Learning.
10. Chhabra, T.N., and S. K. Grover. Marketing Management. Fourth Edition. DhanpatRai& Company.

U.G. Commerce Common Syllabus, Odisha

Course Structure (CBCS) B.Com (Pass)

Paper	Subject	Paper Code	Full Marks	End-term Marks	Mid-term Marks	Credit Points
	Semester I					
1.1	Environmental Science	AECC -1	100	80	20	4
1.2	Financial Accounting	CORE-1	100	80	20	6
1.3	Business Law	CORE-2	100	80	20	6
1.4	Micro Economics	GE-1	100	80	20	6
	Total		**400**			**22**
	Semester II					
2.1	Communicative English	AECC-1	100	80	20	4
2.2	Cost Accounting	CORE-3	100	80	20	6
2.3	Corporate Law	CORE-4	100	80	20	6
2.4	Macro & Indian Economy	GE-2	100	80	20	6
	Total		**400**			**22**
	Semester III					
3.1	Corporate Accounting	CORE-5	100	80	20	6
3.2	Management Principles and Application	CORE-6	100	80	20	6
3.3	Business Statistics	GE-3	100	80	20	6
3.4	E-Commerce	SEC-1	100	80	20	4
	Total		**400**			**22**
	Semester IV					
4.1	Income-tax Law and Practice	CORE-7	100	60 25 Practical	15	6
4.2	Management Accounting	CORE-8	100	80	20	6
4.3	Principles of Marketing	GE-4	100	80	20	6
4.4	Entrepreneurship Development and Business Ethics	SEC-2	100	80	20	4
	Total		**400**			**22**
	Semester V					
5.1	Fundamentals of Data Management (End Term Exam = 60, Practical = 25, Mid-term = 15	CORE-9	100	60 25 Practical	15	6
5.2	Fundamentals of Financial Management	CORE-10	100	80	20	6
5.3	Elective I (Any *one* of the following)	DSE-1	100	80	20	6
	A. Accounting and Finance Financial Markets, Institutions &					

		Services					
	B. Banking and Insurance	Indian Banking and Insurance System					
	C. Management	Human Resource Management					
5.4	Elective II (Any *one* of the following)		DSE-2	100	80	20	6
	A. Accounting and Finance	Financial Statement Analysis and Reporting					
	B. Banking and Insurance	Merchant Banking and Financial Services					
	C. Management	International Business					
	Total			**400**			**24**
	Semester VI						
6.1	Auditing and Corporate Governance		CORE-11	100	80	20	6
6.2	GST and Indirect Taxes		CORE-12	100	80	20	6
6.3	Elective III (Any *one* of the following)		DSE-3	100	80	20	6
	A. Accounting and Finance	Fundamentals of Corporate Tax Planning					
	B. Banking and Insurance	Fundamentals of Investment					
	C. Management	Consumer Affairs and Customer Care					
6.4	Business Research Methods and Project work	End Term Exam = 50 Project = 30 Viva-voce = 20	DSE-4	100	50 30 Project 20 Viva-voce		6
	Total			**400**			**24**
	Grand Total			**2400**			**136**

Marks per paper - Midterm : 20 marks, End term : 80 marks, Total – 100 marks
Credit per paper – 6
Teaching hours per paper – 50 hours + 10 hours tutorial

(CORE – 1)

FINANCIAL ACCOUNTING

Objectives: The objective of this paper is to help students to acquire conceptual knowledge of financial accounting and to impart skills for recording various kinds of business transactions.

Unit - I.

(a) Basics of Accounting

1. Accounting as the language of business and an information system, the users of financial accounting information and their needs. Qualitative characteristics of accounting information, Functions, advantages and limitations of accounting. Branches of accounting. Bases of accounting: cash basis and accrual basis.
2. The nature of financial accounting principles – Basic concepts and conventions: entity, money measurement, going concern, cost, realization, accruals, periodicity, consistency, prudence (conservatism), materiality and full disclosures and Accounting Equation.

(b)Accounting Process

From recording of business transactions to the preparation of trial balance including adjustments: journal, sub-division of journal, ledger accounts, trial balance

Unit – II: Reporting Standards &Business Income

1. Concepts of AS, Ind AS (Indian Accounting Standards), IFRS (International Financial Reporting Standards) & XBRL (eXtensible Business Reporting Language)
2. Measurement of business income-Net income: the accounting period, the continuity doctrine and matching concept. Objectives of measurement and revenue recognition.
3. Depreciation Accounting: The accounting concept of depreciation. Factors in the measurement of depreciation. Methods of computing depreciation: straight line method and diminishing balance method; Disposal of depreciable assets-change of method. Salient features of Accounting Standard 6 (AS- 6) issued by ICAI

Unit – III: Final Accounts

Capital and revenue expenditures and receipts, Preparation of financial statements of Sole Trade and Partnership Business with adjustments

Accounting for Partnership Firm: Accounting of Admission of partner, Retirement and Death of partner and Dissolution of the Partnership Firm Including Insolvency of partners

Unit – IV:

1. Hire Purchase and Installment Systems and Accounting for Branch & Department
2. Concepts of operating and financial lease (theory only)
3. Departmental Accounting and Branch Accounting including foreign branch (Theory and Problem)

4. Hire purchase and Installment System

Learning Outcomes: The course structure of this paper would equip the students to get in-depth knowledge of financial accounting along with its practical application thereby giving an opportunity to gain easy access to this competitive business world.

Text Books Recommended

1. Financial Accounting I and Financial Accounting II: Mukherjee, Oxford University Press
2. Jain, S.P. and K.L. Narang. Financial Accounting, Kalyani Publishers, New Delhi

Suggested Readings:

1. Financial Accounting, R.K. Mittal , M.R. Bansal, V.K, Global Publication.
2. Bal Ranjan Kumar, Financial Accounting – S. Chand
3. Text Book of Financial Accounting-Anil Kumar and Mariappa- Himalaya Publishing House
4. Financial Accounting - P. C. Tulsiani, Pearson Publication
5. Anthony, R.N. Hawkins, and Merchant, Accounting: Text and Cases. McGraw-Hill Education.
6. Bansal.K.M- Financial Accounting – Taxman Publication
7. Horngren, Introduction to Financial Accounting, Pearson Education.
8. Maheshwari, S.N. and. S. K. Maheshwari. Financial Accounting. Vikas Publishing House, New Delhi.
9. Compendium of Statements and Standards of Accounting. The Institute of Chartered Accountants of India, New Delhi
10. N.Godwin and D. Sanyal, Financial ACCT, Cengage Learning

(CORE – 2)

BUSINESS LAW

Objective: The objective of the course is to impart basic knowledge of the important business laws along with relevant case laws.

Unit I: The Indian Contract Act, 1872

1. Contract – meaning, characteristics and kinds, Essentials of a valid contract
2. Offer and acceptance (Definition, Rules, Communication and Revocation of offer and acceptance)
3. Consideration (Definition, Elements, Types, Rules), “No Consideration No Contract” and its exceptions; Capacity to Parties (Definition and Types)
4. Consent, Free consent, Coercion, Undue Influence, Fraud, Misrepresentation, Mistake
5. Legality of objects and Consideration
6. Void and Voidable agreements – Definition, Types and Distinction
7. Discharge of a contract – Modes of discharge, Breach and Remedies against breach of contract
8. Specific Contracts - Contingent contracts, Quasi, Contract of Indemnity, Guarantee, Bailment, Pledges

Unit II: The Sale of Goods Act, 1930

1. Contract of sale, meaning and difference between sale and agreement to sell
2. Conditions and warranties
3. Transfer of ownership in goods including sale by a non-owner
4. Unpaid seller – meaning, rights of an unpaid seller against the goods and the buyer

Consumers Protection Act, 1986 and Right to Information Act

Objectives and features of Consumers Protection Act

Definitions – Complainant, Complaint, Consumer, Consumer Dispute, Defect, Deficiency, District Forum, Person

Unfair trade practices

Consumer Protection Council (Central, State and District – their constitutions and objectives

Unit III: Partnership Laws

B. The Partnership Act, 1932
g. Definition – Partner, Partnership
h. Nature and Characteristics of Partnership
i. Types of Partners
j. Registration of a Partnership Firms and consequences of non-registration
k. Rights and Duties of Partners
l. Dissolution of firms – meaning and grounds
C. The Limited Liability Partnership Act, 2008
f. Definition
g. Salient Features of LLP
h. Advantages and disadvantages of LLP
i. Differences between: LLP and Partnership, LLP and Company
j. Incorporation of LLP

Unit IV: The Negotiable Instruments Act 1881

b. Definition, Features, Types, Parties of Negotiable Instruments: Promissory Note, bill of exchange, Cheque (Definition and Types)
d. Endorsement: Meaning and Types of Endorsement
e. Holder and Holder in Due Course, Privileges of Holder in Due Course.
f. Dishonour of Negotiable Instruments: Modes, Consequences, Notice of Dishonour; Noting and Protesting
g. Discharge of Negotiable Instruments: Meaning and Modes

Learning Outcomes: The students would be able to deal with the legal aspect of different business situations.

Text Books Recommended

1. Business Law, Garg K.C., Saareen,Sharma, Kalyani Publishers
2. Kumar, R. Legal Aspects of Business, Cengage Learning

Suggested Readings:

1. Arora Sushma – Business Law – Taxmann Publication
2. A Book of Business Laws-Jena B and Mohapatra-Himalaya Publishing House
3. Business Law, Ashok Sharma, V.K. Global Publication.
4. Business Laws: Das & Roy, Oxford University Press
5. Business Law- S K Matta, Geetika Matta, Vrinda Publications (P) Ltd
6. Business Law - Tejpal Singh, Pearson Publication
7. Kuchhal, M.C. and Vivek Kuchhal, Business Law, Vikas Publishing House, New Delhi.
8. Tulsian, P.C, Business Law, S.Chand
9. Maheshwari & Maheshwari, Business Law, National Publishing House, New Delhi.

(Core-3)

COST ACCOUNTING

Objective: To acquaint the students with basic concepts used in cost accounting, various methods involved in cost ascertainment.

CONTENTS:

Unit- 1:

Introduction to Cost Accounting: Meaning, concept, scope, objectives, principles, importance and limitations of cost accounting; Implementation of costing system; Methods & Techniques of costing; Cost concepts and Cost Sheet, Job costing and Batch Costing.

Unit – II:

Accounting for Material: Concept and technique of accounting for material; Methods of pricing of materials issues – FIFO, LIFO and Average; Treatment of material losses; Techniques of material control – level setting, Economic Ordering Quantity, ABC Analysis, VED Analysis, Perpetual inventory system, & Just-In-Time.

Unit – III:

Accounting for Labour:

Accounting for labour cost, control procedure, labour turnover, idle time, overtime, Methods of wage payment and the Incentive schemes- Halsey, Rowan, Taylor’s Differential piece wage plan.

Accounting for Overheads:

Classification, Allocation & Apportionment of production overheads; Re-apportionment of Service department overheads; Absorption of overheads, methods of absorption – actual and predetermined rates, blanket and multiple rates, choice of an overhead absorption rate; Administration, selling and distribution overheads; Under absorption and over absorption of overheads.

Unit – IV:

Methods of Costing: Contract costing: Features and procedure of contract costing, uncompleted contract profit determination, Escalation clause, cost plus contracts. Process costing: Meaning and characteristics of Process costing, Procedure for process costing, treatment of process losses and wastages.

Learning Outcome: After the completion of this paper, the students will be able to have confidence in managing cost issues and also to keep a check on cost control and taking managerial decisions.

Text Books Recommended

i. Cost Accounting-Arora MN A- Himalaya Publishing House
ii. Nigam, B.M. Lall and I.C. Jain. Cost Accounting: Principles and Practice. Prentice Hall of India, New Delhi.

Suggested Reading:

i. Jain, S.P. and K.L. Narang. Cost Accounting: Principles and Methods. Kalyani Publishers, Jalandhar.
ii. Cost accounting, S.P. Gupta/ A Sharma- V.K. Global Publishing Pvt. Ltd.
iii. Cost & Management Accounting I: Mitra, Oxford University Press.
iv. Cost & Management Accouning, Taxmann Publications
v. Colin Drury, Management and Cost Accounting, Cengage Learning
vi. Lal, Jawahar. Cost Accounting. Tata McGraw Hill Publishing Co., New Delhi.
vii. Arora, M.N. Cost Accounting – Principles and Practice. Vikas Publishing House, New Delhi.
viii. Lal, Jawahar. Advanced Management Accounting Text and Cases. S. Chand & Co., New Delhi.
ix. Cost Accounts- Datar and Rajan, Pearson Publication

(Core-4)

CORPORATE LAWS

Objectives: The objective of the course is to impart basic knowledge of the provisions of the Companies Act, 2013 and the Depositories Act, 1996. Case studies involving issues in corporate laws are required to be discussed.

Contents:

Unit – I: INTRODUCTION TO COMPANY

Meaning and Definition – Features –, High Lights of Companies Act 2013 - Body Corporate ,Kinds of Companies (Concept, Definition and Features) – One Person Company, Private Company, Public Company, Company limited by Guarantee, Company limited by Shares, Holding Company, Subsidiary Company, Government Company, Associate Company, Small Company, Foreign Company, Listed Company, Dormant company

FORMATION OF A COMPANY

Steps in formation of a Company, Promotion Stage, Meaning of Promoter, Position of Promoter & Functions of Promoter, Incorporation Stage – Meaning, Contents, Forms of Memorandum of Association & Articles of Association and its alteration, Distinction between Memorandum of Association and Articles of Association, Certificate of Incorporation, Subscription Stage – Meaning & contents of Prospectus, Types, Mis-statement in prospectus and its consequences.

Unit - II: COMPANY ADMINISTRATION

Director (Concept and Definition), DIN, Qualification, Disqualification, Appointment, Position, Rights, Duties, Power, Resignation, Liabilities, Removal and Resignation of director, Key Managerial Personnel (Definition, Appointment and Qualifications) – Managing Director, Whole time Directors, the Companies Secretary, Chief Financial Officer, Resident Director, Independent Director, Women director.

Unit - III: SHARE CAPITAL & DEBENTURE

Share and Share Capital - Types and Definition, Allotment and Forfeiture, Calls on Shares, ESOP, Buyback, Sweat Equity, Bonus, Right, Capital Reduction, Share Certificate, D-mat System, Transfer and Transmission, Redemption of Preference Shares, Debenture – Definition, Types, Rules Regarding Issue of Debenture, Rules regarding Dividend and distribution of dividend.

Unit - IV: CORPORATE MEETINGS

Corporate Meetings - Shareholder and Board, Types of Meetings – Annual General Meeting Extraordinary General meeting, Minutes of Proceedings of General Meeting, Meeting of BOD and other meetings (Section 118), Requisite of Valid Meeting- Notice, Agenda, Chairman, Quorum, Proxy, Resolutions, Minutes, Postal Ballot, E- voting, Video Conferencing,

Learning Outcomes: Students would acquire knowledge about the legal framework and the ways and means to deal with the legal aspect of different situations of corporate sector.

Text Books Recommended

1. Corporate Laws-Maheswari, Maheswari- Himalaya Publishing House
2. Corporate Law, Ashok Sharma, V.K. Global Publishing Pvt. Ltd., New Delhi

Suggested Readings:

1. **A** Compendium of Companies Act 2013, along with Rules, by Taxmann Publications.
2. Corporate Law, Gupta,Garg,Dhingra, Kalyani Publication
3. Company Law: Roy & Das, Oxford University Press.
4. Kumar, R., Legal Aspects of Business, Cengage Learning
5. Corporate Law– S K Matta, Geetika Matta, Vrinda Publications (P) Ltd
6. Arora &Banshal, Corporate Law – Vikash Publication
7. Gogna, P.P.S – Company Law, S. Chand
8. MC KuchhalCorporate Laws, Shri Mahaveer Book Depot. (Publishers).
9. GK Kapoor& Sanjay Dhamija, Company Law, Bharat Law House.

(Core-5)

CORPORATE ACCOUNTING

Objectives: To help the students to acquire the conceptual knowledge of the corporate accounting and to learn the techniques of preparing the financial statements

Contents:

Unit – I

Meaning of Company; Maintenance of Books of Accounts; Statutory Books; Annual Return Company – Issue of Shares – issue, forfeiture, reissue, issue other than cash consideration and issue to the promoters; Pro-rata issue of shares. Issue of Right and Bonus Share – Rules,

Accounting for debentures: Issue of debenture, Underwriting of shares and debentures: Determination of Underwriters Liability – with marked, unmarked & firm underwriting; Accounting of Employee Stock Option Plan – meaning; rules; Vesting Period; Exercise Period, Accounting for ESOP and Accounting of ESPS.

Unit – II: Redemption of Preference shares & Debentures

Buy Back of Securities: meaning, rules and accounting. Redemption of Preference Shares – Rules and Accounting (with and without Bonus Shares) ; Redemption of Debenture – Important Provisions, Redemption of debenture

Accounting for Redemption: by conversion, by lot, by purchase in the open market (cum and ex-interest), held as Investment and Use of Sinking Fund

Unit – III: Company's Final Accounts

Introduction to Schedule III of Companies Act 2013; Treatment of Tax; transfer to reserve, Dividend and applicable tax (out of current profit, out of past reserve); Preparation of Statement of Profit & Loss and Balance Sheet. (tax on net profit without recognizing deferred tax)

Valuation of Goodwill & Shares

Goodwill – valuation using different methods, i.e., Average Profit, Super Profit, Capitalization and Annuity.
Shares – Valuation using different methods: Asset approach, Earnings approach, Dividend Yield, Earnings-Price, Cum-div and Ex-div, Majority and Minority view and Fair Value

Unit – IV: Liquidation

Meaning of liquidation, modes of winding up, consequences of winding up, statement of affairs, liquidator's final statement of account, list 'B' contributories

Learning Outcomes: This paper can provide conceptual clarity about the techniques to prepare financial statements of companies along with accounting treatment of various situations viz. floating of shares, amalgamation and liquidation of companies.

Text Books Recommended

1. Jain, S.P. and K.L. Narang. Corporate Accounting. Kalyani Publishers, New Delhi.
2. Maheshwari, S.N. and S. K. Maheshwari. Corporate Accounting. Vikas Publishing House, New Delhi.

Suggested Readings:

1. Sehgal, Ashok and Deepak Sehgal. Corporate Accounting. Taxman Publication, New Delhi.
2. Corporate Accounting, R.K. Mittal? S. Ahuja- V .K. Global Pub. Pvt. Ltd, New Delhi.
3. Corporate Accounting – Anil Kumar, Mariappa- Himalaya Publishing House
4. Tulsian, P.C, Corporate Accounting, S. Chand
5. Monga, J.R. Fudamentals of Corporate Accounting. Mayur Paper Backs, New Delhi.
6. Gupta, Nirmal. Corporate Accounting. SahityaBhawan, Agra.
7. Bhushan Kumar Goyal, Fundamentals of Corporate Accounting, International Book House

(Core-6)

MANAGEMENT PRINCIPLES & APPLICATIONS

Objective: The objective of the course is to provide the student with an understanding of basic management concepts, principles and practices.

Unit-I: Introduction:

Management-definition, importance, functions, nature-as profession, science and art, universality of management; levels of management; managerial tasks and skills

Different Schools of Thoughts: Classical School-contributions of Taylor and Henri Fayol; Neo-classical school-Human Relations approach and Behavioral Science Approach; Modern School; System approach and Contingency approach

Unit-II: Planning:

Concept, importance, steps, types, premises, barriers to effective planning and remedial measures; strategic planning-concept forecasting –concept, techniques.

Organizing:

Concept, importance, principles, different organization models-line and staff; Functional; Departmentation-need, basis, principles, Delegation of Authority-elements, steps barriers; Centralization and Decentralization of Authority; Span of Management; concept and determining factors

Unit-III: Directing and Staffing:

Directing: concepts, importance of directing,

Leadership: Concept, importance, types, leadership traits, Tannenbaum & Schmidt’s Model and Blake & Mouton’s Model.

Staffing: concepts, importance

Unit- IV: Motivation, Co-ordination and Control:

Motivation: Concept, importance, importance of need theory, and contributions of McGregor, Maslow, Herzberg.

Coordination: concepts, importance, principles and implementation techniques. Control: concepts, importance and tools of control.

Learning Outcomes: Students would be able to make use of different management principles in the course of decision making in different forms of business organizations.

Text Books Recommended

1. Pany Tushar K , Management Principles and Application, Kalyani
2. Prasad, L.M. Principles and Practice of Management, Sulatan Chand

Suggested Readings:

1. Sharma gupta , Management: Principles and application , Kalyani Publishers
2. R. K . Singhal, Management Principle and application, V.K. Global Pub. Pvt. Ltd, New Delhi.
3. Management Principles and Applications-Jhunjhunwala J Mohanty- Himalaya Publishing House
4. Principles of Management: Mitra, Oxford University Press.
5. Griffin, R.W. – Management :Principles& Practices, Cengage Learning
6. Gupta R.N - Principles & Practice of Management – S. Chand
7. A K Jha, Management Principles and Application - Vrinda Publications (P) Ltd.
8. Chandan J.S – Management Concepts of Strategy – Vikash Publication
9. B.P. Singh and A.K.Singh, Essentials of Management, Excel Books
10. TN Chhabra, Management Concepts and Practice, DhanpatRai& Co. (Pvt. Ltd.), New Delhi
11. Peter F Drucker, Practice of Management, Mercury Books, London

(Core-7)

Income Tax Law and Practice

Objective: To provide basic knowledge and equip students with the application of principles and provisions of Income Tax Act 1961.

Contents:

Unit I :

Basic Concepts and Definitions under IT Act:
Assessee, Previous year, Assessment year, Person, Income, Sources of income, Heads of income, Gross total income, Total income, Maximum marginal rate of tax, Tax Evasion, Tax avoidance and Tax planning

Residential Status and Incidence of Tax, Residential status of all persons except company

Incomes which do not form part of Total Income Except section 10AA.

Agricultural Income Definition, determination of agricultural and non-agricultural Income, assessment of tax liability when there is both agricultural and non-agricultural income

Unit II:

Heads of Income and Provisions governing Heads of Income

a) Income from Salary
b) Income from House property

Unit III: Heads of Income and Provisions governing Heads of Income

a) Profits and Gains of Business and Profession

Special emphasis on sec. 32, 32AC, 32AD, 35, 35D, 36(i)(ib), (ii), (iii), (iv), (vii), 37, 37(2B), 40A(2), 40A(3), 43B, (Excluding presumptive taxation)

b) Capital Gains

Meaning and types of capital assets, basic concept of transfer, cost of acquisition, cost of improvement and indexation, computation of STCG and LTCG, exemptions u/s 54, 54B, 54EC and 54F, capital gain on transfer of bonus shares, right entitlement and right shares, taxability of STCG and LTCG.

c) Income from Other Sources

Basis of charge excluding deemed dividend

Unit IV:

a) **Income of other Persons** included in Assessee's Total Income Remuneration of spouse, income from assets transferred to spouse and Son's wife, income of minor.

b) Set off and Carry Forward of Losses

Mode of set off and carry forward, inter source and inter head set off, carry forward and set off of losses u/s 71B, 72, 73, 74, 74A.

c) Deductions from Gross Total Income

Basic concepts, deductions u/s 80C, 80CCC, 80CCD, 80CCE, 80D, 80DD, 80DDB, 80E, 80G, 80GG, 80GGC, 80TTA, 80U

Rebate u/s 87A

Computation of Total Income and Tax Payable

a) Rate of tax applicable to individual assessee

b) Computation of tax liability of an individual

c) Provision for Filing of Return Date of filing of return, relevant forms of return, different types of returns, return by whom to be signed, PAN, TAN

d) Assessment of Return Self assessment u/s140A, Summary assessment u/s 143(1), Scrutiny assessment u/s 143(3) and Best judgement assessment u/s 144.

e) Advance Tax Who is liable to pay, due dates and computation of advance tax (excluding corporate assessees)

f) Interest & Fees Section 234A, 234B, 234C, 234F

g) TDS Provisions regarding TDS from salary, interest on securities, horse racing, lottery.

Learning Outcomes: This paper would provide the understanding of various provisions of Income Tax Act as well as equip the students to make practical applications of the provisions for taxation purpose.

Text Books Recommended

1. Gour and Narang, Income tax: Law and practice, kalyani Publishers
2. Dr. Vinod Kumar Singhania, e-filing of Income Tax Returns and Computation ofTax,
3. Taxmann Publication Pvt. Ltd, New Delhi. Latest version.

Suggested readings:

1. Income tax Law and practice, Makta Jain/ Rakesh Jain, V.K. Global Pub. Pvt. Ltd., New Delhi
2. Income Tax Law and Pratcice-Saha, Dash- Himalaya Publishing House.
3. Pagare, Dinkar. Law and Practice of Income Tax. Sultan Chand and Sons, New Delhi.
4. Lal, B.B. Income Tax Law and Practice. Konark Publications, New Delhi.

(Core-8)

MANAGEMENT ACCOUNTING

Objective: To acquaint the students with basic concepts of management accounting, and basic understanding of tools and techniques used for managerial decision making.

CONTENTS: `

Unit – I:

Management Accounting: Meaning, nature, scope, and importance of management accounting; Role of management accounting; management accounting vs. financial accounting; Role of management accounting in modern business; Tools and techniques of management accounting.

Unit – II: Ratio Analysis & Cash flow statement

Ratio Analysis:

Meaning and utility of ratios; significance of Ratio analysis; Classification of Ratios – Profitability ratios, Efficiency Ratios, Liquidity Ratios, Solvency Ratios; Advantages and limitations of Ratio Analysis.

Cash flow Statements:

Cash Flow Statements: Meaning and utility of Cash flow statements; Preparation of Cash flow statements – Indirect method; Limitations of Cash flow statements; Cash flow statements vs. Funds flow statements. (Reference to Revised AS-3 and Ind AS-7)

Unit – IV:

Absorption & Marginal Costing: P/V Ratio, Break-even analysis, Margin of safety, angle of incidence; Marginal and differential costing as a tool for decision making – make or buy, change of product mix, exploring new markets, shut down decisions.

Unit – V:

Budgeting & Standard Costing: Concept of budget and budgetary control; objectives, merits and limitations of budgetary system; Master budget, Functional budget, Fixed and Flexible budgets; Zero based budgeting. Standard Costing & Variance Analysis: Meaning of standard cost and standard costing, Advantages and disadvantages of standard costing and variance analysis: Material, Labour, & Overhead.

Learning Outcome: After the completion of this paper, the students will be able to have confidence in managing cost issues and also to keep a check on cost control and taking managerial decisions.

Text Books Recommended

1. Management Accounting, S swain/ S.P. Gupta/ A Sharma, V.K. Global Pub. Pvt. Ltd., New Delhi.
2. Horngreen, Charles T., Gary L. Sundem. Introduction to Management Accounting.
3. Prentice Hall.

Suggested Reading:

1. Jain & Narang, Management Accounting, Kalyani Publications
2. Management Accounting-M Wilson- Cost Accounting-Jena B,Bal S and Das A-Himalaya Publishing House
3. Narasimhan M.S. , Management Accounting, Cengage Learning
4. Cost & Management Accouning, Taxmann Publications
5. Arora, M.N. Cost Accounting – Principles and Practice. Vikas Publishing House, New Delhi.
6. Maheshwari, S.N. and S.N. Mittal. Cost Accounting: Theory and Problems. Shri Mahabir Book Depot, New Delhi.
7. Lal, Jawahar. Advanced Management Accounting Text and Cases. S. Chand & Co., New Delhi.
8. Khan, M.Y. and P.K. Jain. Management Accounting. Tata McGraw Hill, Publishing Co., New Delhi.

(Core-9)

FUNDAMENTALS OF DATA MANAGEMENT

Unit I: Word Processing

Working with word document- Editing text, Find and Replace text, Formatting, Spell check, Autocorrect, Auto text; Bullets and numbering, Tabs, Paragraph Formatting, Indent, Page Formatting, Header and footer, Macros, Drop cap; Tables: Inserting, Filling and formatting a Table, Inserting Pictures and Video; Mail Merge- including linking with Database, Printing documents. Creating Business Documents using the above facilities

Preparing Presentations

Basics of presentations: Slides, Fonts, Drawing, Editing; Inserting: Tables, Images, texts, Symbols, Media; Design; Transition; Animation, Hyperlink and Slideshow. Creating Business Presentations using above facilities

Unit II: Spreadsheet and its Business Applications

Managing worksheets- Formatting, Entering data, Editing, and Printing a worksheet; handling operators in formula, Project involving multiple spreadsheets, Organizing Charts and graphs, Pivot Table

Spreadsheet Functions: Mathematical [SUMIF, SQRT, SUBTOTAL, SUMPRODUCT etc.], Statistical [AVERAGE, STDEV, VAR, CORRELATION, REGRESSION etc.], Financial [PMT, RATE, PV, FV, NPER, IRR, NPV, Data Table Etc.] Logical [AND, OR, IF etc.], Date and Time, lookup and reference, Database and Text functions.

Creating Spreadsheet in the area of : Loan and Lease statement; Ratio Analysis; Payroll Statements; Capital Budgeting; Depreciation Accounting; Graphical Representation of Data; Frequency Distribution and its Statistical Parameters; Correlation and Regression

Unit III: Database Management System

Creation of Tables, Multiple Table Handling-Defining Relationship [Foreign Key], Simple and Conditional Queries, Types of Queries [Update, Delete, Append], Forms, Reports, Introduction to SQL through Basic Commands.

Applying DBMS in the areas of Accounting, Inventory, HRM and its accounting, managing the data records of Employees, Suppliers and Customers

Unit IV: Website Designing

Introduction to HTML; Tags and Attributes: Text Formatting, Fonts, Hypertext Links, Tables, Images, Lists, Forms, Frames, Cascading Style Sheets

Text Books Recommended

1. Coronel and Rob, Database Principles, Cengage Learning
2. Fundamentals of Data Managemnet –Saha RG- Himalaya Publishing House

Suggested Readings

1. Thareja, IT & Application, Oxford
2. Aurora, Computer Fundamentals, Vikash
3. Sinha & Sinha, Fundamentals of Computers, BPB Publications
4. Dhar, P., Fundamental of IT and Its Application in Business, APH

(Core-10)

FUNDAMENTALS OF FINANCIAL MANAGEMENT

Objective: To familiarize the students with the principles and practices of financial management.

Contents:

Unit – I: Introduction& Basic Concepts

Important functions of Financial Management, Objectives of the firm: Profit maximization vs. Value maximization, Role of Chief Financial Officer. Financial environment in which a firm has to operate, Time Value of Money: concept and reasons, Compounding and Discounting techniques, Concepts of Annuity and Perpetuity. Risk-return relationship (concepts only)

Unit – II: Sources of Finance and Cost of Capital/ Financing Decisions

Different sources of finance; long term and short term sources, Cost of capital: concept, relevance of cost of capital, Implicit and Explicit cost, specific costs (its computation) and weighted average cost (its computation) , rationale of after tax weighted average cost of capital, marginal cost of capital (its computation).

Unit – III: Capital Expenditure Decisions / Long term Financial Decisions & Dividend Decisions

Capital Expenditure Decisions / Long term Financial Decisions

Objectives of Capital Budgeting Process, Concept of Cash flow, Methods of long term investment decisions - Discounted Payback Period, Net Present Value, Profitability Index, Average Rate of Return / Accounting Rate of Return, Internal Rate of Return (Including relative merits and demerits of each of the methods)

Dividend Decisions

Meaning, Natureand Types of Dividend, concept of pay-out ratio, retention ratio Decisions and growth, Dividend policies and formulating a dividend policy, Dividend Theories: Walter’s Model, Gordon’s Model

Unit – IV: Working Capital Management/ Liquidity Management

Meaning and various concepts of Working Capital, Management of Working Capital and Issues in Working Capital, Estimating Working Capital Needs; Operating or Working Capital Cycle,Policies relating to Current Assets – Conservative, Aggressive and Balance, Various sources of finance to meet working capital requirements

Learning Outcome: After the completion of this paper, students will be able to understand finance in a better way along with giving them insight to practical management of long and short finance for real business houses.

Text Books Recommended

1. Rostogi, Fundamentals of Financial Management, Taxmann Publications
2. Fundamental of Financial Management, Sharma, Gupta, Kalyani Publishers, New Delhi.

Suggested Readings

1. Fundamentals of Financial Management, Vandana Dangi, V.K. Global Pvt. Ltd., New Delhi
2. Parasuraman – Financial Management : A Step by Step Approach, Cengage Learning
3. Pandey, I.M. Financial Management. Vikas Publications.
4. Financial Management, Himalaya Publishing House
5. BhallaV.K – Financial Management – S.Chand
6. Horne, J.C. Van and Wackowich. Fundamentals of Financial Management. 9thed. New Delhi Prentice Hall of India.

(Core-11)

AUDITING AND CORPORATE GOVERNANCE

Objective: To provide knowledge of auditing principles, procedures and techniques in accordance with current legal requirements and professional standards and to give an overview of the principles of Corporate Governance and Corporate Social Responsibility

Unit-I

Auditing: Introduction, Meaning, Objects, Basic Principles and Techniques; Classification of Audit, Audit Planning, Internal Control – Internal Check and Internal Audit; Audit Procedure – Vouching and verification of Assets & Liabilities

Unit-II

Audit of Limited Companies:

Company Auditor- Qualifications and disqualifications, Appointment, Rotation, Removal, Remuneration, Rights and Duties Auditor's Report-Contents and Types. Liabilities of Statutory Auditors under the Companies Act 2013

Special Areas of Audit:

Special features of Cost audit, Tax audit, and Management audit; Recent Trends in Auditing: Basic considerations of audit in EDP Environment; Standard on Auditing (SA); Relevant Case Studies/Problems;

Unit-III

Corporate Governance: Conceptual framework of Corporate Governance, Corporate Governance Reforms. Major Corporate Scandals in India and Abroad: Common Governance

Problems Noticed in various Corporate Failures. Codes & Standards on Corporate Governance

Unit-IV

Corporate Social Responsibility (CSR): Strategic Planning and Corporate Social Responsibility; Corporate Philanthropy, Meaning of CSR, CSR and CR, CSR and Corporate Sustainability, CSR and Business Ethics, CSR and Corporate Governance, Environmental Aspect of CSR, CSR provision under the Companies Act 2013, CSR Committees

Learning Outcome: At the end of the paper student will have detail knowledge about principles and techniques of audit in accordance with current legal requirement and as per the guidelines of different statutory authorities.

Text Books Recommended

1. Gupta, Kamal and Ashok Arora. Fundamentals of Auditing. Tata Mc-Graw Hill Publishing Co. Ltd., New Delhi.
2. Auditing and corporate governance, Pradeep kumar , Klayani Publishers , New Delhi.

Suggested Readings:

3. Auditing and corporate governance, A. Sharma, V.K. Global Pvt. Ltd.,New Delhi
4. SATHEESH KUMAR Corporate Governance, Oxford University Press.
5. Shikha, N. and Sharma, G. Corporate Governance in India : Principles and Policies, CENGAGE Learning

6. Jha, Aruna. Auditing. Taxmann.
7. Tandon, B. N., S. Sudharsanam and S. Sundharabahu. A Handbook of Practical Auditing. S. Chand and Co. Ltd., New Delhi.
8. Ghatalia, S.V. Practical Auditing. Allied Publishers Private Ltd., New Delhi.
9. Singh, A. K. and Gupta Lovleen. Auditing Theory and Practice. Galgotia Publishing Company.
10. Alvin Arens and James Loebbecke, Auditing: an Integrated Approach
11. MC KuchhalCorporate Laws, Shri Mahaveer Book Depot. (Publishers). (Relevant Chapters)
12. Khanka – Business Ethics & Corporate Governance – Vikash Publication
13. Auditing Principles and Techniques - S. K. Basu, Pearson Publication

(Core-12)

GST & INDIRECT TAX

OBJECTIVE:

The objective is to equip students with the principles and provisions of Goods and Services Tax (GST), which is, implemented from 2017 under the notion of One Nation, One Tax and One Market and to acquaint students with basic provisions of GST Law and basic working knowledge.

Unit I- INTRODUCTION TO GOODS AND SERVICES TAX (GST)

Introduction to GST : Introduction, Constitutional provisions regarding Taxation In India, Pre-GST Indirect Taxation Structure in India, What is GST, Need for GST in India, Overview and Genesis of GST IN INDIA, GST objectives, Scope of GST, Salient features of GST, GST and Centre-State Financial Relations, The Constitution (122nd Amendment) Bill, Constitutional Amendments required for introduction of GST Indirect Taxes subsumed Post-GST : Principles for subsuming taxes under Goods & Services Tax (GST) in India, Indirect Taxes and Levies subsumed in GST, Events that have led to the introduction of GST, DUAL GST : Benefits of Dual GST, Structure Of Dual Model of GST , Key Features of Dual Model of GST, Benefits of implementing GST, CENTRAL GST – STATE / UNION TERRITORY GST – INTEGRATED GST and GST Cess, Pre-GST Regime Vs. GST Regime, Indirect Taxes

Unit II- GST ACTS: (Structure & Terminology)

Salient features of CGST Act, SGST Act (Odisha State), IGST Act, Meaning and Definition of various terms used under GST

(Coverage- Provisions and Illustration)

PROCEDURE RELATING TO LEVY OF, COLLECTION AND EXEMPTION FROM, TAX

PROCEDURE RELATING TO LEVY OF, COLLECTION AND EXEMPTION FROM, TAX: (CGST & SGST)- Meaning and Scope of ‘Supply’ under GST Law, Taxable Person, Time of supply, Place of supply and Value of supply. Computation of Taxable Value and Tax Liability, Composition scheme; INPUT TAX CREDIT; PROCEDURE RELATING TO LEVY, COLLECTION AND EXEMPTION OF IGST; PAYMENT OF TAX, TCS, TDS; PRACTICAL PROBLEMS.

(Coverage- Provisions and Illustration)

Unit III- REGISTRATION, RETURNS AND ASSESSEMENT

REGISTRATION - Persons liable for registration, Persons not liable for registration, Types: Compulsory registration, Voluntary registration, Deemed registration - Procedure for registration, Special provisions for Casual taxable persons and Non-resident taxable persons; CLASSIFICATION OF GOODS & SERVICES- HSN, SAC; TAX INVOICE AND OTHER

SUCH INSTRUMENTS IN GST - Debit Note, Credit Note, Vouchers, Invoice; ACCOUNTS AND RECORDS; RETURN- Process of Return Filing, Furnishing details of outward supplies and inward supplies, First return, Claim of input tax credit, Matching reversal and reclaim of input tax credit, Annual return and Final return; REFUND; OFFENCES AND PENALTIES; ASSESSMENT; AUDIT; APPEALS AND REVISION.

Unit IV- GST Council AND REGULATORY FRAMEWORK

GST COUNCIL: Structure, Powers and Functions. Provisions for amendments; ROLE OF CBEC; Division of Administrative Powers; GST AND TECHNOLOGY- GST Network, GST ECO SYSTEM, GSP, ASP; NATIONAL ANTI-PROFITEERING AUTHORITY IN GST; COMPLIANCE RATING.

Text Books Recommended

Swain AK & Agrawal – GST: Concepts and Applications, Himalayan Publishing House.
GST Manual:Taxman's Publication Ltd., New Delhi.

Suggested Books:

3. GST and Indirect Taxes,Sanjeet Sharma, V.K. Global Pub. Pvt. Ltd, New Delhi.
4. Mishra, Padhi and Bera – Text Books on GST & Practice, Vikash Publishing House Pvt. Ltd. New Delhi.

DSE – 1

Elective – I (Any one of the following Groups)

Group – A: Accounting & Finance

Financial Markets, Institutions, & Services

Objectives: To enable the students to understand the financial institutions operating in India and services provided by them.

Unit-I

Basic Theoretical Framework: The financial system and its technology; The factors affecting the stability of the financial system; Development finance vs. universal banking; Financial intermediaries and Financial Innovation; RBI-Central Banking.

Unit-II: Financial Institutions & Non-Banking Financial Institutions

Financial Institutions:

A brief historical perspective. An update on the performance of IDBI, ICICI, IFCI and SFCs, LIC &GIC, Banking Institutions: Commercial banks - the public and the private sectors - structure and comparative performance, problems of competition; interest rates, spreads, and NPAs. Bank capital - adequacy norms and capital market support.

Non-banking financial institutions:

Evolution, control by RBI and SEBI. A perspective on future role, Unit Trust of India and Mutual Funds, Reserve bank of India Framework for/Regulation of Bank Credit . Commercial paper: Features and advantages, Framework of Indian CP Market, effective cost/interest yield.

Unit-III

Financial services: Asset/fund based Financial services - lease finance, consumer credit and hire purchase finance, factoring definition, functions, advantages, evaluation and forfeiting, bills discounting, housing finance, venture capital financing. Fee-based / Advisory services: Stock broking, credit rating.

Unit-IV

Operations: Financial Assets/ Instruments Rights issues, issue of Debentures, issue of Equity shares - pre-issue activity, post-issue activities. The regulatory framework: SEBI and Regulation of Primary and Secondary Markets, Company Law provisions.

Learning Outcome: After completion of this paper, the students will be able to understand the role and benefits of financial institution and services.

Text Books Recommended

1. Financial Markets, Institutions & Services-Gordon, Natrajan-Himalaya Publishing House
2. Pathak: Indian Financial Systems Pearson Education

Suggested Readings

1. Financial Market and Int. , A. goyal and M. Goyal, V.K. Global Pvt. Ltd., New Delhi
2. Financial Markets , Institutions and Services, Kaur, Talwar, KAlyani Publishers, New Delhi.
3. BHATTACHARYYA INDIAN FINANCIAL SYSTEM 2e, Oxford University Press.
4. M.Y.Khan, Financial Services, Tata McGraw-Hill, New Delhi, 2004.
5. H.R Machiraju, Indian Financial Systems, Vikas Publishing House Pvt. Ltd.2002.
6. Madura, J., Financial Institutions and Markets; Sharma R. and Mehta K. Financial Services, Cengage Learning

DSE – 1

INDIAN BANKING AND INSURANCE SYSTEM

Objectives: To enable the students to acquire knowledge about basics of banking and insurance.

Unit-I: Concept of Bank and Banking & Types of Customers and Account holders

Concept of Bank and Banking:
Historical Evolution of Banking: Origin and Development of Banking - Structure of Banking in India – Banks and Economic Development –Functions of Commercial banks (conventional and innovative functions) – Central Bank – RBI – functions – Emerging trends in Banking.
Types of Customers and Account holders:
Procedure and practice in opening and operating the accounts of customers - individuals including minors - joint account holders -Partnership firms - joint stock companies - executors and trustees-clubs and associations

Unit-II

Introduction to insurance: Purpose and need of insurance, insurance as a social security tool - insurance and economic development - Principles of insurance -various kinds of insurance - life, marine, fire, medical, general insurance – features
.

Unit-III

Life Insurance - Law relating to life Insurance; General Principles of Life Insurance Contract; Proposal and policy; assignment and nomination; title and claims; General Insurance - Law relating to general insurance; different types of general insurance; general insurance Vs life insurance – Insurance business in India.

Unit-IV

Fundamentals of Agency Law: Definition of an agent; Agents regulations; Insurance intermediaries; Agents' compensation. Procedure for Becoming an Agent: Pre-requisite for obtaining a license; Duration of license; Cancellation of license; Revocation or suspension/termination of agent appointment; Code of conduct; Unfair practices. Functions of the Agent: Proposal form and other forms for grant of cover; Financial and medical underwriting; Material information; Nomination and assignment; Procedure regarding settlement of policy claims.
Learning Outcome: After the completion of this paper, the student will acquired practical knowledge of working mechanism of banking and insurance industries in India.

Text Books Recommended

1. M.N. Mishra: Insurance Principles and Practice, S. Chand & Company Ltd, Delhi.
2. Indian Institute of Bankers (Pub) Commercial Banking Vol-I/Vol-II (part I&II) Vol-III.
3. Hota P.K., and Das S.K. Financial Literacy and Banking, Kalyani Publishers

Suggested Readings

1. Dr. P. Periasamy: Principles and Practice of Insurance, Himalaya Publishing House, Delhi.
2. Mishra S. Banking Law and Practice – S Chand
3. Prasad – Banking Insurance – Vikash Publication
4. Inderjit Singh, RakeshKatyal& Sanjay Arora: Insurance Principles and Practices, Kalyani Publishers, Chennai.
5. Sheldon H.P :Practice and Law of Banking.
6. Bedi. H.L :Theory and Practice of Banking.
7. Maheshwari. S.N. :Banking Law and Practice.
8. Shekar. K.C :Banking Theory Law and Practice.
9. Pannandikar&Mithami': Banking in India.
10. Radhaswamy&Vasudevan: Text Book of Banking.
11. Varshaney: Banking Law and Practice.
12. G. Krishnaswamy : Principles & Practice of Life Insurance
13. Kothari &Bahl : Principles and Pratices of Insurance.

DSE – 1

Group – C: Management

Human Resource Management

Objective: The objective of the course is to acquaint students with the techniques and principles to manage human resource of an organization.

Contents:

Unit I: Nature and Scope & Human Resource Planning

Nature and Scope

Concept and meaning of IR &HR, Understanding the Nature and Scope of IR & HRM, Functions and importance

Human Resource Planning

Definition, Need and Features of Human Resource Planning, factors affecting Human Resource Planning

Unit II: Recruitment and Selection

Definition of Recruitment, Source, need and importance of Recruitment, Recruitment Policy process – sources of Recruitment Definition of Selection, Steps in selection.

Unit III: Training and Development

Training and Development Meaning and purpose of training, Benefits of training to organizationand employees -Training methods

Unit IV: Job Evaluation and Performance Appraisal

Job evaluation - objectives, scope, method, Job analysis, Job description, Job Specification - basic concept and significance, Performance Appraisal - Concept

Learning Outcomes: This paper can enhance the capability of the students to manage the most important assets of organization i.e. human beings which is much needed to ensure growth of that organization.

Text Books Recommended

1. Rao V.S.P - Human Resource Management. Vikash Publication
2. Human Resource Management, Sagun Ahuja, V.K. Global Pvt. Ltd., New Delhi

Suggested Readings:

1. Human Resource Management-Satapathy, Taheer and Mohanty—Himalaya Publishing House P Ltd.
2. Human Resource Management, Gupta, Joshi. Kalyani Publishers, Ne4w Delhi
3. Marketing Management & Human Resource Management: Verma et.al, Oxford University press.
4. Sinha, P. R. N. Shekhar, S.P.Human Resource Management, Cengage Learning
5. Human Resource Management -Gajendran, A K Jha, Vrinda Publications (P) Ltd
6. DeCenzo, D.A. and S.P. Robbins, “Personnel/Human Resource Management”, Prentice Hall of India, New Delhi.
7. Khanka S.S. Human Resource Management. S Chand.
8. Ivancevich, John M. Human Resource Management. McGraw Hill.
9. Wreather and Davis. Human Resource Management. Pearson Education.

DSE – 2
Elective – II (Any one of the following Groups)
Group – A: Accounting & Finance
Financial Statement Analysis & Reporting

Objectives: To enable the students to understand the basic knowledge about the financial statement analysis and reporting for economic decision making.

Unit-I

Introduction Concepts of financial statements – Nature of financial statements – Objectives of financial statements – Different types of financial statements: income statement, balance sheet, statement of retained earnings, fund flow statement, cash flow statement, Notes to Accounts – Limitations of financial statements.

Unit-II

Analysis & Interpretation of Financial Statements: Traditional Approaches Vs. Modern Approaches to financial statement analysis – Classification of financial statement analysis: based on modus operandi and based on materials used – Techniques of financial statement analysis: Comparative Statements, Common-size Statements, Trend Ratios and Ratio Analysis – Problems encountered in financial statement analysis.

Unit-III: Ratio Analysis

Ratio Analysis:

Classification of ratios – Ratio formation – Ratio interpretation – Practical methods of ratio analysis: Time Series (intra firm) Analysis, Cross Sectional (inter firm) Analysis, Residual Analysis and Multivariate Analysis.

Multivariate Ratio Analysis:

Concept, objectives, uses and limitations – Univariate analysis Vs. Multivariate ratio analysis – Application of statistical tools in financial statement analysis.

Unit-IV

Corporate Reporting: Cash Flow statement Analysis (AS 3) and Statutory and Non Statutory Reports, Integrated Reporting and Sustainability Reporting

Learning Outcome: After the completion of this paper, the students will be able to prepare the end result of a business houses by preparation through financial statement analysis and reporting.

Text Books Recommended

1. Financial Statement Analysis and Reporting, S Swain/ B. Mishra, V.K. Global Pvt. Ltd., New Delhi.
2. Financial Statement Analysis and Reporting-Prashanth Athma-Himalaya Publishing House

Suggested Readings:

1. Financial Statement Analysis and Reporting. Gupta, Mehra Kalyani Publishers.
2. Narasimhan, M.S. : Financial Statement and Analysis, Cengage Learning
3. Foster, G.: Financial Statement Analysis, Englewood Cliffs, NJ, Prentice Hall.

4. Sahaf M.A – Management Accounting – Principles & Practice – Vikash Publication
5. Maheswari, S.N.: Management Accounting & Financial Control, New Delhi, Sultan Chand.
6. Foulke, R.A.: Practical Financial Statement Analysis, New York, McGraw-Hill.
7. Hendriksen, E.S.: Accounting Theory, New Delhi, Khosla Publishing House.
8. Porwal, L.S.: Accounting Theory – An Introduction, New Delhi, Tata-McGraw-Hill

DSE-2

Group B: Banking & Insurance

MERCHANT BANKING AND FINANCIAL SERVICES

Objectives:To enable the students to understand the basic knowledge about the financial services available in India.

Unit-I

Merchant Banking: Nature and scope of Merchant Banking - Regulation of Merchant Banking Activity - overview of current Indian Merchant Banking scene - structure of Merchant Banking industry - primary Markets in India and Abroad - professional Ethics and code of conduct - current Development

Unit-II

Financial Services: Meaning and Definition, Role of Financial Services in a financial system. Leasing: Meaning and features. Introduction to equipment leasing: Types of Leases, Evolution of Indian Leasing Industry. Legal Aspects of Leasing: present Legislative Framework. Hire purchase: concept and characteristics of Hire purchase. Difference between hire purchase and leasing

Unit-III

Factoring: concept, nature and scope of Factoring - Forms of Factoring - Factoring vis-à-vis Bills Discounting - Factoring vis-à-vis credit Insurance Factoring vis-à-vis Forfeiting-Evaluation of a Factor - Evaluation of Factoring - Factoring in India current Developments.

Unit-IV

Securitization / Mortgages: Meaning, nature and scope of securitization, securitization as a Funding Mechanism, securitization of Residential Real Estate - whole Loans - Mortgages - Graduated-payment. Depository: Meaning, Evolution, Merits and Demerits of Depository. Process of Dematerialization and Dematerialization, Brief description of NSDL and CDSL

Security Brokerage:

Meaning of Brokerage, types of brokers. Difference between broker and jobber,SEBI Regulations relating to brokerage business in India.

Learning Outcome: After the completion of this course, the student will be able to understand the structure and function of mercantile banking and various financial services available in the present business world.

Text Books Recommended

1. Machiraju, Indian Financial System, Vikas Publishing House, 2nd Edition, 2002.
2. Merchant banking and financial services, Gupta /Gupta, Kalyani Publishers, New delhi

Suggested Readings:

1. M.Y.Khan, Financial Services, Tata McGraw-Hill, 11th Edition, 2008
2. Gopal C.R – Management Financial Service – S.Chand
3. NaliniPravaTripathy, Financial Services, PHI Learning, 2008
4. J.C.Verma, A Manual of Merchant Banking, Bharath Publishing House, New Delhi.
5. Varshney P.N. & Mittal D.K., Indian Financial System, Sultan Chand & Sons, New Delhi.
6. Sasidharan, Financial Services and System, Tata Mcgraw Hill, New Delhi, 1st Edition, 2008.
7. Website of SEBI.
8. Merchant Banking and Financial Services-Sharma M--Himalaya Publishing House
9. Sharma R. and Mehta K. Financial Services, Cengage Learning

DSE – 2

Group – C: Management

International Business

Objective: The objective of the course is to familiarize the students with the concepts, importanceand dynamics of international business and India's involvement with global business. The coursealso seeks to provide theoretical foundations of international business to the extent these arerelevant to the global business operations and developments.

Unit I: Introduction to International Business

a. Introduction to International Business: Globalization and its importance in worldeconomy; Impact of globalization; International business vs. domestic business:Complexities of international business; Modes of entry into international business
b. International Business Environment: National and foreign environments and theircomponents - economic, cultural and political-legal environments,
Issues in International Trade

Unit –II Theories of International Trade and International Organizations

a. Theories of International Trade – an overview (Classical Theories, Product Life Cycletheory, Theory of National Competitive Advantage); Commercial Policy Instruments - tariff and non-tariff measures – difference in Impact on trade, types of tariff and non tariffbarriers (Subsidy, Quota and Embargo in detail) ; Balance of payment account and itscomponents.

b. International Organizations and Arrangements: WTO – Its objectives, principles, organizational structure and functioning; An overview of other organizations – UNCTAD,;Commodity and other trading agreements (OPEC).

Unit –III International Financial Environment

a. Regional Economic Co-operation: Forms of regional groupings; Integration efforts among in Europe, North America and Asia (NAFTA, EU , ASEAN and SAARC) .

b. International Financial Environment: International financial system and institutions (IMF and World Bank – Objectives and Functions) ; Foreign exchange markets and riskmanagement; Foreign investments - types and flows; Foreign investment in Indianperspective

Unit –IV Foreign Trade Promotion and Financing of foreign trade

a. Foreign Trade Promotion Measures and Organizations in India; Special economic zones(SEZs) and export oriented units (EOUs), ; Measures for promoting foreign investmentsinto and from India; Indian joint ventures and acquisitions abroad.

b. Financing of foreign trade and payment terms – sources of trade finance (Banks, factoring, forfaiting, Banker's Acceptance and Corporate Guarantee) and forms of payment (Cash in advance, Letter of Credit, Documentary Collection, Open Account)

Text Books Recommended

1. Daniels John, D. Lee H. Radenbaugh and David P. Sullivan. International Business.
2. Pearson Education
3. Cherunilam, Francis. International Business: Text and Cases. PHI Learning

Suggested Readings:

1. Charles W.L. Hill and Arun Kumar Jain, International Business. New Delhi: McGraw Hill
    a. Education
2. Johnson, Derbe., and Colin Turner. International Business - Themes & Issues in the Modern
3. Global Economy. London: Roultedge.
4. Michael R. Czinkota. et al. International Business. Fortforth: The Dryden Press.
5. Peng and Srivastav, Global Business, Cengage Learning
6. Subba Rao P – International Business-Himalaya Publishing House
7. JOSHI INTERNATIONAL BUSINESS SITKIN INTERNATIONAL BUSINESS, Oxford University Press.

DSE – 3

Elective – III (Any one of the following Groups)

Group – A: Accounting & Finance

Fundamentals of Corporate Tax Planning

Objective: To provide a conceptual idea about the various provisions of tax planning related to corporate sector.

Contents

Unit-I:

Corporate Tax in India–Concept of Tax planning, Tax management, Tax avoidance, Tax evasion, Assessment year and Financial Year

Residential status of corporate and its incidence of tax, Minimum Alternate Tax, Calculation of Tax Liability.

Unit-II:

Carryforward and set-off of losses and unabsorbed depreciation (headwise)

Unit-III:

Tax Planning with reference to Depreciation, Capital Gain and Scientific Research

Unit-IV:

Corporate Tax returns–Assessment, Return Filing, Penal provision, Double taxation Relief

Learning outcome: After completion of this paper, students will be able to help tax consultants in tax planning, assessment and filing income tax returns of corporate sector, thereby they can get themselves self-employed.

Text Books Recommended

1. Bhagabati Prasad, Direct Tax Laws & Practices
2. Corporate Tax Planning, V.K. Global Publications
3.

Suggested Readings

1. Singhania V.K. Direct Taxes: Law & Practices, Taxmann Publication.
2. Corporate Tax Planning, Kalyani Publishers

DSE – 3

Group B: Banking & Insurance

Fundamentals of Investment

Objective: To familiarize the students with different investment alternatives, introduce them to the framework of their analysis and valuation and highlight the role of investor protection.

Contents

Unit-I:

The Investment Environment- The investment decision process, Types of Investments – Commodities, Real Estate and Financial Assets, the Indian securities market, the market participants and trading of securities, security market indices, sources of financial information, Concept of return and risk, Impact of Taxes and Inflation on return.

Investor Protection

Role of SEBI and stock exchanges in investor protection; Investor grievances and their redressal system, insider trading, investors' awareness and activism.

Unit-II:

Fixed Income Securities- Bond features, types of bonds, estimating bond yields, Bond Valuation types of bond risks, default risk and credit rating

Unit-III:

Approaches to Equity Analysis: Introductions to Fundamental Analysis, Technical Analysis and Efficient Market Hypothesis, dividend capitalization models, and price-earnings multiple approach to equity valuation.

Unit-IV:

Portfolio Analysis and Financial Derivatives:(a) Portfolio and Diversification, Portfolio Risk and Return. (b) Mutual Funds. (c) Introduction to Financial Derivatives, Financial Derivatives Markets in India.

Learning outcome: After completion of this paper, this paper will educate the students about various aspect of investment in detail along with understandability of stock market operation, focusing on need for common investor protection.

Text Books Recommended

1. Bhalla – Fundamentals of Investment – S.Chand
2. Rustogi, R.P., Fundamentals of Investment, Sultan Chand & Sons, New Delhi.

Suggested Readings

1. Pandian P. – Security Analysis & Portfolio Management – Vikash Publication
2. Jones, C.P., "Investments Analysis and Management", Wiley, 8th ed.
3. Prasanna, Chandra., "Investment Analysis and Portfolio Management", Tata McGraw Hill.
4. Vohra, N.D., and B.R. Bagri, "Futures and Options", McGraw Hill Publishing
5. Mayo, An Introduction to Investment,Cengage Learning.
6. Fundamentals of Investment, Sashi Gupta, Kalyani Publishers, New Delhi,
7. Fundamentals of Investment, Vandana Dangi, V.K. Globa. Pub. Pvt. Ltd. New delhi.

DSE-3

Group – C: Management

Consumer Affairs & Customer Care

Objective: This paper seeks to familiarise the students with of their rights as a consumer, the social framework of consumer rights and legal framework of protecting consumer rights. It also provides an understanding of the procedure of redress of consumer complaints, and the role of different agencies in establishing product and service standards. The student should be able to comprehend the business firms' interface with consumers and the consumer related regulatory and business environment.

Unit I: Conceptual Framework

Consumer and Markets: Concept of Consumer, Nature of markets, Concept of Price in Retail and Wholesale, Maximum Retail Price (MRP) and Local Taxes, Fair Price, labeling and packaging Experiencing and Voicing Dissatisfaction: Consumer Satisfaction/dissatisfaction-Grievances- complaint, Consumer Complaining Behaviour: Alternatives available to Dissatisfied Consumers; Internal and External Complaint handling: Corporate Redress Systems and Public Redress Systems

Unit II: The Consumer Protection Act, 1986 (CPA)

Objectives and Basic Concepts: Consumer, goods, service, defect in goods, deficiency in service, spurious goods and services, unfair trade practice, restrictive trade practice.

Organizational set-up under the Consumer Protection Act: Advisory Bodies: Consumer Protection Councils at the Central, State and District Levels, Basic Consumer Rights; Adjudicatory Bodies: District Forums, State Commissions, National Commission: Their Composition, Powers, and Jurisdiction (Pecuniary and Territorial), Role of Supreme Court under the CPA.

RTI Act

Unit III: Grievance Redress Mechanism under the Consumer Protection Act, 1986:

Who can file a complaint? Grounds of filing a complaint; Limitation period; Procedure for filing and hearing of a complaint; Disposal of cases, Relief/Remedy to be provided; Temporary Injunction, Enforcement of order, Appeal, frivolous and vexatious complaints; Offences and penalties.

Unit IV: Industry Regulators and Consumer Complaint Redress Mechanism

i. Banking: RBI and Banking Ombudsman
ii. Insurance: IRDA and Insurance ombudsman
iii. Telecommunication: TRAI
iv. Food Products: FSSAI (an overview)
v. Electricity Supply: Electricity Regulatory commission
vi. Advertising: ASCI

Text Books Recommended

1. The Consumer Protection Act, 1986
2. Bhatta KG- Customer Care Management-Himalaya Publishing House

Suggested Readings:

1. Khanna, Sri Ram, Savita Hanspal, Sheetal Kapoor, and H.K. Awasthi. Consumer Affairs"
2. (2007) Delhi University Publication. 334 pp.
3. Aggarwal, V. K. (2003). Consumer Protection: Law and Practice. 5th ed. Bharat Law
4. House, Delhi, or latest edition.
5. Girimaji, Pushpa (2002). Consumer Right for Everyone Penguin Books.
6. Nader, Ralph (1973). The Consumer and Corporate Accountability. USA, Harcourt Brace
7. Jovanovich, Inc.
8. Sharma, Deepa (2011).Consumer Protection and Grievance-Redress in India: A Study of
9. Insurance Industry (LAP LAMBERT Academic Publishing GmbH & Co.KG,
10. Saarbrucken, Germany. 263 pp.
11. Empowering Consumers e-book, www.consumeraffairs.nic.in
12. ebook, www.bis.org
13. Nair Suja – Consumer Behaviour – Himalaya Publishing House

DSE-4

Semester – VI

Business Research Methods and Project Work

Objective: This course aims at providing the general understanding of business research and the methods of business research. The course will impart learning about how to collect, analyze, present and interpret data.

Section A: Business Research Methods 50 Marks

Unit-I

Introduction: Meaning of research; Scope of Business Research; Purpose of Research – Exploration, Description, Explanation; Unit of Analysis – Individual, Organization, Groups, and Data Series; Conception, Construct, Attributes, Variables, and Hypotheses.

Unit-II

Research Process: An Overview; Problem Identification and Definition; Selection of Basic Research Methods- Field Study, Laboratory Study, Survey Method, Observational Method Existing Data Based Research, Longitudinal Studies, Panel Studies

Unit-III

Measurement: Definition; Designing and writing items; Uni-dimensional and Multi-dimensional scales; Measurement Scales- Nominal, Ordinal, Interval, Ratio; Ratings and Ranking Scale, Thurst one, Likert and Semantic Differential scaling, Paired Comparison; Sampling –Steps, Types, Sample Size Decision; Secondary data sources

Hypothesis Testing: Tests concerning means and proportions; ANOVA, Chi-square test and other Non-parametric tests; testing the assumptions of Classical Normal Linear Regression.

Section B – Project Report Marks (30 + 20)

Unit-IV Report Preparation: Meaning, types and layout of research report; Steps in report writing; Citations, Bibliography and Annexure in report; JEL Classification

Note:

1. There shall be a written examination of 50% Marks on the basis of Unit I to III.
2. The student will write a project report under the supervision of a faculty member assigned by the college/institution based on field work. The Project Report carries 50% Marks and will be evaluated by University appointed examiners.

Learning Outcome: After completion of this paper, the students will be able to assess and apply a range of research method on a practical project.

Text Books Recommended

Mishra Business Research Methods , Oxford University Press.
Business Research Methods and Project work, Priyaranjan Dash, VrindaPublications (P)

Ltd

Suggested Readings:

1. Business Research methods, S.C. Agarwal, V.K. Global Pub. Pvt. Ltd., New Delhi.
2. Upagade& Shende – Research Methodology – S. Chand
3. A.K.P.C. Swain, Business Research methods and Project work, Kalyani Publishers, New Delhi
4. Dangi, H.K. Business Research methods, Cengage Learning
5. Chawla Deepak – Research Methodology – Vikash Publication

(GE – 1)

MICRO ECONOMICS

Objective: Objective of the course is to acquaint the students with the concepts of micro-economics dealing with consumer behavior. The course also makes the student understand the supply side of the market through the production and cost behavior of firms.

Unit: I Demand and Consumer behaviour

Concept of demand: demand function, law of demand, derivation of individual and market demand curves, shifting of the demand curve, elasticity of demand, Consumer behavior, Marshallian utility approach and Indifference Curve approach; utility maximization conditions . Income-Consumption Curve (ICC) and Price-Consumption Curve (PCC)

Unit: II Production and Cost

Production function: Short-run and Long-run; Total Product, Average Product and Marginal Product, Law of returns to a variable factor, Law of Returns to Scale; Concepts of Iso-quant and iso-cost line;
Cost: Accounting and Economic Costs; Social and Private Costs; Short-run and Long-run Costs; Relation between Average and Marginal

Unit: III Perfect Competition

Concept of Perfectly Competitive market: Assumptions, Profit maximization conditions; Related concepts of Total Revenue, Average Revenue and Marginal Revenue, Short-run and Long- run equilibrium of a firm; determination of short-run supply curve of a firm, measuring producer surplus under perfect competition

Unit: IV Imperfect Competition

Monopoly

Concept of Monopoly: Sources of monopoly power; Short-run and Long-run equilibrium of a monopoly firm; Price discrimination; Social Cost of Monopoly (concept only).

Monopolistic Competition

Concept of Imperfectly Competitive market; Monopolistic Competition: Features and examples; Oligopoly: Non-Collusive Oligopoly: Sweezy's Kinked demand Curve Model, Collusive Oligopoly: Cartel (concept with example)

Learning Outcomes: The students would be able to apply tools of consumer behaviour and firm theory to business situations.

Text Books Recommended

1. Micro Economics-K C Dash- Himalaya Publishing House
2. Ahuja, H.L, Micro Economics, S.Chand

Suggested Readings:

1. Mehta P.K, Singh M. – Micro Economics – Taxmann Publication
2. Micro Economics-T.R. Jain , B.D. Majhi, V.K. Global

3. Browining, E.K. and J.M. Browning; Microeconomic Theory and Applications,
4. Kalyani Publishers, New Delhi.
5. Microeconomics I and Statistics: Das & Sengupta, Oxford University Press
6. N. Gregory mankiw, Principles of Micro Economics, Cengage Learning

7. Dwivedi, D.N. Micro Economics, Vikash Publication
8. Pindyck, R.S., D. L. Rubinfeld and P. L. Mehta; Microeconomics, Pearson Education.
9. N. Gregory mankiw, Principles of Micro Economics, Cengage Learning
10. Maddala G.S.and E.Miller; Microeconomics: Theory and Applications,
11. MCGraw-Hill International.

(GE-2)

MACRO & INDIAN ECONOMY

Objectives: The course aims at providing the student with knowledge of basic concepts of the macro economics. The modern tools of macro-economic analysis are discussed and the policy framework is elaborated, including the open economy.

Contents:

Unit I Introduction to Macro Economics

Introduction: Meaning and definition of Microeconomics and macroeconomics, Difference between Microeconomics and macroeconomics, macro-economic goals, components of Macroeconomics, Economic Systems: Mixed economy, Socialism economy, Capitalism economy and Islamic economy (only meaning and characteristics)

Unit II National Income Accounting

Definition of National Income, Concepts of National Income,GDP and GNP, Methods of Measuring National Income, Uses of National Income, Difficulties in calculating National Income, Real Income, Per Capita Income and Growth Rate

Unit:III National Income Equilibrium

I Concepts of Equilibrium, Consumptions & Savings, Investment Theory, Government Sector, Foreign Sector, Determination of Equilibrium, Multiplier Concept, Inflationary Gap and Deflationary Gap, Summary of Two-, Three- and Four-sector Economies

Unit:IV Role of Government

Economic functions of Government, Types of Budget, Government Revenue, Government Expenditure, Public Debt, and Government Policy

Macroeconomic Problems

Introduction, Business cycle, Unemployment, Inflation, Deflation, Depression, RBI and monetary policy

Learning Outcomes: Students would be able to apply the modern tools of macro-economic analysis so as to minimize the adverse impact of macro-economic factors on business.

Text Books Recommended

1. Macro & Indian Economy, M. Treheran, T Treheran, V.K. Global publishing Pvt. Ltd., New Delhi
2. Ahuja H.L – Macro Economics – S.Chand

Suggested Readings

1. Mankiw, N. Gregory. Principles Macroeconomics.Cengage Learning
2. Macro and Indian economy, P.K. Dhar, Kalyani Publishers
3. Macro and Indian Economy-V K Puri- Himalaya Publishing House
4. Dornbusch, Rudiger., Stanley. Fischer and Richard Startz, Macroeconomics. Irwin/McGraw-Hill.
5. Vaish – Macro Economics – Vikash Publication
6. Macroeconomics & Indian Economy: Bhattacharyya, Oxford University Press.

(GE-3)

Business Statistics

Objective: The objective of this course is to familiarize students with the basic statistical toolsused for managerial decision-making.

Unit I:

Statistical Data and Descriptive Statistics (With the use of Excel and other statistical software)

Nature and Classification of data: Univariate, Bivariate and multivariate data; time-series and cross-sectional data
Measures of Central Tendency
a. Mathematical averages including arithmetic mean, geometric mean and harmonic mean. Properties and applications.
b. Positional Averages
Mode and Median and other partition values including quartiles, deciles, and percentiles

Unit II:

Measures of Variation (With the use of Excel and other statistical software)

Absolute and relative, Range, quartile deviation, mean deviation, standard deviation, and their coefficients, Properties of standard deviation/variance Skewness: Meaning, Measurement using Karl Pearson and Bowley's measures; Concept of Kurtosis

Unit III:

Simple Correlation and Regression Analysis (With the use of Excel and other latest software)

Correlation Analysis: Meaning of Correlation: simple, multiple and partial; linear and non-linear, Correlation and Causation, Scatter diagram, Pearson's co-efficient of correlation; calculation and properties (proofs not required). Correlation and Probable error; Rank Correlation

Regression Analysis: Principle of least squares and regression lines, Regression equations and estimation; Properties of regression coefficients; Relationship between Correlation and Regression coefficients; Standard Error of Estimate

Unit IV:

Index Numbers (With the use of Excel and other latest software)

Meaning and uses of index numbers: Construction of index numbers: fixed and chain base: univariate and composite. Aggregative and average of relatives – simple and weighted

Tests of adequacy of index numbers, Base shifting, splicing and deflating. Problems in the construction of index numbers. Construction of consumer price indices, important share price indices

Time Series Analysis (With the use of Excel and other latest software)

Components of time series, Additive and multiplicative models Trend analysis, Fitting of trend line using principle of least squares – linear, second degree parabola and exponential, Conversion of annual linear trend equation to quarterly/monthly basis and vice-versa; Moving averages Seasonal variations- Calculation of Seasonal Indices using Simple averages, Ratio-to-trend, and Ratio-to-moving averages methods. Uses of Seasonal Indices

Learning Outcomes: Students would be armed with the knowledge of using different statistical tools very much required in the decision making process in any business as well as business research.

Text Books Recommended

1. Gupta, S.P., and Archana Gupta. Statistical Methods. Sultan Chand and Sons, New Delhi.
2. Business Statistics - Levine and Viswanathan, Pearson Publication

Suggested Readings:

1. Business statistics, S.C. Agarwal, V.K. Global Pub. Pvt. Ltd, New Delhi.
2. Patri and Patri, Business statistics , Kalyani Publishers New Delhi.
3. Keller G, and Arora H, BSTAT, Cengage Learning
4. Gupta, S.C. Fundamentals of Statistics. Himalaya Publishing House.
5. Business Statistics– S K Sahoo, P K Prusty, Vrinda Publications (P) Ltd
6. Microeconomics I and Statistics: Das & Sengupta, Oxford University Press.
7. Sharma J K, Fundamentals of Business Statistics – Vikash Publication
8. Vohra N. D., Business Statistics, McGraw Hill.

(GE-4)

Principles of Marketing

Objective: The objective of this course is to provide basic knowledge of concepts, principles, tools and techniques of marketing.

Contents:

Unit I: Introduction:

Nature, scope and importance of marketing; Selling vs Marketing; Marketing mix, Marketing environment: concept, importance, and components (Economic, Demographic, Technological, Natural, Socio-Cultural and Legal).

Consumer Behaviour and Market segmentation:

Consumer Behaviour: Nature and Importance, Factors influencing consumer buying behaviour. Market segmentation: concept, importance and bases; Product differentiation vs. market segmentation.

Unit II: Product:

Concept and importance, Product classifications; Concept of product mix; Branding, packaging and labeling; Product life-cycle; New Product Development Process

Unit III: Pricing, Distribution Channels and Physical Distribution

Pricing: Significance, Factors affecting price of a product, Pricing policies and strategies, Distribution Channels and Physical Distribution: Channels of distribution - meaning and importance; Types of distribution channels; Factors affecting choice of distribution channel

Unit IV: Promotion and Recent developments in marketing:

Promotion: Nature and importance of promotion; Communication process; Types of promotion: advertising, personal selling, public relations & sales promotion, and their distinctive characteristics. Recent developments in marketing: Social Marketing, online marketing, direct marketing, services marketing, green marketing, Rural marketing; Consumerism

Learning outcome: After the completion of this paper, the students will able to identify marketing components and fit them in the value chain along with the various marketing strategies.

Text Books Recommended

1. Marketing Principles and Management-Sherleker and Pany-- Himalaya Publishing House
2. Kotler, Philip, Gary Armstrong, Prafulla Agnihotri and AhsanUlHaque. Principlesof Marketing. 13thedition. Pearson Education.

Suggested Readings:

1. Principles of Marketing, Bajaj, Kaur, Kalyani Publishers, New Delhi.
2. Principles of Marketing , R.K. Mittal , A. Sharma, V .K. Global Pub. Pvt. Ltd, New Delhi.
3. Marketing Management & Human Resource Management: Verma et.al, Oxford University Press.
4. Lamb, C. W., Hair, J.F. and Sharma, D. MKTG, Cengage Learning
5. Principles of Marketing M K Nabi, K C Raut, Vrinda Publications (P) Ltd
6. Arun Kumar – Marketing management – Vikash Publication
7. Rudani R.B – Basics of Marketing Management – S. Chand
8. Majaro, Simon. The Essence of Marketing. Prentice Hall, New Delhi.
9. Zikmund William G. and Michael D'Amico. Marketing; Creating and Keeping Customers in an E-Commerce World. Thomson Learning.
10. Chhabra, T.N., and S. K. Grover. Marketing Management. Fourth Edition. DhanpatRai& Company.

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SEC 2 Paers for both B.COM Pass and Honours

(SEC-1)

E-Commerce

Objectives: To enable the student to become familiar with the mechanism for conducting business transactions through electronic means.

Unit I:

Introduction E-Commerce-meaning, nature, concepts, types; e-commerce business models B2B [concept, major activities, types of B to B market (independent, buyer oriented, supplier oriented, e- market place)], B2C [portals, e-tailer, content provider, transaction broker, real life examples of B2C], C2C, C2B, etc.; forces behind e-commerce, e-Governance [meaning, types, significance, real life examples].

Unit II:

E-CRM and SCM E-CRM-definition, features, goals of E-CRM business framework, phases of E-CRM, types of E-CRM, Functional components of E-CRM, strategies for E-CRM solutions; SCM-definition, features, types of supply chain.

Unit III:

Digital Payment Methods of e-payments [Debit Card, Credit Card, Smart Cards, e-Money, NEFT, RTGS], electronic or digital wallet, digital signature (procedures, working and legal provisions), payment gateways [Core Banking Solution or CBS, Mobile Payment, UPI, NCPI, International Payments], Online banking [meaning, concepts, importance, electronic fund transfer, automated clearing house, automated ledger posting], risks involved in e-payments.

Unit IV: ERP & New Trends in E-Commerce

ERP

Definition, features, major characteristics, levels of ERP, benefits of ERP, enterprise potential of ERP, modules of ERP, phases of ERP implementation, limitations of ERP.

New Trends in E-Commerce

Social Commerce-concept, definition, features; Digital Marketing-definition, objectives, methods, limitations; Advertisement in Social Media-objectives, advantages and disadvantages, procedures

Learning Outcomes: This paper would enhance the technical skills of the students to get into the business ventures using electronic means thereby providing the opportunity to gain access to a larger customer base.

Text Books Recommended

1. E Commerce-D Mohapatra, Das and K M Das- Himalaya Publishing House
2. Bhaskar, B., E–Commerce, McGraw Hill

Suggested Readings:

1. E-Commerce ,Kakkar, Sendhu, Kalyani Publishers ,New delhi
2. E-Commerce, S.K. Dey/ M. Behera ,V.K. Global Pub. Pvt. Ltd, New Delhi.
3. Schneider G., E-Business, Cengage
4. E-Commerce and Business Communication: Datta &Somani, Oxford University Press.
5. E-Commerce– A K Jha, Vrinda Publications (P) Ltd
6. Pandey U.S – E.Commerce& Mobile Commerce Technology – S. Chand
7. P. T. Joseph, E-Commerce: An Indian Perspective, PHI Learning
8. Laudon, E-Commerce, Pearson Education India

Entrepreneurship Development and Business Ethics (SEC-2)

Objective: The purpose of the paper is to orient the learner toward entrepreneurship as a career option and creative thinking and behavior for effectiveness at work and in life.

Contents:

Unit-I: Introduction:

Meaning, elements, determinants and importance of entrepreneurship and creative behavior; Entrepreneurship and Micro, Small and Medium Enterprises, Role of family business in India; The contemporary role models in Indian business: their values, business philosophy and behavioural orientations; Conflict in family business and its resolution

Unit-II: Sources of business ideas

Sources of business ideas and tests of feasibility: Significance of writing the business plan/ project proposal; Contents of business plan/ project proposal; Designing business processes, location, layout, operation, planning & control; preparation of project report

Unit-III: Public and private system of stimulation

Public and private system of stimulation: support and sustainability of entrepreneurship. Requirement, availability and access to finance, marketing assistance, technology, and industrial accommodation, Role of industries/entrepreneur's associations and self-help groups, The concept, role and functions of business incubators, angel investors, venture capital and private equity fund

Mobilizing Resources

Mobilizing Resources: Mobilizing resources for start-up, Accommodation and utilities; Preliminary contracts with the vendors, suppliers, bankers, principal customers; Basic start-up problems

Unit IV: Business Ethics

Meaning - Scope – Types of Ethics – features – Factors influencing Business Ethics – significance of Business Ethics - Arguments for and against business ethics- Basics of business ethics - Corporate Social Responsibility and Business Ethics

Principles of Business Ethics Introduction – Meaning – Element – Ethics, Morale, Business ethics, Ethical dilemma [basic idea, features and significance of each of element]

Text Books Recommended

1. Entrepreneurship Development and Business Ethics: Mukherjee & Roy, Oxford University Press.

2. Entrepreneurship Development and Business Ethics-Desai V- Himalaya Publishing House- Himalaya Publishing House

Suggested Readings:

1. Kuratko and Rao, Entrepreneurship: A South Asian Perspective; Ferrell, Fraedrich, Farrell, Business Ethics, Cengage Learning

2. Ferrell, Fraedrich, Farrell, Business Ethics, Cengage

3. Entrepreneurship, R. Saibaba, Kalyani Publishers, New Delhi.

4. Entrepreneurship Develeopment and Business Ethics, Sanjeet Sharma – V.K. Global Pvt. Ltd., New Delhi.

5. SS Khanka, Entrepreneurial Development, S. Chand & Co, Delhi.
6. Rao, V.S.P – Business Entrepreneurship & Management – Vikash Publication
7. Desai, Vasant. Dynamics of Entrepreneurial Development and Management. Mumbai, Himalaya Publishing House.
8. Plsek, Paul E. Creativity, Innovation and Quality(Eastern Economic Edition), New Delhi:Prentice-Hall of India. ISBN-81-203-1690-8.
9. Singh, Nagendra P. Emerging Trends in Entrepreneurship Development. New Delhi: ASEED.
10. Entrepreneurship Development and Business Ethics - M K Nabi, K C Rout, Vrinda Publications (P) Ltd

Training Requirement for Subjects(7 Days each)

1. GST and Financial Markets and E-Commerce
2. IFRS, IND AS and Computerised Accounting
3. Data Management and Analytics, Business Mathematics (Only Derivatives and Integration)

STATE MODEL SYLLABUS FOR UNDER GRADUATE COURSE IN EDUCATION

(Bachelor of Arts Examination)

UNDER
CHOICE BASED CREDIT SYSTEM

Course structure of UG Education Honours

Semester	Course	Course Name	Credits	Total marks
I	AECC-I	AECC-I	04	100
	C-I C-I Practical	Educational Philosophy	04 02	75 25
	C-II C-II Practical	Educational Psychology	04 02	75 25
	GE-I GE-I Practical	GE-I	04 02	75 25
			22	
II	AEC-II	AEC-II	04	100
	C-III C-III Practical	Educational Sociology	04 02	75 25
	C-IV C-IV Practical	Changing Pedagogical Perspective	04 02	75 25
	GE-II GE-II Practical	GE-II	04 02	75 25
			22	
III	C-V C-V Practical	Educational Assessment and Evaluation	04 02	75 25
	C-VI C-VI Practical	Educational Research	04 02	75 25
	C-VII C-VII Practical	Statistics in Education	04 02	75 25
	GE-III GE-III Practical	GE-III	04 02	75 25
	SEC-I	SEC-I	04	100
			28	
IV	C-VIII C-VIII Practical	History of Education in India	04 02	75 25
	C-IX C-IX Practical	Curriculum Development	04 02	75 25

	C-X C-X Practical	Guidance and Counseling	04 02	75 25
	GE-IV GE-IV Practical	GE-IV	04 02	75 25
	SEC-II	SEC-II	04	100
			28	
Semester	Course	Course Name	Credits	Total marks
V	C-XI C-XI Practical	Development of Education in Odisha	04 02	75 25
	C-XII C-XII Practical	Information and Communication Technology in Education	04 02	75 25
	DSE-I DSE-I Practical	A. Pedagogy of language (English) B. Pedagogy of language (Odia)	04 02	75 25
	DSE-II DSE-II Practical	A. Pedagogy of Social Sciences B. Pedagogy of Mathematics	04 02	75 25
			24	
VI	C-XIII C-XIII Practical	Contemporary Trends and Issues in Indian Education	04 02	75 25
	C-XIV C-XIV Practical	Educational Management and Leadership	04 02	75 25
	DSE-III DSE-III Practical	A. Policy and Practices in School Education in India B. Policy and Practices in Higher Education in India	04 02	75 25
	DSE-IV DSE-IV Practical	Inclusive Education (Theory)	04 02	75 25
	OR			
	DSE-IV	Dissertation	06	100*
			24	

EDUCATION

HONOURS PAPERS:

Core course – 14 papers
Discipline Specific Elective – 4 papers
Generic Elective for non Education students – 4 papers. Universities where 2 subjects of two paper each are offered can offer GE1 and GE2

Marks per paper – Mid term : 15 marks, End term : 60 marks, Practical : 25 marks
Total – 100 marks
Credit per paper – 6

Core Paper I

EDUCATIONAL PHILOSOPHY

Learning Objectives:

On completion of this course, the learners shall be able to:
- State and analyze the meaning of education and form own concept on education
- Explain philosophy as the foundation of education
- Analyze aims of education
- Describe the essence of different formal philosophies and draw educational implications
- Compare and contrast Indian and western philosophies of education

UNIT 1: Education in Philosophical Perspective

(i) Etymological meaning of education
(ii) Narrower and broader meaning of education, Lifelong education
(iii) Aims of Education- Individual and Social aims of education
(iv) Meaning and nature of philosophy
(v) Branches of Philosophy- Metaphysics, Epistemology and Axiology, and its educational implications
(vi) Functions of Philosophy in relation to education

UNIT 2: Formal Schools of Philosophy and Educational Implications

(i) Idealism, Naturalism, Pragmatism with reference to: Aims of education, curriculum, methods of teaching, role of teacher, discipline

UNIT 3: Indian Schools of Philosophy and their Educational Implications

(i) Common characteristics of Indian philosophy
(ii) Sankhya, Vedanta, , Buddhism, Jainism with reference to:

Philosophical tenets, aims of education, curriculum, methods of teaching, role of teacher

UNIT 4: Educational Thought of Western and Indian Thinkers

i. Plato
ii. Dewey
iii. Gopabandhu Das
iv. Gandhi
v. Tagore
vi. Aurobindo

PRACTICAL

- Field visit to a seat of learning in the locality and prepare report.

NB: It will be evaluated by both the internal core -1 internal and External examiners.

Text Books

- Safaya, R.N. & Shaida, B.D. (2010). *Modern Theory and Principles of Education*. New Delhi: Dhanpatrai Publishing Company Pvt. Ltd. (Nayak, B.K. (2018).
- Ravi, Samuel.S. (2015). *A Comprehensive Study of Education*. Delhi: PHI Learning Pvt. Ltd.
- Taneja, V.R. (2000). *Educational thought and practice*. New Delhi: Sterling Publishers Pvt. Limited.

Reference Books

- Aggrawal, J.C. (2013). *Theory and principle of education*. New Delhi: Vikash Publishing House Pvt Ltd.
- Anand, C.L. *et.al*. (1983). Teacher and education in emerging in Indian society, New Delhi: NCERT.
- Brubacher, John.S.(1969). Modern philosophies of education. New York: McGraw Hill Co.
- Clarke, P. (2001). Teaching and learning: The Culture of pedagogy. New Delhi: Sage Publication.
- Dash, B.N. (2011) Foundation of education, New Delhi; Kalyani Publishers.
- Dewey, John (1916/1977). Democracy and education. New York: MacMillan.
- Dewey, John (1956). The Child and the curriculum, school and society. Chicago, Illinois: University of Chicago Press.
- Dewey, John (1997). Experience and education. New York: Touchstone.
- Ganesh, Kamala & Thakkar, Usha (Ed.) (2005). Culture and making of identity in India. New Delhi: Sage Publications.
- Govt. of India (1986/’92). National policy on education. New Delhi: MHRD.
- Krishnamurthy, J. (1953). Education and significance of life. New Delhi: B.I. Publications
- Kumar Krishna (1996). Learning from conflict. New Delhi: Orient Longman.
- Ministry of Education (1966). Education and national development. New Delhi: Ministry of Education, Government of India.
- Ornstein, Allan C. & Levine, Daniel U. (1989).Foundations of education (4th Edn.). Boston: Houghton Mifflin Co.
- Pathak, R. P. (2012). Philosophical and sociological principles of education. Delhi: Pearson. Pathak, Avijit (2002). Social implications of schooling. New Delhi: Rainbow Publishers.
- Peters, R.S. (1967). The Concept of education. London: Routledge Kegan & Paul. Radhakrishnan, S. Indian philosophy Vol. I and Vol. II
- Ross, James S.(1981). Ground work of educational theory.Delhi: Oxford University Press
- Rusk, Robert R., Philosophical bases of education, London: Oxford University Press.
- Salamatullah, (1979). Education in social context. New Delhi: NCERT.
- Srinivas, M.N., (1986). Social changes in modern India. Bombay: Allied Publishers.
- Wingo, G. Max (1975). Philosophies of education. New Delhi: Sterling Publisher Pvt. Limited.

Core Paper II

EDUCATIONAL PSYCHOLOGY

Learning Objectives:

On completion of this course, the learners shall be able to:

- Explain the concept of educational psychology and its relationship with psychology.
- Understand different methods of educational psychology.
- Describe the theoretical perspectives of educational psychology.
- Explain the concepts of growth and development of child and adolescence, and underlined general principles of growth and development.
- Describe briefly the periods and the typical characteristics of growth and development during childhood and adolescence.
- Specify the contexts and factors influencing development.
- Explain the theory of cognitive development and its educational implications.
- State the different forms and characteristics of individual differences and the ways of meeting the classroom issues arising out of the differences.
- Identify the learning needs during the different stages of development and adopt appropriate strategies in and out of school to meet the learning needs.

UNIT 1: Educational Psychology in Developmental Perspective

(i) Meaning, nature, scope and relevance of educational psychology
(ii) Methods of educational psychology- observation, experimentation, and case study
(iii) Application of educational psychology in understanding learner
(iv) Growth and Development-Concept, difference between growth and development, and principles of growth and development
(v) Characteristics of development during adolescence in different areas: Physical, social, emotional and intellectual (with reference to Piaget)

UNIT 2: Intelligence, Creativity and Individual difference

(i) Individual difference-concept, nature, factors and role of education
(ii) Intelligence- meaning and nature of intelligence, concept of I.Q, theories of intelligence- Two factor theories, Guildford's structure of intelligence (SI) model, Gardner's multiple theory of intelligence.
(iii) Measurement of intelligence- individual and group test, verbal, non-verbal test
(iv) Creativity- meaning, nature and stages of creative thinking, strategies for fostering creativity

UNIT 3: Learning and Motivation

(i) Learning- meaning, nature and factors of learning
(ii) Theories of learning with experiment and educational implications-

(iii) Classical conditioning, operant conditioning, insightful learning and constructivist approach to learning

(iv) Motivation – concepts, types, and techniques of motivation

UNIT 4: Personality and Mental health

(i) Personality- meaning and nature of personality

(ii) Theories- type theory and trait theory

(iii) Assessment of personality- subjective, objective and projective techniques

(iv) Mental health-concept, factors affecting mental health and role of teacher, mental health of teacher.

(v) Adjustment mechanism: Concept and Types

PRACTICAL

- Administration and interpretation of any psychological test relating to intelligence or personality

N.B: It will be evaluated by both the Internal and External examiners.

Text Books

- Woolfolk, A. (2015). *Educational psychology (9th Ed.)*. New Delhi: Pearson Publication
- Chauhan, S.S. (2010). *Advanced educational psychology*. New Delhi: Vikas Publishing House Pvt. Ltd.
- Mangal, S.K. (2002). *Advanced educational psychology*. New Delhi: Prentice Hall of India.

Reference Books

- Arnett, J. (2007). Adolescence and emerging adulthood: A cultural approach. (3rd Edn.). Upper Saddle River, N.J.: Pearson.
- Berk, Laura E. (2011). Child development (9th Edn.). New Delhi: Prentice Hall of India.
- Flavell, J.H. (1963). The developmental psychology of Jean Piaget. New York: Van Nostrand
- Hurlock, E. B. (1980). Developmental psychology: All span approach. New York: McGraw Hill Book.
- Hurlock, E.B. (1980). Child development (6th Edn.). Tokyo: McGraw-Hill, Kogakusha Ltd.
- Hurlock, E.B. (2007). Child growth and development. New York: McGraw Hill.
- Kail, Robert V (2011). Children and their development (6th Edition). Englewood Cliffs, N.J: Prentice Hall.
- Stephens, J. M.; Evans, E. D.(1973). Development and classroom learning: An introduction to educational psychology. New York: Holt, Rinehart and Winston

Core Paper III

EDUCATIONAL SOCIOLOGY

Learning Objectives:

On completion of this course, the students shall :

- State the relationship between education and society.
- Understand the meaning of Educational Sociology and function of education as a social system.
- State different agencies of education and their functions.
- Justify the importance of education for social change.
- Describe the role of education in modernization and globalization.
- Describe the function of education to ensure equality and equity.

UNIT 1: Education and Society

(i) Relationship between education and society, school as a miniature society
(ii) Educational Sociology- Concept, nature, scope and importance;
(iii) Relationship between education and sociology.
(iv) Education as a process of socialization.
(v) Education and politics, education and economic development

UNIT 2: Agencies of Education

(i) Family- Importance, functions and role for education and socialization of the children
(ii) School - Importance, functions and role for education and socialization of the children
(iii) Society- Importance, functions and role for education and socialization of the children
(iv) Mass Media- Importance, functions and role for education and socialization of the children

UNIT 3: Education, Social change and Modernization

(i) Concept of social change and factors affecting Social Change
(ii) Education as an instrument of social change and social control
(iii) Concept and attributes of modernization
(iv) Education for accelerating the process of modernization
(v) Impact of globalization on education

UNIT 4: Equalization of Educational opportunities for ensuring equity and Inclusion

(i) Concept of equality, equity and inclusion: its educational implication
(ii) Ensuring equality in the education of SC and ST
(iii) Education for women empowerment
(iv) Inclusive education with reference to children with special needs (CWSN)

PRACTICAL

Field Visit: Study of a social unit (Home/School/Village/slum) and reporting.

NB: It will be evaluated by both the internal and external examiners

Text Books

- Mathur, S. S. (2000). *A sociological approach to Indian education.* Agra : Vinod Pustak Mandir.
- Pathak, R. P. (2012). Philosophical and sociological principles of education. Delhi: Pearson.
- Bahttacharya, S. (2006). Sociological Foundation of Education. New Delhi: Atlantic

Reference Books

- Ravi, Samuel.S.(2015). *A Comprehensive Study of Education*. Delhi: PHI Learning Pvt. Ltd.
- Safaya, R.N. & Shaida, B.D. (2010), *Modern theory and principles of education*. New Delhi: Dhanpati Publising Company Pvt. Ltd.
- Aggrawal, J.C.(2013). Theory and principle of education. New Delhi: Vikash Publishing House Pvt Ltd.
- Anand, C.L. et.al. (1983). Teacher and education in emerging in Indian society, New Delhi: NCERT. Brubacher, John.S.(1969). Modern philosophies of education. New York: McGraw Hill Co.
- Clarke, P. (2001). Teaching and learning: The Culture of pedagogy. New Delhi: Sage Publication.
- Dewey, John (1916/1977). Democracy and education. New York: MacMillan.
- Dewey, John (1956). The Child and the curriculum, school and society. Chicago, Illinois: University of Chicago Press.
- Dewey, John (1997). Experience and education. New York: Touchstone.
- Ganesh, Kamala & Thakkar, Usha (Ed.) (2005). Culture and making of identity in India. New Delhi: Sage Publications.
- Govt. of India (1986/'92). National policy on education. New Delhi: MHRD.

  Ministry of Education (1966). Education and national development. New Delhi: Ministry of Education, Government of India.
- Ornstein, Allan C. & Levine, Daniel U. (1989).Foundations of education (4th Edn.). Boston: Houghton Mifflin Co.
- Pathak, Avijit (2002). Social implications of schooling. New Delhi: Rainbow Publishers.
- Salamatullah, (1979). Education in social context. New Delhi: NCERT.

  Saraswati, T.S. (Ed.) (1999).Culture, socialization and human development. Theory, research and applications in India. New Delhi: Sage Publication.
- Taneja, V.R. (2000). Educational thought and practice, New Delhi: Sterling

  Publishers Pvt. Limited.

Core Paper IV

CHANGING PEDAGOGICAL PERSPECTIVE

Learning Objectives:

On completion of this course, the students shall:

- Explain the concept of pedagogy
- Differentiate pedagogy from other allied concepts
- Explain different teaching task with example
- Establish relationship between teaching and learning
- List out different approaches and methods of teaching
- Prepare a lesson plan following different designs

UNIT 1: Concept of Teaching and Learning

(i) Meaning and definition of teaching and learning
(ii) Relationship between teaching and learning
(iii) Variables involved in teaching task: independent, dependent and intervening
(iv) Phases of teaching: Pre- active, inter- active and post- active
(v) Levels of teaching: memory, understanding and reflective
(vi) Lesson plan design- The Herbartian steps, 5 E and ICON design model

UNIT 2: Theories of Teaching

(i) Meaning and nature of teaching theory
(ii) Types of teaching theories:
(iii) Formal theories of teaching- communication theory of teaching
(iv) Descriptive theories of teaching– Gagne's hierarchical theory of instruction and Bruner's cognitive theory of instruction
(v) Normative theories of teaching - Mitra's psychological theory of teaching and Clarke's general theory of teaching

UNIT 3: Principles and maxims of teaching

(i) General principles of teaching
(ii) Psychological principles of teaching
(iii) Maxims of teaching
(iv) Core teaching skills: Introducing the lesson, explaining, illustrating with examples, stimulus variation, and reinforcement, questioning, probing questions, closure.

UNIT 4: Approaches and methods of Teaching

(i) Concept of approach, method, strategy and techniques
(ii) Methods of teaching: inductive-deductive, analytic- synthetic, problem solving and

project

(iii) Shift in focus from teaching to learning- constructivist approach to learning

PRACTICAL

- Preparation of rating scale/ checklist /observation schedule to evaluate classroom teaching and reporting.

  NB: It will be evaluated by both the internal and external examiners

Text Books

- Kochar, S.K.(2011). *Methods and Techniques of teaching*. Sterling Publisher Pvt. Ltd., New Delhi
- Chauhan, S.S.(1995). *Innovations of teaching learning process*. Vikash Publishing House, New Delhi
- Sharma, R.A.(1986).*Technology of Teaching*. International Publishing House, Meerut.

Reference Books

- Aggarwal, J.C.(1995). *Essentials of Educational Technology*. Vikash Publishing House, New Delhi
- Walia, J.S. (2013). *Educational Technology*. Jalandhar, Punjab: Ahim Publications.
- Mangal, S.K. and Mangal, U.(2010) *Essentials of Educational Technology*, New Delhi, PHI Learning Pvt. Limited
- Mangal, S.K.(1988) *Foundations of Educational Technology,* Ludhiana, Tandan Publications
- Nageswar Rao, S., Sreedhar, P. & Rao, B.(2007). *Methods and techniques of teaching*, Sonali Publications, New Delhi
- Oliver,R.A. (1963) *Effective teaching*, JM Dent & Sons
- Pathak, R.P. & Chaudhary, J. (2012) *Educational Technology*, Pearson, New Delhi
- Ryburn, W.M.(1955) *Principles of Teaching*, Geoffrey Cembridge, OUP
- Sampath,K, Pannir Salvam,A.,& Santhanam, S.(1981) *Introduction to Educational Technology*, Sterling Publisher, New Delhi

Core Paper V

EDUCATIONAL ASSESSMENT AND EVALUATION

Learning Objectives:

On completion of this course, the students will.

- State the nature, purpose and types of educational assessment and evaluation.
- Develop and use different types of tools and techniques for continuous and comprehensive assessment of learning in the school situation.
- Explain the importance of assessment for learning and its processes for enhancing the quality of learning and teaching.
- Describe the characteristic of a good test.

- Analyze the trends and issues in learning and learner assessment.
- Analyze and interpret results of the assessment using standard score.
- Illustrate the principles of test construction in education.

UNIT 1: Assessment and Evaluation in Education

(i) Understanding the meaning and purpose of test, measurement, assessment and evaluation
(ii) Scales of measurement- nominal, ordinal, interval and ratio
(iii) Types of test- teacher made and standardized
(iv) Approaches to evaluation- placement, formative, diagnostic and summative
(v) Types of evaluation- norm referenced and criterion referenced
(vi) Concept and nature of continuous and compressive evaluation

UNIT 2: Instructional Learning Objectives

(i) Taxonomy of instructional learning objectives with special reference to cognitive domain
(ii) Criteria of selecting appropriate learning objectives, and stating of general and specific instructional learning objectives
(iii) Relationship of evaluation procedure with learning objectives
(iv) Difference between objective based objective type test and objective based essay type test

UNIT 3: Tools and Techniques of Assessment and construction of Test

(i) Steps of test construction: planning, preparing, trying out and evaluation
(ii) Principles of construction of objective type test items- matching, multiple choice, completion and true – false
(iii) Principles of construction of essay type test
(iv) Non- standardized tools: Observation schedule, interview schedule, rating scale, check list, portfolio and rubrics .

UNIT 4: Characteristics of a good Test

(i) Validity-concept, types and methods of validation
(ii) Reliability- concept and methods of estimating reliability
(iii) Objectivity- concept and methods of estimating objectivity
(iv) Usability- concept and factors ensuring usability

PRACTICAL

- Construction of Unit test on a school subject based on blueprint and reporting.

NB: It will be evaluated by both Internal and External examiners.

Text Books

- Aggrawal, J.C. (1997). *Essentials of examination system, evaluation, tests and measurement*. New Delhi: Vikas Publishing House Pvt Ltd.
- Goswami, M. (2011). *Measurement and evaluation in psychology and education*.

Hyderabad: Neelkamal Publishers
Gronlund, N.E. (2003). *Assessment of student Achievement*. Boston: Allyn & Bacon

- Singh, A.K. (2016). *Tests, measurements and research methods in behavioural sciences*. New Delhi: Bharati Bhawan Publishers.

Reference Books

- Anastasi, A.(1976). Psychological testing. New York: Macmillan Publishing Co.
- Anderson, L.W. (2003). Classroom assessment: Enhancing the quality of teacher decision making.
- Banks, S.R. (2005). *Classroom assessment: issues and PRACTICES*. Boston: Allyn & Bacon.
- Blooms, B.S.(1956). *Taxonomy of educational Learning Objectives*. New York: Longman Green and Company
- Cohen, R.J., Swerdlik, M.E., & Phillips, S.M. (1996). *Psychological testing and assessment. an introduction to the tests and measurement*. California: Mayfield Publishing Co.
- Earl, L.M. (2006). *Assessment as learning: using classroom assessment to maximize student learning*. Thousand Oaks, California: Corwin Press
- Hopkins, KD. (1998). *Educational and psychological measurement and evaluation.* Boston: Allyn and Bacon.
- Linn, R.L. & Gronlund, N.E. (2000). *Measurement and assessment in teaching.* London: Merrill Prentice Hall.
  Macmillan, J.H. (1997). *Classroom assessment, principles and practice for effective instruction.* Boston: Allyn and Bacon
- Mohan, R. (2016). *Measurement evaluation and assessment in education*. Delhi: PHI Learning Pvt. Ltd.
- National Council of Educational Research and Training (2006). *Position paper: Examination Reforms.* New Delhi: NCERT
- Noll, N.H. S cannell, D.P. & Craig, RC. (1979). *Introduction to educational measurement.* Boston: Houghton Miffin.

Core Paper VI

EDUCATIONAL RESEARCH

Learning Objectives:

On completion of this course, the student will:

- Describe nature, scope and limitation of educational research.
- Understand different types and methods of educational research.
- Explain sources from where knowledge could be obtained.
- Describe the process of research in education.
- Analyze research design in education.
- Illustrate procedure of collecting and analyzing data.
- Prepare the research report.

UNIT 1: Concept and Types of Educational Research

(i) Concept and nature of research
(ii) Meaning, nature and scope of educational research

(iii) Types of research by purpose- fundamental, applied and action
(iv) Types of research by approach- quantitative and qualitative

UNIT 2: Design of Research and preparation of research proposal

(i) Steps of Research
(ii) Review of Related Literature; and identification of problem
(iii) Hypothesis: meaning, types, sources and characteristics of hypothesis
(iv) Concept of population and sample
(v) Sampling procedures- probability and non-probability
(vi) Tools and techniques for data collection(i.e. questionnaire, interview, observation and procedure of data collection , preparation of research proposal

UNIT 3: Methods of Research

Meaning nature and steps of:
(i) Survey method
(ii) Case-study method
(iii) Historical research
(iv) Experimental research

UNIT 4: Writing Research Report

(i) Data analysis and interpretation in research.
(ii) Steps for reporting research
(iii) Reporting style (APA Style)
(iv) Plagiarism checking
(v) Referencing Style (APA Style): Bibliography, Webliography

PRACTICAL

- Preparation of a Research Proposal on any Educational Topic (Issues/ Trends/ Problems/ Psychological Topics)
  NB: It will be evaluated by both Internal and External examiners.

Text Books

- Best J.W. and Kahn, J. V. (2006). *Research in education (*9th Ed.) New Delhi: Pearson Education Inc.
- Kaul, L. (1984). *Methodology of educational research.* New Delhi: Vikas Publication
- Singh, A.K. (2016). *Tests, measurements and research methods in behavioural sciences*. New Delhi: Bharati Bhawan Publishers.

Reference Books

- Nanda, G.C. & Khatoi, P.K. (2012). *Fundamentals of Educational Research and Statistics.* New Delhi: Ludhiana.

- Gay, L.R. (1990). *Educational research-competencies for analysis and application* (3rd Ed.), Macmillan Publishing Company, New York
- Ary, D., Jacobs, L. C., &Razavieh, A. (2002). *Introduction to research in education* (6th Ed.). Belmont, CA: Wadsworth/Thomson Learning.
- Bhandarkar, P.L. and Wilkinson,T.S. (2010). *Methodology and techniques of social research*. Himalaya Publishing House, New Delhi.
- Creswell, J.W. (2014). *Educational research-planning, conducting and evaluating quantitative and qualitative research (4th Ed.).* New Jersey, USA: Pearson Education Inc. (Indian Reprint available at PHI Learning Pvt.Ptd.)
- Kerlinger, F.N. (1973). *Foundation of behavioral research.* New York: Holt Rinehart & Winston.
- Rao, U. (2007). *Action research.* Himalaya Publishing House, New Delhi.
- Borg, W.R. & Gall, M.D. (1989). *Educational research: An introduction*. New York: Longman.
- Corey, S. M. (1953), *Action research to improve school practice*, New York: Teachers College Press
- Johnson, B. & Christensen, L. (2008). *Educational research: quantitative, qualitative, and mixed approaches*. London: Sage Publication
- McMillan, J.H. & Schumacher, S. (1989). *Research in Education- a Conceptual Introduction.* New York: Harper Collins.
- Mertler, C.A. (2006). *Action research: teachers as researchers in the classroom*. London: Sage Publication

Core Paper VII

STATISTICS IN EDUCATION

Learning Objectives:

On completion of this course, the students will:

- Describe the importance of statistics in education.
- Organise and represent educational data in tabular and graphical form.
- Compute and use various statistical measures of average, variation and bi-variate distribution to in analysis and interpretation of educational data.
- Describe the concept and importance of normal probability curve and interpret test scores in using normal probability curve.
- Understand the divergence of data from normality.

UNIT 1: Educational Statistics

(i) Educational Statistics-meaning, nature, scope and uses
(ii) Organization of Data: frequency distribution, cumulative frequency distribution
(iii) Graphical representation of data (histogram, frequency polygon , ogive and pie-diagram)

UNIT 2: Measures of Central Tendency and Variability

(i) Mean, Median and Mode- concept, computational process, uses and limitations
(ii) Range, Average Deviation, Quartile Deviation and Standard Deviation- Concept, computational process, uses and limitations

UNIT 3: Co-relational Statistics

(i) Meaning and types of correlation
(ii) Computation of coefficient of correlation by rank difference method; product moment method

UNIT 4: Normal Probability Curve and Divergence from Normality

(i) Normal Probability Curve- concept, properties and applications
(ii) Skewness and Kurtosis
(iii) Interpretation of derived scores: Z- score and T- score

PRACTICAL

- Analysis of Achievement Data of a particular class and Reporting

  NB: It will be evaluated by both Internal and External examiners.

Text Books

- Aggarwal,Y.P.(2009).*Statistical methods: concepts, application and computation*.New Delhi: Sterling Publishers Pvt. Ltd
- Garrett, H.E. (1971). *Statistics in psychology and education.* New Delhi: Paragon International Publisher
- Mangal, S.K. (2008). *Statistics in education and psychology*. New Delhi: Prentice-Hall of India Private Limited

Reference Books

- Ferguson, G.A.(1971). *Statistical analysis in psychology and education.* Kogakusha, Tokyo: McGraw-Hill
- Guilford, J.P. &Fruchter, B. (1981). *Fundamental statistics in psychology and education.* New York: McGraw Hill
- McCall, R. (1993). *Fundamental statistics for the behavioral Science.* New York: Harcourt Brace
- Ravid, Ruth. (2000). *Practical statistics for education*. New York: University Press of America.
- Seigel. S. & Castel Ian N.J. (1988). *Non-parametric statistics for the Behavioral Science.* Singapore: Graw- Hill Book Co.

Core Paper VIII

HISTORY OF EDUCATION IN INDIA

Learning Objectives:

On completion of this course, the student will

- Understand the development of education in India during ancient period, medieval

period and pre-independence period.
- Describe the development of education in India during post-independence period.
- Describe major recommendations of different policies and committee reports on education in India.

UNIT 1: Education during Ancient Period

(i) Features of Vedic period with special reference to aims, curriculum and methods of teaching
(ii) Features of Buddhist period with special reference to aims, curriculum and methods of teaching
(iii) Relevance of Gurukul system and Buddhist centers of learning
(iv) Ancient seats of learning

UNIT 2: Education during Medieval Period

(i) Features of education during medieval period with special reference to aims, curriculum and methods of teaching
(ii) Educational institutions during Muslim period, important centers of education.
(iii) Relevance of Islamic period

UNIT 3: Education during pre-independence period

(i) Charter’s Act(1813)
(ii) Maculay’s Minute(1835)
(iii) Wood’s Despatch (1854)
(iv) Indian Education Commission(1882)
(v) Calcutta University Commission(1917)
(vi) Hartog committee(1929)

UNIT 4: Education during post-independence period

Major recommendations of the following commissions and committees relating to the aims of education and curriculum:
(i) University Education Commission (1948-49)
(ii) Major recommendations of Secondary Education Commission (1952-53)
(iii) Major recommendations of Education Commission (1964-66)
(iv) National Policy on Education (1986), revised in 1992 and beyond

PRACTICAL

- Study on implementation of NPE(1986) in respect of recommendations for elementary level

NB: It will be evaluated by both Internal and External examiners.

Text Books

- Aggrawal, J.C.(2010). *Landmarks in the history of modern Indian education*. New Delhi: Vikash Publishing Pvt Ltd.
- Dash, B.N. (1911). *Development of education in India*. New Delhi: Ajanta Prakashan
- Das, K.K. (1993). *Development of education in India*. New Delhi: Kalyani Publishers.

Reference Books

- Naik, J.P. & Narullah, S. (1996). *A student's history of education in India.*New Delhi: Mc Millan India Ltd
  Rawat, P.L. (1989). *History of Indian education* New Delhi: Ram Prasad & Sons.
- Govt. of India. (1992, 1998). National policy on education, 1986 (As modified in 1992). Retrieved from http://mhrd.gov.in/sites/upload_files/mhrd/files/NPE86-mod92.pdf
- Keay, F.E. & Mitra, Sukumar (1978). A history of education in India. New Delhi: Oxford University Press.
- Ministry of Education (1966). Education and national development. New Delhi: Ministry of Education, Government of India.
- Ministry of Human Resource Development (2004).Learning without Burden: Report of the National Advisory Committee. New Delhi: Min. of HRD.
- Mookharjee, R.K. (1989). The Gupta Empire. Delhi: Motilal Banarsi Dass Publishers Pvt Ltd. Mukherji, S.M., (1966). History of education in India. Vadodara: Acharya Book Depot.
- Naik, J.P. and Syed, N., (1974). A student's history of education in India. New Delhi: MacMillan.
- Rawat, P.L.(1989). History of Indian education. New Delhi: Ram Prasad & Sons. Website, www.mhrd.gov.in

Core Paper IX

CURRICULUM DEVELOPMENT

Learning Objectives:

On completion of this course, the students will

- Differentiate curriculum from courses of study, text book.
- Analyse bases and sources of curriculum.
- Describe different types of curriculum.
- Critically examine National curriculum framework- 2000 and 2005.
- Describe process of curriculum development and differentiate different models of curriculum development.
- Evaluate curriculum using different evaluation models.

UNIT 1: Curriculum

(i) Concept of syllabus, courses of study, text book and curriculum
(ii) Bases of curriculum- philosophical, sociological and psychological
(iii) Components of curriculum: learning objectives, contents, methods and evaluation
(iv) Concept of curriculum design

UNIT 2: Types of Curriculum

(i) Subject centered curriculum
(ii) Learner centered curriculum

(iii) Experience centered curriculum
(iv) Core curriculum

UNIT 3: Curriculum Organization

(i) Principles of curriculum construction
(ii) Selection and organization of content
(iii) Selection and organization of learning experiences
(iv) National curriculum framework- 2005 and its guiding principles

UNIT 4: Curriculum Development and Evaluation

(i) Curriculum development- its process, role of local authority, state level agencies like SCERT, BSE and National Agencies like CBSE, NCERT
(ii) Tyler and Taba Model of curriculum development
(iii) Meaning and nature of curriculum evaluation

PRACTICAL

- Content Analysis of any text book of elementary level

NB: It will be evaluated by both Internal and External examiners.

Text Books

- Ornstein, A.C. & Hunkins, E (1998). *Curriculum. Foundations, Principles and Issues*. Boston: Allyn & Bacon, Boston.
- Oliva, P.F. (2001). *Developing the curriculum* (Fifth Ed.). New York, NY: Longman.
- Talla, M. (2012). *Curriculum Development: Perspectives, Principles and Issues.* New Delhi: Pearson Publications.

Reference Books

- Beane, J.A. ,Conrad, E.P. Jr. and Samuel JA, Jr. (1986). Curriculum planning and development, Boston: Allyn & Bacon.
- Brady, L. (1995). Curriculum development, New Delhi: Prentice Hall.
- Doll, R.C. (1996).Curriculum development: decesion-making and process, Boston: Allyn & Bacon. Krug, E.A.(1956). Curriculum planning. New York: Harper and Row Publishers.
- Oliva, P.F. (2001). *Developing the curriculum* (Fifth Ed.). New York, NY: Longman.
- Pratt, D.(1980). Curriculum design and development. New York: Macmillan Publishing Co. Inc.
- Popham, W.J. (1993). Modern educational measurement. Englewood Cliffs, N.J.: Prentice Hall.
- Saylor, J.G., Alexander, W.M. and Lewis, A.J.(1981). Curriculum planning for better teaching and learning. New York: Holt Rienehart & Winston.
- Taba, H. (1962). Curriculum development-theory and practice. New York: Harcourt Brace, Jovanoich. Tanner, D. and Tanner, L.(1975) Curriculum development- theory and practice. New York: Macmillan Publishing Co. Inc.

- Tyler, R.W.(1941). Basic principles of curriculum and instruction .Chicago: University of Chicogo Press.

Core Paper X

GUIDANCE AND COUNSELLING

Learning Objectives:

On completion of this course, the students will

- State the concept, need, principles and bases of guidance.
- Use various tools and techniques of guidance in appropriate contexts.
- Explain the role of school in organizing different guidance programmes.
- State the concept, scope and type of counseling.
- Narrate the process, tools and techniques of counseling.
- Explain the qualities and role of a counselor.
- Describe different programmes for with differently abled children.
- Explain the role of teacher and head master in organizing different guidance programmes.

UNIT 1: CONCEPT OF GUIDANCE

(i) Meaning, nature and scope of guidance
(ii) Philosophical, psychological and sociological bases of guidance
(iii) Need, importance, purpose and scope of educational guidance in schools
(iv) Need, importance, purpose and scope of vocational guidance

UNIT 2: EDUCATIONAL GUIDANCE

(i) Basic data necessary for educational guidance
(ii) Basic principles and main types of pupil personnel records
(iii) Cumulative records in a guidance programme
(iv) Case study procedure in guidance

UNIT 3: CONCEPT OF COUNSELLING

(i) Meaning, nature and scope of counseling
(ii) Relationship between guidance and counselling
(iii) Different types of counseling
(iv) Steps and techniques of counseling
(v) Necessary qualities of a good counselor
(vi) Role of a counselor in secondary schools

UNIT 4: ORGANISATION OF GUIDANCE SERVICE

(i) Placement service

(ii) Follow-up service
(iii) Individual inventory service
(iv) Occupational information service
(v) Launching school guidance programme

PRACTICAL

- Case Study of a Child with Special Needs or a child coming from socially disadvantaged background

NB: It will be evaluated by both Internal and External examiners.

Text Books

- Goswami, Marami (2016). *Essentials of Guidance and Counselling*. New Delhi: Lakshi Publishers And Distributors.
- Kochhar. S.K. (2017). *Educational and Vocational Guidance in Secondary Schools*. New Delhi: Sterling Publishers
- Siddiqui, M.H. (2009). *Guidance And Counselling*. New Delhi: APH Publishing Corporation

Reference Books

- Sharma, R. N., & Sharma, R. (2013). *Guidance and counselling in India*. New Delhi: Atlantic Publishers and Distributors (P) Ltd.
- Bhatnagar, Asha Gupta, Nirmala (Eds) (1999). Guidance and counseling: A theoretical perspective (Vol.I). New Delhi: Vikas
- Bhatnagar, Asha and Gupta, Nirmala (Eds) (1999). Guidance and counseling:A practical approach(Vol.II). New Delhi: Vikas.
- Dave, Indu (1984). The basic essentials of counseling. New Delhi: Sterling Pvt. Ltd.
- Gazda George R.M.(1989). Group counseling: A development approach. London: Allyn and Bacon. Gibson, R.L. & Mitchell, M.H. (1986). Introduction to guidance. New York: McMillan.
- Nugent, Frank A. (1990). An Introduction to the profession of counseling. Columbus: Merrill publishing Co.
- Pietrofesa, J.J., Bernstein, B.,and Stanford,S.(1980). Guidance: An introduction. Chicago: Rand McNally.
- Rao, S.N. (1981). Counseling psychology. New Delhi: Tata McGraw Hill.
- Saraswat, R.K. & Gaur, J.S.(1994). Manual for guidance counselors. New Delhi: NCERT.

Core Paper XI

DEVELOPMENT OF EDUCATION IN ODISHA

Learning Objectives

On completion of the course the students will:

- Grasp the structure of educational system of Odisha
- State the function of institutions/units at the state and district levels
- Appreciate the contribution of Utkalmani Gopabandhu Das to the thoughts and

- Practices of Indian education narrate the learning objectives and implementation process of the major education
- Schemes of central as well as state government being implemented in the state of Odisha
- Explain the role of various state and district level institutions in education
- Analyze the scenario of higher and technical education of Odisha
- Establish linkage between higher education and development of the state

UNIT 1: Status of Elementary Education

(i) History of primary education in Odisha
(ii) Efforts to Universalize Elementary Education: DPEP, SSA and Right to Education Act, 2009
(iii) Indicator wise position in terms of provision, enrolment, retention and achievement for elementary level programmes: NPEGEL and KGBV
(iv) Problem and issues in elementary education

UNIT 2: Status of Secondary and Higher Secondary Education

(i) History of secondary education in Odisha
(ii) Rashtriya Madhyamik Shiksha Abhiyan (RMSA) and its implementation in Odisha.
(iii) Role of BSE, Odisha- Problems and issues
(iv) Status of Higher Secondary Education and Role of CHSE; Problems and Issues
(v) Status of Higher Secondary Vocational Education-Problems and Issues

UNIT 3: Status of Higher Education

(i) History of collegiate education
(ii) Organization of higher education at the under graduation level and university level-present status
(iii) RUSA and its implementation
(iv) Autonomous colleges and their functioning
(v) Problems and issues relating to higher education

UNIT 4: Status of Teacher Education

(i) History of teacher education in Odisha
(ii) Pre-service and In-service teacher education for elementary schools teachers
(iii) Pre-service and In-service teacher education for secondary school teachers
(iv) Role of DIET, CTE, IASE and SCERT
(v) Problems and issues in teacher education

Practical: 25 Marks

- Seminar Presentation (Each student has to present minimum two papers during this semester related to themes based on Core-11)

NB: It will be evaluated by both the Internal and External Examiners.

Text & Reference Books

- Govt. of Odisha, Department of S & ME (2011). *School Education at a Glance-2011-12*, Bhubaneswar
- Samal, J.K.(1984). History of Education in Odisha: 1905-1936, Sankar Bhattacharya, Punthi Pustak, 136/4B, Bidhan Sarani, Calcutta -700004 ;p-171
- Samal, J.K.(1989). History of Modern Orissa, Firma KLM private limited, 257B,B.B.Ganguly Street, Calcutta;p-188

- www.shodhganga.inflibnet.ac.in/bitstream/10603/.../08_chapter%202.pdf: Education in Odisha- *1850-1900: Retrieved on dt.25.07.2012*
- *Odisha - Wikipedia, the free encyclopedia/Retrieved on dt.25.07.2012*
- Odisha: Info on geography, history, government, districts, business *...: Retrieved on dt.25.07.2012*
- *www.Odisha.gov.in/e-magazine/Odishareview/2011/Jan/engpdf/57-61.pdf:*
- Gopabandhu Das:The National Education Planner of Odisha*: Retrieved ondt.25.07.2012*
- www.dheOdisha.in/ *Higher Education Department - Online Admission - e-Admission for ...*: Retrieved on dt.25.07.2012
- www.Odisha.gov.in/highereducation/index.htm: *Higher Education Department.... - Government of Odisha*: Retrieved on dt.25.07.2012
- *www.Odisha2020.org/home/Odisha-higher-education-task-force:Odisha Higher Education Vision 2020*: Retrieved on dt.25.07.2012
- http://www.scertodisha.nic.in/
- http://www.chseodisha.nic.in/
- http://bseodisha.nic.in/
- http://mhrd.gov.in/rusa
- http://mhrd.gov.in/rmsa

Core Paper XII

INFORMATION AND COMMUNICATION TECHNOLOGY IN EDUCATION

Learning Objectives

On completion of this course, the student will:

- Explain the concept, nature and scope of ICT in education
- Explore ICT resources for Teaching and learning.
- Differentiate between Web1.0 and Web2.0
- Describe the importance of free and open source software in education
- Demonstrate the use of various application software in education.
- Develop the ability to use various tools connect the world
- Explain the content by using various subject tools.
- Explore tools and techniques of ICT for evaluation.

UNIT 1: Educational technology

(i) Meaning , nature and scope
(ii) Approaches to educational Technology: hardware, software and system approach
(iii) Innovations in Educational Technology: Open Educational Resources (OER), Massive Open Online Course (MOOC) Learning Management System (LMS)
(iv) Importance of Educational Technology for the teacher and the student.

UNIT 2: ICT in Education

(i) Conceptual understanding: Information Technology; Communication Technology; and Information and Communication Technology (ICT)
(ii) Relevance of ICT in Education
(iii) Nature and scope of ICT in Education.
(iv) Content, pedagogy and technology integration
(v) Challenges in Integrating ICT in Education
(vi) Use of computers in education- Computer Aided Learning

UNIT 3: Application of software and ICT assessment Tools in Education

(i) Word Processing Application
(ii) Spread sheet Application
(iii) Presentation Application
(iv) Free and Open Source Software (FOSS)
(v) Subject Tools: Digital Storytelling, Concept Map Software (C-Map)
(vi) Assessment Tools: Rubistar, Hot potatoes, E- portfolios

UNIT 4: Connecting with the World

(i) Use of browsers and search engines; choosing appropriate sites; search and retrieval of information and resources; Downloading, uploading and sharing information and resources;
(ii) Use and importance of Web 2.0 Tools: E-mail, Wikis, Social networking (WhatsApp, Twitter, Facebook and Blogging)
(iii) Use and importance of e-library, e-books, e-journals, Inflibnet.

PRACTICAL

- Development of an objective test using any assessment tool or development of a Rubric using Rubistar.

NB: It will be evaluated by both Internal and External examiners.

Text Books

- UNESCO (2002). *Information and communication technology in education: A curriculum for schools and programme of teacher development.* Paris: UNESCO.
- Kanvaria, V.K. (2014). *A Comprehension on Educational Technology and ICT for Education*. New Delhi: GBO.
- Vanaja and Rajasekar, S. (2016). *Information & Communication Technology (ICT) In*

Education. New Delhi: Neelkamal

Reference books

- Senapaty, H.K. (2011). *Pedagogy-Technology Integration for the Professional Development of Teacher Educators.* Bhubaneswar: Regional Institute of Education, NCERT (Monograph).
- NCERT (2006). National Curriculum Framework 2005 Position Paper National Focus Group on Educational Technology. New Delhi: Author.
- Senapaty, H.K. (2009). *ICT Integrated Learning Materials on Basic School Subjects from Constructivist Perspectives*. Bhubaneswar: Regional Institute ofEducation, NCERT (Monograph).
- Singh, L. C. (Ed.) (2010). *Educational Technology for Teachers and Educators.* New Delhi: Vasunandi Publication.
- UNESCO (2008).*ICT Competency Standards for Teachers: Policy Framework.* Retrieved from http://portal.unesco.
- UNESCO (2002). Information and Communication Technologies in Teacher Education A Planning Guide. Paris: Author
- UNESCO (2005). How ICT can create new, open learning environments: Information and communication technologies in schools: A handbook for teachers. Paris: UNESCO.
- Mishra, S. (2008). Developing E-Learning Materials: Some Pedagogical Concerns. *Indian Journal of Open Learning*, 17 (2).

Core Paper XIII

CONTEMPORARY TRENDS AND ISSUES IN INDIAN EDUCATION

Learning Objectives

On completion of this course the students will:

- Understand the importance of pre-school and elementary school education. Analyze various problems and issues for ensuring quality education.
- State the importance of secondary education and analyze various problems and issues for ensuring quality in secondary education.
- Enumerate the importance of higher education and analyze various problems and issues for ensuring quality in higher education.
- Justify the importance of teacher education and analyze various problems and issues for ensuring quality in teacher education.
- Analyze emerging concerns in Indian education.

UNIT 1: Pre-school and Elementary School Education

(i) Meaning, nature and importance of ECCE, problems and issues with regard to ECCE
(ii) Universalisation of Elementary Education: efforts to achieve UEE, SSA
(iii) Problems and issues in implementing Right to Education Act 2009.
(iv) Problems and issues in bringing the community to school, role of SMC
(v) Problems in ensuring equity and quality of elementary education

UNIT 2: Secondary and Higher Secondary Education

(i) Rashtriya Madhyamik Shiksha Abhiyan (RMSA) and ensuring secondary education for all.
(ii) Role of School Management and Development Committee (SMDC)
(iii) Shifting the teaching learning process from teacher centered to learner centered and activity based classroom –problems and issues
(iv) Problems and issues with regard to vocationalisation of secondary and higher secondary education
(v) Examination reforms at the secondary level
(vi) Widening the access to secondary education through National Open School

UNIT 3: Higher Education and Teacher Education

(i) Challenges in Higher education- expansion, quality and inclusion
(ii) Role of RUSA and NAAC for quality assurance in Higher education
(iii) Higher education through open and distance learning mode
(iv) Elementary level pre-service teacher education- problems, issues and reforms with reference to National Curriculum Framework for Teacher Education-2009
(v) Secondary level pre-service teacher education- problems, issues and reforms with reference to National Curriculum Framework for Teacher Education-2009

UNIT 4: Emerging Concerns

(i) Examination system: defects and reforms for making examination system flexible (internal assessment and semester system , grading, open book examination, online examination)
(ii) Choice Based Credits System (CBCS): concept, learning objectives, importance, problems and issues.
(iii) Human Rights Education: concept, learning objectives, importance, problems and issues.
(iv) Life-Skill Education: concept, learning objectives, importance, problems and issues.
(v) Peace Education: concept, learning objectives, importance, problems and issues.

PRACTICAL

- Study of perception of Stakeholder’s of Education on any of the current issues and concerns, and reporting.

NB: It will be evaluated both by the Internal and External Examiners.

Text Books

- Kumar, Chanchal & Sachedeva, M.S. (2017). *Vision of Secondary Education In India in the context of 21st century*. Twentyfirst Century Publications; First Edition edition (2015)
- Pathak, K. R. (2007). *Education in the Emerging* India. New Delhi: Atlantic Publishers**.**
- Saxena, V. (2011). *Contemporary trends in education: A handbook for educators*. New
- Delhi: Pearson.

Reference Books

- Broudy, H.S. (1977) *Types of knowledge and purposes of education*. In R.C. Anderson, R.J., Spiro and W.E. Montanaque (Eds.) Schooling and the acquisition of knowledge (PP. Hillsdale, NJ: Erlbaum.
- Bruner, J.S. (1996). *The culture of education*. Cambridge, M.A.: Harvard University Press.
- Butchvarov, P. (1970). *The concept of knowledge*. Evanston, Illinois, North Western University Press.
- Dearden R. F. (1984). *Theory and practice in Education*. Routledge K Kegan & Paul.
- Delors, Jacques, et al; (1996). *Learning: the Treasure within report of the international commission on education for 21st century*, UNESCO.
- Illich, I. (1996). *Deschooling society*. Marion Boyers, London.
- Matheson, David (2004). *An Introduction to the study of education* (2 Ed.). David Fulton Publish.
- MHRD (2008). *Framework for implementation of Rashtriya Madhyamik Shiksha Abhiyan: A scheme for universalisation of access to and improvement of quality at the secondary stage.* New Delhi: Department of School Education and Literacy.
- MHRD (2011). *Sarva Shiksha Abhiyan: Framework for implementation based on the Right of Children to Free and Compulsory Education Act, 2009*. New Delhi: Department of School Education and Literacy.
- MHRD, (1992). *Programme of action*. Govt. of India, New Delhi.
- MHRD, Gov. of India (1992). *National policy on education* (revised) New Delhi: MHRD.
- Ministry of Law and Justice (2009). *Right to education Act 2009*. New Delhi: Govt of India.
- Naik, J.P. (1975). *Equality, quality and quantity: The elusive triangle of Indian education.* Allied Publications, Bombay.
- NCERT (2005). *National curriculum framework 2005*. New Delhi: NCERT.
- NCERT (2005). *National curriculum framework*, New Delhi: NCERT.
- Slatterry, P. and Dana R. (2002). *Ethics and the foundations of education-Teaching Convictions in a postmodern world*. Allyn & Bacon.
- UN (2015). *The sustainable development goals (SDGs) – UNDP*. United Nations
- UNESCO (1998). *Educating for a sustainable future: A transdisciplinary vision for concerted action*. Paris: UNESCO.
- UNICEF (2000). *Defining quality in education*. New York: Programme Division (Education), Unicef.

- Wall, Edmund (2001). *Educational theory: philosophical and political Perspectives*. Prometheus Books.
- WHO (1991). *Comprehensive school health programme*. New Delhi: World Health Organization Regional Office.
- Winch, C. (1996). *Key concepts in the philosophy of education*. Routledge.
- Yadav, M. S. & Lakshmi, T. K. S. (1995). Education: Its disciplinary identity. *Journal of Indian Education,* XXI (*1*), 01-21.

Core Paper XIV

EDUCATIONAL MANAGEMENT AND LEADERSHIP

Learning Objectives

On completion of this course, the students will

- Describe the concept, types and importance of educational management.
- Spell out the structure of educational management at different levels - from national to institution level
- Describe different aspects and importance of educational management.
- Describe the concept, theories and style of leadership in educational management.
- Analyze the concept, principles and structures of total quality management approach in education.

UNIT 1: Educational Management

(i) Concept of educational management- meaning, nature, scope and principles
(ii) Process of educational management- planning, execution, staffing, control, supervision, monitoring, evaluation and feedback
(iii) Types of Management:
(iv) Centralized and decentralized
(v) Authoritarian, democratic, dynamic/creative and laissez-faire
(vi) Educational management in Odisha- structure and function with reference to school and mass education, and higher education

UNIT 2: Aspects of Institutional Management

(i) Human, material and financial resource management
(ii) Management of curricular and co curricular programmes
(iii) Management of students’ welfare, auxiliary services including students’ health services
(iv) School development plan
(v) Working with SMC and SMDC

UNIT 3: Leadership in Education

(i) Leadership- meaning, nature and importance in education
(ii) Leadership : Functions and skills

(iii) Theories of leadership- Redden's 3-D theory, and Hersey and Blanchard's situational theory
(iv) Styles of leadership-participating style, delegating style, selling style and telling style, Hersey and Blanchard)

UNIT 4: Total Quality Management

(i) Total Quality Management(TQM)- meaning, nature and importance
(ii) Principles of TQM- Demming's and Jurana's
(iii) Planning for TQM in school and higher education
(iv) Quality Assurance in Higher Education

PRACTICAL

- Studying the role of SMC/SMDC in school management and reporting

NB: It will be evaluated by both Internal and External examiners.

Text Books

- Kochar, S.K (2011). *School Administration and Management*. New Delhi: Sterling Publishers Private Limited.
- Bhatnagar, R. P. & Aggrawal V (2015). Educational Administration, Supervision, Planning and financing. Meerut: R Lal Book Depot.
- Mukhopadhyay, M. (2005). New Delhi: Sage

Reference Books

- Adolph and Turner Harold, E. *Supervision for change & Innovation*. Houghton Miffin Company.
- Anderson, C.A & Bowman, M.J (1971).*Educational management*, London, U.K: Frankas
- Ashima V, Deshmukh & Naik A.P (2010). *Educational management*. Girgaon, Mumbai: Himalaya Publishing House.
- Bhatnagar, R.P & Verma, I.B (1978). *Educational administration*. Meerut, India: Loyal Book Depot.
- Chau, Ta-Ngoc (2003): *Demographic aspects of educational planning.* Paris: International Institute for Educational Planning.
- Hariss, B. M (1963).*Supervisory behaviour in education*.USA: Englewood Cliffs.
- Kimbrough, S.Ralph, Michall & Nunnery. *Educational administration*. New York: Mc Millan Company.
- Livack, et al (1998).*Rethinking Decentralization in developing countries*. Washington, D.C, USA: World Bank.
- Mukerji, S.N. *Administration of educational planning and financ*e. Baroda, India: Acharya Book Depot.
- Naik, J.P. (1965): *Educational planning in India*. New Delhi, India: Allied.
- Naik, J.P. (1982): *The educational commission & after*. New Delhi, India: Allied.
- Newman and summer. *The process of management: concept, behaviour and practice*. New Delhi, India: Prentice Hall of India Pvt. Ltd.
- Oliva, O (19760. *Supervision for today's school*. New York, USA: Harper & Row.
- Ramani, K.V (2004). *A text book of educational management*. New Delhi, India: Dominant Publisher

- Safya, R & Saida, B.D *(1964). School administration and organisation.* Jalandhar, India: Dhanpat Rai & Sons
- Shukia, P.O (1983). *Administration in India*. New Delhi, India: Vikas Publication.
- Simon, Herbart A. *Administrative behaviour*. New York,USA :McMillan Company.
- Tilak, J.B.G. (1992). *Educational planning at grassroots*. New Delhi: India.
- Waber, Clarence A. *Fundamentals of educational leadership*. New York ,USA: Exposition Press.Buch, T. et al. (1980). Approaches to school management. London: Harper and Row.
- Chalam K.S. (2003): Introduction to Educational Planning and Management: New Delhi, Anmol Publications Pvt. Ltd.
- Chandrasekharan P. (1997): Educational Planning and Management. New Delhi: Sterling Publishers Pvt. Ltd.
- Deshmukh, A.V. & Naik, A.P.(2010). School administration and management. Mumbai.
- Glasser, William(1990). The quality school. New York, NY: Harper Collins Publishers, Inc.
- Government of India (1986/92). National policy on education. New Delhi: MHRD.
- Government of India (1992). Programme of action. New Delhi: MHRD.
- Gupta, S.K. & Gupta, S.91991). Educational administration and management. Indore: Manorama Prakashan.
- Hallak, J.(1990).Investing in the future:Setting educational priorities in the developing world. Paris: UNESCO.
- Kalra, Alka (1977). Efficient school management and role of principals. New Delhi: APH Publishing Corporation.
- Kochar, S.K. (2011). School administration and management. New Delhi: Sterling Mukhopadhyay, M. (2001). Total quality management in education. New Delhi: NIEPA.
- Shaeffer, S. (1991). Collaborating for educational change: The role of parents and the community in school improvement. Paris: UNESCO.
- Tyagi R.S. and Mahapatra P.C. (2000), Educational Administration in Orissa : New Delhi, National Institute of Educational Planning and Administration (NIEPA)
- Vashist, Savita(ed.) (1998). Encyclopaedia of school education and management. New Delhi: Kamal Publishing House.

Discipline Specific Elective Paper-I

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A.PEDAGOGY OF LANGUAGE (ENGLISH)

Learning Objectives

On completion of this course, the student will

- Analyze the issues relating to place of English in school curriculum, acquisition of skills in English, realization of aims and Learning Objectives of learning English and language policy as conceived in NPE, 1986 and NCF – 2005
- Use various methods, approaches and strategies for teaching-learning English and transact various types of lesson plans covering all aspects of English language following different approaches
- Develop test items to assess learning in English and provide feedback as well as prepare enrichment materials
- Use the understanding of phonetics for facilitating students' speaking in English
- Plan appropriate pedagogical treatment of the prescribed contents for effective classroom transaction

UNIT 1: English in School Curriculum

(i) Language policy in India with reference to NPE 1986 and NCF 2005
(ii) Place of English as a compulsory subject in school curriculum (both at elementary and secondary levels)
(iii) Learning Objectives of learning English at elementary and secondary levels
(iv) English language skills –components, their independence and interdependence

UNIT 2: Approaches, Methods and Strategies of Teaching English

(i) Understanding of different methods and strategies: Bi-lingual Method, Translation Method, Direct Method, Structural Approach, Communicative Approach.
(ii) Listening Skill: Tasks for developing Listening Comprehension
(iii) Speaking Skill: Tasks for developing Speaking skills
(iv) Reading skill: Types of Reading, Strategies to develop reading comprehension
(v) Writing Skill: Strategies to improve writing skill, Qualities of good writing (simplicity, logicality and organization in writing)

UNIT 3: Transaction of Contents

(i) Teaching of Prose (detailed and non-detailed), poetry, grammar and composition – Approaches, Methods and Strategies
(ii) Pedagogic analysis :Content analysis- analysis of topics of English text book for identification of language items(new vocabulary, structural words, grammar components),learning learning objectives, methods and strategies, teaching learning materials including ICT materials
(iii) Preparing lesson plan following 5E and Interpretation Construction Design Model(ICON)
(iv) Preparation of lesson plans following Herbartian approach.

UNIT 4: Lesson Delivery Strategies and Assessment

(i) Lesson delivery strategies: lecturing, role play and dramatization, collaborative approach, ability grouping, group work; learning through narratives and discourses; concept mapping and brain storming
(ii) Techniques of assessment in English : continuous assessment of learners performance in English, preparation of different types of objective-based test items (Extended Response Type, Restrictive

PRACTICAL

- School Internship (Delivery of 5 Lessons following Herbatian/5E/ICON model)

NB: It will be evaluated by both Internal and External examiners.

Text Books

- Kohli, A.L (2010) *Techniques of teaching english.* New Delhi: Dhanpat Rai publishing Company
- Jain, R.K (1994). *Essentials of English teaching*, Agra: Vinod Pustak Mandir
- Sharma, K.L(1970) .*Methods of teaching English in India*. Agra : Laxmi Narayan

Agrawal

Reference Books

- Agnihotri R. K. and Khanna A. L. (1994). *Second language acquisition: socio-cultural and linguistic aspects of English in India.* New Delhi: Sage Publications.
- Allen, H.B. (1965). *Teaching English as a second language: A book of readings*. New York: McGraw-Hill.
- Baruah, T.C (1984). *The English teacher's handbook.* New Delhi: Sterling Publishers Pvt.Ltd,
- Billows, F. L. (1975). *The techniques of language teaching.* London: Longman
- Bista, A.R(1965). *Teaching of English (Sixth Edition)*. Agra: Vinod Pustak Mandir
- Bright, J.A(1976). *Teaching English as second language.* London: Long Man Group
- Catarby, E. V (1986) *Teaching English as a foreign language in school curriculum India*, New Delhi: NCERT
- Hudelson, Sarah. (1995). *English as a second language teacher resource handbook. A practical guide for K-12 ESL programs.* California.: Corwin Press, Inc.
- Joyce , Bruce and Weil, Marsha (2003). *Models of teaching*. New Delhi: Prentice Hall of India Pvt. Ltd.
- Krishna Swamy, N. and Sri Raman, T. (1994). English teaching in India. Madras : T.R. Publication.
- Mukalel, Joseph C. (2009). *Approaches to English language teaching.* New Delhi: Discovery Publishing House Pvt Ltd.
- Pal, H.R and Pal, R(2006). *Curriculum – yesterday, today and tomorrow*, New Delhi: Shipra Publications
- Sachdeva, M.S. (1973). A new approach to teaching of english in India. Ludhiana : Prakash Brothers
- Shrivastava, B.D(1968). *Structural approach to the teaching of English*. Agra: Ramprasad and Sons

Discipline Specific Elective Paper-I

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B. PEDAGOGY OF LANGUAGE (ODIA)

Learning Objectives

On completion of this course, the student will:

- State the importance and place of Odia as mother tongue in school curriculum.
- Develop the strategies to address the problems of Odia language acquisition in multilingual context.
- Use various strategies for facilitating the acquisition of language skills in Odia.
- Decide appropriate pedagogic approaches to transact different types of lessons in Odia.
- Prepare appropriate tools for comprehensive assessment of learning in Odia.
- Explain the fundamentals of Odia linguistics and their relevance in teaching learning Odia.
- Plan appropriate pedagogic treatment of the prescribed textual contents (in Odia) of

classes IX and X.

UNIT 1: Odia as Mother Tongue in School Curriculum

(i) Importance of mother tongue in the life and education of an individual
(ii) Place of Odia as mother tongue in school curriculum in Odisha (both at elementary and secondary levels) in the context of language policy recommended by NPE, 1986 (three language formula) and NCF-2005
(iii) Learning objectives of teaching-learning Odia at elementary and secondary levels
(iv) Inter-dependence of language skills in Odia and strategies for facilitating acquisition of four-fold language skills in Odia

UNIT 2: Pedagogic Approaches to Teaching-Learning Odia

(i) Psychology of language learning and acquisition with reference to Odia as mother tongue.
(ii) Problems and issues related to acquisition of Odia language in multi-lingual context
(iii) Traditional versus modern methods of teaching-learning Odia.
(iv) Different approaches and strategies to the teaching-learning of : − Odia prose (detailed and non- detailed) , Odia poetry , Odia composition , Odia grammar .

UNIT 3: Curricular Activities in Odia

(i) Pedagogic analysis :
(ii) Content analysis- analysis of topics of Odia text book for identification of language items(new vocabulary, structural words, grammar components), learning objectives.
(iii) Methods and strategies, teaching learning materials lncluding ICT materials, assessment strategies
(iv) Preparing Lesson Plans following Herbartian, 5E and Interpretation Construction Design Model(ICON)

UNIT 4: Assessment

(i) Types of Assessment-self assessment, peer assessment, teacher assessment, internal assessment and external assessment
(ii) Techniques of Assessment in Odia : Continuous assessment of learners performance in Odia, preparation of different types of objective-based test items (Extended Response Type, Restrictive Response Type and Objective Type), preparation of check list, rating scale and rubric, Portfolio assessment in Odia

PRACTICAL

- School internship (delivery of 5 Lessons following Herbartian/5E/ICON model)

NB: It will be evaluated by both Internal and External examiners.

Text Books

- Barik, N. (2014). Odia shikshyadana paddhati. Cuttack: A.K.Mishra Publishers Pvt. Ltd.

- Kocchar, S.K. (2012). Teaching of Mother Tongue. Sterling Publishers, New Delhi.
- Mohanty, J., Barik, N. & Khandai, U. (1983). Odia sikshadana paddhati. Cuttack : Nalanda.
- Nayak, B.; Mohanty, J.(1999): Odia bhasa O Sahityara Bhitibhumi O Shikshyadan Padhati. Cuttack: Jagannath Process, Toni Road, Cutack-2.

Reference Books

- Daswani, C. J. Language Education in Multilingual India. New/Delhi (UNESCO)
- Dhal, G.B. (1974). Dhwani bijanana. Bhubaneswar : Odisha Rajya Pathya Pustaka Pranayana Sanstha.
- Dhal, G.B. (1972). English uchharana siksha. Cuttack : Friends Publisher.
- Mathur, S.A. Sociological Approach to Indian Education. Vinod Pustak Bhandar, Agra.
- Mohanty, B. (1970). Odia bhasara utpati O 65arma bikasha. Cuttack : Friends Publishers.
- Mohapatra, D. (1976). Odia Dhwani tattwa O sabdha sambhar. Cuttack : Grantha Mandir.
- Mohapatra, N. & Das, S. (1943). Sarbasara vykarana. Cuttack : New Student’s Store
- Palmer, H.P. Principles of Language Teaching. George G. Harrep and Co. Ltd.
- Rybum, W.M.(1926). Suggestions for the Teaching of Mother Tongue. OUP.
- Saiyadain, K.G. Education and Social Order. Asia Publishing House, Bombay.

Discipline Specific Elective Paper-II

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A. PEDAGOGY OF SOCIAL SCIENCES

Learning Objectives

On completion of this course, the student will:

- State the meaning, scope and importance of Social science
- Specify the skills and competencies to formulate specific LEARNING OBJECTIVES for different History and Political Science lessons
- Identify the different methods and skills of teaching History and Political Science for transacting the contents effectively.
- Explain the importance of time sense and prepare / utilize timelines for effecting teaching of History
- Prepare Unit Plans and Lesson Plans in History and Political science
- Develop diagnostic achievement test, administer them and analyse the results for providing feedback

UNIT 1: Concept, Learning Objectives and Values Of Teaching Social Science

(i) Meaning, nature and scope of Social Science as NCF-2005
(ii) Learning objectives of teaching Social Science at elementary and secondary levels
(iii) Importance of teaching Social Science in school education
(iv) Identification of values/ competencies/ skills to be developed through Social Sciences

UNIT 2: Methods and Approaches to Teaching-Learning Social Science

(i) Story-telling
(ii) Narration-cum-discussion
(iii) Dramatization
(iv) Source method
(v) Project method
(vi) Field trips
(vii) Observation

UNIT 3: Curricular Activities in Social Sciences

Pedagogic analysis:
(i) Content analysis- analysis of topics of social science text book .
(ii) Learning objectives,
(iii) Methods and strategies,
(iv) Teaching learning materials including ICT materials
(v) Learning activities including student and teacher activities
(vi) Assessment strategies
(vii) Preparing lesson plan following Herbart, 5E and Interpretation Construction Design Model(ICON)

UNIT 4: Development of Resource Materials and Assessment in Social Science

(i) Teaching-learning materials – Maps, Atlas, Globes, Charts, Graphs, Models, Filmstrips, T.V. Video, OHP, and Computer
(ii) Timeline – concept, aspects, type and use
(iii) Types of Assessment-self assessment, peer assessment, teacher assessment, internal assessment and external assessment
(iv) Techniques of Assessment in history and political science: Continuous Assessment of learners performance in history and political science, preparation of different types of objective-based test-
(v) Items (Extended Response Type, Restrictive Response Type and Objective Type

PRACTICAL

- School internship (delivery of 5 Lessons following Herbatian /5E/ ICON model)

NB: It will be evaluated by both Internal and External examiners.

Text Books

- Kochhar, S.K. (1970). *Methods of Teaching Social Studies.* New Delhi, India: Sterling Publication.
- Mamgal, S.K. & Mangal, U. (2008). *Teaching of Social Studies*. New Delhi: PHI Learning Pvt, Ltd.
- Sharma, R.A. (2014). *Teaching of Sociaal Sceince*. Meerut: R Lal Book Depot.

Reference Books

- Kochhar, S.K. (1970). *Teaching of History*. New Delhi, India: Sterling Publishers Pvt. Ltd.
- Banks James, A. (1997). *Teaching Strategies for the Social Studies Enquiry, Valuing and Decision Making* . Massachusets,USA: Addition- Westely Publishing Co. Reading.
- Bining & Binning.(1952). *Teaching of Social Studies in Secondary Schools*. New York,USA: Mc Graw Hills.
- Burston,W.H.(1963). *Principles of History Teaching.* New Fetter Lance : Methuen & Co. Ltd.II.
- Burton W.H. (1972). Principles of history teaching, London: Methuen.
- Carretero, Mario, & Voss, James F. (Eds.) (1994). Cognitive and instructional processes in history and the social sciences. Hillsdale: Lawrence Erlbaum Associate.
- Choudhury, K.P. (1975).*The effective Teaching of History*. New Delhi,India: NCERT.
- Dhamiaja Neelam.(1993). *Multimedia Approaches in Teaching Social Studies*. New Delhi,India:Harmer Publishing House.
- Drake, Frederick D. & Lynn, R. Nelson (2005). Engagement in teaching history: Theory and practices for middle and secondary teachers. Columbus, OH: Pearson.
- Ghate, V.D. (1956). Teaching of history. Bombay: Oxford University Press.
- Gunnin, Dennis (1978). The teaching of history. Goom Helm Ltd. London.
- James H. (1953). *The Teaching of Social Studies in Secondary Schools*. . London,UK: Longman Green & Co.
- James, T. H., Arthur,J. and Hunt, M. (2001). Learning to teach history in the secondary school: A companion to school experience. London: Routledge Falme.
- Kochhar, S.K.(1970). *Teaching of political science*. New Delhi: Sterling Publishers
- NCERT. (1970). *Teaching of History of Secondary Schools*.New Delhi,India: Author.
- NCERT.(1966). *A Handbook for History Teachers*.Bombay:India: Allied Publishers.
- Taneja,V.R.(1970). *Fundamentals of Teaching Social Studies*. Mahendra Capital Publishers.
- Verma, O.P.(1984). New Delhi, India: Sterling Publishers Pvt. Ltd.
- Verma,O.P. & Vedanayagam E.G. *Geography Teaching.* New Delhi,India: Sterling Publishers Pvt. Ltd .
- Yagnik, K.S.(1966). *The Teaching of Social Studies in India*. Bombay,India: Orient Longman Ltd.

Discipline Specific Elective Paper-II

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B. PEDAGOGY OF MATHEMATICS

Learning Objectives

On completion of this course, the students will

- Narrate the evolution and nature of Mathematics and its importance in the school curriculum in the context of the recent curricular reforms.
- Use various methods and approaches of teaching and learning mathematics especially suitable for the secondary school classes.
- Plan lessons in Mathematics using traditional and constructivist approaches for effective classroom transactions.
- Develop and collect activities and resource materials for their use in enhancing the quality of learning Mathematics at the secondary level.
- Conduct continuous and comprehensive assessment for enhancing the quality of Mathematics learning.
- Explain the concepts in Mathematics included in the secondary school curriculum and make pedagogical analysis of those concepts

UNIT 1: Foundations of Mathematics Education

(i) Nature and Scope of Mathematics,
(ii) Learning of Mathematics: Importance of Mathematics at elementary and secondary level, Learning Objectives of teaching-learning Mathematics at the two levels,
(iii) Curriculum reforms in school mathematics: rationale, learning objectives, principles, designs and materials in Mathematics, recent curricular reforms at the National and State levels (NCF 2005).

UNIT 2: Methods of Teaching-learning Mathematics

(i) Learning by Discovery: Nature and purpose of learning by discovery; guided discovery strategies in teaching Mathematical concepts.
(ii) Teaching for understanding proof: Proof by induction and deduction; proof by analysis and synthesis.
(iii) Problem Solving in Mathematics: Importance of problem solving in Mathematics, Steps of problem solving in Mathematics.
(iv) Constructivist approaches: Self-learning and peer learning strategies, collaborative strategies; 5E and ICON Models.

UNIT 3: Curricular Activities in Mathematics

(i) Pedagogic analysis :
(ii) Content analysis- analysis of topics of mathematics text book .
(iii) Learning objectives,
(iv) Methods and strategies,
(v) Teaching learning materials including ICT materials
(vi) Learning activities including student and teacher activities
(vii) Assessment strategies
(viii) Process of preparing lesson plan following Herbatian, 5E and Interpretation

Construction Design Model(ICON)

UNIT 4: Assessment In Mathematics

(i) Assessment of Mathematics learning: Unit test – Designing blue print, item construction, marking schemes.
(ii) Assessment for Mathematics learning: Assignments, Projects and portfolios in Mathematics, group and collaborative assessment in Mathematics,
(iii) Non-testing methods of assessment of/for Mathematics Learning: Observation of learners in action, rating of participation in various Mathematics tasks and activities,
(iv) Diagnosis of difficulties in learning Mathematics concepts, Remediation of the difficulties, enrichment programmes in Mathematics learning –National Mathematics Talent Search, Mathematics Olympiad.
(v) Planning for continuous assessment of classroom learning in Mathematics.

PRACTICAL

- School internship (Delivery of 5 Lessons following Herbatian/5E/ICON model)

NB: It will be evaluated by both Internal and External examiners.

Text Books

- Sidhu, K.S (1985).*Teaching of mathematics*. New Delhi: Sterling publication.
- James, A. (2003). *Teaching of mathematics*. Neel Kamal Publication: Hyderabad. NCERT (2011). *Pedagogy of mathematics for two year B.Ed. course*. New Delhi:

Reference Books

- Cooney, Thomas J. et al. (1975). Dynamics of Teaching Secondary School Mathematics. Boston: Houghton Mifflin.
- Cooper, B. (1985). *Renegotiating secondary school mathematics*. The Hamer Press: East Sussex.
- Michel. (1982). *Teaching mathematics*. Nicholos Publication Co: New York.
- NCF (2005). *National curriculum framework*. NCERT: New Delhi
- NCERT (2006). *Position paper: National focus group (NFG) on teaching Mathematics*. NCERT: New Delhi.
- NCERT (2005). *Position paper: national focus group (NFG) on examination reform*. NCERT: New Delhi. Scopes, P.G. (1973). *Mathematics in secondary schools- a teaching approach*. Cambridge: Cambridge University Press
- Driscoll,M., Egan, M., Nikula, J., & DiMatteo, R. W. (2007). Fostering geometric thinking: A guide for teachers, grades 6-10. Portsmouth, NH: Heinemann.
- Driscoll,M.(1999). Fostering algebraic thinking: A guide for teachers, grades 5-10. Portsmouth, NH: Heinemann.
- Grouws, D.A. (ed) (1992). Handbook of research on mathematics teaching and learning. New York: Macmillan Publishing.
- Malone, J. and Taylor, P. (eds) (1993). Constructivist interpretations of teaching and learning mathematics.
- Perth: Curtin University of Technology.

- Marshall, S.P. (1995). Schemes in problem-solving. New York: Cambridge University Press.
- Moon, B. & Mayes, A.S. (eds.) (1995). Teaching and learning in secondary school. London: Routledge.
- NCERT (1998). A textbook of content-cum-methodology of teaching mathematics. New Delhi: NCERT.
- NCERT (2005). National curriculum framework 2005. New Delhi: NCERT.
- NCERT (2006). Position paper: National focus group on teaching mathematics. New Delhi:NCERT.
- TESS India (2015). Key resources. The Open University U.K.(http//creativecommons.org/licences/ and http//www.tess-india.edu.in/)

Discipline Specific Elective Paper-III

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A. POLICY AND PRACTICES IN SCHOOL EDUCATION IN INDIA

Learning Objectives

On completion of this course, the student will:

- Analyse various policies on education for school education in India
- Evaluate progress of schools education
- Examine the problems in implementation of the policies on school education
- Explore status of women education and education for SC, ST and Minorities in Indian

UNIT 1: Policies in School Education

(i) National Education Policy, 1986, revised in 1992 and its corresponding document Programme of Action with reference to Elementary Education and Secondary Education.
(ii) Implementation of Elementary Education with reference to RTE Act-2009 and Policy issues.
(iii) Implementation of Secondary Education with reference to Rashtriya Madhyamik Siksha Abhiyan (RMSA) and policy issues
(iv) Guiding principles of NCF-2005 and curriculum revision at the school level.

UNIT 2: Policies for Vocationalisation of Education

(i) Vocationalisation of education- A policy analysis with reference to the report of Patel Committee (1977), Adisheshia Committee (1978) and National Policy on Education (1986) revised NPE (1992)
(ii) Vocational Education at Higher Secondary level: Policy challenges
(iii) Work education in schools –concept to implementation

UNIT 3: Policies for Inclusive Education

(i) Education of Children with Special Needs (CWSN): Policy perspectives with reference to NPE,1986, 1992, Mental Health Act, 1987, Persons with Disabilities Act, 1995, Rehabilitation Council of India Act, 1992, National Trust Act,1999

(ii) Inclusive education- Policies, Progress and Problems.

UNIT 4: Policy on Access and equity in Education

(i) Women's education and empowerment of women with reference to National Policy on Women Empowerment, , NPE-1986

(ii) Progress of Women Education and Problems.

(iii) Access and Equity in Education with focus to SC, ST and Minorities

(iv) Policy for SC children- Implementation, Progress and Problems.

(v) Policy for ST children- Implementation, Progress and Problems with reference to Mother Tongue based Multilingual Education

(vi) Policy for Minority Children- Implementation, Progress and Problems.

PRACTICAL

- Analysis of any Policy documents being implemented at School Education level

NB: It will be evaluated by both Internal and External examiners

Text Books

- Aggarwal, J.C. (2010). Landmarks in the history of modern Indian education (7th Ed) New Delhi: Vikash Publishing Pvt. Ltd.
- Rawat, P.L. (1989). History of Indian education New Delhi: Ram Prasad & Sons.

Reference Books

- Das, K.K. (1993). *Development of education in India*. New Delhi: Kalyani Publishers
- Dash,B.N. (1991). *Development of education in India*. New Delhi: Ajanta Prakashan
- Keay, F. E. & Mitra, Sukumar (1978). A history of education in India. New Delhi: Oxford University Press
- Mukherjee, R.K. (1988). Ancient Indian education. New Delhi: Motilal Banarsidass
- Mukherjee, R.K. (1989). The Gupta Empire. New Delhi: Motilal Banarsidass
- Naik, J.P. & Narullah, S. (1996). A student's history of education in India.New Delhi: Mc Millan India Ltd
- Ghosh, S.C. (1989). Education policy in India since warren Hastings, Calcutta: N-Prakashan.
- Reference Books
- Altekar, A.S. (1934), Education in ancient India, Banaras: Indian book Shop.
- Das Gupta, S.N. (1988). A history of Indian philosophy. (5 Vols.) Delhi: Motilal Banarasi Dass.
- MHRD, GOI (1986). National policy on education. New Delhi: The Author
- MHRD, GOI (1993). Learning without burden. Yashpal Committee Report (1993). New Delhi: The Author
- Ministry of Education, GOI (1964-66). Education and national development. (Report of education commission (1964-66). New Delhi: The Author
- Sen, Bimal (1989). Development of technical education in India and state policy-a historical perspective. Indian Journal of History of Science, 24 (2): 224-248, Indian National Science Academy.

- Sen, S.N. (1988). Education in ancient and medieval India. Indian Journal of History of Science, 23 (1): 1-32.
- Shanker, Uday (1984). Education of Indian teachers. New Delhi: Sterling Publishers Pvt. Ltd.
- Singh. R.P. (1970). Education in ancient and medieval India. Delhi: Arya Book Depot.Rao, K.Sudha (Ed.) (2002). Educational policies in India: Analysis and review of promise and performance. New Delhi: NUEPA.
- NCERT (2005). *National curriculum framework*, New Delhi: NCERT.
- MHRD, Gov. of India (1986). *National policy on education.* New Delhi: GoI.
- MHRD, Gov. of India (1992), *National policy on education (*revised) New Delhi: GoI. MHRD, (1992), *Programme of action*., New Delhi: Govt. of India.
- NCTE (1998b). *Curriculum Framework for Quality Teacher Education.* New Delhi:NCTE.
- NCTE (2009). *National Curriculum Framework for Teacher Education TowardsPreparing Professional and Humane Teacher.* New Delhi:NCTE.
- Ministry of Law Justice (2009). The Right of Children to Free and Compulsory Education Act, 2009. *The Gazette of India*, Ministry of Law Justice, Govt. of India.
- Kurrien, J (1983). *Elementary Education in India*. New Delhi: Vikas. MHRD (). *Report to the People on Education 2011-12.* New Delhi: Author. MHRD (1986): *National Policy on Education*. New Delhi: MHRD.
- MHRD (2000). *Sarva Shiksha Abhiyan: A program for Universal Elementary Education A framework for implementation.* New Delhi: Author.
- Government of India, Ministry of Human Resource Development (2005), Report of the CABE Committee on Autonomy of Higher Education Institutions, Department of Secondary and Higher Education, New Delhi, June.

- http://www.rehabcouncil.nic.in/
- writereaddata/RCI_Amendments_ACT.pdf
- http://socialjustice.nic.in/pwdact1995.php
- http://mhrd.gov.in/rmsa

Discipline Specific Elective Paper-III

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B. POLICY AND PRACTICES IN HIGHER EDUCATION IN INDIA

Learning Objectives

On completion of this course, the student shall:

- Analyse various policies on education for Higher education in India
- Evaluate progress of Higher education
- Examine the problems in implementation of the policies on higher education
- Explore status of higher education.
- Analyse role of various agencies of higher education in India.

UNIT 1: Policies in Higher Education

(i) NPE-1986, revised in 1992 and its corresponding document Programme of Action

(POA) with reference to Higher Education.
(ii) Recommendations of National Knowledge Commission-2006.
(iii) Implementation of Policies, progress and problems.

UNIT 2: Future of Higher Education

(i) Rashtriya Uchattar Shiksha Abhiyan (RUSA)- goals, features, strategies and implementation- problems and issues.
(ii) Progress Higher Education in Odisha.
(iii) Autonomy and Accountability in Higher Education

UNIT 3: Curriculum and Assessment

(i) Curriculum issues in higher education
(ii) Choice Based Credits System, Semester system, Grading.
(iii) Role of UGC, NAAC and Accreditation
(iv) Quality Assurance in Higher Education
(v) ICT in Higher Education

UNIT 4: Educational Management System

(i) Funding and management of Higher Education
(ii) Open and Distance Learning System: Policy and Development-Role of IGNOU.
(iii) Research in higher education-problems and issues- Role of ICSSR, UGC, Association of Indian Universities
(iv) Capacity Building of Teachers in Higher Education.

PRACTICAL

- Analysis of any Policy Document being implemented in the field of Higher Education in India

NB: It will be evaluated by both Internal and External examiners

Text Books

- Rao, K.Sudha (Ed.) (2002). Educational policies in India: Analysis and review of promise and performance. New Delhi: NUEPA.

Reference Books

- Government of India, Ministry of Human Resource Development. 2011a. 'Indian Institutes of Development'. Available at http://mhrd.gov. in/itt_higher_english.
- Government of India, Ministry of Statistics and Programme Implementation. No date. NSS Survey Reports. Available at http:// mospi.nic.in/Mospi_New/site/inner. aspx? status=3&menu_id=31.
- Cheney, G. R., with B. B. Ruzzi and K. Muralidharan. 2005. India Education Report. NCEE (National Center on Education and the Economy). Available at http://www.ncee. org/wp-content/uploads/ 2013/10/ IndiaEducation-Report.pdf.
- UCG (University Grants Commission). 2008. Higher Education in India: Issues Related to Expansion, Inclusiveness, Quality and Finance. New Delhi: University Grants Commission. Available at http://www.ugc.ac.in/oldpdf/pub/report/12. pdf.
- Agarwal, P. 2006. 'Higher Education in India: The Need for Change'. ICRIER Working Paper No. 180, June. Delhi: Indian Council for Research on International Economic Relations.

- BhallaVeena& et al (1998), Accountability and Autonomy in Higher Education, AIU.
- Country paper (1998), Higher Education in India: Vision & Action, presented in UNESCO world conference of Higher Education in the Twenty-first century, Paris 5-9th Oct 1998, National Commission for Cooperation with UNESCO.
- UNESCO (1998), report on Higher Education in the Twentieth First Century Vision & Actions held at Paris 5-9th Oct 1998, UNESCO.
- Meek, V Lynn (2000), Diversity and marketisation of higher education: incompatible concepts? Higher Education Policy, 13 (2000), p-25 & 26.
- Government of India, Ministry of Human Resource Development (2005), Report of the CABE Committee on Autonomy of Higher Education Institutions, Department of Secondary and Higher Education, New Delhi, June.
- Tilak, J.B.G. (1996), “Higher Education under Structural Adjustment”, Journal of Indian School of Political Economy 8 (2) (April-June): 266-93.
- UGC (2005), University Development in India: Basic Facts and Figures (1995-96 to 2001-02), University Grants Commission, Information & Statistics Bureau, New Delhi, November

Discipline Specific Elective Paper-IV

INCLUSIVE EDUCATION

Learning Objectives

On completion of the course the students shall be able to:

- Define meaning and scope of inclusive education.
- identify the assumptions of disability underlying current general and special education practices
- understand the various suggestions given by different recent commissions on education of children with disabilities for realizing the concept of “Universalization of Education”;
- explore and utilize pedagogical approaches that can support students with a variety of learning profiles in respectful ways
- explain the meaning and implications of universal design in learning (UDL) for classroom pedagogy
- examine the different support services and collaboration for inclusive education

UNIT 1: Meaning, Genesis and Scope Inclusive Education

(i) Special education and inclusive education: concept and principles
(ii) Historical developments of special and inclusive education in India.
(iii) Medical and social models of disability

(iv) Examining the practice of labeling
(v) Social, psychological and educational contexts of inclusion

UNIT 2: Polices & Frameworks Facilitating Inclusive Education

(i) International Declarations: Universal Declaration of Human Rights (1948), World Declaration for Education for All (1990)
(ii) International Conventions: United Nations Convention of Rights of Persons with Disabilities (UNCRPD) (2006)
(iii) International Frameworks: Salamanca Framework (1994), Biwako Millennium Framework of Action (2002)
(iv) Constitutional Obligations; RCI Act 1992; PwD 1995 and NTA 1999; RTE-SSA and RPD Act. 2016.

UNIT 3: Understanding and Support Needs of Students with Disability

(i) Understanding and support needs of students with different labels of disability including: autism, learning disabilities, speech & hearing disability, blindness, and intellectual disabilities in inclusive classroom.

UNIT 4: Frameworks, Support and Collaboration for Inclusive Education

(i) Universal Design for Learning: Multiple Means of Access, Expression, Engagement & Assessment
(ii) Principles of Differentiated Instruction and Assessment
(iii) Capacity Building of Teachers for Inclusive Education
(iv) Assistive Technology & Devices for Inclusive Education

PRACTICAL

- Visit to a centre for students with special needs (special school/special institute). Observe the process of teaching learning and write a report.

NB: It will be evaluated by both Internal and External examiners

Text Books

- Panda, K.C. (nd). *Education of Exceptional Children*
- Daniels, H. (1999) . *Inclusive education*. London: Kogan.
- Mangal, S.K. (2013). Exceptional Childred. New Delhi: PHI Learning Pvt. Ltd.

Reference Books

- Bartlett, L. D., & Weisentein, G. R. (2003). *Successful inclusion for educational leaders*. New Jersey: Prentice Hall.
- Deiner, P. L. (1993). *Resource for Teaching Children with Diverse Abilities*. Florida: Harcourt Brace and Company.
- Dessent, T. (1987). *Making Ordinary School Special*. Jessica Kingsley Pub.
- Gargiulo, R.M. *Special Education in Contemporary Society: An Introduction to Exceptionality*. Belmont: Wadsworth.
- Gartner, A., & Lipsky, D.D. (1997). *Inclusion and School Reform Transferring America's Classrooms.* Baltimore: P. H. Brookes Publishers.
- Giuliani, G.A. & Pierangelo, R. (2007). *Understanding, Developing and Writing IEPs*. Corwin press:Sage Publishers.

- Gore, M.C. (2004) . *Successful Inclusion Strategies for Secondary and Middle School Teachers,* Crowin Press, Sage Publications.
- Hegarthy, S. & Alur, M. (2002). *Education of Children with Special Needs: from Segregation to Inclusion*. Corwin Press, Sage Publishers.
- Karant, P., & Rozario, J. ((2003). *Learning Disabilities in India*. Sage Publications.
- Karten, T. J. (2007). *More Inclusion Strategies that Work*. Corwin Press, Sage Publications.
- King□Sears, M. (1994). *Curriculum□Based Assessment in Special Edcuation*. California: Singular Publications.
- Kluth, P. (2009). *The autism checklist: A practical reference for parents and teachers.* San Francisco, CA: Jossey-Bass.
- Lewis, R. B., & Doorlag, D. (1995). *Teaching Special Students in the Mainstream*. 4th Ed. New Jersey: Pearson.
- Rayner, S. (2007). *Managing Special and Inclusive Education*, Sage Publications.
- Rose, D. A., Meyer, A. & Hitchcock, C. (2005). *The Universally Designed Classroom: Accessible Curriculum and Digital Technologies.* Cambridge, MA: Harvard Education Press.
- Ryandak, D. L. & Alper, S. (1996). Curriculum Content for Students with Moderate and Severe Disabilities in Inclusive Setting. Boston, Allyn and Bacon.
- Thousand, J., Villa, R., & Nevin, A. (2007). *Differentiating instruction: Collaborative planning and teaching for universally designed learning*. Thousand Oaks, CA: Corwin Press.
- Turnbull, A., Turnbull, R., Turnbull, M., & Shank, D.L. (1995). *Exceptional Lives: Special Education in Today's Schools*. 2nd Ed. New Jersey: Prentice□Hall.Inc
- Udvari-Solner, A. & Kluth, P. (2008). *Joyful Learning: Active and collaborative learning in inclusive classrooms*. Thousand Oaks, CA: Corwin Press.

DSE Paper – IV

DISSERTATION/ RESEARCH PROJECT

(College can give this choice only for students with above 60% aggregate marks)

The students will select a research project on any Educational issue or problem or topic and prepare a report. The project will be prepared based on proposal already developed in Semester-III, Core-6.

Distribution of Marks will be as follows:

Item	**Total**
Report	75
Viva-voce	25
Total	**100**

The assessment of students' performance will be made jointly by the external and internal examiners.

Generic Elective Paper I

EDUCATIONAL PHILOSOPHY

Learning Objectives

On completion of this course, the learners shall be able to:

- State and analyse the meaning of education and form own concept on education
- Explain philosophy as the foundation of education
- Analyse aims of education
- Describe the essence of different formal philosophies and draw educational implications
- Compare and contrast Indian and western philosophies of education

UNIT 1: Education in Philosophical Perspective

(i) Etymological meaning of education
(ii) Narrower and broader meaning of education, lifelong education
(iii) Aims of Education- Individual and Social aims of education
(iv) Meaning and nature of philosophy
(v) Branches of Philosophy- Metaphysics, epistemology and axiology, and its educational implications
(vi) Functions of Philosophy in relation to education

UNIT 2: Formal Schools of Philosophy and their Educational Implications

(i) Idealism, Naturalism, Pragmatism with reference to:

Aims of Education, curriculum, methods of teaching, role of teacher, discipline

UNIT 3: Indian Schools of Philosophy and their Educational Implications

(i) Common characteristics of Indian philosophy

(ii) Sankhya, Vedanta, , Buddhism, Jainism with reference to: Philosophical tenets, Aims of education, curriculum, methods of teaching, role of teacher.

UNIT 4: Educational Thought of Western and Indian Thinkers

(i) Plato

(ii) Dewey

(iii) Gopabandhu Das

(iv) Gandhi

(v) Tagore

(vi) Aurobindo

PRACTICAL

- Field visit to a seat of learning in the locality and prepare report.

NB: It will be evaluated by both the internal and External examiners.

Text Books

- Safaya, R.N. & Shaida, B.D. (2010). *Modern Theory and Principles of Education*. New Delhi: Dhanpatrai Publishing Company Pvt. Ltd.
- Ravi, Samuel.S. (2015). *A Comprehensive Study of Education*. Delhi: PHI Learning Pvt. Ltd.
- Nayak, B.K . . *Text Book of Foundation of Education.* Cuttack, Odisha: Kitab Mhal.

Reference Books

- Aggrawal, J.C. (2013). Theory and principle of education. New Delhi: Vikash Publishing House Pvt Ltd.
- Anand, C.L. *et.al.* (1983). Teacher and education in emerging in Indian society, New Delhi: NCERT. Brubacher, John.S.(1969). Modern philosophies of education. New York: McGraw Hill Co.
- Clarke, P. (2001). Teaching and learning: The Culture of pedagogy. New Delhi: Sage Publication.
- Dash, B.N. (2011) Foundation of education, New Delhi; Kalyani Publishers.
- Dewey, John (1956). The Child and the curriculum, school and society. Chicago, Illinois: University of Chicago Press.

- Dewey, John (1997). Experience and education. New York: Touchstone.
- Ganesh, Kamala & Thakkar, Usha (Ed.) (2005). Culture and making of identity in India. New Delhi: Sage Publications.
- Krishnamurthy, J. (1953). Education and significance of life. New Delhi: B.I. Publications
- Kumar Krishna (1996). Learning from conflict. New Delhi: Orient Longman.
- Ministry of Education (1966). Education and national development. New Delhi: Ministry of Education, Government of India.
- Ornstein, Allan C. & Levine, Daniel U. (1989).Foundations of education (4th Edn.). Boston: Houghton Mifflin Co.
- Pathak, R. P. (2012). Philosophical and sociological principles of education. Delhi: Pearson. Pathak, Avijit (2002). Social implications of schooling. New Delhi: Rainbow Publishers.
- Peters, R.S. (1967). The Concept of education. London: Routledge Kegan & Paul. Radhakrishnan, S. Indian philosophy Vol. I and Vol. II
- Ross, James S.(1981). Ground work of educational theory.Delhi: Oxford University Press Rusk, Robert R., Philosophical bases of education, London: Oxford University Press.
- Salamatullah, (1979). Education in social context. New Delhi: NCERT.
- Srinivas, M.N., (1986). Social changes in modern India. Bombay: Allied Publishers.
- Taneja, V.R. (2000). Educational thought and practice, New Delhi: Sterling Publishers Pvt. Limited.
- Wingo, G. Max (1975). Philosophies of education. New Delhi: Sterling Publisher Pvt. Limited.

Generic Elective Paper II

EDUCATIONAL PSYCHOLOGY

Learning Objectives

On completion of this course, the students will:

- Explain the concept of educational psychology and its relationship with psychology.
- Understand different methods of educational psychology.
- Explain the concepts of growth and development of child and adolescence, and underlined general principles of growth and development.
- Describe briefly the periods and the typical characteristics of growth and development during childhood and adolescence.
- Explain the theory of cognitive development and its educational implications.
- State the different forms and characteristics of individual differences and the ways of meeting the classroom issues arising out of the differences.
- Identify the learning needs during the different stages of development and adopt appropriate strategies in and out of school to meet the learning needs.

UNIT 1: Educational Psychology in Developmental Perspective

(i) Meaning, nature, scope and relevance of educational psychology
(ii) Methods of educational psychology- observation, experimentation, and case study
(iii) Application of educational psychology in understanding learner

(iv) Growth and Development-Concept, difference between growth and development, and principles of growth and development
(v) Characteristics of development during adolescence in different areas:
(vi) Physical, social, emotional and intellectual (with reference to Piaget)

UNIT 2: Intelligence, Creativity and Individual difference

(i) Individual difference-concept, nature, factors and role of education
(ii) Intelligence- meaning and nature of intelligence, concept of I.Q, theories of intelligence- Two factor theories, Guildford's structure of intelligence (SI) model, Gardner's multiple theory of intelligence.
(iii) Measurement of intelligence- individual and group test, verbal, non-verbal test
(iv) Creativity- meaning, nature and stages of creative thinking, strategies for fostering creativity

UNIT 3: Learning and Motivation

(i) Learning- meaning, nature and factors of learning
(ii) Theories of learning with experiment and educational implications-
(iii) Classical conditioning, operant conditioning, insightful learning and constructivist approach to learning
(iv) Motivation – concepts, types, and techniques of motivation

UNIT 4: Personality and Mental health

(i) Personality- meaning and nature of personality
(ii) Theories- type theory(Jung), trait theory(Allport)
(iii) Assessment of personality- subjective, objective and projective techniques
(iv) Mental health-concept, factors affecting mental health and role of teacher, mental health of teacher.
(v) Adjustment mechanism: concept and types

PRACTICAL

- Case study of an exceptional child and reporting

N.B: It will be evaluated by both the Internal and External examiners**.**

Text Books

- Chauhan, S.S. (1978). *Advanced educational psychology*. New Delhi: Vikas Publishing House Pvt. Ltd.
- Mangal, S.K. (2002). *Advanced educational psychology*. New Delhi: Prentice Hall of India.
- Woolfolk, A. (2015). *Educational psychology (9th Ed.)*. New Delhi: Pearson Publication

Reference Books

- Aggarwal, J.C. (2014). Essentials of Educational Psychology. New Delhi: Vikas Publishing House Pvt. Ltd.

- Attri, A.K. (2015). *Psychology of development and learning*. New Delhi: APH Publishing Corporation.
- Bernard, P.H. (1970). *Mental Health in the class room*. New York: McGraw Hill.
- Biehier, R.F. & Snowman, J., (1997). *Psychology applied to teaching*. New York: Houghton MIflin.
- Bigge, M.L., *Psychological foundations of education*, Harper and Row, New York, 1985.
- Chandraiah,K.(2011). *Emotional intelligence*. New Delhi: APH Publishing Corporation.
- Dececco, J.P. & Crawford, W.R. (1997). *Psychology of learning and institution*. New Delhi: Prentice Half of India.
- Good T., (1990). *Educational psychology*. Longman, New York, 1990.
- Lindgren, H.C. (1980). *Educational psychology in the classroom*. New York: Oxford University Press.
- Mouly, G.J. (1982). *Psychology for teaching*. Allyn & Bacon, Boston.
- Rothstein, P.R. (1990). *Educational psychology*. New York: McGraw Hill..
- Salvin, R, (1990). *Educational psychology: theory into practice,* N.J.: Prentice hall, Englewood Cliffs,
- Snowman and Biehler **(---).** *Psychology applied to teaching……….*
- Sprint hall, RC. & Sprint hall, NA, (1990). *Educational psychology, development approach*, New York: McGraw Hill.

Generic Elective Paper III

CONTEMPORARY TRENDS AND ISSUES IN INDIAN EDUCATION

Learning Objectives

On completion of this course the students will

- Understand the importance of pre-school and elementary school education. Analyze various problems and issues for ensuring quality education.
- State the importance of secondary education and analyze various problems and issues for ensuring quality in secondary education.
- Enumerate the importance of higher education and analyze various problems and issues for ensuring quality in higher education.
- Justify the importance of teacher education and analyze various problems and issues for ensuring quality in teacher education.
- Analyze emerging concerns in Indian education.

UNIT 1: Pre-school and Elementary School Education

(i) Meaning, nature and importance of ECCE, problems and issues with regard to ECCE
(ii) Universalization of Elementary Education: efforts to achieve UEE, SSA
(iii) Problems and issues in implementing Right to Education Act 2009.
(iv) Problems and issues in bringing the community to school, role of SMC
(v) Problems in ensuring equity and quality of elementary education

UNIT 2: Secondary and Higher Secondary Education

(i) Rashtriya Madhyamik Shiksha Abhiyan (RMSA) and ensuring secondary education for all.
(ii) Role of School Management and Development Committee (SMDC)
(iii) Shifting the teaching learning process from teacher centered to learner centered and activity based classroom –problems and issues
(iv) Problems and issues with regard to vocationalisation of secondary and higher secondary education
(v) Examination reforms at the secondary level
(vi) Widening the access to secondary education through National Open School

UNIT 3: Higher Education and Teacher Education

(i) Challenges in Higher education- expansion, quality and inclusion
(ii) Role of RUSA and NAAC for quality assurance in Higher education
(iii) Higher education through open and distance learning mode
(iv) Elementary level pre-service teacher education- problems, issues and reforms with reference to National Curriculum Framework for Teacher Education-2009
(v) Secondary level pre-service teacher education- problems, issues and reforms with reference to National Curriculum Framework for Teacher Education-2009

UNIT 4: Emerging Concerns

(i) Examination system: defects and reforms for making examination system flexible (internal assessment and semester system , grading, open book examination, online examination)
(ii) Choice Based Credits System (CBCS): Concept, learning objectives, importance, problems and issues.
(iii) Human Rights Education: Concept, learning objectives, importance, problems and issues.
(iv) Life-Skill Education: Concept, learning objectives, importance, problems and issues.
(v) Peace Education: Concept, learning objectives, importance, problems and issues.

PRACTICAL

- Study of Perception of Stakeholder's of Education on any of the current issues and concerns, and reporting.

NB: It will be evaluated both by the Internal and External Examiners.

Text Books

- Kumar, Chanchal & Sachedeva, M.S. (2017). *Vision of Secondary Education In India in the context of 21st century*. Twentyfirst Century Publications; First Edition edition (2015)
- Pathak, K. R. (2007). *Education in the Emerging* India. New Delhi: Atlantic

Publishers**.**
Saxena, V. (2011). Contemporary trends in education: A handbook for educators. New Delhi: Pearson.

Reference Books

- Broudy, H.S. (1977) *Types of knowledge and purposes of education*. In R.C. Anderson, R.J., Spiro and W.E. Montanaque (Eds.) Schooling and the acquisition of knowledge (PP. Hillsdale, NJ: Erlbaum.
- Bruner, J.S. (1996). *The culture of education*. Cambridge, M.A.: Harvard University Press.
- Butchvarov, P. (1970). *The concept of knowledge*. Evanston, Illinois, North Western University Press.
- Dearden R. F. (1984). *Theory and practice in Education*. Routledge K Kegan & Paul.
- Delors, Jacques, et al; (1996). *Learning: the Treasure within report of the international commission on education for 21st century*, UNESCO.
- Illich, I. (1996). *Deschooling society*. Marion Boyers, London.
- Matheson, David (2004). *An Introduction to the study of education* (2 Ed.). David Fulton Publish.
- MHRD (2008). *Framework for implementation of Rashtriya Madhyamik Shiksha Abhiyan: A scheme for universalisation of access to and improvement of quality at the secondary stage.* New Delhi: Department of School Education and Literacy.
- MHRD (2011). *Sarva Shiksha Abhiyan: Framework for implementation based on the Right of Children to Free and Compulsory Education Act, 2009*. New Delhi: Department of School Education and Literacy.
- MHRD, (1992). *Programme of action*. Govt. of India, New Delhi.
- MHRD, Gov. of India (1992). *National policy on education* (revised) New Delhi: MHRD.
- Ministry of Law and Justice (2009). *Right to education Act 2009*. New Delhi: Govt of India.
- Naik, J.P. (1975). *Equality, quality and quantity: The elusive triangle of Indian education.* Allied Publications, Bombay.
- NCERT (2005). *National curriculum framework 2005*. New Delhi: NCERT.
- NCERT (2005). *National curriculum framework*, New Delhi: NCERT.
- Slatterry, P. and Dana R. (2002). *Ethics and the foundations of education-Teaching Convictions in a postmodern world*. Allyn & Bacon.
- UN (2015). *The sustainable development goals (SDGs) – UNDP*. United Nations
- UNESCO (1998). *Educating for a sustainable future: A transdisciplinary vision for concerted action*. Paris: UNESCO.
- UNICEF (2000). *Defining quality in education*. New York: Programme Division (Education), Unicef.
- Wall, Edmund (2001). *Educational theory: philosophical and political Perspectives*. Prometheus Books.
- WHO (1991). *Comprehensive school health programme*. New Delhi: World Health Organization Regional Office.
- Winch, C. (1996). *Key concepts in the philosophy of education*. Routledge.
- Yadav, M. S. & Lakshmi, T. K. S. (1995). Education: Its disciplinary identity. *Journal of Indian Education,* XXI (*1*), 01-21.

Generic Elective Paper IV

EDUCATIONAL ASSESSMENT AND EVALUATION

Learning Objectives

On completion of this course, the students will.

- State the nature, purpose and types of educational assessment and evaluation.
- Develop and use different types of tools and techniques for continuous and comprehensive assessment of learning in the school situation.
- Explain the importance of assessment for learning and its processes for enhancing the quality of learning and teaching.
- Describe the characteristic of a good test.
- Analyze the trends and issues in learning and learner assessment.
- Analyze and interpret results of the assessment using standard score.
- Illustrate the principles of test construction in education.

UNIT 1: Assessment and Evaluation in Education

(i) Understanding the meaning and purpose of test, measurement, assessment and evaluation
(ii) Scales of measurement- nominal, ordinal, interval and ratio
(iii) Types of test- teacher made and standardized
(iv) Approaches to evaluation- placement, formative, diagnostic and summative
(v) Types of evaluation- norm referenced and criterion referenced
(vi) Concept and nature of continuous and compressive evaluation

UNIT 2: Instructional Learning Objectives

(i) Taxonomy of instructional learning objectives with special reference to cognitive domain
(ii) Criteria of selecting appropriate learning objectives, and stating of general and specific instructional learning objectives
(iii) Relationship of evaluation procedure with learning objectives
(iv) Difference between objective based objective type test and objective based essay type test

UNIT 3: Tools and Techniques of Assessment and construction of Test

(i) Steps of test construction: planning, preparing, trying out and evaluation
(ii) Principles of construction of objective type test items- matching, multiple choice, completion and true – false
(iii) Principles of construction of essay type test
(iv) Non- standardized tools: Observation schedule, interview schedule, rating scale, check list, portfolio and rubrics.

UNIT 4: Characteristics of a good Test

(i) Validity-concept, types and methods of validation

(ii) Reliability- concept and methods of estimating reliability
(iii) Objectivity- concept and methods of estimating objectivity
(iv) Usability- concept and factors ensuring usability

PRACTICAL

- Construction of Unit test on a school subject based on Blueprint and Reporting.

NB: It will be evaluated by both Internal and External examiners.

Text Books

- Aggrawal, J.C. (1997). *Essentials of examination system, evaluation, tests and measurement*. New Delhi: Vikas Publishing House Pvt Ltd.
  Gronlund, N.E. (2003). *Assessment of student Achievement*. Boston: Allyn & Bacon
- Singh, A.K. (2016). *Tests, measurements and research methods in behavioural sciences*. New Delhi: Bharati Bhawan Publishers.

Reference Books

- Anastasi, A.(1976). Psychological testing. New York: Macmillan Publishing Co.
- Anderson, L.W. (2003). Classroom assessment: Enhancing the quality of teacher decision making.
- Banks, S.R. (2005). *Classroom assessment: issues and PRACTICES.* Boston: Allyn & Bacon.
- Blooms, B.S.(1956). *Taxonomy of educational Learning Objectives*. New York: Longman Green and Company
- Cohen, R.J., Swerdlik, M.E., & Phillips, S.M. (1996). *Psychological testing and assessment. an introduction to the tests and measurement*. California: Mayfield Publishing Co.
- Earl, L.M. (2006). *Assessment as learning: using classroom assessment to maximize student learning*. Thousand Oaks, California: Corwin Press
- Hopkins, KD. (1998). *Educational and psychological measurement and evaluation.* Boston: Allyn and Bacon.
- Linn, R.L. & Gronlund, N.E. (2000). *Measurement and assessment in teaching.* London: Merrill Prentice Hall.
- Macmillan, J.H. (1997). *Classroom assessment, principles and practice for effective instruction.* Boston: Allyn and Bacon
- Mohan, R. (2016). *Measurement evaluation and assessment in education*. Delhi: PHI Learning Pvt. Ltd.
- National Council of Educational Research and Training (2006). *Position paper: Examination Reforms.* New Delhi: NCERT
- Noll, N.H. S cannell, D.P. & Craig, RC. (1979). *Introduction to educational measurement.* Boston: Houghton Miffin.

Course structure of UG Education Pass

Semester	Course	Course Name	Credits	Total marks
I	DSC-I	Educational philosophy	04	75
	DSC-I Practical		02	25
II	DSC-II	Educational psychology	04	75
	DSC-II Practical		02	25
III	DSC-III	Educational sociology	04	75
	DSC-III Practical		02	25
IV	DSC-IV	Changing pedagogical perspective	04	75
	DSC-IV		02	25

	Practical			
V	DSE-I DSE-I Practical	Contemporary trends and issues in Indian education	04 02	75 25
VI	DSE-II DSE-II Practical	Educational assessment and evaluation	04 02	75 25
			30	**600**

Education Papers for PASS students

Discipline Specific Core – 4 papers

Discipline Specific Elective – 2 papers

Marks per paper – Mid term : 15 marks, End term : 60 marks, Practical: 25 marks

Total – 100 marks Credit per paper – 6

Teaching hours per paper – 40 hours + 20 hours practical

Discipline Specific Core Paper I

EDUCATIONAL PHILOSOPHY

Learning Objectives

On completion of this course, the learners shall be able to:

- State and analyse the meaning of education and form own concept on education
- Explain philosophy as the foundation of education
- Analyse aims of education
- Describe the essence of different formal philosophies and draw educational implications
- Compare and contrast Indian and western philosophies of education

UNIT 1: Education in Philosophical Perspective

(i) Etymological meaning of education

(ii) Narrower and broader meaning of education, lifelong education

(iii) Aims of education- Individual and Social aims of education

(iv) Meaning and nature of philosophy

(v) Branches of Philosophy- metaphysics, epistemology and axiology, and its educational implications

(vi) Functions of Philosophy in relation to education

UNIT 2: Formal Schools of Philosophy and their Educational Implications

(i) Idealism, Naturalism, Pragmatism with reference to: Aims of Education, curriculum, methods of teaching, role of teacher, discipline

UNIT 3: Indian Schools of Philosophy and their Educational Implications

(i) Common characteristics of Indian Philosophy

(ii) Sankhya, Vedanta, , Buddhism, Jainism with reference to: Philosophical tenets, aims of education, curriculum, methods of teaching, role of teacher

UNIT 4: Educational Thought of Western and Indian Thinkers

(i) Plato

(ii) Dewey

(iii) Gopabandhu Das

(iv) Gandhi

(v) Tagore

(vi) Aurobindo

PRACTICAL

- Field visit to a seat of learning in the locality and prepare report.

NB: It will be evaluated by both internal and External examiners.

Text Books

- Safaya, R.N. & Shaida, B.D. (2010). *Modern Theory and Principles of Education*. New Delhi: Dhanpatrai Publishing Company Pvt. Ltd. Nayak, B.K. (2018).
- Ravi, Samuel.S. (2015). *A Comprehensive Study of Education*. Delhi: PHI Learning Pvt. Ltd.
- Nayak, B.K (2012). *Text Book of Foundation of Education*. Cuttack, Odisha: Kitab Mhal.

Reference Books

- Aggrawal, J.C. (2013). Theory and principle of education. New Delhi: Vikash

Publishing House Pvt Ltd.

- Anand, C.L. *et.al.* (1983). Teacher and education in emerging in Indian society, New Delhi: NCERT. Brubacher, John.S.(1969). Modern philosophies of education. New York: McGraw Hill Co.
- Clarke, P. (2001). Teaching and learning: The Culture of pedagogy. New Delhi: Sage Publication.
- Dash, B.N. (2011) Foundation of education, New Delhi; Kalyani Publishers.
- Dewey, John (1956). The Child and the curriculum, school and society. Chicago, Illinois: University of Chicago Press.
- Dewey, John (1997). Experience and education. New York: Touchstone.
- Ganesh, Kamala & Thakkar, Usha (Ed.) (2005). Culture and making of identity in India. New Delhi: Sage Publications.
- Govt. of India (1986/'92). National policy on education. New Delhi: MHRD.
- Krishnamurthy, J. (1953). Education and significance of life. New Delhi: B.I. Publications
- Kumar Krishna (1996). Learning from conflict. New Delhi: Orient Longman.
- Ministry of Education (1966). Education and national development. New Delhi: Ministry of Education, Government of India.
- Ornstein, Allan C. & Levine, Daniel U. (1989).Foundations of education (4th Edn.). Boston: Houghton Mifflin Co.
- Pathak, R. P. (2012). Philosophical and sociological principles of education. Delhi: Pearson. Pathak, Avijit (2002). Social implications of schooling. New Delhi: Rainbow Publishers.
- Peters, R.S. (1967). The Concept of education. London: Routledge Kegan & Paul. Radhakrishnan, S. Indian philosophy Vol. I and Vol. II
- Ross, James S.(1981). Ground work of educational theory.Delhi: Oxford University Press Rusk, Robert R., Philosophical bases of education, London: Oxford University Press.
- Salamatullah, (1979). Education in social context. New Delhi: NCERT.
- Srinivas, M.N., (1986). Social changes in modern India. Bombay: Allied Publishers.
- Taneja, V.R. (2000). Educational thought and practice, New Delhi: Sterling Publishers Pvt. Limited.
- Wingo, G. Max (1975). Philosophies of education. New Delhi: Sterling Publisher Pvt.Limited.

Discipline Specific Core Paper II

EDUCATIONAL PSYCHOLOGY

Learning Objectives

On completion of this course, the students will:

- Explain the concept of educational psychology and its relationship with psychology.
- Understand different methods of educational psychology.
- Describe the theoretical perspectives of educational psychology.
- Explain the concepts of growth and development of child and adolescence, and underlined general principles of growth and development.
- Describe briefly the periods and the typical characteristics of growth and development

during childhood and adolescence.
- Explain the theory of cognitive development and its educational implications.
- State the different forms and characteristics of individual differences and the ways of meeting the classroom issues arising out of the differences.
- Identify the learning needs during the different stages of development and adopt appropriate strategies in and out of school to meet the learning needs.

UNIT 1: Educational Psychology in Developmental Perspective

(i) Meaning, nature, scope and relevance of educational psychology
(ii) Methods of educational psychology- observation, experimentation, and case study
(iii) Application of educational psychology in understanding learner
(iv) Growth and Development-Concept, difference between growth and development, and principles of growth and development
(v) Characteristics of development during adolescence in different areas:
(vi) Physical, social, emotional and intellectual (with reference to Piaget)

UNIT 2: Intelligence, Creativity and Individual difference

(i) Individual difference-concept, nature, factors and role of education
(ii) Intelligence- meaning and nature of intelligence, concept of I.Q, theories of intelligence- Two factor theories, Guildford's structure of intelligence (SI) model, Gardner's multiple theory of intelligence.
(iii) Measurement of intelligence- individual and group test, verbal, non-verbal test
(iv) Creativity- meaning, nature and stages of creative thinking, strategies for fostering creativity

UNIT 3: Learning and Motivation

(i) Learning- meaning, nature and factors of learning
(ii) Theories of learning with experiment and educational implications-
(iii) Classical conditioning, operant conditioning, insightful learning and constructivist approach to learning
(iv) Motivation – concepts, types, and techniques of motivation

UNIT 4: Personality and Mental health

(i) Personality- meaning and nature of personality
(ii) Theories: type theory and trait theory
(iii) Assessment of personality- subjective, objective and projective techniques
(iv) Mental health-concept, factors affecting mental health and role of teacher, mental health of teacher.
(v) Adjustment Mechanism: concept and types

PRACTICAL

- Administration and interpretation of any psychological test relating to Intelligence OR Personality

N.B: It will be evaluated by both the Internal and External examiners.

Text Books

- Chauhan, S.S. (1978). *Advanced educational psychology*. New Delhi: Vikas Publishing House Pvt. Ltd.
- Mangal, S.K. (2002). *Advanced educational psychology*. New Delhi: Prentice Hall of India.
- Aggarwal, J.C. (2014). *Essentials of educational psychology*. New Delhi: Vikas Publishing House Pvt. Ltd.

Reference Books

- Woolfolk, A. (2015). Educational psychology (9th Ed.). New Delhi: Pearson Publication
- Attri, A.K. (2015). Psychology of development and learning. New Delhi: APH Publishing Corporation.
- Bernard, P.H. (1970). Mental Health in the class room. New York: McGraw Hill.
- Biehier, R.F. & Snowman, J., (1997). Psychology applied to teaching. New York: Houghton Mifflin.
- Bigge, M.L., Psychological foundations of education, Harper and Row, New York, 1985.
- Chandraiah,K.(2011). Emotional intelligence. New Delhi: APH Publishing Corporation.
- Dececco, J.P. & Crawford, W.R. (1997). Psychology of learning and institution. New Delhi: Prentice Half of India.
- Good T., (1990). Educational psychology. Longman, New York, 1990.
- Lindgren, H.C. (1980). Educational psychology in the classroom. New York: Oxford University Press.
- Mouly, G.J. (1982). Psychology for teaching. Allyn & Bacon, Boston.
- Salvin, R, (1990). Educational psychology: theory into practice, N.J.: Prentice hall, Englewood Cliffs,
- Sprint hall, RC. & Sprint hall, NA, (1990). Educational psychology, development approach, New York: McGraw Hill

Discipline Specific Core Paper III

EDUCATIONAL SOCIOLOGY

Learning Objectives

On completion of this course, the students will:

- State the relationship between education and society.
- Understand the meaning of Educational Sociology and function of education as a social system.
- State different agencies of education and their functions.
- Justify the importance of education for social change.
- Describe the role of education in modernization and globalization.
- Describe the function of education to ensure equality and equity.

UNIT 1: Education and Society

(i) Relationship between education and society, school as a miniature society
(ii) Educational Sociology- Concept, nature, scope and importance;
(iii) Relationship between education and sociology.
(iv) Education as a process of Socialization.
(v) Education and Politics, Education and Economic Development

UNIT 2: Agencies of Education

(i) Family- Importance, functions and role for education and socialization of the children
(ii) School - Importance, functions and role for education and socialization of the children
(iii) Society- Importance, functions and role for education and socialization of the children
(iv) Mass Media- Importance, functions and role for education and socialization of the children

UNIT 3: Education, Social change and Modernization

(i) Concept of social change and factors affecting Social Change
(ii) Education as an instrument of social change and social control
(iii) Concept and Attributes of modernization
(iv) Education for accelerating the process of modernization
(v) Impact of globalization, liberalization, and privatization on education

UNIT 4: Equalization of Educational opportunities for ensuring equity and Inclusion

(i) Concept of equality, equity and inclusion: its educational implication
(ii) Ensuring equality in the Education of SC and ST
(iii) Education for women empowerment
(iv) Inclusive Education with reference to children with special needs (CWSN)

PRACTICAL

- Field Visit: Study of a social unit (Home/School/Village/slum) and reporting.

NB: It will be evaluated by both the internal and external examiners

Text Books

- Aggrawal, J.C.(2013). *Theory and principle of education*. New Delhi: Vikash Publishing House Pvt Ltd.
- NCERT (2014). Basics in Education. New Delhi: Author.
- Pathak, R. P. (2012). *Philosophical and sociological principles of education*. Delhi: Pearson. Pathak

Reference Books

- Anand, C.L. et.al. (1983). Teacher and education in emerging in Indian society, New Delhi: NCERT. Brubacher, John.S.(1969). Modern philosophies of education. New York: McGraw Hill Co.
- Clarke, P. (2001). Teaching and learning: The Culture of pedagogy. New Delhi: Sage Publication.

Ravi, Samuel.S.(2015). *A Comprehensive Study of Education*. Delhi: PHI Learning Pvt. Ltd.

- Dewey, John (1956). The Child and the curriculum, school and society. Chicago, Illinois: University of Chicago Press.
- Dewey, John (1997). Experience and education. New York: Touchstone.
- Ganesh, Kamala & Thakkar, Usha (Ed.) (2005). Culture and making of identity in India. New Delhi: Sage Publications.
- Govt. of India (1986/'92). National policy on education. New Delhi: MHRD.
  Ministry of Education (1966). Education and national development. New Delhi: Ministry of Education, Government of India.
- Ornstein, Allan C. & Levine, Daniel U. (1989).Foundations of education (4th Edn.). Boston: Houghton Mifflin Co.
- Avijit (2002). Social implications of schooling. New Delhi: Rainbow Publishers.
- Safaya, R.N. & Shaida, B.D. (2010), Modern theory and principles of education. New Delhi: Dhanpati Publising Company Pvt. Ltd.
- Salamatullah, (1979). Education in social context. New Delhi: NCERT.
  Saraswati, T.S. (Ed.) (1999). Culture, socialization and human development. Theory, research and applications in India. New Delhi: Sage Publication.
- Srinivas, M.N., (1986). Social changes in modern India. Bombay: Allied Publishers.
- Taneja, V.R. (2000). Educational thought and practice, New Delhi: Sterling Publishers Pvt. Limited.

Discipline Specific Core Paper IV

CHANGING PEDAGOGICAL PERSPECTIVE

Learning Objectives

- On completion of this course, the students will:
- Explain the concept of pedagogy
- Differentiate pedagogy from other allied concepts
- Explain different teaching task with example
- Establish relationship between teaching and learning
- List out different approaches and methods of teaching
- Prepare a lesson plan following different designs

UNIT 1: Concept of Teaching and Learning

(i) Meaning and definition of teaching and learning
(ii) Relationship between teaching and learning
(iii) Variables involved in teaching task: independent, dependent and intervening
(iv) Phases of teaching: Pre- active, inter- active and post- active
(v) Levels of teaching: memory, understanding and reflective
(vi) Lesson plan design**-** The Herbartian steps, 5 E and ICON design model

UNIT 2: Theories of Teaching

(i) Meaning and nature of teaching theory
(ii) Types of teaching theories:
(iii) Formal theories of teaching- communication theory of teaching
(iv) Descriptive theories of teaching– Gagne's hierarchical theory of instruction and Bruner's cognitive theory of instruction
(v) Normative theories of teaching - Mitra's psychological theory of teaching and Clarke's general theory of teaching

UNIT 3: Principles and maxims of teaching

(i) General principles of teaching
(ii) Psychological principles of teaching
(iii) Maxims of teaching
(iv) Core teaching skills: Introducing the lesson, explaining, illustrating with examples, stimulus variation, and reinforcement, questioning, and probing questions, closure.

UNIT 4: Approaches and methods of Teaching

(i) Concept of approach, method, strategy and techniques
(ii) Methods of teaching: inductive-deductive, analytic- synthetic, problem solving and project
(iii) Shift in focus from teaching to learning- constructivist approach to learning

PRACTICAL

- Preparation of Rating Scale/ Observation Schedule and evaluate a classroom teaching and reporting.

NB: It will be evaluated by both the internal and external examiners

Text Books

- Mangal, S.K. and Mangal, U.(2010). Essentials of Educational Technology. New Delhi, PHI Learning Pvt. Limited.
- Walia, J.S. (2013). *Educational Technology*. Jalandhar, Punjab: Ahim Publications.
- Sharma, R.A.(1986). *Technology of Teaching*. International Publishing House, Meerut.

Reference Books

- Aggarwal, J.C.(1995). Essentials of Educational Technology, Vikash Publishing House, New Delhi
- Chauhan, S.S.(1995). Innovations of teaching learning process, Vikash Publishing House, New Delhi
- Kochar, S.K.(2011) Methods and Techniques of teaching, Sterling Publisher Pvt. Ltd., New Delhi
- Mangal, S.K.(1988) Foundations of Educational Technology, Ludhiana, Tandan Publications
- Nageswar Rao, S., Sreedhar, P. & Rao, B.(2007). Methods and techniques of teaching, Sonali Publications, New Delhi

- Oliver,R.A. (1963) Effective teaching, JM Dent & Sons
- Pathak, R.P. & Chaudhary, J. (2012) Educational Technology, Pearson, New Delhi
- Ryburn, W.M.(1955) Principles of Teaching, Geoffrey Cembridge, OUP
- Sampath,K, Pannir Salvam,A.,& Santhanam, S.(1981) introduction to Educational Technology, Sterling Publisher, New Delhi

Discipline Specific Elective Paper I

CONTEMPORARY TRENDS AND ISSUES IN INDIAN EDUCATION

Learning Objectives

On completion of this course the students will

- Understand the importance of pre-school and elementary school education. Analyze various problems and issues for ensuring quality education.
- State the importance of secondary education and analyze various problems and issues for ensuring quality in secondary education.
- Enumerate the importance of higher education and analyze various problems and issues for ensuring quality in higher education.
- Justify the importance of teacher education and analyze various problems and issues for ensuring quality in teacher education.
- Analyze emerging concerns in Indian education.

UNIT 1:Pre-school and Elementary School Education

(i) Meaning, nature and importance of ECCE, problems and issues with regard to ECCE
(ii) Universalization of Elementary Education: efforts to achieve UEE, SSA
(iii) Problems and issues in implementing Right to Education Act 2009.
(iv) Problems and issues in bringing the community to school, role of SMC
(v) Problems in ensuring equity and quality of elementary education

UNIT 2: Secondary and Higher Secondary Education

(i) Rashtriya Madhyamik Shiksha Abhiyan (RMSA) and ensuring secondary education for all.
(ii) Role of School Management and Development Committee (SMDC)
(iii) Shifting the teaching learning process from teacher centered to learner centered and activity based classroom –problems and issues
(iv) Problems and issues with regard to vocationalisation of secondary and higher secondary education
(v) Examination reforms at the secondary level
(vi) Widening the access to secondary education through National Open School

UNIT 3: Higher Education and Teacher Education

(i) Challenges in Higher education- expansion, quality and inclusion
(ii) Role of RUSA and NAAC for quality assurance in Higher education
(iii) Higher education through open and distance learning mode
(iv) Elementary level pre-service teacher education- problems, issues and reforms with reference to National Curriculum Framework for Teacher Education-2009
(v) Secondary level pre-service teacher education- problems, issues and reforms with reference to National Curriculum Framework for Teacher Education-2009

UNIT 4: Emerging Concerns

(i) Examination system: defects and reforms for making examination system flexible (internal assessment and semester system , grading, open book examination, online examination)
(ii) Choice Based Credits System(CBCS):Concept, learning objectives, importance, problems and issues.
(iii) Human Rights Education: Concept, learning objectives, importance, problems and issues.
(iv) Life-Skill Education: Concept, learning objectives, importance, problems and issues.
(v) Peace Education: Concept, learning objectives, importance, problems and issues.

PRACTICAL

- Study of perception of Stakeholder's of Education on any of the current issues based on Pass DSE-1 and concerns, and reporting.

NB: It will be evaluated both by the Internal and External Examiners.

Text Books

- Kumar, Chanchal & Sachedeva, M.S. (2017). *Vision of Secondary Education In India in the context of 21st century*. Twentyfirst Century Publications; First Edition edition (2015)
- Pathak, K. R. (2007). *Education in the Emerging* India. New Delhi: Atlantic Publishers**.**
- Saxena, V. (2011). *Contemporary trends in education: A handbook for educators*. New Delhi: Pearson.

Reference Books

- Broudy, H.S. (1977) *Types of knowledge and purposes of education*. In R.C. Anderson, R.J., Spiro and W.E. Montanaque (Eds.) Schooling and the acquisition of knowledge (PP. Hillsdale, NJ: Erlbaum.
- Bruner, J.S. (1996). *The culture of education*. Cambridge, M.A.: Harvard University Press.

- Butchvarov, P. (1970). *The concept of knowledge*. Evanston, Illinois, North Western University Press.
- Dearden R. F. (1984). *Theory and practice in Education*. Routledge K Kegan & Paul.
- Delors, Jacques, et al; (1996). *Learning: the Treasure within report of the international commission on education for 21st century*, UNESCO.
- Illich, I. (1996). *Deschooling society*. Marion Boyers, London.
- Matheson, David (2004). *An Introduction to the study of education* (2 Ed.). David Fulton Publish.
- MHRD (2008). *Framework for implementation of Rashtriya Madhyamik Shiksha Abhiyan: A scheme for universalisation of access to and improvement of quality at the secondary stage.* New Delhi: Department of School Education and Literacy.
- MHRD (2011). *Sarva Shiksha Abhiyan: Framework for implementation based on the Right of Children to Free and Compulsory Education Act, 2009*. New Delhi: Department of School Education and Literacy.
- MHRD, (1992). *Programme of action*. Govt. of India, New Delhi.
- MHRD, Gov. of India (1992). *National policy on education* (revised) New Delhi: MHRD.
- Ministry of Law and Justice (2009). *Right to education Act 2009*. New Delhi: Govt of India.
- Naik, J.P. (1975). *Equality, quality and quantity: The elusive triangle of Indian education.* Allied Publications, Bombay.
- NCERT (2005). *National curriculum framework 2005*. New Delhi: NCERT.
- NCERT (2005). *National curriculum framework*, New Delhi: NCERT.
- Slatterry, P. and Dana R. (2002). *Ethics and the foundations of education-Teaching Convictions in a postmodern world*. Allyn & Bacon.
- UN (2015). *The sustainable development goals (SDGs) – UNDP*. United Nations
- UNESCO (1998). *Educating for a sustainable future: A transdisciplinary vision for concerted action*. Paris: UNESCO.
- UNICEF (2000). *Defining quality in education*. New York: Programme Division (Education), Unicef.
- Wall, Edmund (2001). *Educational theory: philosophical and political Perspectives*. Prometheus Books.
- WHO (1991). *Comprehensive school health programme*. New Delhi: World Health Organization Regional Office.
- Winch, C. (1996). *Key concepts in the philosophy of education*. Routledge.
- Yadav, M. S. & Lakshmi, T. K. S. (1995). Education: Its disciplinary identity. *Journal of Indian Education,* XXI (*1*), 01-21.

Discipline Specific Elective Paper II

EDUCATIONAL ASSESSMENT AND EVALUATION

Learning Objectives

On completion of this course, the students will.

- State the nature, purpose and types of educational assessment and evaluation.
- Develop and use different types of tools and techniques for continuous and comprehensive assessment of learning in the school situation.

- Explain the importance of assessment for learning and its processes for enhancing the quality of learning and teaching.
- Describe the characteristic of a good test.
- Analyze the trends and issues in learning and learner assessment.
- Analyze and interpret results of the assessment using standard score.
- Illustrate the principles of test construction in education.

UNIT 1: Assessment and Evaluation in Education

(i) Understanding the meaning and purpose of test, measurement, assessment and evaluation
(ii) Scales of measurement- nominal, ordinal, interval and ratio
(iii) Types of test- teacher made and standardized
(iv) Approaches to evaluation- placement, formative, diagnostic and summative
(v) Types of evaluation- norm referenced and criterion referenced
(vi) Concept and nature of continuous and compressive evaluation

UNIT 2: Instructional Learning Objectives

(i) Taxonomy of Instructional Learning Objectives with special reference to cognitive domain
(ii) Criteria of selecting appropriate Learning Objectives, and stating of general and specific instructional Learning Objectives
(iii) Relationship of evaluation procedure with Learning Objectives
(iv) Difference between objective based, objective type test and objective based essay type test

UNIT 3: Tools and Techniques of Assessment and construction of Test

(i) Steps of test construction: planning, preparing, trying out and evaluation
(ii) Principles of construction of objective type test items- matching, multiple choice, completion and true – false
(iii) Principles of construction of essay type test
(iv) Non- standardized tools: Observation schedule, interview schedule, rating scale, check list, portfolio and rubrics.

UNIT 4: Characteristics of a Good Test

(i) Validity-concept, types and methods of validation
(ii) Reliability- concept and methods of estimating reliability
(iii) Objectivity- concept and methods of estimating objectivity
(iv) Usability- concept and factors ensuring usability

PRACTICAL

- Construction of Unit test on a school subject based on blueprint and reporting.

NB: It will be evaluated by both Internal and External examiners.

Text Books

- Aggrawal, J.C. (1997). *Essentials of examination system, evaluation, tests and measurement*. New Delhi: Vikas Publishing House Pvt Ltd.
- Goswami, M. (2011). *Measurement and evaluation in psychology and education*. Hyderabad: Neelkamal Publishers
  Gronlund, N.E. (2003). *Assessment of student Achievement*. Boston: Allyn & Bacon
- Singh, A.K. (2016). *Tests, measurements and research methods in behavioural sciences*. New Delhi: Bharati Bhawan Publishers.

Reference Books

- Anastasi, A.(1976). Psychological testing. New York: Macmillan Publishing Co.
- Anderson, L.W. (2003). Classroom assessment: Enhancing the quality of teacher decision making.
- Banks, S.R. (2005). *Classroom assessment: issues and PRACTICES*. Boston: Allyn & Bacon.
- Blooms, B.S.(1956). *Taxonomy of educational Learning Objectives*. New York: Longman Green and Company
- Cohen, R.J., Swerdlik, M.E., & Phillips, S.M. (1996). *Psychological testing and assessment. an introduction to the tests and measurement*. California: Mayfield Publishing Co.
- Earl, L.M. (2006). *Assessment as learning: using classroom assessment to maximize student learning*. Thousand Oaks, California: Corwin Press
- Hopkins, KD. (1998). *Educational and psychological measurement and evaluation.* Boston: Allyn and Bacon.
- Linn, R.L. & Gronlund, N.E. (2000). *Measurement and assessment in teaching.* London: Merrill Prentice Hall.
- Macmillan, J.H. (1997). *Classroom assessment, principles and practice for effective instruction.* Boston: Allyn and Bacon
- Mohan, R. (2016). *Measurement evaluation and assessment in education*. Delhi: PHI Learning Pvt. Ltd.
- National Council of Educational Research and Training (2006). *Position paper: Examination Reforms.* New Delhi: NCERT
- Noll, N.H. S cannell, D.P. & Craig, RC. (1979). *Introduction to educational measurement.* Boston: Houghton Miffin.

SYLLABUS FOR UNDERGRADUATE COURSE IN HISTORY

(Bachelor of Arts Examination)

UNDER

CHOICE BASED CREDIT SYSTEM

Course Structure of U.G. History Honours

Semester	**Course**	**Course Name**	**Credit**	**Total marks**
Semester-I	AECC-I	AECC-I	4	100
	C 1	History of India-I	6	100
	C 2	Social Formations and Cultural Patterns of the Ancient World	6	100
	GE-I	History of India-I (Early Times to 1750)	6	100
Semester-II	AECC-II	AECC-II	4	100
	C 3	History of India-II	6	100
	C 4	Social Formations and Cultural Patterns of the Medieval World	6	100
	GE-II	History of India – II (1750-1950)	6	100
Semester-III	C 5	History of India-III (c.750-1206)	6	100
	C 6	Rise of Modern West-I	6	100
	C 7	History of India-IV (c.1206-1526)	6	100
	GE-III	Rise of the Modern West – I	6	100
	SEC-I	SEC-I	4	100
Semester-IV	C 8	Rise of Modern West-II	6	100
	C 9	History of India-V (c.1526-1750)	6	100
	C 10	Historical Theories and Methods	6	100
	SEC-II	SEC-II	4	100
	GE-IV	Rise of the Modern West – II	6	100
Semester-V	C 11	History of Modern Europe-I(c.1780-1880)	6	100
	C 12	History of India-VII (1750-1857)	6	100
	DSE-I	History and Culture of Odisha - I	6	100
	DSE-II	History and Culture of Odisha - II	6	100
Semester-VI	C 13	History of India-VIII (C.1857-1950)	6	100
	C 14	History of Modern Europe-II(1880-1939)	6	100
	DSE-III	History and Culture of Odisha- III	6	100

	DSE-IV	Project Report	6	100
		Total	**148**	**2600**

HISTORY

HONOURS PAPERS:

Core course – 14 papers

Discipline Specific Elective – 4 papers
Generic Elective for non History students – 4 papers. In case University offers 2 subjects as GE, then paper 1 and 2 will be the GE papers.

Marks per paper – Mid term: 20 Marks, End term: 80 Marks Total – 100 marks
Credit per paper – 6

Teaching hours per paper – 50 hours (Theory) + 10 hours (Tutorial)

Core Paper I

HISTORY OF INDIA- I

Unit-I: Reconstructing Ancient Indian History

1. Early Indian notions of History
2. Sources of Historical Writings
3. Historical Geography (Major Harappan Sites and Sixteen Mahajanapadas).

Unit-II: Pre-historic Hunter-Gatherers and Food Production

1. Paleolithic Culture: Upper, Middle and Lower; Tool making habit
2. Mesolithic Culture: New developments in Technology and Economy
3. Neolithic and Chalcolithic Settlements
4. Food Production : Beginning of Agriculture

Unit-III: The Harappan Civilization

1. Origins; Settlement Patterns and Town Planning
2. Economic Life: Agriculture, Craft Productions and Trade
3. Social and Political Organization; Religious Beliefs and Practices; Art

Unit-IV: Cultures in Transition

1. Early Vedic Age: Society, Polity, Religion and Literature
2. Later Vedic Age: Social Stratification (Varna and Gender), Polity, Religion, and Culture

Suggested Text Books:

1. R. S. Sharma, Material Culture and Social Formations in Ancient India, 1983.
2. Upinder Singh, A History of Ancient and Early Medieval India.

Reference Reading:

1. Romila Thapar, Early India: From Beginning to 1300 CE, Penguin.
2. A.L. Basham, The Wonder that was India, Vol.1
3. B. Fagan, Digging from the Earth
4. H.D. Sankhalia, Prehistory of India.
5. B.R. Alchin, The Birth of Indian Civilization.

Core Paper II

SOCIAL FORMATIONS AND CULTURAL PATTERNS OF THE ANCIENT WORLD

Unit-I:

1. Evolution of Man
2. Paleolithic Cultures
3. Mesolithic Cultures

Unit-II: Neolithic Culture:

1. Food Production
2. Development of Agriculture
3. Animal Husbandry

Unit-III: Bronze Age Civilizations

1. Egypt
2. Mesopotamia (Sumeria & Babylonia)
3. China (Shang)

Unit-IV: Ancient Greece:

1. Athens and Sparta
2. Politics, Economic
3. Culture

Suggested Text Books:

1. Burns and Ralph. World Civilizations, Vol. A.
2. V. Gordon Childe, What Happened in History?

Reference Reading:

1. G. Clark, World Prehistory: A New Perspective.
2. Bisman Basu, The Story of Man
3. H.Neil & M.C.Willam, A World of History, Oxford, New York, 1907.
4. H.R. Hall, Ancient History of the Near East, 1932.
5. H.S. Baghela, World of Civilization

Core Paper III

HISTORY OF INDIA-II (300BCE-750CE)

Unit-I: Economy and Society (circa 300 BCE to circa CE 300):

1. Expansion of Agrarian Economy: Production relations.
2. Urban growth: Trade & Commerce
3. Social stratification: Class, Varna, Jati, Gender

Unit-II: Changing Political Formations (circa 300 BCE to circa CE 300):

1. The Mauryan Empire: Chandragupta Maurya and Asoka-Conquest and Administration
2. Post-Mauryan Polities: Kushanas, and Satavahanas
3. The Cholas

Unit-III: Towards Early Medieval India [circa CE fourth century to CE 750]:

1. Gupta Age: Agrarian Expansion, Land Grants, Graded Land Rights and Peasantry.
2. Varna, Proliferation of Jatis: changing norms of marriage and property.
3. The Nature of Polities: The Gupta Empire
4. Post- Gupta Polities - Pallavas, Chalukyas, and Vardhanas

Unit-IV: Religion, Culture, Philosophy and Society

1. Consolidation of the Brahmanical Tradition: Dharma, Varnashram, Purusharthas,
2. Buddhism: Hinayan and Mahayana
3. Jainism: It's major Priniples
4. Development of Art and Architecture: Mauryan, and Gupta

Suggested Text Books:

1. D. D. Kosambi, An Introduction to the Study of Indian History, 1975.
2. A. L. Basham, Wonder That Was India, Rupa.

Reference Reading:

1. Romila Thapar, Early India: From the Origins to 1300, 2002.
2. Dharma Kumar and Irfan Habib, Cambridge Economic History of India, vol-I.
3. Romila Thapar, Ancient India.
4. K.M. Ashraf, Life and Condition of the People of Hindustan.
5. D.N. Jha (ed.), Feudal Social Formation in Early India.

Core Paper IV

SOCIAL FORMATIONS AND CULTURAL PATTERNS OF THE MEDIEVAL WORLD

Unit-I: Polity and Economy in Ancient Rome

1. Polity and Empire in Ancient Rome
2. Crises of the Roman Empire-Rise and fall of Julius Caesar
3. Agrarian Economy
4. Urbanization and Trade

Unit-II: Economic Developments in Europe from 7th to 14th Centuries:

1. Agricultural Production
2. Towns and Trade,
3. Feudalism- Origin, Growth and Decline

Unit-III: Religion and Culture in Medieval Europe:

1. Medieval Church,
2. Monastic Communities
3. Papacy

Unit-IV: Societies in Central Islamic Lands:

1. The Tribal background, Rise of Islam; Rise of Sultanates
2. Religious Developments: the Origins of Shariah,

Suggested Text Books:

1. Perry Anderson, Passages from Antiquity to Feudalism.
2. Marc Bloch, Feudal Society, 2 Vols.

Reference Reading:

1. J. Barrawclough, The Medieval Papacy.
2. Cambridge History of Islam, 2 Vol.
3. Will Durant, The Story of Civilization (vols. I & II).
4. T.W. Wallbank & N.M. Bailey, Civilization –Past and Present.
5. R. Coulborne, Feudalism in History.

Core Paper V

HISTORY OF INDIA-III (c. 750 -1206)

Unit –I: Studying Early Medieval India: Political Structures

1. Sources: Literary and Archaeology
2. Evolution of Political structures: Rajputs and Cholas
3. Legitimization of Kingship; Brahmanas and Temples
4. Arab conquest of Sindh: Causes and Impact

Unit-II: Agrarian Structure and Social Change:

1. Agricultural Expansion; Crops
2. Landlords and Peasants
3. Proliferation of Castes
4. Peasantization of Tribes

Unit-III: Trade and Commerce:

1. Inter-regional Trade
2. Maritime Trade and Forms of Exchange
3. Process of Urbanization
4. Merchant Guilds of South India

Unit-IV: Religious and Cultural Developments:

1. Puranic Traditions; Buddhism and Jainism
2. Islamic Intellectual Traditions: Al-Biruni
3. Regional Languages and Literature
4. Art and Architecture: Evolution of Regional styles: Kalingan and Dravidian style of Temple Architecture

Suggested Text Books:

1. B.D. Chattopadhyaya, The Making of Early Medieval India.
2. R.S. Sharma and K.M. Shrimali, (eds), Comprehensive History of India, Vol. IV (A & B).

Reference Reading:

1. Satish Chandra, Medieval India, Vol. I, Har Anand.
2. D. D. Koasambi, The Culture and Civilization of Ancient India: In Historical outline New Delhi; Vikas 1971.5th Print.
3. K. A. Nilakantha Sastri, The Colas, South Indian History.
4. Mittal, Socio-Cultural History of India.
5. R.C.Majumdar (ed) History and Culture of Indian people. Bombay; Bharatiya Vidya Bhavan 1960.Relevant Vol.

Core Paper VI

RISE OF THE MODERN WEST - I

Unit-I: Transition from Feudalism to Capitalism:

1. The problems of Transition: Economic Expansion, Industrial production
2. Trade and Commerce
3. Urban Development, Town Life

Unit-II: Early Colonial Expansion:

1. Motives, Voyages and Explorations.
2. The Conquests of America
3. Mining and Plantation, The African Slaves.

Unit-III: Renaissance and Reformation:

1. Its Social Roots Spread of Humanism in Europe.
2. The Renaissance: Art, Architecture, Sculpture, Painting and Literature
3. Origins and Spread of Reformation Movements.
4. Emergence of European State system: Spain, France, England, Russia

Unit-IV: Economic Developments of the Sixteenth Century:

1. Shift of economic balance from the Mediterranean to the Atlantic.
2. Commercial Revolution- Causes and Nature
3. Growth of Industries and its Impact

Suggested Text Books:

1. Charles A. Nauert, Humanism and the Culture of the Renaissance (1996).
2. Harry Miskimin, The Economy of Later Renaissance Europe: 1460 û1600.

Reference Reading:

1. Meenaxi Phukan, Rise of the Modern West: Social and Economic History of Early Modern Europe.
2. F. Rice, The Foundation of Early Modern Europe.
3. Toynbee, A.J, A Study of History (12 volumes).
4. Maurice Dobb, Transition from Feudalism to Capitalism.
5. Wallbank, T.W. & Bailey, N.M. Civilization: Past and Present.

Core Paper VII

HISTORY OF INDIA IV (c.1206 - 1526)

Unit-I: Sultanate: Political Structures

1. Survey of Sources: (a) Persian Tarikh Tradition, (b) Vernacular Histories; (c) Epigraphy.
2. Consolidation of the Sultanate of Delhi: Balban, Alauddin Khaljis and Mahammad-bin Tughluqs.
3. Theories of kingship: The Ruling Elites: Ulema, Sufis and the Imperial Monuments

Unit-II: Emergence of Regional Identities

1. Bahamanis, Vijayanagar and Odisha.
2. Regional Art, Architecture and Literature in Vijayanagar and Odisha

Unit-III: Society and Economy:

1. Iqta and the Revenue-free Grants.
2. Agricultural production, Technology.
3. Market Regulations, Growth of Urban Centers.
4. Trade and Commerce, Indian Overseas Trade.

Unit-IV: Religion, Society and Culture:

1. Sufi Silsilas: Chishtis and Suhrawardis; doctrines and practices, Social roles
2. Bhakti Movements and Monotheistic Traditions: Kabir, Nanak, Ravidas and Sri Chaitanya.
3. Social Impact of the Bhakti Tradition: Rise of Liberal Thought, Ideology of Equality and Gender Relations

Suggested Text Books:

1. Satish Chandra, Medieval India, Vol. I, Har Anand Publications, New Delhi.
2. J.L. Mehta, An Advanced Study of the History of Mevieval India, Vol.I.

Reference Reading:

1. Irfan Habib, Medieval India: The Study of a Civilization, NBT, New Delhi.
2. ABM Habibullah, The Foundation of Muslim Rule in India.
3. SBP Nigam, Nobility under the Sultans of Delhi.
4. R.P. Tripathy, Some Aspects of Muslim Administration in India.
5. R.S.Sharma, Early Medieval Indian Society: Orient Blackswan 2001.

Core Paper VIII
RISE OF THE MODERN WEST - II

Unit-I: The English Revolution and European Politics in the 18th century:

1. Background: Socio-Economic and Political Crisis in 17th Century Europe.
2. Major Issues-Political and Intellectual Currents;
3. Parliamentary Monarchy;
4. Patterns of Absolutism in Europe

Unit-II: Rise of Modern Science

1. Development of Science from Renaissance to the 17th century
2. Impact of Modern Science on European society

Unit-III: Mercantilism and European Economy

1. Origin and spread of Mercantilism
2. Impact of Mercantilism on European economy
3. Agricultural and Scientific Background to the Industrial Revolution

Unit-IV: The American Revolution

1. Political currents
2. Socio-Economic Issues
3. Significance of the American Revolution

Suggested Text Books:

1. H. Butterfield, The Origins of Modern Science.
2. Meenaxi Phukan, Rise of the Modern West: Social and Economic History of Early Modern Europe.

Reference Reading:

1. Harry Miskimin, The Economy of Later Renaissance Europe: 1460 - 1600.
2. C.A Fisher, History of Modern Europe.
3. F. Rice, The Foundation of Early Modern Europe
4. David Thomson, Europe since Napoleon, Pelican Books, 1985

5. Swain, J.E., A History of World Civilization, Eurasia Publishing House Pvt. Ltd., New Delhi, 1994

Core Paper IX
HISTORY OF INDIA V (c. 1526 - 1750)

Unit-I: Establishment of Mughal Rule:
1. India on the eve of advent of the Mughals
2. Military Technology: Fire Arms,
3. Sher Shah: Administrative and Revenue Reforms

Unit-II: Consolidation of Mughal Rule:
1. Incorporation of Rajputs and other Indigenous Groups in Mughal Nobility
2. Evolution of Administrative Institutions: zabti, mansab, jagir,madad-i-maash
3. Emergence of the Marathas; Shivaji; Expansion under the Peshwas

Unit-III: Society and Economy:
1. Land rights and Revenue system: Zamindars and Peasants
2. Trade Routes and patterns of Internal Commerce; overseas trade
3. Urban Centres, Craft and Technology

Unit-IV: Cultural Ideals:
1. Religious tolerance and sulh-i-kul; Sufi mystical and Intellectual Interventions
2. Art and Architecture
3. Mughal and Rajput Paintings: Themes and Perspectives

Suggested Text Books:
1. J.L. Mehta, An Advanced Study of the History of Mevieval India, Vol.II.
2. Satish Chandra, Medieval India, vol.2, Har Anand Publications, New Delhi.

Reference Reading:
1. Irfan Habib, Agrarian System of Mughal India, 1526-1707.
2. A.B.Pandey, Later Medieval Period.
3. R.P.Tripathi, Rise and Fall of the Mughal Empire
4. S.Nurul Hassan, Thoughts on Agrarian Relations in Mughal India.
5. Ishwari Prasad, Life and Times of Humayun.

Core Paper X
HISTORICAL THEORIES & METHODS

Unit-I: Meaning and Scope of History
1. Definition, Nature and Scope of History.
2. Object and Value of History.
3. History, Science and Morality.

Unit-II: Traditions of Historical Writing
1. Ancient Greek Traditions – Herodotus, Thucydides
2. Ancient Roman Traditions - Polybius, Livy and Tacitus

3. Medieval Understanding: Western – St. Augustine, Arabic – Ibn Khaldun.

Unit-III: History as Interdisciplinary Practice

1. History and Archaeology, History and Anthropology.
2. History and Psychology, History and Literature.
3. History and Political Science

Unit-IV: Historical Methods

1. Sources of History: Written, Oral. Visual & Archaeological.
2. Historical facts.
3. Historical Causation.
4. Historical Objectivity

Suggested Text Books:

1. B. Sheik Ali, History: Its Theory and Method, Macmillan, Reprinted, 1996.
2. E. H. Carr, What is History? , Penguine Books, Reprinted, 1983.

Reference Reading:

1. E. Sreedharan, A Text Book of Historiography, Orient Longman, Reprinted, 2004.
2. Marc Bloch, The Historians Craft.
3. R.G. Collingwood, The Idea of History
4. G.T.Reiner, History: Its Purpose and Method.
5. K.Rajayyan, History: it's Theory & Method

Core Paper XI
History of Modern Europe- I (c. 1780-1880)

Unit-I: The French Revolution (1789):

1. Socio, Religious, Economic and Political Conditions
2. Intellectual Currents.
3. Role of the Middle Classes

Unit-II: Revolution and its European Repercussions:

1. National Constituent Assembly
2. National Legislative Assembly
3. Napoleonic Consolidation- Reform and Empire

Unit-III: Restoration and Revolution: c. 1815 - 1848

1. Congress of Vienna Restoration of old Hierarchies
2. Revolutionary and Radical Movements-
    A) July Revolution (1830) and
    B) February Revolution (1848)

Unit-IV: Socio-Economic Transformation and Remaking of States (Late 18th Century to Late 19th Century)

1. Process of Capitalist Development: Agrarian and Industrial Revolutions in England and German States.
2. Evolution of Social Classes: Land Owners, Peasantry: Bourgeoisie and Proletariat

3. Popular Movements and the Formation of National Identities in Germany and Italy, Ireland

Suggested Text Books:

1. T.S. Hamerow, Restoration, Revolution and Reaction: Economics and Politics in Germany [1815 - 1871].
2. Anthony Wood, History of Europe, 1815 to 1960 (1983).

Reference Reading:

1. E.J. Hobsbawm, Nations and Nationalism.
2. A .Wesley Rohem, The Record of Mankind, Health and Company, Boston, 1952.
3. CMD Ketelbey, History of Modern Times since 1789, OUP, 2009.
4. David Thomson, Europe since Napoleon, Pelican Books, 1985.
5. Edward Mac Nall Burns et al, World Civilizations, vols. A,B,C,Goyal Saab, New Delhi.

Core Paper XII
HISTORY OF INDIA VII (c. 1750 - 1857)

Unit-I: Expansion and Consolidation of Colonial Power:

1. Foreign Trade and Early forms of Economic Exploitations in Bengal
2. Dynamics of Expansion, with special reference to Bengal, Mysore and Odisha

Unit-II: Colonial State and Ideology:

1. Arms of the Colonial state: army, Police, Law.
2. Imperial Ideology: Orientalism and Utilitarianism
3. Education: Indigenous and Modern.

Unit-III: Economy and Society:

1. Land revenue systems- Permanet, Ryotwari and Mahalwari.
2. Commercialization of Agriculture- Consequences
3. Drain of Wealth- Causes and Consequences
4. Growth of Modern Industry

Unit-IV: Popular Resistance:

1. Santhal Uprising (1856-57)
2. Indigo Rebellion (1860)
3. Movement of 1857- Causes and Consequences

Suggested Text Books:

1. Dharma Kumar and Tapan Raychaudhuri, (ed.)., The Cambridge Economic History of India, Vol. II.
2. Bipan Chandra, K.N. Panikkar, Mridula Mukherjee, Sucheta Mahajan and Aditya Mukherjee, India’s Struggle for Independence.

Reference Reading:

1. Sumit Sarkar, Modern India (1885-1947), Mac Milan.
2. A.R.Desai, Social Background of Indian Nationalism
3. R. Vlyanovsky, Agrarian India between the World Wars.
4. Sekhar Bondhapadhaya, From Plessey to Partition.
5. G.Kaushal, Economic History of India, 1757-1956

Core Paper XIII

C.C. XIII: HISTORY OF INDIA VIII (c. 1857 - 1950)

Unit-I: Cultural Changes, Socio and Religious Reform Movements:

1. The advent of Printing and its Implications
2. Reform and Revival: Brahmo Samaj, Arya Samaj, Aligarh Movement.
3. Emancipation of Women, Sanskritization and Anti-Caste Movements

Unit-II: Nationalism: Trends up to 1919:

1. Political Ideology and Organizations, Formation of INC
2. Moderates and Extremists.
3. Swedish Movement
4. Revolutionaries

Unit-III: Gandhian Nationalism after 1919: Ideas and Movements:

1. Mahatma Gandhi: His Perspectives and Methods
2. Non- Cooperation, Civil Disobedience, Quit India,
3. Subhas Chandra Bose and INA
4. Nationalism and Social Groups: Peasants, Tribes, Dalits and Women

Unit-IV: Communalism and Partition:

1. Ideologies and Practices, Muslim League
2. Hindu Maha Sabha
3. Partition and Independence
4. Making of the Constitution

Suggested Text Books:

1. Sumit Sarkar, Modern India, 1885-1947.
2. Bipan Chandra, K.N. Panikkar, Mridula Mukherjee, Sucheta Mahajan and Aditya Mukherjee, India’s, Struggle for Independence, Penguin

Reference Reading:

1. Sekhar Bandopadhyaya, From Plessey to Partition
2. N.S. Bose, Indian Awakening and Bengal
3. A. R. Desai, Social Background of Indian Nationalism, Popular, Bombay.
4. S.Gopal, British Policy in India, 1858-1905.
5. Bipan Chandra, Indian National Movement.

Core Paper XIV

HISTORY OF MODERN EUROPE II (c. 1880 - 1939)

Unit-I: Liberal Democracy, Working Class Movements and Socialism in the 19th and 20th Centuries:

1. The Struggle for Parliamentary Democracy and Civil Liberties in Britain.
2. Forms of Protest during early Capitalism: Food Riots in France and England: Luddites and Chartism.
3. Early Socialist Thought; Marxian Socialism

Unit-II: The Crisis of Feudalism in Russia and Experiments in Socialism:

1. Emancipation of Serfs
2. Revolutions of 1905; the Bolshevik Revolution of 1917.
3. Programme of Socialist Construction.

Unit-III: Imperialism, War, and Crisis: c. 1880-1939:

1. Growth of Militarism; Power Blocks and Alliances: Expansion of European Empires –First World War (1914 – 1918)
2. Fascism and Nazism.
3. The Spanish Civil War.
4. Origins of the Second World War.

Unit-IV: Intellectual Developments since circa 1850: Major Intellectual Trends:

1. Mass Education and Extension of Literacy.
2. Institutionalization of Disciplines: History, Sociology and Anthropology.
3. Darwin and Freud.

Suggested Text Books:

1. C.M. Cipolla, Fontana Economic History of Europe, Volume II the Present (1981). I : The Industrial Revolution.
2. T.S. Hamerow, Restoration, Revolution and Reaction: Economics and Politics in Germany [1815 - 1871].

Reference Reading:

1. George Lichtheim, A Short History of Socialism.
2. K.B. Keswani, International Relations in Modern World (1990-1995).
3. C.D.M. Ketelby, A History of Modern Times.
4. Carr.E.H., International Relations between the Two World Wars, 1919-1939, New York, 1966.
5. Garden Green Wood, The Modern World –A History of Our Times.

Discipline Specific Elective Paper-1

History and Culture of Odisha - I

Units: I

1.Historical Geography: Kalinga, Utkal, Kosal
2.Kalinga War (261 B.C.) and its Significance.
3.Kharavela –Career and Achievements

Unit: II

1.Matharas and Eastern Gangas and Sailodbhavas
2.Bhaumakaras
3.Somavamsis

Unit: III

1.Imperial Gangas
2.Suryavamsi Gajapatis
3.Post- Gajapati Political developments upto 1568.

Unit: IV

1.Social and Cultural Life in Early and Medieval Odisha
2.Growth and Decay of Urban Centres
3.Trade and Commerce
4.Taxation and Land Revenue

Suggested Text Books:

1.K.C. Panigrahi, History of Odisha, Kitab Mahal.

2. Sahu, Mishra & Sahu, History of Odisha.

Reference Reading:

1.S.K. Panda, Political and Cultural History of Odisha.
2.A. C Pradhan, A Study of History of Orissa
3.B.K. Mallik, etal (eds) Odia Identity, Page Maker Publications, Bhubaneswar, 2019.
4.R. D Banarjee, History of Orissa, 2 vols.
5.M.N. Das(ed), Sidelights on History and Culture of Orissa, Vidyapuri, Cuttack, 1977

Discipline Specific Elective Paper-II

History and Culture of Odisha -II

Units: I

1. Afghan Conquest and Mughal Rule in Odisha- Administration
2. Maratha rule in Odisha – Administration
3. British Occupation and Early Colonial Administration: Land Revenue, Salt Policy, Jail and Police Administration.

Unit: II

1. Resistance Movements: Ghumsar Rebellion, Paik rebellion, Revolt of 1857 and Surendra Sai, Keonjhar Uprisings.
2. Famine of 1866 – Causes and Consequences
3. Growth of Education and Language Movement

Unit: III

1. Growth of Nationalism
2. Formation of Separate Province of Orissa.
3. Prajamandal Movement

Unit: IV

1.Nationalist Politics in Odisha
2.Quit India Movement
3.Merger of Princely States

Suggested Text Books:

1. P.K. Mishra & J.K. Samal, A Comprehensive History and Culture of Orissa- Vol. I & II.
2. A. C. Pradhan, Sidelights on Freedom Struggle in Orissa.

Reference Reading:

1. K.M. Patra, Freedom Struggle in Odisha.
2. J.K.Samal, Orissa under the British Crown.
3. K.M.Patra, Orissa State Legislature & Freedom Struggle.
4. B.C. Ray, Orissa under the Mughals, Punthi Pustak.
5. B.C. Ray, Orissa under the Marathas, Punthi Pustak.

Discipline Specific Elective Paper-III

History and Culture of Odisha - III

Unit: I

1. Buddhism in Odisha
2. Jainism in Odisha
3. Saivism in Odisha

Unit: II

1. Saktism and Tantricism in Odisha
2. Growth of Vaishnavism in Odisha and Cult of Jagannath
3. Growth of Odia Literature : Sarala Mahabharata
4. Pancha-Sakha Literature

Unit: III

1. Buddhist Art and Architecture
2. Jaina Art
3. Evolution of Temple Architecture -Parsurameswar, Mukteswar, Lingaraja, Jagannath and Konarka

Unit: IV

1. Christian Missionaries – Education and Health
2. Mahima Movement and its Impact
3. Neo-Hindu Movements – Brahmo, Arya Samaj.

Suggested Text Books:

1. A.C. Pradhan, A Study of the History of Odisha, Panchasheel.
2. B.K. Mallik, Paradigm of Dissent and Protest :- Social Movements in Eastern India (1400-1700 AD)

Reference Reading:

1. K.S. Behera, Temples of Orissa.
2. P.K. Mishra(ed), Comprehensive History and Culture of Orissa, Vol-I Pt. II.
3. N.K. Bose, Canons of Orissan Architecture
4. M.N. Das (ed), Sidelights on History and Culture of Orissa.

5. N.K. Sahu, Buddhism in Orissa.

Discipline Specific Elective Paper-IV (Optional/Project)

History of Contemporary Odisha (1947-1980)

Unit I: Political Developments

1. Second Congress Ministry (1946-1950):

a) Integration of Princely States with Odisha
b) New Capital
c) Hirakud Dam Project

2. Years of Uncertainties (1950-1980)

a) Third Congress Ministry and Abolition of Zamindary System
b) Biju Patnaik's First Ministry Achievements

Unit II: United Political Initiatives

1. Coalition Politics-Achievements and Challenges

  a) R.N. Singdeo,
  b) Sadasiba Tripathy

2. Panchayati Raj Institutions-Its Working and Impacts.

  a) Rural Stages
b) Urban Stages

Unit III: Economic Development

a) Growth of Industries- Roulkela Steel Plant and Odisha Sponge Iron Ltd.
b) Irrigation and Agricultural Infrastructure
c) Development in Transport and State communication- National and State High Ways in Odisha

Unit IV: Social Developments and Problems

a) Government Community Development Programmes- Its Impact
b) Peasant Movements: Causes and Effects
c) Growth of Art and Craft: Raghunathpur, Pipli and Bargarh

Suggested Text Books:

1. Hemant K. Mohapatra, Odisara Etihasha (Odia), Friends Publishers, Cuttack, 2019.
2. Sukadeva Nanda, Coalition Politics in Odisha, Sterling Publishers, Delhi.

Reference Reading:

1. Sunit Ghosh, Orissa in Turmoil: A Study in Political Developments, Bookland International, Bhubaneswar, 1991.
2. Basant Das, Odisha Rajanitira Gopan Katha (Odia), Anusandhan Publication, Bhubaneswar, 2001.
3. B.B. Jena & J.K. Baral (eds), Government and Politics in Orissa, Print House (India), Lucknow, 1988.
4. Chittaranjan Das, Nabakrushna Chaudhury, NBT, New Delhi.
5. Dasarathi Bhuyan, Orissa Politics: From 1936 to Contemporary Politics, Mangalam Publishers, New Delhi, 2010.

OR

Project Report

The Students may be allotted topics of their interest in the beginning of 5th Semester Classes. They may write the Project Reports on local History and Culture, local personalities with their significant contribution to change the Society and economy with historical perspective containing up to 50 double spaced typed pages. The students may consult the sources like local archaeology, manuscripts, community documents, oral traditions, oral narratives, local biographies and family sources for writing the project dissertation. The Teachers will guide the students to complete their Project assignments. The students may be allowed to fill up their forms after their submission of the projects assigned to them. The student has to secure fifty percent of marks from the evaluation of the project and fifty percent of the marks in the viva voce test which are compulsory.

Generic Elective Paper I
History of India - I (Early Times to 1750)

Unit – I : Reconstructing Ancient Indian History

1. Sources of Historical Writings.
2. Vedic Age : Society, Polity and Culture
3. Buddhism and Jainism : Principles and Impact

Unit – II : Polity and Administration

1. The Mauryan Empire : Conquest and Administration
2. Gupta Society : Land Grants, Peasantry and beginning of Feudal Society
3. Gupta Polity : Conquests and Administration
4. Harshavardhan : Achievements

Unit – III: Early Medieval Society, Economy and Culture

1. Post Gupta Trade and Commerce
2. Delhi Sultanate : Conquests and Administration
3. Bhakti and Sufi Movements in India
4. Development of Regional Language and Literature

Unit – IV: India on the Eve of the Advent of the Mughals

1. Sher Shah : Administration and Reforms
2. Mughal Administrative Institutions : Zabti, Mansab and Jagir
3. Religious Tolerance Sulh-i- Kul
4. Mughal Art and Architecture

Suggested Text Books:

1. Upinder Singh, History of Ancient & Early Medieval India.

2. Romila Thappar, The Early India

Reference Reading:

1. Irfan Habib, Medieval India, NBT, New Delhi
2. R.S. Sharma, India's Ancient Past
3. S.A.A. Rizri, Wonder that was India, Vol.II, Rupa
4. Cultural Heritage of India, Bharatiya Vidyabhaban Series, Vol-1-IV
5. A.L. Basheon (ed), Cultural History of India, OUP, New Delhi, 2011

Generic Elective Paper II

History of India - II (1750-1950)

Unit – I Foundation and Expansion of British Rule_

1. Battle of Plessey (1757) and Conquest of Bengal
2. Conquest of Mysore and Maharashtra
3. Expansion through Diplomacy : Subsidiary Alliance and Doctrine of Lapse

Unit – II Consolidation of British Rule and Indian Responses

1. Peasant & Tribal Resistance against British Rule: Sanyasi Reballion (1763); Kondh Rebellion in Ghumusar, Santal Rebellion
2. Revolt of 1857 : Nature and Significance
3. Land Revenue Settlements : Permanent Settlement, Ryotwari and Mahalwari Settlement

Unit – III – Social and Cultural Policies

1. Socio-Religious Reform Movements: Brahmo Samaj, Arya Samaj, Theosophical Society, Aligarh Movement.
2. Growth of Press and Education
3. Issues of Caste and Gender : Jyotiba Phule- Women Question and Issues, Depressed Class.

Unit – IV – Indian National Movement

1. Politics of Moderates and Extremists (1885-1920)
2. Gandhian Mass Movements (Non-Cooperation, Civil Disobedience and Quit India Movements), (1920-1940)
3. Communal Politics and Partition
4. Making of the Democratic Constitution

Suggested Text Books:

1. A.R. Desai, Social Background of Indian Nationalism, Popular, Mumbai

2. Priyadarshi Kar, Comprehensive History of Modern India.

Reference Reading:

1. Sumit Sarkar, Modern India : 1885-1947, Mac Millon.
2. B.R.Mani, Debrahminising History: Dominance and Resistance in Indian Society, Manohar, New Delhi, First Published 2005.
3. Chandra Bharil, Social and Political Ideas of B.R. Ambedkar, Aalekh Publishers, Jaipur, 1977.

4. Sumit Sarkar, Modern India (1885-1947), Mac Millan, Delhi, First Published 1983.
5. Hirendra N.Mukherjee, Gandhi, Ambedkar and the Extirpation of Untouchablility, PPT, New Delhi.

Generic Elective Paper III

RISE OF THE MODERN WEST - I

Unit-I: Transition from Feudalism to Capitalism

1. The problems of Transition: Economic Expansion, Industrial production
2. Trade and Commerce
3. Urban Development, Town Life

Unit-II: Early Colonial Expansion

1. Motives, Voyages and Explorations.
2. The Conquests of America
3. Mining and Plantation, The African Slaves.

Unit-III: Renaissance and Reformation

1. Its Social Roots Spread of Humanism in Europe.
2. The Renaissance: Art, Architecture, Sculpture, Painting and Literature
3. Origins and Spread of Reformation Movements.
4. Emergence of European State system: Spain, France, England, Russia

Unit-IV: Economic Developments of the Sixteenth Century

1. Shift of economic balance from the Mediterranean to the Atlantic.
2. Commercial Revolution- Causes and Nature
3. Growth of Industries and its Impact

Suggested Text Books:

1. Charles A. Nauert, Humanism and the Culture of the Renaissance (1996).
2. Harry Miskimin, The Economy of Later Renaissance Europe: 1460 û1600.

Reference Reading:

1. Meenaxi Phukan, Rise of the Modern West: Social and Economic History of Early Modern Europe.
2. F. Rice, The Foundation of Early Modern Europe.
3. Toynbee, A.J, A Study of History (12 volumes).
4. Maurice Dobb, Transition from Feudalism to Capitalism.
5. Wallbank, T.W. & Bailey, N.M. Civilization: Past and Present.

Generic Elective Paper IV

G.E. IV: RISE OF THE MODERN WEST - II

Unit-I: The English Revolution and European Politics in the 18th century

1. Background: Socio-Economic and Political Crisis in 17th Century Europe.
2. Major Issues-Political and Intellectual Currents;
3. Parliamentary Monarchy;

1. Patterns of Absolutism in Europe

Unit-II: Rise of Modern Science

1. Development of Science from Renaissance to the 17th century
2. Impact of Modern Science on European society

Unit-III: Mercantilism and European Economics

1. Origin and spread of Mercantilism
2. Impact of Mercantilism on European economy
3. Agricultural and Scientific Background to the Industrial Revolution

Unit-IV: The American Revolution

1. Political currents
2. Socio-Economic Issues
3. Significance of the American Revolution

Suggested Text Books:

1. H. Butterfield, The Origins of Modern Science.
2. Meenaxi Phukan, Rise of the Modern West: Social and Economic History of Early Modern Europe.

Reference Reading:

1. Harry Miskimin, The Economy of Later Renaissance Europe: 1460 - 1600.
2. C.A Fisher, History of Modern Europe.
3. F. Rice, The Foundation of Early Modern Europe
4. David Thomson, Europe since Napoleon, Pelican Books, 1985
5. Swain, J.E., A History of World Civilization, Eurasia Publishing House Pvt. Ltd., New Delhi, 1994

HISTORY Papers for PASS students

Discipline Specific Core – 4 papers

Discipline Specific Elective – 2 papers

Marks per paper – Mid term: 20 Marks, End term: 80 marks; Total – 100 marks

Credit per paper – 6

Teaching hours per paper – 40 hours (theory) + 20 hours (tutorial)

Course Structure of U.G. History Pass				
Semester	**Course Opted**	**Course Name**	**Credit**	**Total Marks**
I	DSC I	History of India from c. 300 to 1206	6	100
II	DSC II	History of India from c. 300 to 1206	6	100
III	DSC III	History of India from c. 1206-1707	6	100
IV	DSC IV	History of India from c. 1707-1950	6	100
V	DSE I	Society and Economy of Modern Europe (c. 15th to 18th Century)	6	100
VI	DSE II	Some Aspects of European History (1780-1945)	6	100
		Total:	36	600

Discipline Specific Core Paper I

History of India From Earliest Times up to 300 CE

Unit I:

1. A broad survey of Paleolithic, Mesolithic and Neolithic Cultures.
2. Harappan Civilization: Origin, Extent, dominant features &decline.
3. The Vedic Period: Polity, Society, Economy and Religion.

Unit II:

1. Territorial States and the rise of Magadha:
    a) Conditions for the rise of Mahajanapadas
    b) The Causes of Magadha's success
2. Alexander's Invasion and impact
3. Jainism and Buddhism: Causes, Doctrines, Spread, Decline and Contributions

Unit III:

1. The Satavahanas Phase; Aspects of Political History, Material Culture, Administration, Religion
2. Emergence and Growth of Mauryan Empire;
    a) State
    b) Administration
    c) Economy
    d) Ashoka's Dhamma
    e) Art & Architecture

Unit IV:

1. The Sangam Age: Sangam Literature, Polity, Society & Culture
2. The Kushanas: Aspects of Polity, Society, & Religion.

Suggested Text Books:

1. Basham, A.L. The Wonder that was India
2. Thapar, Romila, History of Early India

Reference Reading:

1. Allchin, F.R. and B., Origins of a Civilization: The Prehistory and Early Archaeology of South Asia
2. Sastri, K.A.N., A History of South India
3. Sharma, R.S., Aspects of Political Ideas and Institutions in Ancient India (1991 edn.)
4. Agrawal, D.P. The Archaeology of India
5. Chakrabarti, D.K. Archaeology of Ancient Indian Cities

Discipline Specific Core Paper II

History of India From. C.300 to1206

Unit I:

1. The Rise & Growth of the Guptas: Administration, Society, Economy, Religion, Art, Literature, and Science & Technology.

Unit II:

1. Harsha & His Times: Harsha’s Kingdom, Administration, Buddhism & its spread
2. The Cholas and Pandyas: Polity, Society, and Economy & Culture

Unit III:

1. Towards the Early Medieval: Changes in Society, Polity Economy and Culture with reference to the Pallavas, & Chalukayas

Unit IV

1. Arabs in Sindh: Polity, Religion &Society.
2. Struggle for power in Northern India & Establishment of Sultanate: Mahmud of Ghazani, Muhammad of Ghor.

Suggested Text Books:

1. R. S. Sharma: Indian Feudalism-India’s Ancient Past
2. B. D. Chattopadhaya: Making of Early Medieval India

Reference Reading:

1. Derryl N. Maclean: Religion and Society in Arab Sindh
2. K. M. Ashraf: Life and Conditions of the People of Hindustan
3. M. Habib and K.A. Nizami: A Comprehensive History of IndiaVol.V
4. Tapan Ray Chaudhary and Irfan Habib (ed.) : The Cambridge Economic History of India, Vol.I
5. Satish Chandra: A History of Medieval India, 2 Volumes

Discipline Specific Core Paper III

History of India From 1206 to 1707

Unit I:

1. Foundation, Expansion &consolidation of the Delhi Sultanate: Iltutmish & Balban
2. Miltary, administrative &economic reforms under the Khiljis &the Tughlaqs: Alauddin Khilji & Mahammud-bin-Tughlaq

Unit II:

1. Bhakti &Sufi Movements.
2. Emergence and consolidation of Mughal State: Babur and Akbar

Unit III:

1. Akbar to Aurangzeb: administrative structure-Mansab & Jagirs, State &Religious policies.
2. Economy, Society &Culture under the Mughals.

Unit IV:

1. Emergence of Maratha Power: Shivaji, Conquest & Administration.

Suggested Text Books:

1. Satish Chandra: A History of Medieval India, 2 Volumes
2. J.L. Meheta, An Advanced History of Medieval India.

Reference Reading:

1. S.A.A.Rizvi: Muslim Revivalist Movements in Northern India during 16th and 17th Centuries
2. R.P. Tripathi: The Rise and Fall of the Mughal Empire, 2 vol.
3. I. H. Siddiqui: Some Aspects of Afghan Despotism
4. Kesvan Veluthat: Political Structure of Early Medieval South India
5. Stewart Gordon, : The Marathas 1600-1818

Discipline Specific Core Paper IV

History of India; 1707-1950

Unit I:

1. Political condition of India and Advent of European Trading Companies.
2. Expansion & consolidation of Colonial Power up to 1857: Anglo-French Rivalry, Battle of Plassey & Buxar, Subsidiary Alliance & Doctrine of Lapse.

Unit II:

1. Revolt of 1857: Causes, Nature &Aftermath.
2. Colonial economy: Agriculture, Trade & Industry- Permanent Settlement, Ruin of Indigenous Industries & Monopoly of Trade

Unit III:

1. Socio-Religious Movements in the 19th century: Raja Rammohan Ray, Dayananda Saraswati, Ramakrishna Paramahans, Swami Vivekananada & Theosophical Society.
2. Emergence & Growth of Nationalism: Causes, Swadeshi Movement, Non-cooperation Movement, Civil Disobedience Movement & Quit India Movement

Unit IV:

1. Communalism: Origin, Growth and partition of India.
2. Advent of Freedom: Constituent Assembly, establishment of Republic & Salient Features of Indian Constitution.

Suggested Text Books:

1. Sugata Bose and Ayesha Jalal: Modern South Asia: History, Culture, Political Economy, New Delhi, 1998
2. Sekhar Bandyopadhyay: From Plassey to Partition

Reference Reading:

1. Sumit Sarkar: Modern India 1885 to 1947, Mamillan, 1983
2. Bipan Chandra: Modern India, Orient Blackswan.
3. Bipan Chandra: India's Struggle for Idependence
4. R.P. Dutt: India Today.
5. K.G. Subramanian: The Living Tradition: Perspectives on Modern Indian Art

Discipline Specific Elective Paper I

Society & Economy of Modern Europe: 15th – 18th Century

Unit I:

1. Feudalism: Origin, Growth & Decline

Unit II:

1. Renaissance: Origin, Spread & its Impact
2. European Reformation: Origin, nature & Impact

Unit III:

1. Geographical Discovery
2. Beginning of Colonization and Economic Exploitation

Unit IV:

1. Growth of Capitalism; Industrial Revolution- Causes and Consequences

Suggested Text Books:

1. J H Plumb, The Pelican Book of the Renaissance, Penguin,1982
2. G. R. Elton, Reformation Europe 1517,1559, Wiley, 1999

Reference Reading:

1. Ralph Davis, The Rise of the Atlantic Economies, New York,1973
2. Arvind Sinha, Europe in Transition, Delhi, 2010
3. Rodney Hilton, The Transition from Feudalism to Capitalism, Delhi, 2006.
4. Fernand Braudel, Civilization and Capitalism, Vols. I, II, III, California, 1992
5. Butterfield, Herbert, The origins of modern science. Vol. 90507. Free Press, 1997

Discipline Specific Elective Paper II

Some Aspects of European History: C. 1780-1945

Unit I:

1. The French Revolution: Causes, Nature & Consequences
2. Napoleonic Era: First Consul, Achievements & Downfall.

Unit II:

1. Revolutions of 1830 & 1848: Causes & Effects.
2. Unification of Italy &Germany.

Unit III:

1. Imperialist Conflicts: First World War-Causes and Consequences.
2. League of Nations

Unit IV:

1. Rise of Fascism in Italy and Nazism in Germany.
2. Second World War-Causes and Consequences.

Suggested Text Books:

1. E.J. Hobsbawm: The Age of Revolution.

2. Lynn Hunt: Politics, Culture and Class in the French Revolution.

Reference Reading:

1. Andrew Porter: European Imperialism, 18760 -1914 (1994).
2. E.J. Hobsbawm: The Age of Extremes, 1914 - 1991, New York: Vintage, 1996
3. Carter V. Findley and John Rothey: Twentieth-Century World, Boston: Houghton-Mifflin, 5th ed. 2003
4. David Thomson, Europe Since Napaleon.

STATE MODEL SYLLABUS FOR UNDER GRADUATE
COURSE IN MATHEMATICS
(Bachelor of Science Examination)

UNDER
CHOICE BASED CREDIT SYSTEM

Preamble

Mathematics is an indispensable tool for much of science and engineering. It provides the basic language for understanding the world and lends precision to scientific thought. The mathematics program at Universities of Odisha aims to provide a foundation for pursuing research in Mathematics as well as to provide essential quantitative skills to those interested in related fields. With the maturing of the Indian industry, there is a large demand for people with strong analytical skills and broad-based background in the mathematical sciences.

COURSE STRUCTURE FOR MATHEMATICS HONORS

Semester	Course	Course Name	Credits
I	AECC-I	AECC-I	04
	C-I C-I	Calculus Practical	04 02
	C-II C-II	Discrete Mathematics Tutorial	05 01
	GE-I GE-I	GE-I Tutorial	05 01
			22
II	AECC-II	AECC-II	04
	C-III C-III	Real Analysis Tutorial	05 01
	C-IV C-IV	Differential equations Practical	04 02
	GE-II GE-II	GE-II Tutorial	05 01
			22
III	C-V C-V	Theory of Real functions Tutorial	05 01
	C-VI C-VI	Group Theory-I Tutorial	05 01
	C-VII C-VII	Partial differential equations and system of ODEs Practical	04 02
	GE-III GE-III	GE-III Tutorial	05 01
	SECC-I	SECC-I	04

			28
IV	C-VIII C-VIII	Numerical Methods and Scientific Computing Practical	04 02
	C-IX C-IX	Topology of Metric spaces Tutorial	05 01
	C-X C-X	Ring Theory Tutorial	05 01
	GE-IV GE-IV	GE-IV (Theory) Tutorial	05 01
	SECC-II	SECC-II	04
			28
Semester	Course	Course Name	Credits
V	C-XI C-XI	Multivariable Calculus Tutorial	05 01
	C-XII C-XII	Linear Algebra Tutorial	05 01
	DSE-I DSE-I	Linear Programming Tutorial	05 01
	DSE-II DSE-II	Probability and Statistics Tutorial	05 01
			24
VI	C-XIII C-XIII	Complex analysis Tutorial	05 01
	C-XIV C-XIV	Group Theory-II Tutorial	05 01
	DSE-III DSE-III	Differential Geometry Tutorial	05 01
	DSE-IV	Number Theory/Project	06
			24
		TOTAL	**148**

B.A./B.SC.(HONOURS)-MATHEMATICS

HONOURS PAPERS:

Core course – 14 papers

Discipline Specific Elective – 4 papers (out of the 5 papers suggested)

Generic Elective for non Mathematics students – 4 papers. Incase University offers 2 subjects as GE, then papers 1 and 2 will be the GE paper.

Marks per paper –

For practical paper: Mid term : 15 marks, End term : 60 marks, Practical- 25 marks

For non practical paper: Mid term : 20 marks, End term : 80 marks

Total – 100 marks Credit per paper – 6

Teaching hours per paper –

Practical paper-40 hours theory classes + 20 hours Practical classes

Non Practical paper-50 hours theory classes + 10 hours tutorial

CORE PAPER-1
CALCULUS

Objective: The main emphasis of this course is to equip the student with necessary analytic and technical skills to handle problems of mathematical nature as well as practical problems. More precisely, main target of this course is to explore the different tools for higher order derivatives, to plot the various curves and to solve the problems associated with differentiation and integration of vector functions.

Expected Outcomes: After completing the course, students are expected to be able to use Leibnitz's rule to evaluate derivatives of higher order, able to study the geometry of various types of functions, evaluate the area, volume using the techniques of integrations, able to identify the difference between scalar and vector, acquired knowledge on some the basic properties of vector functions.

UNIT-I

Hyperbolic functions, higher order derivatives, Leibnitz rule and its applications to problems of the type $e^{ax+b} sinx, e^{ax+b} cosx, (ax+b)^n sinx, (ax+b)^n cosx$, concavity and inflection points, asymptotes, curve tracing in Cartesian coordinates, tracing in polar coordinates of standard curves, L' Hospitals rule, Application in business ,economics and life sciences.

UNIT-II

Riemann integration as a limit of sum, integration by parts, Reduction formulae, derivations and illustrations of reduction formulae of the type $\int \sin^n xdx, \int \cos^n xdx, \int \tan^n xdx, \int sec^n xdx, \int (logx)^n dx, \int \sin^n x \cos^n xdx,$

definite integral, integration by substitution.

UNIT-III

Volumes by slicing, disks and washers methods, volumes by cylindrical shells, parametric equations, parameterizing a curve, arc length, arc length of parametric curves, area of surface of revolution, techniques of sketching conics, reflection properties of conics, rotation of axes and second degree equations, classification into conics using the discriminant, polar equations of conics.

UNIT-IV

Triple product, introduction to vector functions, operations with vector-valued functions, limits and continuity of vector functions, differentiation and integration of vector functions, tangent and normal components of acceleration.

LIST OF PRACTICALS

(Using any software/ MATLAB to be performed on a Computer.)

1. Plotting the graphs of the functions $e^{ax+b}, \log(ax+b), 1/ax+b, \sin(ax+b), \cos\ (ax+b)$ and $|ax+b|$ to illustrate the effect of a and b on the graph.
2. Plotting the graphs of the polynomial of degree 4 and 5.
3. Sketching parametric curves (E.g. Trochoid, cycloid, hypocycloid).
4. Obtaining surface of revolution of curves.
5. Tracing of conics in Cartesian coordinates /polar coordinates.
6. Sketching ellipsoid, hyperboloid of one and two sheets (using Cartesian co-ordinates).

BOOKS RECOMMENDED:

1. H. Anton, I. Bivens and S. Davis, *Calculus*, 10thEd.,John Wiley and Sons (Asia)P. Ltd., Singapore, 2002.
2. Shanti Narayan, P. K. Mittal, Differential Calculus, S. Chand, 2014.
3. Shanti Narayan, P. K. Mittal, Integral Calculus, S. Chand, 2014.

BOOKS FOR REFERNCE:

1. James Stewart, Single Variable Calculus, Early Transcendentals, Cengage Learning, 2016.
2. G.B. Thomas and R.L. Finney, *Calculus*, 9th Ed., Pearson Education, Delhi,2005.

CORE PAPER-II

DISCRETE MATHEMATICS

Objective: This is a preliminary course for the basic courses in mathematics and all its applications. The objective is to acquaint students with basic counting principles, set theory and logic, matrix theory and graph theory.

Expected Outcomes: The acquired knowledge will help students in simple mathematical modeling. They can study advance courses in mathematical modeling, computer science, statistics, physics, chemistry etc.

UNIT-I

Sets, relations, Equivalence relations, partial ordering, well ordering, axiom of choice, Zorn's lemma, Functions, cardinals and ordinals, countable and uncountable sets, statements, compound statements, proofs in Mathematics, Truth tables, Algebra of propositions, logical arguments, Well-ordering property of positive integers, Division algorithm, Divisibility and Euclidean algorithm, Congruence relation between integers, modular arithmetic, Chinese remainder theorem, Fermat's little theorem.

UNIT-II

Principles of Mathematical Induction, pigeonhole principle, principle of inclusion and exclusion Fundamental Theorem of Arithmetic, permutation combination circular permutations binomial and multinomial theorem, Recurrence relations, generating functions, generating function from recurrence relations.

UNIT-III

Matrices, algebra of matrices, determinants, fundamental properties, minors and cofactors, product of determinant, adjoint and inverse of a matrix, Rank and nullity of a matrix, Systems of linear equations, row reduction and echelon forms, solution sets of linear systems, applications of linear systems, Eigen values, Eigen vectors of a matrix.

UNIT-IV

Graph terminology, types of graphs, sub-graphs, isomorphic graphs, Adjacency and incidence matrices, Paths, Cycles and connectivity, Eulerian and Hamiltonian paths, Planar graphs.

BOOKS RECOMMENDED:

1. Edgar G. Goodaire and Michael M. Parmenter, Discrete Mathematics with Graph Theory, 3rd Ed., Pearson Education (Singapore) P. Ltd., Indian Reprint, 2005.
2. Kenneth Rosen Discrete mathematics and its applications Mc Graw Hill Education 7th edition.
3. V Krishna Murthy, V. P. Mainra, J. L. Arora, An Introduction to Linear Algebra, Affiliated East-West Press Pvt. Ltd.

BOOKS FOR REFERENCE:

1. J. L. Mott, A. Kendel and T.P. Baker: Discrete mathematics for Computer Scientists and Mathematicians, Prentice Hall of India Pvt Ltd, 2008.

CORE PAPER-III

REAL ANALYSIS

Objective: The objective of the course is to have the knowledge on basic properties of the field of real numbers, studying Bolzano-Weierstrass Theorem , sequences and convergence of sequences, series of real numbers and its convergence etc. This is one of the core courses essential to start doing mathematics.

Expected Outcome: On successful completion of this course, students will be able to handle fundamental properties of the real numbers that lead to the formal development of real analysis and understand limits and their use in sequences, series, differentiation and integration. Students will appreciate how abstract ideas and rigorous methods in mathematical analysis can be applied to important practical problems.

UNIT-I

Review of Algebraic and Order Properties of *R,* ε-neighborhood of a point in *R,* Bounded above sets, Bounded below sets, Bounded Sets, Unbounded sets, Suprema and Infima, The Completeness Property of *R,* The Archimedean Property, Density of Rational (and Irrational) numbers in *R.,* Intervals, Interior point, , Open Sets, Closed sets, , Limit points of a set , Illustrations of Bolzano-Weierstrass theorem for sets, closure, interior and boundary of a set.

UNIT-II

Sequences and Subsequences, Bounded sequence, Convergent sequence, Limit of a sequence. Limit Theorems, Monotone Sequences,. Divergence Criteria, Bolzano Weierstrass Theorem for Sequences, Cauchy sequence, Cauchy's Convergence Criterion. Infinite series, convergence and divergence of infinite series, Cauchy Criterion, Tests for convergence: Comparison test, Limit Comparison test, Ratio Test, Cauchy's nth root test, Integral test, Alternating series, Leibniz test, Absolute and Conditional convergence.

UNIT-III

Limits of functions (epsilon-delta approach), sequential criterion for limits, divergence criteria. Limit theorems, one sided limits, Infinite limits and limits at infinity, Continuous functions, sequential criterion for continuity & discontinuity. Algebra of continuous functions, Continuous functions on an interval, Boundedness Theorem, Maximum Minimum Theorem, Bolzano's Intermediate value theorem, location of roots theorem, preservation of intervals theorem. Uniform continuity, non-uniform continuity criteria, uniform continuity theorem, Monotone and Inverse Functions.

UNIT-IV

Differentiability of a function at a point & in an interval, Caratheodory's theorem, chain Rule, algebra of differentiable functions, Mean value theorem, interior extremum theorem. Rolle's theorem, intermediate value property of derivatives, Darboux's theorem. Applications of mean value theorem to inequalities.

BOOKS RECOMMENDED:

1. R.G. Bartle and D. R. Sherbert, Introduction to Real Analysis (3rd Edition), John Wiley and Sons (Asia) Pvt. Ltd., Singapore,2002.

2. G. Das and S. Pattanayak, Fundamentals of Mathematical Analysis, TMH Publishing Co.

BOOKS FOR REFERENCE:

1. S.C. Mallik and S. Arora-Mathematical Analysis, New Age International Publications.
2. A.Kumar, S. Kumaresan, *A basic course in Real Analysis*, CRC Press, 2014.
3. Brian S. *Thomson*, Andrew. M. *Bruckner*, and Judith B. *Bruckner*, *Elementary Real Analysis,* Prentice Hall,2001.
4. Gerald G. Bilodeau, Paul R. Thie, G.E. Keough, *An Introduction to Analysis,* Jones & Bartlett, Second Edition, 2010.

CORE PAPER-IV

DIFFERENTIAL EQUATIONS

Objective: Differential Equations introduced by Leibnitz in 1676 models almost all Physical, Biological, Chemical systems in nature. The objective of this course is to familiarize the students with various methods of solving differential equations and to have a qualitative applications through models. The students have to solve problems to understand the methods.

Expected Outcomes: A student completing the course is able to solve differential equations and is able to model problems in nature using Ordinary Differential Equations. This is also prerequisite for studying the course in Partial Differential Equations and models dealing with Partial Differential Equations.

UNIT-I

Differential equations and mathematical models, General, Particular, explicit, implicit and singular solutions of a differential equation. Exact differential equations and integrating factors, separable equations and equations reducible to this form, linear equations and Bernoulli's equation, special integrating factors and transformations.

UNIT-II

Introduction to compartmental models, Exponential decay radioactivity (case study of detecting art forgeries), lake pollution model (with case study of Lake Burley Griffin), drug assimilation into the blood (case study of dull, dizzy and dead), exponential growth of population, Density dependent growth, Limited growth with harvesting.

UNIT-III

General solution of homogeneous equation of second order, principle of superposition, Wronskian, its properties and applications, method of undetermined coefficients, Method of variation of parameters, Linear homogeneous and non-homogeneous equations of higher order with constant coefficients, Euler's equation.

UNIT-IV

Equilibrium points, Interpretation of the phase plane, predatory-pray model and its analysis, epidemic model of influenza and its analysis, battle model and its analysis.

Practical / Lab work to be performed on a computer:

Modeling of the following problems using *Matlab / Mathematica / Maple* etc.

1. Plotting of second & third order solution family of differential equations.
2. Growth & Decay model (exponential case only).
3. (a) Lake pollution model (with constant/seasonal flow and pollution concentration)/
   (b) Case of single cold pill and a course of cold pills.
   (c) Limited growth of population (with and without harvesting).

4. (a) Predatory- prey model (basic volterra model, with density dependence, effect of DDT, two prey one predator).
   (b) Epidemic model of influenza (basic epidemic model, contagious for life, disease with carriers).
   (c) Battle model (basic battle model, jungle warfare, long range weapons).
5. Plotting of recursive sequences.

BOOKS RECOMMENDED:

1. J. Sinha Roy and S Padhy: A course of Ordinary and Partial differential equation Kalyani Publishers, New Delhi.

2. Belinda Barnes and Glenn R. Fulford, *Mathematical Modeling with Case Studies, A Differential Equation Approach using Maple and Matlab,* 2ndEd., Taylor and Francis group, London and New York,2009.

BOOKS FOR REFERENCE:

1. Simmons G F, Differential equation, Tata Mc Graw Hill, 1991.
2. Martin Braun, Differential Equations and their Applications, Springer International, Student Ed.
3. S. L. Ross, Differential Equations, 3rd Edition, John Wiley and Sons, India.
4. C.Y. Lin, Theory and Examples of Ordinary Differential Equations, World Scientific, 2011.

CORE PAPER-V
THEORY OF REAL FUNCTIONS

Objective: The objective of the course is to have knowledge on limit theorems on functions, limits of functions, continuity of functions and its properties, uniform continuity, differentiability of functions, algebra of functions and Taylor’s theorem and, its applications. The student how to deal with real functions and understands uniform continuity, mean value theorems.

Expected Outcome: On the completion of the course, students will have working knowledge on the concepts and theorems of the elementary calculus of functions of one real variable. They will work out problems involving derivatives of function and their applications. They can use derivatives to analyze and sketch the graph of a function of one variable, can also obtain absolute value and relative extrema of functions. This knowledge is basic and students can take all other analysis courses after learning this course.

UNIT-I

L’ Hospital’s Rules, other Intermediate forms, Cauchy's mean value theorem, Taylor's theorem with Lagrange's form of remainder, Taylor's theorem with Cauchy's form of remainder, application of Taylor's theorem to convex functions, Relative extreme, Taylor's series and Maclaurin's series, expansions of exponential and trigonometric functions.

UNIT-II

Riemann integration; inequalities of upper and lower sums; Riemann conditions of integrability. Riemann sum and definition of Riemann integral through Riemann sums; equivalence of two definitions; Riemann integrability of monotone and continuous functions; Properties of the Riemann integral; definition and integrability of piecewise continuous and monotone functions. Intermediate Value theorem for Integrals; Fundamental theorems of Calculus.

UNIT-III

Improper integrals: Convergence of Beta and Gamma functions. Pointwise and uniform convergence of sequence of functions, uniform convergence, Theorems on continuity, derivability and integrability of the limit function of a sequence of functions.

UNIT-IV

Series of functions; Theorems on the continuity and derivability of the sum function of a series of functions; Cauchy criterion for uniform convergence and Weierstrass M-Test Limit superior and Limit inferior, Power series, radius of convergence, Cauchy Hadamard Theorem, Differentiation and integration of power series; Abel's Theorem; Weierstrass Approximation Theorem.

BOOKS RECOMMENDED:

1. R.G. Bartle & D. R. Sherbert, Introduction to Real Analysis, John Wiley &Sons.
2. G. Das and S. Pattanayak, *Fundamentals of mathematics analysis*, TMH Publishing Co.
3. S. C. Mallik and S. Arora, *Mathematical analysis*, New Age International Ltd., New Delhi.

BOOK FOR REFERENCES:

1. A. Kumar, S. Kumaresan, *A basic course in Real Analysis*, CRC Press, 2014
2. K. A. Ross, *Elementary analysis: the theory of calculus*, Undergraduate Texts in Mathematics, Springer (SIE), Indian reprint, 2004A.Mattuck, Introduction toAnalysis, Prentice Hall

3. Charles G. Denlinger, *Elements of real analysis*, Jones and Bartlett (Student Edition), 2011.

CORE PAPER-VI

GROUP THEORY-I

Objective: Group theory is one of the building blocks of modern algebra. Objective of this course is to introduce students to basic concepts of group theory and examples of groups and their properties. This course will lead to future basic courses in advanced mathematics, such as Group theory-II and ring theory.

Expected Outcomes: A student learning this course gets idea on concept and examples of groups and their properties . He understands cyclic groups, permutation groups, normal subgroups and related results. After this course he can opt for courses in ring theory, field theory, commutative algebras, linear classical groups etc. and can be apply this knowledge to problems in physics, computer science, economics and engineering.

UNIT-I

Symmetries of a square, Dihedral groups, definition and examples of groups including permutation groups and quaternion groups (illustration through matrices), elementary properties of groups, Subgroups and examples of subgroups, centralizer, normalizer, center of a group,

UNIT-II

Product of two subgroups, Properties of cyclic groups, classification of subgroups of cyclic groups, Cycle notation for permutations, properties of permutations, even and odd permutations, alternating group,

UNIT-III

Properties of cosets, Lagrange's theorem and consequences including Fermat's Little theorem, external direct product of a finite number of groups, normal subgroups, factor groups.

UNIT-IV

Cauchy's theorem for finite abelian groups, group homomorphisms, properties of homomorphisms, Cayley's theorem, properties of isomorphisms, first, second and third isomorphism theorems.

BOOKS RECOMMENDED:

1. Joseph A. Gallian, *Contemporary Abstract Algebra* (4th Edition), Narosa Publishing House, New Delhi
2. John B. Fraleigh, *A First Course in Abstract Algebra,* 7th Ed., Pearson, 2002.

BOOK FOR REFERENCES:

1. M. *Artin, Abstract Algebra,* 2nd Ed., Pearson, 2011.
2. Joseph 1. Rotman, *An Introduction to the Theory of Groups,* 4th Ed., Springer Verlag, 1995.
3. I. N. Herstein, *Topics in Algebra,* Wiley Eastern Limited, India, 1975.

CORE PAPER-VII

PARTIAL DIFFERENTIAL EQUATIONS AND SYSTEM OF ODEs

Objective: The objective of this course is to understand basic methods for solving Partial Differential Equations of first order and second order. In the process, students will be exposed to Charpit’s Method, Jacobi Method and solve wave equation, heat equation, Laplace Equation etc. They will also learn classification of Partial Differential Equations and system of ordinary differential equations.

Expected Outcomes: After completing this course, a student will be able to take more courses on wave equation, heat equation, diffusion equation, gas dynamics, non linear evolution equations etc. All these courses are important in engineering and industrial applications for solving boundary value problem.

UNIT-I

Partial Differential Equations - Basic concepts and Definitions, Mathematical Problems. First-Order Equations: Classification, Construction and Geometrical Interpretation. Method of Characteristics for obtaining General Solution of Quasi Linear Equations. Canonical Forms of First-order Linear Equations. Method of Separation of Variables for solving first order partial differential equations.

UNIT-II

Derivation of Heat equation, Wave equation and Laplace equation. Classification of second order linear equations as hyperbolic, parabolic or elliptic. Reduction of second order Linear Equations to canonical forms.

UNIT-III

The Cauchy problem, Cauchy problem of an infinite string. Initial Boundary Value Problems, Semi-Infinite String with a fixed end, Semi-Infinite String with a Free end. Equations with non-homogeneous boundary conditions, Non- Homogeneous Wave Equation. Method of separation of variables, Solving the Vibrating String Problem, Solving the Heat Conduction problem

UNIT-IV

Systems of linear differential equations, types of linear systems, differential operators, an operator method for linear systems with constant coefficients, Basic Theory of linear systems in normal form, homogeneous linear systems with constant coefficients: Two Equations in two unknown functions, The method of successive approximations.

LIST OF PRACTICALS (USING ANY SOFTWARE)

(i) Solution of Cauchy problem for first order PDE.

(ii) Finding the characteristics for the first order PDE.

(iii) Plot the integral surfaces of a given first order PDE with initial data.

(iv) Solution of wave equation $\frac{\partial^2 u}{\partial t^2} - c\frac{\partial^2 u}{\partial x^2} = 0$ for the following associated conditions

(a) $u(x, 0) = ¢(x), u_t\{ (x, 0) = \psi(x), \mathrm{x} \in R, t>0$

(b) $u(x,0)=¢(X), u_t\{ (x, 0) = \psi(x), u(0,t)=0, x\in (0,\infty), t>0$

(c) $u(x, 0)=¢(x), u_t\{ (x, 0) = \psi(x) , u_x (0,t) = 0, x \in(\mathrm{O},\infty), t>0$

(d) $u(x, 0) = ¢(x), ut (x, 0) = \psi(x), u(0,t) = 0, u(l,t) = 0, 0<x <l, t >0$

(v) Solution of wave equation $\frac{\partial u}{\partial t} - \kappa\frac{\partial^2 u}{\partial x^2} = 0$ for the following associated conditions

(a) $u(x, 0) =\phi(x), u(0,t) = a, u(l, t) = b, 0 <x <l, t >0$

(b) $u(x, 0) =\phi(x), x \in R, 0 <t <T$

(c) $u(x,0)=\phi(x), u(0,t)=a, x \in (0,\infty), t \geq 0$

BOOKS RECOMMENDED :

1. Tyn Myint-U and Lokenath Debnath, *Linear Partial Differential Equations for Scientists and Engineers,* 4th edition, Birkhauser, Indian reprint, 2014.
2. S.L. Ross, *Differential equations,* 3rd Ed., John Wiley and Sons, India,

BOOK FOR REFERENCES:

1. J Sinha Roy and S Padhy: A course of Ordinary and Partial differential equation Kalyani Publishers,New Delhi,
2. Martha L Abell, James P Braselton, *Differential equations with MATHEMATICA,* 3rd Ed., Elsevier Academic Press, 2004.
3. Robert C. Mc Owen: Partial Differential Equations, Pearson Education Inc.
4. T Amarnath: An Elementary Course in Partial Differential Equations, Narosa Publications.

CORE PAPER-VIII

NUMERICAL METHODS AND SCIENTIFIC COMPUTING

Use of Scientific Calculator is allowed.

Objective: Calculation of error and approximation is a necessity in all real life, industrial and scientific computing. The objective of this course is to acquaint students with various numerical methods of finding solution of different type of problems, which arises in different branches of science such as locating roots of equations, finding solution of systems of linear equations and differential equations, interpolation, differentiation, evaluating integration.

Expected Outcome: Students can handle physical problems to find an approximate solution. After getting trained a student can opt for advance courses in numerical analysis in higher mathematics. Use of good mathematical software will help in getting the accuracy one need from the computer and can assess the reliability of the numerical results, and determine the effect of round off error or loss of significance.

UNIT-I

Rate of convergence, Algorithms, Errors: Relative, Absolute, Round off, Truncation. Approximations in Scientific computing, Error propagation and amplification, conditioning, stability and accuracy, computer arithmetic mathematical software and libraries, visualisation, Numerical solution of non-linear equations: Bisection method, Regula- Falsi method, Secant method, Newton- Raphson method, Fixed-point Iteration method.

UNIT-II

Rate of convergence of the above methods. System of linear algebraic equations: Gaussian Elimination and Gauss Jordan methods. Gauss Jacobi method, Gauss Seidel method and their convergence analysis. Computing eigen-values and eigenvectors

UNIT-III

Polynomial interpolation: Existence uniqueness of interpolating polynomials. Lagrange and Newtons divided difference interpolation, Error in interpolation, Central difference & averaging operators, Gauss-forward and backward difference interpolation. Hermite and Spline interpolation, piecewise polynomial interpolation.

UNIT-IV

Numerical Integration: Some simple quadrature rules, Newton-Cotes rules, Trapezoidal rule, Simpsons rule, Simpsons *3/8th* rule, Numerical differentiation and integration, Chebyshev differentiation and FFT, Richard-son extrapolation.

PRACTICAL/LAB WORK TO BE PERFORMED ON A COMPUTER:

Use of computer aided software (CAS), for example *Matlab / Mathematica / Maple / Maxima* etc., for developing the following Numerical programs:

(i) Calculate the sum *1/1 + 1/2 + 1/3 + 1/4* + ----------+ 1/*N.*

(ii) To find the absolute value of an integer.

(iii) Enter- 100 integers into an array and sort them in an ascending' order.

(iv) Any two of the following

  (a) Bisection Method

  (b) Newton Raphson Method

  (c) Secant Method

  (d) Regular Falsi Method

  (v) Gauss-Jacobi Method

  (vi) SOR Method or Gauss-Siedel Method

  (vii) Lagrange Interpolation or Newton Interpolation

(viii) Simpson's rule.

Note: For any of the CAS *Matlab / Mathematica / Maple / Maxima* etc., Data types-simple data types, floating data types, character data types, arithmetic operators and operator precedence, variables and constant declarations, expression, input/output, relational operators, logical operators and logical expressions, control statements and loop statements, Arrays should be introduced to the students.

BOOKS RECOMMENDED:

1. M. K. Jain, S. R. K. Iyengar and R. K. Jain, *Numerical Methods for Scientific and Engineering Computation,* New age International Publisher, India,
2. Michael Heath: Scientific Computing : An introductory Survey.

BOOK FOR REFERENCES:

1. B. Bradie, *A Friendly Introduction to Numerical Analysis,* Pearson Education, India, 2007.
2. Kendall E. Atkinson: An Introduction to Numerical Analysis
3. C. F. Gerald and P. O. Wheatley, *App.ied Numerical Analysis,* Pearson Education, India, 7th Edition, 2008
4. S. D. Conte & S. de Boor: Elementary Numerical Analysis: An Algorithmic Approach.

CORE PAPER-IX

TOPOLOGY OF METRIC SPACES

Objective: This is an introductory course in topology of metric spaces. The objective of this course is to impart knowledge on open sets, closed sets, continuous functions, connectedness and compactness in metric spaces.

Expected Outcomes: On successful completion of the course students will learn to work with abstract topological spaces. This is a foundation course for all analysis courses in future.

UNIT-I

Metric spaces, sequences in metric spaces, Cauchy sequences, complete metric spaces, open and closed balls, neighborhood, open set, interior of a set, limit point of a set, closed set, diameter of a set, Cantor's theorem,

UNIT-II

Subspaces, Countability Axioms and Separability, Baire’s Category theorem

UNIT-III

Continuity: Continuous mappings, Extension theorems, Real and Complex valued Continuous functions, Uniform continuity, Homeomorphism, Equivalent metrics and isometry, uniform convergence of sequences of functions.

UNIT-IV

Contraction mappings and applications, connectedness, Local connectedness, Bounded sets and compactness, other characterization of compactness, continuous functions on compact spaces,

BOOKS RECOMMENDED:

1. Satish Shirali & Harikishan L. Vasudeva, *Metric Spaces*, Springer Verlag London (2006) (First Indian Reprint 2009)

BOOK FOR REFERENCES:

1. S. Kumaresan, *Topology of Metric Spaces*, Narosa Publishing House, Second Edition 2011.

CORE PAPER-X
RING THEORY

Objective: This is a second course in modern algebra which deals with ring theory. Some basics of ring theory like rings, subrings, ideals, ring homomorphisms and their properties and. This course is an integral part of any course on Modern algebra the ohers being Group theory and Field Theory.

Expected Outcomes: After completing this course, this will help students to continue more courses in advanced Ring theory modules, Galois groups.

UNIT-I

Definition and examples of rings, properties of rings, subrings, integral domains and fields, characteristic of a ring, Ideals, ideal generated by a subset of a ring, factor rings, operations on ideals.

UNIT-II

Prime and maximal ideals. Ring homomorphisms, properties of ring homomorphisms, Isomorphism theorems I, II and III, field of quotients.

UNIT-III

Polynomial rings over commutative rings, division algorithm and consequences, principal ideal domains, factorization of polynomials, reducibility tests, irreducibility tests, Eisenstein criterion, Unique factorization in Z[x].

UNIT-IV

Divisibility in integral domains, irreducibles, primes, unique factorization domains, Euclidean domains.

BOOKS RECOMMENDED:

1. Joseph A. Gallian, *Contemporary Abstract Algebra* (4th Edition), Narosa Publishing House, New Delhi.
2. John B. Fraleigh, *A First Course in Abstract Algebra,* 7th Ed., Pearson, 2002.

BOOK FOR REFERENCES:

1. M. *Artin, Abstract Algebra,* 2nd Ed., Pearson, 2011.
2. Joseph 1. Rotman, *An Introduction to the Theory of Groups,* 4th Ed., Springer Verlag, 1995.
3. I. N. Herstein, *Topics in Algebra,* Wiley Eastern Limited, India, 1975.

CORE PAPER - XI

MULTIVARIATE CALCULUS

Objective: The objective of this course to introduce functions of several variable to a student after he has taken a course in one variable calculus. The course will introduce partial derivatives and several of its consequences and will introduce double and triple integrals along with line integrals which are fundamental to all streams where calculus can be used.

Expected Outcomes: After reading this course a student will be able to calculate partial derivatives, directional derivatives, extreme values and can calculate double, triple and line integrals. He will have idea of basic vector calculus including green’s theorem, divergence theorem.and stokes theorem. He can take courses in calculus on manifolds, Differential geometry and can help in numerical computations involving several variables.

UNIT-I

Functions of several variables, limit and continuity of functions of two variables. Partial differentiation, total differentiability and differentiability, sufficient condition for differentiability. Chain rule for one and two independent parameters, directional derivatives, the gradient, maximal and normal property of the gradient, tangent planes.

UNIT-II

Extrema of functions of two variables, method of Lagrange multipliers, constrained optimization problems.

Definition of vector field, divergence and curl, Double integration over rectangular region, double integration over nonrectangular region. Double integrals in polar co-ordinates,

UNIT-III

Triple integrals, Triple integral over a parallelepiped and solid regions. Volume by triple integrals, cylindrical and spherical co-ordinates. Change of variables in double integrals and triple integrals.

UNIT-IV

Line integrals, Applications of line integrals: Mass and Work. Fundamental theorem for line integrals, conservativevector fields, independence of path. Green's theorem, surface integrals, integrals over parametrically defined surfaces. Stokes' theorem, The Divergence theorem.

BOOKS RECOMMENDED:

1. M. J, Strauss, G. L. Bradley and K. J. Smith, Calculus (3rd Edition), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education), Delhi, 2007.
2. S C Mallik and S Arora: Mathematical Analysis, New Age International Publications

BOOK FOR REFERENCES:

1. G.B. Thomas and R.L. Finney, *Calculus,* 9th Ed., Pearson Education, Delhi, 2005.
2. E. Marsden, A.J. Tromba and A. Weinstein, *Basic Multivariable Calculus,* Springer(SIE). Indian reprint, 2005.
3. James Stewart, *Multivariable Calculus, Concepts and Contexts,* 2nd Ed., Brooks/*Cole,* Thomson Learning, USA, 2001.
4. S Ghorpade, B V Limaye, Multivariable calculus, Springer international edition

CORE PAPER –XII

LINEAR ALGEBRA

Objective: Linear algebra is a basic course in almost all branches of science. A full course in undergraduate program will help students in finding real life applications later.. The objective of this course is to introduce a student the basics of linear algebra and some of its application

Expected Outcomes: The student will use this knowledge wherever he/She goes after undergraduate program. It has applications in computer science, finance mathematics, industrial mathematics, bio mathematics and what not.

UNIT-I

Vector spaces, subspaces, examples, algebra of subs paces, quotient spaces, linear combination of vectors, linear span, linear independence, basis and dimension, dimension of subspaces.

Linear transformations, null space, range, rank and nullity of a linear transformation.

UNIT-II

Matrix representation of a linear transformation, Algebra of linear transformations, Isomorphisms, Isomorphism theorems, invertibility and isomorphisms, change of coordinate matrix, Dual spaces, dual basis, double dual, transpose of a linear transformation and its matrix in the dual basis, annihilators, Basics of Fields.

UNIT-III

Eigenspaces of a linear operator, diagonalizability. Invariant subspaces and Cayley-Hamilton theorem, the minimal polynomial for a linear operator, Inner product spaces and norms, Gram-Schmidt orthogonalization process,

UNIT-IV

Orthogonal complements, Bessel's inequality, the adjoint of a linear operator, Least Squares Approximation, minimal solutions to systems of linear equations, Normal and self-adjoint operators, Orthogonal projections and Spectral theorem.

BOOKS RECOMMENDED:

1. Stephen H. Friedberg, Arnold J. Insel, Lawrence E. Spence, *Linear Algebra* (4th Edition), Pearson, 2018.

BOOKS FOR REFERENCE:

1. Rao A R and Bhim Sankaram Linear Algebra Hindustan Publishing house.
2. Gilbert Strang, Linear Algebra and its Applications, Thomson, 2007.

CORE PAPER-XIII

COMPLEX ANALYSIS

Objectives: The objective of the courseis aimed to provide an introduction to the theories for functions of a complex variable. The concepts of analyticity and complex integration are presented. The Cauchy’s theorem and its applications, the calculus of residues and its applications are discussed in detail.

Expected Outcomes: Students will be able to handle certain integrals not evaluated earlier and will know a technique for counting the zeros of polynomials. This course is prerequisite to many other advance analysis courses.

UNIT-I

Complex Numbers and Complex plane: Basic properties, convergence, Sets in the Complex plane, Functions on the Complex plane: Continuous functions, holomorphic functions, power series, Integration along curves.

UNIT-II

Cauchy's Theorem and Its Applications: Goursat's theorem, Local existence of primitives and Cauchy's theorem in a disc, Evaluation of some integrals, Cauchy's integral formulas.

UNIT-III

Morera's theorem, Sequences of holomorphic functions, Holomorphic functions defined in terms of integrals, Schwarz reflection principle, Zeros and poles.

UNIT-IV

Meromorphic Functions and the Logarithm: The residue formula, Examples, Singularities and meromorphic functions, The argument principle and applications, The complex logarithm.

BOOKS RECOMMENDED:

1. Elias M. Stein & Rami Shakarchi, Complex Analysis, Princeton University press, Princeton and Oxford, 2003.

BOOKS FOR REFERENCE:

1. James Ward Brown and Ruel V. Churchill, *Complex Variables and Applications* (Eighth Edition), McGraw - Hill International Edition, 2009.
2. G. F. Simmons, *Introduction to Topology and Modern Analysis*, Mcgraw-Hill, Edition 2004.
3. Joseph Bak and Donald 1. Newman, *Complex analysis* (2ndEdition), Undergraduate Texts in Mathematics, Springer-Verlag New York, Inc., New York, 1997.

CORE PAPER-XIV
GROUP-THEORY-II

Objective: The objective of this course **i**s to be exposed to more advanced results in group theory after completing a basic course. The course introduces results on automorphism, commutator subgroup, group action Sylow theorems etc.

Expected Outcomes: The knowledge of automorphism helps to study more on field theory. Students learn on direct products, group actions, class equations and their applications with proof of all results . This course helps to opt for more advanced courses in algebra and linear classical groups.

UNIT-I

Automorphism, inner automorphism, automorphism groups, automorphism groups of finite and infinite cyclic groups, applications of factor groups to automorphism groups. characteristic subgroups.

UNIT-II

Commutator subgroup and its properties, Properties of external direct products, the group of units modulo n as an external direct product, internal direct products, Fundamental Theorem of finite abelian groups.

UNIT-III

Group actions, stabilizers and kernels, permutation representation associated with a given group action, Application of group actions: Generalized Cayley's theorem, Index theorem.

UNIT-IV

Groups acting on themselves by conjugation, class equation and consequences, conjugacy in S_n , p - groups, Sylow's theorems and consequences, Cauchy's theorem, Simplicity of A_n for $n \geq 5$, non-simplicity tests.

BOOKS RECOMMENDED:

1. John B. Fraleigh, *A First Course in Abstract Algebra,* Narosa Publishing House, New Delhi.

2. Joseph A. Gallian *Contemporary Abstract Algebra* (4th Edition), Narosa Publishing House, New Delhi.

BOOK FOR REFERENCES:

1. M. Artin, *Abstract Algebra,* 2nd Ed., Pearson, 2011.
2. David S. Dummit and Richard M. Foote, *Abstract Algebra,* 3rd Ed., John Wiley and Sons (Asia) Pvt. Ltd., Singapore, 2004.
3. J.R. Durbin, *Modern Algebra,* John Wiley & Sons, New York Inc., 2000.

Discipline Specific Elective Paper-1

LINEAR PROGRAMMING

Objective: The objective of this course is to familiarize industrial problems to students with various methods of solving Linear Programming Problems, Transportation Problems, Assignment Problems and their applications. Also, students will know the application of linear Programming method in Game Theory.

Expected Outcomes: More knowledge on this topic in higher studies will help students to deal industrial models. This is also prerequisite for studying advanced courses in Nonlinear Programming Problems, Inventory Control Problem and Queuing Theory etc.

UNIT-I

Introduction to linear Programming problem, Theory of simplex method, optimality and unboundedness, the simplex algorithm, simplex method in tableau format, introduction to artificial variables, two-phase method, Big-M method and their comparison.

UNIT-II

Duality, formulation of the dual problem, primal-dual relationships, Fundamental Theorem of Duality, economic interpretation of the dual.

UNIT-III

Transportation problem and its mathematical formulation, northwest-corner method least cost method and Vogel approximation method for determination of starting basic solution, algorithm for solving transportation problem. Assignment problem and its mathematical formulation, Hungarian method for solving assignment problem.

UNIT-IV

Game theory: formulation of two person zero sum games, solving two person zero sum games, games with mixed strategies, graphical solution procedure, linear programming solution of games.

BOOKS RECOMMENDED:

1. Kanti Swarup, Operations Research, Sultan Chand & Sons, New Delhi. Books.

BOOKS FOR REFERENCE:

1. S. Hillier and G.J. Lieberman, *Introduction to Operations Research- Concepts and Cases* (9th Edition), TataMcGraw Hill, 2010.
2. Mokhtar S. Bazaraa, John J. Jarvis and Hanif D. Sherali, *Linear Programming and Network Flows* (2nd edition), John Wiley and Sons, India, 2004.
3. G. Hadley, *Linear Programming,* Narosa Publishing House, New Delhi, 2002.
4. Hamdy A. Taha, *Operations Research: An Introduction* (10th edition), Pearson, 2017.

Discipline Specific Elective Paper-II

Probability and Statistics

Objective: The objective of the course is to expertise the student to the extensive role of statistics in everyday life and computation, which has made this course a core course in all branches of mathematical and engineering sciences.

Expected Outcome: The students shall learn probability and statistics for various random variables, multivariate distributions, correlations and relations. He shall learn law of large numbers and shall be able to do basic numerical calculations.

UNIT-I

Probability: Introduction, Sample spaces, Events, probability of events, rules of probability, conditional probability, independent events, Bayes's theorem,

Probability distributions and probability densities: random variables, probability distributions, continuous random variables, probability density functions, Multivariate distributions, joint distribution function, joint probability density function, marginal distributions, conditional distributions, conditional density, The theory in practice, data analysis, frequency distribution, class limits, class frequencies, class boundary, class interval, class mark, skewed data, multimodality, graphical representation of the data, measures of location and variability. Population, sample, parameters

UNIT-II

Mathematical Expectation: Introduction, expected value of random variable, moments, Chebyshev's theorem, moment generating functions, product moments, moments of linear combinations of random variables, conditional expectations, the theory in practice, measures of location, dispersion

UNIT-III

Special probability distributions: Discrete Uniform distribution, binomial distribution, Negative binomial, geometric, hypergeometric, poisson, multinomial distribution, multinomial. Special probability densities; Uniform distribution, gamma, exponential, gamma, chi-square, beta distribution, normal, normal approximation to binomial, bivariate normal, Functions of random variables, distribution function technique, transformation technique-one variable, several variables, moment generating function technique,

UNIT-IV

Sampling distributions: population distribution, random sample, sampling distribution of mean, Central Limit theorem, Sampling distribution of the mean: finite populations, chi-square, t, F distributions, regression and correlation: Bivariate regression, regression equation, Linear regression, method of least squares.

BOOKS RECOMMENDED:

1. Irwin Miller and Marylees Miller, *John E. Freund's Mathematical Statistics with Applications* (8th Edition), Pearson, Asia, 2014.

BOOK FOR REFERENCES:

1. Robert V. Hogg, Joseph W. McKean and Allen T. Craig, *Introduction to Mathematical Statistics,* Pearson Education, Asia, 2007.
2. Alexander M. Mood, Franklin A. Graybill and Duane C. Boes, *Introduction to the Theory of Statistics,* (3rd Edition), Tata McGraw- Hill, Reprint 2007.
3. Sheldon Ross, *Introduction to Probability Models* (9th Edition), Academic Press, Indian Reprint, 2007.

Discipline Specific Elective Paper-III

DIFFERENTIAL GEOMETRY

Objective: After learning methods on curve tracing and Analytic Geometry, the objective of this course is to teach Differential geometry of curves and surfaces which trains a student using tools in calculus to derive intrinsic properties of plain curves and space curves.

Expected Outcome: After completing this course a student will learn on serret-Frenet formulae, relation between tangent, normal and binormals, first and second fundamental forms and ideas on various curvatures. He has scope to take more advanced courses in surface theory and geometry.

UNIT-I

Theory of Space Curves: Space curves, Planer curves, Curvature, torsion and Serret-Frenet formulae. Osculating circles, Osculating circles and spheres. Existence of space curves.

UNIT-II

Evolutes and involutes of curves. Theory of Surfaces: Parametric curves on surfaces, surfaces of revolution, helicoids, Direction coefficients. First and second Fundamental forms.

UNIT-III

Principal and Gaussian curvatures. Lines of curvature, Euler's theorem. Rodrigue's formula, Conjugate and Asymptotic lines. Developables: Developable associated with space curves and curves on surfaces, Minimal surfaces.

UNIT-IV

Geodesics: Canonical geodesic equations. Nature of geodesics on a surface of revolution. Clairaut’s theorem. Normal property of geodesics. Torsion of a geodesic. Geodesic curvature. Gauss-Bonnet theorem. Surfaces of constant curvature.

BOOKS RECOMMENDED:

1. T.J. Willmore, *An Introduction to Differential Geometry,* Dover Publications, 2012.

BOOK FOR REFERENCES:

1. A. Pressley, Elementary Differential Geometry, Springer Internationl Edition, 2014.
2. O'Neill, *Elementary Differential Geometry,* 2nd Ed., Academic Press, 2006.
3. C.E. Weatherburn, *Differential Geometry of Three Dimensions,* Cambridge University Press 2003.
4. D.J. Struik, *Lectures on Classical Differential Geometry,* Dover Publications, 1988.

Discipline Specific Elective Paper-IV

NUMBER THEORY

Objective: The main objective of this course is to build up the basic theory of the integers, prime numbers and their primitive roots, the theory of congruence, quadratic reciprocity law and number theoretic functions, Fermat’s last theorem, to acquire knowledge in cryptography specially in RSA encryption and decryption.

Expected Outcomes: Upon successful completion of this course students will able to know the basic definitions and theorems in number theory, to identify order of an integer, primitive roots, Euler's criterion, the Legendre symbol, Jacobi symbol and their properties, to understand modular arithmetic number-theoretic functions and apply them to cryptography.

UNIT- I

Linear Diophantine equation, prime counting function, statement of prime number theorem, Goldbach conjecture, linear congruences, complete set of residues, Chinese remainder theorem, Fermat's little theorem, Wilson's theorem.

UNIT-II

Number theoretic functions, sum and number of divisors, totally multiplicative functions, definition and properties of the Dirichlet product, the Mobius inversion formula, the greatest integer function, Euler's phi-function, Euler's theorem, reduced set of residues, some properties of Euler's phi-function.

UNIT-III

Order of an integer modulo *n,* primitive roots for primes, composite numbers having primitive roots, Euler's criterion, the Legendre symbol, Jacobi symbol and their properties, quadratic reciprocity, quadratic congruences with composite moduli.

UNIT-IV

Affine ciphers, Hill ciphers, p vgh vg gv ublic key cryptography, RSA encryption and decryption, the equation $x^2 + y^2 = z^2$, Fermat's Last Theorem.

BOOKS RECOMMENDED:

1. David M.Burton, *Elementary Number Theory* (6thEdition), TataMcGraw-Hill Edition, Indian reprint, 2007.

BOOK FOR REFERENCES:

1. Thomas Koshy, *Elementary Number Theory with Applications (*2nd Edition), Academic Press, 2007.
2. Neville Robinns, *Beginning Number Theory* (2ndEdition), Narosa Publishing House Pvt. Limited, Delhi,2007.

OR

Discipline Specific Elective Paper-IV

PROJECT

Guidelines for +3 (CBCS) Under Graduate(B.A./B.Sc.) Mathematics (Honours) Project

1. Any student registering for doing project is required to inform the HOD, Mathematics the name of his/her project supervisor(s) at the time of pre-registration.
2. By the last date of add and drop, the student must submit the "Project Registration Form'', appended as Annexure-I to this document, to the HOD, Mathematics. This form requires a project title, the signature of the student, signature(s) of the supervisor(s) and the signature of the HOD, Mathematics of the college/university.
3. The project supervisor(s) should normally be a faculty member(s) of the Department of Mathematics and the topic of the project should be relevant to Mathematical Sciences. If a student desires to have a Project Supervisor from another department of the institute, the prior approval for the same should be sought from the HOD, Mathematics.
4. A student may have at the most two Project Supervisors. If a student desires to have two supervisors, at least one of these should be from the Department of Mathematics.
5. The student(s) will be required to submit one progress report and a final report of the Project to the HOD, Mathematics. The progress report is to be submitted in the sixth

week of the semester in which the project is undertaken. The hard copy and an electronic version of the final report of the project should be submitted two weeks before the end semester examination of the sixth semester. In addition the student will be required to make an oral presentation in front of a committee **(**Under Graduate (B.A./ B.Sc.) Mathematics (Honours) Project committee of the college in which supervisor is one of the members) constituted for this purpose by the Department of Mathematics of the college.

6. The student is expected to devote about 100 hours. The project will be evaluated by a committee of faculty members at the end of the sixth semester. The committee will be constituted by the Under Graduate (B.A./B.Sc.) Mathematics (Honours) Project committee of the college keeping in mind the areas of project they will cover.
7. In each semester the grade of a student will be awarded by the committee in consultation with his/her project supervisor(s). The project is evaluated on the basis of the following components: First Progress Reports: 20%; second/Final Report: 30%; Presentation: 30%; Viva: 20%.
8. Project progress reports should normally be no longer than 250 words and final report should not be longer than 40 A4 size pages in double spacing. Each final project report need to contain the following: (i) Abstract (ii) Table of contents (iii) Review of literature (iv) Main text(v) List of references. It may be desirable to arrange the main text as an introduction, the main body and conclusions.

GUIDELINES FOR STRUCTURING CONTENTS

The following sequence for the thesis organization should be followed:

(i) Preliminaries	Title Page
	Certificate
	Abstract/Synopsis
	Acknowledgement and/ or Dedication
	Table of Contents

	List of Figures, Tables, Illustrations, Symbols, etc (wherever applicable)
(ii) Text of Thesis	Introduction The body of the thesis, summary and conclusions
(iii) Reference Material	List of References, Bibliography
(iv) Appendices	

NOTE:

1. *Synopsis/Abstract* should be self-complete and contain no citations for which the thesis has to be referred.
2. The Text of the Thesis

(a) Introduction:

Introduction may be the first chapter or its first major division. In either case, it should contain a brief statement of the problem investigated. It should outline the scope, aim, general character of the research and the reasons for the student's interest in the problem.

(b) *The body of Thesis*

This is the substance of the dissertation inclusive of all divisions, subdivisions, tables, figures, etc.

(c) *Summary and conclusions*

If required, these are given as the last major division (chapter) of the text. A further and final subdivision titled "*Scope* for Further Work" may follow.

(d) *Reference material*

The list of references should appear as a consolidated list with references listed either alphabetically or sequentially as they appear in the text of the thesis.

For referencing an article in a scientific journal the suggested format should contain the following information: authors, title, name of journal, volume number, page numbers and year. For referencing an article published in a book, the suggested format should contain, authors, the title of the book, editors, publisher, year, page number of the article in the book being referred to. For referencing a thesis the suggested format should contain, author, the title of thesis, where thesis was submitted or awarded, year.

ANNEXURE-I
Department of Mathematics
Project Registration Form

Name of the college/university:

Name of the student:

Roll No. :

e-mail :

Name of the supervisor(s):

Department(s):

e-mail(s):

Title of the Project:

Signature of the Student:

Signature of supervisor(s): (i)

(ii)

Signature of HOD, Mathematics:

GENERIC ELECTIVES (TWO PAPER CHOICE)

Generic Elective Paper I

CALCULUS AND DIFFERENTIAL EQUATIONS

Objective: Calculus invented by Newton and Leibnitz is powerful analytical tool to solve mathematical problems which arise in all branches of science and engineering. The main emphasis of this course is to equip the student with necessary analytic and technical skills to handle problems of a mathematical nature as well as practical problems using calculus and differential equation. The aim should be to expose the students to basic ideas quickly without much theoretical emphasis with importance on applications.

Excepted Outcomes: After completing the course, students are expected to be able to apply knowledge of calculus and differential equations in the areas of their own interest.

UNIT-I

Curvature, Asymptotes, Tracing of Curves (Catenary, Cycloid, Folium of Descartes), Rectification, Quadrature, Elementary ideas about Sphere, Cones, Cylinders and Conicoids.

UNIT-II

Reviewoflimits,continuityanddifferentiabilityoffunctionsofonevariable and their properties, Rolle's theorem, Mean value theorems, Taylor's theorem with Lagrange's theorem and Cauchy's form of remainder, Taylor's series, Maclaurin's series of $sinx, cosx, e^x, \log(1+x), (1+x)^m$, L' Hospital's Rule, other Intermediate forms.

UNIT-III

Limitand Continuity of functions of several variables, Partial derivatives, Partial derivatives of higher orders, Homogeneous functions, Change of variables, Mean value theorem, Taylors theorem and Maclaurin's theorem for functions of two variables(statements &applications), Maxima and Minima of functions of two and three variables, Implicit functions, Lagrange's multipliers (Formulae & its applications), Concepts of Multiple integrals & its applications.

UNIT-IV

Ordinary Differential Equations of order one and degree one (variables separable, homogeneous, exact and linear). Equations of order one but higher degree. Second order linear equations with constant coefficients, homogeneous forms, Second order equations with variable coefficients, Variation of parameters.

BOOKS RECOMMENDED:

1. Shanti Narayan, P. K. Mittal, Differential Calculus, S. Chand, 2014.
2. Shanti Narayan, P. K. Mittal, Integral Calculus, S. Chand, 2014.
3. S.C. Mallik and S. Arora-Mathematical Analysis, New Age International Publications.
4. J. Sinharoy and S. Padhy: A Course of Ordinary and Partial Differential Equations, Kalyani Publishers.

BOOK FOR REFERENCES:

1. H.Anton,I.Bivens and S.Davis,*Calculus*,10th Ed.,John Wiley and Sons (Asia) P. Ltd., Singapore, 2002.
2. Shanti Narayan and P.K. Mittal-Analytical Solid Geometry, S. Chand & Company Pvt. Ltd., New Delhi.
3. Martin Braun-Differential Equations and their Applications-Martin Braun, Springer International.
4. B. P.Acharya and D. C.Sahu: Analytical Geometry of Quadratic Surfaces, Kalyani Publishers.

Generic Elective Paper II

ALGEBRA

Objective: This is a preliminary course for the basic courses in mathematics like, abstract algebra and linear algebra. The objective is to acquaint students with the properties of natural numbers i.e. Euclidean algorithm, congruence relation, fundamental theorem of arithmetic, etc. The basics of linear algebra i.e. vector spaces, matrices are introduced here.

Expected Outcomes: The acquired knowledge will help students to study further courses in mathematics like, group theory, ring theory and field theory and linear algebra. It has applications not only in higher mathematics but also in other science subjects like computer science, statistics, physics, chemistry etc.

UNIT-I

Sets, relations, Equivalence relations, partial ordering, well ordering, Functions, Composition of functions, Invertible functions, One to one correspondence and cardinality of a set, statements, compound statements, proofs in Mathematics, Truth tables, Algebra of propositions, logical arguments

UNIT-II

Well-ordering property of positive integers, Division algorithm, Divisibility and Euclidean algorithm, Congruence relation between integers, Principles of Mathematical Induction, statement of Fundamental Theorem of Arithmetic.

UNIT-III

Matrices, algebra of matrices, determinants, fundamental properties, minors and cofactors, product of determinant, adjoint and inverse of a matrix, Rank and nullity of a matrix, Systems of linear equations, row reduction and echelon forms, solution sets of linear systems, applications of linear systems,.

UNIT-IV

Vector spaces and subspaces, examples, linear independence, linear dependence, basis, dimension, examples, Introduction to linear transformations, matrix representation of a linear transformation, Eigen values, Eigen vectors of amatrix.

BOOKS RECOMMENDED:

1. Edgar G. Goodaire and Michael M. Parmenter, Discrete Mathematics with Graph Theory, 3rd Ed., Pearson Education (Singapore) P. Ltd., Indian Reprint, 2005.
2. V Krishna Murthy, V P Mainra, J L Arora, An Introduction to Linear Algebra ,

Affiliated East-West Press Pvt. Ltd

BOOKS FOR REFERENCE:

1. David C. Lay, Linear Algebra and its Applications,3rd Ed., Pearson Education Asia, Indian Reprint,2007.
2. B S Vatsa and Suchi Vatsa Theory of Matrices New age International third edition 2010.
3. Ward Cheney, David kincaid. Linear algebra theory and applications, Jones and Bartlett , 2010.

OR

GENERIC ELECTIVES (FOUR PAPERS CHOICE)

Generic Elective Paper I

CALCULUS AND DIFFERENTIAL EQUATIONS

Objective: Calculus invented by Newton and Leibnitz is powerful analytical tool to solve mathematical problems which arise in all branches of science and engineering. The main emphasis of this course is to equip the student with necessary analytic and technical skills to handle problems of a mathematical nature as well as practical problems using calculus and differential equation. The aim should be to expose the students to basic ideas quickly without much theoretical emphasis with importance on applications.

Excepted Outcomes: After completing the course, students are expected to be able to apply knowledge of calculus and differential equations in the areas of their own interest.

UNIT-I

Curvature, Asymptotes, Tracing of Curves (Catenary, Cycloid, Folium of Descartes), Rectification, Quadrature, Elementary ideas about Sphere, Cones, Cylinders and Conicoids.

UNIT-II

Reviewoflimits,continuityanddifferentiabilityoffunctionsofonevariable and their properties, Rolle's theorem, Mean value theorems, Taylor's theorem with Lagrange's theorem and Cauchy's form of remainder, Taylor's series, Maclaurin's series of $sinx, cosx, e^x, \log(1+x), (1+x)^m$, L' Hospital's Rule, other Intermediate forms.

UNIT-III

Limitand Continuity of functions of several variables, Partial derivatives, Partial derivatives of higher orders, Homogeneous functions, Change of variables, Mean value theorem, Taylors theorem and Maclaurin's theorem for functions of two variables(statements &applications), Maxima and Minima of functions of two and three variables, Implicit functions, Lagranges multipliers (Formulae & its applications), Concepts of Multiple integrals & its applications.

UNIT-IV

Ordinary Differential Equations of order one and degree one (variables separable, homogeneous, exact and linear). Equations of order one but higher degree.Second order linear equations with constant coefficients, homogeneous forms, Second order equations with variable coefficients, Variation of parameters.

BOOKS RECOMMENDED:

1. Shanti Narayan, P. K. Mittal, Differential Calculus, S. Chand, 2014.
2. Shanti Narayan, P. K. Mittal, Integral Calculus, S. Chand, 2014.
3. S.C. Mallik and S. Arora-Mathematical Analysis, New Age International Publications.
4. J. Sinharoy and S. Padhy: A Course of Ordinary and Partial Differential Equations, Kalyani Publishers.

BOOKS FOR REFERENCE:

1. H. Anton, I. Bivens and S.Davis, *Calculus*, 10th Ed., John Wiley and Sons (Asia) P. Ltd., Singapore, 2002.

2. Shanti Narayan and P.K. Mittal-Analytical Solid Geometry, S. Chand & Company Pvt. Ltd., New Delhi.

3. Martin Braun-Differential Equations and their Applications-Martin Braun, Springer International.

4. B. P.Acharya and D. C. Sahu: Analytical Geometry of Quadratic Surfaces, Kalyani Publishers.

Generic Elective Paper II

ALGEBRA

Objective: This is a preliminary course for the basic courses in mathematics like, abstract algebra and linear algebra. The objective is to acquaint students with the properties of natural numbers i.e. Euclidean algorithm, congruence relation, fundamental theorem of arithmetic, etc. The basics of linear algebra i.e. vector spaces, matrices are introduced here.

Expected Outcomes: The acquired knowledge will help students to study further courses in mathematics like, group theory, ring theory and field theory and linear algebra. It has applications not only in higher mathematics but also in other science subjects like computer science, statistics, physics, chemistry etc.

UNIT-I

Sets ,relations, Equivalence relations, partial ordering, well ordering, Functions, Composition of functions, Invertible functions, One to one correspondence and cardinality of a set, statements, compound statements, proofs in Mathematics, Truth tables, Algebra of propositions, logical arguments

UNIT-II

Well-ordering property of positive integers, Division algorithm, Divisibility and Euclidean algorithm, Congruence relation between integers, Principles of Mathematical Induction, statement of Fundamental Theorem of Arithmetic.

UNIT-III

Matrices, algebra of matrices , determinants, fundamental properties, minors and cofactors, product of determinant, adjoint and inverse of a matrix, Rank and nullity of a matrix, Systems of linear equations, row reduction and echelon forms, solution sets of linear systems, applications of linear systems,.

UNIT-IV

Vector spaces and subspaces, examples, linear independence, linear dependence, basis, dimension, examples, Introduction to linear transformations, ,matrix representation of a linear transformation, Eigen values, Eigen vectors of amatrix.

BOOKS RECOMMENDED:

1 Edgar G. Goodaire and Michael M. Parmenter, Discrete Mathematics with Graph Theory, 3rd Ed., Pearson Education (Singapore) P. Ltd., Indian Reprint, 2005.

2 V Krishna Murthy, V P Mainra, J L Arora, An Introduction to Linear Algebra , Affiliated East-West Press Pvt. Ltd

BOOKS FOR REFERENCE:

1. David C. Lay, Linear Algebra and its Applications, 3rd Ed., Pearson Education Asia, Indian Reprint,2007.
2. B S Vatsa and Suchi Vatsa Theory of Matrices New age International third edition 2010.
3. Ward Cheney, David Kincaid. Linear algebra theory and applications, Jones and Bartlett ,2010

Generic Elective Paper III

REAL ANALYSIS

Objective: The objective of the course is to have the knowledge on basic properties of the field of real numbers, studying Bolzano-Weiersstrass Theorem , sequences and convergence of sequences, series of real numbers and its convergence etc. This is one of the core courses essential to start doing mathematics.

Expected Outcome: On successful completion of this course, students will be able to handle fundamental properties of the real numbers that lead to the formal development of real analysis and understand limits and their use in sequences, series, differentiation and integration. Students will appreciate how abstract ideas and rigorous methods in mathematical analysis can be applied to important practical problems.

UNIT-I

Review of Algebraic and Order Properties of *R,* ε-neighborhood of a point in *R,* Idea of countable sets, uncountable sets and uncountability of *R,* Bounded above sets, Bounded below sets, Bounded Sets, Unbounded sets, Suprema and Infima, The Completeness Property of *R,* The Archimedean Property, Density of Rational (and Irrational) numbers in *R.*

UNIT-II

Intervals, Interior point, Open Sets, Closed sets, Limit points of a set , Illustrations of Bolzano-Weierstrass theorem for sets, closure, interior and boundary of a set. Sequences, Bounded sequence, Convergent sequence, Limit of a sequence. Limit Theorems, Monotone Sequences, Monotone Convergence Theorem. Subsequences, Divergence Criteria, Monotone Subsequence Theorem (statement only). Bolzano Weierstrass Theorem for Sequences, Cauchy sequence, Cauchy's Convergence Criterion.

UNIT-III

Infinite series, convergence and divergence of infinite series, Cauchy Criterion, Tests for convergence: Comparison test, Limit Comparison test, Ratio Test, Cauchy's nth root test, Integral test, Alternating series, Leibniz test, Absolute and Conditional convergence.

UNIT-IV

Sequence and Series of functions, pointwise and uniform convergences, M_n test, M test, statement of results about uniform convergence, differentiability and integrability of function, power series and radius of convergence.

BOOKS RECOMMENDED:

1. S.C. Mallik and S. Arora- Mathematical Analysis, New Age International Publications.
2. G. Das and S. Pattanayak, Fundamentals of Mathematical Analysis, TMH Publishing Co.

BOOKS FOR REFERENCE:

1. R.G. Bartle and D. R. Sherbert, Introduction to Real Analysis (3rd Edition), John Wiley and

Sons (Asia) Pvt. Ltd., Singapore,2002.

2. A. Kumar, S. Kumaresan, *A basic course in Real Analysis*, CRC Press, 2014.
3. Brian S. *Thomson*, Andrew. M. *Bruckner*, and Judith B. *Bruckner*, *Elementary Real Analysis,* Prentice Hall,2001.
4. Gerald G. Bilodeau, Paul R. Thie, G.E. Keough, *An Introduction to Analysis,* Jones & Bartlett, Second Edition, 2010.

Generic Elective Paper IV

NUMERICAL METHODS

Objective: Calculation of error and approximation is a necessity in all real life, industrial and scientific computing. The objective of this course is to acquaint students with various numerical methods of finding solution of different type of problems, which arises in different branches of science such as locating roots of equations, finding solution of nonlinear equations, systems of linear equations, differential equations, Interpolation, differentiation, evaluating integration.

Expected Outcome: Students can handle physical problems to find an approximated solution. After getting trained a student can opt for advance courses in Numerical analysis in higher mathematics. Use of good mathematical software will help in getting the accuracy one need from the computer and can assess the reliability of the numerical results, and determine the effect of round off error or loss of significance.

UNIT-I

Algorithms, Convergence, Bisection method, False position method, Fixed point iteration method, Newton’s method, Secant method.

Gauss Elimination and Gauss Jordan methods, LU decomposition, Gauss-Jacobi, Gauss-Siedel.

UNIT-II

Lagrange and Newton interpolation: linear and higher order, finite difference operators.

UNIT-III

Numerical differentiation: forward difference, backward difference and central Difference.

UNIT-IV

Integration: trapezoidal rule, Simpson's rule, Euler's method, Runge-Kutta methods of orders two and four.

BOOKS RECOMMENDED:

1. M.K. Jain, S.R.K. Iyengar and R.K. Jain, *Numerical Methods for Scientific and Engineering Computation*, 5th Ed., New age International Publisher, India, 2007.

BOOKS FOR REFERENCE:

1. S. S. Sastry, Introductory method for Numerical Analysis, PHI New Delhi,2012.
2. S. D. Conte and Carl De Boor, Elementary Numerical Analysis, Mc Graw Hill, 1980.

PROPOSED STRUCTURE OF THE +3 UNDER GRADUATE (B.A/B.SC) MATHEMATICS (PASS) SYLLABUS BASED ON CHOICE BASED CREDIT SYSTEM (CBCS)

Semester	Course Number	Title of the Course	Number of credits assigned to the course		Total Credits
			Theory	Practical(P)/ Tutorial((T)	
DSC 4 PAPERS					
	MATH- DSC-1	Calculus and Differential equations	5	1	6
	MATH-DSC2	Algebra	5	1	6
	MATH-DSC-3	Real Analysis	5	1	6
	MATH-DSC-4	Numerical Methods	5	1	6
DSE 2 PAPERS					
	MATH- DSE-1	Group Theory	5	1	6
	MATH-DSE-2	Linear Programming	5	1	6
				TOTAL	36

B.A./B.SC.(PASS)-MATHEMATICS

MATHEMATICS PAPERS FOR PASS STUDENTS

Discipline Specific Core – 4 papers

Discipline Specific Elective – 2 papers

Marks per paper –Mid term : 20 marks, End term : 80 marks

Total – 100 marks Credit per paper – 6

Teaching hours per paper – 50 hours Theory classes + 10 hours tutorial

Discipline Specific Core Paper I

CALCULUS AND DIFFERENTIAL EQUATIONS

Objective: Calculus invented by Newton and Leibnitz is powerful analytical tool to solve mathematical problems which arise in all branches of science and engineering. The main emphasis of this course is to equip the student with necessary analytic and technical skills to handle problems of a mathematical nature as well as practical problems using calculus and differential equation. The aim should be to expose the students to basic ideas quickly without much theoretical emphasis with importance on applications.

Excepted Outcomes: After completing the course, students are expected to be able to apply knowledge of calculus and differential equations in the areas of their own interest.

UNIT-I

Curvature, Asymptotes, Tracing of Curves (Catenary, Cycloid, Folium of Descartes), Rectification, Quadrature, Elementary ideas about Sphere, Cones, Cylinders and Conicoids.

UNIT-II

Review of limits, continuity and differentiability of functions of one variable and their properties, Rolle's theorem, Mean value theorems, Taylor's theorem with Lagrange's theorem and Cauchy's form of remainder, Taylor's series, Maclaurin's series of $sinx, cosx, e^x, \log(1+x), (1+x)^m$, L' Hospital's Rule, other Intermediate forms.

UNIT-III

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UNIT-IV

Ordinary Differentia lEquations o order one and degree one (variables separable, homogeneous, exact and linear). Equations of order one but higher degree. Second order linear equations with constant coefficients, homogeneous forms, Second order equations with variable coefficients,V ariationofparameters.

BOOKS RECOMMENDED:

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2. Shanti Narayan, P. K. Mittal, Integral Calculus, S. Chand, 2014.
3. S.C. Mallik and S. Arora-Mathematical Analysis, New Age International Publications.
4. J. Sinharoy and S. Padhy: A Course of Ordinary and Partial Differential Equations, Kalyani Publishers.

BOOKS FOR REFERENCE:

1. H.Anton,I.Bivensand S.Davis,*Calculus*,10thEd.,JohnWileyand Sons(Asia)P.Ltd., Singapore, 2002.
2. Shanti Narayan and P.K. Mittal-Analytical Solid Geometry, S. Chand & Company Pvt. Ltd., New Delhi.
3. Martin Braun-Differential Equations and their Applications-Martin Braun, Springer International.
4. B. P.Acharya and D. C. Sahu: Analytical Geometry of Quadratic Surfaces, Kalyani Publisher

Discipline Specific Core Paper II

ALGEBRA

Objective: This is a preliminary course for the basic courses in mathematics like, abstract algebra and linear algebra. The objective is to acquaint students with the properties of natural numbers i.e. Euclidean algorithm, congruence relation, fundamental theorem of arithmetic, etc. The basics of linear algebra i.e. vector spaces, matrices are introduced here.

Expected Outcomes: The acquired knowledge will help students to study further courses in mathematics like, group theory, ring theory and field theory and linear algebra. It has applications not only in higher mathematics but also in other science subjects like computer science, statistics, physics, chemistry etc.

UNIT-I

Sets, relations, Equivalence relations, partial ordering, well ordering, Functions, Composition of functions, Invertible functions, One to one correspondence and cardinality of a set, statements, compound statements, proofs in Mathematics, Truth tables, Algebra of propositions, logical arguments

UNIT-II

Well-ordering property of positive integers, Division algorithm, Divisibility and Euclidean algorithm, Congruence relation between integers, Principles of Mathematical Induction, statement of Fundamental Theorem of Arithmetic.

UNIT-III

Matrices, algebra of matrices , determinants, fundamental properties, minors and cofactors, product of determinant, adjoint and inverse of a matrix, Rank and nullity of a matrix, Systems of linear equations, row reduction and echelon forms, solution sets of linear systems, applications of linear systems,.

UNIT-IV

Vector spaces and subspaces, examples, linear independence, linear dependence, basis, dimension, examples, Introduction to linear transformations, matrix representation of a linear transformation, Eigen values, Eigen vectors of a matrix.

BOOKS RECOMMENDED:

1. Edgar G. Goodaire and Michael M. Parmenter, Discrete Mathematics with Graph Theory, 3rd Ed., Pearson Education (Singapore) P. Ltd., Indian Reprint, 2005.
2. V Krishna Murthy, V P Mainra, J L Arora, An Introduction to Linear Algebra , Affiliated East-West Press Pvt. Ltd

BOOKS FOR REFERENCE:

1. David C. Lay, Linear Algebra and its Applications, 3rdEd., Pearson Education Asia, Indian Reprint, 2007.
2. B S Vatsa and Suchi Vatsa Theory of Matrices New age International third edition, 2010.

3. Ward Cheney, David Kincaid. Linear algebra theory and applications, Jones and Bartlett, 2010.

Discipline Specific Core Paper III

REAL ANALYSIS

Objective: The objective of the course isto have the knowledge on basic properties of the field of real numbers, studying Bolzano- Weiersstrass Theorem , sequences and convergence of sequences, series of real numbers and its convergence etc. This is one of the core courses essential to start doing mathematics.

Expected Outcome: On successful completion of this course, students will be able to handle fundamental properties of the real numbers that lead to the formal development of real analysis and understand limits and their use in sequences, series, differentiation and integration. Students will appreciate how abstract ideas and rigorous methods in mathematical analysis can be applied to important practical problems.

UNIT-I

Review of Algebraic and Order Properties of R, ε-neighborhood of a point in R, Idea of countable sets, uncountable sets and uncountability of R, Bounded above sets, Bounded below sets, Bounded Sets, Unbounded sets, Suprema and Infima, The Completeness Property of R, The Archimedean Property, Density of Rational (and Irrational) numbers in R.

UNIT-II

Intervals, Interior point, Open Sets, Closed sets, Limit points of a set , Illustrations of Bolzano-Weierstrass theorem for sets, closure, interior and boundary of a set. Sequences, Bounded sequence, Convergent sequence, Limit of a sequence. Limit Theorems, Monotone Sequences, Monotone Convergence Theorem. Subsequences, Divergence Criteria, Monotone Subsequence Theorem (statement only). Bolzano Weierstrass Theorem for Sequences, Cauchy sequence, Cauchy's Convergence Criterion.

UNIT-III

Infinite series, convergence and divergence of infinite series, Cauchy Criterion, Tests for convergence: Comparison test, Limit Comparison test, Ratio Test, Cauchy's nth root test, Integral test, Alternating series, Leibniz test, Absolute and Conditional convergence.

UNIT-IV

Sequence and Series of functions, pointwise and uniform convergences, M_n test, M test, statement of results about uniform convergence, differentiability and integrability of function, power series and radius of convergence.

BOOKS RECOMMENDED:

1. S.C. Mallik and S. Arora-Mathematical Analysis, New Age International Publications.
2. G. Das and S. Pattanayak, Fundamentals of Mathematical Analysis, TMH Publishing Co.

BOOKS FOR REFERENCE:

1. R.G. Bartle and D. R. Sherbert, Introduction to Real Analysis (3rd Edition), John Wiley and Sons (Asia) Pvt. Ltd., Singapore,2002.
2. A.Kumar, S. Kumaresan, *A basic course in Real Analysis*, CRC Press, 2014.
3. BrianS.*Thomson*,Andrew. M.*Bruckner*, and JudithB. *Bruckner*, *ElementaryReal Analysis,* Prentice Hall,2001.
4. Gerald G. Bilodeau , Paul R. Thie, G.E. Keough, *An Introductionto Analysis,* Jones & Bartlett, Second Edition, 2010.

Discipline Specific Core Paper IV

NUMERICAL METHODS

Objective: Calculation of error and approximation is a necessity in all real life, industrial and scientific computing. The objective of this course is to acquaint students with various numerical methods of finding solution of different type of problems, which arises in different branches of science such as locating roots of equations, finding solution of nonlinear equations, systems of linear equations, differential equations, Interpolation, differentiation, evaluating integration.

Expected Outcome: Students can handle physical problems to find an approximated solution. After getting trained a student can opt for advance courses in numerical analysis in higher mathematics. Use of good mathematical software will help in getting the accuracy one need from the computer and can assess the reliability of the numerical results, and determine the effect of round off error or loss of significance.

UNIT-I

Algorithms, Convergence, Bisection method, False position method, Fixed point iteration method, Newton's method, Secant method.

Gauss Elimination and Gauss Jordan methods, LU decomposition, Gauss-Jacobi, Gauss-Siedel.

UNIT-II

Lagrange and Newton interpolation: linear and higher order, finite difference operators.

UNIT-III

Numerical differentiation: forward difference, backward difference and central Difference.

UNIT-IV

Integration: trapezoidal rule, Simpson's rule, Euler'smethod, Runge-Kutta methods of orders two and four.

BOOKS RECOMMENDED:

1. M.K. Jain, S.R.K. Iyengar and R.K. Jain, *Numerical Methods for Scientific and Engineering Computation*, 5th Ed., New age International Publisher, India, 2007.

BOOKS FOR REFERENCE:

1. S. S. Sastry, Introductory method for Numerical Analysis, PHI New Delhi, 2012.

2. S. D. Conte and Carl De Boor, Elementary Numerical Analysis, Mc Graw Hill, 1980.

Discipline Specific Elective Paper –I

GROUP THEORY

Objective: Group theory is one of the building blocks of modern algebra. Objective of this course is to introduce students to basic concepts of group theory and examples of groups and their properties. This course will lead to future basic courses in advanced mathematics, such as Group theory-II and ring theory.

Expected Outcomes: A student learning this course gets idea on concept and examples of groups and their properties. He understands cyclic groups, permutation groups, normal subgroups and related results. After this course he can opt for courses in ring theory, field theory, commutative algebras, linear classical groups etc. and can be apply this knowledge to problems in physics, computer science, economics and engineering.

UNIT-I

Symmetries of a square, Dihedral groups, definition and examples of groups including permutation groups and quaternion groups (illustration through matrices), elementary properties of groups, Subgroups and examples of subgroups, centralizer, normalizer, center of a group,

UNIT-II

Product of two subgroups, Properties of cyclic groups, classification of subgroups of cyclic groups, Cycle notation for permutations, properties of permutations, even and odd permutations, alternating group,

UNIT-III

Properties of cosets, Lagrange's theorem and consequences including Fermat's Little theorem, external direct product of a finite number of groups, normal subgroups, factor groups.

UNIT-IV

Cauchy's theorem for finite abelian groups, group homomorphisms, properties of homomorphisms, Cayley's theorem, properties of isomorphisms, first, second and third isomorphism theorems.

BOOKS RECOMMENDED:

1. Joseph A. Gallian, *Contemporary Abstract Algebra* (4th Edition), Narosa Publishing House, New Delhi,
2. John B. Fraleigh, *A First Course in Abstract Algebra,* 7th Ed., Pearson, 2002.

BOOK FOR REFERENCES:

1. M. Artin*, Abstract Algebra,* 2nd Ed., Pearson, 2011.
2. Joseph 1. Rotman, *An Introduction to the Theory of Groups,* 4th Ed., Springer Verlag, 1995.
3. I. N. Herstein, *Topics in Algebra,* Wiley Eastern Limited, India, 1975.

Discipline Specific Elective Paper –II

LINEAR PROGRAMMING

Objective: The objective of this course is to familiarize industrial problems to students with various methods of solving Linear Programming Problems, Transportation Problems, Assignment Problems and their applications. Also, students will know the application of linear Programming method in Game Theory.

Expected Outcomes: More knowledge on this topic in higher studies will help students to deal industrial models. This is also prerequisite for studying advanced courses in Nonlinear Programming Problems, Inventory Control Problem and Queuing Theory etc.

UNIT-I

Introduction to linear Programming problem, Theory of simplex method, optimality and unboundedness, the simplex alorithm, simplex method in tableau format, introduction to artificial variables, two-phase method, Big-M method and their comparison.

UNIT-II

Duality, formulation of the dual problem, primal-dual relationships, Fundamental Theorem of Duality, economic interpretation of the dual.

UNIT-III

Transportation problem and its mathematical formulation, northwest-corner method least cost method and Vogel approximation method for determination of starting basic solution, algorithm for solving transportation problem. Assignment problem and its mathematical formulation, Hungarian method for solving assignment problem.

UNIT-IV

Game theory: formulation of two person zero sum games, solving two person zero sum games, games with mixed strategies, graphical solution procedure, linear programming solution of games.

BOOKS RECOMMENDED:

1. Kanti Swarup, Operations Research, Sultan Chand & Sons, New Delhi. Books.

BOOKS FOR REFERENCE:

1. Mokhtar S. Bazaraa, John J. Jarvis and Hanif D. Sherali, *Linear Programming and Network Flows* (2nd edition), John Wiley and Sons, India, 2004.
2. Hillier and G.J. Lieberman, *Introduction to Operations Research- Concepts and Cases* (9th Edition), TataMcGraw Hill, 2010.
3. G. Hadley, *Linear Programming,* Narosa Publishing House, New Delhi, 2002.
4. Hamdy A. Taha, *Operations Research: An Introduction* (10th edition), Pearson, 2017

SKILL ENHANCEMENT COMPULSORY COURSES (SECC)

Optional for SECC II paper

Skill Enhancement Compulsory Courses (Option1)

COMPUTER GRAPHICS

Development of computer Graphics: Raster Scan and Random Scan graphics storages, displays processors and character generators, colour display techniques, interactive input/output devices. Points, lines and curves: Scan conversion, line-drawing algorithms, circle and ellipse generation, conic-section generation, polygon filling anti aliasing. Two-dimensional viewing: Coordinate systems, linear transformations, line and polygon clipping algorithms.

Books Recommended:

1. D. Hearn and M.P. Baker-Computer Graphics, 2nd Ed., PrenticeHall of India, 2004.
2. J. D. Foley, A van Dam, S.K. Feiner and J.F. Hughes-Computer Graphics: Principals and Practices, 2nd Ed., Addison-Wesley, MA, 1990.
3. D. F. Rogers-Procedural Elements in Computer Graphics, 2nd Ed., McGraw Hill Book Company, 2001.
4. D. F. Rogers and A. J. Admas-Mathematical Elements in Computer Graphics, 2nd Ed., McGraw Hill Book Company, 1990.

SKILL ENHANCEMENT COURSES (Option2)-

INFORMATION SECURITY

Overview of Security: Protection versus security; aspects of security data integrity, data availability, privacy; security problems, user authentication, Orange Book. Security Threats: Program threats, worms, viruses, Trojan horse, trap door, stack and buffer over flow; system threats- intruders; communication threats- tapping and piracy. Security Mechanisms: Intrusion detection, auditing and logging, tripwire, system-call monitoring.

Books Recommended:

1. C. Pfleeger and S. L. Pfleeger-Security in Computing, 3rd Ed., Prentice-Hall of India, 2007.
2. D. Gollmann-Computer Security, John Wiley and Sons, NY, 2002.
3. J. Piwprzyk, T. Hardjono and J. Seberry-Fundamentals of Computer Security, Springer-Verlag Berlin, 2003. 335
4. J.M. Kizza-Computer Network Security, Springer, 2007.
5. M. Merkow and J. Breithaupt-Information Security: Principles and Practices, Pearson Education, 2006.

Training Programmes to be Imparted

1. There should be training programs in MATLAB/ PYTHON/ R/ MATHEMATICA software for all college teachers to acquaint the teachers on state of the art. Experts from Indian Statistical Institute Kolkata and nearby IIT's should be invited for the programs to add to quality.

2. The faculty members in colleges/universities should be trained in the following courses at University or any Institute of Higher Learning.

   a) Advanced Group Theory
   b) Advanced Ring Theory
   c) Differential Equations & Mathematical Modeling
   d) Mathematical Finance
   e) Object Oriented Programming in C++
   f) Computer Graphics
   g) Information Security

3. Emphasis may be given for implementation of the programs as listed in the courses with Practical.

4. College/universities should be provided with the recommended set of books in adequate numbers.

5. There should be frequent visits to colleges/universities offering crash courses to initiate some of the new courses.

Required Equipment/Technical Experts

The following equipments/softwares shall be provided to colleges/universities for smooth running of practical/project:

1. There should be funding to Computer Lab with minimum of 15 computer systems for 30 students with licensed MATLAB/ PYTHON/R/MATHEMATICA software.
2. At least one computer programmer must be assigned in computer labs during practical sessions.

Guideline for the Newly Introduced "Ethics and Values" Compulsory Course

The new course "Ethics and Values" has been designed to be taught among the +3 under graduate degree course from the session 2021-2022 under AECC (i.e. Ability Enhancement Compulsory Course) which is as follows:

- Course Name Ethics and Values
- Total No. of Units - 6 Units (One unit per Semester)
- No. of credit to be awarded- 1 credit per semester (total 6 credits)
- No. of lectures per unit per semester- 15 classes of 45mintues duration
- Marks - 25 marks per unit per semester
Grand total 150marks for six semesters
- Total No. of subunits per unit- 4 subunits
- Course material available on- e-Books will be available on OSHEC website and e-Lectures on www.vtputkal.odisha.gov.in
- Teaching assignment - Classes can be assigned to teachers of any subject by the Principal.
- Question Paper Setter &Evaluator of Answer paper -Board of Studies (BOS) of State Public University and Autonomous colleges (Govt. /Govt. aided) Odisha will prepare the panel of question Paper Setter and Evaluator of Answer paper. Question setter may be instructed to prepare question papers as per CBCS model regulation 2018-19. Further, question setter will have to mandatorily supply the Scheme of Valuation along with question paper for evaluation.

Implementation:

All State Public Universities of Odisha (i.e. coming under HED) will implement the course "Ethics and Values" under AECC from the session 2021-2022.

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Ability Enhancement Courses in CBCS in Odisha:

Ability Enhancement Compulsory Courses (AECC)

1. Environmental Studies and Disaster Management- 4 credits
2. English/Hindi/MIL communication - 4 credits
3. Ethics and Values (EV) - 6 credits (1 credit per Unit/Semester)

B.A. / B. Com. / B. Sc. (Honors and Pass) Course

Course	Credit
Semester I	
AECC-I	**04**
AECC-(EV-I)	**01**
Semester II	
AECC-II	**04**
AECC-(EV-II)	**01**
Semester III	
AECC-(EV-III)	**01**
Semester IV	
AECC-(EV-IV)	**01**
Semester V	
AECC-(EV-V)	**01**
Semester VI	
AECC-(EV-VI)	**01**

Examination Question Pattern

- Duration of examination of each semester -1 hour
- There will be no mid-term examination (for 'Ethics and Value' Course)
- The question paper will be in bilingual format
- The question paper shall be divided into 3 parts

Part-I will carry 5 numbers of questions each carrying one mark [5 X 1]
Part-II will carry 5 numbers of questions each carrying two marks (within 50 words) [5 X 2]
Part-III will carry 2 numbers of questions each carrying five marks [2 X 5]
(Within 250 words)

The SGPA and CGPA will be calculated accordingly for awarding grades to the students.

Re

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Final
27/10

SUGGESTED CURRICULUM FOR THE PROPOSED COURSE

Ethics and Values

(Consisting of six modules of 1 credit each: 15 lectures per credit)

ODISHA STATE HIGHER EDUCATION COUNCIL
A-11, 2nd Floor, PUSTAK BHAVAN
SUKA BIHAR, BHOI NAGAR-751022
BHUBANESWAR, ODISHA

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OBJECTIVES/LEARNING GOALS OF THE COURSE

- Development of a good human being and a responsible citizen.
- Developing a sense of right and wrong leading to ethically correct behavior.
- Inculcating a positive attitude and a healthy work culture.

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SEMESTER-I

Unit-1

Title: - Issues Relating to Women

Total no. of Periods-15 **Full mark-25** **Credit point -1**

1.0 Aims of the Unit:

- *The module aims to generate a sensitivity among the students towards women*
- *Enable them to value the contributions of women, from family to the larger society*
- *To generate among them a distinct urge to respect women*
- *To appreciate that women should have equal status and equal entitlements as member of the society*

Learning Objectives:

After going through the contents of the module and the classroom transactions on the contents, the students are expected to

- Have changes in their perceptions and practices towards women
- Develop proper attitude towards women and value their work and contribution
- Come forward to challenge unethical treatments against women
- End gender based hierarchy and hegemony, remove the feeling that women are counter to men and bring about a complementarity among the hitherto existing gender binary
- Allow women to realize their self worth and contribute their best for betterment of the society
- Pioneer in creating a gender equal society where the well being, happiness and security of the women will be well protected ; contributing towards a better and happier society

Teaching Hours

1.1 Introduction:

1-2-3

General introduction on Ethics and Values, Gender equality as an essential precursor to social progress, the present scenario, Desirable gender related values.

1.2 Women and Family

4-5-6-7

Pre-natal sex selection, Gendered practices in the family, Gender based division of labour in the family, Marriage and women, Marriage and women's consent, Child marriage, Practice of dowry, Women and family violence.

1.3 Women and Work

8-9-10-11

Women's work: The Invisible hands, Exploitation of women at work, Gender Stereotyping at work, Glass ceiling, Women and pay gap, Sexual Harassment of women at work, Working women and role conflict.

1.4 Women, Community and Society

12-13-14-15

Violence against women in public spaces, Gender sensitive language and communication, Gendered language, Sexist Language, Gender neutral language, Women and property Rights, Women's property Rights in Indian Laws, The functionality of Women's Property Rights

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SEMESTER-II

Unit-2

Title: - Values and Good Citizenship

Total no. of Periods-15 **Full mark-25** **Credit point -1**

2.0 Aim of the Unit:

- Introducing the Salient features of Indian Constitution to students and to inculcate the sense of patriotism in them
- Encouraging them to Volunteer for social work
- Instilling appropriate work ethics in them

Learning Objectives:

- Understanding Basic Values of Indian Constitution
- Inculcating Volunteerism for Social change
- Helping students to become good human being and citizen

	Teaching Hours
2.1 Indian Constitution Salient Values of Preamble: Sovereign, Socialist, Secular, Democratic, Republic, Justice, Liberty, Equality and Fraternity.	**1-2-3**
2.2 Patriotism Patriotic Value and ingredients of nation building, Concept of Good citizenship, Emotional connection with the country, Duties of citizens and Qualities of good citizens	**4-5-6-7**
2.3 Volunteerism Concept and facets of Volunteerism and Leadership, Building a better society through Volunteerism, Blood Donation, Social Work, Helping the Aged, Environmental Protection	**8-9-10-11**
2.4 Work Ethics Punctuality, Cleanliness, Law abidingness, Rational Thinking and Scientific Temper	**12-13-14-15**

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SEMESTER-III

Unit-3

Title: - Issues of Drug, Tobacco and Alcohol Addiction

Total no. of Periods-15 **Full mark-25** **Credit point -1**

3.0 Aims of the Unit:

- Creating awareness about health and Societal hazards of drugs, tobacco and alcohol addiction
- Sensitizing students about professional support system for treatment and rehabilitation

Learning Objectives:

- The students become aware of the grave danger of consuming alcohol, tobacco and drugs
- Students would encourage their friends to remain away from tobacco ,alcohol , drugs and seek professional help when needed

Teaching Hours

3.1 Extent of the Problem

1-2-3-4

Extent of Drug and Tobacco addiction and alcoholism in India, Myths associated with them, Health hazards associated with them and how they have become silent killers

3.2 Socio- economic impact

5-6-7-8

Socio- economic impact of Drug and Tobacco addiction and alcoholism:

Loss of physical and mental strength, Loss of character, Loss of family ties and relationship, Loss of earning and livelihood potentials, Loss of societal respect and dignity etc

3.3 Laws to Address this Problem

9-10-11-12

Silent features of social legislation such as NDPS Act, 1985 and COTPA Act , 2003 , Mechanism and Government Schemes for prevention , de-addiction and rehabilitation

3.4 Role of Stake - holders

13-14-15

Provision of Tobacco free campus and role of students, Role of students in their family and immediate surroundings, Role of NGOs and other agencies

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SEMESTER-IV

Unit-4

Title: - Ethical Values for Student Life

Total no. of Periods-15 **Full mark-25** **Credit point -1**

4.0 Aims of the Unit:

- To familiarize the students with core values of Academics and Goals of Education
- To create an awareness about Unethical practices in the academics

Learning Objectives:

- The students will learn to behave ethically in the campus
- Exhibit respectful treatment to others in an organizational context
- Contribute to develop a positive social environment through active participation and cooperation with others

	Teaching Hours
4.1 Meaning and Objective of Education: Knowledge is power and quest for knowledge is the real meaning of education, not quest for Degree and qualifications; Real education builds character: Difference between Academic Qualification and Ability, Academic failure could be failure within the classroom, but not outside (i.e. Failed in exam, passed in life!)	**1-2-3**
4.2 Challenges for Ethical Practices in Institutions of Higher Education: Ragging, Suicide and Need for Educational Counseling, Violence vs. Peaceful Protest, Conflict resolution, Plagiarism and Violation of Intellectual property Rights, Cheating in Examination and other Fraudulent Practices	**4-5-6-7**
4.3 Inter personal Relation and Community Life in HEI: Green Preacher and conservation of Energy, Community Life in Campus including Hostels, Local Common area, Inter personal relations (Students-Teacher, Students-Student and Man-Woman, Positive Friendship).	**8-9-10-11**
4.4 Ethical Leadership in Academic Institution: Concept and Traits of Leadership to provide solution, everyone has Leadership Role (not limited to position), Concept of Ethical leadership, Scope of Leadership in college and Universities for Students, Teachers and Administrators, Importance of co-curricular and extra – curricular activities.	**12-13-14-15**

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SEMESTER-V
Unit-5

Title: -Vulnerable Sections of Society: Understanding their Issues

Total no. of Periods-15 **Full mark-25** **Credit point -1**

5.0 Aims of the Unit:

To create an awareness amongst students about the need for ensuring dignity and equality for the vulnerable sections of the society.

Learning Objectives:

- Students would be able to appreciate values and ethics relating to vulnerable sections of the society.
- Students would learn to practice equality, diversity and social justice.
- Students would become more empathetic and compassionate towards vulnerable sections of the society.

	Teaching Hours
5.1 Issues Relating to Children: Nutrition and health, Child Exploitation: Child labour, trafficking, Sexual exploitation	**1-2-3-4**
5.2 Issues Relating to Elderly Persons: Abuse of Elders, Financial Insecurity, Loneliness and Social Insecurity, Health Care Issues, Needs for a Happy and Dignified Ageing	**5-6-7-8**
5.3 Issues Relating to Persons with disability: Rights of PWD, affirmative action, Prevention of discrimination, providing equal opportunity, various scheme for empowering PWD and social justice for PWD	**9-10-11-12**
5.4 Issues Relating to Third Gender: Understanding the Third Gender, Social justice for them, Removal of discrimination, Affirmative action and Acceptance of diversity of gender.	**13-14-15**

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SEMESTER-VI

Unit-6

Title: - Environmental &Techno Ethics

Total no. of Periods-15 **Full mark-25** **Credit point -1**

Aims of the Unit:

- To develop awareness and sensitize students about the importance of environment for a sustainable earth and to bring Green Technology into action
- To focus their attention towards cleanliness, preservation of biodiversity and practice of conservation of natural resources
- To make them understand the judicious use of modern technology strictly on need basis
- To use science and technology for preservation of environment and its sustainable development but not for destruction.

Learning Objectives:

- Develop an understanding of environmental ethics and work towards sustainable development
- Commitment to Green Technology for sustainable future
- Understand ethical issues relating to use of digital medium

Teaching Hours

6.1 Environmental Ethics:

Types of Ecological Values, Environmental Values & Valuing Nature, Equitable use of Resources, Role of Individual in the conservation of resources for future generation, Bio-Ethics-Genetic manipulation in plants and animals for benefit of society and cruelty against animal.

1-2-3

6.2 Promotion of Green Technology:

Goal of Green Technology: Reduce recycling, **Renew** (removal of chemicals), **Refuse** and **Responsibility.**

Green Technology in relation to: -Energy and Construction.

4-5-6-7

6.3 Ethics and Technology with reference to Science, gadget, machine etc. and interaction with each other;

Agricultural, Industrial, Digital, Globalized Age etc

8-9-10-11

6.4 Judicious Use of Technology:

12-13-14-15

Judicious use of Mobile Phones, Electrical machines, Plastics, Television, Computers and their harmful effects

Ethics and Use of Digital Technology: Cyber ethics- Crimes and Ethical hacking,

Ethics of social media: WhatsApp, Facebook, Twitter and others.

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STATE MODEL SYLLABUS FOR UNDERGRADUATE COURSE IN ODIA

+3, Arts, Science & Commerce

(Under Choice Based Credit System)

ପସନ୍ଦ ଓ ଆସ୍ଥାଭିତ୍ତିକ ପାଠ୍ୟଖସଡ଼ା : ସ୍ନାତକ (ଓଡ଼ିଆ ସମ୍ମାନ)

୨୦୧୯-୨୦

CBCS : BA (Hons.) 2019-20

Core Course – ପ୍ରଧାନ ପାଠ୍ୟାଂଶ

ମୋଟ୍ ପତ୍ର ସଂଖ୍ୟା – ୧୪

ପ୍ରତ୍ୟେକ ପତ୍ର – ୧୦୦ ମୂଲ୍ୟାଙ୍କ ବିଶିଷ୍ଟ (୨୦ ନମ୍ବର ମହାବିଦ୍ୟାଳୟ ସ୍ତରୀୟ ଅନ୍ତଃ ପର୍ଯ୍ୟାୟ ପରୀକ୍ଷା + ୮୦ ବିଶ୍ୱବିଦ୍ୟାଳୟ ସ୍ତରୀୟ ମାନକ ଅନ୍ତିମ ପରୀକ୍ଷା)

ସମ୍ମାନ : ଜଣେ ସ୍ନାତକ – ସମ୍ମାନର (ଅନର୍ସ) ବିଦ୍ୟାର୍ଥୀ – ମୋଟ୍ ୧୪୦୦ ନମ୍ବରର ପରୀକ୍ଷା ଦେବେ ।

କ) ଅତି କମ୍‌ରେ (ମୋଟ୍) ୫୦ଟି କାର୍ଯ୍ୟ ନିର୍ଘଣ୍ଟ (ପିରିୟଡ୍)ରେ ଗୋଟିଏ ପତ୍ରର ପାଠଦାନ ଶେଷ ହେବ । ଗୋଟିଏ କାର୍ଯ୍ୟ ନିର୍ଘଣ୍ଟ ବା ପିରିୟଡ୍-୪୫ ମିନିଟ)

ଖ) ପ୍ରତ୍ୟେକ ପତ୍ର ୪ ଗୋଟି ୟୁନିଟ୍ / ଏକକ / ଉପାଂଶରେ ବିଭକ୍ତ ହୋଇଛି ।

ଗ) ପ୍ରତ୍ୟେକ ପତ୍ର ୬ ଆସ୍ଥାଭିତ୍ତିକ କାର୍ଯ୍ୟ ନିର୍ଘଣ୍ଟ (୪ + ୨ କ୍ରେଡିଟ୍) ପାଇବେ । ଗୋଟିଏ ଆସ୍ଥାଭତ୍ତିକ କାର୍ଯ୍ୟ ନିର୍ଘଣ୍ଟର ମହତ୍ତ୍ୱ ହେଉଛି – ୧୦ ପିରିୟଡ୍ ସହିତ ସମାନ ।

ମୋଟ ୧୪ ଗୋଟି ସମ୍ମାନ ପତ୍ରର ଆସ୍ଥାମୂଲ୍ୟାଙ୍କ (କ୍ରେଡିଟ୍) ହେଉଛି – ୧୪ x ୬ (୪ + ୨) = ୮୪ । ଏଥିମଧ୍ୟରୁ ୧୪ x ୪ = ୫୬ ତାତ୍ତ୍ୱିକ ପାଠ (Theory) ରହିବ ।

ଘ) ପରୀକ୍ଷା ପର୍ଯ୍ୟାୟକ୍ରମ (Semester) ଓ ପ୍ରସ୍ତାବିତ ପାଠ ଯୋଜନା :

ପ୍ରଥମ ଶିକ୍ଷାବର୍ଷ

୧ମ ପର୍ଯ୍ୟାୟ

ଦୁଇଟି ପତ୍ର ୧ମ ଓ ୨ୟ ପତ୍ର - ୧୦୦ + ୧୦୦ = ୨୦୦ ନମ୍ବର
(୧ମ ଓ ୨ୟ ପ୍ରଧାନ ପାଠ୍ୟାଂଶ)

୨ୟ ପର୍ଯ୍ୟାୟ

ଦୁଇଟି ପତ୍ର ୩ୟ / ୪ର୍ଥ ପତ୍ର ୧୦୦ + ୧୦୦ = ୨୦୦ ନମ୍ବର
(୩ୟ ଓ ୪ର୍ଥ ପ୍ରଧାନ ପାଠ୍ୟାଂଶ)

ଦ୍ୱିତୀୟ ଶିକ୍ଷାବର୍ଷ

୩ୟ ପର୍ଯ୍ୟାୟ

ତିନୋଟି ପତ୍ର ୫ମ, ୬ଷ୍ଠ ଓ ୭ମ ପତ୍ର (୫ମ, ୬ଷ୍ଠ, ୭ମ ପ୍ରଧାନ ପାଠ୍ୟାଂଶ)
୧୦୦+୧୦୦+୧୦୦= ୩୦୦ ନମ୍ବର

୪ର୍ଥ ପର୍ଯ୍ୟାୟ

ତିନୋଟି ପତ୍ର ୮ମ, ୯ମ ଓ ୧୦ମ ପତ୍ର- (୮ମ,୯ମ, ୧୦ମ ପ୍ରଧାନ ପାଠ୍ୟାଂଶ)
୧୦୦+୧୦୦+୧୦୦= ୩୦୦ ନମ୍ବର

ତୃତୀୟ ଶିକ୍ଷାବର୍ଷ

୫ମ ପର୍ଯ୍ୟାୟ

ଦୁଇଟି ପତ୍ର ୧୧ଶ ଓ ୧୨ଶ ପତ୍ର (୧୧ଶ, ୧୨ଶ ପ୍ରଧାନ ପାଠ୍ୟାଂଶ)
୧୦୦ + ୧୦୦ = ୨୦୦ ନମ୍ବର

୬ଷ୍ଠ ପର୍ଯ୍ୟାୟ

ଦୁଇଟି ପତ୍ର ୧୩ଶ ଓ ୧୪ଶ ପତ୍ର (୧୩ଶ, ୧୪ଶ ପ୍ରଧାନ ପାଠ୍ୟାଂଶ)
୧୦୦ + ୧୦୦ = ୨୦୦ ନମ୍ବର

ଶିକ୍ଷା ଅବଧି ୬ଟି ପରୀକ୍ଷା ୧୪ଗୋଟି ମୋଟ = ୧୪୦୦ ନମ୍ବର
୩ ବର୍ଷ ୬ଟି ପର୍ଯ୍ୟାୟ ପତ୍ର

3 years	Total	Total paper	Total number 1400	Total credits
Course	Semester-6	14		14 × 6 (4+2) = 84

ବିଦ୍ୟାର୍ଥୀମାନଙ୍କ ମୁକ୍ତ ମେଧାବୃତ୍ତି ପରୀକ୍ଷା ପାଇଁ ସେମାନଙ୍କ ପସନ୍ଦ ଓ ବୋଧଜ୍ଞାନମୂଳକ ଦୀର୍ଘ ଓ ସଂକ୍ଷିପ୍ତ ପ୍ରଶ୍ନ ପରୀକ୍ଷା ନିମନ୍ତେ ଉପସ୍ଥାପନା କରାଯିବ ।

ନମ୍ବର / ମୂଲ୍ୟାଙ୍କ ବିଭାଜନ ପଦ୍ଧତି :

୧. ପ୍ରତ୍ୟେକ ପ୍ରଧାନ ପାଠ୍ୟାଂଶ ବା ପ୍ରତ୍ୟେକ ପତ୍ର – ୧୦୦ ନମ୍ବର ବିଶିଷ୍ଟ
୨. ମହାବିଦ୍ୟାଳୟ ସ୍ତରୀୟ ଅନ୍ତଃପରୀକ୍ଷା – ୨୦ ନମ୍ବର
ବିଶ୍ୱବିଦ୍ୟାଳୟ ସ୍ତରୀୟ ମୁଖ୍ୟ ପରୀକ୍ଷା – ୮୦ ନମ୍ବର

୩. ବିଶ୍ୱବିଦ୍ୟାଳୟ ସ୍ତରୀୟ ମୁଖ୍ୟ ପରୀକ୍ଷା ନିମନ୍ତେ ନିମ୍ନମତେ ପ୍ରଶ୍ନ ହେବ :

କ) ପ୍ରତ୍ୟେକ ପତ୍ରର ପ୍ରତ୍ୟେକ ଏକକରୁ ୨ଟି କରି ୮ଟି ୧୫ ନମ୍ବର ବିଶିଷ୍ଟ ଦୀର୍ଘ ପ୍ରଶ୍ନ ପଡ଼ିବ । ବିଦ୍ୟାର୍ଥୀ ସେଥିରୁ ୪ଟି ପ୍ରଶ୍ନର ଉତ୍ତର ଦେବେ । ପ୍ରତ୍ୟକଏକକରୁ ଗୋଟିଏ ଲେଖାଏଁ ପ୍ରଶ୍ନର ଉତ୍ତରଦେବା ବାଧ୍ୟତାମୂଳକ । (୪ X ୧୫ = ୬୦ ନମ୍ବର)

ଖ) ପ୍ରତ୍ୟେକ ପତ୍ରର ପ୍ରତି ଏକକରୁ ୧୫ଟି ୨ ନମ୍ବର ବିଶିଷ୍ଟ ସଂକ୍ଷିପ୍ତ ପ୍ରଶ୍ନ ପଡ଼ିବ; ବିଦ୍ୟାର୍ଥୀ ସେଥିରୁ ୧୦ଟି ପ୍ରଶ୍ନର ଉତ୍ତର ଦେବେ । (୨ X ୧୦ = ୨୦)

ବିଶେଷ ଦ୍ରଷ୍ଟବ୍ୟ –

ଓଡ଼ିଆ ସମ୍ମାନ ୧୧ଶ ପତ୍ର, ୧୨ଶ ପତ୍ର, ୧୩ଶ ପତ୍ର ଓ ୧୪ଶ ପତ୍ର ଥିବା ପ୍ରତ୍ୟେକ ପତ୍ରର ପଞ୍ଚମ ଏକକର ପ୍ରକଳ୍ପ ପାଇଁ ୨୦ ନମ୍ବର ଓ ଅନ୍ତଃ ପରୀକ୍ଷା ପାଇଁ ୧୦ ନମ୍ବର ରହିବ ।

କ) ମୋଟ୍ ନମ୍ବର - ୧୦୦

ଖ) ଅନ୍ତଃ ପରୀକ୍ଷା - ୨୦ ଓ ମୁଖ୍ୟ ପରୀକ୍ଷା – ୬୦

ଗ) ପ୍ରକଳ୍ପ ପ୍ରସ୍ତୁତି – ୨୦

ଘ) ମୁଖ୍ୟ ପରୀକ୍ଷାରେ ପ୍ରତ୍ୟେକ ପତ୍ରର ପ୍ରଥମ ଚାରୋଟି ଏକକରୁ ଦୁଇଟି ଲେଖାଏଁ ୧୫ ନମ୍ବର ବିଶିଷ୍ଟ ୮ଟି ଦୀର୍ଘ ପ୍ରଶ୍ନ ପଡିବ; ସେଥିରୁ ପ୍ରତ୍ୟେକ ଏକକରୁ ଗୋଟିଏ ଲେଖାଏଁ ପ୍ରଶ୍ନର ଉତ୍ତର ଦେବା ବାଧ୍ୟତାମୂଳକ । (୧୫ X ୪ = ୬୦)

ଙ) ପ୍ରଥମ ୪ଟି ଏକକରୁ ୨ନମ୍ବର ବିଶିଷ୍ଟ ୧୫ଟି ସଂକ୍ଷିପ୍ତ ପ୍ରଶ୍ନ ପଡିବ । ସେଥିରୁ ୧୦ଟି ପ୍ରଶ୍ନର ଉତ୍ତର ଦେବାକୁ ହେବ । (୧୦ X ୨ = ୨୦)

ପ୍ରକଳ୍ପଗୁଡିକ ସାହିତ୍ୟଭିତ୍ତିକ ହେବା ଆବଶ୍ୟକ । ବିଭାଗମୁଖ୍ୟଙ୍କ ଅନୁମୋଦନକ୍ରମେ ବିଭାଗର ସମସ୍ତ ଅଧ୍ୟାପକ ଓ ଅଧ୍ୟାପିକାଙ୍କ ମଧ୍ୟରେ ଦିଗ୍‌ଦର୍ଶନ ନିମନ୍ତେ ସମାନ ଭାବରେ ବାଣ୍ଟିଦିଆଯିବ ।

ଭୂମିକା

ସ୍ନାତକ ଶ୍ରେଣୀରେ ଓଡ଼ିଆ ଭାଷା ଓ ସାହିତ୍ୟ ସମ୍ବନ୍ଧୀୟ ପାଠଦାନ ନିମନ୍ତେ ଏହି ପାଠ୍ୟଖସଡ଼ାଟି ପ୍ରସ୍ତୁତ ହୋଇଛି । ଏହାର ପ୍ରସ୍ତୁତି କ୍ଷେତ୍ରରେ ବିଶ୍ୱବିଦ୍ୟାଳୟ ଆୟୋଗଙ୍କ ପ୍ରାୟୋଜିତ "ପସନ୍ଦ ଓ ଆସ୍ଥାଭିତ୍ତିକ ନୂତନ ପାଠ୍ୟବିନ୍ୟାସ ପଦ୍ଧତି"କୁ ଗ୍ରହଣ କରାଯାଇଛି । ଏହି ପାଠ୍ୟଖସଡ଼ାଟି ସଦ୍ୟତମ ଭାଷା-ସାହିତ୍ୟ ସମ୍ବନ୍ଧୀୟ ଜ୍ଞାନ ବ୍ୟବସ୍ଥା ଓ ଚଳନ୍ତି ସମୟର ଉପଯୋଗିତାକୁ ଗ୍ରହିଁ ପ୍ରସ୍ତୁତ ହୋଇଛି । ଏହା ଓଡ଼ିଆ ଭାଷା ଓ ସାହିତ୍ୟର ଉନ୍ମେଷ, ବିକାଶ ସହିତ ଏହାର ସାଂପ୍ରତିକ ସ୍ଥିତି, ବ୍ୟାକରଣ ଓ ଭାଷାତାତ୍ତ୍ୱିକ ବୈଶିଷ୍ଟ୍ୟ ସଂପର୍କରେ ସବିଶେଷ ଧାରଣା ପ୍ରଦାନ କରିବ । ଓଡ଼ିଆ ସାହିତ୍ୟର ବ୍ୟାବହାରିକ ଦିଗ ଓ ମହତ୍ତ୍ୱ ପ୍ରତି ଏଥିରେ ଧାନ ଦିଆଯାଇଛି । ଓଡ଼ିଆ ସାହିତ୍ୟର ବିବିଧ ରୂପ, ସାହିତ୍ୟ-ଧାରା ଓ ବିଶିଷ୍ଟ ସାହିତ୍ୟ-ଲେଖକଙ୍କ ବହି ସହିତ ବିଦ୍ୟାର୍ଥୀଙ୍କୁ ଅବଗତ କରିବାରେ ପାଠ୍ୟଖସଡ଼ାଟି ସହାୟକ । ଓଡ଼ିଆ ଭାଷା ଓ ସାହିତ୍ୟକୁ ସର୍ବଭାରତୀୟ ଭାଷା ଓ ସାହିତ୍ୟ ତଥା ଅନ୍ତର୍ଜାତୀୟ ସାହିତ୍ୟ ବିଦ୍ୟା ସହିତ ବିଦ୍ୟାର୍ଥୀମାନଙ୍କୁ ପରିଚିତ କରାଇବାରେ ଏହା ବିଦ୍ୟାର୍ଥୀଙ୍କ ଉପଯୋଗୀ ହୋଇପାରିବ ।

ପାଠ୍ୟକ୍ରମର ସାରାଂଶ – ସଂରଚନା

Structure of B.A. (Honours) Odia Under CBCS

ପ୍ରଧାନ ପାଠ୍ୟାଂଶ (Core Course) : 14

ପ୍ରତ୍ୟେକ ପତ୍ରର କ୍ରେଡ଼ିଟସ୍ / ସମୟ ନିର୍ଘଣ୍ଟ = ୪ + ୨ = ୬ (୬୦ ପିରିଅଡ଼ସ୍)

ପ୍ରଥମ ପର୍ଯ୍ୟାୟ :

ପ୍ରଧାନ ପାଠ୍ୟାଂଶ - ୧ (Core Course – 1) ପ୍ରାଚୀନ ଓଡ଼ିଆ ସାହିତ୍ୟର ଇତିହାସ :
(ଚର୍ଯ୍ୟାପଦଠାରୁ ପଞ୍ଚସଖା ପର୍ଯ୍ୟନ୍ତ)
୧ମ ପତ୍ର - ସମୟ ନିର୍ଘଣ୍ଟ = ୪ + ୨ = ୬ (୬୦ ପିରିଅଡ଼ସ୍)

ପ୍ରଧାନ ପାଠ୍ୟାଂଶ – ୨ (Core Course – 2) ମଧ୍ୟଯୁଗୀୟ ଓଡ଼ିଆ ସାହିତ୍ୟ :
(ପ୍ରାକ୍‌ରୀତି, ରୀତି ଓ ଗୀତି ସାହିତ୍ୟ)
୨ୟ ପତ୍ର - ସମୟ ନିର୍ଘଣ୍ଟ = ୪ + ୨ = ୬

ଦ୍ୱିତୀୟ ପର୍ଯ୍ୟାୟ :

ପ୍ରଧାନ ପାଠ୍ୟାଂଶ – ୩ (Core Course – 3) ଆଧୁନିକ ଓଡ଼ିଆ ସାହିତ୍ୟ (ସ୍ୱାଧୀନତା ପୂର୍ବବର୍ତ୍ତୀ)
୩ୟ ପତ୍ର - ସମୟ ନିର୍ଘଣ୍ଟ = ୪ + ୨ = ୬

ପ୍ରଧାନ ପାଠ୍ୟାଂଶ – ୪ (Core Course – 4) ସ୍ୱାଧୀନତା ପରବର୍ତ୍ତୀ ଓଡ଼ିଆ ସାହିତ୍ୟ
୪ର୍ଥ ପତ୍ର - ମୂଲ୍ୟାଙ୍କ = ୪ + ୨ = ୬

ତୃତୀୟ ପର୍ଯ୍ୟାୟ :

ପ୍ରଧାନ ପାଠ୍ୟାଂଶ – ୫ (Core Course – 5) ଭାଷାର ସଂଜ୍ଞା ଓ ସ୍ୱରୂପ
୫ମ ପତ୍ର- ସମୟ ନିର୍ଘଣ୍ଟ ୪ + ୨ = ୬

ପ୍ରଧାନ ପାଠ୍ୟାଂଶ – ୬ (Core Course – 6) ଓଡ଼ିଆ ଭାଷାର ବୈଶିଷ୍ଟ୍ୟ ଓ ବିବିଧତା
ଷଷ୍ଠ ପତ୍ର- ସମୟ ନିର୍ଘଣ୍ଟ ୪ + ୨ = ୬

ପ୍ରଧାନ ପାଠ୍ୟାଂଶ – ୭ (Core Course – 7) ଓଡ଼ିଆ ବ୍ୟାବହାରିକ ବ୍ୟାକରଣ
ସପ୍ତମ ପତ୍ର - ସମୟ ନିର୍ଘଣ୍ଟ = ୪ + ୨ = ୬

ଚତୁର୍ଥ ପର୍ଯ୍ୟାୟ :

ପ୍ରଧାନ ପାଠ୍ୟାଂଶ – ୮ (Core Course – 8) ଓଡ଼ିଆ ଲୋକ ସଂସ୍କୃତି ଓ ଲୋକସାହିତ୍ୟ

୮ମ ପତ୍ର - ସମୟ ନିର୍ଘଣ୍ଟ = ୪ + ୨ = ୬

ପ୍ରଧାନ ପାଠ୍ୟାଂଶ – ୯ (Core Course – 9) ପ୍ରାଚ୍ୟ ଓ ପାଶ୍ଚାତ୍ୟ ସାହିତ୍ୟ ତତ୍ତ୍ୱ

୯ମ ପତ୍ର - ସମୟ ନିର୍ଘଣ୍ଟ = ୪ + ୨ = ୬

ପ୍ରଧାନ ପାଠ୍ୟାଂଶ – ୧୦ (Core Course-10) ଓଡ଼ିଆ ପଦ୍ୟ ସାହିତ୍ୟ (ପ୍ରାଚୀନରୁ ସ୍ୱାଧୀନତା ପର୍ଯ୍ୟନ୍ତ)

୧୦ମ ପତ୍ର - ସମୟ ନିର୍ଘଣ୍ଟ = ୪ + ୨ = ୬

ପଞ୍ଚମ ପର୍ଯ୍ୟାୟ :

ପ୍ରଧାନ ପାଠ୍ୟାଂଶ-୧୧ (Core Course - 11) ଓଡ଼ିଆ ନାଟକ ଓ ଏକାଙ୍କିକା

୧୧ଶ ପତ୍ର - ସମୟ ନିର୍ଘଣ୍ଟ = ୪ + ୨ = ୬

ପ୍ରଧାନ ପାଠ୍ୟାଂଶ-୧୨ (Core Course -12) ଓଡ଼ିଆ କଥା ସାହିତ୍ୟ (ଗଳ୍ପ ଓ ଉପନ୍ୟାସ)

୧୨ଶ ପତ୍ର - ସମୟ ନିର୍ଘଣ୍ଟ = ୪ + ୨ = ୬

ଷଷ୍ଠ ପର୍ଯ୍ୟାୟ :

ପ୍ରଧାନ ପାଠ୍ୟାଂଶ-୧୩ (Core Course -13) ଓଡ଼ିଆ ଗଦ୍ୟ ସାହିତ୍ୟ (ପ୍ରବନ୍ଧ, ଆତ୍ମଜୀବନୀ, ଭ୍ରମଣକାହାଣୀ)

୧୩ଶ ପତ୍ର - ସମୟ ନିର୍ଘଣ୍ଟ = ୪ + ୨ = ୬

ପ୍ରଧାନ ପାଠ୍ୟାଂଶ-୧୪ (Core Course- 14) ଓଡ଼ିଆ ଭାଷାର ବ୍ୟାବହାରିକ ପ୍ରୟୋଗ

୧୪ଶ ପତ୍ର - ସମୟ ନିର୍ଘଣ୍ଟ = ୪ + ୨ = ୬

ସବିଶେଷ ପାଠ୍ୟକ୍ରମ (Detail Syllabus)

ପ୍ରଥମ ପର୍ଯ୍ୟାୟ (Semester – 1)

ମୂଳ ପାଠ : ଓଡ଼ିଆ ସାହିତ୍ୟର ଇତିହାସ

ପ୍ରଧାନ ପାଠ୍ୟାଂଶ-୧ (Core Course - 1) : ପ୍ରାଚୀନ ଓଡ଼ିଆ ସାହିତ୍ୟର ଇତିହାସ

ପ୍ରଥମ ପତ୍ର

୧ମ ଏକକ / ୟୁନିଟ୍ – ୧ : ପ୍ରାକ୍-ସାରଳା ସାହିତ୍ୟ (ଚର୍ଯ୍ୟାଗୀତିକା ଓ ନାଥ ସାହିତ୍ୟ)
ସାମାଜିକ, ଧାର୍ମିକ, ସାହିତ୍ୟିକ ଓ ଭାଷାତାତ୍ତ୍ୱିକ ମୂଲ୍ୟାୟନ

୨ୟ ଏକକ / ୟୁନିଟ୍ – ୨ : ସାରଳା ସାହିତ୍ୟର ସାମାଜିକ, ସାଂସ୍କୃତିକ ଓ ସାହିତ୍ୟିକ ମୂଲ୍ୟ

୩ୟ ଏକକ / ୟୁନିଟ୍ – ୩ : ବଳରାମ ଦାସ ଓ ଜଗନ୍ନାଥ ଦାସ (ବିଶେଷ ଅଧ୍ୟୟନ)

୪ର୍ଥ ଏକକ / ୟୁନିଟ୍ – ୪ : ଅନନ୍ତ ଦାସ, ଯଶୋବନ୍ତ ଦାସ ଓ ଅଚ୍ୟୁତାନନ୍ଦ ଦାସ (ବିଶେଷ ଅଧ୍ୟୟନ)

ସହାୟକ ଗ୍ରନ୍ଥସୂଚୀ

୧. ଓଡିଆ ସାହିତ୍ୟର ଇତିହାସ – ସୂର୍ଯ୍ୟନାରାୟଣ ଦାଶ (୧ମ ଓ ୨ୟ ଭାଗ) – ଗ୍ରନ୍ଥ ମନ୍ଦିର, କଟକ
୨. ଓଡିଆ ସାହିତ୍ୟର ଆଦିପର୍ବ – ସୁରେନ୍ଦ୍ର ମହାନ୍ତି – କଟକ ଷ୍ଟୁଡେଣ୍ଟସ ଷ୍ଟୋର୍, କଟକ
୩. ଚର୍ଯ୍ୟା ଗୀତିକା- ଖଗେଶ୍ୱର ମହାପାତ୍ର, ଫ୍ରେଣ୍ଡସ୍ ପବ୍ଲିଶର୍ସ, କଟକ
୪. ଓଡ଼ିଶାର ନାଥ ସାହିତ୍ୟ - ବଂଶୀଧର ମହାନ୍ତି, ଫ୍ରେଣ୍ଡସ୍ ପବ୍ଲିଶର୍ସ, କଟକ
୫. ଓଡ଼ିଆ ସାହିତ୍ୟର ସଂକ୍ଷିପ୍ତ ପରିଚୟ - ବୃନ୍ଦାବନ ଚନ୍ଦ୍ର ଆଚାର୍ଯ୍ୟ,ଗ୍ରନ୍ଥ ମନ୍ଦିର, କଟକ
୬. ଓଡିଆ ସାହିତ୍ୟର ଇତିହାସ, ପ୍ରଥମ ଭାଗ, ବୈଷ୍ଣବ ଚରଣ ସାମଲ, ଫ୍ରଣ୍ଡସ୍ ପବ୍ଲିଶର୍ସ, କଟକ
୭. ଓଡିଆ ସାହିତ୍ୟର ମଧ୍ୟପର୍ବ – ସୁରେନ୍ଦ୍ର ମହାନ୍ତି – କଟକ ଷ୍ଟୁଡେଣ୍ଟସ ଷ୍ଟୋର୍, କଟକ
୮. ପଞ୍ଚସଖା ଓଡ଼ିଆ ସାହିତ୍ୟ - ଦେବେନ୍ଦ୍ର ମହାନ୍ତି, ଫ୍ରେଣ୍ଡସ୍ ପବ୍ଲିଶର୍ସ, କଟକ
୯. ଓଡ଼ିଆ ସାହିତ୍ୟର ଉନ୍ମେଷ ଓ ଉତ୍ତରଣ - ଦେବେନ୍ଦ୍ର ମହାନ୍ତି, ଫ୍ରେଣ୍ଡସ୍ ପବ୍ଲିଶର୍ସ, କଟକ
୧୦. ଓଡିଆ ସାହିତ୍ୟର ଇତିହାସ, ବଂଶୀଧର ମହାନ୍ତି (୧ମ ଓ ୨ୟ ଭାଗ), ଫ୍ରେଣ୍ଡସ୍ ପବ୍ଲିଶର୍ସ, କଟକ

ପ୍ରଧାନ ପାଠ୍ୟାଂଶ - ୨ (Core Course - 2) : ମଧ୍ୟଯୁଗୀୟ ଓଡ଼ିଆ ସାହିତ୍ୟ

ଦ୍ୱିତୀୟ ପତ୍ର

୧ମ ଏକକ / ୟୁନିଟ୍ – ୧ : ମଧ୍ୟଯୁଗୀୟ ଓଡ଼ିଆ ସାହିତ୍ୟର ପୃଷ୍ଠଭୂମି (ସାମାଜିକ, ସାଂସ୍କୃତିକ, ରାଜନୀତିକ ଓ ଧର୍ମୀୟ ପୃଷ୍ଠଭୂମି)

୨ୟ ଏକକ / ୟୁନିଟ୍ – ୨ : ମଧ୍ୟଯୁଗୀୟ କାବ୍ୟର ଆଙ୍ଗିକ ବୈଚିତ୍ର୍ୟ
(ବିଷୟ ବିନ୍ୟାସ, ଭାଷା, ଛନ୍ଦ ବୈଚିତ୍ର୍ୟ, ବର୍ଣ୍ଣନା ବୈଚିତ୍ର୍ୟ ଓ ଆଳଂକାରିକତା)

୩ୟ ଏକକ / ୟୁନିଟ୍ – ୩ : ମଧ୍ୟଯୁଗୀୟ କାବ୍ୟର ଆତ୍ମିକ ବିଭବ
(ରସ, ସୌନ୍ଦର୍ଯ୍ୟଚେତନା ଓ ଭାବାଦର୍ଶ)

୪ର୍ଥ ଏକକ / ୟୁନିଟ୍ – ୪ : ମଧ୍ୟଯୁଗୀୟ ଓଡିଆ ଗୀତି ପରମ୍ପରା (ଚଂପୂ, ଚଉପଦୀ, ଚଉତିଶା, ଭଜନ ଓ ଜଣାଣ)

ସହାୟକ ଗ୍ରନ୍ଥସୂଚୀ

୧. ଓଡିଆ ସାହିତ୍ୟର ଇତିହାସ – ସୂର୍ଯ୍ୟନାରାୟଣ ଦାଶ (୪ର୍ଥ ଭାଗ) – ଗ୍ରନ୍ଥ ମନ୍ଦିର, କଟକ
୨. ଭଞ୍ଜୀୟ କାବ୍ୟ ଭାବନା – ବେଣୀ ମାଧବ ପାଢୀ, ବ୍ରହ୍ମପୁର
୩. ଉପେନ୍ଦ୍ର ଭଞ୍ଜ ସାହିତ୍ୟ ଏକ ଅଧ୍ୟୟନ - ଜୟକୃଷ୍ଣ ମିଶ୍ର, ଓଡ଼ିଶା ରାଜ୍ୟ ପାଠ୍ୟ ପୁସ୍ତକ ପ୍ରଣୟନ ଓ ପ୍ରକାଶନ ସଂସ୍ଥା, ଭବନେଶ୍ୱର
୪. ମଧ୍ୟକାଳୀନ ଓଡ଼ିଆ ସାହିତ୍ୟ – କୃଷ୍ଣ ଚରଣ ସାହୁ, ଫ୍ରେଣ୍ଡ୍ସ ପବ୍ଲିଶସ୍, କଟକ

୫. ଭଞ୍ଜ ସାହିତ୍ୟର ବିଭା ଓ ବିଭବ - ସଚ୍ଚିଦାନନ୍ଦ ମିଶ୍ର, ଓଡ଼ିଶା ବୁକ୍ ଷ୍ଟୋର
୬. ଓଡିଆ ଗୀତିକାବ୍ୟ- ଜାନକୀବଲ୍ଲଭ ମହାନ୍ତି, ଫ୍ରେଣ୍ଡସ ପବ୍ଲିଶର୍ସ, କଟକ
୭. କାବ୍ୟକୌଶଳ- ସୁଦର୍ଶନ ଆଚାର୍ଯ୍ୟ, ଫ୍ରେଣ୍ଡସ ପବ୍ଲିଶର୍ସ, କଟକ

ଦ୍ୱିତୀୟ ପର୍ଯ୍ୟାୟ (Semester – II)

ପ୍ରଧାନ ପାଠ୍ୟାଂଶ - ୩ (Core Course - 3) : ଆଧୁନିକ ଓଡ଼ିଆ ସାହିତ୍ୟ

ତୃତୀୟ ପତ୍ର

୧ମ ଏକକ / ୟୁନିଟ୍ – ୧ : ଆଧୁନିକ ଓଡ଼ିଆ ସାହିତ୍ୟର ପୃଷ୍ଠଭୂମି ଓ ନବଜାଗରଣ (ଇଂରାଜୀ ଶିକ୍ଷା ବିସ୍ତାର, ପତ୍ରପତ୍ରିକା ପ୍ରକାଶନ, ମୁଦ୍ରଣଯନ୍ତ୍ର ପ୍ରତିଷ୍ଠା ଓ ଭାଷା ସୁରକ୍ଷା ଆନ୍ଦୋଳନ)

୨ୟ ଏକକ / ୟୁନିଟ୍ – ୨ : ଆଧୁନିକ ଓଡ଼ିଆ ସାହିତ୍ୟର ପ୍ରମୁଖ ସ୍ରଷ୍ଟା (ରାଧାନାଥଙ୍କ କାବ୍ୟ, ଗଙ୍ଗାଧରଙ୍କ କାବ୍ୟ, ମଧୁସୂଦନ ରାଓଙ୍କ କବିତା ଓ ଫକୀରମୋହନଙ୍କ ଉପନ୍ୟାସ ଓ ଗଳ୍ପ)

୩ୟ ଏକକ / ୟୁନିଟ୍ – ୩ : ଓଡ଼ିଆ ସାହିତ୍ୟରେ ସତ୍ୟବାଦୀଧାରା

୪ର୍ଥ ଏକକ / ୟୁନିଟ୍ – ୪ : ଓଡ଼ିଆ ସାହିତ୍ୟରେ ସବୁଜଧାରା ଓ ପ୍ରଗତିବାଦୀ ଧାରା

ସହାୟକ ଗ୍ରନ୍ଥସୂଚୀ

୧. ଓଡ଼ିଆ ସାହିତ୍ୟର ଇତିହାସ (୧୮୦୩-୧୯୨୦) ନଟବର ସାମନ୍ତରାୟ, ବାଣୀ ଭବନ, ଭୁବନେଶ୍ୱର
୨. ଓଡ଼ିଆ ସାହିତ୍ୟର ଇତିହାସ – ପ୍ରେମାନନ୍ଦ ମହାପାତ୍ର, ସତ୍ୟନାରାୟଣ ବୁକ୍ ଷ୍ଟୋର, କଟକ
୩. ମେହେର ସାହିତ୍ୟରେ ମାନବୀୟ ମହନୀୟତା- ମଣୀନ୍ଦ୍ର କୁମାର ମେହେର, ଗ୍ରନ୍ଥମନ୍ଦିର, କଟକ
୪. କାବ୍ୟଶିଳ୍ପୀ ଗଙ୍ଗାଧର - ଗୋବିନ୍ଦଚନ୍ଦ୍ର ଉଦ୍‌ଗାତା
୫. ଓଡିଆ ସାହିତ୍ୟରେ ରାଧାନାଥ ଓ ସତ୍ୟବାଦୀ ଯୁଗ, ପ୍ର. ବୈଷ୍ଣବ ଚରଣ ସାମଲ, ଫ୍ରେଣ୍ଡସ ପବ୍ଲିଶର୍ସ, କଟକ
୬. ସବୁଜରୁ ସାଂପ୍ରତିକ - ନିତ୍ୟାନନ୍ଦ ଶତପଥୀ, ଗ୍ରନ୍ଥ ମନ୍ଦିର, କଟକ
୭. ଓଡ଼ିଆ ସାହିତ୍ୟର ପ୍ରଗତିବାଦୀ ଧାରା – ବିଜୟ କୁମାର ଶତପଥୀ, ଓଡ଼ିଶା ବୁକ୍ ଷ୍ଟୋର, କଟକ

ପ୍ରଧାନ ପାଠ୍ୟାଂଶ - ୪ (Core Course - 4) : ସ୍ୱାଧୀନତା ପରବର୍ତ୍ତୀ ଓଡ଼ିଆ ସାହିତ୍ୟ

ଚତୁର୍ଥ ପତ୍ର

୧ମ ଏକକ / ୟୁନିଟ୍ – ୧ : ସ୍ୱାଧୀନତା ପରବର୍ତ୍ତୀ ଓଡ଼ିଆ କବିତା

୨ୟ ଏକକ / ୟୁନିଟ୍ – ୨ : ସ୍ୱାଧୀନତା ପରବର୍ତ୍ତୀ ଓଡ଼ିଆ କଥା ସାହିତ୍ୟ

୩ୟ ଏକକ / ୟୁନିଟ୍ – ୩ : ସ୍ୱାଧୀନତା ପରବର୍ତ୍ତୀ ଓଡ଼ିଆ ନାଟକ ଓ ଏକାଙ୍କିକା

୪ର୍ଥ ଏକକ / ୟୁନିଟ୍ – ୪ : ସ୍ୱାଧୀନତା ପରବର୍ତ୍ତୀ ଓଡ଼ିଆ ଗଦ୍ୟ ସାହିତ୍ୟ (ପ୍ରବନ୍ଧ, ଜୀବନୀ, ଆତ୍ମ ଜୀବନୀ ଓ ସମାଲୋଚନା)

ସହାୟକ ଗ୍ରନ୍ଥସୂଚୀ

୧. ସବୁଜରୁ ସାଂପ୍ରତିକ - ନିତ୍ୟାନନ୍ଦ ଶତପଥୀ, ଗ୍ରନ୍ଥ ମନ୍ଦିର, କଟକ
୨. ସତୁରୀରୁ ସହସ୍ରାବ୍ଦୀ - ନିତ୍ୟାନନ୍ଦ ଶତପଥୀ
୩. ଶହେ ବର୍ଷର ଓଡ଼ିଆ କ୍ଷୁଦ୍ରଗଳ୍ପ ଏକ ତାତ୍ତ୍ୱିକ ବିଶ୍ଳେଷଣ - କବିତା ବାରିକ, ବିଦ୍ୟାପୁରୀ, କଟକ
୪. ଉପନ୍ୟାସ ସାହିତ୍ୟର ପରିଚୟ - ସଂକଳନ - ପଠାଣି ପଟ୍ଟନାୟକ ଓ ଭୋଳାନାଥ ରାଉତ (୧ମ ଓ ୨ୟ ଭାଗ) ଓଡ଼ିଶା ବୁକ୍ ଷ୍ଟୋର, କଟକ
୫. ଓଡ଼ିଆ କ୍ଷୁଦ୍ର ଗଳ୍ପର ଇତିବୃତ୍ତ - ବୈଷ୍ଣବ ଚରଣ ସାମଲ, ବୁକ୍ସ ଆଣ୍ଡ୍ ବୁକ୍ସ, କଟକ
୬. ସ୍ୱାଧୀନତା ପରବର୍ତ୍ତୀ ଓଡିଆ ସାହିତ୍ୟର ଭୂମି ଓ ଭୂମିକା- ସଂ. ବୈଷ୍ଣବ ଚରଣ ସାମଲ, ଓଡିଶା ବୁକ୍ଷ୍ଟୋର, କଟକ
୭. ଓଡ଼ିଆ ନାଟକର ଉତ୍ତର ଆଧୁନିକ ପର୍ବ – ହେମନ୍ତ କୁମାର ଦାସ, ବିଦ୍ୟାପୁରୀ, କଟକ
୮. ସ୍ୱାଧୀନତତ୍ତୋର ଓଡିଆ ନାଟକ- ନାରାୟଣ ସାହୁ, ଓ. ରା. ପା. ପ୍ର. ଓ ପ୍ରକାଶନ ସଂସ୍ଥା, ଭୁବନେଶ୍ୱର
୯. ଓଡିଆ ନାଟ୍ୟସାହିତ୍ୟ - ସର୍ବେଶ୍ୱର ଦାସ, ଓ. ରା. ପା. ପ୍ର. ଓ ପ୍ରକାଶନ ସଂସ୍ଥା, ଭୁବନେଶ୍ୱର
୧୦. ଓଡିଆ ନାଟକର ଉଦ୍ଭବ ଓ ବିକାଶ - ରତ୍ନାକର ଚଇନି,
୧୧. ଓଡିଆ ଐତିହାସିକ ନାଟକର ମୂଳସୂତ୍ର - ନୀଳାଦ୍ରିଭୂଷଣ ହରିଚନ୍ଦନ
୧୨. ନାଟକର ବ୍ୟାପ୍ତି ଓ ଦୀପ୍ତି - ସଂଘମିତ୍ରା ମିଶ୍ର, ଅଗ୍ରଦୂତ, କଟକ
୧୩. ନାଟ୍ୟସୃଷ୍ଟି ଓ ନାଟ୍ୟଦୃଷ୍ଟି -ବିଷ୍ଣୁପ୍ରିୟା ଓତା, ଶିଶୁକଲମ, ଭୁବନେଶ୍ୱର
୧୪. ଓଡ଼ିଆ ସାହିତ୍ୟର ଇତିହାସ – ବାଉରୀ ବନ୍ଧୁ କର, ଫ୍ରେଣ୍ଡସ୍ ପବ୍ଲିଶର୍ସ, କଟକ
୧୫. ଓଡ଼ିଆ ଚରିତ ସାହିତ୍ୟ – ଲାବଣ୍ୟ ନାୟକ
୧୬. ଓଡ଼ିଆ ସମାଲୋଚନା ସାହିତ୍ୟ - ଅସିତ କବି

ତୃତୀୟ ପର୍ଯ୍ୟାୟ (Semester – III)

ପ୍ରଧାନ ପାଠ୍ୟାଂଶ - ୫ (Core Course - 5) : ଓଡ଼ିଆ ଭାଷା ଓ ଲିପିର ଐତିହାସିକ ବିକାଶକ୍ରମ

ପଞ୍ଚମ ପତ୍ର :

୧ମ ଏକକ / ୟୁନିଟ୍ – ୧ : ଓଡ଼ିଆ ଭାଷାର ଉଦ୍ଭବ ଓ ବିକାଶକ୍ରମ

୨ୟ ଏକକ / ୟୁନିଟ୍ – ୨ : ଓଡ଼ିଆ ଲିପିର ଐତିହାସିକ ବିବର୍ତ୍ତନ

୩ୟ ଏକକ / ୟୁନିଟ୍ – ୩ : ଓଡ଼ିଆ ଅଭିଲେଖର ଭାଷା (ଶିଳାଲେଖ, ତାମ୍ରଲେଖ ଓ ପ୍ରାଚୀନ ସନନ୍ଦ)

୪ର୍ଥ ଏକକ / ୟୁନିଟ୍ – ୪ : ଚର୍ଯ୍ୟାପଦ ଓ ସାରଳା ସାହିତ୍ୟର ଭାଷା

ସହାୟକ ଗ୍ରନ୍ଥସୂଚୀ

୧. ଓଡ଼ିଆ ଭାଷାର ଉନ୍ମେଷ ଓ ବିକାଶ – ବାସୁଦେବ ସାହୁ, ଫ୍ରେଣ୍ଡସ୍ ପବ୍ଲିଶର୍ସ, କଟକ
୨. ଓଡ଼ିଆ ଧ୍ୱନିତତ୍ତ୍ୱ ଓ ଶବ୍ଦ ସଂଭାର - ଧନେଶ୍ୱର ମହାପାତ୍ର, ଫ୍ରେଣ୍ଡସ୍ ପବ୍ଲିଶର୍ସ, କଟକ
୩. ଓଡ଼ିଆ ଭାଷା ଓ ଲିପିର କ୍ରମବିକାଶ – କୁଞ୍ଜ ବିହାରୀ ତ୍ରିପାଠୀ, ଓ.ରା.ପା.ପ୍ର. ଓ ପ୍ରକାଶନ ସଂସ୍ଥା, ଭୁବନେଶ୍ୱର
୪. ଓଡିଆ ଭାଷାତ ୍ୱର ରୂପଚିତ୍ର, ନଟବର ଶତପଥୀ, ବିଜୟିନୀ ପବ୍ଲିକେଶନ, କଟକ
୫. ଧ୍ୱନିବିଜ୍ଞାନ, ଗୋଲୋକ ବିହରୀ ଧଳ, ଓ. ରା. ପା. ପ୍ର. ଓ ପ୍ରକାଶନ ସଂସ୍ଥା, ଭୁବନେଶ୍ୱର

ପ୍ରଧାନ ପାଠ୍ୟାଂଶ - ୬ (Core Course - 6) : ଭାଷାର ସଂଜ୍ଞା ସ୍ୱରୂପ, ଓଡିଆ ଭାଷାର ବୈଶିଷ୍ଟ୍ୟ ଓ ବିବିଧତା

ଷଷ୍ଠ ପତ୍ର

୧ମ ଏକକ / ୟୁନିଟ୍ – ୧ : ଭାଷାର ସଂଜ୍ଞା, ସ୍ୱରୂପ ଓ ପ୍ରକାରଭେଦ

୨ୟ ଏକକ / ୟୁନିଟ୍ – ୨ : ଭାଷା ଉତ୍ପତ୍ତି ସମ୍ପର୍କୀୟ ବିଭିନ୍ନ ସିଦ୍ଧାନ୍ତ

୩ୟ ଏକକ / ୟୁନିଟ୍ – ୩ : ଓଡ଼ିଆ ଭାଷାର ଆଞ୍ଚଳିକ ରୂପ

୪ର୍ଥ ଏକକ/ୟୁନିଟ୍ – ୪ : ଓଡ଼ିଆ ଭାଷା ଉପରେ ବିଭିନ୍ନ ଭାଷାର ପ୍ରଭାବ (ଦ୍ରାବିଡ଼, ଅଷ୍ଟ୍ରିକ୍ ଯାବନିକ ଓ ଇଂରାଜୀ)

ସହାୟକ ଗ୍ରନ୍ଥସୂଚୀ

୧. ଭାଷାବିଜ୍ଞାନର ରୂପରେଖ – ବାସୁଦେବ ସାହୁ, ଫ୍ରେଣ୍ଡସ୍ ପବ୍ଲିଶର୍ସ, କଟକ
୨. ଭାଷାଶାସ୍ତ୍ର ପରିଚୟ – ଗୋଲୋକ ବିହାରୀ ଧଳ, ଓ.ରା.ପା.ପ୍ର. ଓ ପ୍ରକାଶନ ସଂସ୍ଥା, ଭୁବନେଶ୍ୱର
୩. ଓଡିଆ ଭାଷାର ସୃଷ୍ଟି ଓ ବିକାଶ – ଉପେନ୍ଦ୍ର ପ୍ରସାଦ ଦଳାଇ, ଏ.କେ.ମିଶ୍ର ପବ୍ଲିଶର୍ସ, କଟକ
୪. ଓଡ଼ିଆ ଭାଷାର ଉନ୍ମେଷ ଓ ବିକାଶ – ବାସୁଦେବ ସାହୁ, ଫ୍ରେଣ୍ଡସ୍ ପବ୍ଲିଶର୍ସ, କଟକ
୫. ଭାଷା ଭାବନା, ସଂ. ବିଜୟଲକ୍ଷ୍ମୀ ମହାନ୍ତି, ବିଦ୍ୟାପ୍ରକାଶନୀ, ଭୁବନେଶ୍ୱର
୬. ଓଡ଼ିଆ ଭାଷା ଓ ଭାଷା ବିଜ୍ଞାନ - ଦେବୀ ପ୍ରସନ୍ନ ପଟ୍ଟନାୟକ, ଗ୍ରନ୍ଥମନ୍ଦିର, କଟକ

ପ୍ରଧାନ ପାଠ୍ୟାଂଶ - ୭ (Core Course - 7) : ଓଡ଼ିଆ ବ୍ୟାବହାରିକ ବ୍ୟାକରଣ

୭ମ ପତ୍ର

୧ମ ଏକକ / ୟୁନିଟ୍ – ୧ : ଓଡ଼ିଆ ବର୍ଣ୍ଣ ବିଚାର, ବାକ୍ୟର ଗଠନ ରୀତି ଓ ପ୍ରକାରଭେଦ ।

୨ୟ ଏକକ / ୟୁନିଟ୍ – ୨ : କାରକ, ବିଭକ୍ତି, କୃଦନ୍ତ ଓ ତଦ୍ଧିତ

୩ୟ ଏକକ / ୟୁନିଟ୍ – ୩ : ଉପସର୍ଗ, ସନ୍ଧି ଓ ସମାସ

୪ର୍ଥ ଏକକ / ୟୁନିଟ୍ – ୪ : ଓଡିଆ ଶବ୍ଦସମ୍ଭାର

ସହାୟକ ଗ୍ରନ୍ଥସୂଚୀ

୧. ସର୍ବସାର ବ୍ୟାକରଣ - ନାରାୟଣ ମହାପାତ୍ର ଓ ଶ୍ରୀଧର ଦାସ, ନିୟୁ ଷ୍ଟୁଡେଣ୍ଟ ଷ୍ଟୋର୍, କଟକ
୨. ଆଧୁନିକ ଓଡ଼ିଆ ବ୍ୟାକରଣ - ଧନେଶ୍ୱର ମହାପାତ୍ର, କିତାବ ମହଲ, କଟକ
୩. ବ୍ୟାବହାରିକ ଓଡିଆ ବ୍ୟାକରଣ, ବିଜୟ ପ୍ରସାଦ ମହାପାତ୍ର, ବିଦ୍ୟାପୁରୀ, କଟକ
୪. ଓଡିଆ ଭାଷା ଚର୍ଚ୍ଚାର ପରଂପରା, ପ୍ରଫେସର ଗଗନେନ୍ଦ୍ର ନାଥ ଦାସ, ଓଡିଆ ଗବେଷଣା ପରିଷଦ, କଟକ

ଚତୁର୍ଥ ପର୍ଯ୍ୟାୟ (Semester – IV)

ପ୍ରଧାନ ପାଠ୍ୟାଂଶ - ୮ (Core Course - 8) : (ଓଡ଼ିଆ ଲୋକସଂସ୍କୃତି ଓ ଲୋକସାହିତ୍ୟ)

ଅଷ୍ଟମ ପତ୍ର

୧ମ ଏକକ / ୟୁନିଟ୍ – ୧ : ଲୋକ ସଂସ୍କୃତି ଓ ଲୋକସାହିତ୍ୟର ସଂଜ୍ଞା, ସ୍ୱରୂପ ଓ ପ୍ରକାରଭେଦ)

୨ୟ ଏକକ / ୟୁନିଟ୍ – ୨ : ଓଡ଼ିଆ ଲୋକଗୀତର ସ୍ୱରୂପ, ପ୍ରକାରଭେଦ ଓ ବିଭିନ୍ନ ଦିଗ

୩ୟ ଏକକ / ୟୁନିଟ୍ – ୩ : ଓଡ଼ିଆ ଲୋକକାହାଣୀର ସ୍ୱରୂପ ଓ ପ୍ରକାରଭେଦ

୪ର୍ଥ ଏକକ/ୟୁନିଟ୍ – ୪: ଓଡ଼ିଆ ଲୋକନାଟକର ସ୍ୱରୂପ ଓ ପ୍ରକାରଭେଦ (ପାଲା, ଦାସକାଠିଆ, ଦଣ୍ଡନାଚ, ଛଉନାଚ, ଲୀଳା, ଦଧି, ଡାଲଖାଇ ଓ କରମା)

ସହାୟକ ଗ୍ରନ୍ଥସୂଚୀ

୧. ଲୋକଧାରା, ଲୋକସଂସ୍କୃତି ଓ ଲୋକସାହିତ୍ୟ – କୁମୁଦ ରଞ୍ଜନ ପାଣିଗ୍ରାହୀ, ସୁଖ୍‌ଦୁଖ୍ ପବ୍ଲିକେଶନ, ସମ୍ବଲପୁର
୨. ଲୋକସଂସ୍କୃତି ଓ ଲୋକ ସାହିତ୍ୟ – କୃଷ୍ଣଚନ୍ଦ୍ର ପ୍ରଧାନ, ବିଦ୍ୟାପୁରୀ, କଟକ
୩. ଲୋକସାହିତ୍ୟ ତତ୍ତ୍ୱ- ଶ୍ୟାମ ସୁନ୍ଦର ମହାପାତ୍ର, ଓଡ଼ିଶା ବୁକ୍ ଷ୍ଟୋର୍, କଟକ
୪. ଓଡ଼ିଆ ଲୋକଗୀତି ସଂଚୟନ - କୁଞ୍ଜବିହାରୀ ଦାଶ, ବିଶ୍ୱ ଭାରତୀ ପ୍ରକାଶନ
୫. ପଲ୍ଲୀଗୀତି ସଞ୍ଚୟନ - କୁଞ୍ଜବିହାରୀ ଦାଶ, (୧ମ- ୨ୟ ଓ ୩ୟ ଭାଗ)
୬. ଲୋକସଂସ୍କୃତି-ଲୋକସାହିତ୍ୟ - ନାରାୟଣ ସାହୁ, ଚିନ୍ମୟ ପ୍ରକାଶନ, କଟକ
୭. ଓଡ଼ିଶାର ଦଣ୍ଡ ନାଟ - ସନ୍ତୋଷ କୁମାର ଶତପଥୀ, କେଦାର ପ୍ରିଣ୍ଟିଙ୍ଗ୍ ପ୍ରେସ୍, ଭୁବନେଶ୍ୱର
୮. ଓଡ଼ିଆ ଲୋକନାଟ୍ୟ - କଲଚରାଲ ଏକାଡ଼େମୀ, ରାଉରକେଲା
୯. ପଶ୍ଚିମ ଓଡିଶାର ଲୋକସଂସ୍କୃତି, ଡ. ସୁଶୀଳ କୁମାର ବାଗ୍
୧୦. ପଶ୍ଚିମ ଓଡିଶାର ଲୋକଗୀତ, ଦ୍ୱାରିକାନାଥ ନାୟକ, ଓଡ଼ିଶା ବୁକ୍ ଷ୍ଟୋର୍, କଟକ

୧୧. ଲୋକବିଶ୍ୱାସ ଓ ଲୋକାଚାର, ଡ. ସଦାନନ୍ଦ ନାୟକ, ବିଜୟ ବୁକ୍ ଷ୍ଟୋର୍, ବ୍ରହ୍ମପୁର

୧୨. ଉତ୍କଳ ଗାଉଁଲି ଗୀତ, ଚକ୍ରଧର ମହାପାତ୍ର, ଫ୍ରେଣ୍ଡସ୍ ପବ୍ଲିଶର୍ସ, କଟକ

୧୩. ଉତ୍କଳ ଗ୍ରାମ୍ୟ ଗୀତି – ଚକ୍ରଧର ମହାପାତ୍ର, ଓଡିଆ ସାହିତ୍ୟ ଏକାଡେମୀ

ପ୍ରଧାନ ପାଠ୍ୟାଂଶ - ୯ (Core Course - 9) : ସାହିତ୍ୟ ତତ୍ତ୍ୱ (ପ୍ରାଚ୍ୟ ଓ ପାଶ୍ଚାତ୍ୟ)

୯ମ ପତ୍ର

୧ମ ଏକକ / ୟୁନିଟ୍ – ୧ : ରସ ଓ ଧ୍ୱନି

୨ୟ ଏକକ / ୟୁନିଟ୍ – ୨ : ରୀତି, ବକ୍ରୋକ୍ତି ଓ ଅଳଂକାର

୩ୟ ଏକକ / ୟୁନିଟ୍ – ୩ : କ୍ଲାସିସିଜିମ୍, ରୋମାଣ୍ଟିସିଜିମ୍

୪ର୍ଥ ଏକକ / ୟୁନିଟ୍ – ୪ : ପ୍ରତୀକବାଦ, ଚିତ୍ରକଳ୍ପ

ସହାୟକ ଗ୍ରନ୍ଥସୂଚୀ

୧. ଅଳଙ୍କାର ପ୍ରସଙ୍ଗ – ଗୋବିନ୍ଦ ଚନ୍ଦ୍ର ଉଦ୍‌ଗାତା, ଫ୍ରେଣ୍ଡସ୍ ପବ୍ଲିଶର୍ସ, କଟକ

୨. ଭାରତୀୟ ସାହିତ୍ୟ ତତ୍ତ୍ୱ– ବନମାଳୀ ରଥ,ଓ.ରା.ପା.ପ୍ର. ଓ ପ୍ରକାଶନ ସଂସ୍ଥା, ଭୁବନେଶ୍ୱର

୩. ଓଡ଼ିଆ କାବ୍ୟ କୌଶଳ – ସୁଦର୍ଶନ ଆଚାର୍ଯ୍ୟ, ଫ୍ରେଣ୍ଡସ୍ ପବ୍ଲିଶର୍ସ, କଟକ

୪. ପାଶ୍ଚାତ୍ୟ ସାହିତ୍ୟ ଓ ସମୀକ୍ଷା ତତ୍ତ୍ୱ – କୃଷ୍ଣଚନ୍ଦ୍ର ପ୍ରଧାନ, ପ୍ରାଚୀ ସାହିତ୍ୟ ପ୍ରତିଷ୍ଠାନ, କଟକ

୫. ସାହିତ୍ୟର ସୂଚୀପତ୍ର, ବିଭୂତି ପଟ୍ଟନାୟକ, ଫ୍ରେଣ୍ଡସ୍ ପବ୍ଲିଶର୍ସ, କଟକ

ପ୍ରଧାନ ପାଠ୍ୟାଂଶ-୧୦ (Core Course - 10) : ଓଡ଼ିଆ କବିତା ପ୍ରାଚୀନରୁ ଆଧୁନିକ

୧୦ମ ପତ୍ର

୧ମ ଏକକ / ୟୁନିଟ୍ – ୧ : ସାରଳା ମହାଭାରତ (ଦୁର୍ଯ୍ୟୋଧନଙ୍କ ରକ୍ତନଦୀ ସନ୍ତରଣ)

୨ୟ ଏକକ / ୟୁନିଟ୍ – ୨ : ଭାଗବତ (୨୪ ଗୁରୁ ପ୍ରସଙ୍ଗ) - ଜଗନ୍ନାଥ ଦାସ

୩ୟ ଏକକ / ୟୁନିଟ୍ – ୩ : ଦୀନକୃଷ୍ଣ ଦାସଙ୍କ ରସକଲ୍ଲୋଳ(୧ମ ଛାନ୍ଦ) ଓ ଉପେନ୍ଦ୍ରଭଞ୍ଜଙ୍କ କୋଟିବ୍ରହ୍ମାଣ୍ଡ ସୁନ୍ଦରୀ (୧ମ ଛାନ୍ଦ)

୪ର୍ଥ ଏକକ / ୟୁନିଟ୍ – ୪ : ଆଧୁନିକ କବିତା

ମହାଯାତ୍ରା (ସପ୍ତମ ସର୍ଗ)- ଅମର୍ଷୀଙ୍କ ଉଦ୍‌ବୋଧନ (ରାଧାନାଥ ରାୟ)

ମଙ୍ଗଳେ ଅଇଲା ଉଷା – ଗଙ୍ଗାଧର ମେହେର

ବନ୍ଦୀର ସାନ୍ଧ୍ୟ ଅନୁଚିନ୍ତା - ଗୋପବନ୍ଧୁ ଦାସ

ପ୍ରତିମା ନାୟକ - ସଚ୍ଚିଦାନନ୍ଦ ରାଉତରାୟ

ସହାୟକ ଗ୍ରନ୍ଥସୂଚୀ

୧. ସାରଳା ମହାଭାରତ (ଗଦା ପର୍ବ-ସାରଳା ଦାସ)
୨. ଅବଧୂତ ଓ ଯଦୁରାଜା ସମ୍ବାଦ, ବୈଷ୍ଣବ ଚରଣ ସାମଲ, ଫ୍ରେଣ୍ଡସ ପବ୍ଲିଶର୍ସ, କଟକ
୩. କହେ କୃଷ୍ଣଦାସ କବି – କୃଷ୍ଣଚରଣ ସାହୁ, ବିଦ୍ୟାପୁରୀ, କଟକ
୪. ରସକଲ୍ଲୋଳ, ସଂପାଦନା – ଦେବେନ୍ଦ୍ର ମହାନ୍ତି
୫. ଦୁର୍ଲଭ ଦୀନକୃଷ୍ଣ - ଡ. ଜ୍ୟୋତିରଞ୍ଜନ ସାମଲ, ବିଜୟିନୀ ପବ୍ଲିକେସନ୍, କଟକ
୬. ତପସ୍ୱିନୀ ଓ ମେହେର ସାହିତ୍ୟ – ଗୌରୀ କୁମାର ବ୍ରହ୍ମା

ପଞ୍ଚମ ପର୍ଯ୍ୟାୟ (Semester – V)

ପ୍ରଧାନ ପାଠ୍ୟାଂଶ - ୧୧ (Core Course - 11) : ଓଡ଼ିଆ ନାଟକ ଓ ଏକାଙ୍କିକା

୧୧ଶ ପତ୍ର

୧ମ ଏକକ / ୟୁନିଟ୍ – ୧ : ରକ୍ତମାଟି - କାଳୀଚରଣ ପଟ୍ଟନାୟକ

୨ୟ ଏକକ / ୟୁନିଟ୍ – ୨ : ନନ୍ଦିକା କେଶରୀ - ମନୋରଞ୍ଜନ ଦାସ କିମ୍ବା ତଟନିରଞ୍ଜନା – ବିଜୟ ମିଶ୍ର
୩ୟ ଏକକ / ୟୁନିଟ୍ – ୩ : କୋକୁଆ – ବିଜୟ କୁମାର ଶତପଥୀ, ଅଗ୍ରଦୂତ, କଟକ କିମ୍ବା ଭୁଖା- ମଙ୍ଗଳୁଚରଣ ବିଶ୍ୱାଳ
୪ର୍ଥ ଏକକ / ୟୁନିଟ୍ – ୪ : ଏକାଙ୍କିକା- ସ୍ମୃତି ବିଭ୍ରାଟ - ପ୍ରାଣବନ୍ଧୁ କର ଓ ଛଦ୍ମବେଶୀ - ବିଶ୍ୱଜିତ୍ ଦାସ
୫ମ ଏକକ / ୟୁନିଟ୍ – ୫ : ପ୍ରକଳ୍ପ ପ୍ରସ୍ତୁତି

ସହାୟକ ଗ୍ରନ୍ଥସୂଚୀ

୧. ରକ୍ତମାଟି - କାଳୀଚରଣ ପଟ୍ଟନାୟକ
୨. ନନ୍ଦିକା କେଶରୀ-ମନୋରଞ୍ଜନ ଦାସ କିମ୍ବା ତଟନିରଞ୍ଜନା – ବିଜୟ ମିଶ୍ର
୩. କୋକୁଆ – ବିଜୟ କୁମାର ଶତପଥୀ, ଅଗ୍ରଦୂତ, କଟକ କିମ୍ବା ଭୁଖା- ମଙ୍ଗଳୁଚରଣ ବିଶ୍ୱାଳ
୪. ଅଶ୍ରୁ ନୁହେଁ ଅନଳ, ହେମନ୍ତ କୁମାର ଦାସ
୫. ସ୍ୱାଧୀନୋତ୍ତୋର ଓଡିଆ ନାଟକର ମନସ୍ତାତ୍ତ୍ୱିକ ବିଶ୍ଳେଷଣ, ରଶ୍ମିତା ରାଉତରାୟ, ବିଜୟିନୀ ପବ୍ଲିକେସନ, କଟକ
୬. ସାହିତ୍ୟ ସାଧକ ମଙ୍ଗଳୁଚରଣ ବିଶ୍ୱାଳ – ଗୌରିଦାସ ପ୍ରଧାନ
(ଚତୁର୍ଥ ପତ୍ର ନିମନ୍ତେ ପ୍ରଦତ୍ତ ସହାୟକ ପୁସ୍ତକଗୁଡିକ ଅନୁସରଣୀୟ ।)

ପ୍ରଧାନ ପାଠ୍ୟାଂଶ - ୧୨ (Core Course - 12) : (ଓଡ଼ିଆ କଥା ସାହିତ୍ୟ)

୧୨ଶ ପତ୍ର

୧ମ ଏକକ / ୟୁନିଟ୍ – ୧ : ଓଡ଼ିଆ କଥାସାହିତ୍ୟର ବିକାଶକ୍ରମ

୨ୟ ଏକକ / ୟୁନିଟ୍ – ୨ : ଛ'ମାଣ ଆଠଗୁଣ୍ଠ - ଫକୀର ମୋହନ ସେନାପତି

୩ୟ ଏକକ / ୟୁନିଟ୍ – ୩ : ଦାନାପାଣି - ଗୋପୀନାଥ ମହାନ୍ତି କିମ୍ବା ନୟନତାରା - ଦୟାନିଧି ମିଶ୍ର

୪ର୍ଥ ଏକକ / ୟୁନିଟ୍ – ୪ : ଗଳ୍ପ ସାହିତ୍ୟ

ପାଠ୍ୟ ଗଳ୍ପ: ଦେବତାର ବିଧାତା – ଗୋଦାବରୀଶ ମହାପାତ୍ର
ମାଂସର ବିଳାପ - କାଳିନ୍ଦୀ ଚରଣ ପାଣିଗ୍ରାହୀ
ମଧୁବନର ମେୟର - ମନୋଜ ଦାସ

୫ମ ଏକକ / ୟୁନିଟ୍ – ୫ : ପ୍ରକଳ୍ପ ପ୍ରସ୍ତୁତି

ସହାୟକ ଗ୍ରନ୍ଥସୂଚୀ

୧. ଓଡ଼ିଆ ଉପନ୍ୟାସ ସାହିତ୍ୟର ପରିଚୟ, ସଂ ପଠାଣି ପଟ୍ଟନାୟକ ଓ ଭୋଳାନାଥ ରାଉତ, ଓଡ଼ିଶା ବୁକ୍ ଷ୍ଟୋର୍, କଟକ
୨. ଓଡ଼ିଆ କ୍ଷୁଦ୍ରଗଳ୍ପର ଉନ୍ମେଷ ଓ ଉତ୍ତରଣ – ବୈଷ୍ଣବ ଚରଣ ସାମଲ, ଫ୍ରେଣ୍ଡସ୍ ପବ୍ଲିଶର୍ସ, କଟକ
୩. ଛ'ମାଣ ଆଠଗୁଣ୍ଠ - ଫକୀର ମୋହନ ସେନାପତି
୪. ଛ'ମାଣ ଆଠଗୁଣ୍ଠ ଭିନ୍ନ ଦୃଷ୍ଟି ଭିନ୍ନ ବ୍ୟାଖ୍ୟା, ପଞ୍ଚାନନ ମିଶ୍ର, ବିଜୟିନୀ ପବ୍ଲିକେସନ, କଟକ
୧. ଦାନାପାଣି - ଗୋପୀନାଥ ମହାନ୍ତି କିମ୍ବା ନୟନତାରା - ଦୟାନିଧି ମିଶ୍ର
୨. କଥାଶିଳ୍ପୀ ମନୋଜ ଦାସ - ଶତ୍ରୁଘ୍ନ ପାଣ୍ଡବ, ଫ୍ରେଣ୍ଡସ୍ ପବ୍ଲିଶର୍ସ, କଟକ
୩. ମନସ୍ୱୀ ମନୋଜ - ମଣୀନ୍ଦ୍ର କୁମାର ମେହେର, ଫ୍ରେଣ୍ଡସ୍ ପବ୍ଲିଶର୍ସ, କଟକ
୪. ଓଡିଆ ଉପନ୍ୟାସର ସମାଜତାତ୍ତ୍ୱିକ ଆଲୋଚନା - କଇଳାଶ ପଟ୍ଟନାୟକ, ବିଦ୍ୟାପୁରୀ, କଟକ

ଷଷ୍ଠ ପର୍ଯ୍ୟାୟ (Semester – VI)

ପ୍ରଧାନ ପାଠ୍ୟାଂଶ - ୧୩ (Core Course - 13) : ଓଡ଼ିଆ ଗଦ୍ୟ ସାହିତ୍ୟ

୧୩ଶ ପତ୍ର

୧ମ ଏକକ/ୟୁନିଟ୍ – ୧ : ଆତ୍ମ ଜୀବନୀ, ଭ୍ରମଣ କାହାଣୀ ଓ ସମାଲୋଚନା ତତ୍ତ୍ୱ (ସଂଜ୍ଞା, ସ୍ୱରୂପ ଓ ପ୍ରକାରଭେଦ)

୨ୟ ଏକକ / ୟୁନିଟ୍ – ୨ : ମୋ ଫୁଟା ଡଙ୍ଗାର କାହାଣୀ - ଫତୁରାନନ୍ଦ

୩ୟ ଏକକ / ୟୁନିଟ୍ – ୩: ପଶ୍ଚିମ ଆଫ୍ରିକାରେ ଓଡ଼ିଆ ଢେଙ୍କି - ଭୁବନେଶ୍ୱର ବେହେରା

୪ର୍ଥ ଏକକ / ୟୁନିଟ୍ – ୪ : ପ୍ରବନ୍ଧ - ଭାଷା ଓ ଜାତୀୟତା - ଗୋପବନ୍ଧୁ ଦାସ
ମୁଁ ସତ୍ୟଧର୍ମା କହୁଛି – ଚନ୍ଦ୍ରଶେଖର ରଥ
ବିବେକାନନ୍ଦ: ଏକ ଗୁହାମୁକ୍ତିର ପ୍ରୟାସ - ଚିତ୍ତରଂଜନ ଦାସ

୫ମ ଏକକ / ୟୁନିଟ୍ – ୫ : ପ୍ରକଳ୍ପ ପ୍ରସ୍ତୁତି

ସହାୟକ ଗ୍ରନ୍ଥସୂଚୀ

୧. ମୋ ଫୁଟା ଡଙ୍ଗାର କାହାଣୀ - ଫଂତୁରାନନ୍ଦ
୨. ପଶ୍ଚିମ ଆଫ୍ରିକାରେ ଓଡ଼ିଆ ଢେଙ୍କି - ଭୁବନେଶ୍ୱର ବେହେରା
୩. ଜୀବନୀ ସାହିତ୍ୟ ଏକ ଅଧ୍ୟୟନ - ପଠାଣି ପଟ୍ଟନାୟକ, ଓଡ଼ିଶା ପା.ପୁ.ପ୍ର.ଓ.ପ୍ର.ସଂସ୍ଥା, ଭୁବନେଶ୍ୱର
୪. ସମାଲୋଚନାର ଦିଗଦିଗନ୍ତ - ଖଗେଶ୍ୱର ମହାପାତ୍ର, ଫ୍ରେଣ୍ଡସ୍ ପବ୍ଲିଶର୍ସ, କଟକ
୫. ସାହିତ୍ୟ ଓ ସମାଲୋଚନା - କୁଞ୍ଜବିହାରୀ ଦାଶ, ଓଡ଼ିଶା ବୁକ୍ ଷ୍ଟୋର୍, କଟକ

ପ୍ରଧାନ ପାଠ୍ୟାଂଶ - ୧୪ (Core Course - 14) : **ଓଡ଼ିଆ ଭାଷାର ବ୍ୟାବହାରିକ ପ୍ରୟୋଗ**

୧୪ଶ ପତ୍ର

୧ମ ଏକକ / ୟୁନିଟ୍ – ୧ : ଭାଷଣ କଳା, ଦଳଗତ ଆଲୋଚନା ଓ ସାକ୍ଷାତକାର

୨ୟ ଏକକ / ୟୁନିଟ୍ – ୨ : ସମ୍ବାଦ ପ୍ରସ୍ତୁତି, ଫିଚର୍ ରଚନା ଓ ବିଜ୍ଞାପନ ପ୍ରସ୍ତୁତି

୩ୟ ଏକକ / ୟୁନିଟ୍ – ୩ : କାର୍ଯ୍ୟାଳୟରେ ଓଡ଼ିଆ ଲିଖନ ବିଧି

ନଥି ପ୍ରସ୍ତୁତି, ଅନୁବିଧି, ଟିପ୍ପଣୀ, ପ୍ରସ୍ତାବ, ଅନୁମୋଦନ, ଚିଠା ପ୍ରସ୍ତୁତି, ଅଧିସୂଚନା, ବିଜ୍ଞପ୍ତି, ଘୋଷଣା ଲିଖନ, ପତ୍ରଲିଖନ (ବ୍ୟକ୍ତିଗତ, ବ୍ୟାବସାୟିକ ଓ ସମ୍ପାଦକଙ୍କୁ ପତ୍ର)

୪ର୍ଥ ଏକକ / ୟୁନିଟ୍ – ୪ : ଓଡ଼ିଆ ଭାଷାର କମ୍ପ୍ୟୁଟରୀକରଣ, ସଫ୍ଟୱେୟାର୍ ଏବଂ ହାର୍ଡୱେୟାର, ଓଡ଼ିଆ ଫଣ୍ଟସ୍,କୀ-ବୋର୍ଡ, ୱାଡ ପ୍ରୋସେସିଂ, ବନାନ ଓ ବ୍ୟାକରଣଯାଞ୍ଚକ ପ୍ରକ୍ରିୟା, ଓଡ଼ିଆରେ ଇଣ୍ଟରନେଟ୍‌ର ବ୍ୟବହାର, ଓଡ଼ିଆ ସାମାଜିକ ୱେବ୍‌ସାଇଟ୍

୫ମ ଏକକ / ୟୁନିଟ୍ – ୫ : ପ୍ରକଳ୍ପ ପ୍ରସ୍ତୁତି

ସହାୟକ ଗ୍ରନ୍ଥସୂଚୀ

୧. ଯୋଗାଯୋଗମୂଳକ ମାତୃଭାଷା – ବିରଞ୍ଚି ନାରାୟଣ ସାମଲ, ସତ୍ୟନାରାୟଣ ବୁକ୍ ଷ୍ଟୋର, କଟକ
୨. ଭାଷଣ କଳା ଓ ଅନ୍ୟାନ୍ୟ ପ୍ରସଙ୍ଗ - କୃଷ୍ଣଚନ୍ଦ୍ର ପ୍ରଧାନ, ସତ୍ୟନାରାୟଣ ବୁକ୍ ଷ୍ଟୋର୍, କଟକ
୩. ସମ୍ବାଦପତ୍ର ଓ ଗଣମାଧମ - ମୃଣାଳ ଚାଟ୍ଟାର୍ଜୀ, ଶେଫାଳୀ କମ୍ୟୁନିକେଶନ, ସଆଁରମାର୍ଗ, ଢେଙ୍କାନାଳ
୪. ପ୍ରାୟୋଗିକ ଭାଷା ଓ ବିଜ୍ଞାପନର ଦିଗବିଦିଗ - କେ.ବି. ପଟ୍ଟନାୟକ, ଓ.ରା.ପା.ପ୍ର.ଓ.ପ୍ରକାଶନ ସଂସ୍ଥା, ଭୁବନେଶ୍ୱର
୫. ସଂଯୋଗ ଅନୁବିଧି-ସନ୍ତୋଷ କୁମାର ତ୍ରିପାଠୀ, ନାଳନ୍ଦା, କଟକ
୬. କାର୍ଯ୍ୟାଳୟ ନଥି - ଓଡ଼ିଆ ଭାଷା ପ୍ରତିଷ୍ଠାନ, ଭୁବନେଶ୍ୱର

୭. ଓଡ଼ିଆରେ କମ୍ପ୍ୟୁଟର ଶିକ୍ଷା – ରୁଦ୍ରନାରାୟଣ ମହାପାତ୍ର, ସତ୍ୟନାରାୟଣ ବୁକ୍ ଷ୍ଟୋର୍, କଟକ

୮. ଓଡ଼ିଆ ଭାଷାରେ କମ୍ପ୍ୟୁଟରର ପ୍ରୟୋଗ - ସୁଧୀର ଚନ୍ଦ୍ର ମହାନ୍ତି, ଏ.କେ. ମିଶ୍ର ପବ୍ଲିକେଶନ, ଭୁବନେଶ୍ୱର

୯. କମ୍ପ୍ୟୁଟରରେ ଓଡିଆ ଭାଷାର ବ୍ୟବହାର ଓ ପ୍ରୟୋଗ, ରୁଦ୍ରପ୍ରସାଦ ମିଶ୍ର, ଆଜିଅନ୍ତା ପବ୍ଲିଶର୍ସ, ଜଗତସିଂହପୁର

ଶୃଙ୍ଖଳାକୈନ୍ଦ୍ରିକ ଇଚ୍ଛାଧୀନ ପାଠ – ଓଡ଼ିଆ

Discipline Specific Elective – Odia DSE

ସାଧାରଣ (Pass) ଶ୍ରେଣୀ ପାଇଁ ଉଦ୍ଦିଷ୍ଟ

୫ମ ଓ ୬ଷ୍ଠ ପର୍ଯ୍ୟାୟ (Semester – V, VI)

୫ମ ପର୍ଯ୍ୟାୟ (Semester – V) : ପ୍ରଥମ ଓ ଦ୍ୱିତୀୟ ପତ୍ର
୧୦୦ + ୧୦୦ = ୨୦୦ ନମ୍ବର
୬ଷ୍ଠ ପର୍ଯ୍ୟାୟ (Semester – VI) : ତୃତୀୟ ପତ୍ର ଓ ଚତୁର୍ଥ ପତ୍ର
୧୦୦ + ୧୦୦ = ୨୦୦ ନମ୍ବର
(୨୦ ନମ୍ବର ଅନ୍ତଃ ପରୀକ୍ଷା ଓ ୮୦ ନମ୍ବର ମୁଖ୍ୟ ପରୀକ୍ଷା = ୧୦୦ ନମ୍ବର)
ଚତୁର୍ଥ ପତ୍ର - ପ୍ରକଳ୍ପ ପ୍ରସ୍ତୁତି ୧୦୦ ନମ୍ବର
(ଅନୁବାଦ ବା ସଂପାଦନା ବା ଓଡିଆ ସଂସ୍କୃତି ଉପରେ ଅନ୍ୟୁନ ୫୦ ପୃଷ୍ଠା ମଧରେ ନିବନ୍ଧଟି ଲେଖିବାକୁ ହେବ ।)
(୮୦ ନମ୍ବର ପ୍ରକଳ୍ପ ଲେଖା + ୨୦ ନମ୍ବର ସାକ୍ଷାତକାର ପରୀକ୍ଷା= ୧୦୦ ନମ୍ବର)

ମୋଟ୍ - ୪୦୦ ନମ୍ବର

ମୂଲ୍ୟାଙ୍କନ ବିଭାଜନ ପଦ୍ଧତି

(କ) ପ୍ରତ୍ୟେକ ପାଠ୍ୟର ସବୁ ଏକକ (ୟୁନିଟ୍) ରୁ ୧୫ଟି ୨ ନମ୍ବର ବିଶିଷ୍ଟ ଅତି ସଂକ୍ଷିପ୍ତ ପ୍ରଶ୍ନ ପଡ଼ିବ । ବିଦ୍ୟାର୍ଥୀଙ୍କୁ ସେଥିରୁ ଯେକୌଣସି ୧୦ ଟି ପ୍ରଶ୍ନର ଉତ୍ତର ଦେବାକୁ ହେବ । (୨x୧୦=୨୦)

(ଖ) ପ୍ରତ୍ୟେକ ପାଠ୍ୟର ସବୁ ଏକକ (ୟୁନିଟ୍)ରୁ ଅନ୍ତତଃ ୨ଟି ଲେଖାଏଁ ମୋଟ ୮ଟି ୧୫ ନମ୍ବର ବିଶିଷ୍ଟ ଦୀର୍ଘ ପ୍ରଶ୍ନ ପଡିବ । ବିଦ୍ୟାର୍ଥୀଙ୍କୁ ସେଥିରୁ ଯେକୌଣସି ୪ଟି ପ୍ରଶ୍ନର ଉତ୍ତର ଦେବାକୁ ପଡିବ । (୧୫ x ୪=୬୦)

(ଗ) ମହାବିଦ୍ୟାଳୟ ସ୍ତରୀୟ ଅନ୍ତଃ ପର୍ଯ୍ୟାୟ ପରୀକ୍ଷା – (୨୦ ନମ୍ବର)

ମୋଟ୍ ମୂଲ୍ୟାଙ୍କ – ୧୦୦ ନମ୍ବର

ଭୂମିକା:

ଏହି ପାଠ୍ୟକ୍ରମଟି ବିଦ୍ୟାର୍ଥୀମାନଙ୍କୁ ଓଡ଼ିଶାର ସାମାଜିକ, ସାଂସ୍କୃତିକ ଓ ଐତିହାସିକ ବିବର୍ତ୍ତନ ବିଷୟରେ ଜ୍ଞାନ ଆହରଣ ପାଇଁ ସୁଯୋଗ ସୃଷ୍ଟିକରିବ । ଓଡ଼ିଆ ସାହିତ୍ୟରେ ସମାଜ ଓ ସଂସ୍କୃତିର ପ୍ରତିଫଳନ, ସାହିତ୍ୟର ବିବିଧତା ଏବଂ କମ୍ପ୍ୟୁଟରଭିତ୍ତିକ ବିଦ୍ୟା ଶିକ୍ଷଣ ଦିଗକୁ ଧାନ ଦିଆଯାଇ ଏହା ପ୍ରସ୍ତୁତ ହୋଇଛି ।

ଏହି ପାଠ୍ୟକ୍ରମରେ ମୋଟ ୪ ଗୋଟି ପାଠ୍ୟ ବାଧତାମୂଳକ । ସମ୍ମାନ (Hons) ଶ୍ରେଣୀର ଛାତ୍ରଛାତ୍ରୀମାନେ ଏହି ଚାରୋଟିଯାକ ପାଠ୍ୟ ପଢ଼ିବେ । ଏଥିମଧରୁ ଗୋଟିଏ ପାଠ୍ୟକୁ ଆଧାର କରି ତା' ସହିତ ଅନ୍ୟ ବିଦ୍ୟାକୁ ସଂଯୋଗ କରି ଷଷ୍ଠ ପର୍ଯ୍ୟାୟ (ସେମିଷ୍ଟର-୬) ପରୀକ୍ଷା ବେଳକୁ ପ୍ରକଳ୍ପ (୫୦ ପୃଷ୍ଠା ମଧରେ) ପ୍ରସ୍ତୁତ କରିବେ । ପ୍ରକଳ୍ପଟି ୪ର୍ଥ ପତ୍ର ଭାବରେ ବିବେଚିତ ହେବ ।

ଈଶେଷ୍ୟ ଦ୍ରଷ୍ଟବ୍ୟ: ସାଧାରଣ (Pass) ଶ୍ରେଣୀର ଛାତ୍ରଛାତ୍ରୀମାନେ ପାଠ୍ୟ-୧ କୁ ୫ ପର୍ଯ୍ୟାୟରେ DSE-IA କିମ୍ବା DSE-IIA ଭାବେ ଏବଂ ପାଠ୍ୟ-୨କୁ ଷଷ୍ଠ ପର୍ଯ୍ୟାୟରେ DSE-IB କିମ୍ବା DSE-IIB ଭାବେ ପଢ଼ିବେ ।

ସବିଶେଷ ପାଠ୍ୟକ୍ରମ

ମୋଟ ୪ ଗୋଟି ପାଠ୍ୟ
ପତ୍ର ସଂଖ୍ୟା - ୪
ପ୍ରତ୍ୟେକ ପତ୍ର - ୧୦୦ ନମ୍ବର (୨୦ ନମ୍ବର ଅନ୍ତଃପରୀକ୍ଷା + ୮୦ ନମ୍ବର ମୁଖ୍ୟ ପରୀକ୍ଷା)
ସମୟ ନିର୍ଘଣ୍ଟ = ୬ x ୪ = ୨୪
ପ୍ରତ୍ୟେକ ପତ୍ର ପାଇଁ ୪୦ଟି ପିରିୟଡ୍, ପ୍ରତି ପିରିୟଡ୍ – ୪୫ ମିନିଟ

୫ମ ଓ ୬ଷ୍ଠ ପର୍ଯ୍ୟାୟ (ସେମିଷ୍ଟର – ୦୫ ଓ ୦୬)

ପାଠ୍ୟ-୧ / Course-1 : ଓଡ଼ିଶାର ସାଂସ୍କୃତିକ ଇତିହାସ ଓ ଓଡ଼ିଆ ସାହିତ୍ୟ (Pass)

(ସମୟ ନିର୍ଘଣ୍ଟ ୪+୨=୬)

୧ମ ଏକକ : ଓଡ଼ିଶାର ସଂକ୍ଷିପ୍ତ ଇତିହାସ ।

୨ୟ ଏକକ : ଓଡ଼ିଶାରେ ବୌଦ୍ଧ ସଂସ୍କୃତି, ଶୈବ ସଂସ୍କୃତି ଓ ବୈଷ୍ଣବ ସଂସ୍କୃତି ।

୩ୟ ଏକକ : ଶ୍ରୀଜଗନ୍ନାଥ ସଂସ୍କୃତି ଓ ଆଦିବାସୀ ସଂସ୍କୃତି ।

୪ର୍ଥ ଏକକ : ଓଡ଼ିଆ ଓଷା ବ୍ରତ ଓ ପର୍ବପର୍ବାଣି ।

ସହାୟକ ଗ୍ରନ୍ଥସୂଚୀ :

୧. ଓଡ଼ିଶାର ସାଂସ୍କୃତିକ ଇତିହାସ - ସଂସ୍କୃତି ବିଭାଗ, ଓଡ଼ିଶା
୨. ଓଡ଼ିଶାର ସାଂସ୍କୃତିକ ଇତିହାସ - ପ୍ରବୋଧ କୁମାର ମିଶ୍ର, ବିଦ୍ୟାପୁରୀ, କଟକ
୩. ଓଡ଼ିଆ ସାହିତ୍ୟର ସାମାଜିକ ଓ ସାଂସ୍କୃତିକ ଇତିହାସ - ଚିତ୍ତରଞ୍ଜନ ଦାସ, ଓ.ରା.ପା.ପ୍ର. ଓ ପ୍ରକାଶନ ସଂସ୍ଥା, ଭୁବନେଶ୍ୱର
୪. ଓଡ଼ିଶାର ଧର୍ମଧାରା - କାହ୍ନୁଚରଣ ମିଶ୍ର, ଓ.ରା.ପା.ପ୍ର. ଓ ପ୍ରକାଶନ ସଂସ୍ଥା, ଭୁବନେଶ୍ୱର
୫. ବୈଷ୍ଣବ ସାହିତ୍ୟ ତତ୍ତ୍ୱ - ଆଶୁତୋଷ ପଟ୍ଟନାୟକ, ଫ୍ରେଣ୍ଡସ୍ ପବ୍ଲିଶର୍ସ, କଟକ
୬. ଓଡ଼ିଆ ସାହିତ୍ୟରେ ଶୈବଧର୍ମ - କୃଷ୍ଣଚନ୍ଦ୍ର ପ୍ରଧାନ, ଫ୍ରେଣ୍ଡସ୍ ପବ୍ଲିଶର୍ସ, କଟକ
୭. ଓଡ଼ିଆ ସାହିତ୍ୟରେ ଶ୍ରୀଜଗନ୍ନାଥ - ବାସୁଦେବ ସାହୁ, ଫ୍ରେଣ୍ଡସ୍ ପବ୍ଲିଶର୍ସ, କଟକ
୮. ଲୀଳାମୟ ନୀଳାଦ୍ରୀଶ - ସଂପାଦନା, ଭୁବନେଶ୍ୱର ଭଞ୍ଜ ଭାରତୀ (୧ମ ଭାଗ ଓ ୨ୟ ଭାଗ)
୯. ଓଡ଼ିଆ ବ୍ରତ ସାହିତ୍ୟ - ଅରବିନ୍ଦ ପଟ୍ଟନାୟକ, ଓଡ଼ିଶା ସାହିତ୍ୟ ଏକାଡେମୀ

୧୦. ଓଡିଶାର ଧର୍ମଧାରା, ଡ. ପ୍ରଦୀପ୍ତ କୁମାର ପଣ୍ଡା
୧୧. ଲୋକଧର୍ମ ଓ ଲୋକସାହିତ୍ୟ, ଡ. ସଦାନଂଦ ନାୟକ, ବିଜୟ ବୁକ୍ ଷ୍ଟୋର୍, ବ୍ରହ୍ମପୁର

ପାଠ୍ୟ-୨ / Course – 2 : ଓଡ଼ିଆ ଶିଶୁ ସାହିତ୍ୟ ଓ ବିଜ୍ଞାନଭିତ୍ତିକ ସାହିତ୍ୟ (Pass)

୧ମ ଏକକ : ଓଡ଼ିଆ ଶିଶୁ ସାହିତ୍ୟର ସ୍ୱରୂପ ଓ ପ୍ରକାରଭେଦ

୨ୟ ଏକକ : ଓଡ଼ିଆ ବିଜ୍ଞାନଭିତ୍ତିକ ସାହିତ୍ୟର ସ୍ୱରୂପ ଓ ବିକାଶଧାରା

୩ୟ ଏକକ : ପୃଥିବୀ ବାହାରେ ମଣିଷ - ଗୋକୁଳାନନ୍ଦ ମହାପାତ୍ର

୪ର୍ଥ ଏକକ : ବିଚିତ୍ର ବିଶ୍ୱ - ଦେବକାନ୍ତ ମିଶ୍ର

ସହାୟକ ଗ୍ରନ୍ଥସୂଚୀ :

୧. ଓଡ଼ିଆ ଶିଶୁ ସାହିତ୍ୟର ଇତିବୃତ୍ତ - ମନୀନ୍ଦ୍ର ମହାନ୍ତି, ଫ୍ରେଣ୍ଡସ୍ ପବ୍ଲିଶର୍ସ, କଟକ
୨. ପୃଥିବୀ ବାହାରେ ମଣିଷ - ଗୋକୁଳାନନ୍ଦ ମହାପାତ୍ର
୩. ବିଚିତ୍ର ବିଶ୍ୱ - ଦେବକାନ୍ତ ମିଶ୍ର
୪. ଓଡିଆ ସାହିତ୍ୟ, ମହେଶ୍ୱର ମହାନ୍ତି
୫. ଆଧୁନିକ ଶିଶୁ ଓଡିଆ ସାହିତ୍ୟ –ଜାନକୀ ବଲ୍ଲଭ ମହାନ୍ତି, ଗ୍ରନ୍ଥମନ୍ଦିର, କଟକ

ପାଠ୍ୟ-୩ / Course – 3 : ଓଡ଼ିଆ ପଦ୍ୟ ସାହିତ୍ୟ (Pass)

୧ମ ଏକକ : ଜଗନ୍ନାଥ ଜଣାଣ - କବିସୂର୍ଯ୍ୟ ବଳଦେବ ରଥ
ଆକାଶ ପ୍ରତି - ମଧୁସୂଦନ ରାଓ
ଯାତ୍ରା ସଂଗୀତ - ବୈକୁଣ୍ଠନାଥ ପଟ୍ଟନାୟକ
ମୌସୁମୀ - ରାଧାମୋହନ ଗଡ଼ନାୟକ
୨ୟ ଏକକ : କ୍ଷୁଦ୍ରଗଳ୍ପ
ଡିମିରି ଫୁଲ – ଅଖିଳ ମୋହନ ପଟ୍ଟନାୟକ
ଭଙ୍ଗା ଖେଳନା - କିଶୋରୀ ଚରଣ ଦାଶ
ଅନ୍ଧ ରାତିର ସୂର୍ଯ୍ୟ - ମହାପାତ୍ର ନୀଳମଣି ସାହୁ
ବାସି ମଡ଼ା - ସୁରେନ୍ଦ୍ର ମହାନ୍ତି
୩ୟ ଏକକ : ପ୍ରବନ୍ଧ ଓ ସମାଲୋଚନା
ମହାସ୍ରୋତ - ବିଶ୍ୱନାଥ କର
ଚିତ୍ରଗ୍ରୀବର ଉଚିତ ଅଭିମାନ - ଗୋଲୋକ ବିହାରୀ ଧଳ

ତିନୋଟି ସମାଲୋଚନା – ବାଉରୀବନ୍ଧୁ କର, ଫ୍ରେଣ୍ଡସ୍ ପବ୍ଲିଶର୍ସ, କଟକ

୪ର୍ଥ ଏକକ : ଉପନ୍ୟାସ - ମାଟିର ମଣିଷ - କାଳିନ୍ଦୀ ଚରଣ ପାଣିଗ୍ରାହୀ

ସହାୟକ ଗ୍ରନ୍ଥସୂଚୀ :

୧. ଓଡ଼ିଆ ଉପନ୍ୟାସ ସାହିତ୍ୟର ପରିଚୟ, ସଂ ପଠାଣୀ ପଟ୍ଟନାୟକ ଓ ଭୋଳାନାଥ ରାଉତ, ଓଡ଼ିଶା ବୁକ୍ ଷ୍ଟୋର୍, କଟକ
୨. କାଳିନ୍ଦୀ ଚରଣଙ୍କ କଥାସାହିତ୍ୟ – ବିଷ୍ଣୁପ୍ରିୟା ଓତା, ଫ୍ରେଣ୍ଡସ୍ ପବ୍ଲିଶର୍ସ, କଟକ
୩. ଓଡିଆ ପ୍ରବନ୍ଧ ସାହିତ୍ୟ - ବାଉରୀବନ୍ଧୁ କର
୪. ଓଡିଆ ସମାଲୋଚନା ସାହିତ୍ୟ - ଓଡିଶା ସାହିତ୍ୟ ଏକାଡେମୀ
୫. ମାଟିର ମଣିଷ - କାଳିନ୍ଦୀ ଚରଣ ପାଣିଗ୍ରାହୀ

ପାଠ୍ୟ-୪/ **Course – 4 : ପ୍ରବନ୍ଧ ପ୍ରସ୍ତୁତି ଓ ଉପସ୍ଥାପନା (Pass)**

ସନ୍ଦର୍ଭ ଲିଖନ - ୮୦ + ମୌଖିକ - ୨୦ = ୧୦୦

ଅନୁବାଦ ବା ସଂପାଦନା ବା ଓଡିଆ ସଂସ୍କୃତି ଉପରେ ଅନ୍ୟୁନ ୫୦ ପୃଷ୍ଠା ମଧ୍ୟରେ ନିବନ୍ଧ ପ୍ରସ୍ତୁତି।

କିମ୍ବା

(ସମାଲୋଚନା, ଅନୁବାଦ, ସମ୍ପାଦନା, ଗବେଷଣା)

୧. ପ୍ରଥମ ଏକକ : ସମାଲୋଚନାର ସଂଜ୍ଞା, ସ୍ୱରୂପ ଓ ପ୍ରକାରଭେଦ

୨. ଦ୍ୱିତୀୟ ଏକକ : ଅନୁବାଦର ସଂଜ୍ଞା, ସ୍ୱରୂପ ଓ ପ୍ରକାରଭେଦ

୩. ତୃତୀୟ ଏକକ : ସମ୍ପାଦନା ବିଧି

୪. ଚତୁର୍ଥ ଏକକ : ଗବେଷଣା ପ୍ରବିଧି

ସହାୟକ ଗ୍ରନ୍ଥସୂଚୀ

୧. ଗବେଷଣା ଅନୁବାଦ ସମ୍ପାଦନା କଳା – ସଂ ନାରାୟଣ ସାହୁ, ସତ୍ୟନାରାୟଣ ବୁକ୍ ଷ୍ଟୋର, କଟକ
୨. ଗବେଷଣା ପ୍ରବିଧି - ଡ. ସୁବୋଧ ଚାଟାର୍ଜୀ, ବିଦ୍ୟାପୁରୀ, କଟକ
୩. ଗବେଷଣା ପ୍ରକରଣ : ସଂପାଦନା ଓ ଅନୁବାଦ ପ୍ରବିଧି - କୃଷ୍ଣଚନ୍ଦ୍ର ପ୍ରଧାନ ଓ ନିର୍ମଳା କୁମାରୀ ରାଉତ

ଅନ୍ତର୍ବିଷୟ ଇଚ୍ଛାଧୀନ ପାଠ - ଓଡ଼ିଆ

Generic Electives (GE) - Course - Odia

ସୂଚନା : ଅନ୍ୟ ସମ୍ମାନର ବିଦ୍ୟାର୍ଥୀ ଏଥିମଧ୍ୟରୁ ୨ଗୋଟି କିମ୍ବା ୪ଗୋଟି ପତ୍ର ଅଧ୍ୟୟନ କରିପପାରିବେ ; କିନ୍ତୁ ପାସ୍ ବିଦ୍ୟାର୍ଥୀ ଏଥିମଧ୍ୟରୁ ୧ମ ଓ ୨ୟ ପତ୍ରକୁ ଯଥାକ୍ରମେ ୫ମ ଓ ୬ଷ୍ଠ ପର୍ଯ୍ୟାୟରେ ପଢିବେ ।

୧. ପତ୍ର ସଂଖ୍ୟା - ୪

୨. ପ୍ରତ୍ୟେକ ପତ୍ର - ୧୦୦ ନମ୍ବର ବିଶିଷ୍ଟ, ମୋଟ୍ -୪୦୦ ନମ୍ବର

୩. ପ୍ରତ୍ୟେକ ପତ୍ରରେ ୪ଗୋଟି ଏକକ ରହିବ ।

ନମ୍ବର ବିଭାଜନ ବିଧି :

କ) ପ୍ରତ୍ୟେକ ପତ୍ରର ମୋଟ ନମ୍ବର – ୧୦୦

ଖ) ଅନ୍ତଃପରୀକ୍ଷା – ୨୦ ଓ ମୁଖ୍ୟ ପରୀକ୍ଷା – ୮୦

(ଗ) ମୁଖ୍ୟ ପରୀକ୍ଷାରେ ପ୍ରତ୍ୟେକ ଏକକରୁ ଦୁଇଟି ଲେଖାଏଁ ୧୫ ନମ୍ବର ବିଶିଷ୍ଟ ପସନ୍ଦମୂଳକ ବୋଧଜ୍ଞାନମାପକ ୮ଟି ଦୀର୍ଘ ପ୍ରଶ୍ନ ପଡ଼ିବ । ୮ ଟି ଦୀର୍ଘ ପ୍ରଶ୍ନରୁ ୪ଟିର ଉତ୍ତର ଦେବାକୁ ହେବ ।

(୧୫ x ୪ = ୬୦)

(ଘ) ସମସ୍ତ ଏକକରୁ ୨ ନମ୍ବର ବିଶିଷ୍ଟ ଲବ୍ଧଜ୍ଞାନମୂଳକ ୧୫ଟି ସଂକ୍ଷିପ୍ତ ପ୍ରଶ୍ନ ପଡ଼ିବ । ମୋଟ ୧୫ ଗୋଟି ପ୍ରଶ୍ନରୁ ୧୦ ଗୋଟି ପ୍ରଶ୍ନର ଉତ୍ତର ଦେବାକୁ ହେବ ।

(୨ x ୧୦ = ୨୦)

ସବିଶେଷ ପାଠ୍ୟକ୍ରମ

ପ୍ରଥମ ପର୍ଯ୍ୟାୟ (Semester – I)

ପାଠ୍ୟ – ୧ / ପତ୍ର – ୧ (Core Course - 1): ଗଣମାଧ୍ୟମ, ବେତାର କଳା ଓ ବିଜ୍ଞାପନ କଳା

୧ମ ଏକକ : ଗଣମାଧ୍ୟମ ଓ ତା'ର ପ୍ରକାରଭେଦ

୨ୟ ଏକକ : ବିଜ୍ଞାପନର ପରିଭାଷା, ପରିସର ଓ ଉଦ୍ଦେଶ୍ୟ

୩ୟ ଏକକ : ସ୍ତମ୍ଭ ଲିଖନ ଓ ଫିଚର ଲିଖନ

୪ର୍ଥ ଏକକ : ପତ୍ରଲିଖନ (ବାଣିଜ୍ୟିକ, କାର୍ଯ୍ୟାଳୟ ଭିତ୍ତିକ, ବ୍ୟକ୍ତିଗତ ଓ ସମ୍ପାଦକଙ୍କୁ ପତ୍ର)

ସହାୟକ ଗ୍ରନ୍ଥସୂଚୀ

୧. ଓଡ଼ିଆ ସାହିତ୍ୟକୁ ଆକାଶବାଣୀର ଦାନ - ବ୍ରଜମୋହନ ମହାନ୍ତି, ଓଡ଼ିଶା ବୁକ୍ ଷ୍ଟୋର
୨. ସମ୍ବାଦପତ୍ର ଓ ଗଣମାଧମ -ମୃଣାଳ ଚାଟ୍ଟାର୍ଜୀ, ଶେଫାଳୀ କମ୍ୟୁନିକେଶନ, ଢେଙ୍କାନାଳ
୩. ସମ୍ବାଦ ଓ ସାମ୍ବାଦିକତା – ଚନ୍ଦ୍ରଶେଖର ମହାପାତ୍ର, ଓ.ରା.ପା.ପ୍ର. ଓ ପ୍ରକାଶନ ସଂସ୍ଥା, ଭୁବନେଶ୍ୱର
୪. ସଂଯୋଗ ଅନୁବିଧି,-ସନ୍ତୋଷ କୁମାର ତ୍ରିପାଠୀ, ନାଳନ୍ଦା, କଟକ
୫. ଯୋଗାଯୋଗମୂଳକ ମାତୃଭାଷା – ବିରଞ୍ଚି ନାରାୟଣ ସାମଲ, ସତ୍ୟନାରାୟଣ ବୁକ୍ ଷ୍ଟୋର୍
୬. ଯୋଗାଯୋଗର ଭାଷା – ସୁଧୀର ଚନ୍ଦ୍ର ମହାନ୍ତି, ପ୍ରାଚୀ ପ୍ରକାଶନ, କଟକ

ଦ୍ୱିତୀୟ ପର୍ଯ୍ୟାୟ (Semester – II)

ପାଠ୍ୟ – ୨ / ପତ୍ର - ୨ (Core Course -2) : ସାହିତ୍ୟ ଅଧ୍ୟୟନ

୧ମ ଏକକ : ଗଳ୍ପ ସାହିତ୍ୟ
ବୁଢ଼ା ଶଙ୍ଖାରି - ଲକ୍ଷ୍ମୀକାନ୍ତ ମହାପାତ୍ର
ମାଗୁଣୀର ଶଗଡ଼ - ଗୋଦାବରୀଶ ମହାପାତ୍ର
ଶିକାର - ଭଗବତୀ ଚରଣ ପାଣିଗ୍ରାହୀ
୨ୟ ଏକକ : ଉପନ୍ୟାସ ସାହିତ୍ୟ
ଶାସ୍ତି - କାହ୍ନୁଚରଣ ମହାନ୍ତି, ଫ୍ରେଣ୍ଡସ୍ ପବ୍ଲିଶର୍ସ, କଟକ
୩ୟ ଏକକ : ନାଟକ
ଶେଷ କଥା - ଡକ୍ଟର ନାରାୟଣ ସାହୁ, ସତ୍ୟନାରାୟଣ ବୁକ୍ ଷ୍ଟୋର୍, କଟକ
୪ର୍ଥ ଏକକ : ରମ୍ୟ ରଚନା
ବାଇ ମହାନ୍ତି ପାଞ୍ଜି (ପ୍ରଥମ ବିଡ଼ା) - ଗୋପାଳ ଚନ୍ଦ୍ର ପ୍ରହରାଜ
ବଟୁଆ - ଗୋବିନ୍ଦ ତ୍ରିପାଠୀ
ସାଧୁ ସଙ୍ଗ - ଚୌଧୁରୀ ହେମକାନ୍ତ ମିଶ୍ର

ସହାୟକ ଗ୍ରନ୍ଥସୂଚୀ

୧. କାହ୍ନୁଚରଣ ବିଶେଷାଙ୍କ, କୋଣାର୍କ, ଓଡିଶା ସାହିତ୍ୟ ଏକାଡେମୀ
୨. ଓଡିଆ କ୍ଷୁଦ୍ରଗଳ୍ପର ଇତିହାସ, ବୈଷ୍ଣବ ଚରଣ ସାମଲ, ଫ୍ରେଣ୍ଡସ୍ ପବ୍ଲିଶର୍ସ, କଟକ
୩. ଓଡିଆ କଥାସାହିତ୍ୟର କଥା ଓ ରମ୍ୟରଚନା, ମହାପାତ୍ର ନୀଳମଣି ସାହୁ, ଓଡଶା ବୁକ୍ ଷ୍ଟୋର୍, କଟକ
୪. ଶାସ୍ତି - କାହ୍ନୁଚରଣ ମହାନ୍ତି, ଫ୍ରେଣ୍ଡସ୍ ପବ୍ଲିଶର୍ସ, କଟକ
୫. ଉତ୍ତର ସତୁରୀ ଓଡିଆ ନାଟକ, ହେମନ୍ତ କୁମାର ଦାସ, ଗ୍ରନ୍ଥମନ୍ଦିର, କଟକ
୬. ଶେଷ କଥା - ନାରାୟଣ ସାହୁ, ସତ୍ୟନାରାୟଣ ବୁକ୍ ଷ୍ଟୋର୍, କଟକ

ତୃତୀୟ ପର୍ଯ୍ୟାୟ (Semester – III)

ପାଠ୍ୟ – ୩ / ପତ୍ର – ୩ (Core Course -3) : ପ୍ରାଚୀନ, ମଧ୍ୟଯୁଗ ଓ ଆଧୁନିକ ଓଡିଆ ସାହିତ୍ୟ

୧ମ ଏକକ : ସାରଳା ମହାଭାରତରେ କାହାଣୀ
ସତ୍ୟଆମ୍ବ
ତୁଳସୀବଣ ବାଘ
ଗଙ୍ଗା ବୋଇଲେ ଥିବି ଗାଂଗୀ ବୋଇଲେ ଯିବି
୨ୟ ଏକକ : ବଳରାମ ଦାସ ଓ ଜଗନ୍ନାଥ ଦାସଙ୍କ କାହାଣୀ
ବଳରାମ ଦାସଙ୍କ ବଉଳା ଅଧାୟ ଓ ମୃଗୁଣୀ ସ୍ତୁତି
ଜଗନ୍ନାଥ ଦାସଙ୍କ କପୋତ ଉପାଖ୍ୟାନ ଓ ପିଙ୍ଗଳା ଉପାଖ୍ୟାନ
୩ୟ ଏକକ : ମଧକାଳୀନ ସାହିତ୍ୟ ସ୍ରଷ୍ଟାଙ୍କ ସଂକ୍ଷିପ୍ତ ପରିଚୟ
ଦୀନକୃଷ୍ଣ ଦାସ, ଅଭିମନ୍ୟୁ ସାମନ୍ତସିଂହାର, କବିସମ୍ରାଟ ଉପେନ୍ଦ୍ର ଭଞ୍ଜ
କବିସୂର୍ଯ୍ୟ ବଳଦେବ ରଥ
୪ର୍ଥ ଏକକ : ଆଧୁନିକ ଯୁଗର ସାହିତ୍ୟ ସ୍ରଷ୍ଟାଙ୍କ ସଂକ୍ଷିପ୍ତ ପରିଚୟ
ରାଧାନାଥ ରାୟ, ଫକୀର ମୋହନ ସେନାପତି, ଗଙ୍ଗାଧର ମେହେର, ମାୟାଧର ମାନସିଂହ

ସହାୟକ ଗ୍ରନ୍ଥସୂଚୀ

୧. ଓଡ଼ିଆ ସାହିତ୍ୟର ଇତିହାସ - ମାୟାଧର ମାନସିଂହ, ଗ୍ରନ୍ଥ ମନ୍ଦିର, କଟକ
୨. ଓଡିଆ ସାହିତ୍ୟର ଇତିହାସ – ସୂର୍ଯ୍ୟନାରାୟଣ ଦାଶ (୨ୟ ଓ ୩ୟ ଭାଗ) – ଗ୍ରନ୍ଥ ମନ୍ଦିର, କଟକ
୩. ଓଡ଼ିଆ ସାହିତ୍ୟର ଇତିହାସ (୧୮୦୩-୧୯୨୦) ନଟବର ସାମନ୍ତରାୟ, ବାଣୀ ଭବନ, ଭୁବନେଶ୍ୱର
୪. ଆଲୋକ ଓ ଅମୃତର କବି ଗଙ୍ଗାଧର : ମଣୀନ୍ଦ୍ର କୁମାର ମେହେର, ପଢ଼ାପଢ଼ି, ଭୁବନେଶ୍ୱର

ଚତୁର୍ଥ ପର୍ଯ୍ୟାୟ (Semester – IV)

ପାଠ୍ୟ – ୪ / ପତ୍ର – ୪ (Core Course - 4) : ଓଡ଼ିଆ କମ୍ପ୍ୟୁଟର ଶିକ୍ଷା

୧ମ ଏକକ / ୟୁନିଟ୍-୧ : କମ୍ପ୍ୟୁଟର କ'ଣ ଓ କାହିଁକି
କମ୍ପ୍ୟୁଟର ର ବିଭିନ୍ନ ଅଂଶବିଶେଷ ଓ କାର୍ଯ୍ୟ
୨ୟ ଏକକ/ ୟୁନିଟ୍-୨ : ୟୁନିକୋଡ ମାଧମରେ ଓଡ଼ିଆ ଡିଟିପି ଶିକ୍ଷା
୩ୟ ଏକକ/ ୟୁନିଟ୍-୩: ଇଣ୍ଟରନେଟ୍‌ରେ ଓଡ଼ିଆ ଚିଠି
ଇଣ୍ଟରନେଟ୍‌ରେ ସାମାଜିକ ଗଣମାଧମର ବ୍ୟବହାର

୪ର୍ଥ ଏକକ/ ୟୁନିଟ୍-୪ : ପାୱାର୍ ପଏଣ୍ଟ ସ୍ଲାଇଡ୍ ପ୍ରସ୍ତୁତି, ଟେବୁଲ୍ସ, ଫିଗର୍ସ ଏବଂ ପିକ୍‌ଚରସ
ଏକ୍‌ସେଲ୍‌ର ବ୍ୟବହାର ପ୍ରସ୍ତୁତି

ସହାୟକ ଗ୍ରନ୍ଥସୂଚୀ

୧. ମୌଳିକ କମ୍ପ୍ୟୁଟର ଶିକ୍ଷା - ଦେବକାନ୍ତ ମିଶ୍ର, ଫ୍ରେଣ୍ଡସ୍ ପବ୍ଲିଶର୍ସ, କଟକ
୨. ଓଡ଼ିଆରେ କମ୍ପ୍ୟୁଟର ଶିକ୍ଷା – ରୁଦ୍ରନାରାୟଣ ମହାପାତ୍ର, ସତ୍ୟନାରାୟଣ ବୁକ୍ ଷ୍ଟୋର୍, କଟକ
୩. ଓଡ଼ିଆ ଭାଷାରେ କମ୍ପ୍ୟୁଟର୍‌ର ପ୍ରୟୋଗ - ସୁଧୀର ଚନ୍ଦ୍ର ମହାନ୍ତି, ଏ.କେ. ମିଶ୍ର ପବ୍ଲିକେଶନ, ଭୁବନେଶ୍ୱର
୪. କମ୍ପ୍ୟୁଟରରେ ଓଡିଆ ଭାଷାର ବ୍ୟବହାର ଓ ପ୍ରୟୋଗ – ରୁଦ୍ରପ୍ରସାଦ ମିଶ୍ର, ଆଜିଅନ୍ତା ପବ୍ଲିଶର୍ସ, ଜଗତସିଂହପୁର
୫. କମ୍ପ୍ୟୁଟର ଶିକ୍ଷା – ରାନୁ ବନିକ୍, ଫ୍ରେଣ୍ଡସ୍ ପବ୍ଲିଶର୍ସ, କଟକ

ପାଠ୍ୟକ୍ରମର ସାରାଂଶ – ସଂରଚନା

Structure of B.A. Pass (DSC-Odia) Under CBCS

ପ୍ରଧାନ ପାଠ୍ୟ (Core Course) : ୪
ପ୍ରତ୍ୟେକ ପତ୍ରର କ୍ରେଡ଼ିଟିସ୍ = ୪ + ୨ = ୬

ପ୍ରଥମ ପର୍ଯ୍ୟାୟ : (Ist Semester)

ପ୍ରଧାନ ପାଠ୍ୟ - ୧ (Core Course – 1) ଓଡ଼ିଆ କବିତା ପ୍ରାଚୀନରୁ ଆଧୁନିକ
ପ୍ରଥମ ପତ୍ର – **କ୍ରେଡ଼ିଟିସ୍** = ୪ + ୨ = ୬

ଦ୍ୱିତୀୟ ପର୍ଯ୍ୟାୟ : (2ndSemester)

ପ୍ରଧାନ ପାଠ୍ୟାଂଶ – ୨ (Core Course – 2) ଓଡ଼ିଆ ନାଟକ ଓ ଏକାଙ୍କିକା
୨ୟ ପତ୍ର - **କ୍ରେଡ଼ିଟିସ୍** = ୪ + ୨ = ୬

ତୃତୀୟ ପର୍ଯ୍ୟାୟ : (3rd Semester)

ପ୍ରଧାନ ପାଠ୍ୟାଂଶ – ୩ (Core Course – 3) ଓଡ଼ିଆ କଥା ସାହିତ୍ୟ
୩ୟ ପତ୍ର- **କ୍ରେଡ଼ିଟିସ୍** = ୪ + ୨ = ୬

ଚତୁର୍ଥ ପର୍ଯ୍ୟାୟ : (4th Semester)

ପ୍ରଧାନ ପାଠ୍ୟାଂଶ-୪ (Core Course - 04) ବ୍ୟାବହାରିକ ଓଡ଼ିଆ ବ୍ୟାକରଣ
୪ର୍ଥ ପତ୍ର - **କ୍ରେଡ଼ିଟିସ୍** = ୪ + ୨ = ୬

CBCS : B.A. (PASS) 2019-20

ପସନ୍ଦ ଓ ଆସ୍ଥାଭିତ୍ତିକ ପାଠ୍ୟଖସଡ଼ା : ସ୍ନାତକ (ଓଡ଼ିଆ ଇଚ୍ଛାଧୀନ)

2019-20

Core Course – ପ୍ରଧାନ ପାଠ୍ୟ

ମୋଟ ପତ୍ର ସଂଖ୍ୟା – ୦୪ (Four Paper – Discipline-1/ Four Paper – Discipline-2)

ପ୍ରତ୍ୟେକ ପତ୍ର – ୧୦୦ ନମ୍ବର ବିଶିଷ୍ଟ (୨୦ ନମ୍ବର ମହାବିଦ୍ୟାଳୟ ସ୍ତରୀୟ ଅନ୍ତଃ ପର୍ଯ୍ୟାୟ ପରୀକ୍ଷା + ୮୦ ବିଶ୍ୱବିଦ୍ୟାଳୟ ସ୍ତରୀୟ ମାନକ ପରୀକ୍ଷା)

ଇଚ୍ଛାଧୀନ ଓଡ଼ିଆ : ଜଣେ ସ୍ନାତକ – (ଇଚ୍ଛାଧୀନ)– ମୋଟ୍ ୪୦୦ ନମ୍ବରର ପରୀକ୍ଷା ଦେବେ ।

କ) ଅତି କମ୍‌ରେ (ମୋଟ୍) ୫୦ଟି କାର୍ଯ୍ୟ ନିର୍ଘଣ୍ଟ (ପିରିୟଡ୍)ରେ ଗୋଟିଏ ପତ୍ରର ପାଠଦାନ ଶେଷ ହେବ । ଗୋଟିଏ କାର୍ଯ୍ୟ ନିର୍ଘଣ୍ଟ ବା ପିରିୟଡ୍-୪୫ ମିନିଟ)

ଖ) ପ୍ରତ୍ୟେକ ପତ୍ର ୪ ଗୋଟି ୟୁନିଟ୍ (ଏକକ) ଉପାଂଶରେ ବିଭକ୍ତ ।

ଗ) ପ୍ରତ୍ୟେକ ପତ୍ର ୬ ଆସ୍ଥାଭିତ୍ତିକ କାର୍ଯ୍ୟ ନିର୍ଘଣ୍ଟ (୪ + ୨ କ୍ରେଡିଟ୍) ବିଶିଷ୍ଟ । ଗୋଟିଏ ଆସ୍ଥାଭିତ୍ତିକ କାର୍ଯ୍ୟ ନିର୍ଘଣ୍ଟର ମହତ୍ତ୍ୱ ହେଉଛି – ୧୦ ପିରିୟଡ୍ ସହିତ ସମାନ ।

ମୋଟ୍ ୪ ଗୋଟି ଇଚ୍ଛାଧୀନ ପତ୍ରର କ୍ରେଡିଟ୍ ହେଉଛି – ୪ x ୬ (୪ + ୨) = ୨୪ ।

ଘ) ପର୍ଯ୍ୟାୟ (Semester) ଓ ପ୍ରସ୍ତାବିତ ପାଠ ଯୋଜନା :

ପ୍ରଥମ ଶିକ୍ଷାବର୍ଷ

୧ମ ପର୍ଯ୍ୟାୟ ୧ମ -ପତ୍ର	୧୦୦ ନମ୍ବର
୨ୟ ପର୍ଯ୍ୟାୟ ୨ୟ -ପତ୍ର	୧୦୦ ନମ୍ବର

ଦ୍ୱିତୀୟ ଶିକ୍ଷାବର୍ଷ

୩ୟ ପର୍ଯ୍ୟାୟ ୩ୟ -ପତ୍ର	୧୦୦ ନମ୍ବର
୪ର୍ଥ ପର୍ଯ୍ୟାୟ ୪ର୍ଥ - ପତ୍ର	୧୦୦ ନମ୍ବର

ଙ) ନମ୍ବର / ମୂଲ୍ୟାଙ୍କ ବିଭାଜନ ପଦ୍ଧତି :

ମହାବିଦ୍ୟାଳୟ ସ୍ତରୀୟ ଅନ୍ତଃପରୀକ୍ଷା	– ୨୦ ନମ୍ବର
ବିଶ୍ୱବିଦ୍ୟାଳୟ ସ୍ତରୀୟ ମୁଖ୍ୟ ପରୀକ୍ଷା	– ୮୦ ନମ୍ବର

ବିଶ୍ୱବିଦ୍ୟାଳୟ ସ୍ତରୀୟ ପରୀକ୍ଷାରେ ନିମ୍ନମତେ ପ୍ରଶ୍ନ ପଡ଼ିବ :

କ) ପ୍ରତ୍ୟେକ ପତ୍ରର ପ୍ରତ୍ୟେକ ଏକକରୁ ବିକଳ୍ପ ସହ ୮ଟି ୧୫ ନମ୍ବର ବିଶିଷ୍ଟ ଦୀର୍ଘ ପ୍ରଶ୍ନ ପଡ଼ିବ । ବିଦ୍ୟାର୍ଥୀ ୪ଟି ପ୍ରଶ୍ନର ଉତ୍ତର ଦେବେ । (୧୫ x ୪ = ୬୦ ନମ୍ବର)

ଖ) ପ୍ରତ୍ୟେକ ପତ୍ରର ପ୍ରତ୍ୟେକ ଏକକରୁ ୧୫ଟି ୨ ନମ୍ବର ବିଶିଷ୍ଟ ସଂକ୍ଷିପ୍ତ ପ୍ରଶ୍ନ ପଡ଼ିବ । ବିଦ୍ୟାର୍ଥୀ ୧୦ଟି ପ୍ରଶ୍ନର ଉତ୍ତର ଦେବେ । (୨ x ୧୦ = ୨୦)

ସବିଶେଷ ପାଠ୍ୟକ୍ରମ (Detail Syllabus)

(କ) ପ୍ରଥମ ପର୍ଯ୍ୟାୟ (Semester – 1) DSC 1/2 A

ପ୍ରଥମ ପତ୍ର: ଓଡ଼ିଆ କବିତା ପ୍ରାଚୀନରୁ ଆଧୁନିକ

ପ୍ରଧାନ ପାଠ (Core Course -1): ଓଡିଆ ସାହିତ୍ୟ ପ୍ରାଚୀନରୁ ଆଧୁନିକ

୧ମ ଏକକ / ୟୁନିଟ୍ – ୧ : ସାରଳା ମହାଭାରତ (ଦୁର୍ଯ୍ୟୋଧନଙ୍କ ରକ୍ତନଦୀ ସନ୍ତରଣ)
୨ୟ ଏକକ / ୟୁନିଟ୍ – ୨ : ଭାଗବତ (୨୪ ଗୁରୁ ପ୍ରସଙ୍ଗ) - ଜଗନ୍ନାଥ ଦାସ
୩ୟ ଏକକ / ୟୁନିଟ୍ – ୩ : ଦୀନକୃଷ୍ଣ ଦାସଙ୍କ ରସକଲ୍ଲୋଳ(୧ମ ଛାନ୍ଦ) ଓ ଉପେନ୍ଦ୍ରଭଞ୍ଜଙ୍କ କୋଟିବ୍ରହ୍ମାଣ୍ଡ ସୁନ୍ଦରୀ (୧ମ ଛାନ୍ଦ)

୪ର୍ଥ ଏକକ / ୟୁନିଟ୍ – ୪ : ଆଧୁନିକ କବିତା

ମହାଯାତ୍ରା (ସପ୍ତମ ସର୍ଗ)- ଅମର୍ଷୀଙ୍କ ଉଦ୍‌ବୋଧନ, ରାଧାନାଥ ରାୟ

ମଙ୍ଗଳେ ଅଇଲା ଉଷା – ଗଙ୍ଗାଧର ମେହେର

ବନ୍ଦୀର ସାନ୍ଧ୍ୟ ଅନୁଚିନ୍ତା - ଗୋପବନ୍ଧୁ ଦାସ
ପ୍ରତିମା ନାୟକ - ସଚ୍ଚିଦାନନ୍ଦ ରାଉତରାୟ

ସହାୟକ ଗ୍ରନ୍ଥସୂଚୀ

୬. ସାରଳା ମହାଭାରତ (ସାରଳା ଦାସ)
୧. ଅବଧୂତ ଓ ଯଦୁରାଜା ସମ୍ବାଦ, ବୈଷ୍ଣବ ଚରଣ ସାମଲ, ଫ୍ରେଣ୍ଡସ ପବ୍ଲିଶର୍ସ, କଟକ
୧. କହେ କୃଷ୍ଣଦାସ କବି – କୃଷ୍ଣଚରଣ ସାହୁ, ବିଦ୍ୟାପୁରୀ, କଟକ
୨. ରସକଲ୍ଲୋଳ, ସଂପାଦନା – ଦେବେନ୍ଦ୍ର ମହାନ୍ତି
୩. ଦୁର୍ଲଭ ଦୀନକୃଷ୍ଣ, ଜ୍ୟୋତିରଞ୍ଜନ ସାମଲ, ବିଜୟିନୀ ପବ୍ଲିକେସନ୍, କଟକ

(ଖ) ଦ୍ୱିତୀୟ ପର୍ଯ୍ୟାୟ (**Semester – II) DSC 1/2 B**

ପ୍ରଧାନ ପାଠ୍ୟାଂଶ – ୨ (Core Course - 2) : ଓଡ଼ିଆ ନାଟକ ଓ ଏକାଙ୍କିକା
ଦ୍ୱିତୀୟ ପତ୍ର

୧ମ ଏକକ / ୟୁନିଟ୍ – ୧ : ରକ୍ତମାଟି - କାଳୀଚରଣ ପଟ୍ଟନାୟକ

୨ୟ ଏକକ / ୟୁନିଟ୍ – ୨ : ନନ୍ଦିକା କେଶରୀ -ମନୋରଞ୍ଜନ ଦାସ
୩ୟ ଏକକ / ୟୁନିଟ୍ – ୩ : କୋକୁଆ – ବିଜୟ କୁମାର ଶତପଥୀ, ଅଗ୍ରଦୂତ, କଟକ
୪ର୍ଥ ଏକକ / ୟୁନିଟ୍ – ୪ : ଏକାଙ୍କିକା- ସ୍ମୃତି ବିଭ୍ରାଟ - ପ୍ରାଣବନ୍ଧୁ କର ଓ ଛଦ୍ମବେଶୀ - ବିଶ୍ୱଜିତ୍ ଦାସ
୫ମ ଏକକ / ୟୁନିଟ୍ – ୫ : ପ୍ରକଳ୍ପ ପ୍ରସ୍ତୁତି

ସହାୟକ ଗ୍ରନ୍ଥସୂଚୀ

୧. ଅଭିଯାନ - କାଳୀଚରଣ ପଟ୍ଟନାୟକ
୨. ନନ୍ଦିକା କେଶରୀ-ମନୋରଞ୍ଜନ ଦାସ କିମ୍ବା ତଟନିରଂଜନା – ବିଜୟ ମିଶ୍ର
୩. କୋକୁଆ – ବିଜୟ କୁମାର ଶତପଥୀ, ଅଗ୍ରଦୂତ, କଟକ କିମ୍ବା ଭୁଖା –ମଂଗଲୁ ଚରଣ ବିଶ୍ୱାଳ
୪. ଅଶ୍ରୁ ନୁହେଁ ଅନଳ, ହେମନ୍ତ କୁମାର ଦାସ
୫. ସ୍ୱାଧୀନୋତ୍ତର ଓଡିଆ ନାଟକର ମନସ୍ତାତ୍ତ୍ୱିକ ବିଶ୍ଳେଷଣ, ରଶ୍ମିତା ରାଉତରାୟ, ବିଜୟିନୀ ପବ୍ଲିକେସନ, କଟକ
୬. ସାହିତ୍ୟସାଧକ ମଙ୍ଗଳୁଚରଣ – ଗୌରିଦାସ ପ୍ରଧାନ
(ଚତୁର୍ଥ ପତ୍ର ନିମନ୍ତେ ପ୍ରଦତ୍ତ ସହାୟକ ପୁସ୍ତକଗୁଡିକ ଅନୁସରଣୀୟ ।)

ତୃତୀୟ ପର୍ଯ୍ୟାୟ (Semester – III) DSC 1/2 C

ପ୍ରଧାନ ପାଠ୍ୟାଂଶ – ୩ (Core Course - 3) : ଓଡ଼ିଆ କଥା ସାହିତ୍ୟ

ତୃତୀୟ ପତ୍ର :

୧ମ ଏକକ / ୟୁନିଟ୍ – ୧ : ଓଡ଼ିଆ କଥାସାହିତ୍ୟର ବିକାଶକ୍ରମ

୨ୟ ଏକକ / ୟୁନିଟ୍ – ୨ : ଛ'ମାଣ ଆଠଗୁଣ୍ଠ - ଫକୀର ମୋହନ ସେନାପତି

୩ୟ ଏକକ / ୟୁନିଟ୍ – ୩ : ଦାନାପାଣି - ଗୋପୀନାଥ ମହାନ୍ତି କିମ୍ବା ନୟନତାରା -ଦୟାନିଧି ମିଶ୍ର

୪ର୍ଥ ଏକକ / ୟୁନିଟ୍ – ୪ : ଗଳ୍ପ ସାହିତ୍ୟ

ପାଠ୍ୟ ଗଳ୍ପ: ଦେବତାର ବିଧାତା – ଗୋଦାବରୀଶ ମହାପାତ୍ର

ମାଂସର ବିଳାପ - କାଳିନ୍ଦୀ ଚରଣ ପାଣିଗ୍ରାହୀ

ମଧୁବନର ମେୟର - ମନୋଜ ଦାସ

୫ମ ଏକକ / ୟୁନିଟ୍ – ୫ : ପ୍ରକଳ୍ପ ପ୍ରସ୍ତୁତି

ସହାୟକ ଗ୍ରନ୍ଥସୂଚୀ

୧. ଓଡ଼ିଆ ଉପନ୍ୟାସ ସାହିତ୍ୟର ପରିଚୟ, ସଂ ପଠାଣି ପଟ୍ଟନାୟକ ଓ ଭୋଳାନାଥ ରାଉତ, ଓଡ଼ିଶା ବୁକ୍ ଷ୍ଟୋର୍, କଟକ
୨. ଓଡ଼ିଆ କ୍ଷୁଦ୍ରଗଳ୍ପର ଉନ୍ମେଷ ଓ ଉତ୍ତରଣ – ବୈଷ୍ଣବ ଚରଣ ସାମଲ, ଫ୍ରେଣ୍ଡସ୍ ପବ୍ଲିଶର୍ସ, କଟକ
୩. ଛ'ମାଣ ଆଠଗୁଣ୍ଠ - ଫକୀର ମୋହନ ସେନାପତି
୪. ଛ'ମାଣ ଆଠଗୁଣ୍ଠ ଭିନ୍ନ ଦୃଷ୍ଟି ଭିନ୍ନ ବ୍ୟାଖ୍ୟା, ପଞ୍ଚାନନ ମିଶ୍ର, ବିଜୟିନୀ ପବ୍ଲିକେସନ, କଟକ
୫. ଦାନାପାଣି - ଗୋପୀନାଥ ମହାନ୍ତି
୬. ନୟନତାରା - ଦୟାନିଧି ମିଶ୍ର
୭. କଥାଶିଳ୍ପୀ ମନୋଜ ଦାସ, ଶତ୍ରୁଘ୍ନ ପାଣ୍ଡବ, ଫ୍ରେଣ୍ଡସ୍ ପବ୍ଲିଶର୍ସ, କଟକ
୮. ମନସ୍ୱୀ ମନୋଜ, ମଣୀନ୍ଦ୍ର କୁମାର ମେହେର, ଫ୍ରେଣ୍ଡସ୍ ପବ୍ଲିଶର୍ସ, କଟକ
୯. ଓଡିଆ ଉପନ୍ୟାସର ସମାଜତାତ୍ତ୍ୱିକ ଆଲୋଚନା, କଇଳାଶ ପଟ୍ଟନାୟକ, ବିଦ୍ୟାପୁରୀ, କଟକ

ଚତୁର୍ଥ ପର୍ଯ୍ୟାୟ (Semester – IV)

ପ୍ରଧାନ ପାଠ୍ୟାଂଶ - ୪ (Core Course - 4) : ବ୍ୟାବହାରିକ ଓଡ଼ିଆ ବ୍ୟାକରଣ (DSC 1/2 D)

୪ର୍ଥ ପତ୍ର

୧ମ ଏକକ / ୟୁନିଟ୍ – ୧ : ଓଡ଼ିଆ ବର୍ଣ୍ଣ ବିଚାର, ବାକ୍ୟର ଗଠନ ରୀତି ଓ ପ୍ରକାରଭେଦ ।

୨ୟ ଏକକ / ୟୁନିଟ୍ – ୨ : କାରକ, ବିଭକ୍ତି, କୃଦନ୍ତ ଓ ତଦ୍ଧିତ

୩ୟ ଏକକ / ୟୁନିଟ୍ – ୩ : ଉପସର୍ଗ, ସନ୍ଧି ଓ ସମାସ

୪ର୍ଥ ଏକକ / ୟୁନିଟ୍ – ୪ : ଓଡିଆ ଶବ୍ଦସମ୍ଭାର

ସହାୟକ ଗ୍ରନ୍ଥସୂଚୀ

୧. ସର୍ବସାର ବ୍ୟାକରଣ - ନାରାୟଣ ମହାପାତ୍ର ଓ ଶ୍ରୀଧର ଦାସ, ନିୟୁ ଷ୍ଟୁଡେଣ୍ଟ ଷ୍ଟୋର୍, କଟକ
୨. ଆଧୁନିକ ଓଡ଼ିଆ ବ୍ୟାକରଣ - ଧନେଶ୍ୱର ମହାପାତ୍ର, କିତାବ ମହଲ, କଟକ
୩. ବ୍ୟାବହାରିକ ଓଡିଆ ବ୍ୟାକରଣ, ବିଜୟ ପ୍ରସାଦ ମହାପାତ୍ର, ବିଦ୍ୟାପୁରୀ, କଟକ
୪. ଓଡ଼ିଆ ଭାଷାର ଉନ୍ମେଷ ଓ ବିକାଶ – ବାସୁଦେବ ସାହୁ, ଫ୍ରେଣ୍ଡସ୍ ପବ୍ଲିଶର୍ସ, କଟକ
ଓଡିଆ ଭାଷା ଚର୍ଚ୍ଚାର ପରଂପରା, ଗଗନେନ୍ଦ୍ର ନାଥ ଦାସ, ଓଡିଆ ଗବେଷଣା ପରିଷଦ, କଟକ

ଦକ୍ଷତାବର୍ଦ୍ଧକ ବାଧତାମୂଳକ ପାଠ୍ୟକ୍ରମ

Ability Enhancement Compulsory Course (AECC)

ଯୋଗାଯୋଗମୂଳକ ମାତୃଭାଷା – ଓଡ଼ିଆ

(2019-20)

MIL (Communications) – Odia

ଦ୍ୱିତୀୟ ପର୍ଯ୍ୟାୟ **(2nd Semester)** କଳା, ବିଜ୍ଞାନ ଓ ବାଣିଜ୍ୟ ସାଧାରଣ **(Pass)** / ସମ୍ମାନ **(Hons)**
ଶ୍ରେଣୀ ପାଇଁ ଉଦ୍ଦିଷ୍ଟ

ମୋଟ୍ କ୍ରେଡିଟ୍ସ-୪, ମୋଟ ଶ୍ରେଣୀ ପାଠଦାନ ନିର୍ଘଣ୍ଟ -୪୦, ଗୋଟିଏ ଶ୍ରେଣୀ ପାଠଦାନର (ପିରିୟଡ୍) ସମୟ ଅବଧି
-୪୫ ମିନିଟ୍, ପାଠ୍ୟକ୍ରମ – ୨, ପୂର୍ଣ୍ଣସଂଖ୍ୟା – ୧୦୦

(Credits – 4) Total Classes - 40, One Period - 45 Minutes, Course - II, Full Marks - 100

ପାଠ୍ୟକ୍ରମର ଭୂମିକା :

ଏହି ପାଠ୍ୟଖସଡ଼ାଟି ପସନ୍ଦ ଓ ଆସ୍ଥାଭତ୍ତିକ (CBCS / ସିବିସିଏସ୍) ପାଠ୍ୟ ପ୍ରଣାଳୀ ଅନୁସାରେ ପ୍ରସ୍ତୁତ ହୋଇଛି । ବିଭିନ୍ନ ସ୍ତରରେ ଆବଶ୍ୟକ ଅନୁସାରେ ସମସାମୟିକ ପରିସ୍ଥିତିକୁ ନେଇ ଭାବବିନିମୟ ଓ ପାରସ୍ପରିକ ଯୋଗାଯୋଗ ସ୍ଥାପନ କିପରି ଓଡ଼ିଆ ଭାଷାରେ ସହଜରେ, ସରଳରେ ହୋଇପାରିବ – ଏ ଦିଗ ପ୍ରତି ଏଥିରେ ଧ୍ୟାନ ଦିଆଯାଇଛି । ଓଡ଼ିଆ ଭାଷା ଓ ସାହିତ୍ୟର ପ୍ରାୟୋଗିକ ଜ୍ଞାନର ବିକାଶ ନିମିତ୍ତ +୩ ସ୍ତରୀୟ ବିଦ୍ୟାର୍ଥୀଙ୍କୁ ଏହି ପାଠ୍ୟକ୍ରମର ଖସଡ଼ାଟି ସାହାଯ୍ୟ କରିବ । ସେଥିପାଇଁ ପ୍ରଚଳିତ ଭାଷାର ବୈୟାକରଣିକ, ବ୍ୟାବହାରିକ ଓ ପ୍ରାୟୋଗିକ ଦିଗ ପ୍ରତି ଏଥିରେ ଧ୍ୟାନ ଦିଆଯାଇଛି । ଏଥିରେ ସଂଯୋଗ ପ୍ରକ୍ରିୟାର ଅନୁବିଧି, ଯୋଗାଯୋଗର ତଥ୍ୟ ଓ ତତ୍ତ୍ୱ ପ୍ରତି ଗୁରୁତ୍ୱ ଦିଆଯାଇଛି । ସରକାରୀ କାର୍ଯ୍ୟାଳୟରେ ଓଡ଼ିଆ ଭାଷାର ବ୍ୟବହାରରେ ଏହା ଦକ୍ଷତା ବୃଦ୍ଧି କରିବ । ଓଡ଼ିଆ ଭାଷାର ପ୍ରୟୋଗରେ ସେମାନେ ଶୁଦ୍ଧ ଓ ପରିଚ୍ଛନ୍ନ ଭାବରେ ଯେକୌଣସି ପ୍ରକାର ଜ୍ଞାନର ସୂଚନା ତଥ୍ୟ ଓ ସିଦ୍ଧାନ୍ତକୁ ମୌଖିକ ଓ ଲିଖିତ ସ୍ତରରେ ସହଜରେ ପ୍ରକାଶ କରିପାରିବେ ଏବଂ ସେମାନଙ୍କ ମାତୃଭାଷା ପ୍ରୟୋଗର ବିକାଶ ଘଟିପାରିବ ।

ମୂଲ୍ୟ ବିଭାଜନ ପଦ୍ଧତି : (ସବୁଥିରୁ ବିକଳ୍ପ ପଡ଼ିବ)

କ) ନିର୍ଦ୍ଧାରିତ ପାଠ୍ୟର ସବୁ ଏକକ (ୟୁନିଟ୍) ରୁ ବିକଳ୍ପସହ ଦୁଇଟି ଲେଖାଏଁ ମୋଟ ୮ଟି ୧୫ନମ୍ବର ବିଶିଷ୍ଟ ଦୀର୍ଘପ୍ରଶ୍ନ ପଡିବ । ବିଦ୍ୟାର୍ଥୀଙ୍କୁ ୪ଟି ପ୍ରଶ୍ନର ଉତ୍ତର ଦେବାକୁ ହେବ ।(୧୫ x ୪ = ୬୦)

ଖ) ନିର୍ଦ୍ଧାରିତ ପାଠ୍ୟର ସବୁ ଏକକରୁ ୧୨ଟି ଅତିସଂକ୍ଷିପ୍ତ ପ୍ରଶ୍ନ ପଡ଼ିବ । ସେଥିରୁ ୧୦ଟି ପ୍ରଶ୍ନର ଉତ୍ତର ଦେବାକୁ ହେବ । (୧୦ x ୨ = ୨୦)

ଗ) ମହାବିଦ୍ୟାଳୟସ୍ତରୀୟ ଅନ୍ତଃ ପରୀକ୍ଷା (୨୦)

ମୋଟ ମୂଲ୍ୟାଙ୍କ - ୧୦୦

ସବିଶେଷ ପାଠ୍ୟ

ଯୋଗାଯୋଗମୂଳକ ମାତୃଭାଷା – ଓଡ଼ିଆ (AECC)

ପାଠ୍ୟ-୧ / Course – 1: ଯୋଗାଯୋଗ ଅନୁବିଧି, ରୀତି ଓ ମାଧ୍ୟମ

୧ମ ଏକକ : ଯୋଗାଯୋଗର ପରିଭାଷା, ଅନୁବିଧି, ପରିସର ଓ ପ୍ରକାରଭେଦ
୨ୟ ଏକକ : ସାକ୍ଷାତକାର, ଭାଷଣ କଳା
୩ୟ ଏକକ : ସମ୍ବାଦର ପରିଭାଷା, ପରିସର ଓ ସମ୍ବାଦ ପ୍ରସ୍ତୁତି
୪ର୍ଥ ଏକକ : ଓଡ଼ିଆ ଭାଷାର ବର୍ଣ୍ଣମାଳା, ବର୍ଣ୍ଣାଶୁଦ୍ଧିର ନିରାକରଣ । (ବନାନ ତ୍ରୁଟି - ସାଦୃଶ୍ୟଜନିତ ଅଶୁଦ୍ଧି, ଲିଙ୍ଗଗତ ଅଶୁଦ୍ଧି, ସନ୍ଧିଗତ ଅଶୁଦ୍ଧି, ସମାସଗତ ଅଶୁଦ୍ଧି, ବଚନ ଓ ବିଭକ୍ତିଗତ ଅଶୁଦ୍ଧି, ବାକ୍ୟ ବିଧିଜନିତ ଅଶୁଦ୍ଧି, ସମାର୍ଥବୋଧକ ଶବ୍ଦାଶୁଦ୍ଧି, ପ୍ରତ୍ୟୟ ଜନିତ ଅଶୁଦ୍ଧି, ଶବ୍ଦ ସଂଯୋଗାତ୍ମକ ଓ ସ୍ୱରସଙ୍ଗତି ଜନିତ ଅଶୁଦ୍ଧି)

ସହାୟକ ଗ୍ରନ୍ଥସୂଚୀ (ପାଠ୍ୟ-୧ / Course – 1)

୧. ଯୋଗାଯୋଗ ମୂଳକ ମାତୃଭାଷା (ଓଡ଼ିଆ) ସାମଲ ବିରଞ୍ଚି ନାରାୟଣ, ସତ୍ୟନାରାୟଣ ବୁକ ଷ୍ଟୋର, କଟକ ।
୨. ସଂଯୋଗ ଅନୁବିଧି, ସନ୍ତୋଷ କୁମାର ତ୍ରିପାଠୀ, ନାଳନ୍ଦା, କଟକ
୩. ଭାଷଣ କଳା ଓ ଅନ୍ୟାନ୍ୟ ପ୍ରସଙ୍ଗ - କୃଷ୍ଣଚନ୍ଦ୍ର ପ୍ରଧାନ, ସତ୍ୟନାରାୟଣ ବୁକ୍ ଷ୍ଟୋର,କଟକ
୪. ପ୍ରାୟୋଗିକ ଓଡ଼ିଆ ଭାଷା – ଓଡ଼ିଶା ରାଜ୍ୟପାଠ୍ୟ ପୁସ୍ତକ ପ୍ରଣୟନ ଓ ପ୍ରକାଶନ ସଂସ୍ଥା, ଭୁବନେଶ୍ୱର
୧. ସମ୍ବାଦ ଓ ସାମ୍ବାଦିକତା – ଚନ୍ଦ୍ରଶେଖର ମହାପାତ୍ର, ଓଡ଼ିଶା ରାଜ୍ୟ ପାଠ୍ୟପୁସ୍ତକ ପ୍ରଣୟନ ଓ ପ୍ରକାଶନ ସଂସ୍ଥା, ଭୁବନେଶ୍ୱର
୧. ନିର୍ଭୁଲ ଲେଖାର ମୂଳସୂତ୍ର, ନୀଳାଦ୍ରିଭୂଷଣ ହରିଚନ୍ଦନ, ପି.ସି.ଆର **ପବ୍ଲି**କେସନ, ଭୁବନେଶ୍ୱର
୨. ସର୍ବସାର ବ୍ୟାକରଣ - ନାରାୟଣ ମହାପାତ୍ର ଓ ଶ୍ରୀଧର ଦାସ, ନିୟୁ ଷ୍ଟୁଡେଣ୍ଟସ୍ ଷ୍ଟୋର, କଟକ

COMPULSORY LANGUAGE / LITERATURE COURSE MIL (ODIA)- ARTS

ବାଧ୍ୟତାମୂଳକ ଭାଷା ଓ ସାହିତ୍ୟ - ଆଧୁନିକ ଭାରତୀୟ ଭାଷା (ଓଡ଼ିଆ)

+୩, ପ୍ରଥମ ବର୍ଷ କଳା ସାଧାରଣ (PASS) ଶ୍ରେଣୀ ପାଇଁ ଉଦ୍ଦିଷ୍ଟ

ପତ୍ର ସଂଖ୍ୟା - ପ୍ରଥମ

ପ୍ରଥମ ପର୍ଯ୍ୟାୟ (1ST SEMESTER)

ପ୍ରତ୍ୟେକ ପତ୍ରର ମୂଲ୍ୟ - ୧୦୦ ନମ୍ବର

(୨୦ ନମ୍ବର ଅନ୍ତଃ ପରୀକ୍ଷା + ୮୦ ନମ୍ବର ମୁଖ୍ୟ ପରୀକ୍ଷା)

ମୂଲ୍ୟ ବିଭାଜନ

(କ) ପ୍ରଥମ ଏକକ (ଗଦ୍ୟ ସାହିତ୍ୟ)ରୁ ୧୫ ନମ୍ବର ବିଶିଷ୍ଟ ୨ଟି ଦୀର୍ଘ ପ୍ରଶ୍ନ ଆସିବ । ବିଦ୍ୟାର୍ଥୀଙ୍କୁ ପସନ୍ଦ ଅନୁସାରେ ଗୋଟିଏ ପ୍ରଶ୍ନର ଉତ୍ତର ଦେବାକୁ ହେବ । (ମୋଟ୍ ମୂଲ୍ୟ -୧୫)

(ଖ) ଦ୍ୱିତୀୟ ଏକକ (ପଦ୍ୟ ସାହିତ୍ୟ) ରୁ ୧୫ ନମ୍ବର ବିଶିଷ୍ଟ ୨ଟି ଦୀର୍ଘ ପ୍ରଶ୍ନ ଆସିବ । ବିଦ୍ୟାର୍ଥୀଙ୍କ ପସନ୍ଦ ଅନୁସାରେ ଗୋଟିଏ ପ୍ରଶ୍ନର ଉତ୍ତର ଦେବାକୁ ହେବ । (ମୋଟ୍ ମୂଲ୍ୟ -୧୫)

(ଗ) ତୃତୀୟ ଏକକ (ଅତିରିକ୍ତ ପାଠ୍ୟ) ରୁ ୧୫ ନମ୍ବର ବିଶିଷ୍ଟ ୨ଟି ଦୀର୍ଘ ପ୍ରଶ୍ନ ଆସିବ । ବିଦ୍ୟାର୍ଥୀଙ୍କ ପସନ୍ଦ ଅନୁସାରେ ଗୋଟିଏ ପ୍ରଶ୍ନର ଉତ୍ତର ଦେବାକୁ ହେବ । (ମୋଟ୍ ମୂଲ୍ୟ -୧୫)

(ଘ) ଚତୁର୍ଥ ଏକକରୁ ୧୫ ନମ୍ବର ବିଶିଷ୍ଟ ୨ଟି ପ୍ରଶ୍ନରୁ ଗୋଟିକର ଉତ୍ତର ଦେବାକୁ ହେବ । (ମୋଟ୍ ମୂଲ୍ୟ -୧୫)

(ଙ) ପ୍ରତ୍ୟେକ ଏକକରୁ ତିନୋଟି କରି ୧୨ଟି ପ୍ରଶ୍ନ ଆସିବ, ସେଥିରୁ ବିଦ୍ୟାର୍ଥୀ ୧୦ ଗୋଟି ପ୍ରଶ୍ନର ଉତ୍ତର ଦେବେ । (ମୋଟ୍ ୨ x ୧୦ = ୨୦)

ସବିଶେଷ ଅଧ୍ୟୟନ

ଅନୁମୋଦିତ ପାଠ୍ୟ

ପ୍ରଥମ ଏକକ- ଗଦ୍ୟ ସାହିତ୍ୟ

୧- ଜାତୀୟ ଜୀବନ - ମଧୁସୂଦନ ଦାସ

୨- ସୌନ୍ଦର୍ଯ୍ୟ ଓ ପ୍ରେମ – ଶଶିଭୂଷଣ ରାୟ

୩- ସାହିତ୍ୟ ଓ ଗଣମାଧ୍ୟମ – ଶରତ କୁମାର ମହାନ୍ତି

ଦ୍ୱିତୀୟ ଏକକ - ପଦ୍ୟ ସାହିତ୍ୟ

୧- କେଶବ କୋଇଲି - ମାର୍କଣ୍ଡ ଦାସ

୨- ମନବୋଧ ଚଉତିଶା - ଭକ୍ତଚରଣ ଦାସ

୩- କାକ ବାରତା - ନନ୍ଦକିଶୋର ବଳ

୪- ଝିଅ ପାଇଁ ଗୋଟିଏ କବିତା - ରାଜେନ୍ଦ୍ର କିଶୋର ପଣ୍ଡା

ତୃତୀୟ ଏକକ – ଅତିରିକ୍ତ ପାଠ୍ୟ (ଗଳ୍ପ ସାହିତ୍ୟ)

୧- ଅଶୁଭ ପୁତ୍ରର କାହାଣୀ - ଅଚ୍ୟୁତାନନ୍ଦ ପତି

୨- ସୁଲତାନ୍ - ରାଜକିଶୋର ପଟ୍ଟନାୟକ

୩- ପାଟଦେଈ – ବୀଣାପାଣି ମହାନ୍ତି

ଚତୁର୍ଥ ଏକକ – ବ୍ୟାକରଣ

ପାଠ : ପଦ ପ୍ରକରଣ - (ବିଶେଷ୍ୟ, ବିଶେଷଣ, ସର୍ବନାମ, ଅବ୍ୟୟ ଓ କ୍ରିୟା)

ସହାୟକ ଗ୍ରନ୍ଥସୂଚୀ :

୧) ସର୍ବସାର ବ୍ୟାକରଣ - ପଣ୍ଡିତ ନାରାୟଣ ମହାପାତ୍ର ଏବଂ ଶ୍ରୀଧର ଦାଶ - ନିଉ ଷ୍ଟୁଡେଣ୍ଟସ୍ ଷ୍ଟୋର୍, କଟକ

୨) ପ୍ରଚଳିତ ଓଡ଼ିଆ ଭାଷାର ବ୍ୟାକରଣ - ବିଜୟ ପ୍ରସାଦ ମହାପାତ୍ର - ବିଦ୍ୟାପୁରୀ, କଟକ

୩) ଆଧୁନିକ ଓଡ଼ିଆ ବ୍ୟାକରଣ - ଧନେଶ୍ୱର ମହାପାତ୍ର - କିତାବ ମହଲ, କଟକ

୪) ଶେଷ ଦଶକର ରଚନା – ଶରତ କୁମାର ମହାନ୍ତି

COMPULSORY LANGUAGE / LITERATURE COURSE

MIL (ODIA)- ARTS

ବାଧତାମୂଳକ ଭାଷା ଓ ସାହିତ୍ୟ - ଆଧୁନିକ ଭାରତୀୟ ଭାଷା (ଓଡ଼ିଆ)

+୩, ପ୍ରଥମ ବର୍ଷ କଳା ସାଧାରଣ (PASS)ଶ୍ରେଣୀ ପାଇଁ ଉଦ୍ଦିଷ୍ଟ

2019-20

ପତ୍ର ସଂଖ୍ୟା - ଦ୍ୱିତୀୟ

ଦ୍ୱିତୀୟ ପର୍ଯ୍ୟାୟ (3RD SEMESTER)

(୨୦ ନମ୍ବର ଅନ୍ତଃ ପରୀକ୍ଷା + ୮୦ ନମ୍ବର ମୁଖ୍ୟ ପରୀକ୍ଷା = ୧୦୦ ନମ୍ବର)

ମୂଲ୍ୟ ବିଭାଜନ

(କ) ପ୍ରଥମ ଏକକ (ଗଦ୍ୟ ସାହିତ୍ୟ)ରୁ ୧୫ ନମ୍ବର ବିଶିଷ୍ଟ ୨ଟି ଦୀର୍ଘ ପ୍ରଶ୍ନ ଆସିବ । ବିଦ୍ୟାର୍ଥୀଙ୍କୁ ପସନ୍ଦ ଅନୁସାରେ ଗୋଟିଏ ପ୍ରଶ୍ନର ଉତ୍ତର ଦେବାକୁ ହେବ । (ମୋଟ୍ ମୂଲ୍ୟ -୧୫)

(ଖ) ଦ୍ୱିତୀୟ ଏକକ (ପଦ୍ୟ ସାହିତ୍ୟ) ରୁ ୧୫ ନମ୍ବର ବିଶିଷ୍ଟ ୨ଟି ଦୀର୍ଘ ପ୍ରଶ୍ନ ଆସିବ । ବିଦ୍ୟାର୍ଥୀଙ୍କ ପସନ୍ଦ ଅନୁସାରେ ଗୋଟିଏ ପ୍ରଶ୍ନର ଉତ୍ତର ଦେବାକୁ ହେବ । (ମୋଟ୍ ମୂଲ୍ୟ -୧୫)

(ଗ) ତୃତୀୟ ଏକକ (ଅତିରିକ୍ତ ପାଠ୍ୟ) ରୁ ୧୫ ନମ୍ବର ବିଶିଷ୍ଟ ୨ଟି ଦୀର୍ଘଧର୍ମୀ ପ୍ରଶ୍ନ ଆସିବ । ବିଦ୍ୟାର୍ଥୀଙ୍କ ପସନ୍ଦ ଅନୁସାରେ ଗୋଟିଏ ପ୍ରଶ୍ନର ଉତ୍ତର ଦେବାକୁ ହେବ । (ମୋଟ୍ ମୂଲ୍ୟ -୧୫)

(ଘ) ଚତୁର୍ଥ ଏକକରୁ ୧୫ ନମ୍ବର ବିଶିଷ୍ଟ ୨ଟି ପ୍ରଶ୍ନରୁ ଗୋଟିକର ଉତ୍ତର ଦେବାକୁ ହେବ । (ମୋଟ୍ ମୂଲ୍ୟ -୧୫)

(ଙ) ପ୍ରତ୍ୟେକ ଏକକରୁ ତିନୋଟି କରି ୧୨ଟି ପ୍ରଶ୍ନ ଆସିବ, ସେଥିରୁ ବିଦ୍ୟାର୍ଥୀ ୧୦ ଗୋଟି ପ୍ରଶ୍ନର ଉତ୍ତର ଦେବେ । (ମୋଟ୍ ୨ x ୧୦ = ୨୦)

ସବିଶେଷ ଅଧ୍ୟୟନ

ଅନୁମୋଦିତ ପାଠ୍ୟ

ପ୍ରଥମ ଏକକ- ଗଦ୍ୟ ସାହିତ୍ୟ

୧- ଅଛୁ ଓ ହେବୁ - ନୀଳକଣ୍ଠ ଦାସ
୨- ସ୍ତ୍ରୀ ଶିକ୍ଷା - ରେବା ରାୟ
୩- ଇଚ୍ଛନ୍ତି ଦାମ୍ଭିକେ - ବୈଷ୍ଣବ ଚରଣ ସାମଲ

ଦ୍ୱିତୀୟ ଏକକ - ପଦ୍ୟ ସାହିତ୍ୟ

୧- ସବୁଥିରୁ ବଞ୍ଚିତ କରି - କାନ୍ତକବି ଲକ୍ଷ୍ମୀକାନ୍ତ ମହାପାତ୍ର
୨- ଅକ୍ରୂର ଉବାଚ - ଗୁରୁ ପ୍ରସାଦ ମହାନ୍ତି
୩- ଓଡିଶା - ସୀତାକାନ୍ତ ମହାପାତ୍ର
୪- ହେ ମୋ ଦେଶ – ବ୍ରଜନାଥ ରଥ

ତୃତୀୟ ଏକକ - ଅତିରିକ୍ତ ପାଠ୍ୟ (ଜୀବନୀ)

୧-ପିତୃପ୍ରସଙ୍ଗ (ସ୍ୱଭାବ କବି ଗଙ୍ଗାଧର ମେହେରଙ୍କ ଜୀବନୀ –କେବଳ ଜୀବନୀ ଅଂଶ)– ଭଗବାନ ମେହେର

ଚତୁର୍ଥ ଏକକ – ବ୍ୟାକରଣ- ବାକ୍ୟର ସଂଜ୍ଞା, ସ୍ୱରୂପ, ଲକ୍ଷଣ ଓ ରୂପାନ୍ତର, ଲୋକୋକ୍ତିର ଅର୍ଥ ଓ ପ୍ରୟୋଗ

ସହାୟକ ଗ୍ରନ୍ଥସୂଚୀ :

୧) ସର୍ବସାର ବ୍ୟାକରଣ - ପଣ୍ଡିତ ନାରାୟଣ ମହାପାତ୍ର ଏବଂ ଶ୍ରୀଧର ଦାଶ - ନିଉ ଷ୍ଟୁଡେଣ୍ଟସ୍ ଷ୍ଟୋର୍, କଟକ
୨) ପ୍ରାୟୋଗିକ ଓଡିଆ ଭାଷା, ଓଡ଼ିଶା ରାଜ୍ୟପାଠ୍ୟ ପୁସ୍ତକ ପ୍ରଣୟନ ଓ ପ୍ରକାଶନ ସଂସ୍ଥା, ଭୁବନେଶ୍ୱର

ପାଠ୍ୟକ୍ରମ ସଂପର୍କରେ ଶିକ୍ଷକଙ୍କ ପ୍ରଶିକ୍ଷଣ ଯୋଜନା (୨୧ ଦିନ)

୨-ବୌଦ୍ଧ, ଶୈବ, ବୈଷ୍ଣବ, ଜଗନ୍ନାଥ ତତ୍ତ୍ୱ
୩-ଗବେଷଣା ପ୍ରବିଧି
୪-ସାହିତ୍ୟତତ୍ତ୍ୱ (ପ୍ରାଚ୍ୟ-ପାଶ୍ଚାତ୍ୟ)
୫-ଭାଷାବିଜ୍ଞାନ ଓ ଭାଷାତତ୍ତ୍ୱ
୬-ଲୋକସାହିତ୍ୟ ଓ ସଂସ୍କୃତି
୭-କଥା ସାହିତ୍ୟ (ଗଳ୍ପ ଉପନ୍ୟାସ)
୮-ଅନୁବାଦ ଓ ସଂପାଦନା
୯-କମ୍ପ୍ୟୁଟର ଶିକ୍ଷା

STATE MODEL SYLLABUS FOR UNDER GRADUATE

COURSE IN PHILOSOPHY

(Bachelor of Arts Examination)

UNDER

CHOICE BASED CREDIT SYSTEM

PHILOSOPHY

Semester		**CORE COURSE (14)**	**Ability Enhancement Compulsory Course (AECC) (2)**	**Ability Enhancement Elective Course (AEEC) (2) (Skill Based)**	**Elective: Discipline Specific DSE (4)**	**Elective: Generic (GE) (4)**
I	CC 1	General Philosophy	English Communication / Odia/ Hindi			**GE-I** Symbolic Logic
	CCII	Logic and Scientific Method				
II	CCIII	Systems of Indian Philosophy –I	Environmental Studies			**GE-II** Indian Philosophy
	CCIV	Symbolic Logic				
III	CCV	Ethics		**SEC -I**		**GE-III** History of Modern European Philosophy
	CCVI	History of Greek Philosophy				
	CCVII	Systems of Indian Philosophy (II)				
IV	CCVIII	Contemporary Indian Philosophy		**SEC -II**		**GE- IV** Ethics: Theory and Practice
	CCIX	History of Modern European Philosophy				
	CCX	Philosophy of Language				
V	CCXI	Western Classics: Meditations of Rene Descartes			**DSE-I** PHILOSOPHY OF BHAGVAD GITA	
	CCXII	Indian Text: Isa Upanisad			**DSE-II** PHILOSOPHY OF RELIGION	
VI	CCXIII	Social & Political Philosophy			**DSE-III** GANDHIAN STUDIES	
	CC XIV	Applied Ethics			**DSE- IV** RECENT WESTERN PHILOSOPHY/ PROJECT	

PHILOSOPHY- Honours

Core course – 14 papers
Discipline Specific Elective – 4 papers
Generic Elective for non Philosophy students – 4 papers. Incase University offers 2 subjects as GE, then only papers 1 and 2 will be the GE paper.

Marks per paper - Midterm : 20 marks, End term : 80 marks, Total – 100 marks
Credit per paper – 6, Teaching hours per paper – 50 hours + 10 hours tutorial

CC 1: GENERAL PHILOSOPHY

Unit-I: Definition, Nature & Function of Philosophy, and Philosophy in relation to other modes of thinking like Science & Religion.

Unit-II: Metaphysics: Monism, Pluralism, Realism, Idealism, Metaphysical issues: Substance, Universal, Mind & Body.

Unit-III: Problem of knowledge: What is knowledge? Sources of knowledge: Empiricism, Rationalism, Theories of Truth: Correspondence, coherence and pragmatic theory

Unit-IV: Problems of Ethics**:** (1) Theories of Goodness: The good and the evil (2) Theories of conduct: Egoism & Altruism.

Prescribed Book:

1. John Hospers: An Introduction to Philosophical Analysis(relevant portions)
2. J.N. Sinha : Introduction to Philosophy

Reference book:

(1) G.T.W. Patrick: Introduction to Philosophy
(2) A.C. Ewing: The Fundamental Questions of Philosophy
(3) G.W. Cunningham: Problems of Philosophy
(4) Richard Taylor: Metaphysics
(5) D.W. Hamlyn: Metaphysics

CC II: LOGIC AND SCIENTIFIC METHOD

Unit-I: Definition of Logic, Laws of Thought, Deductive and Inductive Arguments, Validity & Soundness of Arguments.

Unit-II: Classification of propositions (from stand-point of Quality & Quantity), Distribution of Terms, Square of oppositions, Existential Import of Propositions, Interpretation of categorical proposition.

Unit-III: Inference- Immediate Inference (Conversion and Obversion), Mediate Inference (Syllogism): Figure & Moods, Testing of Validity of Arguments by syllogistic Rules.

Unit-4: Inductive Reasoning & Scientific Enquiry: Causation & Mills Experimental Methods.

Prescribed Book:

1. Cohen & Nagel- Introduction to Logic & Scientific Method.

Reference Book:

1. Copi, Cohen & Mac Mahan- Introduction to Logic (14th Edition)
2. Alex Rosenberg- Philosophy of Science: A Contemporary Introduction
3. John Hospers: An Introduction to Philosophical Analysis.

CC III: SYSTEMS OF INDIAN PHILOSOPHY–I

Unit-I: Salient Features of Indian Philosophy, Basic concepts like Rta, Rna, Carvakas - Epistemology and Metaphysics (Lokayatamata)
Unit-II- Jainism - Syadvada, Anekantavada, Jaina ethics (concept of Triratna)
Unit-III: Buddhism: Four Noble Truths, Doctrine of Momentariness, Dependant Origination, No Soul Theory, Nirvana
Unit-IV: Samkhya-Dualistic System: Purusa, Prakriti, Theory of Causation, Theory of Evolution, Astanga Yoga of Patanjali

Prescribed Books:
(1) Dutta&Chatterjee - An Introduction to Indian Philosophy
(2) C. D. Sharma - A Critical Survey of Indian Philosophy

Reference Books:
(1) R. K. Puligandla- Fundamentals of Indian Philosophy.
(2) M. Hiriyana- Outlines of Indian Philosophy
(3) J. N. Sinha- Indian Philosophy
(4) S. Radhakrishnan- Indian Philosophy(Vol.1 & 2)

CC IV: SYMBOLIC LOGIC

Unit-I: Chapter- I Introduction
Chapter- II-The Calculus of Propositions
Unit- II: Chapter-Ill Calculus of Propositions (Sec 1 to 6)
Unit-Ill: Chapter-IV Calculus of Propositions (Sec 7 to 9)
The Elements of Predicate Calculus (Section 1 to 9 of chapter V)
Unit-IV: Appendix (Sec-1 toSec-4)

Prescribed Books: - Basson & O' Corner: Introduction to Symbolic Logic

CC V: ETHICS

Unit-I: Definition, Nature & Scope of Ethics, Ethics in relation to Politics, Sociology and Religion
Unit-II: Distinction between moral and non-moral action, Moral and factual judgement. Object of Moral judgement.
Unit-III: Theories of Morality: Hedonism, Utilitarianism, Rigorism, Perfectionism
Unit-IV: Theories of punishment; Retributive, Reformative and Preventive theory**.**

Prescribed Book:
(1) J. N. Sinha- A Manual of Ethics

Reference Books:
(1) W. Frankena– Ethics
(2) William Lily- An Introduction to Ethics

CC VI: HIISTORY OF GREEK PHILOSOPHY

Unit-I: Nature of Greek Philosophy: What is Philosophy? Origin, development and Salient features of early Greek Thought
Unit-II: Pre-Socratic Thought: The Being of Parmenides, Becoming of Heraclitus and Atomism of Democritus
Unit-III: Socrates: Problem before Socrates, Dialectical method, epistemology and ethics of Socrates.
Unit-IV: Plato: Theory of Knowledge, Theory of Idea, and Theory of Soul
Aristotle: Theory of Form and Matter, Theory of Causation.

Prescribed Book:

(1) W. T. Stace - Greek Philosophy

Reference books:

(1) Burnet - Greek Philosophy
(2) B. A. G, Fuller - A History of Greek Philosophy
(3) B. Russell - A History of Western Philosophy
(4) Y. Masih - A Critical History of Philosophy

CC VII: SYSTEMS OF INDIAN PHILOSOPHY (II)

Unit-I: Upanisadic view of Atman and Brahman, Vidya and Avidya, Para vidya and Aparavidya
Unit-II: Nyaya theory of Inference, Prama and Aprama, Concept of God
Unit-III: Vaishesika: Categories (Padarthas),Nyaya: Pramanas
Unit-IV: Sankara and Ramanuja's view on Maya, Jiva, Isvara, Brahman and Liberation

Prescribed Books: -

1. Dutta and Chatterjee: An Introduction to Indian Philosophy
2. C.D. Sharma: A Critical Survey of Indian Philosophy
3. M. Hiriyana: Outlines of Indian Philosophy

Books for Reference: -

1. J.N Sinha: Indian Philosophy
2. R.K Puligandla: Fundamentals of Indian Philosophy
3. S. Radhakrishnan: Indian Philosophy (Vol-I and II)

CC VIII: CONTEMPORARY INDIAN PHILOSOPHY

UNIT-I: Tagore: Nature of man God, Reality and Religion, Vivekananda: The concept of man, Universal Religion and Practical Vedanta
Unit-II: Sri Aurobindo: World, Maya, Evolution and Reality (Sacchidananda), Integral yoga
Unit- III: Gandhi: Truth, God and Non-violence, Ideal social order Dr B.R. Ambedkar: Vision of a just society
Unit- IV:S. Radhakrishnan: Man, Reality and Religion
J Krishnamurti: Man and Nature, Human Crisis

Prescribed Book: -

1. B.K Lal: Contemporary Indian Philosophy

Books for Reference: -

1. H. Sahoo (Ed): Contemporary Indian Philosophy
2. T.M.P Mahadevan and V. Saroja: Contemporary Indian Philosophy

CC IX: HISTORY OF MODERN EUROPEAN PHILOSOPHY

Unit- I Bacon: Theory of Idola, Inductive Method

Descartes: Universal Doubt, Cogito-Ergo-Sum, Existence of God

Unit-II Spinoza: Substance, Attribute and Modes
Leibnitz: Theory of Monads, Pre-established harmony
Unit- III Locke: Refutation of Innate ideas, Sources of knowledge
Berkeley: Subjective idealism, Ese-est- percipii
Hume: Impression and Idea, Skepticism and Causality
Unit- IV Kant: Reconciliation between empiricism and Rationalism
Possibility of Synthetic-a priori judgment

Prescribed Book: -

1. R.K. Pati: History of Modern European Philosophy

Books for Reference: -

1. Y Masih: History of Western Philosophy
2. Ira Sen Gupta: A History of Western Philosophy
3. Frank Thilly: History of Western Philosophy

CC X: PHILOSOPHY OF LANGUAGE

Unit-I Word Meaning: Meaning of the word “meaning”, Ambiguity and Vagueness
Unit- II Definitions: Denotative, Connotative and Ostensive
Defining and Accompanying Characteristics
Stipulative, Reportive and Persuasive definition
Unit- III Sentence Meaning: Proposition and sentence
Word Meaning and sentence meaning, Criteria of sentence meaning
Unit-IV Concept: Nature and source
Truth: Correspondence, Coherence and Truth as it works

Prescribed book: -

1. John Hospers: An Introduction to Philosophical Analysis

Books for Reference: -

1. Alston: Philosophy of Language
2. Das P: Life Language & Reality: An Introduction to Philosophy of Language

CCXI: WESTERN CLASSICS: MEDITATIONS OF RENE DESCARTES

Unit- I Meditation I: Sceptical Doubts
Meditation II: Cogito-ergo-sum, Sum- res-cogitans, The Wax argument
Unit- II Meditation III: Clear and Distinct perceptions
Theory of Ideas, Existence of God
Unit- III Meditation IV: God is no deceiver, will, intellect and possibility of Error
Meditation V: Essence of Material things, Existence of God
Unit- IV Meditation- VI Mind- body Dualism, Primary and Secondary Quality

Prescribed Book: -

1. Rene Descartes: Meditations on first Philosophy

Books for Reference: -

1. Rae Langton: A Study Guide to Descartes Meditations
2. Amelie Rorty: Essays on Descartes Meditations

CCXII: INDIAN TEXT: ISA UPANISAD

Unit-I What are Upanishads? Place of Upanishad in Indian Philosophy and Isa Upanishad
Unit-II Mantra 1 to 9
Unit- III Mantra 10 to 14
Unit- IV Mantra 15 to 18

Prescribed Book: -

1. Swami Gambhirananda, Eight Upanisads (vol-1) God and Reality, Advaita Ashrama, Calcutta

Books for Reference: -

1. S. Radhakrishnan: The Principal Upanisads
2. Satyabadi Mishra: Central Philosophy of the Upanishads
3. Aditya ku. Mohanty: Upanishads Rediscovered

CCXIII: SOCIAL & POLITICAL PHILOSOPHY

Unit-I: Sociality, Social science & Social laws, Philosophy of Social Science- Relation between Individual & Society (Mechanical, Organic &Idealistic view)

Unit- II: Political Ideals- Justice, Liberty, Equality
Political Doctrines- Humanism, Secularism, Feminism, Philosophy of Ecology.

Unit- III: Democratic Ideals- Democratic Government, Conditions for Successful Functioning of Democracy, Human Rights

Unit-IV: Political Ideologies- (a) Anarchism (b) Marxism (c)Sarvodaya

Prescribed Books-

1. O.P. Gauba - An Introduction to Political Philosophy.

Reference Books-

1. Mackenzie: Social & Political Philosophy
2. Sukhvir Singh- Social and Political Philosophy
3. SushilaRamaswamy- Political Theories: Ideas &Concepts
4. D.D. Raphel- Problems of Political Philosophy
5. Patitapaban Das- Social and Political Philosophy

CCXIV: APPLIED ETHICS

Unit- I: What is Applied Ethics: Nature &Scope of Applied Ethics- Ethical Theories- Deontology, Utilitarianism, Relativism &Subjectivism

Unit-II: Taking Life: Animals- Animals rights, Reverence for life
Taking Life: Humans - Types of Euthanasia, Abortion

Unit-III: Environmental Ethics: Anthropocentricism, Non-anthropocentricism, Deep Ecology

Unit-IV: Professional Ethics: (a) Business Ethics- Rights and Obligations, Justice & Honesty in Ethics. (b) Bio-medical Ethics- Hippocratic Oath, Rights and Obligations of Health- Care Professionals, Doctor- Patient-Relationship

Prescribed Book-

1. Peter Singer- Practical Ethics

Reference Books-

1. J. Jagadeb- Bio-medical Ethics
2. Tom ReganAnimal Rights
3. J. P. Theroux- Ethics: Theory & Practice
4. P.K Mohapatra :Ethics and Society

DESCIPLINE SPECIFIC ELECTIVE

DSE I: PHILOSOPHY OF BHAGVAD GITA

Unit-I: Dharma:-Varnadharma, Swabhava, Swadharma- Paradharma

Unit-II: Karma:-Classification of Karma; Agency Niskama Karma, Lokasamgraha, Relation between Karma Yoga and Jnana yoga

Unit-III: Jnana:- Distinction between Jnana and Vijnana. Criteria of True Knowledge (Buddhi Yoga &JnanaYoga), Kshetra, Kshetrajna, Purusottama. Sattvika, Rajasika and TamasikaJnana

Unit-IV: Bhakti Yoga:- Four kinds of devotee, Characteristics of Ideal Bhakti- Saranagati & Prapattikrupa(grace); Relation between Bhakti Yoga &Jnana Yoga

Prescribed Books-

The Bhagabad Gita- S. Radhakrishnan (Trs&Ed)

Reference Books-

1. Concept of Yoga in the Gita- S. C. Panigrahi
2. Bhagabad Gita & Modern Life- K. M. Munshi& R. R. Diwakar
3. The Lord Speaks (2016)- B. K. Tripathy
4. SrimadBhagabad Gita Bhasya of Sri Sankaracharya- A. G. K. Warrier(Trs)
5. The Ethical Philosophy of Gita- P. N. Srinivasachari

DSE-II: PHILOSOPHY OF RELIGION

Unit-I: Judaic- Christian Concept of God (Chapter-1) Introduction to Philosophy of Religion Grounds for belief in existence of God (Chapter- 2)

Unit-II: Grounds for belief against existence of God (Chapter- 3)

Unit-III: The Problem of Evil (Chapter- 4)

Unit-IV: Problems of Religious Language

Prescribed Book-

1. John Hick- Philosophy of Religion

Reference Books-

1. Y. Masih-Introduction to Religious Philosophy
2. Arvind Sharma- Philosophy of Religion

DSE –III:GANDHIAN STUDIES

Unit-I : Gandhi's concept of a Just society. Basic Ideals- Truth, Non-violence, Equality and Human Freedom.

Unit-II: Gandhi's idea of Social Engineering, Constructive Programme. Fight against social Evils (Injustice, Caste system, Untouchability) upliftment of Women.

Unit-III: Social Ideals of Gandhi - Sarvodaya, Criticism of industrial civilization, Grama Swaraj, Anarchism, Trusteeship.

Unit –IV: Method of Social Action, Satyagraha- Kinds of Satyagraha, Methods of Satyagraha. Mercy- Killing, Ideals of Basic Education. Basic Norms & Method of Education, Education for a Happier & Peaceful Society. World Peace.

Prescribed Book-The Philosophy of Mahatma Gandhi, by:D.M Datta

Reference Books-

1. Social & Political Thought of M.K. Gandhi-
2. Jaya Tanuja Bandopadhyay
3. Mahatma Gandhi- R.R. Diwakar

DSE-IV: RECENT WESTERN PHILOSOPHY

Unit-1: Arther, Schopenhauer: The world as representation. The world as will, theory of perception, Ethics

Unit-2: Nietzsche: Critique of enlightenment Perspectivism, Appollonian and Dyonysian will to power, concept of superman

Unit-3: Sartre, J.P.: Concept of Freedom, Bad-faith, Humanism

Unit-4: William James: Meaning & Truth, Varieties of Religious experience

Recommended Text

1. B.A.G Fuller&McMurrin , A History of Philosophy
2. D.M.Dutta Chief Currents of Contemporary Philosophy
3. Frank Thilly, History of Western Philosophy

Reference Book

1. M.K. Bhadra, A critical Survey of Phenomenology & Existentialism
2. H.J. Blackham, Six Existential Thinkers
3. W.Mc. Neil& K.S. Feldman, Continental Philosophy: An Anthology

Project (Optional)

Eligibility: Students who have scored more than 60% marks in Semester –I, II, III &IV are eligible to opt for project paper. The student has to prepare a project of his own selecting a topic from philosophical perspective (some broad themes are given below). The dissertation carries 60 marks which will be evaluated by an external examiner and he / she will face a viva-voice test of 40 marks by an external examiner along with his / her supervisor of the concerned project.

1. Philosophy, value and culture
2. Existentialism and Phenomenology
3. Philosophy of religion
4. Philosophy of Language
5. Socio-Political Philosophy
6. Indian Philosophy/Contemporary Indian Philosophy
7. Ethics/Applied ethics
8. Philosophy of Mind

GENERIC ELECTIVE

GE 1: SYMBOLIC LOGIC

Unit 1: Chapter 1- Introductory
Chapter II- The Calculus of Propositions
Unit II: Chapter III- The Calculus of Propositions (Sec 1 to 6)
Unit III: Chapter IV- The Calculus of Propositions (Sec 7 to 9)
Chapter V- The Elements of Predicate Calculus
Unit IV: Appendix Sec 1 to Sec 4

Prescribed Book: -

1. Basson and O. Conner: Introduction to symbolic Logic

GE 1I: INDIAN PHILOSOPHY

Unit I: Salient features of Indian philosophy and key concepts, Carvaka epistemology and metaphysic, Jainism Syadvada and Anekantavada

Unit II: Buddhism- The Four Nobel Truth, Doctrine of Dependent origination, No Soul Theory, Nirvana

Unit III: Samkhya- Purusa, Prakrti, Theory of Evolution Yoga- Patanjali's CittaVrttiNirodha,Astanga Yoga

Unit IV: Nyaya- Theory of Inference,Vaishesika- Padarthas (Categories)

Prescribed Books:-

1. Dutta and Chatterjee: An Introduction to Indian Philosophy

Reference Books:-

1. C.D Sharma: A critical Survey of Indian Philosophy
2. G.C Nayak: Bharatiya Darshana (Odia)
3. B.B. Choudhury: Bharatiya Darshana Ruparekha(Odia Translated book)

GE III: HISTORY OF MODERN EUROPEAN PHILOSOPHY

Unit I : Bacon: Theory of Idolas, Inductive Method
Descartes: Methods of Doubt, Cogito ergo Sum
Unit II: Spinoza: Substance, Attributes and Modes
Leibnitz: Theory of Monads, Pre-Established Harmony
Unit III: Locke: Refutation of Innate Ideas, Theory of Knowledge
Berkeley: Esseest percipi, Subjective Idealism
Unit IV: Hume: Ideas and Impressions Skepticism
Kant: Reconciliation of Empiricism and Rationalism

Prescribed Books: -

1. R.K Pati- A History of Modern European Philosophy

Reference Books: -

1. Ira Sengupta- A History of Western Philosophy
2. Barlingay and Kulkarni- A History of Western Philosophy
3. Ray and Das- Paschatya Darshanra Itihasa
4. Y. Masih- A Critical History of Western Philosophy
5. Falkenberg- A History of Philosophy

GE IV: ETHICS: THEORY AND PRACTICE

Unit I: Definition, Nature and Scope of Ethics, Distinction between moral and Non-moral action.
Unit II: Distinction between factual and moral judgement, objects of moral Judgement.
Unit III: Moral Standards: Hedonism, Mill’s Utilitarianism, And Kant’s Rigorism and Perfectionism.
Unit IV: Environmental Ethics: Anthropocentrism and Non- Anthropocentrism Bio-centric Egalitarianism, Deep Ecology, Responsibility for future Generation

Prescribed Book: -

1. J.N. Sinha- A Manual of Ethics
2. Peter Singer- Practical Ethics

Reference Book:

1. H. Sahoo(ed) Ethics theory and practice

PHILOSOPHY PASS

Semester	Course	Course Name
I	DSC-I	Ethics
II	DSC-II	History Of Modern European Philosophy
III	DSC-III	Indian Philosophy
IV	DSC-IV	Symbolic Logic
V	DSE-I	Philosophy Of Religion
VI	DSE-II	Gandhian Studies

DSC-I: ETHICS

Unit-I: Definition, Nature & Scope of Ethics, Ethics in relation to Politics, Sociology and Religion

Unit-II: Distinction between moral and non-moral action, Moral and factual judgement. Object of Moral judgement.

Unit-III: Theories of Morality: Hedonism, Utilitarianism, Rigorism, Perfectionism

Unit-IV: Theories of punishment; Retributive, Reformative and Preventive theory.

Prescribed Book:

1) J. N. Sinha- A Manual of Ethics

Reference Books:

1) W. Frankena– Ethics
2) William Lily- An Introduction to Ethics

DSC-II: HISTORY OF MODERN EUROPEAN PHILOSOPHY

Unit- I Bacon: Theory of Idola, Inductive Method
Descartes: Universal Doubt, Cogito-Ergo-Sum, Existence of God

Unit-II Spinoza: Substance, Attribute and Modes
Leibnitz: Theory of Monads, Pre-established harmony

Unit- III Locke: Refutation of Innate ideas, Sources of knowledge
Berkeley: Subjective idealism, Ese-est- percipii
Hume: Impression and Idea, Scepticism and Causality

Unit- IV Kant: Reconciliation between empiricism and Rationalism
Possibility of Synthetic-a priori judgement

Prescribed Book: -

1. R.K. Pati: History of Modern European Philosophy

Books for Reference: -

1. Y Masih: History of Western Philosophy
2. Ira Sen Gupta: A History of Western Philosophy
3. Frank Thilly: History of Western Philosophy

DSC-III: Indian Philosophy

Unit-1

Salient Features of Indian Philosophy, Concepts like Rta, Rna and Lokayata Mata of Carvaka

Unit-2

Jainism: Syadvada&Anekanta Vada

Buddhism: Four nobel truth Doctrine of momentariness, dependent, origination and nirvana

Unit-3

Samkhya-Purusha, Prakriti, Evolution Nyaya Theory of Inference

Unit-4

Sankara& Ramanuja on Maya, Jiva, Isvara, Brahman & Liberation

Prescribed Book: -

1. Dutta & Chatterjee, An Introduction to Indian Philosophy
2. C.D. Sharma: A Critical Survey of Indian Philosophy
3. M. Hiriyana: Outlines of Indian Philosophy

Books for Reference: -

1. R.K. Puligandla: Fundamentals of Indian Philosophy

DSC-IV: SYMBOLIC LOGIC

Unit-I: Chapter- I Introduction
Chapter- II- The Calculus of Propositions
Unit- II: Chapter-Ill Calculus of Propositions (Sec 1 to 6)
Unit-Ill: Chapter-IV Calculus of Propositions (Sec 7 to 9)
The Elements of Predicate Calculus (Section 1 to 9 of chapter V)
Unit-IV: Appendix (Sec-1 toSec-4)
Books Prescribed: -
Basson& O' Corner: Introduction to Symbolic Logic

DESCIPLINE SPECIFIC ELECTIVE

DSE-I: PHILOSOPHY OF RELIGION

Unit-I

Judaic- Christian Concept of God (Chapter-1) Introduction to Philosophy of Religion
Grounds for belief in existence of God (Chapter- 2)

Unit-II

Grounds for belief against existence of God (Chapter- 3)

Unit-III

The Problem of Evil (Chapter- 4)

Unit-IV

Problems of Religious Language

Prescribed Book-

1. John Hick- Philosophy of Religion

Reference Books-

1. Y. Masih-Introduction to Religious Philosophy
2. Arvind Sharma- Philosophy of Religion**-**

DSE-II: GANDHIAN STUDIES

Unit-I

Gandhi's concept of a Just society. Basic Ideals- Truth, Non-violence, Equality and Human Freedom.

Unit-II

Gandhi's idea of Social Engineering, Constructive Programme. Fight against social Evils (Injustice, Caste system, Untouchability) upliftment of Women.

Unit-III

Social Ideals of Gandhi Sarvodaya, Criticism of industrial civilization, GramaSwaraj, Anarchism, Trusteeship.

Unit –IV

Method of Social Action, Satyagraha- Kinds of Satyagraha, Methods of Satyagraha. Mercy- Killing, Ideals of Basic Education. Basic Norms & Method of Education, Education for a Happier & Peaceful Society. World Peace.

Prescribed Book-

1. The Philosophy of Mahatma Gandhi D.M Datta

Reference Books-

1. Social & Political Thought of M.K. Gandhi-
2. Jaya Tanuja Bandopadhyay
3. Mahatma Gandhi- R.R. Diwakar

SKILL ENHANCEMENT COURSE

SEC-I: CRITICAL THINKING

Unit I: Introduction to Critical Thinking: Standards of Critical Thinking: Benefits and Limitations.

Unit II: Arguments and Recognizing arguments: Definition and Contents of Argument, Premises hidden Premises, Conclusions intermediate Conclusions

Books Prescribed: -

1. Hurley, Patrick. J.- A concise Introduction to Logic(2015) 12th Ed.
2. Madhuchhanda Sen- An Introduction to Critical Thinking (2010)

SEC-II: Applied Reasoning

Unit-I	Fallacies: Introduction, Fallacies of Relevance, Fallacies of Presumption, Fallacies of Ambiguity, Illicit Transference , Fallacies in Ordinary language
Unit-II	Types of Reasoning: Analogical, Legal and Moral
Unit-III	Science & Superstitution: Distinction, Evidentiary Support, Objectivity Integrity

Books Recommended:

1. H.Patrick, J. – A Concise Introduction to Logic (2015) 12th Edition
2. M.Sen – An Introduction to Critical Thinking (2010)

STATE MODEL SYLLABUS FOR UNDER GRADUATE
COURSE IN PHYSICS
(Bachelor of Science Examination)

UNDER
CHOICE BASED CREDIT SYSTEM

Course structure of UG Physics Honors

SEMESTER	COURSE OPTED	COURSE NAME	Credits
I 4 Papers (400 Marks)	Ability Enhancement Compulsory Course-I	AECC-1	4
	Core course-I	Mathematical Physics-I	4
	Core Course-I Practical/Tutorial	Mathematical Physics-I Lab	2
	Core course-II	Mechanics	4
	Core Course-II Practical/Tutorial	Mechanics Lab	2
	Generic Elective -1	GE-1	4
	Generic Elective -1	Practical/Tutorial	2
II 4 Papers (400 Marks)	Ability Enhancement Compulsory Course-II	AECC-II	4
	Core course-III	Electricity and Magnetism	4
	Core Course-III Practical/Tutorial	Electricity and Magnetism Lab	2
	Core course-IV	Waves and Optics	4
	Core Course-IV Practical/Tutorial	Waves and Optics Lab	2
	Generic Elective -2	GE-2	4
	Generic Elective -2	Practical/Tutorial	2
III 5 Papers (500 Marks)	Core course-V	Mathematical Physics-II	4
	Core Course-V Practical/Tutorial	Mathematical Physics-II Lab	2
	Core course-VI	Thermal Physics	4
	Core Course-VI Practical/Tutorial	Thermal Physics Lab	2
	Core course-VII	Analog Systems and Applications	4
	Core Course-VII Practical/Tutorial	Analog Systems & Applications Lab	2
	Skill Enhancement Compulsory Course -1	SECC-1	4
	Generic Elective -3	GE-3	4
	Generic Elective -3	Practical/Tutorial	2
IV 5 Papers (500 Marks)	Core course-VIII	Mathematical Physics III	4
	Core Course-VIII Practical/Tutorial	Mathematical Physics-III Lab	2
	Core course-IX	Elements of Modern Physics	4
	Core Course-IX Practical/Tutorial	Elements of Modern Physics Lab	2
	Core course-X	Digital Systems and Applications	4
	Core Course-X Practical/Tutorial	Digital Systems & Applications Lab	2
	Skill Enhancement Compulsory Course -2	SECC -2	4
	Generic Elective -4	GE-4	4
	Generic Elective -4	Practical/Tutorial	2
V	Core course-XI	Quantum Mechanics &	4

4 Papers **(400 Marks)**		**Applications**	
	Core Course-XI Practical/Tutorial	**Quantum Mechanics Lab**	**2**
	Core course-XII	**Solid State Physics**	**4**
	Core Course-XII Practical/Tutorial	**Solid State Physics Lab**	**2**
	Discipline Specific Elective -1	**DSE-1**	**5**
	Discipline Specific Elective -1	**Practical/Tutorial**	**1**
	Discipline Specific Elective -2	**DSE-2**	**5**
	Discipline Specific Elective- 2	**Practical/Tutorial**	**1**
VI **4 Papers** **(400 Marks)**	**Core course-XIII**	**Electro-magnetic Theory**	**4**
	Core Course-XIII Practical/Tutorial	**Electro-magnetic Theory Lab**	**2**
	Core course-XIV	**Statistical Mechanics**	**4**
	Core Course-XIV Practical/Tutorial	**Statistical Mechanics Lab**	**2**
	Discipline Specific Elective -3	**DSE-3**	**5**
	Discipline Specific Elective -3	**Practical/Tutorial**	**1**
	Discipline Specific Elective-4	**DSE-4**	**4/5**
	Discipline Specific Elective -4	**Practical/Tutorial**	**2/1**
	Alternative to Discipline Specific Elective-4	**(Eligible Students may do a Project in DSE-IV)**	**6**
		Total Credits	**148**

Generic Elective Papers (GE) (Minor-Physics) for other Departments/Disciplines: (Credit: 06 each)

Depending on their requirements, Universities may choose 2 (two)GE subjects with 2 papers from each subject or only one GE subject with 4 papers from it.

Two papers GE subject will be :

1. **GE-I** (Mechanics & Properties of matter, Oscillation & Waves, Thermal Physics, Electricity and Magnetism & Electronics) + Lab
2. **GE-II** (Optics, Special Theory of Relativity, Atomic Physics, Quantum Mechanics and Nuclear Physics)+ Lab

A student who chooses to read only Physics subject GE will take 4 DSC papers of the Pass Course as below

1.**GE-I** as **DSC-1**(Mechanics)+ Lab

2.**GE-II** as **DSC-2**,(Electricity, Magnetism & Emt))+ Lab

3. **GE-III** as **DSC-3**,(Thermal Physics & Statiscal Mechanics))+ Lab

4. **GE-IV** as **DSC-4** (Waves and Optics)+ Lab

(GE-I same paper as DSC-1,GE-II same as DSC-2 ,GE-III same as DSC-3,GE-IV same as DSC-4)

SEC papers can be chosen from the general pool or physics specific courses as indicated.

PHYSICS

HONOURS PAPERS:

Core course – 14 papers

Discipline Specific Elective – 4 papers (out of the 5 papers suggested)

Generic Elective for non Physics students – 4 papers. Incase University offers 2 subjects as GE, then papers 1 and 2 will be the GE paper.

Marks per paper –

For practical paper: Mid term : 15 marks, End term : 60 marks, Practical- 25 marks

For non practical paper: Mid term : 20 marks, End term : 80 marks

Total – 100 marks Credit per paper – 6

Teaching hours per paper –

Practical paper-40 hours theory classes + 20 hours Practical classes

Non Practical paper-50 hours theory classes + 10 hours tutorial

CORE PAPER-1

MATHEMATICAL PHYSICS-I

The emphasis of course is on applications in solving problems of interest to physicists. The students are to be examined entirely on the basis of problems, seen and unseen.

UNIT-I

Calculus -I: Plotting of functions, Intuitive ideas of continuous, differentiable functions and plotting of curves, Approximation: Taylor and binomial series (statements only), First Order Differential Equations and Integrating Factor, Second Order Differential equations: Homogeneous Equations with constant coefficients, Wronskian and general solution, Statement of existence and Uniqueness Theorem for Initial Value Problems, Particular Integral.

UNIT-II

Calculus-II: Calculus of functions of more than one variable: Partial derivatives, exact and inexact differentials. Integrating factor, with simple illustration, Constrained Maximization using Lagrange Multipliers,

Vector algebra: Recapitulation of vectors: Properties of vectors under rotations. Scalar product and its invariance under rotations, Vector product, Scalar triple product and their interpretation in terms of area and volume respectively, Scalar and Vector fields.

UNIT-III

Orthogonal Curvilinear Coordinates: Orthogonal Curvilinear Coordinates, Derivation of Gradient, Divergence, Curl and Laplacian in Cartesian, Spherical and Cylindrical Coordinate Systems, Comparison of velocity and acceleration in cylindrical and spherical coordinate system

Dirac Delta function and its properties: Definition of Dirac delta function. Representation as limit of a Gaussian function and rectangular Function, Properties of Dirac delta function.

UNIT-IV

Vector Differentiation: Directional derivatives and normal derivative, Gradient of a scalar field and its geometrical interpretation, Divergence and curl of a vector field, Del and Laplacian operators, Vector identities

Vector Integration: Ordinary Integrals of Vectors, Multiple integrals, Jacobian, Notion of infinitesimal line, surface and volume elements, Line, surface and volume integrals of Vector fields, Flux of a vector field, Gauss' divergence theorem, Green's and Stokes Theorems and their applications (no rigorous proofs)

Text Books:

1. MathematicalMethodsforPhysicists,G.B.Arfken,H.J.Weber,F.E.Harris (2013,7th Edition., Elsevier)
2. Advanced Engineering Mathematics, Erwin Kreyszig (Wiley India) , 2008

Reference books:

1. Mathematical Physics C. Harper (Prentice Hall India), 2006
2. Complex Variable: Schaum's Outlines Series M. Spiegel (2nd Edition , Mc-Graw Hill Education)
3. Complex variables and applications, J. W. Brown and R.V.Churchill Mathematical Physics, Satya Prakash (Sultan Chand)
4. Mathematical Physics, B. D. Gupta (4th edition, Vikas Publication), 2009
5. Mathematical Physics and Special Relativity, M. Das, P.K. Jena and B.K.Dash (Srikrishna Prakashan) ,2009
6. Mathematical Physics–H.K.Dass, Dr. Rama Verma (S. Chand Publishing) , 2011

CORE PAPER I LAB:

The aim of this Lab is not just to teach computer programming and numerical analysis but to emphasize its role in solving problems in Physics.

- Highlights the use of computational methods to solve physical problems
- The course will consist of lectures(both theory and practical)in the Lab
- Evaluation done not on the programming but on the basis of formulating the problem
- Aim at teaching students to construct the computational problem to be solved
- Students can use any one operating system Linux or Microsoft Windows

Introduction and Overview: Computer architecture and organization, memory and Input/output devices.

Basics of scientific computing: Binary and decimal arithmetic, Floating pointnumbers, algorithms, Sequence, Selection and Repetition, single and double precision arithmetic, underflow and overflow emphasize the importance of making equations in terms of dimension less variables, Iterative methods. Algorithm

Errors and error Analysis: Truncation and round off errors, Absolute and relative errors, Floating point computations. Systematic and Random Errors, Propagation of Errors, Normal Law of Errors, Standard and Probable Error.

Review of C and C++ Programming: Introduction to Programming, constants, variables and Fundamentals data types, operators and Expressions, I/O statements, scanf and printf, c in and c out, Manipulators for data format- ting, Control statements (decision making and looping statements) (If Statement, Ifelse Statement, Nested If structure, Else If Statement, Ternary operator, Go to Statement. Switch Statement. Unconditional and Conditional Looping.While Loop. Do-While Loop. FOR Loop. Break and Continue Statements. Nested Loops), Arrays (1D and 2D) and strings, user defined functions, Structures and Unions, Idea of classes and objects

Programs: Sum and average of a list of numbers, largest of a given list of numbers and its location in the list, sorting of numbers in ascending descending order, Binary search,

Random number generation: Area of circle, area of square, volume of sphere, value of π and applications in physics lab.

Reference Books:

1. Introduction to Numerical Analysis, S.S. Sastry, 5th Edition., 2012, PHI Learning Pvt. Ltd.
2. Schaum's Outline of Programming with C++.J.Hubbard,2000, McGraw–Hill Pub.
3. Numerical Recipes in C:The Art of Scientific Computing, W.H. Pressetal, 3rd Edition. 2007, Cambridge University Press.
4. A first course in Numerical Methods, U.M. Ascher and C. Greif, 2012, PHI Learning.
5. Elementary Numerical Analysis, K.E. Atkinson, 3rd Edn. , 2007, Wiley India Edition.
6. Numerical Methods for Scientists and Engineers, R.W. Hamming, 1973, Courier Dover Pub.
7. An Introduction to computational Physics,T.Pang, 2nd Edn., 2006, Cambridge Univ. Press.

CORE PAPER-II

MECHANICS

UNIT-I

Rotational Dynamics: Centre of Mass, Motion of CoM, Centre of Mass and Laboratory frames, Angular momentum of a particle and system of particles, Principle of conservation of angular momentum, Rotation about a fixed axis, Moment of Inertia, Perpendicular and Parallel Axis Theorems, Routh Rule, Calculation of moment of inertia for cylindrical and spherical bodies, Kinetic energy of rotation, Eulers Equations of Rigid Body motion, Motion involving both translation and rotation. Moment of Inertia of a Fly wheel.

Non-Inertial Systems: Non-inertial frames and fictitious forces, Uniformly rotating frame, Laws of Physics in rotating coordinate systems, Centrifugal force, Coriolis force and its applications.

UNIT-II Elasticity: Relation between Elastic constants, Twisting torque on a Cylinder or Wire, Bending of beams, External bending moment, Flexural rigidity, Single and double cantilever

Surface Tension: Excess pressure across a curved membrane, Quink's drop

Fluid Motion: Kinematics of Moving Fluids: Poiseuilles Equation for Flow of a Liquid through a Capillary Tube, Surface tension, Gravity waves and ripple

Viscocity: Poiseuilles Equation for Flow of a Liquid with corrections.

UNIT-III Gravitation and Central Force Motion: Law of gravitation, Gravitational potential energy, Inertial and gravitational mass, Potential and field due to spherical shell and solid sphere, Motion of a particle under a central force field, Two-body problem and its reduction to one-body problem and its solution, Differential Equation of motion with central force and its solution, The first Integrals (two), Concept of power Law Potentials, Keplers Laws of Planetary motion, Satellites:. Geosynchronous orbits, Weightlessness, Basic idea of global positioning system (GPS), Physiological effects on astronauts.

UNIT-IV

Oscillations: Simple Harmonic Oscillations. Kinetic energy, potential energy, total energy and their time-average values. Damped oscillation. Equation of motion and solution (cases of oscillatory, critically damped and over damped) Forced oscillations: Transient and steady states; Resonance, sharpness of resonance; power dissipation and Quality Factor, Bar Pendulum, Katers Pendulum

Special Theory of Relativity: Michelson-Morley Experiment and its out- come, Postulates of Special Theory of Relativity, Lorentz Transformations, Simultaneity and order of events, Lorentz contraction,Timedilation,Relativistic transformation of velocity, Frequency and wave number, Relativistic addition of velocities, Variation of mass with velocity, Massless Particles, Mass-energy Equivalence, Relativistic Doppler effect, Relativistic Kinematics, Transformation of Energy and Momentum.

Text Books:

1. Mechanics, D.S. Mathur, PS Hemne (S. Chand Publishing) ,2012
2. Introduction to Special Relativity, R. Resnick (John Wiley), 2007

Reference Books:

1. Introduction to Mechanics Daniel Klapnner and Robert Kolenkow, McgrawHill.2007
2. Mechanics by K.R Simon, 1971
3. Mechanics, Berkeley Physics, vol.1, C.Kittel, W. Knight, etal (Tata McGraw-Hill), 2007
4. Physics, Resnick, Halliday and Walker (8/e.2010,Wiley)
5. Theoretical Mechanics-M.R. Spiegel (Tata McGraw Hill), 2017
6. Feynman Lectures, Vol. I, R.P.Feynman, R.B.Leighton, M.Sands (Pearson),2012
7. Mechanics-M.Das, P.K.Jena and R.N. Mishra (Srikrishna Publications), 2009

CORE PAPER-II LAB

(minimum 5 experiments are to be done):

1. To study surface tension by capillary rise method
2. To determine the height of a building using a Sextant.
3. To study the Motion of Spring and calculate (a) Spring constant, (b) g and (c) Modulus of rigidity.
4. To determine the Moment of Inertia of a Flywheel.
5. To determine Coefficient of Viscosity of water by Capillary Flow Method (Poiseuilles method).

6. To determine the Modulus of Rigidity of a Wire by Maxwells needle.
7. To determine the value of g using Bar Pendulum.
8. To determine the value of g using Kater's Pendulum

Reference Books:

1. Advanced Practical Physics for students, B. L. Flint and H.T. Worsnop, 1971, Asia Publishing House
2. Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers
3. A Text Book of Practical Physics, I.Prakash and Ramakrishna, 11thEdn, 2011, Kitab Mahal

CORE PAPER-III

ELECTRICITY AND MAGNETISM

UNIT-I

Electric Field and Electric Potential

Electric field: Electric field lines, Electric flux, Gauss Law with applications to charge distributions with spherical, cylindrical and planar symmetry, Conservative nature of Electrostatic Field. Electrostatic Potential, Potential and Electric Field of a dipole, Force and Torque on a dipole placed in electric field, Potential calculation indifferent simple cases, Laplace and Poisson's equations, The Uniqueness Theorem, Method of Images and its application to (1) Plane Infinite Sheet and (2) Sphere.

Electrostatic energy of system of charges, Electrostatic energy of a charged sphere, Conductors in an electrostatic Field, Surface charge and force on a conductor.

UNIT-II

Magnetic Field: Magnetic Force, Lorentz Force, Biot Savarts Law, Current Loop as a Magnetic Dipole and its Dipole Moment (analogy with Electric

Dipole), Amperes Circuital Law and its application to (1) Solenoid (2) Toroid (3) Helmhotz coil, Properties of B: curl and divergence, Vector Potential, Ballistic Galvanometer: Torque on a current Loop, Current and Charge Sensitivity, Electromagnetic damping, Logarithmic damping, CDR.

UNIT-III

Dielectric Properties of Matter: Electric Field in matter, Polarization, Polarization Charges, Electrical Susceptibility and Dielectric Constant, Capacitor (parallel plate, spherical, cylindrical) filled with dielectric, Displacement vector D, Relations between E, P and D, Gauss Law in dielectrics. Magnetic Properties of Matter: Magnetization vector (M), Magnetic Intensity (H), Magnetic Susceptibility and permeability, Relation between B, H, M, Ferromagnetism, B-H curve and hysteresis.

Electromagnetic Induction: Faradays Law, Lenzs Law, Self Inductance and Mutual Inductance, Reciprocity Theorem, Energy stored in a Magnetic Field, Introduction to Maxwell's Equations

UNIT-IV

Electrical Circuits: AC Circuits: Kirchhoff's laws for AC circuits, Complex Reactance and Impedance, Series LCR Circuit: (1) Resonance (2) Power Dissipation (3) Quality Factor, (4) Band Width, Parallel LCR Circuit.

Network theorems: Ideal Constant-voltage and Constant-current Sources, Network Theorems: Thevenin theorem, Norton theorem, Superposition theorem, Reciprocity theorem, Maximum Power Transfer theorem, Applications to DC and AC circuits. Transient Currents Growth and decay of current in RC and LR circuits.

Text Books:

1. Introduction to Electrodynamics – D.J. Griffiths (Pearson, 4th edition, 2015)
2. Foundations of Electromagnetic Theory-Ritz and Milford (Pearson) 4th Edition

Reference Books:

1. Classical Electrodynamics, J. D. Jackson (Wiley), 1998
2. Electricity and Magnetism D. C. Tayal (Himalaya Publishing house), 2014
3. Electricity, Magnetism and Electromagnetic Theory- S. Mahajan and Choudhury (Tata McGraw Hill)-2012
4. Feynman Lectures Vol.2, R. P. Feynman, R. B. Leighton, M. Sands (Pearson)-2008
5. Electricity and Magnetism, J. H. Fewkes and J. Yarwood. Vol. I (Oxford Univ. Press)

CORE PAPER-II1

(minimum of 6 experiments are to be done)

Use a Multimeter for measuring (a) Resistances, (b) AC and DC Voltages, c)DC Current, (d) Capacitances, and (e) Checking electrical fuses.

1. To study the characteristics of a series RC Circuit.
2. To determine an unknown Low Resistance using Potentiometer.
3. To determine an unknown Low Resistance using Carey Fosters Bridge.
4. And compare capacitances using DeSautys bridge.
5. Measurement of field strength B and its variation in a solenoid/ artificial coil (determine dB/dx)
6. To verify the Thevenin and Norton theorems.
7. To determine self inductance of a coil by Andersons bridge.
8. To study response curve of a Series LCR circuit and determine its (a) Reso- nant frequency, (b) Impedance at resonance, (c) Quality factor Q, and (d) Band width.
9. To study the response curve of a parallel LCR circuit and determine its (a) Antiresonance frequency and (b) Quality factor Q.

Reference Books:

1. Advanced Practical Physics for students, B.L. Flint and H.T. Worsnop, 1971, Asia Publishing House
2. A Text Book of Practical Physics, I. Prakash and Ramakrishna, 11th Ed., 2011, Kitab Mahal
3. Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers
4. A Laboratory Manual of Physics for undergraduate classes, D.P.Khandelwal, 1985, Vani Pub.

CORE PAPER-1V: WAVES AND OPTICS

UNIT - I

Geometrical Optics : Fermats principle, reflection and refraction at plane interface, Matrix formulation of geometrical Optics, Cardinal points and Cardinal planes of an optical system, Idea of dispersion, Application to thick Lens and thin Lens, Ramsden and Huygens eyepiece. Wave Optics : Electromagnetic nature of light. Definition and properties of wave front Huygens Principle. Temporal and Spatial Coherence.

UNIT - II

Wave Motion : Plane and Spherical Waves, Longitudinal and Transverse Waves, Plane Progressive (Traveling) Waves, Wave Equation, Particle and Wave Velocities, Differential Equation, Pressure of a Longitudinal Wave, Energy Transport, Intensity of Wave. Superposition of two perpendicular Harmonic Oscillations : Graphical and Analytical Methods, Lissajous Figures (1:1 and 1:2) and their uses, Superposition of N harmonic waves.

UNIT- III

Interference : Division of amplitude and wave front, Young's double slit experiment, Lloyds Mirror and Fresnels Bi-prism, Phase change on reflection: Stokes treatment, Interference in Thin Films: parallel and wedge-shaped films, Fringes of equal inclination (Haidinger Fringes), Fringes of equal thickness (Fizeau Fringes), Newton's

Rings: Measurement of wavelength and refractive index. Interferometer : Michelsons Interferometer-(1) Idea of form of fringes (No theory required), (2) Determination of Wavelength, (3) Wavelength Difference, (4) Refractive Index, and (5) Visibility of Fringes, Fabry-Perot interferometer.

UNIT - IV

Fraunhofer diffraction: Single slit, Circular aperture, Resolving Power of a telescope, Double slit, Multiple slits, Diffraction grating, Resolving power of grating. Fresnel Diffraction: Fresnels Assumptions, Fresnels Half-Period Zones for Plane Wave, Explanation of Rectilinear Propagation of Light, Theory of a Zone Plate: Multiple Foci of a Zone Plate, Fresnels Integral, Fresnel diffraction pattern of a straight edge, as lit and a wire.

Text Books:

1. OpticsP.K.Chakrabarty, New Central Agency 3rd Edition 2012

2.Optics - Ajoy Ghatak (McGraw Hill)- 2017

Reference Books:

2. Optics-E.Hecht (Pearson)-2008
3. Fundamentals of Optics- F.A. Jenkins and H.E.White (McGraw-Hill)-2017
4. Geometrical and Physical Optics R.S. Longhurst (Orient Black swan)-1986
5. A text book of Optics N. Subrahmanyam and Brij Lal (S.Chand Publishing), 2006
6. The Physics of Vibrations and Waves- H.J. Pain (JohnWiley)-2013
7. Principles of Optics- Max Born and Emil Wolf(Pergamon Press) 7th Edition 1999
8. The Physics of Waves and Oscillations-N.K.Bajaj (McGraw Hill)-1998

CORE PAPER-IV LAB

(minimum 5 experiments are to be done)

1. To determine the frequency of an electric tuning fork by Meldes experiment and verify 2 T law.

2. To plot the I-D curve and to determine the refractive index of a prism

3. **To** determine refractive index of the Material of a prism using sodium source.
4. **To** determine the dispersive power and Cauchy constants of the material of a prism using mercury source.
5. **To** determine wavelength of sodium light using Newton's Rings.
6. **To** determine wavelength of (1) Na source and (2) spectral lines of Hg source using plane diffraction grating.
7. **To** determine dispersive power and resolving power of a plane diffraction grating.

Reference Books:

1. Advanced Practical Physics for students, B.L. Flint and H.T. Worsnop, 1971, Asia Publishing House
2. A Text Book of Practical Physics, I. Prakash and Ramakrishna, 11th Ed., 2011, Kitab Mahal
3. Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers
4. A Laboratory Manual of Physics for undergraduate classes, D. P. Khandelwal, 1985, Vani

CORE PAPER-V

MATHEMATICAL PHYSICS-II

The emphasis of the course is on applications in solving problems of interest to physicists. Students are to be examined on the basis of problems, seen and unseen.

UNIT-I

Fourier Series-I: Periodic functions, Orthogonality of sine and cosine functions, Dirichlet Conditions (Statement only), Expansion of periodic functions in a series of sine and cosine functions and determination of Fourier coefficients, Complex representation of Fourier series, Expansion of functions with arbitrary period, Expansion of non-periodic functions over an interval, Even and odd functions and their Fourier expansions and Application, Summing of Infinite Series, Term-by-Term differentiation and integration of Fourier Series, Parseval Identity.

UNIT-II

Frobenius Method and Special Functions: Singular Points of Second Order Linear Differential Equations and their importance, Singularities of Bessel's and Laguerre Equations, Frobenius method and its applications to differential equations:LegendreandHermiteDifferentialEquations,LegendreandHermite Polynomials: Rodrigue's Formula, Generating Function, Orthogonality.

UNIT-III

Polynomials: Simple recurrence relations of Legendre and Hermite Polynomials, Expansion of function in a series of Legendre Polynomials, Associated Legendre Differential Equation, Associated Legendre polynomials, Spherical Harmonics

Some Special Integrals: Beta and Gamma Functions and relation between them, Expression of Integrals in terms of Gamma Functions, Error Function (Probability Integral).

UNIT-IV

Partial Differential Equations: Solutions to partial differential equations using separation of variables: Laplace's Equation in problems of rectangular, cylindrical and spherical symmetry. Conducting and dielectric sphere in an external uniform electric field. Wave equation and its solution for vibrational modes of a stretched string

Text Books:

1. MathematicalMethodsforPhysicists,G.B.Arfken,H.J.Weber,F.E.Harris (2013, 7th Edn., Elsevier)
2. Advanced Engineering Mathematics, Erwin Kreyszig (Wiley India) 9th Edition

2011

Reference Books:

1. Mathematical Physics and Special Relativity, M. Das, P.K. Jena and B.K. Dash (Srikrishna Prakashan)-2009
2. Mathematical Physics–H. K. Dass, Dr. Rama Verma (S. Chand Publishing) -2011
3. Mathematical Physics C. Harper (Prentice Hall India)-1978
4. Schaum's Outlines Series M. Spiegel (2nd Edition, McGraw Hill Education)-2004
5. Complex variables and applications J.W.Brown and R.V.Churchill-2017
6. Mathematical Physics, Satya Prakash (Sultan Chand)-2014
7. Mathematical Physics B.D. Gupta (4th edition, Vikas Publication-2009

CORE PAPER-V LAB

The aim of this Lab is to use the computational methods to solve physical problems. Course will consist of lectures (both theory and practical) in the Lab. Evaluation done on the basis of formulating the problem but not on the programming

Topics

Introduction to Numerical computation software Scilab: Introduction to Scilab, Advantages and disadvantages, Scilab computation software Scilab environment, Command window, Figure window, Edit window, Variables and arrays, Initialising variables in Scilab, Multidimensional arrays, Subarray, Special values, Displaying output data, data file, Scalar and array operations, Hierarchy of operations, Built in Scilab functions, Introduction to plotting, 2D and 3D plotting (2), Branching Statements and program design, Relational and logical operators, the while loop, for loop, details of loop operations, break and continue statements, nested loops, logical arrays and vectorization (2) User defined functions, Introduction to Scilab functions, Variable passing in Scilab, optional arguments, preserving data between calls to a function, Complex and Character data, string function, Multidimensional arrays (2) an introduction to Scilab file processing, file opening and closing, Binary I/o functions, comparing binary and formatted functions, Numerical methods and developing the skills of writing a program(2).

Curve fitting, Least square fit Goodness of fit, standard constant Deviation: Ohms law to calculate R, Hooke's law to calculate spring constant

Solution of Linear system of equations by Gauss elimination Solution method and Gauss Seidal method. Diagonalization matrices, Inverse of a matrix, Eigen vectors, problems: Solution of mesh equations of electric circuits(3meshes),Solution of coupled spring mass systems (3masses)

Solution of ODE :

First order Differential equation Euler, modified Euler, Runge- Kutta methods, Second order differential equation. Fixed difference method:

First order differential equations

- Radioactive decay
- Current in RC and LC circuits with DC source
- Newton's law of cooling
- Classical equations of motion

Second order Differential Equation

- Harmonic oscillator (no friction)
- Damped Harmonic oscillator
- Over damped
- Critical damped
- Oscillatory
- Forced Harmonic oscillator
- Transient and Steady state solution
- Apply above to LCR circuits also

Reference Books:

1. Mathematical Methods for Physics and Engineers, K.FRiley, M.P.Hobson and S. J.20 Bence, 3rd ed., 2006, Cambridge University Press

2. Complex Variables, A.S. Fokas and M.J. Ablowitz, 8th Ed., 2011, Cambridge Univ. Press
3. First course in complex analys is with applications, D.G.Zill and P.D.Shanahan, 1940, Jones and Bartlett
4. Simulation of ODE/PDE Models with MATLAB, OCTAVE and SCILAB: Scientific and Engineering Applications: A.V. Wouwer, P. Saucez, C.V. Fernndez. 2014 Springer
5. Scilab by example: M. Affouf 2012, ISBN: 978-1479203444
6. Scilab (A free software to Matlab): H.Ramchandran,A.S.Nair.2011S.Chand and Company
7. Scilab Image Processing: Lambert M. Surhone. 2010 Beta script Publishing

CORE PAPER-VI

THERMAL PHYSICS

UNIT-I

Introduction to Thermodynamics Recapitulation of Zeroth and First law of thermodynamics,

Second Law of Thermodynamics: Reversible and Irreversible process with examples, Kelvin-Planck and Clausius Statements and their Equivalence, Carnots Theorem, Applications of Second Law of Thermodynamics: Thermodynamic Scale of Temperature and its Equivalence to Perfect Gas Scale.

Entropy: Concept of Entropy, Clausius Theorem. Clausius Inequality, Second Law of Thermodynamics in terms of Entropy, Entropy of a perfect gas, Principle of increase of Entropy, Entropy Changes in Reversible and Irreversible processes with examples, Entropy of the Principle of Increase of Entropy, Temperature Entropy diagrams for Carnot's Cycle, Third Law of Thermodynamics, Unattainability of Absolute Zero.

UNIT-II

Thermodynamic Potentials: Extensive and Intensive Thermodynamic Variables,

Thermodynamic Potentials: Internal Energy, Enthalpy, Helmholtz Free Energy, Gibbs Free Energy, Their Definitions, Properties and Applications, Surface Films and Variation of Surface Tension with Temperature, Magnetic Work, Cooling due to adiabatic demagnetization

Phase Transitions: First and second order Phase Transitions with examples, Clausius Clapeyron Equation and Ehrenfest equations

Maxwell's Thermodynamic Relations: Derivations and applications of Maxwell's Relations, Maxwell's Relations: (1) Clausius Clapeyron equation (2) Relation between C_p and C_v (3) TdS Equations,(4)Joule-Kelvin coefficient for Ideal and Van der Waal Gases (5) Energy equations (6) Change of Temperature during Adiabatic Process.

UNIT-III

Kinetic Theory of Gases

Distribution of Velocities: Maxwell-Boltzmann Law of Distribution of Velocities in an Ideal Gas and its Experimental Verification, Sterns Experiment, Mean, RMS and Most Probable Speeds, Degrees of Freedom, Law of Equipartition of Energy (No proof required), Specific heats of Gases.

Molecular Collisions: Mean Free Path, Collision Probability, Estimates of Mean Free Path,

Transport Phenomenon in Ideal Gases: (1) Viscosity, (2) Thermal Conductivity and (3) Diffusion. Brownian Motion and its Significance.

UNIT-IV

Real Gases: Behavior of Real Gases: Deviations from the Ideal Gas Equation, The Virial Equation, Andrews Experiments on CO_2 Gas. Critical Constants, Continuity of Liquid and Gaseous State. Vapour and Gas, Boyle Temperature, Van der Waals Equation of State for Real Gases, Values of Critical Constants, Law of Corresponding States, Comparison with Experimental Curves, P-V Diagrams, Joules Experiment, Free Adiabatic Expansion of a Perfect Gas, Joule- Thomson Porous Plug Experiment, Joule- Thomson Effect for Real and Van der Waal Gases, Temperature of Inversion, Joule-Thomson Cooling

Text Books:

1. Thermal Physics, A. B. Gupta (Books and allied Ltd)-2010
2. Heat and Thermodynamics, M.W. Zemansky, Richard Dittman (McGraw- Hill)-1981

Reference Books:

1. Theory and experiments on thermal Physics, P.K.Chakrabarty (New central book agency limited)-2017
2. Thermodynamics, Kinetic Theory and Statistical Thermodynamics- Sears and Salinger(Narosa)-1988
3. A Treatise on Heat- Meghnad Saha and B.N.Srivastava (The Indian Press) Heat, Thermodynamics and Statistical Physics, N.Subrahmanyam and Brij Lal (S.Chand Publishing)-2008
4. Thermal and Statistical Physics M.Das, P.K. Jena, S. Mishra, R.N.Mishra (Shri Krishna Publication)-2009

CORE PAPER-VI LAB

(minimum 5 experiments are to be done):

1. To determine Mechanical Equivalent of Heat, J, by Callender and Barnes constant flow method.
2. To determine the Coefficient of Thermal Conductivity of a bad conductor by Lee and Charltons disc method.
3. To determine the Temperature Coefficient of Resistance by Platinum

Resistance Thermometer (PRT).

4. To study the variation of Thermo-emf of a Thermocouple with Difference of Temperature of its Two Junctions.
5. To determine the specific heat of liquid by the method of cooling
6. To determine the specific heat of solid by applying radiation correction.

Reference Books:

1. Advanced Practical Physics for students, B. L. Flint and H.T. Worsnop, 1971, Asia Publishing House
2. A Text Book of Practical Physics, I. Prakash and Ramakrishna, 11th Ed., 2011, Kitab Mahal
3. Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers
4. A Laboratory Manual of Physics for undergraduate classes, D.P. Khandelwal, 1985, Vani Publications.

CORE PAPER-VII

ANALOG SYSTEMS AND APPLICATIONS

UNIT-I

Semiconductor Diodes: P and N type semiconductors, energy level diagram, conductivity and Mobility, Concept of Drift velocity, PN junction fabrication (simple idea), Barrier formation in PN Junction Diode, Static and Dynamic Resistance, Current flow mechanism in Forward and Reverse Biased Diode, Drift velocity, derivation for Barrier Potential, Barrier Width and current Step Junction.

Two terminal device and their applications: (1) Rectifier Diode: Half-waveRectifiers.center-tappedandbridgetypeFull-waveRectifiers,Calculation of Ripple Factor and Rectification Efficiency, L and C Filters (2) Zener Diode and Voltage Regulation, Principle and structure of LEDS, (2) Photo diode(3) Solar Cell.

UNIT II

Bipolar Junction Transistors: n-p-n and p-n-p transistors, Characterstics of CB, CE and CC Configurations, Current gains a and b, Relation between a and b, Load line analysis of Transistors, DC Load line and Q-point, Physical mechanism of current flow, Active, Cut-off and Saturation Regions.

Transistors Biasing: Transistor Biasing and Stabilization circuits, Fixed Bias and Voltage Divider Bias.

Amplifiers: Transistors as 2-port network h-parameter Equivalent Circuit, Analysis of a single stage CE amplifier using Hybrid Model, Input and Output impedance, Current, Voltage and Power Gains, Classification of class A, B and C amplifiers, Push-pull amplifier (class B)

UNIT-III

Coupled Amplifier: RC-coupled amplifier and it's frequency response.

Feedback in Amplifiers: Effect of Positive and Negative Feedback on In- put Impedance, Output Impedance, Gain Stability, Distortion and Noise. Sinusoidal Oscillations: Barkhausen's Gaterian for self-sustained oscillations. RC Phase shift oscillator, determination of Frequency, Hartley and Colpitt's oscillators.

UNIT-IV

Operational Amplifiers (Black Box approach): Characteristics of an Ideal and Practical OP-AMP (IC741). Open-loop and Closed loop Gain. Frequency Response. CMRR, Slew Rate and concept of virtual ground.

Application of Op-Amps: (1) Inverting and non-inverting amplifiers (2) Adder (3) Subtractor (4) Differentiator, (5) Integrator (6) Log amplifier, (7) Zero crossing detector (8) Wein bridge oscillator.

Text Books:

-

1. Foundations of Electronics-Raskhit and Chattopadhyay (New age International Publication), 15th Edition-2018

2. Concept of Electronics- D.C.Tayal (Himalay Publication)-2018

Reference Books:

1. Electronic devices and circuits R.L.Boylstad (Pearson India)-2009
2. Electronic Principles- A.P.Malvino (Tata McGraw Hill)-2008
3. Electronic Devices and Circuits- S.Salivahar and NS Kumar -(Tata McGraw Hill) 3rd Edition-2012
4. OP-Amps and Linear Integrated Circuit-R. A. Gayakwad (Prentice Hall) 4th Edition, 2000
5. Physics of Semiconductor devices, Donald A Neamen (Prentice Hall)
6.

CORE PAPER-VII LAB

(minimum 5 experiments are to be done)

1. To study the V-I characteristics of a Zener diode and its use as voltage regulator.
2. Study of V-I and power curves of solar cells, and find maximum power point and efficiency.
3. To study the characteristics of a Bipolar Junction Transistor in CE configuration and draw load line
4. To study the various biasing configurations of BJT for normal class A operation.
5. To study the frequency response of voltage gain of a RC-coupled transistor amplifier.
6. To design and study OP Amp-IC (741/351) as inverting and non inverting amplifier
7. To design and study OP Amp-IC (741/351) as integrator and differentiation and study frequency response.
8. To design and study OP Amp-IC (741/351) as adder and subtractor.
9. To design a Wien bridge oscillator for given frequency using a nop-amp.
10. To design a phase shift oscillator of given specifications using BJT.

11. To study the Colpitt's oscillator.

Reference Books:

1. Modern Digital Electronics, R.P. Jain, 4th Edition, 2010, Tata McGrawHill.
2. Basic Electronics: A text lab manual, P.B. Zbar, A.P. Malvino, M.A. Miller, 1994, Mc-Graw Hill.
3. Microprocessor Architecture Programming and applications with 8085, R.S. Goankar, 2002, Prentice Hall.
4. Microprocessor 8085:Architecture, Programming and interfacing, A. Wadhwa, 2010, PHI Learning.

CORE PAPER-VIII

MATHEMATICAL PHYSICS-III

The emphasis of the course is on applications in solving problems of interest to physicists. Students are to be examined on the basis of problems; known or unknown.

UNIT-I

Complex Analysis: Brief Revision of Complex Numbers and their Graphical Representation Eulers formula, De Moivre's theorem, Roots of complex Numbers, Functions of Complex Variables, Analyticity and Cauchy-Riemann Conditions, Examples of analytic functions, Singular functions: poles and branch points, order of singularity, branch cuts, Integration of a function of a complex variable, Cauchys Inequality, Cauchys Integral formula, Simply and multiply connected region, Laurent and Taylors expansion, Residues and Residue Theorem, Application in solving simple Definite Integrals.

UNIT-II

Integral Transforms-I: Fourier Transforms: Fourier Integral theorem, Fourier Transform,Examples,FourierTransformoftrigonometric,Gaussian,finitewave train and other functions, Representation of Dirac delta function as a Fourier Integral, Fourier transform of derivatives, Inverse Fourier Transform.

UNIT-III

Integral Transforms-II : Convolution theorem, Properties of Fourier Trans- forms (translation, change of scale, complex conjugation), Three dimensional Fourier transforms with examples, Application of Fourier Transforms to differential equations: One dimensional Wave and Diffusion/Heat flow Equations.

UNIT-IV

Laplace Transforms: Laplace Transforms (LT) of Elementary functions,

Properties of Laplace Transforms: Change of Scale Theorem, Shifting Theorem, LTs of Derivatives and Integrals of Functions, Derivatives and Integrals of Functions, Derivatives and Integrals of LTs. LT of Unit Step function, Dirac Delta function, Periodic Functions, Inverse LT, Application of Laplace Transforms to Differential Equations: Damped Harmonic Oscillator, Simple Electrical Circuits.

Text Books:

1. Mathematica lMethods for Physicists, G.B.Arfken, H.J.Weber, F.E.Harris (2013,7th Edn., Elsevier)
2. Advanced Engineering Mathematics, Erwin Kreyszig (Wiley India) 10th Edition 2014

Reference Books:

1. Mathematical Physics and Special Relativity–M.Das, P.K. Jena and B.K. Dash (Srikrishna Prakashan)-2009
2. Mathematical Physics–H. K. Das, Dr. Rama Verma (S. Chand Publishing) 2011
3. Complex Variable: Schaum’s Outlines Series M. Spiegel (2nd Edition , Mc- Graw Hill Education)-2004
4. Complex variables and applications J.W.Brown and R.V.Churchill 7th Edition 2003
5. Mathematical Physics, Satya Prakash (Sultan Chand)-2014
6. Mathematical Physics B.D.Gupta (4th edition, Vikas Publication)-2009

CORE PAPER-VIII LAB

20 clasees (2 hrs. duration each)

Scilab based simulations (XCos) experiments based on Mathematical Physics problems like

- Solve Simple Differential Equations like

$$\frac{dy}{dx}=e^{x}, with\, y(x=0)=0$$

$$\frac{dy}{dx}+e^{x}=x^{2}, with\, y(x=0)=0\frac{d^{2}y}{dx^{2}}+2\frac{dy}{dx}=-y, with\, y(x=0)=0, y^{'}(x=0)=1$$

$$\frac{d^{2}y}{dx^{2}}+e^{-x}\frac{dy}{dx}=-y, with\, y(x=0)=0, y^{'}(x=0)=1$$

- Direct Delta Function

Evaluate $\int_{-3}^{3} dx \, \frac{(x+3)}{\sqrt{2\pi\sigma^2}} \quad e^{-\frac{(x-2)^2}{2\sigma^2}}$, for $\sigma = 0.1, 0.01, 0.001$ and show that it tends to 5.

- **Fourier Series:**

Program to sum

Evaluate the Fourier coefficients of a given periodic function (square wave)

- **Frobenius method and Special functions:**

$\int_{-1}^{1} d\mu \; P_n(\mu) \; P_m(\mu) = \frac{2}{2n+1}\delta_{m,n}$

Plot $P_n(x)$, Legendre polynomial of degree n, and $J_n(x)$, Bessel function of first kind.

Show recursion relation

- Calculation of error for each data point of observations recorded in experiments done in previous semesters (choose any two).

- Calculation of least square fitting manually without giving weightage to error. Confirmation of least square fitting of data through computer program.

- Evaluation of trigonometric functions e.g. sin θ, Given Bessels function at N points find its value at an intermediate point.

Complex analysis: Calculate $\int \frac{dx}{(x^2+2)}$ and check it with computer integration.

- Integral transform: FFT of e^{-x^2}

Reference Books:

1. Mathematical Methods for Physics and Engineers, K.F Riley, M.P.Hobson and S. J. Bence, 3rd ed., 2006, Cambridge University Press
2. Mathematics for Physicists, P.Dennery and .Krzywicki,1967,DoverPublications
3. Simulation of ODE/PDE Models with MATLAB, OCTAVE and SCILAB: Scientific and Engineering Applications: A. Vande Wouwer, P. Saucez, C. V. Ferndez. 2014 Springer ISBN: 978-3319067896

4. Scilab by example: M. Affouf, 2012. ISBN: 978-1479203444
5. Scilab(A free software to matlab):H.Ramchandran, A.S.Nair. 2011 S. Chand and Company
6. Scilab Image Processing: Lambert M. Surhone. 2010 Beta script Publishing

CORE PAPER-IX

ELEMENTS OF MODERN PHYSICS

UNIT- I

Atomic Spectra and Models: Inadequacy of classical physics, Brief Review of Black body Radiation, Photoelectric effect, Compton Effect, dual nature of radiation wave nature of particles, Atomic spectra, Line spectra of hydrogen atom, Ritz Rydberg combination principle, Alpha Particle Scattering, Rutherford Scattering Formula, Rutherford Model of atom and its limitations.

Atomic Model: Bohrs Model of Hydrogen atom, explanation of atomic spec- tra, correction for finite mass of the nucleus, Bohr correspondence principle, limitations of Bohr model, discrete energy exchange by atom, Frank Hertz Experiment, Sommerfelds modification of Bohr's Theory.

UNIT- II

Wave Packet: superposition of two waves, phase velocity and group velocity, wave packets, Gaussian Wave Packet, spatial distribution of wave packet, Localization of wave packet in time, Time development of a wave packet, Wave Particle Duality, Complemntarity.

Wave Particle Duality: de Broglie hypothesis, Experimental confirmation of matter wave, Davisson Germer Experiment, velocity of deBroglie wave, wave particle duality, Complementarity.

Uncertainty Principle: Heisenberg Uncertainty Principle, Illustration of the PrinciplethroughthoughtExperimentsofGammaraymicroscopeandelectron diffraction through a slit, Estimation of ground state energy of harmonic oscillator and hydrogen atom, non existence of electron in the nucleus, Uncertainty and complementarities.

UNIT- III

Nuclear Physics- I: Size and structure of atomic nucleus and its relation with atomic weight, Impossibility of an electron being in the nucleus as a con- sequence of the uncertainty principle, Nature of the nuclear force, NZ graph, Liquid Drop model: semi empirical mass formula and binding energy, Nuclear Shell Model and magic numbers.

UNIT- IV

Nuclear Physics- II: Radioactivity, stability of the nucleus, Law of radioactive decay, Mean life and Half life Alpha decay, Beta decay-energy released, spectrum and Paulis prediction of neutrino, Gamma ray emission energy-momentum conservation: electron-positron pair creation by gamma photons in the vicinity of a nucleus, Fission and fusion mass deficit, relativity and generation of energy, Fission- nature of fragments and emission of neutrons, Nuclear reactor: slow neutron interacting with Uranium 235, Fusion and thermo nuclear reactions driving stellar energy (brief qualitative discussion).

Text Books:

1. Concepts of Modern Physics Arthur Beiser (McGraw Hill)-2002
2. Modern Physics Murugeshan and Sivaprasad (S.Chand) 18th Edition 2016

Reference Books:

1. QuantumMechanics:TheoryandApplications,A.K.GhatakandS.Lokanathan, (Macmillan)-2004
2. Introduction to Quantum Theory, David Park (Dover Publications)-1974
3. Theory and Problems of Modern Physics, Schaum‘s outline, R.Gautreau and W.Savin- (Tata McGraw-Hill) 2nd Edition
4. Physics for scientists and engineer with Modern Physics-Jewell and Serway - (CENGAGE Learnings) 2010.

5. Modern Physics of Atoms and Molecules Bransden and Joachim (Pearson India)-2003
6. Atomic and Nuclear Physics-A.B.Gupta (New Central)-2009
7. Theoretical Nuclear Physics , J.M.Blatt and V.F. Weisskof (Springer)-2003

CORE PAPER-IX LAB

(minimum 4 experiments are to be done):

1. To show the tunneling effect in tunnel diode using I-V characteristics.
2. To determine the wavelength of laser source using diffraction of single slit.
3. To determine the wavelength of laser source using diffraction of double slits.
4. To determine (1) wavelength and (2) angular spread of He-Ne laser using plane diffraction grating.
5. To determine the Plancks constant using LEDs of at least 4 different colours.
6. To determine the value of e/m by (a) Magnetic focusing or (b) Bar magnet.
7. To setup the Millikan oil drop apparatus and determine the charge of an electron.

Reference Books:

1. Advanced Practical Physics for students, B.L. Flint and H.T. Worsnop, 1971, Asia Publishing House
2. Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers
3. A Text Books Book of Practical Physics, I. Prakashand Ramakrishna, 11th Edn, 2011,Kitab Mahal

CORE PAPER-X

DIGITAL SYSTEMS AND APPLICATIONS

UNIT-I

Integrated Circuits (Qualitative treatment only): Active and Passive Components, Discrete components, Wafer Chip, Advantages and Drawbacks of ICs, Scale of Integration: SSI, MSI, LSI and VLSI (basic idea and definitions only), Classification of ICs, Examples of Linear and Digital ICs.

Digital Circuits: Difference between Analog and Digital Circuits, Binary Numbers, Decimal to Binary and Binary to Decimal Conversation, BCD, Octal and Hexadecimal numbers, AND, OR and NOT. Gates (realization using Diodes and Transistor), NAND and NOR Gates as Universal Gates, XOR and XNOR Gates and application as Parity Checkers.

UNIT-II

Boolean algebra: De Morgans Theorems: Boolean Laws, Simplification of Logic Circuit using Boolean Algebra, Fundamental Products, Idea of Minterms and Maxterms, Conversion of a Truth table into Equivalent Logic Circuit by

(1) Sum of Products Method and (2) Karnaugh Map.

Introduction to CRO: Block Diagram of CRO, Electron Gun, Deflection system and Time Base, Deflection Sensitivity,

Applications of CRO: (1) Study of Wave Form, (2) Measurement of Volt- age, Current, Frequency and Phase Difference.

UNIT-III

Data Processing Circuits: Basic Idea of Multiplexers, De-multiplexers, Decoders, Encoders.

Arithmetic Circuits: Binary Addition. Binary Subtraction using 2s complement. Half and Full Adders. Half and Full Subtractors, 4 bit binary Adder/ Subtractor.

Timers: IC 555: block diagram and application is Astable multivibrator and Monostable multivibrator.

UNIT-IV

Introduction to Computer Organization: Input/output Devices, Data storage (idea of RAM and ROM), Computer memory, Memory organization and addressing, Memory Interfacing, Memory Map.

Shift registers: Serial-in-serial-out, Serial-in-Parallel-out, Parallel-in-Serial- out and Parallel-in-Parallel-out. Shift Registers (only up to 4 bits)
Counters (4 bits): Ring Counter, Asynchronous counters, Decade Counter. Synchronous Counter.

Text Books:

1. Foundation of Electronics-Rakshit Chattopadhaya (New Age) -2015
2. Digital Circuits and Logic design: Samuel C. Lee(Printice Hall)-1976
3. Digital Principles and Applications - A.P. Malvino, D.P.Leach and Saha (Tata McGraw)- 7th Edition 2011

Reference Books:

1. The Art of Electronics by Paul Horowitz and Wilfield Hill ,Cambridge University -2006
2. Electronics by Allan R. Hambley, Prentice Hall - 1994
3. Digital Logic and Computer design M. Morris Mano (Pearson) -2016
4. Concepts of Electronics D.C.Tayal (Himalaya Publishing house) -2018

CORE PAPER--X LAB

(minimum 6 experiments are to be done):

1. Student should know how to measure (a) Voltage, and (b) Time period of a periodic waveform using CRO and to test a Diode and Transistor using a Millimeter.
2. To design a switch (NOT gate) using a transistor.
3. To verify and design AND, OR, NOT and XOR gates using NAND gates.
4. Half Adder, Full Adder and 4-bit binary Adder.
5. Half Subtractor, Full Subtractor, Adder- Subtractor using Full AdderI.C.
6. To build Flip-Flop(RS,Clocked RS,D- type and JK) circuits using

NAND gates.

7. To design an stable multivibrator of given specifications using 555Timer.
8. To design a monostable multivibrator of given specifications using 555 Timer.

Reference Books:

1. Basic Electronics: A Text Books lab manual, P.B. Zbar, A.P. Malvino,
2. M.A. Miller, 1994, Mc-Graw Hill.
3. OP-Amps and Linear Integrated Circuit, R. A. Gayakwad, 4th edition, 2000, Prentice Hall.
4. Electronic Principle, Albert Malvino, 2008, Tata Mc-Graw Hill. Electronic Devices and circuit Theory, R.L.Boylestad and L.D. Nashelsky, 2009, Pearson

CORE PAPER-XI

QUANTUM MECHANICS AND APPLICATIONS

UNIT- I

Schrodinger equation : Time dependent Schrodinger equation , Properties of Wave Function, Interpretation of wave function, Probability and probability current densities in three dimensions, Conditions for Physical Acceptability of Wave Function, Normalization, Linearity and Superposition Principles. Wave function of a free particle ,Wave Packet, Fourier Transform and momemtum space Wave function ,Spread of Gaussian Wave packet, Evolution with time, Position and Momentum Uncertainty.

UNIT-II

Operators: Operators, Commutator Algebra, Position, Momentum Angular Momentum and Energy operators, Hermitian Operators, Expectation values of position and momentum, Ehrenfest Theorem, Eigenvalues and Eigen functions of Hermitian Operator, Energy Eigen Spectrum, Degeneracy, Orthonormality of

Eigen functions, Linear Dependance. Orthogonalisation.

UNIT-III

Time Independent Schrodinger equation in one dimension (1d), 2d and 3d, Hamiltonian, stationary states and energy eigen values, expansion of an arbitrary wave function as a linear combination of energy eigen functions, General solution of the time dependent Schrodinger equation in terms of linear combinations of stationary states. General Discussion of Bound states in an arbitrary potential: Continuity of wave function, Boundary condition and emergence of discrete energy levels, Application to one dimensional problem-Square well potential, Quantum mechanics of simple Harmonic Oscillator-Energy Levels and energy eigen functions, ground state, zero point energy and uncertainty principle, One dimensional infinitely rigid box energy eigen values and eigen functions, normalization, quantum dot as example, Quantum mechanical scattering and tunnelling in one dimension across a step potential and rectangular potential barrier.

UNIT-IV

Atoms in Electric and Magnetic Fields: Electron angular momentum. Space quantization, Electron Spin and Spin Angular Momentum, Larmors Theorem, Spin Magnetic Moment, Stern Gerlach Experiment,Vector Atom Model, L-S and J-J coupling, Zeeman Effect, Electron Magnetic Moment and Magnetic Energy, Gyro magnetic Ratio and Bohr Magnet on Atoms in External Magnetic Fields:- Normal and Anomalous Zeeman Effect, Paschenback and Stark Effect (qualitative Discussion only)

Text Books:

1. Introduction to Quantum Theory, D. J. Griffiths(Pearson)-2015
2. Introduction to Quantum Theory David Park (Dover Publications)-1974

Reference Books :

1. Quantum Mechanics, Theory and applications A. Ghatak and S. Lokanathan (McMillan India)-2004
2. Quantum Mechanics-G.Aruldhas (Printice Hall of India)-2008
3. Quantum Physics–S. Gasiorowicz (Wiley)-2007
4. Quantum Mechanics -J.L. Powell and B. Craseman (Narosa)-1998
5. Introduction to Quantum Mechanics M.Das and P.K.Jena (Shri Krishna Publication)-2006

CORE PAPER- XI LAB

Use C/C++/Scilab for solving the following problems based on Quantum Mechanics like (Use finite difference method,matrixmethod,ODE Solver method in all cases)

1. Solve the s-wave Schrodinger equation for the ground state and the first excited state of the hydrogen atom:
$\frac{d^2y}{dr^2} = A(r)u(r),\ A(r) = \frac{2m}{\hbar^2}[V(r) - E],\ V(r) = -\frac{e^2}{r},$

where m is the reduced mass of the electron. Obtain the energy eigenvalues and plot the corresponding wave functions. Remember that the ground state energy of the hydrogen atom is ~ -13.6eV. Take $e = 3.795\sqrt{(eV\mathring{A})}$, $\hbar c = 1973(eV\mathring{A})$ and $m = 0.511 \times 10^6 eV/c^2$

2. Solve the s-wave radial Schrodinger equation for an atom:
$\frac{d^2y}{dr^2} = A(r)u(r),\ A(r) = \frac{2m}{\hbar^2}[V(r) - E]$, where m is the reduced mass of the system (which can be chosen to be the mass of an electron), for the screened coulomb potential: $V(r) = -\frac{e^2}{r}e^{-r/a}$

Find the energy (in eV) of the ground state of the atom to an accuracy of three significant digits. Also, plot the corresponding wave function. Take $e = 3.795\sqrt{(eV\mathring{A})}$, $\hbar c = 1973(eV\mathring{A})$ and $m = 0.511 \times 10^6 eV/c^2$, and $a = 3\mathring{A}, 5\mathring{A}, 7\mathring{A}$. The ground state energy is expected to be above -12 eV in all three cases.

3. Solve the s-wave radial Schrodinger equation for a particle of mass m:
$\frac{d^2y}{dr^2} = A(r)u(r),\ A(r) = \frac{2m}{\hbar^2}[V(r) - E]$, for the anharmonic oscillator potential:
$V(r) = \frac{kr^2}{2} + \frac{br^3}{3}$.

Find the ground state energy (in MeV) of the particle to an accuracy of three significant digits. Also, plot the corresponding wave function. Choose $m = 940MeV/c^2, k = 100MeV/fm^2, b = 0, 10, 30MeV/fm^3$. In these Units, c = 197.3 MeV fm. [The ground state energy is expected to lie between 90 and

110 M eV for all three cases.]

4. Solve the s-wave radial Schrodinger equation for the vibrations of hydrogen molecule: $\frac{d^2y}{dr^2} = A(r)u(r)$, $A(r) = \frac{2m}{\hbar^2}[V(r) - E]$, where m is the reduced mass of the two-atom system for the Morse potential $V(r) = D(e^{-2\alpha r} - e^{-\alpha r})$, where $r = r - r_0$ Find the lowest vibrational energy (in MeV) of the molecule to an accuracy of three significant digits. Also plot the corresponding wave functions for the choices given below:

a) $m = 940x10^6 eV/c^2, D = 0.755501eV, \alpha = 1.44, r_0 = 0.131349\mathring{A}$

b) $m = 940x106eV/c^2, D = 0.755501eV, \alpha = 1.44, r_0 = 0.131349\mathring{A}$

Laboratory Based Experiments : (to be taken up depending on availability of equipment)

1. Study of Electron spin resonance- determine magnetic field as a function of the resonance frequency
2. Study of Zeeman effect: with external magnetic field; Hyper fine splitting
3. To show the tunneling effect in tunnel diode using I-V characteristics.
4. Quantum efficiency of CCDs

Reference Books:

1. Schaum's outline of Programming with C++. J.Hubbard,2000,McGraw– Hill Publication
2. Numerical Recipes in C: The Art of Scientific Computing, W.H. Pressetal., 3rd Edition., 2007, Cambridge University Press.
3. An introduction to computational Physics, T. Pang, 2nd Edn.,2006, Cam- bridge Univ. Press
4. Simulation of ODE/PDE Models with MATLAB, OCTAVE and SCILAB: Scientific and Engineering Applications: A. Vande Wouwer, P. Saucez, C. V. Fernndez.2014 Springer.
5. Scilab (A Free Software to Matlab): H. Ramchandran, A.S. Nair. 2011S. Chand and Co.
6. Scilab Image Processing: L.M.Surhone.2010 Beta script Publishing

ISBN:9786133459274

CORE PAPER-XII

SOLID STATE PHYSICS

UNIT-I

Crystal Structure: Solids, Amorphous and Crystalline Materials, Lattice translation Vectors, Lattice with a Basis. Central and Non-Central Elements. Unit Cell, Miller Indices, Types of Lattices, Reciprocal Lattice, Brillouin zones, DiffractionofX-raysbycrystals,BraggLaw,AtomicandGeometricalFactor

UNIT-II

Elementary Lattice Dynamics: Lattice Vibrations and Phonons: Linear, Monotomic and Diatomic Chains, Acoustical and Optical Phonons, Qualitative Description of the phonon spectrum in solids, Dulong and Petits Law, Einstein and Debye theories of specific heat of solids, T^3 Law

Magnetic Properties of Matter: Dia-, Para-, Ferri- and Ferromagnetic Materials, Classical Langevins theory of dia and Paramagnetic Domains, Curies law, Weiss Theory of Ferro magnetism and Ferro magnetic Domains, Discussion of B-H Curve, Hysteresis and Energy Loss.

UNIT-III

Dielectric Properties of Materials: Polarization Local Electrical Field at an Atom, Depolarization Field, Electric Susceptibility, Polari ability, Clausius Mosotti Equation, Classical theory of Electronic Polarizability.

Lasers: Einsteins A and B coefficients, Meta stable States, Spontaneous and Stimulated emissions, Optical Pumping and population Inversion, Three Level and Four Level Lasers, Ruby Laser and He-Ne Laser.

UNIT-IV

Elementary band theory: Kronig-Penny model of band Gap, Conductor, Semiconductor (P and N type) and insulator, Conductivity of Semiconductor, mobility, Hall Effect, Measurement of conductivity (04 problem method) and Hall Coefficient.

Superconductivity: Experimental Results, Critical Temperature, Critical magnetic field, Meissner effect, Type I and type II Superconductors, Londons Equation and Penetration Depth, Isotope effect, Idea of BCS theory (No derivation)

Text Books:

1. Introduction to Solid State Physics- Charles Kittel (Wiley India) 8th Edition 2012
2. LASERS: Fundamentals and Applications-Thyagarajan and Ghatak (McMillan India)-2011

Reference Books:

1. Solid State Physics-N. W. Ashcroft and N.D. Mermin(Cengage)-2003
2. Solid State Physics- R.K.Puri and V.K. Babbar (S.Chand Publication)-2010
3. Solid State Physics S. O. Pillai (New Age Publication)-2008
4. Lasers and Non linear Optics B.B.Laud (Wiley Eastern)-2011
5. Elements of Solid State Physics-J.P. Srivastava (Prentice Hall of India)-2014
6. Elementary Solid State Physics-Ali Omar (Addison Wiley)-2002

CORE PAPER-XII LAB

(minimum 4 experiments are to be done)

1. Measurement of susceptibility of paramagnetic solution (Quinck’s Tube-Method)
2. To measure the Magnetic susceptibility of Solids.
3. To measure the Dielectric Constant of a dielectric Materials and variation with frequency
4. To determine the Hall coefficient of a semiconductor sample.

5. To draw the BH curve of Fe using solenoid and to determine the energy loss from Hysteresis
6. To measure the resistivity and band gap of a given semiconductor by four-problem method.
7. To study PE hysteresis loop of a ferroelectric crystal

Reference Books:

1. Advanced Practical Physics for students, B.L. Flint and H.T. Worsnop, 1971, Asia Publishing House.
2. Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers.
3. A Text Books Book of Practical Physics, I. Prakashand Ramakrishna, 11 Ed., 2011, Kitab Mahal
4. Elements of Solid State Physics, J.P. Srivastava, 2nd Ed., 2006, Prentice- Hall of India.
5.

CORE PAPER-XIII

ELECTROMAGNETIC THEORY

UNIT-I

Maxwell Equations: Maxwell's equations, Displacement Current, Vector and Scalar Potentials, Gauge Transformations: Lorentz and Coulomb Gauge, Boundary Conditions at Interface between Different Media, Wave Equations, Plane Waves in Dielectric Media, Poynting Theorem and Poynting Vector, Electro- magnetic (EM) Energy Density, Physical Concept of Electromagnetic Field Energy Density

UNIT-II

EM Wave Propagation in Unbounded Media: Plane EM waves through vacuum and isotropic dielectric medium, transverse nature of plane EM waves, refractive index and dielectric constant, wave impedance, Propagation through conducting media, relaxation time, skin depth, Electrical conductivity of ionized gases, plasma frequency, refractive index, skin depth, application to propagation through ionosphere.

UNIT-III

EM Wave in Bounded Media: Boundary conditions at a plane interface between two media, Reflection and Refraction of plane waves at plane interface between two dielectric media, Laws of Reflection and Refraction, Fresnel's Formulae for perpendicular and parallel polarization cases, Brewster's law, Reflection and Transmission coefficients, Total internal reflection, evanescent waves, Metallic reflection (normal Incidence)

UNIT IV

Polarization of Electromagnetic Waves: Description of Linear, Circular and Elliptical Polarization, Uniaxial and Biaxial Crystals, Light Propagation in Uniaxial Crystal, Double Refraction, Polarization by Double Refraction, Nicol Prism, Ordinary and extraordinary refractive indices, Production and detection of Plane, Circularly and Elliptically Polarized Light,

Phase Retardation Plates: Quarter-Wave and Half- Wave Plates. Babinets Compensator and its Uses, Analysis of Polarized Light.

Rotatory Polarization: Optical Rotation, Biots Laws for Rotatory Polarization, Fresnels Theory of optical rotation, Calculation of angle of rotation, Experimental verification of Fresnels theory, Specific rotation, Laurents half- shade polarimeter.

Text Books:

1. Introduction to Electrodynamics, D.J. Griffiths (Pearson)-2015
2. Principles of Optics- Max Born and E. Wolf- Cambridge University Press-1999

Reference Books:

1. Classical Electrodynamics by J.D. Jackson (Willey)-2007
2. Foundation of electromagnetic theory: Ritz and Milford (Pearson)-2008
3. Electricity and Magnetism : D C Tayal (Himalaya Publication)-2014
4. Optics : A.K.Ghatak (McGraw Hill Education)- 2017
5. Electricity and Magnetism: Chattopadhyaya, Rakhit (New Central)-2018

CORE PAPER XIII LAB

(minimum 4 experiments are to be done):

1. To verify the law of Malus for plane polarized light.
2. To determine the specific rotation of sugar solution using Polarimeter.
3. To analyze elliptically polarized Light by using a Babinets compensator.
4. To determine the refractive index of liquid by total internal reflection using Wollastonsair-film.
5. To determine the refractive Index of (1) glass and (2) a liquid by total internal reflection using a Gaussian eye piece.
6. To study the polarization of light by reflection and determine the polarizing angle for air-glass interface.
7. To verify the Stefan‘s law of radiation and to determine Stefan’s constant.
8. To determine the Boltzmann constant using V-I characteristics of PN junction diode.
9. To determine wavelength and velocity of ultrasonic wave in liquid.

Reference Books:

1. Advanced Practical Physics for students, B.L. Flint and H.T. Worsnop, 1971, Asia Publishing House.
2. Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers
3. A Text Books Book of Practical Physics, I.Prakashand Ramakrishna, 11 Ed., 2011, Kitab Mahal Electromagnetic Field Theory for Engineers and Physicists, G. Lehner, 2010,Springer

CORE PAPER-XIV

STATISTICAL MECHANICS

UNIT- I

Classical Statistics-I: Macrostate and Microstate, Elementary Concept of Ensemble, Micro canonical, Canonical and Grand Canonical ensemble, Phase Space, Entropy and Thermodynamic Probability, Maxwell-Boltzmann Distribution Law, Partition Function.

UNIT- II

Classical Statistics-II : Thermodynamic Functions of an Ideal Gas, classical Entropy Expression, Gibbs Paradox, Sackur Tetrode equation, Law of equi partition of Energy (with proof)- Applications to Specific Heat and its Limitations, Thermodynamic Functions of a two energy levels system, Negative Temperature.

UNIT-III

Quantum Statistics: Identical particles, macrostates and microstates, Fermions and Bosons, Bose Einstein distribution function and Fermi- Dirac distribution function. Bose- Einstein Condensation, Bose deviation from Plancks law, Effect of temperature on Fermi-Dirac distribution function, degenerate Fermi gas, Density of States Fermi energy.

UNIT-IV

Radiation: Properties of Thermal Radiation, Blackbody Radiation, Pure Temperature dependence, Kirchhoffs law, Stefan Boltzmann law: Thermodynamic proof, Radiation Pressure, Weins Displacement law, Wiens distribution Law, Sahas Ionization Formula, Rayleigh Jeans Law, Ultra Violet catastrophe.

Plancks Law of Black body Radiation: Experimental verification, Deduction of (1) Wiens Distribution Law, (2) Rayleigh Jeans Law, (3) Stefan Boltzmann Law, (4) Weins Displacement Law from Plancks Law.

Text Books:

1. Introduction to Statistical Physics by Kerson Huang(Wiley).-2008
2. Statistical Physics ,Berkeley Physics Course, F.Reif (Tata McGraw-Hill)-2017

ReferenceBooks:

1. Statistical Mechanics, B.K.Agarwal and Melvin Eisner (New Age International)-2013
2. Thermodynamics, Kinetic Theory and Statistical Thermodynamics: Francis W.Sears and Gerhard L. Salinger (Narosa) 1998
3. Statistical Mechanics: R.K.Pathria and Paul D. Beale (Academic Press)-2011

CORE PAPER-XIV LAB

Use C/C++/ Sci lab for solving the problems based on Statistical Mechanics like

1. Plot Plancks law for Black Body radiation and compare it with Weins law and find Wein's constant and Stefan constant
2. plot Raleigh-Jeans Law at high temperature (room temperature) and low temperature.
3. Plot Specific Heat of Solids by comparing (a) Dulong-Petit law, (b) Einstein distribution function, (c) Debye distribution function for high temperature (room temperature) and low temperature and compare them for these two cases
4. Plot Maxwell-Boltzmann distribution function
5. Plot Fermi-Dirac distribution function
6. Plot Bose-Einstein distribution function.

Reference Books:

1. Elementary Numerical Analysis, K.E. Atkinson, 3rdEdn. 2007, Wiley India Edition
2. Statistical Mechanics, R.K. Pathria, Butterworth Heinemann: 2nd Edition,

1996, Oxford University Press.

3. Thermodynamics, Kinetic Theory and Statistical Thermodynamics, Francis W. Sears and Gerhard L. Salinger, 1986, Narosa.
4. Modern Thermodynamics with Statistical Mechanics, Carl S. Helrich, 2009,Springer
5. Simulation of ODE/PDE Models with MATLAB, OCTAVE and SCILAB: Scientific and Engineering Applications: A. Vande Wouwer, P. Saucez, C. V. Fernndez. 2014 Springer ISBN: 978-3319067896
6. Scilab by example: M. Affouf, 2012. ISBN: 978-1479203444
7. Scilab Image Processing:L. M.Surhone. 2010, Betascript Pub., ISBN: 978-6133459274

Discipline Specific Elective Paper-1

CLASSICAL DYNAMICS

The emphasis of the course is on applications in solving problems of interest to physicists. Students are to be examined on the basis of problems, seen and unseen.

UNIT-I

Generalised co-ordinates and Velocities, Generalised Force, Principle of virtual work Derivation of Lagranges equation of motion from D Alemberts Principles, Lagrangian and its Application to Simple, Compound and Double Pendulums, Single Particle in Space, At woods Machine, Dumbbell, Linear harmonic oscillator.

UNIT-II

Hamiltons Principle, Calculus of Variation and derivation of Euler-Lagranges equation, Langranges Equations derived from Hamiltons Principles, Hamiltoian and its applications to Shortest Distance between two points in a plane, Geodesic

Problem, minimum surface of revolution, Brachistochrone problem, The Equations of motion and first integrals, The equivalent one-dimensional problem and classification of orbits, canonical momenta, Hamiltions equations of motion, Motion of charged particles in external electric and magnetic fields, Applications to central force motion and coupled oscillators.

UNIT- III

Special theory of Relativity (Postulates of special theory of relativity), Lorentz transformations, Minkowski space, The invariant interval, light cone and world lines, space time diagrams, Times-dilation, length contraction and Twin paradox, Variation of mass with velocity mass energy relation

UNIT- IV

Four Vectors: Space Like, Time-like and light-like. Four velocity and acceleration, Four momentum and energy-momentum relation. Doppler effects from a four vector perspective, Concept of four-force, Conservation of four momentum, Application to two body decay of anun stable particle

Text Books:

1.Classical Mechanics, H.Goldstein, C.P. Poole, J.L. Safko (Pearson) -20112.Classical Mechanics N C Rana and P S Joag.-2017

Reference Books:

1. Mechanics-D.S.Mathur (Sultan Chand)-2000
2. Solved problems in Classical Mechanics, O.L. Delange and J.Pierrus (Oxford Press)(2010)
3. Classical Mechanics-M. Das, P.K. Jena, M. Bhuyan, R.N. Mishra (Srikrishna Prakashan)-2009
4. Mathematical Physics with Classical Mechanics-Satya Prakash (Sultan Chand and sons)-2014

5. Introduction to classical dynamics R.K.Takwale and S.Puranik (Tata McGraw Hill)-2017
6. Classical Mechanics J.C. Upadhyay (Himalayan Publisher)-2017
7. Classical Dynamics of particles and systems -S.T.Thorton and Marion (Cengage publication)-2012

Discipline Specific Elective Paper-1I

Nuclear and Particle Physics

UNIT-I

General properties of Nuclei: Constituents of nucleus and their intrinsic properties, Quantitative facts about mass, radius, charge density (matter density), binding energy, average binding energy and its variation with mass number, main features of binding energy versus mass number curve, N/A plot, angular momentum, parity, magnetic moment electric moments, nuclear excites states.

Radioactivity decays: (a) Alpha decay: basics of alpha- decay processes, theory of alpha-emission, Gamow factor, Geiger Nuttall law (b) beta-decay: energy kinematics for beta-decay, positron emission, electron capture, neutrino hypothesis.

(c) Elementary idea of Gamma decay.

UNIT-II

Nuclear Models: Liquid drop model approach, semi empirical mass formula and significance of its various terms, conditions of nuclear stability, two nucleon separation energies, evidence for nuclear shell structure, nuclear magic number, basic assumption of shell models.

UNIT-III

Detector for nuclear radiations: Detector for nuclear radiations: Gas detectors: estimation of electric field, mobilityof particle, for ionization chamber and GM Counter. Basic Principle of Scintillation Detectors and Construction of photo-multiplier tube (PMT). Semiconductor Detectors (Si and Ge) for charge Particle and photo detection (Concept of charge carrier and mobility), neutron detector.

Particle Accelerators: Van-de Graff generator (Tandem Accelerator), Lin- ear accelerator, Cyclotron, Synchrotrons

UNIT-IV

Particle Physics: Particle interactions, basic features, types of particles and its families,

Symmetries and conservation laws: Energy and momentum, angular momentum, parity, baryon number, Lepton number, Isospin, strangeness and charm, Elementary ideas of quarks and gluons.

Text Books:

1. Introduction to Nuclear Physics By Roy and Nigam-2014
2. Atomic and Nuclear Physics- N.Subramanyam, Brij Lal and Jivan Seshan (S. Chand Publishing)-2007

Reference Books:

1. Introduction to Modern Physics- H.S.Mani and G.K. Mehta(Affilated east and west) -2018
2. Introductory nuclear Physics-Kenneth S. Krane (Wiley India Pvt. Ltd)-1987
3. Introduction to Elementary Particles-D. Griffith (John Wiley and Sons)-2008
4. Concepts of Nuclear Physics - Bernard L. Cohen. (Tata Mcgraw Hill). -2017
5. Concepts of Modern Physics-Arthur Beiser (McGraw Hill)-2017

Discipline Specific Elective Paper- II1

Nano Materials and Applications

UNIT-I

Nanoscale Systems: Length scales in physics, Nanostructures: 1D, 2D and 3D nanostructures (nanodots, thin films, nanowires, nanorods), Band structure and density of states of materials at nanoscale, size effects in nano systems, Quantum confinement Applications of Schrodinger equation-infinite potential well, potential step, potential box, quantum confinement of carriers in 3D, 2D, 1D nanostructure and its consequences.

UNIT-II

Synthesis of Nanostructure Materials: Top down and bottoms up approach, Photo lithography Ball milling. Gas phase condensation, Vacuum deposition, Physical vapour deposition (PVT): Thermal evaporation, E-beam evaporation, Pulsed Laser deposition, Chemical vapour deposition (CVD), Sol-Gel Electrodeposition,Spraypyrolysis,Hydrothemalsynthesis,Preparationthrough colloidal methods, MBE growth of quantum dots.

UNIT-III

Characterization: X-Ray Diffraction, Optical Microscopy, Scanning Electron Microscopy, Transmission Electron Microscopy, Atomic Force Microscopy, Scanning Tunneling Microscopy

UNIT-IV

Applications: Applications of nano particles, quantum dots, nanowires and thin films for photonic devices (LED, solar cells). Single electron devices (no derivation). CNT based transistors. Nonmaterial Devices: Quantum dots hetero structure lasers, optical switching and optical data storage. Magnetic quantum well; magnetic dots-magmetic data storage. Micro Electromechanical Systems (MEMS), Nano Electromechanical Systems (NEMS)

Text Books:

1. S.K. Kulkarni, Nanotechnology: Principles and Practices (Capital Publishing Company)-3rd Edition 2014

2. Nano science and nano technology, K.K. Choudhary (Narosa)-2016

Reference Books:

1. Nano Science and nano technology, Sundar Singh (Pragati Prakashan)-2017
2. C.P. Poole, Jr. Frank J. Owens, Introduction to Nanotechnology (Wiley India Pvt. Ltd.)-2007
3. Richard Booker, Earl Boysen, Nanotechnology(John Wiley and Sons)-2005
4. M. Hosokawa, K. Nogi, M. Naita, T. Yokoyama, Nanoparticle Technology Handbook (Elsevier, 2007)
5. K.K. Chattopadhya and A. N. Banerjee, Introduction to Nanoscience and Technology (PHI Learning Private Limited)-2009

Discipline Specific Elective Paper-1V

Project

OR

Basic Instrumentation

Basic Instrumentation

UNIT-I

Basic of Measurement: Instruments accuracy, precision, sensitivity, resolution range etc. Errors in measurements and loading effects.

Multimeter: Principles of measurement of dc voltage and dc current, ac volt- age, ac current and resistance. Specifications of a multimeter and their significance.

Electronic Voltmeter: Advantage over conventional multimeter for voltage measurement with respect to input impedance and sensitivity. Principles of voltage, measurement (block diagramonly).Specifications of an electronic Voltmeter/ Multimeter and their significance.

AC mill voltmeter: Type of AC mill voltmeters: Amplifier- rectifier, and rectifier-amplifier. Block diagram ac mill voltmeter, specifications and their significance.

UNIT-II

Cathode Ray Oscilloscope: Block diagram of basic CRO. Construction of CRT, Electron gun, electrostatic focusing and acceleration (Explanation only no mathematical treatment), brief discussion on screen phosphor, visual persistence and chemical composition. Time base operation, synchronization. Front panel controls. Specifications of a CRO and their significance.

Use of CRO for the measurement of voltage (dc and ac frequency, time period. Special features of dual trace, introduction to digital oscilloscope, probes. Digital storage Oscilloscope: Block diagram and principle ofworking.

UNIT-III

Signal Generators and Analytical Instruments: Block diagram, explanation and specifications of low frequency signal generators, pulse generator, and function generator, Brief idea for testing, specifications, Distortion factor meter, wave analysis.

UNIT-IV

Digital Instruments: Principle and working of digital meters, Comparison of analog and digital instruments, Characteristics of a digital meter, Working principles of digital voltmeter.

Digital Multimeter: Block diagram and working of a digital multimeter, Working principle of time interval, frequency and period measurement using universalcounter/frequencycounter,time-basestability,accuracyandresolution.

The test of lab skills will be of the following test items:

1. Use of an oscilloscope.
2. CRO as a versatile measuring device.
3. Circuit tracing of Laboratory electronic equipment,
4. Use of Digital multimeter /VTVM for measuring voltages
5. Circuit tracing of Laboratory electronic equipment,
6. Winding a coil /transformer.

7. Study the layout of receiver circuit.
8. Trouble shooting a circuit
9. Balancing of bridges

Laboratory Exercises:

1. To observe the loading effect of a multimeter while measuring voltage across a low resistance and high resistance.
2. To observe the limitations of a multimeter for measuring high frequency voltage and currents.
3. To measure Q of a coil and its dependence on frequency, using a Q-meter.
4. Measurement of voltage, frequency, time period and phase angle using CRO.
5. Measurement of time period, frequency, average period using universal counter/ frequency counter.
6. Measurement of rise, fall and delay times using a CRO.
7. MeasurementofdistortionofaRFsignalgeneratorusingdistortionfactor meter.
8. Measurement of R, L and Cusinga LCR bridge/universal bridge.

Open Ended Experiments:

1. Using a Dual Trace Oscilloscope
2. Converting the range of a given measuring instrument (voltmeter, ammeter)

More emphasis should be given on hands-on experiments.

Text Books:

1. A Text Books book of electrical technology-B.L.Theraja and A.K. Theraja (S. Chand Publishing)-2014
2. Digital circuits and systems Venugopal (Tata McGraw Hill)-2011

Reference Books :

1. Digital Electronics-Subrata Ghoshal (Cengage Learning)-2017
2. Electronic Devices and circuits - S. Salivahanan and N. S.Kumar (Tata Mc-Graw Hill)-2012
3. Electronic Devices-Thomas L. Floyd (Pearson)-2015

Additional Reference Books for Practical papers:

1. An advanced course in Practical Physics- Chattopadhayay, Rakshit-

Central-2013
2. Practical Physics-B.B.Swain (Kitab Mahal)-2014
3. Advanced practical Physics-B.Ghosh and KG Majumdar (Vol. I and II)-Shreedhar Publication-2004
4. ALaboratoryManualofPhysicsforUndergraduateClasses,D.P.Khandelwal (Vani Publication)-1985
5. B.Sc. Practical Physics- C.L.Arora (S.Chand Publishing)-2010
6. B.Sc. Practical Physics H. Singh and P.S. Hemne (S. Chand Publishing)-2002

GENERIC ELECTIVE (GE)

Generic Elective Paper I

(Mechanics and Properties of matter, Oscillation and Waves, Thermal Physics, Electricity and Magnetism and Electronics

UNIT-I

Mechanics and Properties of Matter

Moment of Inertia Parallel axis and perpendicular axis theorem, M.I. of a Solid sphere and Solid cylinder, Gravitational potential and field due to a thin spherical shell and a solid sphere at external points and internal points, Relation among elastic constants, depression at free end of a light cantilever, Surface tension,pressure,differenceacrossacurvedmembrane,viscousflow,Poiseulles formula.

UNIT-II

Oscillation and Waves

Simple harmonic motion, damped harmonic motion, under damped, over damped and critically damped motion, Forced vibration, Resonance, Wave equation in a medium, Velocity of Longitudinal waves in an elastic medium and velocity of transverse wave in a stretched string, Composition of SHM, Lissajous figures for superposition of two orthogonal simple harmonic vibrations (a) with same frequency, (b) frequency with 2:1.

UNIT-III

Thermal Physics

Entropy, change in entropy in reversible and irreversible process, Carnot engine and its efficiency. Carnot Theorem, Second law of thermodynamics, Kelvin-Planck, Clausius formula. Thermal conductivity, differential equation for heat flow in one dimension, Maxwell thermodynamic relation (statement only), Clausius Clapeyron equation, Black body radiation, Planck radiation formula (No derivation).

UNIT-IV

Electricity and Magnetism

Gauss law of electrostatics, use of Gauss law to compute electrostatic field due to a linear charge distribution, Magnetic induction B, Lorentz force law, Biot Savarts law, Magnetic induction due to long straight current carrying conductor, and in the axis of a current carrying circular coil, Amperes Circuital law,itsdifferentialform,Thelawofelectromagneticequations,itsdifferential and integral form, Maxwells electro-magnetic equations and their physical significance, Growth and decay of currents in LR and RC circuits, time constant, alternating currents in RC, RL and LCR circuits, impedance, power factor, resonance.

P-type and N-type semiconductors, PN-Junction as rectifier, Half wave and Full wave rectifiers (Bridge type), efficiency, ripple factor, use of RC, LC, and filters, working of PNP and NPN transistors, transistor configurations in CE and CB circuits and relation between α and β. JFET, its operation and characteristics of V-Icurve.

Text Books:

1. Elements of Properties of Matter D.S. Mathur (S. Chand Publication)-2010
2. Heat and Thermodynamics A.B. Gupta and H.B. Ray (New Central

Book Agency)-2010

3. A Text Books book of oscillations, waves and acoustics(5thed.)M. Ghosh and D. Bhattacharya (S. Chand Publication)-2018
4. Electricity and magnetism- R. Murugeshan (S.Chand publishing)-2017
5. Fundamentals of Electronics-Raskhit and Chattopadhyay (New age International Publication)-2018

Reference Books:

1. Physics of Degree students Vol.I M. Das, P.K. Jena etal (Sri krishna Prakashan)-2006
2. Physics of Degree students Vol.II M. Das, P.K. Jena etal (Sri krishna Prakashan)-2006
3. Waves and Oscillations (2nd ed) N. Subramaniyam and Brij Lal (Vikas Publications)-1994
4. A Text Books book of Sound (2nd ed) - N. Subramaniyam and Brij Lal (S. Chand Publications)-1999

Generic Elective Paper I Lab-

(minimum 6 experiments are to be done)

1. To determine the moment of inertia of a fly wheel.
2. To determine the Young's modulus Y of a wire by Searl's method.
3. To determine the modulus of rigidity of a wire by Maxwell's needle/Torsion Pendulum (Dynamic method).
4. To determine g by bar pendulum.
5. To determine the value of Y of a rubber by using travelling microscope.
6. To determine the Rigidity of modulus by static method.
7. To determine the frequency of a telescope by using Sonometer.
8. Verification of Laws of Vibration of a string by using Sonometer.
9. To compare capacitances using De Sauty bridge.
10. To determine the Law of resistance by using Foster bridge.
11. Compare the specific heat of two liquids by method of Cooling.

Reference Books:

1. Advanced Practical Physics for students, B.L. Flintand H.T.Worsnop, 1971, Asia Publishing House
2. A Laboratory Manual of Physics for Undergraduate Classes, D.P. Khandelwal (1985), Vani Publication
3. A Text Books of Practical Physics, Indu Prakash and Ramakrishna, 11th Edition (2011), Kitab Mahal, NewDelhi

Generic Elective Paper -II

(Optics, Special Theory of Relativity, Atomic Physics, Quantum Mechanics and Nuclear Physics)

UNIT-I

Optics-I: Elementary ideas of monochromatic aberrations and their minimization, chromatic aberration, achromatic combination, Theory of formation of primary and secondary rainbow, condition of interference, coherent sources, Youngs double slit experiment, biprism and measurement of wave length of light of by it, color of thin films and Newton's rings, Fresnel and Fraunhoffer diffraction, diffraction by single slit plane transmission grating.

Optics-II : Electromagnetic nature of light, polarized and unpolarized light, polarization by reflection and refraction, Brewster's Law, Mauls Law, Double refraction, Ordinary and extraordinary rays.

UNIT-II Atomic Physics

Inadequacy of classical physics, brief outline of Rayleigh Jeans theory and Planck's quantum theory of radiation, particle nature of electromagnetic radiation photo electric effect, Compton effect, dual nature of radiation, wave nature of particles, de-Broglie hypothesis, matter wave, wave-particle duality, Davisson- Germer experiment.

Bohr's theory of Hydrogen atom, explanation of Hydrogen Spectra, correction for finite mass of the nucleus, Bohrs correspondence principle, limitations of Bohr's theory, Discrete energy, exchange by atom Frank Hertz experiment.

UNIT-III

Quantum Mechanics : Heisenberg's Uncertainty relation, Time dependent Schrodinger's wave equation in one dimension and three dimensions, The physical interpretation of the wave function, Probability density and probability current density, Equation of continuity, Normalization of the Wave function, Expectation value of an observable, Ehrenfest's theorem. Time independent Schrodinger's wave equation in one dimension particle in a box, energy eigen values and eigen functions.

UNIT-IV

Nuclear Physics : Properties of the nucleus Charge, Size, Spin, Magnetic Moment, Mass, Mass defect, Binding energy, Packing fraction, Nuclear force and its characteristics features, Radioactive decay laws, average life, half life, nuclear fission, nuclear fusion, Linear accelerators, and cyclotron.

Relativity: Galilean transformation, Newtonian relativity and its limitation, Michelson Morley experiment and it's consequence, postulates of special theory of relativity. Lorentz transformation, length contraction, time dilation, relativistic mass and momentum, mass energy relation.

Text Books:

1. University Physics, H. D. Young, R. A. Freedman (Person)-2017
2. Fundamentals of Physics, Resnick, Halliday, Walker (WIley)-2015

Reference Books:

1. A Text Books book of Optics N. Subrahmanyam and Brij Lal (S.Chand Publishing)-2006
2. Introduction to Special Relativity-R. Resnick (John Wiley)-2007
3. Concepts of Modern Physics Arthur Beiser (McGraw Hill)-2017
4. Modern Physics H.S. Mani and G.K.Mehta-2018.

Generic Elective Paper II LAB

(minimum 6 experiments are to be done):

1. Determination of E.C.E. of a Copper by taking 3readings.
2. Determination of Refractive index of the material of a prism using Sodium light.
3. To determine the wavelength of light using plane diffraction grating.
4. To determine the wavelength of light using Newton's ring.
5. Determination of refractive index of (a) glass and (b) liquid by using travelling microscope.
6. To plot the I-D curve and to determine the refractive index of a prism
7. Determination of radius of curvature of a convex/concave mirror by using Kohlrausch's method.
8. T o determine the magnifying power of a given telescope.
9. To Obtain the static characteristics of a P-N-P/N-P-N transistor/ Triode Valve.
10. To determine the reduction factor of a tangent Galvanometer.
11. To study the Variation of magnetic field along the axis of a circular coil carrying current.

Reference Books:

1. Advanced Practical Physics for students, B.L.Flint and H.T. Worsnop, (1971), Asia Publishing House
2. A Laboratory Manual of Physics for Undergraduate Classes, D.P.Khandelwal (1985), Vani Publication
3. A Text Books of Practical Physics, Indu Prakash and Ramakrishna, 11th Edition (2011), Kitab Mahal, New Delhi

Course structure of UG Physics Pass

Semester	Course	Course Name	Credits	Total marks
I	DSC-I	Mechanics	04	75
	DSC-I	Practical	02	25
II	DSC-II	Electricity, Magnetism &EMT	04	75
	DSC-II	Practical	02	25
III	DSC-III	Thermal Physics & Statistical Mechanics	04	75
	DSC-III	Practical	02	25
IV	DSC-IV	Waves and Optics	04	75
	DSC-IV	Practical	02	25
V	DSE-I	Digital and Analog Circuits& Instrumentation	04	75
	DSE-I	Practical	02	25
VI	DSE-II	Elements of Modern Physics	04	75
	DSE-II	Practical	02	25
			36	**600**

PHYSICS PAPERS FOR PASS STUDENTS

Discipline Specific Core – 4 papers

Discipline Specific Elective – 2 papers

Marks per paper –

Practical paper: Mid term : 15 marks, End term : 60 marks, Practical: 25 marks

For non practical paper: Mid term : 20 marks, End term : 80 marks

Total – 100 marks Credit per paper – 6

Teaching hours per paper –

Practical papers:40 hours + 20 hours practical

Non practical papers:50 hours + 10 hours tutorial

Discipline Specific Core Paper 1

MECHANICS

UNIT-I

Rotational Dynamics: Centre of Mass, Motion of CM , Centre of Mass and Laboratory frames. Angular momentum of a particle and system of particles. Principle of conservation of angular momentum. Rotation about a fixed axis. Moment of Inertia. Perpendicular and Parallel Axis Theorems, Routh Rule, Calculation of moment of inertia for cylindrical and spherical bodies. Kinetic energy of rotation. Euler's Equations of Rigid Body motion, Motion involving both translation and rotation. Moment of Inertia of a Flywheel

Non Inertial frames and fictitious Forces: Uniformly Rotating frame, laws of Physics in rotating Coordinate system, centrifugal Forces, Coriolis force and its applications.

UNIT-II

Gravitation: Newton's Law of gravitation. Gravitational field Intensity and Potential,

. Potential and field Applications.

Central Force:

Motion of a particle under a central force field.Two-body problem and its reduction to one-body problem and its solution. Differential Equation of motion with central force and its solution.The first Integrals (two),Concept of power Law Potentials, Kepler's Laws of Planetary motion.

Satellites:. Geosynchronous orbits. Weightlessness.Basic idea of global positioning system (GPS). Physiological effects on astronauts.

UNIT-III

Elasticity: Relation between Elastic constants. Torsion of a right circular cylinder, torsional wire, Bending of Beams, External Bending Moment, flextural rigidity, single Cantilever, double cantilever(weightless cantilever, and with its own weight)

Fluid Properties:

Surface Tension- Express Pressure across a curved membrane, S.T., Quincke's drop, gravity waves and ripple,

Viscocity: Poiseuille's Equation for Flow of a Liquid with corrections.

Unit-IV

Oscillations: Simple Harmonic Oscillations. Kinetic energy, potential energy, total energy and their time-average values. Damped oscillation. Equation of motion and solution, (cases of oscillatory, critically damped and over damped) Forced oscillations: Transient and steady states;

Resonance, sharpness of resonance; power dissipation and Quality Factor. Bar Pendulum, Kater's Pendulum. Composition of two SHMs propagating perpendicularly to each other (with frequency in the ratio 1:1, 2:1) Lissajous figures

Text Books:

1. Mechanics, D.S. Mathur (S. Chand Publishing)-2010
2. Introduction to Special Relativity-R. Resnick (John Wiley)-2007

Reference Books :

1. Mechanics, Berkeley Physics, vol.1, C.Kittel, W. Knight, etal (Tata McGraw-Hill)-2017
2. Physics, Resnick- Halliday and Walker (8/e. 2008,Wiley)
3. Schaum's outline of theoretical Mechanics-M.R. Spiegel (Tata McGraw Hill)-1980
4. Feynman Lectures, Vol. I, R.P.Feynman, R.B.Leighton, M.Sands (Pearson)-2012
5. Mechanics-M.Das, P.K.Jena and R.N. Mishra (Srikrishna Publications)

Discipline Specific Core Paper I LAB

(minimum 6 experiments are to be done)

1. To study the random error in observations.
2. To determine the height of a building using a Sextant.
3. To study the Motion of Spring and calculate (a) Spring constant, (b) **g** and (c) Modulus of rigidity.
4. To determine the Moment of Inertia of a Flywheel.
5. To determine **g** and velocity for a freely falling body using Digital Timing Technique
6. To determine Coefficient of Viscosity of water by Capillary Flow Method (Poiseuille's method).
7. To determine the Young's Modulus of a Wire by Optical Lever Method.
8. To determine the Modulus of Rigidity of a Wire by Maxwell's needle.
9. To determine the elastic Constants of a wire by Searle's method.
10. To determine the value of g using Bar Pendulum.
11. To determine the value of g using Kater's Pendulum.

Reference Books

1. Advanced Practical Physics for students, B. L. Flint and H.T. Worsnop, 1971, Asia Publishing House
2. Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers
3. A Text Book of Practical Physics, I. Prakash & Ramakrishna, 11thEdn, 2011, Kitab Mahal

Discipline Specific Core Paper-1I

ELECTRICITY, MAGNETISM AND EMT

UNIT-I

Vector Analysis: Scalar and Vector product, gradient, divergence, Curl and their significance, Vector Integration, Line, surface and volume integrals of Vector fields, Gauss-divergence theorem and Stoke's theorem of vectors (statement only).

Electrostatics: Electrostatic Field, electric flux, Gauss's theorem of electrostatics. Applications of Gauss theorem- Electric field due to point charge, infinite line of charge, uniformly charged spherical shell and solid sphere, plane charged sheet, charged conductor. Electric potential as line integral of electric field, potential due to a point charge, electric dipole, uniformly charged spherical shell and solid sphere. Calculation of electric field from potential.

UNIT-II

Electrostatic Energy Capacitance of an isolated spherical conductor. Parallel plate, spherical and cylindrical condenser. Energy per unit volume in electrostatic field. Dielectric medium, Polarisation, Displacement vector. Gauss's theorem in dielectrics. Parallel plate capacitor completely filled with dielectric.

UNIT-III

Magnetism:

Magnetostatics: Biot-Savart's law and its applications- straight conductor, circular coil, solenoid carrying current. Divergence and curl of magnetic field. Magnetic vector potential. Ampere's circuital law. Magnetic properties of materials: Magnetic intensity, magnetic induction, permeability, magnetic susceptibility. Brief introduction of dia, para-and ferromagnetic materials.

Electromagnetic Induction: Faraday's laws of electromagnetic induction, Lenz's law, self andmutual inductance, L of single coil, M of two coils. Energy stored in magnetic field.

UNIT-IV

Maxwell`s equations and Electromagnetic wave propagation: Equation of continuity

Of current, Displacement current, Maxwell's equations, Poynting vector, energy density in electromagnetic field, electromagnetic wave propagation through vacuum and isotropic dielectric medium, transverse nature of EM waves, polarization.

Text:

1. Introduction to Electricity and Magnetism – D.C.Tayal (Himalaya Publishing house)-2014

References:

1. Electricity, Magnetism & Electromagnetic Theory- S. Mahajan and Choudhury (Tata McGraw Hill)-2017
2. Feynman Lectures Vol.2, R.P.Feynman, R.B.Leighton, M. Sands (Pearson)-2012
3. Electricity and Magnetism, J.H.Fewkes & J.Yarwood. Vol. I (Oxford Univ. Press)-2016
4. Foundations of Electromagnetic Theory-Ritz and Milford (Pearson)-2008

Discipline Specific Core Paper 1I LAB

(minimum 6 experiments are to be done)

1. To use a Multimeter for measuring (a) Resistances, (b) AC and DC Voltages, (c) DC Current, and (d) checking electrical fuses.

2. Ballistic Galvanometer:

(i) Measurement of charge and current sensitivity

(ii) Measurement of CDR

(iii) Determine a high resistance by Leakage Method

(iv) To determine Self Inductance of a Coil by Rayleigh’s Method.

3. To compare capacitances using De Sauty’s bridge.

4. Measurement of field strength B and its variation in a Solenoid (Determine dB/dx)

5. To study the Characteristics of a Series RC Circuit.

6. To study a series LCR circuit LCR circuit and determine its (a) Resonant frequency, (b) Quality factor
7. To study a parallel LCR circuit and determine its (a) Anti-resonant frequency and (b) Quality factor Q

8. To determine a Low Resistance by Carey Foster's Bridge.
9. To verify the Thevenin and Norton theorems
10. To verify the Superposition, and Maximum Power Transfer Theorems

Reference Books:

1. Advanced Practical Physics for students, B.L.Flint & H.T.Worsnop, 1971, Asia Publishing House.
2. Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers
3. A Text Book of Practical Physics, I. Prakash & Ramakrishna, 11th Ed.2011, Kitab Mahal

Discipline Specific Core Paper III

THERMAL PHYSICS AND STATISTICAL MECHANICS

UNIT-I

Laws of Thermodynamics: Thermodynamic Description of system: Zeroth Law of thermodynamics and temperature. First law and internal energy, conversion of heat into work, Various Thermodynamical Processes, Applications of First Law: General Relation between CP and CV, Work Done during Isothermal and Adiabatic Processes, Compressibility and Expansion Coefficient, Reversible and irreversible processes, Second law and Entropy, Carnot's cycle & theorem, Entropy changes in reversible & irreversible processes, Entropy-temperature diagrams, Third law of thermodynamics, Unattainability of absolute zero.

Thermodynamical Potentials: Enthalpy, Gibbs, Helmholtz and Internal Energyfunctions, Maxwell's relations and applications - Joule-Thomson Effect, Clausius- Clapeyron Equation, Expression for (CP – CV), CP/CV, TdS equations.

UNIT-II

Kinetic Theory of Gases: Derivation of Maxwell's law of distribution of velocities and its experimental verification, Mean free path (Zeroth Order), Transport Phenomena: Viscosity, Conduction and Diffusion (for vertical case), Law of equipartition of energy (no derivation) and its applications to specific heat of gases; mono-atomic and diatomic gases.

UNIT-III

Theory of Radiation: Blackbody radiation, Spectral distribution, Concept of Energy Density, Derivation of Planck's law, Deduction of Wien's distribution law, Rayleigh- Jeans Law, Stefan Boltzmann Law and Wien's displacement law from Planck's law.

UNIT-IV

Classical Statistical Mechanics: Macrostate& Microstate, Elementary Concept of Ensemble, Microcanonical, Canonical and grand canonical ensemble. Phase Space, Entropy and Thermodynamic Probability, Maxwell-Boltzmann Distribution Law, Partition Function, Thermodynamic Functions of an Ideal Gas, Classical Entropy Expression, Gibbs Paradox.

Text:

1. Thermal Physics, A. B. Gupta (Books and allied Ltd)-2010
2. Theory and experiments on thermal Physics, P.K.Chakrabarty (New central book agency limited)-2011

References:

1. Thermal and Statistical Physics – M.Das, P.K. Jena, S. Mishra, R.N.Mishra (Shri Krishna Publication)
2. Heat and Thermodynamics, M.W. Zemansky, Richard Dittman (McGraw-Hill)-2017
3. Thermal Physics, S. Garg, R. Bansal and Ghosh-(Tata McGraw-Hill)-2017

4. Thermodynamics, Kinetic Theory & Statistical Thermodynamics- Sears & Salinger (Narosa)-1998
5. A Treatise on Heat- Meghnad Saha and B.N.Srivastava (The Indian Press)-1973
6. Heat, Thermodynamics and Statistical Physics-- N.Subrahmanyam and Brij Lal (S.Chand Publishing)-2008

Discipline Specific Core Paper 1II LAB

(minimum 6 experiments are to be done)

1. To determine Mechanical Equivalent of Heat, J, by Callender and Barne's constant flow method.
2. Measurement of Planck's constant using black body radiation.
3. To determine Stefan's Constant.
4. To determine the coefficient of thermal conductivity of Cu by Searle's Apparatus.
5. To determine the Coefficient of Thermal Conductivity of Cu by Angstrom's Method.
6. To determine the coefficient of thermal conductivity of a bad conductor by Lee and Charlton's disc method.
7. To determine the temperature co-efficient of resistance by Platinum resistance thermometer.
8. To study the variation of thermo emf across two junctions of a thermocouple with temperature.
9. To record and analyze the cooling temperature of an hot object as a function of time using a thermocouple and suitable data acquisition system
10. To calibrate Resistance Temperature Device (RTD) using Null Method/Off- Balance Bridge

Reference Books:

1. Advanced Practical Physics for students, B.L.Flint&H.T.Worsnop, 1971, Asia Publishing House.
2. A Text Book of Practical Physics, Indu Prakash and Ramakrishna, 11th Edition, 2011, Kitab Mahal, New Delhi.

3. A Laboratory Manual of Physics for Undergraduate Classes, D.P. Khandelwal, 1985, Vani Publication.

Discipline Specific Core Paper IV

WAVES AND OPTICS

UNIT-I

Geometrical optics: Fermat's principle, reflection and refraction at plane interface, Matrix formulation of geometrical Optics. Idea of dispersion.

Cardinal Points and cardinal planes of an optical system, location of cardinal points and cardinal planes of (1) thick lens(2) thin lens and (3) co axial combination of two thin lenses using matrix formulation.

Aberrations: Chromatic Aberration and remedy, Monochromatic Aberration: Spherical

Aberration and remedy, Simple idea on Coma, Distortion, Astigmatism and Curvature and their

Remedy, Huygens eyepiece, Ramsden eye piece and their comparison.

UNIT-II

Wave Motion: Plane and Spherical Waves. Longitudinal and Transverse Waves. Plane Progressive (Travelling) Waves. Wave Equation. Particle and Wave Velocities. Differential Equation. Pressure of a Longitudinal Wave. Energy Transport. Intensity of Wave. Water Waves: Ripple and Gravity Waves.

Wave Optics: Electromagnetic nature of light. Definition and properties of wave front Huygens Principle. Temporal and Spatial Coherence

UNIT-III

Interference-I- Division of amplitude and wave front. Young's double slit experiment. Lloyd's Mirror and Fresnel's Biprism. Phase change on reflection: Stokes' treatment

Interference-II:

Interference in Thin Films: parallel and wedge-shaped films. Fringes of equal inclination (Haidinger Fringes); Fringes of equal thickness (Fizeau Fringes). Newton's Rings: Measurement of wavelength and refractive index.

Interferometer: Michelson Interferometer-(1) Idea of form of fringes (No theory required), Determination of Wavelength, (3) Wavelength Difference, (4) Refractive Index, and

Visibility of Fringes. Fabry- Perot inter ferometer. Fabry Perot etalon with theory.Applications-Determination of wavelength (2) Wavelength difference of two sodium d-lines.

UNIT-IV

Fraunhofer diffraction: Single slit. Circular aperture, Resolving Power of a telescope.

Doubleslit. Multiple slits. Diffraction grating. Resolving power of grating.

Fresnel Diffraction: Fresnel's Assumptions. Fresnel's Half-Period Zones for Plane

Wave. Explanation of Rectilinear Propagation of Light. Theory of a Zone Plate: Multiple Foci of a Zone Plate. Fresnel's Integral, Fresnel diffraction pattern of a straight edge, a slit and a wire.

Text:

1. A text book of Optics – N. Subrahmanyam and Brij Lal (S.Chand Publishing)
2. Optics - Ajoy Ghatak (McGraw Hill)

Reference:

1. Optics-E.Hecht (Pearson)-4th Edition 2008
2. Fundamentals of Optics- F.A. Jenkins and H.E. White (McGraw-Hill)-2017
3. Geometrical and Physical Optics– R.S. Longhurst(Orient Blackswan)-1974
4. The Physics of Vibrations and Waves- H. J. Pain(John Wiley)-2006
5. Principles of Optics – B.K. Mathur, Gopal Printing-1964
6. Principles of Optics-Max Born and Emil Wolf (Cambridge University Press)-7th Edition 1999

Discipline Specific Core Paper IV LAB

(minimum 6 experiments are to be done)

1. To investigate the motion of coupled oscillators
2. To determine the Frequency of an Electrically Maintained Tuning Fork by Melde’s Experiment and to verify λ2 – T Law.
3. To study Lissajous Figures
4. Familiarization with Schuster`s focussing; determination of angle of prism.
5. To determine the Coefficient of Viscosity of water by Capillary Flow Method (Poiseuille’s method).
6. To determine the Refractive Index of the Material of a Prism using Sodium Light.
7. To determine Dispersive Power of the Material of a Prism using Mercury Light
8. To determine the value of Cauchy Constants.
9. To determine the Resolving Power of a Prism.
10. To determine wavelength of sodium light using Fresnel Biprism.
11. To determine wavelength of sodium light using Newton’s Rings.
12. To determine the wavelength of Laser light using Diffraction of Single Slit.
13. To determine wavelength of (1) Sodium and (2) Spectral lines of the Mercury light using plane diffraction Grating
14. To determine the Resolving Power of a Plane Diffraction Grating.
15. To measure the intensity using photosensor and laser in diffraction patterns of single and double slits

Reference Books:

1. Advanced Practical Physics for students, B.L. Flint and H.T.Worsnop, 1971, Asia Publishing House.
2. Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers
3. A Text Book of Practical Physics, Indu Prakash and Ramakrishna, 11th Edition, 2011, Kitab Mahal, New Delhi.
4. A Laboratory Manual of Physics for undergraduate classes, D.P. Khandelwal, 1985, Vani Publication

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Discipline Specific Elective (DSE) - Pass

(two papers are to be selected)

Discipline Specific Elective Paper –I

DIGITAL AND ANALOG CIRCUITSAND INSTRUMENTATION

UNIT-1:

Digital Circuits

Difference between Analog and Digital Circuits. Binary Numbers. Decimal to Binary and Binary to Decimal Conversion, AND, OR and NOT Gates (Realization using Diodes and Transistor). NAND and NOR Gates as Universal Gates. XOR and XNOR Gates.

De Morgan's Theorems. Boolean Laws. Simplification of Logic Circuit using Boolean Algebra. Fundamental Products. Minterms and Maxterms. Conversion of a Truth Table into an Equivalent Logic Circuit by (1) Sum of Products Method and (2) Karnaugh Map.

UNIT-II

Semiconductor Devices and Amplifiers:

Barrier Formation in PN Junction Diode. Qualitative Idea of Current Flow Mechanism in Forward and Reverse Biased Diode. PN junction and its characteristics. Static and Dynamic Resistance. Principle and structure of (1) LEDs (2) Photodiode (3) Solar Cell.
Power Supply: Half-wave Rectifiers. Centre-tapped and Bridge Full-wave Rectifiers Calculation of Ripple Factor and Rectification Efficiency, Basic idea about capacitor filter, Zener Diode and Voltage Regulation

UNIT-III

BJT and Amplifiers

Bipolar Junction transistors: n-p-n and p-n-p Transistors. Characteristics of CB, CE and CC Configurations. Current gains α and β. Relations between α and β. Load Line analysis of Transistors. DC Load line and Q-point. Active, Cutoff, and Saturation Regions. Voltage Divider Bias Circuit for CE Amplifier. h-parameter Equivalent Circuit. Analysis of a single-stage CE amplifier using Hybrid Model. Input and Output Impedance. Current, Voltage and Power Gains. Class A, B, and C Amplifiers. Class B Push Pull Amplifier.
Feedback in Amplifiers ,Positive and Negative feedback,Effects of Feedback Oscillators:Hartley and Colpitt’s Oscillator

UNIT-IV:

Operational Amplifiers (Black Box approach) :

Characteristics of an Ideal and Practical Op-Amp (IC 741), Open-loop& Closed-loop Gain. CMRR, concept of Virtual ground. Applications of Op-Amps: (1) Inverting and Non-inverting Amplifiers, (2) Adder, (3) Subtractor, (4) Differentiator, (5) Integrator, (6) Zero Crossing Detector.

Instrumentations:

Introduction to CRO: Block Diagram of CRO. Applications of CRO: (1) Study of Waveform, (2) Measurement of Voltage, Current, Frequency, and Phase Difference.

Text:

1. Electronics: Fundamentals and applications – D. Chattopadhyay and P.C.Rakshit (New Age International)-2018
2. Digital Principles and Applications - A.P. Malvino, D.P.Leach and Saha (Tata McGraw)-2017
3. OP-Amps and Linear Integrated Circuit, R. A. Gayakwad, 4th edition, 2000, Prentice Hall-2015

References :

1. Principles of Electronics – V.K.Mehta and Rohit Mehta (S.Chand Publishing)-2014
2. Hand book of electronics – Gupta Kumar (Pragati Prakashan)-2016
3. Digital Logic and Computer design – M. Morris Mano (Pearson)-2016
4. Text book of Electronics – B. B. Swain (Kitab Mahal)
5. Concepts of Electronics – D.C.Tayal (Himalaya Publishing house)-2018
6. Fundamentals of Digital Circuits, A. Anand Kumar, 2nd Edition, 2009, PHI Learning Pvt. Ltd-2016

Discipline Specific Elective Paper –I LAB

DIGITAL AND ANALOG CIRCUITS AND INSTRUMENTS

(minimum 6 experiments are to be done)

1. To measure (a) Voltage, and (b) Frequency of a periodic waveform using a CRO
2. To verify and design AND, OR, NOT and XOR gates using NAND gates.

3. To minimize a given logic circuit.
4. Half adder, Full adder and 4-bit Binary Adder.
5. Adder- Subtractor using Full Adder I.C.
6. To design an astable multivibrator of given specifications using 555 Timer.
7. To design a monostable multivibrator of given specifications using 555 Timer.
8. To study IV characteristics of PN diode, Zener and Light emitting diode
9. To study the characteristics of a Transistor in CE configuration.
10. To design a CE amplifier of a given gain (mid-gain) using voltage divider bias.
11. To design an inverting amplifier of given gain using Op-amp 741 and study its frequency response.
12. To design a non-inverting amplifier of given gain using Op-amp 741 and study its Frequency Response.
13. To study a precision Differential Amplifier of given I/O specification using Opamp.
14. To investigate the use of an op-amp as a Differentiator
15. To design a Wien Bridge Oscillator using an op-amp.

Reference Books:

1. Basic Electronics: A text lab manual, P.B.Zbar, A.P.Malvino, M.A.Miller, 1994, Mc-Graw Hill.
2. Electronics: Fundamentals and Applications, J.D. Ryder, 2004, Prentice Hall.
3. OP-Amps and Linear Integrated Circuit, R. A. Gayakwad, 4th edition, 2000, Prentice Hall.
4. Electronic Principle, Albert Malvino, 2008, Tata Mc-Graw Hill.

Discipline Specific Elective Paper II

ELEMENTS OF MODERN PHYSICS

UNIT-I

Planck's quantum, Planck's constant and Compton scattering. De Broglie experiment. light as a collection of photons; Photoelectric effect , wavelength and matter waves; Davisson-Germer Experiment

Problems with Rutherford model- instability of atoms and observation of discrete atomic spectra; Bohr's quantization rule and atomic stability; calculation of energy levels for hydrogen like atoms and their spectra.

UNIT-II

Position measurement- gamma ray microscope thought experiment; Wave-particle duality, Heisenberg uncertainty principle- impossibility of a particle following a trajectory; Estimating minimum energy of a confined particle using uncertainty principle; Energy-time uncertainty principle.

Two slit interference experiment with photons, atoms & particles; linear superposition principle as a consequence; Matter waves and wave amplitude; Schrodinger equation for non-relativistic particles; Momentum and Energy operators; stationary states; physical interpretation of wave function, probabilities and normalization; Probability and probability current densities in one dimension.

UNIT-III

One dimensional infinitely rigid box- energy eigen values and eigen functions, normalization; Quantum dot as an example; Quantum mechanical scattering and tunnelling in one dimension - across a step potential and across a rectangular potential barrier.

Size and structure of atomic nucleus and its relation with atomic weight; Impossibility of an electron being in nucleus as a consequence of the uncertainty principle. Nature of nuclear force, NZ graph, semi-empirical mass formula and binding energy

UNIT-IV

Radioactivity: stability of nucleus; Law of radioactive decay; Mean life and half-life; α decay; β decay - energy released, spectrum and Pauli's prediction of neutrino; γ-ray emission.

Fission and fusion - mass deficit, relativity and generation of energy; Fission - nature of fragments and emission of neutrons. Nuclear reactor: slow neutrons interacting with Uranium 235; Fusion and thermonuclear reactions.

Text:

1. Concepts of Modern Physics – Arthur Beiser (McGraw Hill)-2017
2. Modern Physics – Murugeshan and Sivaprasad (S.Chand)-2016

Reference:

1. Quantum Mechanics: Theory & Applications, A.K.Ghatak & S.Lokanathan, (Macmillan)
2. Introduction to Quantum Mechanics, David J. Griffith (Pearson)-2015
3. Theory and Problems of Modern Physics, Schaum`s outline, R. Gautreau and W.Savin- (Tata McGraw-Hill)-1978
4. Modern Physics- Serway and Jewett (CENGAGE Learnings)-2017
5. Physics of Atoms and Molecules – Bransden and Joachin (Pearson India)-2003

6. Quantum Mechanics– Satya Prakash (Pragati Prakashan)-2012
7. Atomic and Nuclear Physics-A.B.Gupta (New Central)

DSE II LAB: ELEMENTS OF MODERN PHYSICS

(minimum 6 experiments are to be done)

1. To determine value of Boltzmann constant using V-I characteristic of PN diode.
2. To determine work function of material of filament of directly heated vacuum diode.
3. To determine the ionization potential of mercury.
4. To determine value of Planck's constant using LEDs of at least 4 different colours.
5. To determine the wavelength of H-alpha emission line of Hydrogen atom.
6. To determine the absorption lines in the rotational spectrum of Iodine vapour.
7. To study the diffraction patterns of single and double slits using laser and measure its intensity variation using Photo sensor & compare with incoherent source – Na.
8. Photo-electric effect: photo current versus intensity and wavelength of light; maximum energy of photo-electrons versus frequency of light
9. To determine the value of e/m by (a) Magnetic focusing or (b) Bar magnet.
10. To setup the Millikan oil drop apparatus and determine the charge of an electron.

Reference Books:

1. Advanced Practical Physics for students, B.L. Flint and H.T. Worsnop, 1971, Asia Publishing House.
2. Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers
3. A Text Book of Practical Physics, Indu Prakash and Ramakrishna, 11th Edition, 2011, Kitab Mahal, New Delhi.

SKILL ENHANCEMENT COMPULSORY COURSES (SECC)

Optional for SECC II paper

Skill Enhancement Compulsory Courses (SECC Option-I)

APPLIED OPTICS

The quest to understand the 'nature of light' is a favourite inquiry of mankind since ancient times. By the advent of lasers, holography, and optical fibres in twentieth century the optics now-a-days finds application in several branches of science and engineering. This paper provides the conceptual understanding of these branches of modern optics to the students.

Theory includes only qualitative explanation. Minimum three experiments should be performed covering minimum three sections.

Unit-I

(i) Photo-sources and Detectors

Lasers: an introduction, Planck's radiation law (qualitative idea), Energy levels, Absorption process, Spontaneous and stimulated emission processes, Theory of laser action, Population of energy levels, Einstein's coefficients and optical amplification, properties of laser beam, Ruby laser, He-Ne laser, and semiconductor lasers; Light Emitting Diode (LED) and photo-detectors.

(ii) Elementary ideas of Fourier Optics

Concept of Spatial frequency filtering, Fourier transforming property of a thin lens.

Unit-II

Holography

Basic principle and theory: coherence, resolution, Types of holograms, white light reflection hologram, application of holography in microscopy, interferometry, and character recognition.

Photonics: Fibre Optics

(ii) Photonics: Fibre Optics

Optical fibres: Introduction and historical remarks, Total Internal Reflection, Basic characteristics of the optical fibre: Principle of light propagation through a fibre, the coherent bundle, The numerical aperture, Attenuation in optical fibre and attenuation limit; Single mode and multimode fibres, Fibre optic sensors: Fibre Bragg Grating.

Skill Enhancement Compulsory Courses (SECC Option-I) LAB

Minimum three experiments should be performed covering minimum two sections.

Experiments on Lasers:

1. To determine the grating radial spacing of the Compact Disc (CD) by reflection using He-Ne or solid state laser.
2. To find the width of the wire or width of the slit using diffraction pattern obtained by a He-Ne or solid state laser.
3. To find the polarization angle of laser light using polarizer and analyzer
4. To determine the wavelength and angular spread of laser light by using plane diffraction grating.

Experiments on Semiconductor Sources and Detectors:

1. V-I characteristics of LED
2. Study the characteristics of solid state laser
3. Study the characteristics of LDR
4. Characteristics of Photovoltaic Cell/ Photodiode.
5. Characteristics of IR sensor

Experiments on Fibre Optics

1. To measure the numerical aperture of an optical fibre
2. To measure the near field intensity profile of a fibre and study its refractive index profile

Reference Books:

1. LASERS: Fundamentals & applications, K.Thyagrajan & A.K.Ghatak, 2010, Tata McGraw Hill
2. Introduction to Fiber Optics, A. Ghatak & K. Thyagarajan, Cambridge University Press-2016
3. Fibre optics through experiments, M.R.Shenoy, S.K.Khijwania, et.al. 2009, Viva Books
4. Optical Electronics, Ajoy Ghatak and K. Thyagarajan, 2011, Cambridge University Press
5. Optoelectronic Devices and Systems, S.C. Gupta, 2005, PHI Learning Pvt. Ltd.

Skill Enhancement Compulsory Courses (SECC Option-II)

RENEWABLE ENERGY AND ENERGY HARVESTING

The aim of this course is not just to impart theoretical knowledge to the students but to provide them with exposure and hands-on learning wherever possible

Unit-I

Fossil fuels and Alternate Sources of energy: Fossil fuels and nuclear energy, their limitation, need of renewable energy, non-conventional energy sources. An overview of developments in Offshore Wind Energy, Tidal Energy, Wave energy systems, Ocean Thermal Energy Conversion, solar energy, biomass, biochemical conversion, biogas generation, geothermal energy tidal energy, Hydroelectricity.

Solar energy: Solar energy, its importance, storage of solar energy, solar pond, non plate collector, solar distillation, solar cooker, solar green houses, solar cell, absorption air conditioning. Need and characteristics of photovoltaic (PV) systems, PV models and equivalent circuits, and sun tracking systems.

Unit-II

Wind Energy harvesting: Fundamentals of Wind energy, Wind Turbines and different electrical machines in wind turbines, Power electronic interfaces, and grid interconnection topologies.

Ocean Energy: Ocean Energy Potential against Wind and Solar, Wave Characteristics and Statistics, Wave Energy Devices.

Tide characteristics and Statistics, Tide Energy Technologies, Ocean Thermal Energy, Osmotic Power, Ocean Bio-mass.

Geothermal Energy: Geothermal Resources, Geothermal Technologies.

Hydro Energy: Hydropower resources, hydropower technologies, environmental impact of hydro power sources.

Skill Enhancement Compulsory Courses (SECC Option-II)-LAB

Demonstrations and Experiments

1. Demonstration of Training modules on Solar energy, wind energy, etc.
2. Conversion of vibration to voltage using piezoelectric materials
3. Conversion of thermal energy into volta geusing thermoelectric modules.

Reference Books:

1. Non-conventional energy sources - G.D Rai - Khanna Publishers, New Delhi-2004
2. Solar energy - M P Agarwal - S Chand and Co. Ltd-1983
3. Solar energy - Suhas P Sukhatime Tata McGraw - Hill Publishing Company Ltd-2017
4. Godfrey Boyle and J K Nayak “Renewable Energy, Power for a sustainable future”, 2004, Oxford University Press, in association with The Open University.
5. P Jayakumar, Solar Energy: Resource Assesment Handbook, 2009
6. The Art and Science of Photovoltaic J.Balfour, M. Shaw and S. Jarosek, Photovoltaics, Lawrence J Goodrich (USA)-Jones and Bartlett learning-2013

Faculty Training to be imparted in the following Topics

Computational Physics Lab—C, C++,

Scilab Programming for Core I,C-V,C-VIII,C-XI and C-XIII Practicals.

2. Digital Electronics. Theory and Practicals.

3. Quantum Mechanics Problem Solving

4. Solid State Physics- Elementary Band Theory and Superconductivity

5. Statistical Mechanics.-Quantum Distribution

6. Nanotechnology.

ESSENTIAL LABORATORY EQUIPMENT RECOMMENDED :

Every college must have CRO, Function generator, Laser and Logic Gate packages.

STATE MODEL SYLLABUS FOR UNDER GRADUATE
COURSE IN POLITICAL SCIENCE
(Bachelor of Arts Examination)

UNDER
CHOICE BASED CREDIT SYSTEM

Course structure of UG Political Science Honours

Semester	Course	Course Name	Credits	Total marks
I	AECC-I	AEC-I	04	100
	C-I	Understanding Political Theory	06	100
	C-II	Constitutional Government and Democracy in India	06	100
	GE-I	Feminism: Theory and Practice	06	100
			22	
II	AECC-II	AEC-II	4	100
	C-III	Political Theory-Concepts and Debates	06	100
	C-IV	Political Process in India	06	100
	GE-II	Governance: Issues and Challenges	06	100
			22	
III	C-V	Introduction to Comparative Government and Politics	06	100
	C-VI	Introduction to Public Administration	06	100
	C-VII	Perspectives on International Relations	06	100
	GE-III	Gandhi and the Contemporary World	06	100

	SEC-I	SEC-I(to be selected by the University/College from the Repertoire of SEC courses)	04	100
			28	
IV	C-VIII	Political Processes and Institutions in Comparative Perspective	06	100
	C-IX	Public Policy and Administration in India	06	100
	C-X	Global Politics	06	100
	GE-IV	United Nations and Global Conflicts	06	100
	SEC-II	SEC-II (to be selected by the University/College from the Repertoire of SEC courses)	04	100
			28	

Semester	Course	Course Name	Credits	Total marks
V	C-XI	Western Political Philosophy	06	100
	C-XII	Indian Political Thought(Ancient & Medieval)	06	100
	DSE-I	Introduction to Human Rights	06	100
	DSE-II	Development Process and Social Movements in Contemporary India	06	100
			24	
VI	C-XIII	Contemporary Political Philosophy	06	100

	C-XIV	Modern Indian Political Thought	06	100
	DSE-III	India’s Foreign Policy in a Changing world	06	100
	DSE-IV	Women, Power and Politics	06	100
	OR			
	DSE-IV	Dissertation	06	100*
			24	

Discipline Specific Elective Papers: (Credit: 06 each) (4 papers to be selected by students of Political Science Honours): DSE 1-IV

1. Human Rights in a Comparative Perspective
2. Development Process and Social Movements in Contemporary India (PROJECT)
3. India’s Foreign Policy in a Globalizing world
4. Women, Power and Politics
5. Project *Dissertation (can be opted as alternative of DSE-IV only and of 6 credits. **Dissertation content: 50, Seminar: 30, Viva: 20) as per regulation**

POLITICAL SCIENCE

HONOURS PAPERS:

Core course – Designated as CI to C XIV i.e. 14 papers
Discipline Specific Elective (DSE) – 4 papers
Generic Elective (GE) for non Public Administration students– 4 papers. Incase University offers 2 subjects as GE, then papers 1 and 2 will be the GE paper.

Marks per paper - Midterm: 20 marks, End term : 80 marks, Total – 100 marks

Credit per paper – 6
Teaching hours per paper – 50 hours + 10 hours tutorial

Core Paper I (C- I)

UNDERSTANDING POLITICAL THEORY

Introduction: This course is divided into two sections. Section 'A' introduces the students to the idea of political theory, its history and approaches and an assessment of its critical and contemporary trends. Section 'B' is designed to reconcile political theory and practices through reflections on the ideas and practices related to democracy.

UNIT-1: Introducing Political Theory

(i) What is Politics: Theorizing the 'Political'
(ii) Traditions of Political Theory: Liberal, Marxist, Anarchist and Conservative
(iii)Approaches to Political Theory: Normative, Historical, Behavioural and Post-behavioural

UNIT-II: Critical and Contemporary Perspectives in Political Theory

(i) Theories of Feminism: Feminist and Postmodern
(ii) Modernism and Post -modernism

UNIT-III: Political theory and Practice

(i) Democracy: Liberal and Marxist.
(ii) Procedural Democracy and its critique

UNIT-IV: The Grammar of Democracy

(i) Deliberative Democracy
(ii) Participation and Representation

Text Books

- Bhargava, R. and Ashok Acharya (2008) '*Political Theory: An Introduction.* New Delhi: Pearson Longman.
- Vinod, M.J and Deshpande, Meena (2013) 'Contemporary Political Theory', PHI, New Delhi
- Verma, S. P. (1996) 'Modern Political Theory', Vikash Publishing, 3rd Reprint, New Delhi.
- Ramaswamy, Sushila (2010), 'Political Theory: Ideas and Concepts', PHI Learning, New Delhi
- Bellamy, R. (1993), (ed.) 'Theories and Concepts of Politics'. New York: Manchester University Press.

- Marsh, D. and Stoker, G. (eds.) ‘Theory and Methods in Political Science’. London: Macmillan.
- Heywood, Andrew (2016) (Reprint) ‘Political Theory: An Introduction’, Palgrave, UK.

Further Reading

- Kukathas, Ch. and Gaus, G. F. (2004) (eds.) ‘Handbook of Political Theory’. New Delhi, Sage.
- Vincent, A. (2004) ‘The Nature of Political Theory’. New York: Oxford University Press.
- Mckinnon, C. (ed.) (2008) ‘Issues in Political Theory’, New York: Oxford University Press.
- Arblaster, A. (1994) ‘Democracy’, (2nd Edition), Buckingham: Open University Press.
- Parekh, B. (2000), ‘Rethinking Multiculturalism: Cultural Diversity and Political Theory’, Macmillan Press, London.

Core Paper II(C-II)

CONSTITUTIONAL GOVERNMENT AND DEMOCRACY IN INDIA

Introduction: This course acquaints students with the Constitutional design of state structures and institutions, and their actual working over time. The Indian Constitution accommodates conflicting impulses (of liberty and justice, territorial decentralization and a strong union, for instance) within itself. The course traces the embodiment of some of these conflicts in constitutional provisions, and shows how these have played out in political practice. It further encourages a study of state institutions in their mutual interaction, and in interaction with the larger extra-constitutional environment.

UNIT-I: The Constituent Assembly and the Constitution

i) Formation and working of the Constituent Assembly
ii) The Philosophy of the constitution: The Preamble and its Features.
iii) Fundamental Rights, Directive Principles of State Policy, Fundamental Duties

UNIT-II: Organs of Government

i) The Legislature and the Executive
ii) The Judiciary: Supreme Court and High Courts

UNIT-III: Federalism

i) Federalism: Centre-State relations
ii) Recent trends in federalism

UNIT-IV: Decentralization

i) Panchayati Raj Institutions: Composition, Powers and functions of Gram Panchayat, Panchayat Samiti and Zilla Parishad.
ii) Municipalities: Composition Powers and function of Municipal Corporation, Municipal Council and Notified Area Council

Text Books

- G. Austin, (2010) ‘The Indian Constitution: Cornerstone of a Nation’, New Delhi, Oxford

University Press, 15th print.

- R. Bhargava (ed.) ‘Politics and Ethics of the Indian Constitution’, New Delhi, Oxford University Press.
- D. Basu, (2012) ‘Introduction to the Constitution of India’, New Delhi, Lexis Nexis.
- S. Chaube, (2009) ‘The Making and Working of the Indian Constitution’, New Delhi, National Book Trust.
- G. Austin, (2000) ‘Working a Democratic Constitution’, New Delhi, Oxford University Press.
- B. Shankar and V. Rodrigues, (2011), ‘The Indian Parliament: A Democracy at Work’, New Delhi: Oxford University Press.
- P. Mehta and N. Jayal (2010) (eds.) ‘The Oxford Companion to Politics in India’, New Delhi, Oxford University Press.

Reference Books

- Mehra and G. Kueck (eds.) ‘The Indian Parliament: A Comparative Perspective’, New Delhi, Konark.
- B. Kirpal et.al (eds.) ‘Supreme but not Infallible: Essays in Honour of the Supreme Court of India’, New Delhi, Oxford University Press.
- L. Rudolph and S. Rudolph, (2008) ‘Explaining Indian Institutions: A Fifty Year Perspective, 1956-2006’, Volume 2, New Delhi, Oxford University Press.
- M. Singh, and R. Saxena (2011) (eds.), ‘Indian Politics: Constitutional Foundations and Institutional Functioning’, Delhi: PHI Learning Private Ltd.
- K. Roy, C. Saunders and J. Kincaid (2006) (eds.) ‘A Global Dialogue on Federalism’, Volume 3Montreal, Queen’s University Press

Core Paper III (C - III)

POLITICAL THEORY-CONCEPTS AND DEBATES

Introduction: This course is divided into two sections. Section A helps the student familiarize with the basic normative concepts of political theory. Each concept is related to a crucial political issue that requires analysis with the aid of our conceptual understanding. This exercise is designed to encourage critical and reflective analysis and interpretation of social practices through the relevant conceptual tool kit. Section B introduces the students to the important debates in the subject. These debates prompt us to consider that there is no settled way of understanding concepts and that in the light of new insights and challenges, besides newer ways of perceiving and interpreting the world around us, we inaugurate new modes of Political debates.

UNIT-I: Importance of Freedom

(i) Negative Freedom and Positive Freedom, Freedom of belief, expression and dissent
(ii) Equality: Meaning and Types, Egalitarianism: Social Exclusion & Affirmative action

UNIT-II: Indispensability of Justice

(i) Justice: Meaning and Types
(ii) Procedural, Distributive and Global Justice.

UNIT-III: The Universality of Rights

(i) Rights: Natural, Moral and Legal
(ii) Three Generations of Rights

UNIT-IV: Major debates

(i) Political obligation: Grounds
(ii) Cultural Relativism and Multiculturalism.

Text Book

- Verma, S. P. (1996) ‘Modern Political Theory’, Vikash Publishing, 3rd Reprint, New Delhi.
- Vinod, M.J and Deshpande, Meena (2013) Contemporary Political Theory, PHI, New Delhi
- Ramaswamy, Sushila (2010), ‘Political Theory: Ideas and Concepts’, PHI Learning, New Delhi
- Bellamy, R. (1993), (ed.) *Theories and Concepts of Politics*. New York: Manchester University Press.
- Marsh, D. and Stoker, G. (eds.) ‘Theory and Methods in Political Science’. London, Macmillan.
- Heywood, Andrew (2016) (Reprint), ‘Political Theory: An Introduction’, Palgrave, UK.

Reference Books

- Bellamy, Richard and Mason, Andrew (1993) (eds.) ‘Political Concepts’ Manchester, Manchester University Press.
- Knowles, Dudley. (2001) ‘Political Philosophy’, London, Routledge.
- Mckinnon, Catriona (2008) (ed.) ‘Issues in Political Theory’, New York: Oxford University Press.
- Swift, Adam. (2001) ‘Political Philosophy: A Beginners Guide for Student’s and Politicians’, Cambridge, Polity Press.
- La Follett, Hugh (2003) (ed.) ‘The Oxford Handbook of Practical Ethic’. New York, Oxford University Press.
- Knowles, Dudley. (2001) ‘Political Philosophy’, London, Routledge.

Core Paper IV (C-IV)

POLITICAL PROCESS IN INDIA

Introduction: Actual politics in India diverges quite significantly from constitutional legal rules. An understanding of the political process thus calls for a different mode of analysis - that offered by political sociology. This course maps the working of ‘modern’ institutions, premised on the existence of an individuated society, in a context marked by communitarian solidarities, and their mutual transformation thereby. It also familiarizes students with the working of the Indian state, paying attention to the contradictory dynamics of modern state power.

Political Parties, the Party system and Determinants of Voting Behaviour

UNIT-I: Indian party system

(i) Party System in India: Features and Trends
(ii) Voting Behaviour and Its determinants: Caste, Class, Gender and Religion.
(iii) Election Commission: Constitution and Functions, Electoral Reforms

UNIT-II: Regionalism, Religion and Politics

(i) Regionalism: Causes and its trends,
(ii) Secularism and Communalism: Debates

UNIT-III: Caste and Politics

i) Caste and Politics: Politicisation of Caste
ii) Affirmative Action: Policies, Women, Caste and Marginalized Class

UNIT-IV: The Changing Nature of the India State

(i) Developmental and Welfare Dimensions
(ii) Coercive Dimension

Text books

- Kaviraj, Sudipta(2009) 'Politics in India', Oxford University Press, New Delhi
- Kohli, Atul (2004) (ed.) 'The Success of India's Democracy', New Delhi, Cambridge University Press.
- Kothari,R (1970) 'Caste in Indian Politics', Delhi, Orient Longman.
- M. John, (ed) (2008) 'Women in India: A Reader, Penguin , India
- P. Brass, (1999) 'The Politics of India since Independence, New Delhi, Cambridge University Press and Foundation Books.
- P. Mehta and N. Jayal (2010) (eds.) 'The Oxford Companion to Politics in India', New Delhi, Oxford University Press.
- Z. Hasan (2002) (ed.) 'Parties and Party Politics in India', New Delhi: Oxford University Press.
- Z. Hasan, E. Sridharan and R. Sudarshan (2002) (eds.) 'India's Living Constitution: Ideas, Practices, Controversies', New Delhi, Permanent Black.

Reference Books

- N. Menon and A. Nigam, (2007) 'Power and Contestation: India since 1989', London, Fernwood Publishing, Halifax and Zed Books.
- R. Vora and S. Palshikar (eds.) 'Indian Democracy: Meanings and Practices', New Delhi, Sage.
- Shah, G (ed.) 'Social Movements and the State', New Delhi, Sage Publications.
- P. deSouza and E. Sridharan (eds.) 'India's Political Parties', New Delhi, Sage Publications.
- A S. Ganguly, L. Diamond and M. Plattner (eds.) 'The State of India's Democracy', Baltimore,

John Hopkins University Press.

Core Paper V (C - V)

INTRODUCTION TO COMPARATIVE GOVERNMENT AND POLITICS

Introduction: This is a foundational course in comparative politics. The purpose is to familiarize students with the basic concepts and approaches to the study of comparative politics. More specifically the course will focus on examining politics in a historical framework while engaging with various themes of comparative analysis in developed and developing countries.

UNIT-1: Understanding Comparative Politics

(i) Meaning, Nature, scope and Evolution
(ii) Approaches to the study of Comparative Politics

UNIT-II: Historical context of modern government

(i) Capitalism: meaning and development
(ii) Globalization: Features & impact

UNIT-III: Historical context of Modern Government- II

(i) Socialism: Meaning, Types and its growth
(ii) Rise and Decline of Communism as a Ruling Ideology
(iv) Colonialism and decolonization: meaning, context, forms of colonialism

UNIT-IV: Themes of Comparative Politics

(i) A comparative study of Governments of USA & China
(ii) US: President, Congress, Supreme Court
(iii) China: People’s Congress, National Assembly, Role of Communist Party of China

Text books:

- Bhagwan, Vishnoo et al (2012) ‘World Constitutions’, Sterling Publishers , New Delhi
- Chilcote, Ronald (1994) ‘Theories of Comparative Politics: The Search for a Paradigm Reconsidered’, Westview Press, Boulder.
- G. Ritzer, (2002) ‘Globalization*:* A Basic Text’. London, Wiley-Blackwell.
- Huntington, Samuel, (1968) ‘Political Order in Changing Societies’, Yale University Press, New Haven.
- Kapur, A.C and K.K. Mishra (2010) ‘Select Constitutions’, S. Chand, New Delhi
- Suresh. R(2010), ‘Economy and Society : Evolution of Capitalism’, Sage , New Delhi

Reference Books

- P. Burnell, et. al, ‘Politics in the Developing World’. New Delhi: Oxford University Press,
- J. McCormick, (2007) ‘Comparative Politics in Transition’, UK, Wadsworth.

- L. Barrington et. al (2010) ‘Comparative Politics - Structures and Choices’, Boston, Wadsworth,
- M. Kesselman, J. Krieger and William (2010), ‘Introduction to Comparative Politics: Political Challenges and Changing Agendas’, UK, Wadsworth.
- J. Kopstein and M. Lichbach. (eds.) ‘Comparative Politics: Interest, Identities and Institutions in a Changing Global Order’. Cambridge: Cambridge University Press.

Core Paper VI (C-VI)

INTRODUCTION TO PUBLIC ADMINISTRATION

Introduction: The course provides an introduction to the discipline of public administration. This paper encompasses public administration in its historical context with an emphasis on the various classical and contemporary administrative theories. The course also explores some of the recent trends, including feminism and ecological conservation and how the call for greater democratization is restructuring public administration. The course will also attempt to provide the students a comprehensive understanding on contemporary administrative developments.

UNIT-1 : Public Administration as a Discipline

(i) Meaning, Scope and Significance of the Discipline,Public and Private Administration
(ii) Evolution of Public Administration

UNIT-II: Theoretical Perspectives

Classical Theories

(i) Scientific management (F. W. Taylor), Ideal-type bureaucracy (Max Weber)
(ii) Administrative Management (Gullick, Urwick and Fayol)

UNIT-III: Neo-Classical and Contemporary Theories

(i) Human Relations theory (Elton Mayo), Rational decision-making (Herbert Simon)
(ii) Ecological approach (Fred Riggs), Innovation and Entrepreneurship (Peter Drucker)

UNIT-IV: Public Policy and Major Approaches in Public Administration

(i) Public Policy-Concept and approaches, Formulation, implementation and evaluation
(ii) New Public Administration, New Public Management, New Public Service Approach
(iii) Good Governance, Feminist Perspectives in Governance

Text Books

- B. Chakrabarty and M. Bhattacharya (eds), ‘Administrative Change and Innovation: A Reader’, New Delhi, Oxford University Press.
- Basu, Rumki, (2014) ‘Public Administration: Concepts and Theories’, Sterling Publishers, New Delhi

- D. Ravindra Prasad, Y. Pardhasaradhi, V. S. Prasad and P. Satyrnarayana, (2010) (eds.) 'Administrative Thinkers', Sterling Publishers.
- J. Shafritz, and A. Hyde, (2004) (eds.) 'Classics of Public Administration', 5th Edition. Belmont, Wadsworth.
- M. Bhattacharya, (2008) 'New Horizons of Public Administration', 5th Revised Edition. New Delhi, Jawahar Publishers.
- M. Bhattacharya, (2011) 'New Horizons of Public Administration', New Delhi: Jawahar Publishers.
- M. Bhattacharya, (2012) 'Restructuring Public Administration: A New Look', New Delhi, Jawahar Publishers,
- N. Henry, (2013) 'Public Administration and Public Affairs', 12th edition. New Jersey, Pearson,
- Shafritz, J. and Hyde, A. , (1997) (eds.) 'Classics of Public Administration', 4th Edition. Forth Worth, Hartcourt Brace, TX.

Reference Books

- B. Chakrabarty and M. Bhattacharya (2003) (eds.), 'Public Administration: A Reader', New Delhi, Oxford University Press.
- B. Chakrabarty, (2007) 'Reinventing Public Administration: The India Experience'. New Delhi, Orient Longman,
- B. Miner, (2006) 'Organisational Behaviour: Historical Origins and the Future'. New York,
- F. Riggs, (1964) 'Administration in Developing Countries: The Theory of Prismatic Society'. Boston, Houghton Miffin.
- F. Riggs, (1961) 'The Ecology of Public Administration', Part 3, New Delhi, Asia Publishing House.
- M. Bhattacharya, (2006) 'Social Theory, Development Administration and Development Ethics', New Delhi, Jawahar Publishers.
- Nivedita Menon (1999), (ed.) 'Gender and Politics', New Delhi, Oxford University Press.
- Peter F. Ducker, (2006) 'The Practice of Management', Harper Collins.
- S. Maheshwari,(2009) 'Administrative Thinkers', New Delhi: Macmillan

Core Paper VII (C-VII)

PERSPECTIVES ON INTERNATIONAL RELATIONS

Introduction: This paper seeks to equip students with the basic intellectual tools for understanding International Relations. It introduces students to some of the most important theoretical approaches for studying international relations. The course begins by historically contextualizing the evolution of the international state system before discussing the agency-structure problem through the levels-of-analysis approach. After having set the parameters of the debate, students are introduced to different theories in International Relations. It provides a fairly comprehensive overview of the major political developments and events starting from the twentieth century. Students are expected to learn about the key milestones in world history and equip them with the tools to understand and analyze the same from different perspectives. A key objective of the course is to make students aware of the implicit

Euro-centricism of International Relations by highlighting certain specific perspectives from the Global South.

UNIT-I: Studying International Relations

(i) International Relations: Meaning, Scope and Evolution**,** Emergence of International State System
(ii) National Interest-Key Determinants of International Relations

(iii) Power-Cornerstone of International Relations

UNIT-II: Theoretical Perspectives

- **(i)** Classical Realism & Neo-Realism, Liberalism & Neo-liberalism
- **(ii)** Marxist Approaches, Feminist Perspectives, Euro- centricism & Perspective from the Global South

UNIT-III: An Overview of Twentieth Century IR History-I

- (i) World War I: Causes & Consequences, significance of Bolshevik Revolution
- (ii) Rise of Fascism / Nazism, World war II-Causes &Consequences

UNIT-IV: An Overview of Twentieth Century IR -II

- **(i)** Cold War Evolution& Different Phases (4 Lectures) Disintegration of USSR
- **(ii)** Emergence of the Third World, End of the Cold War

Text Books

- Basu, Rumki (2012) (ed.) 'International Politics: Concepts, Theories and Issues', New Delhi.
- Baylis & S. Smith (2002) (eds.), 'The Globalization of World Politics', Oxford University Press, UK, 4th edition, 2007 W.Bello, Deglobalization, Zed Books, London.
- M. Nicholson, (2002) 'International Relations: A Concise Introduction', New York, Palgrave.
- P. Viotti and M. Kauppi, (2007) 'International Relations and World Politics: Security, Economy, Identity', Pearson Education.
- R. Jackson and G. Sorensen, (2007) 'Introduction to International Relations: Theories and Approaches', 3rd Edition, Oxford, Oxford University Press.
- S. Joshua. Goldstein and J. Pevehouse, (2007) 'International Relations', New York, Pearson Longman.

Reference Books

1. Calvocoressi, P. (2001) 'World Politics: 1945—2000'. Essex, Pearson.
1. Dey, Dipankar (2007)(ed.), 'Sustainable Development: Perspectives and Initiatives', ICFAI University Press, Hyderabad,
2. K. Booth and S. Smith, (eds), 'International Relations Theory Today', Pennsylvania, The Pennsylvania State University Press.
3. M. Smith and R. Little (2000) (eds.), 'Perspectives on World Politics', New York, Routledge

Core Paper VIII(C-VIII)

POLITICAL PROCESSES AND INSTITUTIONS IN COMPARATIVE PERSPECTIVE

Introduction: In this course students will be trained in the application of comparative methods to the study of politics. The course is comparative in both what we study and how we study. In the process the course aims to introduce undergraduate students to some of the range of issues, literature, and methods that cover comparative political.

UNIT-I: Approaches to Studying Comparative Politics

(i) Political Culture –Meaning, Types &relevance.
(ii) New Institutionalism –Meaning, Background, Significance

UNIT-II: Election& Party System

(i) Definition and procedures: Types of election system (First Past the Post, Proportional Representation, Mixed Representation)
(ii) Party System -Evolution, Theories and types

UNIT-III: Nation-state

(i) Nation-state; Meaning and Evolution in West Europe
(ii) Nation and State; Debates in Post-colonial contexts

UNIT-IV: Democratization in Post- colonial societies

(i) Democratization in Post-authoritarian countries and in Post-communist countries
(ii) Federalism: Meaning and Features, Federation& Confederation: Debates around territorial division of power.

Text Books

- A. Heywood, (2002) 'Politics', New York, Palgrave.
- J. Bara and M. Pennington, (eds.) *Comparative politics.* New Delhi: Sage Publications.
- J. Bara and Pennington. (2009) (eds.) 'Comparative Politics: Explaining Democratic System', Sage Publications, New Delhi.
- J. Ishiyama, and M. Breuning, (2011) (eds) '21st Century Political Science: A Reference Book', Los Angeles, Sage Publications.
- M. Lichback and A. Zuckerman, (eds.) 'Comparative Political: Rationality, Culture, and Structure'. Cambridge, Cambridge University Press.

Reference Books

- R. Watts, (2008) 'Comparing Federal Systems'. Montreal and Kingston, McGill Queen's

University Press.
- Saxena, R (2011) (eds.) ‘Varieties of Federal Governance: Major Contemporary Models’, New Delhi, Cambridge University Press.
- T. Landman, (2003) ‘Issues and Methods of Comparative Methods: An Introduction’. London, Routledge.

Core Paper IX (C-IX)

PUBLIC POLICY AND ADMINISTRATION IN INDIA

Introduction: The paper seeks to provide an introduction to the interface between public policy and administration in India. The essence of public policy lies in its effectiveness in translating the governing philosophy into programs and policies and making it a part of the community living. It deals with issues of decentralization, financial management, citizens and administration and social welfare from a non-western perspective.

UNIT-I: Public Policy

i) Definition, characteristics and models
ii) Public Policy Process in India

UNIT-II: Decentralization

(i) Meaning, significance, types and approaches to decentralization.
(ii) Local Self Governance: Rural and Urban

UNIT-III: Budget and Social Welfare Administration

(i) Concept and Significance of Budget, Budget cycle in India, Types of Budgeting
(ii) Concept and Approaches of Social Welfare.
(iii) Social Welfare Policies:
  (a) **Education:** Right to Education,
  (b) **Health:** National Health Mission,
  (c) **Food:** Right to Food Security,
  (d) **Employment:** MNREGA

UNIT-I V: Citizen and Administration Interface

(i) Public Service Delivery System;
(ii) Redressal of Public Grievances: RTI, Lokpal, Citizens’ Charter and e-Governance

Text Books

- Basu Rumki (2015) ‘Public Administration in India Mandates, Performance and Future Perspectives’, New Delhi, Sterling Publishers

- Bidyut Chakrabarty, (2007) ‘Reinventing Public Administration: The Indian Experience’, Orient Longman,
- Henry, N. (1999) ‘Public Administration and Public Affairs’, New Jersey, Prentice Hall
- Jean Drèze and Amartya Sen, (1995) ‘India, Economic Development and Social Opportunity’, Oxford, Oxford University Press.
- R.B. Denhardt and J.V. Denhardt, (2009) ‘Public Administration’, New Delhi, Brooks/Cole
- Satyajit Singh and Pradeep K. Sharma (2007) (eds.) ‘Decentralization: Institutions and Politics in Rural India’, Oxford University Press, New Delhi.
- Singh, S. and Sharma, P. (2007) (eds.) ‘Decentralization: Institutions and Politics in Rural India’. New Delhi, Oxford University Press.
- Vasu Deva, (2005) ‘E-Governance In India: A Reality’, Commonwealth Publishers.
- Vijaya Kumar, (2012) ‘Right to Education Act 2009: Its Implementation as to Social Development in India’, Delhi: Akansha Publishers.

Reference Books

- ‘World Development Report’, (1992) World Bank, Oxford University Press,.
- Anderson, (1975) ‘Public Policy Making’, New York, Thomas Nelson and sons Ltd.
- Gabriel Almond and Sidney Verba, (1965) ‘The Civic Culture’, Boston, Little Brown.
- J.Dreze and Amartya Sen, (1997) ‘Indian Development: Selected Regional Perspectives’, Oxford, Clareland Press
- Jayal, N.G (1999) ‘Democracy and The State: Welfare, Secular and Development in Contemporary India’, Oxford, Oxford University Press.
- Jugal Kishore, (2005) National Health Programs of India: National Policies and Legislations, Century Publications.
- Lee and Mills, (1983) ‘The Economic of Health In Developing Countries’, Oxford, Oxford University Press.
- M. Howlett, M. Ramesh, and A. Perl, (2009), ‘Studying Public Policy: Policy Cycles and Policy subsystems’, 3rd edition, Oxford University Press, New Delhi
- Marma Mukhopadhyay and Madhu Parhar (2007) (ed.) ‘Education in India: Dynamics of Development’ New Delhi, Shipra Publications.
- Noorjahan Bava, (2001) ‘Development Policies and Administration in India’, Delhi, Uppal Publishers.
- R. Putnam, (1993) ‘Making Democracy Work’, Princeton University Press.
- T. Dye, (2002) ‘Understanding Public Policy’, New Delhi, Pearson
- United Nation Development Programme, (1997)‘Reconceptualising Governance’, New York
- Y. Dror, (1989) ‘Public Policy Making Reexamined’. Oxford, Transaction Publication.

Core Paper X (C-X)

GLOBAL POLITICS

Introduction: This course introduces students to the key debates on the meaning and nature of globalization by addressing its political, economic, social, cultural and technological dimensions. In keeping with the most important debates within the globalization discourse, it imparts an understanding of the working of the world economy, its anchors and resistances offered by global social movements while analyzing the changing nature of relationship between the state and trans-national actors and networks. The course also offers insights into key contemporary global issues such as the proliferation of nuclear weapons, ecological issues, international terrorism, and human security before concluding with a debate on the phenomenon of global governance.

UNIT-I: Globalization: Conceptions

- (i) Understanding Globalization and its Alternative Perspectives, Non-Proliferation Regimes
- (ii) Global Economy: Its significance & anchors of Global Political Economy: IMF, World Bank, WTO, TNCs

UNIT-II: Globalization: Perspectives

- (i) Political Debates on Sovereignty and Territoriality
- (ii) Cultural and Technological Dimensions
- (iii) Global Resistances (Global Social Movements and NGOs)
- (iv) Ecological Issues: International Environmental Agreements, Climate Change

UNIT-III: Contemporary Global Issues-I

- (i) Proliferation of Nuclear Weapons
- (ii) International Terrorism: Non-State Actors and State Terrorism; Post 9/11 developments

UNIT-IV: Contemporary Global Issues-II

- (i) Migration & Human Security
- (ii) Global Shifts: Power and Governance

Text Books

- G. Ritzer, (2010) 'Globalization: A Basic Text', Sussex: Wiley-Blackwell.
- M. Strager, (2009) 'Globalization: A Very Short Introduction', London, Oxford University Press.
- Heywood, (2011) 'Global Politics', New York, Palgrave-McMillan.
- J. Baylis, S. Smith and P. Owens (2011) (eds.) 'Globalization of World Politics: An Introduction to International Relations', New York, Oxford University Press.
- W. Ellwood, (2005) 'The No-nonsense Guide to Globalization', Jaipur, Rawat Publications.
- D. Held and A. McGrew (2000) (eds.) 'The Global Trans-Formations Reader', Cambridge, Polity Press.

Reference Books

- A. Narlikar, (2005) 'The World Trade Organization: A Very Short Introduction', New York, Oxford University Press.
- Goldstein, (2006) 'International Relations', New Delhi, Pearson.
- P. Hirst, G. Thompson and S. Bromley, (2009) 'Globalization in Question', Cambridge, Polity Press.
- D. Held et al, (1999) 'Global Transformations: Politics, Economics and Culture', California, Stanford University Press.
- F. Lechner and J. Boli (ed.), (2004) 'The Globalization Reader', London, Blackwell.(WTO).
- G. Ritzer, (2010) 'Globalization: A Basic Text', Sussex, Wiley-Blackwell.
- T. Cohn, (2009) 'Global Political Economy', New Delhi, Pearson.
- D. Held and A. McGrew (eds.), (2002) 'Global Transformations Reader: Politics, Economics and Culture', Cambridge, Polity Press.
- A. Vanaik, (ed.), (2004) 'Globalization and South Asia: Multidimensional Perspectives', New Delhi, Manohar Publications.

Core Paper XI (C-XI)

WESTERN POLITICAL PHILOSOPHY

Introduction: This course goes back to Greek antiquity and familiarizes students with the manner in which the political questions were first posed. Machiavelli comes as an interlude inaugurating modern politics followed by Hobbes and Locke, Rousseau, Marx. This is a basic foundation course for students.

UNIT-I : Text and Interpretation: Antiquity

(i) Plato
(ii) Aristotle

UNIT-II

(i) Machiavelli
(ii) Hobbes

UNIT-III

(i) Locke
(ii) Rousseau

UNIT-IV

(i) J. S. Mill
(ii) Karl Marx

Text Books

- C. Kukathas and G. Gaus, (eds.) 'Handbook of Political Theory', London, Sage Publications Ltd.
- D. Boucher and P. Kelly (2009), (eds) 'Political Thinkers: From Socrates to the Present', Oxford, Oxford University Press.
- J. Coleman, (2000) 'A History of Political Thought: From Ancient Greece to Early Christianity, Oxford, Blackwell Publishers.
- Mukherjee, Subrato and Susheela Ramaswamy(2011) 'History of political Thought: Plato to Marx', PHI Publishers , New Delhi
- Okin, S. (1992), 'Women in Western Political Thought', Princeton, Princeton University Press.
- R. Kraut (1996) (ed.) 'The Cambridge Companion to Plato', Cambridge, Cambridge University Press.

Reference Books

1. A. Skoble and T. Machan, (2007) 'Political Philosophy: Essential Selections', New Delhi, Pearson Education.
2. J. Barnes (1995) (ed.), 'The Cambridge Companion to Aristotle'. Cambridge, Cambridge University Press.

Core Paper XII (C-XII)

INDIAN POLITICAL THOUGHT (ANCIENT AND MEDIEVAL)

Introduction: This course introduces the specific elements of Indian Political Thought spanning over two millennia. The basic focus of study is on individual thinkers whose ideas are however framed by specific themes. The course as a whole is meant to provide a sense of the broad streams of Indian thought while encouraging a specific knowledge of individual thinkers and texts. Selected extracts from some original texts are also given to discuss in class. The list of Reference books is meant for teachers as well as the more interested students.

UNIT-I: Traditions of Pre-colonial Indian Political Thought

i) Brahmanic and Shramanic
ii) Islamic and Syncretic.

UNIT-II : Ved Vyasa (Shantiparva) and Manu
(i) Ved Vyasa : Rajadharma
(ii) Manu : Social Laws

UNIT-III: Kautilya, Barani and Aggannasutta

(i) Kautilya: Theory of State, Foreign Policy, Role of King
(ii) Aggannasutta- Theory of Kingship
(iii) Barani: Ideal Polity

UNIT-IV :Kabir and Abul Faza
(i) AbulFazal-Monarchy
(ii) Kabir: Syncretism

Text Books

- A. Appodoroy, (2002) 'Political Thought in India, Delhi, Khama Publication.
- A. B. M, (1976), 'The Foundation of Muslim Rule in India', Allahabad, Central Book Depot.
- Brown, (2003) 'The Verses of Vemana', Asian Educational Services, Delhi.
- Habib, Irfan.(1995) 'Essays in Indian History', New Delhi, Tulika Publications.
- Roy, Himanshu and Singh, M. (2017), 'Indian Political Thought: Themes and Thinker', Second Edition, New Delhi, Pearson.
- S. Saberwal, (2008) 'Spirals of Contention', New Delhi, Routledge,
- Sharma, R. S (1991) 'Aspects of Political Ideas Institutions in Ancient India, Delhi, Motilal Banarsidas.
- T. Pantham, and K. Deutsch (1986) (eds.), Political Thought in Modern India, New Delhi, Sage Publications.
- Thapar, Romila, (1997) 'Ashok and the Decline of the Mauryas, ' New York, Oxford University Press.
- V. Mehta, (1992) 'Foundations of Indian Political Thought*,* New Delhi, Manohar Publications.
- V.P. Varma, (1974) 'Studies in Hindu Political Thought and Its Metaphysical Foundations', New Delhi, Motilal Banarsidass.

Reference Books

- A. Fazl, (1873) 'The Ain-i Akbari ' (translated by H. Blochmann), Calcutta: G. H. Rouse.
- J. Spellman, (1964) 'Political Theory of Ancient India: A Study of Kingship from the Earliest time to Ceirca AD 300, Oxford, Clarendon Press.
- L. Hess and S. Singh, (2002) 'The Bijak of Kabir', New Delhi, Oxford University Press.
- R. Kangle (ed. and trns.), 'Arthasastra of Kautilya', New Delhi, Motilal Publishers.
- S. Collins, (2001) 'Agganna Sutta: The Discussion on What is Primary (An Annotated Translation from Pali), Delhi, Sahitya Akademi.

Core Paper XIII (C-XIII)

CONTEMPORARY POLITICAL PHILOSOPHY

Introduction: Philosophy and politics are closely intertwined. Students will be exposed to the manner in which the questions of politics have been posed in terms that have implications for larger questions of thought and existence. Contemporary political philosophy and debates are introduced to the students here.

UNIT-I

i) Lenin

UNIT-II

i) Mao Zedong (Mao Tse Tung)

UNIT-III

(i) Antonio Gramsci

UNIT-IV

(i) John Rawls

Text Books

- B. Nelson, (2008) 'Western Political Thought'. New York, Pearson Longman.
- D. Boucher, and P. Kelly, (2003) (eds.) 'Political Thinkers: From Socrates to the Present'. New York, Oxford University Press.
- Gramsci, Antonio(1996), 'Selections from the Prison Notebooks', Orient Longman, Hyderabad
- Hacker, A. (1961), 'Political Theory: Philosophy, Ideology, Science', Macmillan, New York.
- Mukherjee, Subrato and Susheela Ramaswamy(2011) 'History of political Thought: Plato to Marx', PHI Publishers , New Delhi
- Rawls, John (2011), 'A Theory of Justice', Universal Law Publishing Co., New Delhi.

- Sabine, George, H. (1973). 'A History of Political Theory', Oxford and I.B.H. Publishing, New Delhi.
- Wayper. C.L (1989), 'Political Thought', B.I. Publications, Bombay.

Reference Books

- D. Germino (1972). Modern Western Political Thought: Machiavelli to Marx, Chicago University Press, Chicago.
- F.W. Coker (1971). Recent Political Thought, The World Press Pvt. Ltd., Calcutta.
- J.H. Hallowell (1960). Main Currents in Modern Political Thought, Holt, New York.

Core Paper XIV (C-XIV)

MODERN INDIAN POLITICAL THOUGHT

Introduction: Based on the study of individual thinkers, the course introduces a wide span of thinkers and themes that defines the modernity of Indian political thought. The objective is to study general themes that have been produced by thinkers from varied social and temporal contexts. Selected extracts from original texts are also given to discuss in the class. The list of Reference books is meant for teachers as well as the more interested students.

UNIT-I: Introduction

(i) Rammohan Roy: Rights, Reform Movement, Liberalism
(ii) Pandita Ramabai: Gender, critique of orthodoxy
(iii)Vivekananda: Ideal Society, Humanism, Nationalism

UNIT-II: Gandhi & Ambedkar

(i) Gandhi: Swaraj, Swadeshi(8 lectures)
(ii) Ambedkar: Social Justice

UNIT-III : Tagore&Savarkar

(i) Tagore Critiqueof Nationalism (8 lectures)
(ii) Savarkar: Hindutwa-A critical Assessment

UNIT-IV: Nehru,Lohia and J.P. Narayan

(i) Nehru: Secularism, Socialism
(ii) Lohia: Socialism,
(iii) J.P.Narayan: Total Revolution

Text books:

- A. Sen, (2003) 'Swami Vivekananda', Delhi, Oxford University Press.

- D. Dalton, (1982) 'Indian Idea of Freedom: Political Thought of Swami Vivekananda, Aurobindo Ghose, Rabindranath Tagore and Mahatma Gandhi', Academic Press, Gurgaon.
- G. Omvedt, (2008) 'Ramabai: Women in the Kingdom of God', in *Seeking Begumpura*: *The Social Vision of Anti Caste Intellectuals,* New Delhi, Navayana.
- M. Kosambi (2000) (ed.), 'Pandita Ramabai Through her Own Words: Selected Works', New Delhi, Oxford University Press.
- Raghuramaraju, (2007) 'Debates in Indian Philosophy: Classical, Colonial, and Contemporary', Delhi, Oxford University Press.
- S. Sarkar, (1985) 'A Critique on Colonial India', Calcutta, Papyrus.
- Sh. Kapila (2010) (ed.), 'An intellectual History for India', New Delhi: Cambridge University Press.
- T. Pantham and K. Deutsch (1986), (eds.) 'Political Thought in Modern India', New Delhi, Sage.
- V. Mehta and T. Pantham (eds.), (2006) 'A Thematic Introduction to Political Ideas in Modern India: Thematic Explorations, History of Science, Philosophy and Culture in Indian civilization' Vol. 10, Part: 7, New Delhi, Sage Publication.

Reference Books

- P. Chatterjee, (1986) 'Nationalist Thought and the Colonial World: A Derivative Discourse? London, Zed Books.
- S. Hay (1991) (ed.), 'Sources of Indian Tradition', Vol. 2.Second Edition, New Delhi, Penguin.
- S. Thorat and Aryama (2007) (eds.), 'Ambedkar in Retrospect - Essays on Economics, Politics and Society', Jaipur, IIDS and Rawat Publications.

Discipline Specific Elective Paper-I

INTRODUCTION TO HUMAN RIGHTS

Introduction: This course attempts to build an understanding of human rights among students through a study of specific issues in a comparative perspective. It is important for students to see how debates on human rights have taken distinct forms historically and in the contemporary world. The course seeks to anchor all issues in the Indian context, and pulls out another country to form a broader comparative frame.

Human Rights: Theory and Institutionalization

UNIT-I:

i) Understanding Human Right
ii) Three Generations of Rights

UNIT-II

i) Universal Declaration of Human Rights

UNIT-III

i) Rights in National Constitutions: South Africa and India

UNIT-IV

i) International Refugee Law, International Humanitarian Law

Text Books

- Alston Philip (1995), 'The United Nations and Human Rights-A Critical Appraisal', Oxford, Clarendon.
- Baxi, Upendra (1995) (ed.), 'The Right to be Human', Delhi, Lancer,
- Beetham, David (1987) (ed.), 'Politics and Human Rights', Oxford, Blackwell.
- Desai, A R. (1986)(ed), 'Violations of Democratic Rights in India', Bombay, Popular Prakashan.
- Evans, Tony (2001), 'The Politics of Human Rights: A Global Perspective', London, Pluto Press.
- Hargopal. G.(1999) 'Political Economy of Human Rights', Hyderabad, Himalaya.
- J. Hoffman and P. Graham, (2006) 'Introduction to Political Theory', Delhi, Pearson.

Reference Books

- Kothari, Smitu and Sethi, Harsh (1991)(eds.), 'Rethinking Human Rights', Delhi, Lokayan.
- Saksena, K.P. (1999) (ed.), 'Human Rights: Fifty Years of India's Independence', Delhi, Gyan.
- Subramanian, S.(1997), 'Human Rights: International Challenges', Delhi, Manas Publications.
- Vistaar Iyer, V.R. Krishna (1999), 'The Dialectics and Dynamics of Human Rights in India', Delhi, Eastern Law House.

Discipline Specific Elective Paper II

DEVELOPMENT PROCESS AND SOCIAL MOVEMENTS IN CONTEMPORARY INDIA (Project)

Introduction: Under the influence of globalization, development processes in India have undergone transformation to produce spaces of advantage and disadvantage and new geographies of power. The high social reproduction costs and dispossession of vulnerable social groups involved in such a development strategy condition new theories of contestation and struggles. A variety of protest movements emerged to interrogate and challenge this development paradigm that evidently also weakens the democratic space so very vital to the formulation of critical consensus. This course proposes to introduce students to the conditions, contexts and forms of political contestation over development paradigms and their bearing on the retrieval of democratic voice of citizens.

UNIT-I: Development Process since Independence

(i)Welfare State, Development and the role of Planning commission
(ii)Development in the era of Liberalization and Reforms

UNIT-II: Development Strategy and its Impact on the Social Structure

(i) Industrial Development and its impact on organized and unorganized labour
(ii) Agricultural Development and Agrarian Crisis, Land Reforms and Green Revolution,

UNIT-III: Social Movements

i) Social Movements: Meaning and Approaches, New Social Movements
ii) Women's Movement, Environmental Movements

UNIT-IV: Social Movements

i) Dalit Movement, Tribal Movement,
ii) Left wing Extremism: Issues and Challenges

Text Books

- A. Desai, (1986) (ed.), 'Agrarian Struggles in India After Independence', Delhi, Oxford University Press
- A. F. Frankel, (2005) 'India's Political Economy (1947-2004): The Gradual Revolution', Delhi, Oxford University Press.
- B. Nayar, (2007) (ed.), 'Globalization and Politics in India', Delhi, Oxford University Press.
- G. Omvedt, (1983) 'Reinventing Revolution, New Social Movements and the Socialist Tradition in India', New York, Sharpe.
- G. Rath, (2006) (ed.), 'Tribal development in India: The Contemporary Debate', New Delhi, Sage Publications.
- G. Shah, (2004) 'Social Movements in India: A Review of Literature', New Delhi, Sage Publications.
- G. Shah, (ed.), (2002) 'Social Movements and the State'. New Delhi, Sage Publications._
- R. Mukherji (2010) (ed.) 'India's Economic Transition: The Politics of Reforms', Delhi, Oxford University Press.
- S. Roy and K. Debal, (2004) 'Peasant Movements in Post-Colonial India: Dynamics of Mobilization and Identity', Delhi, Sage.

Reference Books

- J. Harris, (2009) 'Power Matters: Essays on Institutions, Politics, and Society in India', Delhi, Oxford University press.
- J. Harriss, (2006) (ed*)* 'Power Matters: Essays on Institutions, Politics, and Society in

India,' Delhi. Oxford University Press.
- K. Suresh, (ed.), (1982) 'Tribal Movements in India', Vol I and II, New Delhi, Manohar (emphasis on the introductory chapter).
- L. Fernandes, (2007) 'India's New Middle Class: Democratic Politics in an Era of Economic Reform', Delhi, Oxford University Press.
- M. Jayal, and P. Mehta, (2010) (eds.), 'The Oxford Companion to Politics in India', Delhi, Oxford University Press.
- M. Mohanty, P. Mukherji and O. Tornquist, (1998)(eds.) 'People's Rights: Social Movements and the State in the Third World', New Delhi, Sage.
- N. Jayal (2012)(ed.) 'Democracy in India', New Delhi, Oxford India Paperbacks, Sixth impression.

Discipline Specific Elective Paper III

INDIA'S FOREIGN POLICY IN A CHANGING WORLD

Introduction: This course's objective is to teach students the domestic sources and the structural constraints on the genesis, evolution and practice of India's foreign policy. The endeavour is to highlight integral linkages between the 'domestic' and the 'international' aspects of India's foreign policy by stressing on the shifts in its domestic identity and the corresponding changes at the international level. Students will be instructed on India's shifting identity as a postcolonial state to the contemporary dynamics of India attempting to carve its identity as an 'aspiring power'. India's evolving relations with the superpowers during the Cold War and after, bargaining strategy and positioning in international politics facilitate an understanding of the changing positions and development of India's role as a global player since independence.

UNIT-I : India's Foreign Policy in a changing world

i) India's Foreign Policy: Major bases and determinants
ii) India's Foreign Policy: Postcolonial Perspective

UNIT-II : India's Relation with USA& Russia

i) India's Relations with the USA
ii) India's Relation with USSR/Russia,

UNIT-III : India-China Relations, India and South Asia

(i) India-China Relations
(ii) India and South Asia: SAARC, Look East Policy, Act East Policy

UNIT-IV : India and Contemporary World

(i) India as an emerging Global Power, Myth and Reality
(ii) India in the Contemporary World

Text Books :

- Appadorai, A. and M.S. Rajan(1988), 'India's Foreign Policy and Relations', New Delhi, South Asian Publishers Pvt. Ltd.
- Bahadur, Kalim (ed.)(1986), 'South Asia in transition: Conflicts and Tensions', New Delhi, Patriots.
- Bandyopadhyaya, J.(2006), 'The making of India's Foreign Policy', New Delhi, Allied Publishers Pvt. Ltd.
- Banerjee, A.K. (ed.)(1998), 'Security issues in South Asia: Domestic and External Sources of Threats to Security', Calcutta, Minerva.
- Bidwai, Praful and Achin Vanaik (eds.)(1999), 'South Asia on a Short Fuse: Nuclear Politics and the Future of Global Disarmament', New Delhi, Oxford University Press.
- D. Scott (2011)(ed.), 'Handbook of India's International Relations', London, Routeledge.
- Dutt, V.P.(2007), 'India's Foreign Policy Since Independence', New Delhi, National Book Trust.
- Tellis and S. Mirski (2013) (eds.), 'Crux of Asia: China, India, and the Emerging Global Order', Carnegie Endowment for International Peace, Washington.

Reference Books

- A. Ganguly, S. and Rahul Mukherji(2011), India since 1980, New Delhi: Cambridge University Press.
- Ghosh, Partha S.(1989), Cooperation and conflict in South Asia, New Delhi: Manohar.
- Gould, H.A. and Sumit Ganguly (eds.)(1993), The Hope and the Reality: U.S.-Indian Relations from Roosevelt to Reagan, New Delhi: Oxford & IBH.
- Gujral, I.K.(1998), A foreign policy for India, Delhi: External publicity division, MEA, Government of India.
- Mansingh, Surjeet(1984), India's search for power: Indira Gandhi's foreign policy, 1966-1982 New Delhi: Sage.
- Muni, S.D.(2010), India's Foreign Policy the democracy dimension, New Delhi: Foundation Books.
- Nayar, B.R. and T.V. Paul(2004), India in the world order searching for major power status, New Delhi: Cambridge University Press.
- S. Cohen, (2002) *India: Emerging Power*, Brookings Institution Press.
- S. Mehrotra, (1990) 'Indo-Soviet Economic Relations: Geopolitical and Ideological Factors', in *India and the Soviet Union: Trade and Technology Transfer*, Cambridge University Press: Cambridge.
- Sengupta, Bhabani(1998), Fulcrum of Asia relations among China, India, Pakistan and the USSR, New Delhi: Konark Publishers.
- W. Anderson, (2011) 'Domestic Roots of Indian Foreign Policy', in W. Anderson, *Trysts with Democracy: Political Practice in South Asia*, Anthem Press: University Publishing Online.

Discipline Specific Elective Paper IV

WOMEN, POWER AND POLITICS

Introduction: This course opens up the question of women's agency, taking it beyond 'women's empowerment' and focusing on women as radical social agents. It attempts to question the complicity of social structures and relations in gender inequality. This is extended to cover new forms of precarious work and labour under the new economy. Special attention will be paid to feminism as an approach and outlook.

UNIT-I: Feminism

(i) Meaning and Development
(ii)Liberal, Socialist and Radical Feminism

UNIT-II: **Issues**

i) Patriarchy
ii) Sex and Gender
iii) Gender, Power and Politics

UNIT-III: Issues

(i) Women Movement in India
(ii) Women Empowerment: Policies and Practices
(iii) Violence against Women

UNIT-IV: **Women and Development**

i) WID (Women in Development), WAD (Women and Development), GAD (Gender and Development
ii) Women and Work (Visible and Invisible)

Text Books

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- B. Hooks, (2010) 'Feminism: A Movement to End Sexism', in C. Mc Cann and S. Kim (eds),
- M. John.(2008) (ed) *Women's Studies in India,* New Delhi: Penguin.
- M. Kosambi, (2007) *Crossing the Threshold,* New Delhi, Permanent Black.
- Menon, (2008) 'Power', in R. Bhargava and A. Acharya (eds), *Political Theory: An Introduction,* Delhi: Pearson.
- *Naarivaadi Rajneeti: Sangharsh evam Muddey,* University of Delhi: Hindi Medium Implementation Board.
- T. Shinde, (1993) 'Stree Purusha Tulna', in K. Lalitha and Susie Tharu (eds), *Women Writing in India,* New Delhi, Oxford University Press.

  The Feminist Reader: Local and Global Perspectives, New York: Routledge.
- U. Chakravarti, (2001) 'Pitrasatta Par ek Note', in S. Arya, N. Menon & J. Lokneeta (eds.)
- V Geetha, (2002) *Gender,* Kolkata, Stree Publications.

Reference Books

- N. Gandhi and N. Shah, (1992) *Issues at Stake – Theory and Practice in the Women's Movement,* New Delhi: Kali for Women.
- N. Menon, (2004) 'Sexual Violence: Escaping the Body', in *Recovering Subversion,* New Delhi: Permanent Black.

- P. Swaminathan, (2012) ‘Introduction’, in *Women and Work,* Hyderabad: Orient Blackswan.
- R. Kapur, (2012) ‘Hecklers to Power? The Waning of Liberal Rights and Challenges to Feminism in India’, in A. Loomba *South Asian Feminisms,* Durham and London: Duke University Press.
- U. Chakravarti, (2003) *Gendering Caste through a Feminist Len,* Kolkata, Stree pubications.
- V. Bryson, (1992) *Feminist Political Theory,* London*:* Palgrave-MacMillan.

DSE Paper – IV

DISSERTATION / RESEARCH PROJECT

(College can give this choice only for students with above 60% aggregate marks)

Project Paper- Development Process and Social Movements in Contemporary India (DSE-II)

Introduction:

The research experience of students is greatly enriched by early exposure to conducting research. There are numerous benefits of undergraduate students who get involved in research. They are better off in understanding published works, determine an area of interest, can discover their passion for research and may start their career as a researcher. Further students will be able to develop ability for scientific inquiry and critical thinking, ability in the knowledge base and communication. This course is included to promote above mentioned abilities among the students.

Learning Objectives:

- To help students to learn how to develop scientific research designs in the study of public administration.
- To guide students to understand the previous research in their field of interest and review them to arrive at a research problem
- To encourage the students to learn ways to describe and evaluate public policy implementation.
- To help students understand the logic of hypothesis testing in both quantitative and qualitative research.
- To make students to learn the methods of writing a research report.

Expected outcomes: Students will be able to

- Independently prepare a research design to carry out a research project
- Review the related research papers to find out a research problem and relevant hypotheses
- Understand the dynamics of citizen – administrative interface and administrative behaviours.
- Learn the use of statistical techniques for interpretation of data.
- Learn the APA style of reporting a research project.

Unit I A student is required to carry out a project on an issue of interest to him / her under the guidance and supervision of a teacher. In order to do so s/he must have the knowledge in research methodology and of steps in planning and conducting a research. The supervisors may help the students to go on field study / study tour relevant to their work. Thirty hours of class may be arranged in the routine to help students understand research methodology, and planning, conduction and reporting on the research. An external examiner with the supervisor as the internal examiner will evaluate the research project on the basis of scientific methodology in writing the report, and presentation skill and performance in the viva.

- **Format**
  - **Abstract –** 150 words including problem, method and results.
  - **Introduction** – Theoretical considerations leading to the logic and rationale for the present research
  - **Review**- Explaining current knowledge including substantive findings and theoretical and methodological contributions to the topic, objectives and hypotheses of the present research
  - **Method** – Design, Sample, Methods of data collection, Procedure
  - **Results**- Quantitative analysis of group data-- (Raw data should not be attached in Appendix) Graphical representation of data wherever required.¬ Qualitative analysis wherever done should indicate the method of¬ qualitative analysis.
  - **Discussion**
  - **References (APA Style) & Appendices**
- Project should be in Soft binding. It should be typed in Times New Roman 14 letter size with 1.5 spacing on one sides of the paper. Total text should not exceed 50 pages (References & Appendices extra).
- Two copies of the project should be submitted to the College.
- ***Project - American Psychological Association (APA) – Publication Manual 2006 to be followed for project writing***

Mark distribution for dissertation / Research project

Identification of problem	Review of Literature	Methodology	Analysis	Findings	Viva-voce	Total
10	10	10	25	20	25	100

Broad areas identified for Project: Social Movements: Environment, Women, Dalit, Peasant, Social Development, Political Development in Odisha, Political Socialization, Political Participation, Political Modernization and Communication, Decentralized democracy: Rural and Urban Local Self Governance, Functionary of Gram Sabha, Empowerment of Women and other marginals in PRIs, Development, Displacement, Rehabilitation, Resettlement in Odisha, Role of NGOs in Development, Regional Development and Regional Imbalances, Implementation of ORTPS- 2012, RTE-2009, Food Security Act, 2013, FRA, 2007.

Generic Elective Paper I

FEMINISM: THEORY AND PRACTICE

Introduction: The aim of the course is to introduce students to contemporary debates on feminism and the history of feminist struggles. The course begins with a discussion on construction of gender and an understanding of complexity of patriarchy and goes on to analyze theoretical debates within feminism. It offers a gendered analysis of Indian society, economy and polity with a view to understanding the structures of gender inequalities. And the last section aims to understand the issues with which contemporary Indian women's movements are engaged with.

UNIT-I: Understanding Feminism

(i) Feminist theorizing of the sex/gender distinction; Public Man and Private Woman

(ii) Understanding Patriarchy and Feminism

UNIT-II: Theories of Feminism

(i) Liberal and Socialist,
(ii) Radical feminism and Eco-feminism

UNIT-III: Feminist issues and women's participation: The Indian Experience

(i) Women's participation in anti-colonial and national liberation movements with special focus on India
(ii) Traditional Historiography and Feminist critiques; Social Reforms Movement and position of women in India, History of Women's struggle in Post- Independent India

UNIT-IV: Family in contemporary India and Understanding Woman's Work and Labour

(i) Family in contemporary India - patrilineal and matrilineal practices. Gender Relations in the Family, Patterns of Consumption: Intra Household Divisions, entitlements and bargaining, Property Rights
(ii) Understanding Woman's Work and Labour – Sexual Division of Labour, Productive and Reproductive labour, Visible - invisible work – Unpaid (reproductive and care), Underpaid and Paid work,- Methods of computing women's work , Female headed households

Text Books

- Bina Agarwal, (2013) 'Gender And Green Governance', Oxford University Press, Oxford,
- Forbes, Geraldine (1998) 'Women in Modern India'. Cambridge, Cambridge University Press
- Geetha, V. (2002) 'Gender'. Calcutta, Stree Publications.
- Geetha, V. (2007) 'Patriarchy'. Calcutta, Stree Publications.
- Jagger, Alison. (1983) 'Feminist Politics and Human Nature'. U.K, Harvester Press.
- John, Mary (
- John, Mary(2008) 'Women studies in India: A Reader', Peguin, New Delhi
- Lerner, Gerda. (1986) 'Creation of Patriarchy'. New York. Oxford University Press.

Reference Books

- Banarjee, Sikata. (2007) 'Ghadially, Rehana. (ed.) 'Urban Women in Contemporary India: A Reader'. New Delhi, Sage.

- Chakravarti, Uma. (1988) 'Beyond the Altekarian Paradigm: Towards a New Understanding of Gender Relations in Early Indian History', Social Scientist, Volume 16, No. 8.
- Desai, Neera & Thakkar, Usha. (2001) 'Women in Indian Society'. New Delhi: National Book Trust.
- Gandhi, Nandita & Shah, Nandita. (1991) 'Contemporary Women's Movement in India'. Delhi, Zubaan.
- Gupta, A and Sinha Smita, (2005) 'Empowerment of women: Language and Other Facets', Mangal Deep, New Delhi.
- Jayawardene, Kumari. (1986) 'Feminism and Nationalism in the Third World'. London, Zed Books and Conclusion.
- Nayak, Smita (2016) (eds.) ' Combating Violence Against Women: A Reality in the Making', Kalpaz, Gyan Books Pvt, Ltd, New Delhi
- Nayak, Smita (2016) (eds.) 'Gender Dynamics: The Emerging Frontiers', Research India Publications, New Delhi.
- Nayak, Smita, (2016), 'Whither Women: A Shift from Endowment to Empowerment', Edupedia, New Delhi.
- Rege, Sharmila. (2003) (ed.) 'The Sociology of Gender: The Challenge of Feminist Sociological Knowledge'. New Delhi, Sage.
- Rowbotham, Shiela. (1993) 'Women in Movements', New York and London, Routledge.
- Sangari, Kumkum & Chakravarty, Uma.(1999) (eds.) 'From Myths to Markets: Essays on Gender'. Delhi, Manohar.
- Sarkar, Tanika & Butalia, Urvashi. (1995) (eds.) 'Women and the Hindu Right'. Delhi, Kali for Women.

Generic Elective Paper II

GOVERNANCE: ISSUES AND CHALLENGES

Objectives: This paper deals with concepts and different dimensions of governance highlighting the major debates in the contemporary times. There is a need to understand the importance of the concept of governance in the context of a globalizing world, environment, administration, development. The essence of governance is explored through the various good governance initiatives introduced in India.

UNIT-I: Government and governance: concepts

(i) Governance: Meaning, Nature and Types
(ii) Role of State in the Era of Globalisation: State, Market and Civil Society

UNIT-II : Good Governance

i) Good Governance

ii) Sustainable Development and Governance

UNIT-III: Local Governance

(i) Democratic Decentralization: Institutions of Local Governance (PRIs),
(ii) People' Participation in Local Governance & Deepening Democracy

UNIT-IV : Good Governance Initiatives In India

i) Public Service Guarantee Acts & Electronic Governance
ii) Citizens Charter & Right to Information, Corporate Social Responsibility
iii)

Text Books

- A Baviskar, ((1995) The Belly of the River: Tribal Conflict Over Development in the Narmada Valley', Delhi, Oxford University Press.
- A. Parel (2000) (ed) 'Gandhi, Freedom and Self-Rule', New Delhi, Lexington Books.
- B. Parekh, (1997) 'Gandhi: A Brief Insight', Delhi, Sterling Publishing Company.
- B. Parekh, (1999) 'Colonialism, Tradition and Reform: An Analysis of Gandhi's Political Discourse', New Delhi, Sage Publication.
- D. Hardiman, (2003) 'Gandhi in his Time and Ours'. Delhi, Oxford University Press.

Reference Books

- R Iyer, (ed) (1993) 'The Essential Writings of Mahatma Gandhi', New Delhi, Oxford University Press.
- R. Ramashray, (1984) 'Self and Society: A Study in Gandhian Thought', New Delhi, Sage Publication.

Generic Elective Paper III

GANDHI AND THE CONTEMPORARY WORLD

Introduction: Locating Gandhi in a global frame, the course seeks to elaborate Gandhian thought and examine its practical implications. It will introduce students to key instances of Gandhi's continuing influence right up to the contemporary period and enable them to critically evaluate his legacy.

UNIT-I-

i) Theories: Satyagraha, Ahimsa

UNIT-II-

i) Swaraj, Swadeshi

UNIT-III-

i) Relevance Gandhi: Gandhi & Environment, Gandhi & Women, Gandhi & Social Harmony

UNIT-IV-

- Gandhi & Global Peace: Gandhian Philosophy in Contemporary World

Text Books

- B. C. Smith (2007), 'Good Governance and Development', Palgrave.
- B. Chakrabarty and M. Bhattacharya, (1998) (eds.) 'The Governance Discourse'. New Delhi, Oxford University Press.
- B. Nayar (1995) (ed.), 'Globalization and Politics in India', Delhi, Oxford University Press.
- Neera Chandhoke, (1995) 'State and Civil Society Explorations In Political Theory', Sage Publishers.
- Panda, Smita Mishra (2008), 'Engendering Governance Institutions: State, Market and Civil Society', Sage Publications.
- Surendra Munshi and Biju Paul Abraham (2004) (eds.), 'Good Governance, Democratic Societies and Globalisation', Sage.
- United Nation Development Programme, (1997) 'Reconceptualising Governance', New York.
- World Bank Report, (1992) 'Governance and Development'.

Reference Books

- Burns H Weston and David Bollier (2013), 'Green Governance: Ecological Survival, Human Rights, and the Law of the Commons', Cambridge University Press.
- Emilio F. Moran, (2010) 'Environmental Social Science: Human - Environment interactions and Sustainability', Wiley-Blackwell.
- Pardeep. Sachdeva, (2011) 'Local Government in India', Pearson Publishers, New Delhi.
- Pranab Bardhan and Dilip Mookherjee (2006), 'Decentralization And Local Governance In Developing Countries: A Comparative Perspective', MIT Press.
- T.R. Raghunandan (2013), 'Decentralization and Local Governments: The Indian Experience, Readings on The Economy, Polity and Society', Orient Blackswan.
- D. Crowther (2008), 'Corporate Social Responsibility', Deep and Deep Publishers, New Delhi.

Generic Elective Paper IV

UNITED NATIONS AND GLOBAL CONFLICTS

Introduction: This course provides a comprehensive introduction to the most important multilateral political organization in international relations. It provides a detailed account of the organizational structure and the political processes of the UN, and how it has evolved since 1945, especially in terms of dealing with the major global conflicts. The course imparts a critical understanding of the UN's performance until now and the imperatives as well as processes of reforming the organization in the context of the contemporary global system.

UNIT-I : The United Nations

i) An Historical Overview of the United Nations.
ii) Principles and Objectives

UNIT-II

i) Structures and Functions**:** General Assembly, Security Council, Economic and Social Council,.

ii) The International Court of Justice, The Specialized Agencies (International Labour Organisation (IOL), United Nations Educational, Scientific and Cultural Organisation (UNESCO), World Health Organisation (WHO), UN Programmes Funds: United Nations Children's Fund (UNICEF), United Nations Development Programme (UNDP), United Nations High Commissioner for Refugees (UNHCR)
iii) Peace Keeping, Peace Making and Enforcement, Peace Building and Responsibility to Protect
iv) Millennium Development Goals.

UNIT-III Major Global Conflicts since the Second World war

i) Korean war
ii) Vietnam War
iii) Afghanistan War
iv) Balkans Serbia and Bosnia

UNIT-IV

Assessment of the United Nations as an International Organisation: Imperatives of Reforms and the Process of Reforms

Text Books

- Basu, Rumki (2014) 'United Nations: Structure and Functions of an international organization', New Delhi, Sterling Publishers
- Baylis, J. and Smith, S. (2008) (eds.) 'The Globalization of World Politics: An Introduction to International Relations'. 4th edn. Oxford, Oxford University Press.
- Gareis, S.B. and Varwick, J. (2005) 'The United Nations: an introduction'. Basingstoke, Palgrave.
- Goldstein, J. and Pevehouse, J.C. (2006) 'International Relations'. 6th edn. New Delhi, Pearson.
- Saxena, J.N. (1986) et.al. 'United Nations for a Better Worl', New Delhi, Lancers.
- White, B. et al. (eds.) (2005) 'Issues in World Politics', 3rd edn. New York, Macmillan.
- Whittaker, D.J. (1997) 'United Nations in the Contemporary World', London, Routledge.

Reference Books

- Armstrong, D., Lloyd, L. and Redmond, J. (2004) 'International Organisations in World Politics'. 3rd edn. New York, Palgrave, Macmillan.
- Calvocoressi, P. (2001) 'World Politics: 1945-2000', 3rd edn. Harlow, Pearson Education.
- Moore, J.A. Jr. and Pubantz, J. (2008) 'The new United Nations', Delhi, Pearson Education.
- United Nations Department of Public Information. (2008) 'The United Nations Today'. New York, UN.

Course structure of UG Political Science Pass

Semester	Course	Course Name	Credits	Total marks
I	DSC-I	Introduction To Political Theory	06	100
II	DSC-II	Indian Government And Politics	06	100

III	DSC-III	Comparative Government And Politics	06	100
IV	DSC-IV	Introduction To International Relations	06	100
V	DSE-I	Administration And Public Policy: Concepts And Theories	06	100
VI	DSE-II	Democracy And Governance	06	100
			30	**600**

POLITICAL SCIENCE Papers for PASS students

Discipline Specific Core – 4 papers
Discipline Specific Elective – 2 papers

Marks per paper - Midterm : 20 marks, End term : 80 marks, Total – 100 marks
Credit per paper – 6
Teaching hours per paper – 50 hours + 10 hours tutorial

Discipline Specific Core Paper I

INTRODUCTION TO POLITICAL THEORY

Course Objective: This course aims to introduce certain key aspects of conceptual analysis in political theory and the skills required to engage in debates surrounding the application of the concepts.

Unit-I Political Theory: Definition and Approaches: Normative, Historical, Behavioural and Post Behavioural, Relevance (14 lectures)

Unit-II Concepts: Democracy, Liberty, Equality, Justice

Unit-III Rights, Gender, Citizenship, Civil Society and State

Unit-IV Debates in Political Theory:
(i) Grounds of Political Obligation
(ii) Protective discrimination and Equality

Text Books

- Bhargava, R. and Ashok Acharya (2008) '*Political Theory: An Introduction.* New Delhi: Pearson Longman.
- Vinod, M.J and Deshpande, Meena (2013) 'Contemporary Political Theory', PHI, New Delhi
- Verma, S. P. (1996) 'Modern Political Theory', Vikash Publishing, 3rd Reprint, New Delhi.
- Ramaswamy, Sushila (2010), 'Political Theory: Ideas and Concepts', PHI Learning, New Delhi
- Bellamy, R. (1993), (ed.) 'Theories and Concepts of Politics'. New York: Manchester University Press.
- Marsh, D. and Stoker, G. (eds.) 'Theory and Methods in Political Science'. London: Macmillan.
- Heywood, Andrew (2016) (Reprint) 'Political Theory: An Introduction', Palgrave, UK.

Reference Books

- Kukathas, Ch. and Gaus, G. F. (2004) (eds.) 'Handbook of Political Theory'. New Delhi, Sage.
- Vincent, A. (2004) 'The Nature of Political Theory'. New York: Oxford University Press.
- Mckinnon, C. (ed.) (2008) 'Issues in Political Theory', New York: Oxford University Press.
- Arblaster, A. (1994) 'Democracy', (2nd Edition), Buckingham: Open University Press.
- Parekh, B. (2000), 'Rethinking Multiculturalism: Cultural Diversity and Political Theory', Macmillan Press, London.

Discipline Specific Core Paper II

INDIAN GOVERNMENT AND POLITICS

Unit-I Historical Development of Indian Constitution and formation and working of the Constituent Assembly

Unit-II Indian Constitution: Basic features, Preamble, Fundamental Rights and Directive Principles

Unit-III Institutional Functioning: President, Prime Minister, Parliament and Judiciary

Unit-IV (i) Parties and Party systems in India
(ii) Recent trends in Federalism in India

Text Books

1. Abbas, H., Kumar, R. & Alam, M. A. (2011) *Indian Government and Politics.* New Delhi: Pearson, 2011.
2. Austin, G. (1999) *Indian Constitution: Corner Stone of a Nation.* New Delhi: Oxford University Press.
3. Austin, G. (2004) *Working of a Democratic Constitution of India.* New Delhi: Oxford University Press.
4. Chakravarty, B. & Pandey, K. P. (2006) *Indian Government and Politics.* New Delhi: Sage.
5. Chandhoke, N. & Priyadarshi, P. (eds.) (2009) *Contemporary India: Economy, Society, Politics.* New Delhi: Pearson.
6. Jayal, N. G. & Maheta, P. B. (eds.) (2010) *Oxford Companion to Indian Politics.* New Delhi: Oxford University Press.

Reference Books:

7. Chandra, B., Mukherjee, A. & Mukherjee, M. (2010) *India After Independence.* New Delhi: Penguin.
8. Menon, N. and Nigam, A. (2007) *Power and Contestation: India Since 1989.* London: Zed Book.
9. Singh, M.P. & Saxena, R. (2008) *Indian Politics: Contemporary Issues and Concerns.* New Delhi: PHI Learning.

   Vanaik, A. & Bhargava, R. (eds.) (2010) *Understanding Contemporary India: Critical Perspectives.* New Delhi: Orient Blackswan.

Discipline Specific Core Paper III

COMPARATIVE GOVERNMENT AND POLITICS

Unit-I The nature, scope and methods of comparative political analysis

Unit-II Comparing Regimes: Authoritarian and Democratic

Unit-III Classifications of political systems:

- (i) Parliamentary and Presidential: UK and USA
- (ii) Federal and Unitary: Canada and China

Unit-IV

Party Systems: one-party, two-party and multi-party systems: China, UK, and India

Text Books

- Ann L. G. (ed.) (2002) Handbook *of Federal Countries.* Montreal & Kingston: McGill□ Queen's University Press.

- Bara, J & Pennington, M. (eds.). (2009) *Comparative Politics.* New Delhi: Sage.
- D. Caramani. (ed.) (2008) *Comparative Politics.* Oxford: Oxford University Press.
- Dhillon, Michael. (2009) *Contemporary China: An Introduction.* London, New York: Routledge, 2009.
- Hague, R and Harrop, M. (2004) *Comparative Government and Politics: An Introduction.* London: Palgrave McMillan, pp. 268□290.
- Newton, K. and Deth, Jan W. V. (2010) *Foundations of Comparative Politics: Democracies of the Modern World.* Cambridge: Cambridge University Press.
- O'Neil, P. (2009) *Essentials of Comparative Politics.* (Third Edition). New York: WW. Norton & Company, Inc.
- Palekar, S.A. (2009) *Comparative Government and Politics.* New Delhi: PHI Learning Pvt. Ltd. (Eighth Edition). London: Palgrave McMillan.
- Rekha Saxena. (ed.) (2002) *Mapping Canadian Federalism for India.* New Delhi: Konark Publisher, Pvt., pp. 115□129.

Reference Books:

- Bara, J. (2009) 'Methods for Comparative Analysis', in Bara, J. & Pennington, M. (eds.) *Comparative Politics.* New Delhi: Sage, pp. 40□65.
- Blondel, J. (1996) 'Then and Now: Comparative Politics', *Political Studies. Vol. 47, Issue 1,* pp. 152□160
- Chandhoke, N. (1996) 'Limits of Comparative Political Analysis', *Economic and Political Weekly.* vol. 31, No. 4, (January 27), pp. PE 2□PE8.
- Ishiyama, J.T. and Breuning, M. (eds.) (2011) *21st Century Political Science: A Reference Book.* Los Angeles: Sage, pp. 150□158.
- Mair, P. (2008) 'Democracy', in Carmani, D. (ed.) *Comparative Politics.* Oxford: Oxford University Press, pp. 108□132.
- Watts, D. (2003) *Understanding US/UK Government and Politics.* Manchester: Manchester University Press, pp. 1□25; 66□105; 106□138.

Discipline Specific Core Paper IV

INTRODUCTION TO INTERNATIONAL RELATIONS

Course Objective: This Course is designed to give students a sense of some important theoretical approaches to understand international relations; a history from 1945 onwards to the present; and an outline of the evolution of Indian foreign policy since independence and its possible future trajectory.

Unit-I Approaches to International Relations

(a) Classical Realism
(b) Liberalism and Neo-Liberalism
(c) Feminist Perspective

Unit-II Cold War and Post-Cold:

(i) Origin and Phases
(ii)Post Cold- War Era and Emerging Centres of Power (European Union, China, Russia and Japan)

Unit-III India's Foreign Policy: Basic Determinants (Historical, Geo-Political, Economic, Domestic and Strategic)

Unit-IV (i) India's Policy of Non-alignment
(ii) India: An Emerging Power

Text Books

- Appadorai and Rajan, M. S. (eds.) (1985) *India's Foreign Policy and Relations.* New Delhi: South Asian Publishers.
- Art, R. J. and Jervis, R. (eds.) (1999) *International Political Enduring: Concepts and Contemporary Issues.*5th Edition. New York: Longman, pp. 7□14; 29□49; 119□126.
- Basu, Rumki (ed)(2012) *International Politics: Concepts theories and Issues*, New Delhi, Sage Publications India Pvt Ltd.
- Baylis, J. and Smith, S. (eds.) (2011) *The Globalization of World Politics: An Introduction to International Relations.* Fifth Edition. Oxford: Oxford University Press.
- Ganguly, S. (ed.) (2009) *India's Foreign Policy: Retrospect and Prospect.* New Delhi: Oxford University Press.
- Goldstein, J. and Pevehouse, J.C. (2009) *International Relations.* New Delhi: Pearson.
- Indian Foreign Service Institute. (1997, 1998) *India's Foreign Policy: An Agenda for the 21st Century* Vols. 1 & 2, New Delhi: Konark Publishers.
- Vanaik, A. (1995) *India in a Changing World: Problems, Limits and Successes of Its Foreign Policy.* New Delhi: Orient Longman.

Reference Books

- Jackson, R. and Sorenson, G. (2008) *Introduction to International Relations: Theories and Approaches*. New York: Oxford University Press.
- Mewmillians, W.C. and Piotrowski, H. (2001) *The World Since 1945: A History of International Relations*.Fifth edition. London: Lynne Rienner Publishers.
- Smith, M., Little, R. and Shackleton, M. (eds.) (1981) *Perspectives on World Politics.* London: Croom Helm.
- Tickner, J. A. (2001) *Gendering World Politics: Issues and Approaches in the Post-Cold War Era.* Columbia University Press.
- Wenger, A. and Zimmermann, D. (eds.) (2003) *International Relations: From the Cold World War to the Globalized World.* London: Lynne Rienner.
- William, P., Goldstein, D. M. and Shafritz, J. M. (eds.) (1999) *Classic Readings of International Relations*. Belmont: Wadsworth Publishing Co.

Discipline Specific Elective Paper I

ADMINISTRATION AND PUBLIC POLICY: CONCEPTS AND THEORIES

Topics:

Unit-I Public administration: Meaning, scope and significance of the subject, Public and Private Administration, Major Approaches, (16 lectures)

Unit-II Administrative Theories: The Classical Theory, Scientific Management, the Human - Relation theory, and Rational Decision-Making. (16 lectures)

Unit-III Understanding public policy: (i) concept and theories, relevance.

Unit-IV Policy formulation, implementation and evaluation. (14 lectures)
Development Administration, New Public Management.

Readings:

Text Books

Topic 1. Public administration as a discipline

- Awasthi, A. and Maheshwari, S. (2003) *Public Administration.* Agra: Laxmi Narain Agarwal, pp. 3–12.
- Basu, Rumki, (2014) Public Administration, Concepts and Theories, Delhi Sterling Publishers
- Henry, N. (2003) Public Administration and Public Affairs. New Delhi: Prentice Hall, pp. 1–52.

Topic 2. Administrative theories

- Bhattacharya, M. and Chakrabarty, B. (2005) (eds.) Public *Administration: A Reader*. Delhi: Oxford University Press.
- *Frontiers in Organization & Management.* New York: Praeger.
- Henry, N. (2003) Public Administration and Public Affairs. New Delhi: Prentice Hall, pp. 53–74.
- Benson, J. K. (ed.) (1977) *Organizational Analysis: Critique and Innovation*. Beverly Hills: Sage.
- Bhattacharya, M. and Chakrabarty, B. (eds.) (2005) Public *Administration: A Reader*. Delhi: Oxford University Press, pp. 88–100.

Topic 3. Development administration

- Bhattacharya, M. (2001) *New Horizons in Public Administration*. New Delhi: Jawahar.

Topic 4. Understanding public policy

- Dror, Y. (1983) *Public Policy Making Re-examined.* Oxford: Transaction Publication.
- Dye, T.R. (1975) *Understanding Public Policy.* New Jersey: Prentice Hall.

Reference Books:

- Bernard, C. (1938) *The Functions of Executive.* Cambridge: Harvard University Press.
- Gant, G.F. (1979) *Development Administration: Concepts, Goals, Methods*. Madison: University of Wisconsin Press.
- Mooney, J. (1954) *The Principles of Organization*. New York: Harper & Row.
- Siffin, W. (eds.), *Approaches to Development Politics* . New York: McGraw–Hill.
- Simon, H. (1967) *Administrative Behavior: A Study of Decision Making Process in Administrative Organization.* New York: Macmillan.
- Wiedner, E. (ed.) (1970) *Development Administration in Asia.* Durham: Duke University Press.

Discipline Specific Elective Paper II

DEMOCRACY AND GOVERNANCE

Course Objective: This Paper tries to explain the institutional aspects of democracy and how institutions function within a constitutional framework. It further delves into how democracy as a model of governance can be complimented by institution building.

Unit-I

Structure and Process of Governance: Parliament, Party Politics and Electoral behaviour, Federalism, The Supreme Court and Judicial Activism, Units of Local Governance (Grassroots Democracy)

Unit-II

Ideas, Interests and Institutions in Public Policy:
a. Contextual Orientation of Policy Design
b. Institutions of Policy Making

Unit-III

Regulatory Institutions –
(i) SEBI, TRAI, Competition Commission Of India
(ii)Lobbying Institutions: Chambers of Commerce and Industries, Trade Unions, Farmers Associations, etc.

Unit-IV

Dynamics of Civil Society: New Social Movements and Various interests, Role of NGO's, Understanding the political significance of Media and Popular Culture.

Text Books

- Agarwal B, Environmental Management, Equity and Eco-feminism: Debating India's Experience, Journal of Pesant Studies, Vol. 25, No. 4, pp. 55□95.
- Atul Kohli (ed.), (2001)The Success of India's Democracy, Cambridge University Press,
- Corbridge, Stuart and John Harris, (2000) Reinventing India: Liberalisation, Hindu Nationalism and Popular Democracy OUP.
- Basu Rumki et, al(ed) (2010)Democracy and good governance: Reinventing the Public service Delivery System in India, New Delhi, Bloomsbury India, 2015
- Baxi, Upendra and Bhikhu Parekh, (ed.) (1994)Crisis and Change in Contemporary India, New Delhi, Sage.
- Bidyut Chakrabarty, (2003) Public Administration: A Reader, Oxford University Press, New Delhi.
- Kothari, Rajini,(1970) Politics in India, Delhi, Orient Longma,.
- Mackie. Gerry, (2003) Democracy Defended, New York, Cambridge University Press,.
- Mahajan, Gurpreet (ed.) (2000) Democracy, Difference and Social Justice, New Delhi, Oxford University Press.
- Menon, Nivedita, (ed.) (2001) Gender and Politics in India, New Delhi, Oxford University Press.
- Mohanty, Manoranjan (1998) Peoples Rights: Social Movements and the State in the Third World, Sage, New Delhi,.
- Brass. Paul, (1990) Politics in India since Independence, Hyderabad, Orient Longman.

Reference Books

- Fuller, C.J. (ed.) (1997)Caste Today, Oxford University Press

- Jenkins. Rob, (2004) Regional Reflections: Comparative Politics Across India's States, New Delhi, OUP,.
- Joseph E. Stiglitz,(2003) Globalisation and its Discontents, WW Norton Press.
- Pankaj Sharma, (2004) E-*Governance: The New Age Governance*, APH Publishers
- S. Laurel Weldon, (2011) When Protest Makes Policy: How Social Movements Represent Disadvantaged Groups, Michigan Publishers.
- Shah. Ghanshyam, [ed.], (2002) Social Movements and The State, Sage Publication,
- Smitu Kothari, (1993) Social Movements and the Redefinition of Democracy, Boulder, Westview.
- Su H. Lee,(2010) Debating New Social Movements: Culture, Identity, and Social Fragmentation , Rawat Publishers, New Delhi
- Sury, M.M, (2003) India: A Decade of Economic Reforms: 1991 –2001, New Delhi, New Century Publication.
- Thomas R. Dye, (1984) Understating Public Policy, Prentice Hall NJ.
- Vasu Deva, *E-Governance In India : A Reality*, Commonwealth Publishers,2005
- Y. Dror, Public Policy Making Re-examined, Leonard Hill Books, Bedfordshire, 1974.

SKILL ENHANCEMENT COURSES (SEC)

Optional for SECC II paper

Total Marks- 100

Skill Enhancement Courses (SECC Option-I)

LEGISLATIVE PRACTICES AND PROCEDURES

Introduction : To acquaint the student broadly with the legislative process in India at various levels, introduce them to the requirements of peoples' representatives and provide elementary skills to be part of a legislative support team and expose them to real life legislative work. These will be, to understand complex policy issues, draft new legislation, track and analyze ongoing bills, make speeches and floor statements, write articles and press releases, attend legislative meetings, conduct meetings with various stakeholders, monitor media and public developments, manage constituent relations and handle inter-office communications. It will also deepen their understanding and appreciation of the political process and indicate the possibilities of making it work for democracy.

Unit-I

Powers and Functions of People's Representatives at different tiers of Governance

i) Members of Parliament, State Legislative Assemblies
ii) Representatives of Rural & Urban local self-government from Zilla Parishad, Municipal Corporation to Panchayat/ Ward

Unit-II :Supporting the Legislative Process and the Legislative Committees

i) Legislative Procedure: How a Bill becomes law, Role of the Standing Committee in reviewing a Bill
ii) Types of Committees; Role of Committees in reviewing Government Finances, policy, programmes and legislation

Unit-III : Reading the Budget Document

i) Overview of the Budget Process, Role of Parliament in Parliament in reviewing the Union Budget
ii) Railway Budget, Examination of Demands for Grants of Ministries, Working of Ministries

Unit –IV : Support in Media monitoring and Communication

i) Types of Media and their significance for Legislators
ii) Basics of Communication in Print and Electronic Media

Text Books

1. D. Kapur and P. Mehta, (2006) 'The Indian Parliament as an Institution of Accountability', *Democracy, Governance and Human Rights,* Programme Paper Number 23, United Nations Research Institute for Social Development.
2. Government of India, (Ministry of Parliamentary Affairs) (2009), *Subordinate Legislation*,
3. Government of India, (Ministry of Parliamentary Affairs), (2009) *Legislation, Parliamentary Procedure.*
4. P. Mehta, 'India's Unlikely Democracy: The Rise of Judicial Sovereignty', *Journal of Democracy,* Vol. 18(2), pp.70-83.
5. Sanyal, (2011) *Strengthening Parliamentary Committees* PRS, Centre for Policy Research, New Delhi.

Reference Books

6. A. Celestine, (2011) *How to Read the Union Budget* PRS, Centre for Policy Research, New Delhi,
7. B. Jalan, (2007) *India's Politics,* New Delhi: Penguin.
8. G. Rose, (2005) 'How to Be a Media Darling: There's No getting Away From It', *State Legislatures*, Vol. 31(3).
9. N. Jayal and P. Mehta (eds), (2010)*The Oxford Companion to Politics in India,* Oxford University Press: New Delhi,
10. R. Guha, (2007), *India After Gandhi*, Macmillan: New Delhi.

Skill Enhancement Courses (SECC Option-II)

PEACE AND CONFLICT RESOLUTION

Introduction: The objective of an undergraduate application course for common students in Peace and Conflict Studies will cover in-depth knowledge of conflict analysis, conflict resolution, conflict prevention, as well as the historical and cultural context of organized violence, Peace and Conflict Resolution addresses the sources of war, social oppression and valence and the challenges of promoting peace and justice internationally and domestically. It also introduces more equitable, cooperative and non-violent methods that can be used to transform unjust, violent or oppressive world situations. This course provides students with an overview of the Peace and Conflict Studies discipline, including key concepts and related theories. The course is designed to familarise students with the historical background of various peace movements, to analyse principles used to resolve conflict and to provide a view of how peace and conflict resolution are being pursued today. The course will also cover extensive understanding of current research and development within the field of peace and conflict studies and perspective of the environment, gender, migration and ethnicity.

Unit-I International Peace and Conflict Resolution: Sources of War

i) Sources of War: International and Domestic Issues and Trends
ii) What is Conflict: Introduction to International Conflict Resolution

Unit-II International Conflict Resolution Theories:

i) Models developed by Johan Galtung, Joseph Montville,
ii) Models developed by Morton Deutsch, William Zartman, Levy Jack.

Unit-III Conflict Resolution

i) Background of various Peace Movement and Concepts,
ii) Principles used to resolve conflict**.**

Unit-IV Cross-border Relationship

i) Migration, International rules and regulations, normative concept and political decisions.
ii) Current perspective of peace and conflict resolution.

Text Books

1. Bidwai, Praful and Achin Vanaik (eds.)(1999), South Asia on a short fuse: Nuclear politics and the future of global disarmament, New Delhi: OUP.

2. Carr, Edward H.,(1994) "Realism and Idealism," Richard Betts (ed), Conflict After the Cold War, Boston: Simon & Schuster.
3. Deutsch, Morton,(1973) The Resolution of Conflict: Constructive and Destructive Processes, New Haven, Yale University Press.
4. Ghosh, Partha S.(1989), Cooperation and conflict in South Asia, New Delhi: Manohar.

Reference Books

5. Kriesberg, Louis (1998), Constructive Conflicts: From Escalation to Resolution, Rowman & Littlefield, Maryland. Banerjee, A.K. (ed.)(1998), Security issues in South Asia: Domestic and external sources of threats to security, Calcutta: Minerva.
6. Levy, Jack, (1995)"Contending Theories of International Conflict: A Levels-of-Analysis Approach" in Crocker et al, Managing Global Chaos, USIP.
7. Starkey, Boyer, and Wilkenfield, (1999) Negotiating a Complex World. Rowman & Littlefield, Maryland.
8. Waltz, Kenneth N., (1994)"Structural Causes and Economic Effects," Richard Betts (ed), Conflict After the Cold War, Boston: Simon & Schuster.

Training Component of the UG Syllabus in Political Science

The present Syllabus in Political Science requires special training for the teachers of undergraduate teaching. The training modules will update their knowledge and help them to deliver quality inputs to the students.

Themes on which inputs for teachers are to be developed:

I. Understanding Political Theory

- Theorizing the Political
- Theories of Feminism
- Modernism and Post Modernism

II. Constitutional Government and Democracy in India

- Recent trends in Federalism

III. Political Theory-Concepts and Debates

- Egalitarianism: Special Exclusion and Affirmative Action
- Procedural, Distributive and Global Justice
- Cultural Relativism and Multiculturalism

IV. Political Process in India

- Recent trends in Indian Party System
- Role of Caste, Class, Gender and Religion in Voting Behaviour
- Electoral Reforms-Recent Debates
- Secularism and Communalism Debates
- Politicisation of Caste

V. Introduction to Comparative Governments and Politics

- Going beyond Euro-centrism
- Capitalism: Meaning and development
- Globalization: features and impact
- Rise and decline of Communism as a ruling Ideology
- Decolonization meaning and context

VI. Introduction to Public Administration

- Public Policy
- New public Administration
- New Public Management
- New Public Service Approach
- Good governance
- Feminist perspective

VII. Perspective on International Relations

- Development of International Relations; Emergence of International State System
- Nationalization and Power
- National Interest-Key Development of International Relations
- Power, Conservations of International Relations
- Classical Realism and Neo-realism, Liberalism and Neo- liberalism, Marxist Approach, Feminist Perspective , Euro-centricism and Perspective from Global South
- World War-I causes and consequences, Significance of Bolshevik Revolution
- Rise of Fascism and Nazism, World War-II cause and consequences
- Cold war evolution and different phrases, Disintegration of USSR
- Emergence of Third World War and End of Cold War

VII. Political Processes and Institutions in Comparative Perspective

- New Institutionalism: meaning, background, significance
- Nation-State-meaning and Evolution in West Europe
- Nation and State Debates in Post colonial context
- Democratization in Post-Authoritarian Countries
- Democratization in Post-Communist Countries
- Federalism: meaning, evolution and features

IX. Public Policy and Administration in India

- Public Policy Process in India
- Concept and Significance of Budget, Budget cycle in India
- Various Approaches and Types of Budgeting
- Public Service Delivery System
- Redressal of Public Grievances: RTI, Lokpal, Citizens' Charter and e-Governance

X. Global Politics

- Proliferation of Nuclear Weapons
- International Terrorism: Non-State Actors and State Terrorism; Post 9/11 developments
- Political Debates on Sovereignty and Territoriality
- Cultural and Technological Dimension
- Global Resistances (Global Social Movements and NGOs)
- Ecological Issues: Historical Overview of International Environmental Agreements, Climate

Change
- Global Economy: Its Significance and Anchors of Global Political Economy: IMF, World Bank, WTO, TNCs
- Understanding Globalization and its Alternative Perspectives
- Migration & Human Security
- Global Shifts: Power and Governance

XI. Western Political Philosophy
- Hegel
- Marx

XII. Indian Political Philosophy
- Brahmanic and Shramanic
- Islamic and Syncretic
- Abul Fazal-Monarchy
- Kabir: Syncretism

XIII. Contemporary Political philosophy
- Antonio Gramsci
- John Rawls

XIV. Modern Indian Political Thought
- Pandita Ramabai: Gender, Critique of Orthodoxy
- Tagore Critique of Nationalism
- Savarkar: Hindutwa-A Critical Assessment
- Lohia: Socialism,
- J.P.Narayan: Total Revolution

Training Component of the UG Syllabus in Political Science (Pass)

The present Syllabus in Political Science requires special training for the teachers of undergraduate teaching. The training modules will update their knowledge and help them to deliver quality inputs to the students.

Themes on which inputs for teachers are to be developed:

I- Introduction to Political Theory
- Definition and Approaches: Normative, Historical, Behavioural and Post Behavioural, Relevance
- Debates in Political Theory: Protective discrimination and Equality.

II- COMPARATIVE GOVERNMENT AND POLITICS

- Comparing Regimes: Authoritarian and Democratic

IV- INTRODUCTION TO INTERNATIONAL RELATIONS
- Approaches to International Relations**:** Classical Realism, Liberalism and Neo-Liberalism Feminist Perspective
- Cold War and Post-Cold: Phases, Post Cold- War Era and Emerging Centres of Power European Union, China, Russia and Japan

Generic Elective -2 (Interdisciplinary): (additional option)

1) READING GANDHI

Course objective: Locating Gandhi in a global frame, the course seeks to elaborate Gandhian thought and examine its practical implications. It will introduce students to key instances of Gandhi's continuing influence right up to the contemporary period and enable them to critically evaluate his legacy.

Unit-I- Theories: Satyagraha, Ahimsa

Unit-II- Swaraj, Swadeshi

Unit-III- Relevance of Gandhi: Gandhi & Environment, Gandhi & Women, Gandhi and Social Harmony

Unit-IV- Gandhi and Global Peace: Gandhian Philosophy in Contemporary World

Text Books

- A. Parel (ed) (2000) Gandhi*, Freedom and Self-Rule*, New Delhi: Lexington Books.
- A. Parel (ed.) (1997) *Gandhi, Hind Swaraj and Other Writings* Cambridge: Cambridge University Press.
- B. Parekh, (1999) *Colonialism, Tradition and Reform: An Analysis of Gandhi's Political Discourse*, New Delhi: Sage Publication.
- Brown. J, and A Parel (eds) (2011) *Cambridge Companion to Gandhi*, Cambridge University Press.
- D. Dalton, (2000) A. Parel (ed) *Gandhi, Freedom and Self-Rule*, New Delhi: Lexington Books.
- H. Coward (ed) (2003) *Indian Critiques of Gandhi,* New York: State University of New York Press.
- R. Iyer, (2001) *The Moral and Political Thought of Mahatma Gandhi*, New Delhi: Oxford University Press. pp. 344-358.
- R. Mukharjee, (ed) (1995), *The Penguin Gandhi Reader*, New Delhi: Penguin.

Reference Books

- B Parekh, (1997) *Gandhi: A Brief Insight,* Delhi: Sterling Publishing Company.
- Brown, J. (2008) *Gandhi and Civil Disobedience: The Mahatma in Indian Politics*, Cambridge: Cambridge University Press.
- Chatterjee. P, (1986) *Nationalist Thought and the Colonial World: A derivative discourse?* Delhi: Zed Books.
- D. Dalton, (1996) *Mahatma Gandhi: Selected Political Writings*, USA: Hackett Publishing.
- D. Hardiman, (1981) *Peasant Nationalists of Gujarat: Kheda District, 1917-1934*, Delhi: Oxford University Press.
- D. Hardiman, (2003) *Gandhi in his Time and Ours*. Delhi: Oxford University Press.
- Dirks, (2001), '*Castes of Mind: Colonialism and the making of Modern India*, Princeton: Princeton University Press.
- Gandhi, (1941) 'Chapter 1, 2, 9, 15, and 16', in *Constructive Programme: Its Meaning and Place*, Ahmedabad: Navjivan Trust.

- R Iyer, (ed) (1993) *The Essential Writings of Mahatma Gandhi*, New Delhi: Oxford University Press.
- R. Ramashray, (1984) *Self and Society: A Study in Gandhian Thought*, New Delhi: Sage Publication.
- S. Sarkar, (1982) *Modern India 1885-1947*, New Delhi: Macmillan.
- Taneja, (2005) Gandhi Women and the National Movement 1920-1947, New Delhi: Haranand Publishers.
- Terchek, (1998) *Gandhi: Struggling for Autonomy*, USA: Rowman and Littlefield Publishers.
- Weber, (2006) 'Gandhi is dead, Long live Gandhi- The Post Gandhi Gandhian Movement in India', in *Gandhi, Gandhism and the Gandhians*, New Delhi: Roli.

Generic Elective- 3, Additional option

2) HUMAN RIGHTS GENDER AND ENVIRONMENT

Course Objective: This course aims at enabling the students to understand the issues concerning the rights of citizens in general and the marginalized groups in particular, and assess the institutional and policy measures which have been taken in response to the demands of various movements. Conceptual dimensions, international trends and the Indian experience form the contents of the course.

Expected Learning Outcome: The study of the course will equip the students with theoretical and conceptual understanding of socio – economic and political problems of marginalized groups in society such as women, dalits, minorities and adivasis and repercussions of contemporary developments on globalization on them.

Unit-I Understanding Social Inequality

i. Caste, Gender, Ethnicity and Class as distinct categories and their interconnection.
ii. Globalisation and its impact on workers, peasants, dalits, adivasis and women.

Unit-II Human Rights

i. Human Rights: Various Meanings
ii. UN Declarations and Covenants
iii. Human Rights and Citizenship Rights
iv. Human Rights and the Indian Constitution
v. Human Rights, Laws and Institutions in India; the role of the National Human Rights Commission.
vi. Human Rights of Marginalized Groups: Dalits, Adivasis, Women, Minorities and Unorganized Workers.
vii. Consumer Rights: The Consumer Protection Act and Grievance Redressal mechanisms.
viii. Human Rights Movement in India.

Unit-III Gender

i. Analysing Structures of Patriarchy
ii. Gender, Culture and History
iii. Economic Development and Women

iv. The issue of Women's Political Participation and Representation in India
v. Laws, Institutions and Women's Rights in India
vi. Women's Movements in India

Unit-IV Environment

i. Environmental and Sustainable Development
ii. UN Environment Programme: Rio, Johannesburg and after.
iii. Issues of Industrial Pollution, Global Warming and threats to Bio – diversity
iv. Environment Policy in India
v. Environmental Movement in India

Text Books

- Agarwal, Anil and Sunita Narain (1991), *Global Warming and Unequal World: A Case of Environmental Colonialism*, Centre for Science and Environment, Delhi.
- Baxi, Upendra (2002), *The Future of Human Rights*, Oxford University Press, Delhi.
- Beteille, Andre (2003), *Antinomies of Society: Essays on Ideology and Institutions*, Oxford University Press, Delhi.
- Geetha, V. (2002) *Gender*, Stree Publications, Kolkata.
- Ghanshyam Shah, (1991) *Social Movements in India*, Sage Publications, Delhi.
- Gonsalves, Colin (2011) Kaliyug: The decline of human rights law in the period of globalization Human Rights Law Network, New Delhi.
- Guha, Ramachandra and Madhav Gadgil, (1993) *Environmental History of India*, University of California Press, Berkeley.
- Haragopal, G. (1997) *The Political Economy of Human Rights*, Himachal Publishing House, Mumbai.
- Menon, Nivedita (ed) (2000) *Gender and Politics in India*, Oxford University Press, Delhi.
- Patel, Sujata et al (eds) (2003) *Gender and Caste: Issues in Contemporary Indian Feminism*, Kali for Women, Delhi.
- Sen, Amartya, (1999) Development as Freedom New Delhi, OUP.
- Shah, Nandita and Nandita Gandhi (1992) *Issues at Stake: Theory and Practice in the Contemporary Women's Movement in India*, Kali for Women, Delhi.

Generic Elective (Interdisciplinary): 4 (additional Option)

1. Feminism: Theory and Practice

- Feminist theorizing of the sex/gender distinction; Public Man and Private Woman
- Radical feminism and Eco-feminism
- Women's participation in anti-colonial and national liberation movements with special focus on India
- Traditional Historiography and Feminist critiques; Social Reforms Movement and position of women in India, History of Women's struggle in Post- Independent India
- Family in contemporary India - patrilineal and matrilineal practices. Gender Relations in the Family, Patterns of Consumption: Intra Household Divisions, entitlements and bargaining, Property Rights

- Understanding Woman's Work and Labour – Sexual Division of Labour, Productive and Reproductive labour, Visible - invisible work – Unpaid (reproductive and care), Underpaid and Paid work,- Methods of computing women's work , Female headed households

II. Gandhi and The Contemporary World

- Relevance of Gandhi: Gandhi and Environment, Gandhi and Women, Gandhi and Social Harmony
- Gandhi and Global Peace: Gandhian Philosophy in Contemporary World

III. Governance: Issues and Challenges

- Role of State in the Era of Globalization: State, Market and Civil Society
- Good Governance
- Sustainable Development and Governance
- People' Participation in Local Governance and Deepening Democracy
- Public Service Guarantee Acts and Electronic Governance
- Citizens Charter and Right to Information, Corporate Social Responsibility

DISCIPLINE SPECIFIC ELECTIVE -4 (DSE Additional))

I. Human Rights in a Comparative Perspective

- Rights in National Constitutions: South Africa
- International Refugee Law, International Humanitarian Law

II. Development Process and Social Movements in Contemporary India

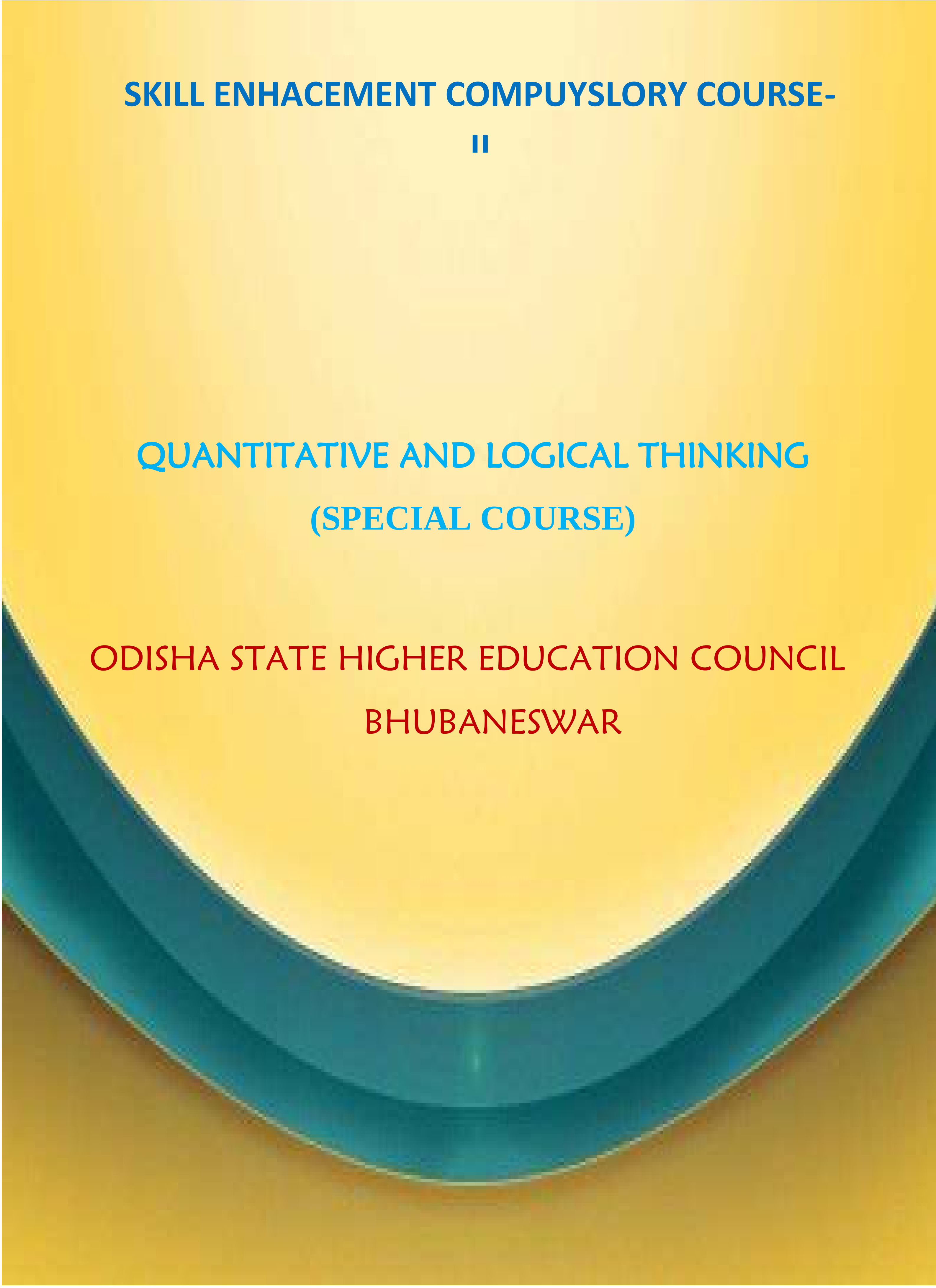
- Welfare State, Development and the role of Planning Commission
- Development in the era of Liberalization and Reforms
- Industrial Development and its impact on organized and unorganized labour
- Agricultural Development and Agrarian Crisis, Land Reforms and Green Revolution,
- Social Movements: Meaning and Approaches, New Social Movements
- Women's Movement, Environmental Movements
- Dalit Movement, Tribal Movement,
- Leftwing Extremism: Issues and Challenges

III. India's Foreign Policy in a Changing World

- India's Foreign Policy: Postcolonial Perspective
- India and South Asia: SAARC, Look East Policy, Act East Policy
- India as an emerging Global Power, Myth and Reality
- India in the Contemporary World

IV. Women, Power and Politics

- Gender, Power and Politics
- WID (Women in Development), WAD (Women and Development), GAD (Gender and Development
- Women and Work (Visible and Invisible)



SKILL ENHACEMENT COMPUYSLORY COURSE-II

QUANTITATIVE AND LOGICAL THINKING

(SPECIAL COURSE)

ODISHA STATE HIGHER EDUCATION COUNCIL
BHUBANESWAR

STATE MODEL SYLLABUS FOR UNDER GRADUATE COURSE IN SKILL ENHANCEMENT COURSE (II)

(Bachelor of Arts/Sc/Com Examination)

UNDER

CHOICE BASED CREDIT SYSTEM

FOREWARD

The Higher Education system has undergone a paradigm shift in Odisha with the introduction of Choice Based Credit System (CBCS) in the academic year 2015-16 as per the University Grant Commission regulations. Initially it was adopted in all Autonomous colleges and from 2016-17, in all the colleges of Odisha. CBCS offers students the liberty to choose from list of available courses under the domains of Ability Enhancement, Skill Enhancement and General Elective. This book on Quantitative and Logical Thinking aims to engage the students more creatively to improve their critical thinking skills. This paper will be taught under Skill Enhancement Compulsory Course (SECC).

The main intent of this paper is to strengthen the quantitative & logical thinking of Under Graduate students, majority of who are set to enter the job market with high hopes. Needless to say, a good command over Quantitative Aptitude and Logical Thinking is one skill which various companies expect from their prospective employees. The course content is developed with the help of faculties from Ravenshaw University, Rama Devi University and other experienced Mathematics faculties keeping in mind the diverse background of students of Odisha. We would like to acknowledge their vital contribution and members of the World Bank project in Higher Education for the development of this book. We hope the students find merit in using this book not just as a course study material but as a life time companion in improving his / her critical thinking skills. Any suggestions for improving the content are most welcome. The same can be emailed to oshec.hed@gmail.com

Vice Chairperson
OSHEC

Bhubaneswar

Table of Contents

I. QUANTITATIVE APTITUDE & DATA INTERPRETATION 4

Unit – 1: Whole numbers, Integers, Rational and irrational numbers, Fractions, Square roots and Cube roots, Surds and Indices, Problems on Numbers, Divisibility 4

Steps of Long Division Method for Finding Square Roots: 10

Unit -2: Basic concepts, Different formulae of Percentage, Profit and Loss, Discount, Simple interest, Ratio and Proportion, Mixture 14

Unit- 3: Time and Work, Pipes and Cisterns, Basic concepts of Time, Distance and Speed ; relationship among them 31

Unit – 4: Concept of Angles, Different Polygons like triangles, rectangle, square, right angled triangle, Pythagorean Theorem, Perimeter and Area of Triangles, Rectangles, Circles 41

Unit – 5: Raw and Grouped Data, Bar Graphs, Pie charts, Mean, Median and Mode, Events and Sample Space, Probability 53

II. LOGICAL REASONING 71

Unit - 1 : Analogy basing on kinds of relationships, Simple Analogy; Pattern and Series of Numbers, Letters, Figures. Coding-Decoding of Numbers, Letters, Symbols (Figures), Blood relations 71

UNIT – 2 : Logical Statements – Two premise argument, More than two premise argument using connectives 96

UNIT -3: Venn Diagrams, Mirror Images, Problems on Cubes and Dices 112

QUANTITATIVE AND LOGICAL THINKING (SPECIAL COURSE)

I. QUANTITATIVE APTITUDE & DATA INTERPRETATION

Unit – 1: Whole numbers, Integers, Rational and irrational numbers, Fractions, Square roots and Cube roots, Surds and Indices, Problems on Numbers, Divisibility

Definitions:

- Whole numbers:

All positive numbers including 0 are called whole numbers.

For Example - 0, 1, 2, 3 ...

- Prime numbers:

A number that is divisible only by itself and 1 is called a prime number.

For Example – 2, 3, 5, 7, …..

  - Prime numbers are whole numbers.
  - The smallest prime number is 2.

- Co-prime / Relatively prime/ Mutually prime:

Two numbers a and b (not both necessarily prime) are said to be co-prime, relatively prime or mutually prime if the only positive integer that divides both of them is 1.

For Example- 15 and 22 are co-prime because the only common divisor is 1.

- Integers:

All the positive and negative numbers including 0 are called integers.

For Example- -3, -2, -1, 0, 1, 2, 3 ...

- Rational numbers:

The set of numbers which can be written in the form of (p/q) are called rational numbers .

For Example - 115/4, 0, 26/5 , -22/9...

- Irrational numbers:

The set of numbers which cannot be written in the form of (p/q) are called irrational numbers.

For Example - π ,$\sqrt{2}$,$\sqrt[3]{3}$…

- Real numbers:

Real numbers contains the set of Whole numbers, integers, rational and irrational number.

For Example: 1, -2, 0, π ,$\sqrt{2}$….

Basic formulae

1. $(a+b)^2 = a^2 + b^2 + 2ab$
2. $(a-b)^2 = a^2 + b^2 - 2ab$
3. $(a+b)^2 - (a-b)^2 = 4ab$
4. $(a+b)^2 + (a-b)^2 = 2(a^2+b^2)$
5. $(a^2-b^2) = (a+b)(a-b)$
6. $(a+b+c)^2 = a^2 + b^2 + c^2 + 2(ab+bc+ca)$
7. $(a^3+b^3) = (a+b)(a^2-ab+b^2)$
8. $(a^3-b^3) = (a-b)(a^2+ab+b^2)$
9. $(a^3+b^3+c^3-3abc) = (a+b+c)(a^2+b^2+c^2-ab-bc-ca)$

Solved examples:

1. If one-third of one-fourth of a number is 15, then three-tenth of that number is:

Solution:

Let the number be x.

Then, $\frac{1}{3}$ of $\frac{1}{4}$ of $x = 15 \Leftrightarrow x = 15 \times 12 = 180$.

So, required number = $\left(\frac{3}{10} \times 180\right) = 54$.

2. The sum of two numbers is 25 and their difference is 13. Find their product.

Solution:
Let the numbers be x and y.
Then, $x + y = 25$ and $x - y = 13$.
$4xy = (x + y)^2 - (x- y)^2$

$= (25)^2 - (13)^2$

$= (625 - 169)$

$= 456$

$\therefore \quad xy = 114.$

3. The difference between a two-digit number and the number obtained by interchanging the positions of its digits is 36. What is the difference between the two digits of that number?

Solution:

Let the ten's digit be x and unit's digit be y.
Then, $(10x + y) - (10y + x) = 36$
⇨ $9(x - y) = 36$
⇨ $x - y = 4.$

4. The difference between a two-digit number and the number obtained by interchanging the its is 36. What are the digits of the number if the ratio between the digits of the number is 1 : 2 ?

Solution:

Since the number is greater than the number obtained on reversing the digits, so the ten's digit is greater than the unit's digit.

Let ten's and unit's digits be 2x and x respectively.
Then, $([10 \times 2x] + x) - (10x + 2x) = 36$
⇨ $9x = 36$
⇨ $x = 4.$
$\therefore$ One digit is 4 and the other digit is $2 \times 4 = 8$

5. The product of two numbers is 18 and the sum of their squares is 45. The sum of the numbers is:

Solution:

Let the numbers be x and y.
Then, $xy = 18$ and $x^2 + y^2 = 45$.
$\therefore \; (x + y)^2 = x^2 + y^2 + 2xy = 45 + (2 \times 18) = 81$
$\therefore \; x + y = \sqrt{81} = 9.$

Divisibility rules

Divisibility by 2:

A number is divisible by 2 if the last digit is even. i.e., if the last digit is 0 or 2 or 4 or 6 or 8.
Ex: 454 is divisible by 2 , 455 is not divisible by 2.

Divisibility by 3:

A number is divisible by 3 if the sum of the digits is divisible by 3.
Ex: 459 is divisible by 3 as the sum of the digits, 4+5+9=18 is divisible by 3.

Divisibility by 4:

A number is divisible by 4 if the number formed by the last two digits is divisible by 4.
Ex: 324 is divisible by 4 as 24 is divisible by 4.

Divisibility by 5:

A number is divisible by 5 if the last digit is either 0 or 5.
Ex: 555 is divisible by 5

Divisibility by 6:

A number is divisible by 6 if it is divisible by both 2 and 3.
Ex: 528 is divisible by 6 as 528 is divisible by both 2 & 3.

Divisibility by 8:

A number is divisible by 8 if the number formed by the last three digits is divisible by 8.
Ex: 8168 is divisible by 8 as 168 is divisible by 8.

Divisibility by 9:

A number is divisible by 9 if the sum of the digits is divisible by 9.
Ex: 981 is divisible by 9 as the number formed by the sum of the digits i.e. 18(9+8+1=18) is divisible by 9.

Divisibility by 10:

A number is divisible by 10 if the last digit is 0.
Ex: 100 is divisible by 10.

Divisibility by 11:

To find out if a number is divisible by 11, find the sum of the odd numbered digits and the sum of the even numbered digits.

Now subtract the lower number obtained from the bigger number obtained.

If the number we get is 0 or divisible by 11, the original number is also divisible by 11.

Ex: 121 is divisible by 11. (Sum of the digits in the even place is 2 & sum of the digits in the odd places is 1+1=2.Now 2-2 =0 is divisible by 11.)

Solved examples:

1. Find the least value of * for which the number 8550*1 is divisible by 3.

   Solution:

   Let the required number be a.
   Now 8+5+5+0+a+1 = 19+a

   Hence the least number is 2.

2. Find the least value of * for which the number 13*1 is divisible by 11.

   Solution:

   Let the required number be x.
   Now sum of digits at odd places –sum of digits at even places
   = (1+3)-(1+x)
   = (3-x), should be divisible by 11.
   Hence the least value of x is 3.

3. Is 7248 divisible (i) by 4, (ii) by 2 and (iii) by 8?

   Solution:

   (i) The number 7248 has 48 on its extreme right side which is exactly divisible by 4. When we divide 48 by 4 we get 12.

Therefore, 7248 is divisible by 4.

(ii) The number 7248 has 8 on its unit place which is an even number so, 7248 is divisible by 2.

(iii) 7248 is divisible by 8 as 7248 has 248 at its hundred place, tens place and unit place which is exactly divisible by 8.

4. A number is divisible by 4 and 12. Is it necessary that it will be divisible by 48? Give an example in support of you answer.

Solution:

48 = 4 × 12 but 4 and 12 are not co-prime.

Therefore, it is not necessary that the number will be divisible by 48.

Let us consider the number 72 for an example

72 ÷ 4 = 18, so 72 is divisible by 4.

72 ÷ 12 = 6, so 72 is divisible by 12.

But 72 is not divisible by 48.

5. Without actual division, find if 235932 is divisible (i) by 4 and (ii) 8.

Solution:

(i)The number formed by the last two digits on the extreme right side of 235932 is 32

32 ÷ 4 = 8, i.e. 32 is divisible by 4.

Therefore, 235932 is divisible by 4.

(ii) The number formed by the last three digits on the extreme right side of 235932 is 932

But 932 is not divisible by 8. Therefore, 235932 is not divisible by 8.

Square roots

Steps of Long Division Method for Finding Square Roots:

Step I: Group the digits in pairs, starting with the digit in the units place.

Step II: Think of the largest number whose square is equal to or just less than the first group. Take this number as the divisor and also as the quotient.

Step III: Subtract the product of the divisor and the quotient from the first group and bring down the next group to the right of the remainder. This becomes the new dividend.

Step IV: Now, the new divisor is obtained by taking two times the quotient and annexing with it a suitable digit which is also taken as the next digit of the quotient, chosen in such a way that the product of the new divisor and this digit is equal to or just less than the new dividend.

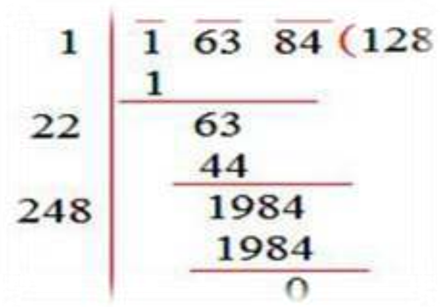
Step V: Repeat steps (2), (3) and (4) till all the groups have been taken up. Now, the quotient so obtained is the required square root of the given number.

Solved examples:

1. Find out √16384.

Solution:

Marking group and using the long-division method,

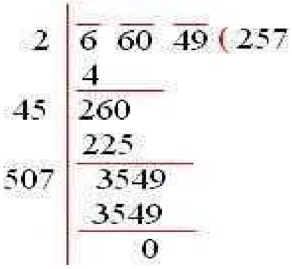


Therefore, √16384 = 128.

2. Find out √66049.

Solution:

Marking group and using the long-division method,



```
  2 | 6  60  49 ( 257
    | 4
 45 | 260
    | 225
507 |  3549
    |  3549
    |     0
```

Therefore, √66049 = 257

Surds & Indices

Definitions:

- Index

  An **index** (plural: **indices**) is the power, or exponent, of a number. E.g a^5 has an **index** of 5.

- Surd

  A **surd** is an irrational number that can be expressed with roots.

  E.g. Let a be rational number and n be a positive integer such that $(a)^{(1/n)} = \sqrt[n]{a},$ Then a is called a surd of order n.

Laws of Indices:

1. $a^m \times a^n = a^{m+n}$
2. $(a^m)^n = a^{mn}$
3. $(ab)^n = a^n b^n$

4. $\frac{a^m}{a^n} = a^{m-n}$
5. $a^0 = 1$
6. $\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}$
7. $a^{-n} = \frac{1}{a^n}$

Laws of Surds:

1. $\sqrt[n]{a} = a^{(1/n)}$
2. $\sqrt[m]{\sqrt[n]{a}} = \sqrt[mn]{a}$
3. $\sqrt[n]{\frac{a}{b}} = \left(\frac{a}{b}\right)^{\frac{1}{n}}$

Solved examples:

1. Divide 12 by $3\sqrt{2}$.

Solution:

$$\frac{12}{3\sqrt{2}} = \frac{4}{\sqrt{2}} = \frac{4\times\sqrt{2}}{\sqrt{2}\times\sqrt{2}} = 2\sqrt{2}.$$

2. Simplify$(125)^{-2/3}$.

Solution:

$$(125)^{-2/3} \quad = (5\ \times 5\ \times 5)^{-2/3} = (5)^{3\times\frac{-2}{3}}$$

$$= 5^{-2} = \frac{1}{5^2}$$

$$= \frac{1}{25}$$

3. $15^4 \times 15^x = 15^6$ Find the value of x.

Solution:
$15^4 \times 15^x = 15^6$

⇨ $15^x = \frac{15^6}{15^4}$

⇨ $15^x = 15^2$

⇨ x = 2

4. If $2^a = 64$, then find the value of 2^{a-3}.

Solution:

We have $2^a = 64$ (Since the LHS contains a power of 2 so the RHS must be expressed in terms of some power of 2)

⇨ $2^a = 2^6$

⇨ a = 6

∴ $2^{a-3} = 2^{6-3} = 2^3 = 8$.

Unit -2: Basic concepts, Different formulae of Percentage, Profit and Loss, Discount, Simple interest, Ratio and Proportion, Mixture

Definitions:

Percentage is a fraction whose denominator is always 100. x percentage is represented by

$$x\,\% = \frac{x}{100}$$

Example - 25 % $= \frac{25}{100} = \frac{1}{4}$

Formulae:

1. To express $\frac{x}{y}$ as a percentage
   We know that $\frac{x}{y} = \left(\frac{x}{y} \times 100\right)\%$
   E.g.- $\frac{1}{4} = \left(\frac{1}{4} \times 100\right)\% = 25\%$

2. If A is R % more than B , then B is less than A by $\left(\frac{R}{R+100} \times 100\right)\%$.

3. If A is R % less than B , then B is more than A by $\left(\frac{R}{100-R} \times 100\right)\%$.

4. If the price of a commodity increases by R % , then reduction in consumption as not to increase the expenditure is $\left(\frac{R}{R+100} \times 100\right)\%$.

5. If the price of a commodity decreases by R % , then increase in consumption as not to decrease the expenditure is $\left(\frac{R}{100-R} \times 100\right)\%$.

6. Results on Population : Let the population of a town be P now and suppose increases at the rate of R % per annum , then :

   i) Population after n years = $P\left(1 + \frac{R}{100}\right)^n$.

ii) Population n years ago = $\frac{P}{\left(1+\frac{R}{100}\right)^{n}}$

7. Results on Depreciation: Let the present value of a machine be P . Suppose it depreciates at the rate of R % per annum , then :

i) Value of machine after n years = $P\left(1-\frac{R}{100}\right)^{n}$

ii) Value of machine n years ago = $\frac{P}{\left(1-\frac{R}{100}\right)^{n}}$

8. To remember :

$\frac{1}{2} = 50\ \%$

$\frac{1}{4} = 25\ \%$

$\frac{1}{6} = 16\frac{2}{3}\ \%$

$\frac{1}{8} = 12\frac{1}{2}\ \%$

$\frac{1}{10} = 10\ \%$

$\frac{1}{12} = 8\frac{1}{3}\ \%$

$\frac{1}{3} = 33\frac{1}{3}\ \%$

$\frac{1}{5} = 20\ \%$

$\frac{1}{7} = 14\frac{2}{7}\ \%$

$\frac{1}{9} = 11\frac{1}{9}\ \%$

$\frac{1}{11} = 9\frac{1}{11}\ \%$

$\frac{1}{13} = 7\frac{9}{13}\ \%$

Solved examples:

1. Find 8 % of 625.

Solution : $\frac{8}{100} \times 625 = 50.$

2. Ram’s salary is increased from Rs. 24,000 to Rs. 30,000. Find the increased % .

Solution :

Increase in salary = Rs.30,000 – Rs.24,000 = Rs. 6000

% Increase = $\frac{6000}{24000} \times 100 = 25\ \%$.

3. In an election, candidate A got 75% of the total valid votes. If 15% of the total votes were declared invalid and the total numbers of votes is 560000, find the number of valid vote polled in favor of candidate.

Solution:

Given that 15% of the total votes were invalid. So we have, Total number of valid votes = 85 % of 560000

$$= \frac{85}{100} \times 560000$$

$$= \frac{47600000}{100}$$

= 476000

Percentage of votes polled in favor of candidate A = 75 %

Therefore, the number of valid votes polled in favors of candidate A = 75 % of 476000

$$= \frac{75}{100} \times 476000$$

$$= \frac{35700000}{100}$$

= 357000

4. Rama had Rs.2100 left after spending 30 % of the money he took for shopping. How much money did he take along with him?

Solution:

Let the money Rama took along with him be 100%.

Given that he spent 30 % of the money for shopping. So money left with him is 70% of the money.

But money left with him = Rs. 2100

Therefore 70%= Rs. 2100

- ⇨ 100% = Rs 2100$\times \frac{100}{70}$
- ⇨ 100% = Rs 3000

Therefore, the money he took for shopping is Rs 3000.

5. A shopkeeper bought 600 oranges and 400 bananas. He found 15% of oranges and 8% of bananas were rotten. Find the percentage of fruits in good condition.

Solution:

Total number of fruits shopkeeper bought = 600 + 400 = 1000

Given that 15% of oranges and 8% of bananas were rotten. So he had 85% of oranges & 92 % of bananas in good condition.

Number of oranges in good condition = 85% of 600

$= \frac{85}{100} \times 600$

= 510

Number of bananas in good condition= 92 % of 400

$= \frac{92}{100} \times 400$

=368

Therefore Number of fruits in good condition = 510+ 368 = 878

Therefore Percentage of fruits in good condition = $(\frac{878}{1000} \times 100)\%$

= 87.8%

PROFIT & LOSS

Definitions:

- Cost Price: The price at which an article is purchased is called its cost price and it is denoted by CP.
- Selling Price: The price at which an article is sold is called its selling price and denoted by SP.
- Profit (P) :If SP is greater than CP, then seller is said to have a profit.
- Loss (L) : If SP is less than CP , then seller is said to have a loss.
- Marked price: MRP of an article is known as marked price or labeled price and denoted by MP.
- Discount : Discount is a percentage of the MP.

***** Profit and loss are always counted on CP.

***** Discount is always carried on MP.

Formulae:

1. P = SP – CP
2. L = CP – SP
3. P % = $\frac{P}{CP} \times 100$
4. L % = $\frac{L}{CP} \times 100$
5. SP = $\frac{100+P\,\%}{100} \times CP$
6. SP = $\frac{100-L\,\%}{100} \times CP$
7. CP = $\frac{100}{100+P\,\%} \times SP$
8. CP = $\frac{100}{100-L\%} \times SP$
9. Discount (D) = MP - SP
10. Discount % = $\frac{Discount}{MP} \times 100$
11. SP = $\frac{100-D\,\%}{100} \times MP$

Solved examples:

1. A person purchased an article for Rs. 80 and sold it for Rs.120. Find his % of profit.

Solution :

CP of the article = Rs. 80

SP of the article = Rs. 120

Profit = SP – CP

= Rs. 120 – Rs. 80 = Rs. 40

Profit % = $\frac{40}{80} \times 100$ = 50 %.

2. By selling a fan for Rs 649, Anil earns a profit of 18%. Find its cost price.

Solution:

S.P. of the fan = Rs 649, profit = 18%

Therefore, Rs 649 = $(1 + \frac{18}{100})$ of C.P.

⇨ Rs 649 = $\frac{118}{100}$ of C.P.

⇨ C.P. = Rs $(649 \times \frac{100}{118})$ = Rs 550

Hence the cost price of the fan = Rs 550.

3. Sammy sold his dining table set at a loss of 20%. If he had sold it for Rs. 800 more, he would have received a profit of 5%. Find the cost price.

Solution :

Let the cost price be Rs. 100

So when C.P = 100 , loss of 20% means

S.P = 100 – 20 = 80

Profit of 5% means S.P = 100 + 5 = 105

The difference of two S.P = 105 - 80 = 25

If the difference is 25, C.P = Rs100

If the difference is Rs 800 , C.P = (100 / 25) x 800

C.P = Rs 3200

4. The cost of 11 pencils is equal to the selling price of 10 pencils. Find the loss or profit percent, whatever may be the cost of 1 pencil.

Solution:

The cost price of 11 pencils = S.P of 10 pencils

Let C.P of 1 pencil is Rs.1.

C.P of 10 pencils = Rs. 10

S.P of 10 pencils = C.P of 11 pencils = Rs. 11

Profit on 10 pencils = 11 – 10 = Rs. 1

Profit % = ($\frac{1}{10}$) x 100 = 10 %.

5. A person sold an article at a profit of 12 %. If he had sold it Rs. 4 more, he would have gained 20 %. What is the cost price?

Solution:

Let the CP of an article be Rs x. Then,

112 % of x + 4 = 120 % of x

⇨ 120 % of x - 112 % of x = 4

⇨ 8 % of x = 4

⇨ $\frac{8}{100} \times x = 4$

⇨ $x = 4 \times \frac{100}{8}$ = 50.

DISCOUNT

Solved examples:

1. If the Marked Price of an article is Rs 1000, then what is the Selling Price at a discount rate of 20%?

Solution:

Given MP of an article= Rs. 1000

D%=20

So SP= 1000$\times \frac{80}{100} = 800.$

2. Find the selling price of an article after two successive discount 10% & 20% if the marked price is Rs. 2500.

Solution:

Given MP of an article = Rs. 2500

SP = $\frac{100-D\,\%}{100} \times MP$

So after first discount 10%, SP = $\frac{100-10}{100} \times 2500 = Rs. 2250$

Now the new MP is = Rs. 2250

After 20% successive discount SP = $\frac{100-20}{100} \times 2250 = Rs. 1800$

3. If the marked price of an article is 13% more than CP and a shopkeeper allows a discount of 10%. Find the profit/ loss percentage?

Solution:

Let CP of the article be Rs. 100.

Then MP = 113% of 100 = 113

Discount = 10%

SP = $113 \times \frac{90}{100}$

= 101.7

P = $SP - CP = 101.7 - 100 = 1.7$

% P = $\frac{P}{CP} \times 100 = \frac{1.7}{100} \times 100$ = 1.7 %

4. After getting two successive discounts, a shirt with MRP Rs. 500 is available at Rs.420. If the first discount is 12.5% then find out the percentage of second discount.

Solution:

Let the second discount be x %.

Thus, (100 – x) % of 87.5% of 500 = 420

⇨ $\frac{100-x}{100} \times \frac{87.5}{100} \times 500 = 420$

⇨ 100 - x = 96

⇨ x = 4 %.

5. At what % above the CP must an article be marked so as to gain 17 % allowing 10 % discount?

Solution:

Let CP of the article be 100.

Then SP = 117

Let MP of the article be x. Now,

90 % of x = 117

⇨ $\frac{90}{100} \times x = 117$

⇨ $x = 117 \times \frac{100}{90} = 130.$

So, MP = 30 % above CP.

SIMPLE INTEREST

Definition :

- Principal (P): The money borrowed or lent out for a certain period is called principal.
- Interest (I): Extra money paid for using other 's money is called interest.
- Simple Interest (S.I) : If the interest on the money borrowed is paid uniformly , then it is called simple interest.

Formulae :

1. S.I = $\frac{P \times R \times T}{100}$

   Where , P = principal

   R = rate percent per annum

   T = time period (Number of years)

2. Amount (A) = P + S.I

Conversions

1. Case I : If S.I , R and T are known ,

   P = $\frac{S.I \times 100}{R \times T}$

2. Case II : If S.I , P and T are known ,

   R = $\frac{S.I \times 100}{P \times T}$

3. Case III : If S.I , P and R are known ,

   T = $\frac{S.I \times 100}{P \times R}$

Solved examples:

1. Find S.I on Rs 2000 at the rate of interest 10 % p.a. for 2 years .

Solution:

S.I = $\frac{P \times R \times T}{100}$

= $\frac{2000 \times 10 \times 2}{100}$

= Rs. 400

2. Find S.I and the amount on Rs. 4000 at a rate of interest 5 % for 6 months.

Solution:

Here, P = Rs. 4000 , R = 5 % , T = 6 months = $\frac{6}{12}$ years = $\frac{1}{2}$ year

S.I = $\frac{P \times R \times T}{100}$

= $\frac{4000 \times 5 \times 1}{100 \times 2}$ = Rs. 100

Amount = P + S.I

= Rs. 4000 + Rs. 100 = Rs. 4100

3. In what time will Rs. 3100 amount to Rs. 6200 at 4 % p.a ?

Solution :

Here , P = Rs. 3100 , R = 4 % , A = Rs. 6200

So, Interest = Rs. 6200 – Rs. 3100 = Rs. 3100

$$T = \frac{3100 \times 100}{3100 \times 4} = 25 \text{ years}$$

4. A sum of money put at S.I doubles itself in 8 years . In how many years it will become five times ?

Solution :

Let Principal be P. Then, Amount = 2 P

⇨ S.I = 2P - P = P

Using, S.I $= \frac{P \times R \times T}{100}$

⇨ $P = \frac{P \times R \times 8}{100}$

⇨ $R = \frac{100}{8}$-

Again Principal = P

⇨ Amount = 5 P

⇨ S.I = 5 P – P = 4 P

Again using, S.I $= \frac{P \times R \times T}{100}$

⇨ $4P = \frac{P \times \frac{100}{8} \times T}{100}$

⇨ T = 4 × 8 = 32 years.

5. If S.I is $\frac{1}{4}$th of the principal and the number of years is equal to rate of interest , then find the rate percent p.a.?

Solution :

Let Principal = P

⇨ S.I $= \frac{1}{4} P$

Let Rate of interest be x .

As per the question, Time = rate of interest = x .

$$S.I = \frac{P \times R \times T}{100}$$

⇨ $\frac{1}{4} P = \frac{P \times x \times x}{100}$

⇨ $x^2 = \frac{100}{4} = 25$

⇨ $x = 5$

RATIO AND PROPORTION

Definition:

- Ratio: The ratio of two quantities a and b in the same units is the fraction $\frac{a}{b}$ and we write it as a : b. In the ratio a : b , a is the first term or antecedent and b is the second term or consequent.

  Example - In the ratio 5 : 9 , 5 is the antecedent and 9 is the consequent.

- Proportion: The equality of two ratios is called proportion.

  If a : b = c : d , then **a, b , c** and **d** are in proportion and can also be written as a : b : : c : d

Solved examples:

1. Divide 240 into two parts in the ratio 2 : 3.

Solution –

Let the first part be 2x and the second part be 3x.

Now, $2x + 3x = 240$

⇨ $5x = 240$

⇨ $x = 48$

So $2x = 2 \times 48 = 96$ and $3x = 3 \times 48 = 144$.

2. Find three numbers in the ratio 1 : 3 : 5 so that the sum of their squares is equal to 315.

Solution –

Let the numbers be x , 3x , 5x.

Now, we have

$x^2 + (3x)^2 + (5x)^2 = 315$

⇨ $x^2 + 9x^2 + 25x^2 = 315$

⇨ $35x^2 = 315$

⇨ $x^2 = 9$

⇨ $x = 3$

⇨ $3x = 9$ & $5x = 15$

∴ The required numbers are 3, 9 and 15.

3. A mixture contains milk and water in the ratio 5 : 4. If 5 litres of water is added to the mixture, the ratio becomes 5 : 6 . Find the quantity of milk in the given mixture.

Solution –

Let the quantity of milk and water be 5x and 4x litres respectively. Then, $\frac{5x}{4x+5} = \frac{5}{6}$

⇨ 30x = 20x + 25

⇨ 10x = 25

⇨ x = 2.5 litres

⇨ 5x = 5 × 2.5 = 12.5 litres

Thus, the quantity of milk in the given mixture is 12.5 litres.

4. The sides of a triangle are in the ratio $\frac{1}{2} : \frac{1}{3} : \frac{1}{4}$ and its perimeter is 78 cm. Find the length of the sides of the triangle.

Solution –

Let the sides of the triangle be a = $\frac{1}{2}x$, $b = \frac{1}{3}x$, $c = \frac{1}{4}x$

Given, Perimeter of the triangle is 78 cm.

⇨ $\frac{1}{2}x + \frac{1}{3}x + \frac{1}{4}x = 78$

⇨ $\frac{13}{12}x = 78$

⇨ $x = 72$ cm

⇨ a = 36 cm , b = 24 cm and c = 18 cm .

MIXTURE & ALLIGATION

Definition:

- Alligation**:** It is a rule that enables us to find the ratio in which two or more ingredients at the given price must be mixed to produce a mixture of desired price.
- CP of the mixture: It is the cost price of a unit quantity of mixture.

- It is a modified form of finding the weighted average. If 2 ingredients are mixed in a ratio and the cost price of the unit quantity of the mixture, called the cost of mixture per kg is given then,

⇨ $Q_c \times (m - c) = Q_d \times (d - m)$

- Here 'd' is the cost of dearer ingredient, 'm' is the cost of mixture per kg and 'c' is the cost of cheaper ingredient. Q_c & Q_d are the quantity of the cheaper and dearer ingredient respectively.

Solved examples:

1. The cost of Type 1 material is Rs. 15 per kg and Type 2 material is Rs.20 per kg. If both Type 1 and Type 2 are mixed in the ratio of 2 : 3, then what is the price per kg of the mixed variety of material?

Solution –

Cost Price (CP) of Type 1 material is Rs. 15 per kg
Cost Price (CP) of Type 2 material is Rs. 20 per kg

Type 1 and Type 2 are mixed in the ratio of 2 : 3.

Hence Cost Price (CP) of the resultant mixture

$$= \frac{(15 \times 2) + (20 \times 3)}{(2 + 3)} = \frac{90}{5} = 18$$

Price per kg of the mixed variety of material = Rs.18.

2. A mixture of 30 litres of milk and water contains 30% of water. The new mixture is formed by adding 10 lit of water. What is the percentage of water in the new mixture?

   Solution -

   Quantity of water in the 30 litre mixture = $\frac{30}{100} \times 30 = 9$ litre
   After adding 10 litre of water, quantity of water becomes 19 litre and total quantity becomes 40 litre.
   Percentage of water = $\frac{19}{40} \times 100 = 47.5\%$

3. Tea worth of Rs. 135/kg & Rs. 126/kg are mixed with a third variety in the ratio 1: 1 : 2. If the mixture is worth Rs. 153 per kg, the price of the third variety per kg will be ?

   Solution –

   Let the price of the third variety of tea be Rs. x.

   Given that Tea worth of Rs. 135/kg , Rs. 126/kg &Rs. x/kg are mixed in the ratio 1: 1 : 2 and the mixture is worth Rs. 153 per kg

   Now we have, $\frac{135 \times 1 + 126 \times 1 + x \times 2}{1+1+2} = 153$

   ⇨ $\frac{135 + 126 + 2x}{4} = 153$

   ⇨ $261 + 2x = 153 \times 4 = 612$

   ⇨ $2x = 612 - 261 = 351$

⇨ x = 175.50

Hence, price of the third variety = Rs.175.50 per kg.

4. A merchant has 1000 kg of sugar part of which he sells at 8% profit and the rest at 18% profit. He gains 14% on the whole. The Quantity sold at 18% profit is?

Solution –

By the rule of alligation:

$Q_c \times (m - c) = Q_d \times (d - m)$

⇨ $\frac{Q_c}{Qd} = \frac{(d - m)}{(m - c)} = \frac{18-14}{14-8} = \frac{4}{6} = \frac{2}{3}$

So, ratio of cheaper quantity and dearer quantity = 2 : 3

∴ Quantity of dearer part $= \frac{3}{5} \times 1000 = 600$ Kg

5. A mixture of 150 litres of wine and water contains 20% water. How much more water should be added so that water becomes 25% of the new mixture?

Solution –

Number of litres of water in 150 litres of the mixture = 20% of 150 = $\frac{20}{100} \times 150$ = 30 litres

Let us assume that another 'P' litre of water is added to the mixture to make water 25% of the new mixture. So, the total amount of water becomes (30 + P) and the total volume of the mixture becomes (150 + P)

Thus, (30 + P) = 25% of (150 + P)

⇨ $30 + P = \frac{25}{100} \times (150 + P)$

⇨ $30 + P = \frac{(150 + P)}{4}$

⇨ $120 + 4P = 150 + P$

- ⇨ $4P - P = 30$
- ⇨ $3P = 30$

∴ We get P = 10 litres.

Unit- 3: Time and Work, Pipes and Cisterns, Basic concepts of Time, Distance and Speed ; relationship among them

- Work done is dependent on factors like number of persons working, number of days, number of hours working per day etc.,If M1 persons working D1 days can complete W1 amount of work and M2 persons working D_2 days can complete W_2 amount of work , then we have a general formula in the relationship of

$$\frac{M_1D_1}{W_1} = \frac{M_2D_2}{W_2}$$

$$\Rightarrow \; M_1D_1W_2 = M_2D_2W_1$$

- If we include the working hours (say, T_1 and T_2) for the two groups and efficiency (say, E_1 and E_2) of the persons in two groups , then the relationship is

$$\frac{M_1D_1T_1E_1}{W_1} = \frac{M_2D_2T_2E_2}{W_2}$$

$$\Rightarrow \; M_1D_1W_2T_1E_1 = M_2D_2W_1T_2E_2$$

Important Formulae

1. Work from days
If A can do a piece of work in n days, then A's 1 day's work = $\frac{1}{n}$

2. Days from Work
If A's 1 day's work = $\frac{1}{n}$, then A can finish the work in n days.

3. Ratio

a) If A is thrice as good a workman as B, then ,

   i. Ratio of work done by A and B =3:1.

   ii. Ratio of times taken by A and B to finish a work =1:3

b) If A is x times as good a workman as B, then he will take $(\frac{1}{x})^{th}$ of the time by B to do the same work.

1. A and B can do a piece of work in 'x' days and 'y' days respectively, then working together, they will take $\left(\frac{xy}{x+y}\right)$ days to finish the work and in one day, they will finish $\left(\frac{x+y}{xy}\right)^{th}$ part of work.

Solved examples:

1. A can do piece of work in 30 days while B alone can do it in 40 days. In how many days can A and B working together do it?

Solution –

A′s one day’s work = $\frac{1}{30}$

B′ s one day’s work = $\frac{1}{40}$

(A+B)′s one day’s work = $\frac{1}{30} + \frac{1}{40} = \frac{4+3}{120} = \frac{7}{120}$

$\therefore$ Number of days required for A and B to finish the work = $\frac{1}{7/120} = \frac{120}{7} = 17\frac{1}{7}$ days.

This can also be calculated by using the formula as…

2. To complete a piece of work A and B take 8 days, B and C 12 days. A, B and C take 6 days. A and C will take **:**

Solution –

Given (A+B)'s one day’s work = $\frac{1}{8}$

(B+C)'s one day’s work = $\frac{1}{12}$

(A+B+C)'s 1 day's work = $\frac{1}{6}$

Work done by A, alone = (A+B+C)'s 1 day's work - (B+C)'s one day's work

$= \frac{1}{6} - \frac{1}{12}$

$= \frac{1}{12}$

Work done by C, alone = (A+B+C)'s 1 day's work - (A+B)'s one day's work

$= \frac{1}{6} - \frac{1}{8}$

$= \frac{1}{24}$

(A+C)'s one day's work = $\frac{1}{12} + \frac{1}{24} = \frac{1}{8}$

∴ (A+C) will take 8 days to complete the work together.

3. A and B can do a piece of work in 45 days and 40 days respectively. They began to do the work together but A leaves after some days and then B completed the remaining work in another 23 days. The number of days after which A left the work was?

Solution –

(A+B)'s 1 day's work = $\frac{1}{45} + \frac{1}{40} = \frac{17}{360}$

Work done by B in 23 days = $1 \times \frac{23}{40} = \frac{23}{40}$

Remaining work = $1 - \frac{23}{40} = \frac{17}{40}$

Now, $\frac{17}{360}$ work was done by (A+B) in 1 day.

$\frac{17}{40}$ Work was done by (A+B) in $1 \times \frac{360}{17} \times \frac{17}{40} =$ 9 days

∴ A left after 9 days.

4. A and B undertake to do a piece of work for Rs 600. A alone can do it in 6 days while B alone can do it in 8 days. With the help of C, they can finish it in 3 days, Find the share of C in Rs?

Solution –

A’s one day’s work = $\mathbf{\frac{1}{6}}$

B’s one day’s work = $\mathbf{\frac{1}{8}}$

(A+ B + C)’s one day’s work = $\mathbf{\frac{1}{3}}$

⇨ C’s one day’s work,= $\left(\frac{1}{3}\right) - \left(\frac{1}{6} + \frac{1}{8}\right)$

$= \frac{1}{24}$

Therefore, A : B : C = Ratio of their one day’s work

$= \frac{1}{6} : \frac{1}{8} : \frac{1}{24}$

C’s share for 3 days = $\frac{1}{24} \times 3 \times 600$ = Rs. 75

5. A can build up a structure in 8 days and B can break it in 3 days. A has worked for 4 days and then B joined to work with A for another 2 days only. In how many days will A alone build up the remaining part of the structure?

Solution –

A can build the structure in 8 days.

Fraction of structure built in a day by A = $\frac{1}{8}$

Similarly, fraction of structure broken by B in a day = $\frac{1}{3}$

Amount of work done by A in 4 days = $\frac{4}{8} = \frac{1}{2}$

Now, both A and B together for 2 days.

Amount of work done by A in 2 days = $\frac{2}{8} = \frac{1}{4}$

Amount of structure broken by B in 2 days = $\frac{2}{3}$

Fraction of structure built = $\left(\frac{1}{2} + \frac{1}{4}\right) - \frac{2}{3} = \frac{1}{12}$

Fraction of structure still to be built = $1 - \frac{1}{12} = \frac{11}{12}$

If A takes x days to build up the remaining structure, then $\frac{x}{8} = \frac{11}{12}$

⇨ x = 22/3 days.

PIPES AND CISTERN

A pipe is connected to a tank or cistern. It is used to fill or empty the tank; accordingly, it is called an inlet or an outlet.

- Inlet pipe: A pipe which is connected to fill a tank is known as an inlet pipe.
- Outlet pipe: A pipe which is connected to empty a tank is known as an outlet pipe.

Important Formulae

1. If an inlet connected to a tank fills it in x hours, part of the tank filled in one hour is = $\frac{1}{x}$

2. If an outlet connected to a tank empties it in y hours, part of the tank emptied in one hour is = $\frac{1}{y}$

3. An inlet can fill a tank in x hours and an outlet can empty the same tank in y hours. If both the pipes are opened at the same time and $y > x$, the net part of the tank filled in one hour is given by;

$$= \left(\frac{1}{x} - \frac{1}{y}\right)$$

4. An inlet can fill a tank in x hours and another inlet can fill the same tank in y hours. If both the inlets are opened at the same time, the net part of the tank filled in one hour is given by;

$$= \left(\frac{1}{x} + \frac{1}{y}\right)$$

Solved examples:

1. Two pipes A and B can fill a tank in 12 and 24 minutes respectively. If both the pipes are used together, then how long will it take to fill the tank?

Solution –

Part filled by pipe A in 1 minute = $\frac{1}{12}$

Part filled by pipe B in 1 minute = $\frac{1}{24}$

Part filled by pipe A and pipe B in 1 minute

$$= \frac{1}{12} + \frac{1}{24} = \frac{1}{8}$$

∴ Both the pipe together can fill the tank in 8 minutes.

2. Pipes A and B can fill a tank in 5 and 6 hours respectively. Pipe C can empty it in 12 hours. If all the three pipes are opened together, then the tank will be filled in:

Solution –

Pipes A and B can fill the tank in 5 and 6 hours respectively. Therefore,
part filled by pipe A in 1 hour = $\frac{1}{5}$
part filled by pipe B in 1 hour = $\frac{1}{6}$

Pipe C can empty the tank in 12 hours. Therefore,
part emptied by pipe C in 1 hour = $\frac{1}{12}$

Net part filled by Pipes A,B,C together in 1 hour,

$$\Rightarrow \quad \frac{1}{5}+\frac{1}{6}-\frac{1}{12}=\frac{17}{60}$$

This is a positive number. This means rate of filling is greater than rate of emptying and so the tank can be filled in some hours.

$\therefore$ The tank can be filled in $\frac{60}{17} = 3\frac{9}{17}$ hours.

3. Two pipes A and B can fill a cistern in $37\frac{1}{2}$ minutes and 45 minutes respectively. Both pipes are opened. The cistern will be filled in just half an hour, if pipe B is turned off after what time?

Solution –

Pipe A alone can fill the cistern in $37\frac{1}{2} = \frac{75}{2}$ minutes.

B was closed after some minutes but A was open for 30 minutes.

Since A was open for 30 minutes, part of the cistern filled by pipe A = $\frac{2}{75} \times 30 = \frac{4}{5}$

So the remaining $= 1 - \frac{4}{5} = \frac{1}{5}$ part is filled by pipe B.

Pipe B can fill the cistern in 45 minutes. So, time required to fill $\frac{1}{5}$ part

$$= \frac{45}{5} = 9 \text{ minutes.}$$

$\therefore$ Pipe B is turned off after 9 minutes.

4. A water tank is two-fifth full. Pipe A can fill a tank in 12 minutes and pipe B can empty it in 6 minutes. If both the pipes are open, how long will it take to empty or fill the tank completely?

Solution –

Since pipe B is faster than pipe A, the tank will be emptied.

Part filled by pipe A in 1 minute = $\frac{1}{12}$

Part emptied by pipe B in 1 minute = $\frac{1}{6}$

Net part emptied by pipe A and B in 1 minute = $\frac{1}{6} - \frac{1}{12} = \frac{1}{12}$

So in 12 minutes, they will empty a full tank.

$\therefore$ Time taken to empty $\frac{2}{5}$ of the tank = $\frac{2}{5} \times 12 = 4.8$ min.

5. Three pipes A, B and C can fill a tank in 6 hours. After working at it together for 2 hours, C is closed and A and B can fill the remaining part in 7 hours. The number of hours taken by C alone to fill the tank is:

Solution –

A, B, C together can fill a tank in 6 hours.

⇨ Part filled by pipes A,B,C together in 1 hr = $\frac{1}{6}$

All these pipes are open for only 2 hours and then C is closed.

Part filled by pipes A,B,C together in these 2 hours = $\frac{2}{6} = \frac{1}{3}$

Remaining part = $1 - \frac{1}{3} = \frac{2}{3}$

This remaining part of $\frac{2}{3}$ is filled by pipes A and B in 7 hours.

Therefore, part filled by pipes A and B in 1 hr = $\frac{\left(\frac{2}{3}\right)}{7} = \frac{2}{21}$

Part filled by pipe C in 1 hr

$= \frac{1}{6} - \frac{2}{21} \quad = \frac{3}{42} = \frac{1}{14}$

∴ C alone can fill the tank in 14 hours.

TIME , DISTANCE AND SPEED

Relationship between Speed, Distance and Time –

1. Speed = $\frac{Distance}{Time}$
2. Distance = Speed × Time
3. Time = $\frac{Distance}{Speed}$

When using these equations, it is important to keep the units straight. For instance, if the rate of the problem is given in kilometres per hour (kmph), then the time needs to be in hours , and the distance in kilometres. If the time is given in minutes, you will need to divide by 60 to convert it to hours before you can use the equation to find the distance in kilometres.

- **Convert kilometres per hour (km/hr) to metres per second (m/s)**

$$\boxed{x \text{ km / hr} = \left(x \times \frac{1000}{3600}\right) \text{ m / s} = \left(x \times \frac{5}{18}\right) \text{ m / s}}$$

- **Convert metres per second (m/s) to kilometres per hour (km/hr)**

$$\boxed{x \text{ m / s} = \left(x \times \frac{3600}{1000}\right) \text{ km / hr} = \left(x \times \frac{18}{5}\right) \text{ km / hr}}$$

❖ Average Speed

If an object covers a certain distance at x kmph and an equal distance at y kmph, the average speed of the whole journey = $\frac{2xy}{x+y}$ km / hr

❖ If the ratio of the speeds of A and B is $a : b$, then, the ratio of the time taken by them to cover the same distance is

$\frac{1}{a} : \frac{1}{b} = b : a$

- **Relative Speed**
  - If two objects are moving in the same direction at v_1 m/s and v_2 m/s respectively where $v_1 > v_2$, then their relative speed = $(v_1 - v_2)$ m / s
  - If two objects are moving in opposite directions at v_1 m/s and v_2 m/s respectively, then their relative speed = $(v_1 + v_2)$ m/s

Solved examples:

1. a) Express speed of 72 km / hr in m / s .
b) Express speed of 25 m / s in km / hr .

Solution –

a) 72 km / hr = $\left(72 \times \frac{5}{18}\right)$ m / s = 20 m / s

b) 25 m / s = $\left(25 \times \frac{18}{5}\right)$ km / hr = 90 km / hr

2. A person crosses a 600 metre long street in 5 minutes. What is his speed in km per hour?

Solution –

Distance =600 metre = 0.6 km

Time = 5 minutes = $\frac{1}{12}$ hour

Speed = $\frac{Distance}{Time}$ = $\frac{0.6}{1/12}$ = 7.2 km/hr.

3. A man completes a journey in 10 hours. He travels first half of the journey at the rate of 21km/hr and second half at the rate of 24 km/hr. Find the total journey in km.

Solution –

Average Speed = $\frac{2xy}{x+y}$
= $\frac{2 \times 21 \times 24}{21 + 24}$ km / hr = 22.4 km / hr

Total distance = 22.4×10=224 km.

4. In covering a distance of 30 km, Arun takes 2 hours more than Anil. If Arun doubles his speed, then he would take 1 hour less than Anil. What is Arun's speed?

Solution –

Let speed of Arun = x kmph,
speed of Anil = y kmph
distance = 30 km

We know that Time = $\frac{Distance}{Speed}$ Hence,

$\frac{30}{x} - \frac{30}{y} = 2 \cdots(1)$

$\frac{30}{y} - \frac{30}{2x} = 1 \cdots(2)$

Adding (1)and (2)

$\frac{30}{x} - \frac{30}{2x} = 3$

⇨ $\frac{30}{2x} = 3$

⇨ $\frac{15}{x} = 3$

⇨ $\frac{5}{x} = 1$

⇨ x = 5

∴ Arun's speed = 5 kmph.

5. A man travelled a distance of 61 km in 9 hours. He travelled partly on foot at 4 km/hr and partly on bicycle at 9 km/hr. What is the distance travelled on foot?

Solution-

Let the time in which he travelled on foot = x hr
Then the time in which he travelled on bicycle = (9−x) hr

Distance = speed × time

⇨ 4x + 9(9−x) = 61

⇨ 4x + 81− 9x = 61

⇨ 5x = 20

⇨ x = 4

∴ Distance travelled on foot = 4x = 16 km.

Unit – 4: Concept of Angles, Different Polygons like triangles, rectangle, square, right angled triangle, Pythagorean Theorem, Perimeter and Area of Triangles, Rectangles, Circles

Concept of Angle

In plane geometry, an **angle** is the figure formed by two rays, called the sides of the angle, sharing common endpoint, called the vertex of the angle.

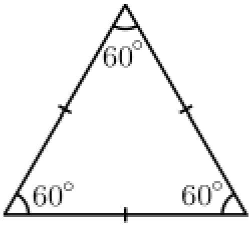
- Angles smaller than 90°are called **acute angles.**
- An angle equal to 90° is called a **right angle.**
- Angles larger than a right angle and smaller than 180° are called **obtuse angles**.

Triangle

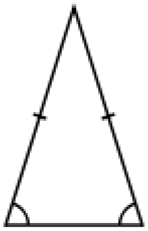
A **triangle** is a polygon with three edges and three vertices. The sum of the 3 angles of a triangle is 180°.

Types of triangle:

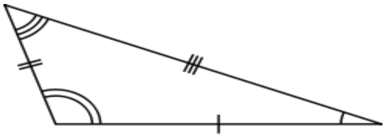
1. An **equilateral triangle** has all sides the same length. An equilateral triangle is also a regular polygon with all angles measuring 60°.



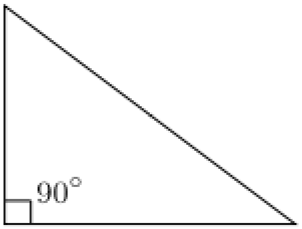
2. An **isosceles triangle** has two sides of equal length. An isosceles triangle also has two angles of the same measure, namely the angles opposite to the two sides of the same length.



3. A **scalene triangle** has all its sides of different lengths. Equivalently, it has all angles of different measure.



4. A **right triangle** (or right-angled triangle) has one of its interior angles measuring 90° (a right angle). The side opposite to the right angle is the hypotenuse, the longest side of the triangle.



Perimeter and area

Let the length of the three sides of a triangle be a , b , c. Then,

- Perimeter of the triangle = a + b + c
- Area of the triangle $= \frac{1}{2} \times base \times height$
- Area = $\sqrt{s\,(s-a)(s-b)(s-c)}$ (if all the sides are given)

  Where s = $\frac{1}{2}(a + b + c)$

❖ Let the side of an equilateral triangle be a . Then ,

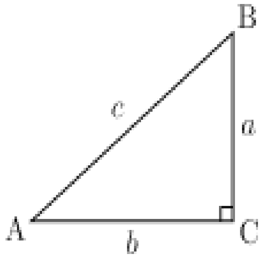
➢ Perimeter of equilateral the triangle = 3 a

➢ Area of the equilateral triangle = $\frac{\sqrt{3}}{4} \times a^2$

Pythagorean Theorem

It states that the square of the hypotenuse (the side opposite the right angle) is equal to the sum of the squares of the other two sides.

$$\boxed{a^2 + b^2 = c^2}$$



Solved examples:

1. Find the perimeter of the triangle having length of the sides 5 cm, 8 cm, 7 cm.

Solution:

Let a , b, c be the length of the sides of the given triangle.

So a = 5 cm, b = 8 cm, c = 7 cm.

Perimeter of the triangle = (a + b + c) cm
= (5 + 8 + 7) cm
= 20 cm.

∴ Perimeter of the given triangle is 20 cm.

2. Find the area of the triangle whose sides measure 13 cm , 14 cm , 15 cm.

Solution –

Let a = 13 cm , b = 14 cm , c = 15 cm.

Then $s = \frac{1}{2}(a + b + c)$

$= \frac{1}{2}(13 + 14 + 15)$ = 21 cm.

Area of the triangle = $\sqrt{s\,(s-a)(s-b)(s-c)} = \sqrt{21\,(21-13)(21-14)(21-15)}$

$= \sqrt{21 \times 8 \times 7 \times 6}$

= 84 cm^2

∴ Area of the triangle is 84 cm^2.

3. Let the perimeter of an equilateral triangle be 27 cm. Then find the length of its sides.

Solution:

Given perimeter of the equilateral triangle = 27 cm

Let a be the length of the side of the equilateral triangle.

⇨ $3a = 27$

⇨ $a = \frac{27}{3} = 9\ cm$

∴ Length of the side of the equilateral triangle is 9 cm.

4. Find the area of the equilateral triangle having sides of length 8 cm.

Solution:

Given length of the side of the equilateral triangle = 8 cm

Area of the triangle = $\frac{\sqrt{3}}{4} \times a^2$

$= \frac{\sqrt{3}}{4} \times (8)^2$

$= 16\sqrt{3}\ cm^2$

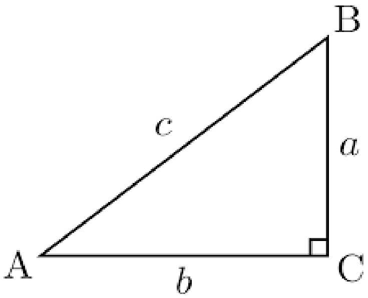
∴ Area of the given equilateral triangle is $16\sqrt{3}\ cm^2$.

5. Find the length of the hypotenuse of the right angled triangle when the length of the base and the perpendicular are 5 cm and 12 cm respectively.

Solution:

Given length of the base (b) = 5 cm

length of the perpendicular (a) = 12 cm



Using Pythagorean theorem, $\mathbf{a^2 + b^2 = c^2}$

⇨ $c^2 = 5^2 + 12^2$

⇨ $c^2 = 25 + 144$

⇨ $c^2 = 169$

⇨ $c = 13$ cm

∴ Length of hypotenuse of the triangle is 13 cm.

6. The base of a triangular field is three times its altitude. If the cost of cultivating the field at Rs. 24.68 per hectare be Rs.333.18, find its base and height.

Solution –

Area of the field $= \frac{total\ cost}{rate} = \frac{333.18}{24.68}$ = 13.5 hectares [1 hectare = 100m × 100m]

$= (13.5 \times 10000)\ m^2 = 135000\ m^2$

Let altitude = x metres and base = 3x metres.

Then, $\frac{1}{2} \times 3x \times x = 135000$

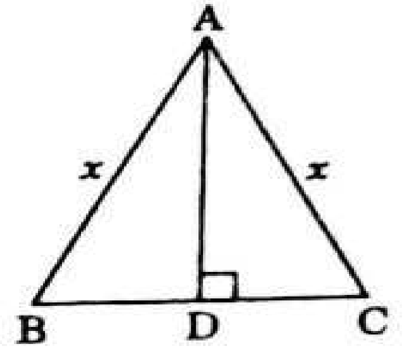
⇨ $x^2 = 90000$

⇨ $x = 300$ metres

Thus, base = 900 metres and altitude = 300 metres.

7. The altitude drawn to the base of the isosceles triangle is 8 cm and the perimeter is 32 cm. Find the area of the triangle.

Solution:



Let ABC be a isosceles triangle and AD be its altitude.
Let AB = AC = x cm. Then BC = (32 – (AB + AC))
= (32 – 2x) cm

Since in an isosceles triangle the altitude bisects the base, so we have BD = CD = (16 – x) cm

In triangle ADC , AD ^{2} + BD ^{2} = AB ^{2}

⇨ $x^2 = 8^2 + (16 - x)^2$

⇨ $x^2 = 64 + 256 + x^2 - 32x$

⇨ $32x = 320$

⇨ $x = 10$

So BC = (32 – 2x) =(32 – 20) = 12 cm

Now Area of the triangle = $\frac{1}{2} \times base \times height$

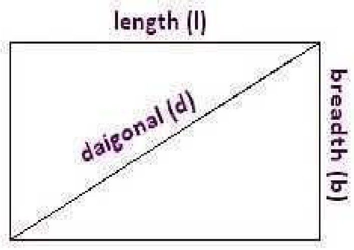
$= \frac{1}{2} \times 12 \times 8$

= 48 cm ^{2}

∴ Area of the triangle is 48 cm ^{2}.

Rectangle

A **rectangle** is a quadrilateral with four right angles. In a rectangle both pairs of opposite sides are parallel and equal in length. The sum of the angles of a rectangle is 360°.



Perimeter and area

If a rectangle has length l and width b,

- it has perimeter P = 2 $(l + b)$
- it has area A = $l \times b$

Solved examples:

1. Find the area and the perimeter of a rectangle having length 12 cm and breadth 10cm.

Solution –

Given Length of the rectangle = 12 cm

Breadth of the rectangle = 10 cm

Perimeter = $2\,(l + b) = 2\,(12 + 10)$

= 44 cm.

Area = $l \times b = 12 \times 10 = 120\ cm^2$.

∴ Area and perimeter of the triangle are 120 cm^2 & 44 cm respectively.

2. A field is in the form of a rectangle having its sides in the ratio 2 : 3. The area of the field is 1.5 hectares. Find the length and breadth of the field.

Solution:

Let length = 2x and breadth = 3x metres.

Area = 1.5 hectares = 1.5×10000 m^2 = 15000 m^2. [1 hectare = 100m × 100m]

⇨ $2x \times 3x = 15000$

⇨ $6\,x^2 = 15000$

⇨ $x^2 = 2500$

⇨ $x = 50$ metres

Length = 2x = 100 metres and breadth = 3x = 150 metres.

∴ The length and breadth of the rectangle is 100 m & 150 cm respectively.

3. If three angles of a quadrilateral are 50°, 75° and 80°, then find the remaining angle of the quadrilateral.

Solution:

Given three angle of the quadrilateral are 50°, 75° and 80°.

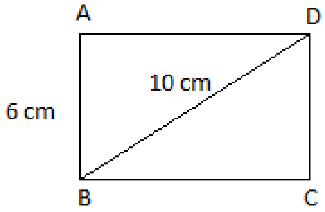
We know that the sum of the angles of a quadrilateral is 360°.

Hence the remaining angle = $360° - (50° + 75° + 80°)$

$= 360° - 205°$

$= 155°$

4. Let one side and a diagonal of a rectangle be 6 cm & 10 cm respectively, then find the area of the rectangle.



Solution:

Given breadth of the rectangle = 6 cm

Length of the diagonal = 10 cm

Δ ABD is a right angle triangle. So we have $BD^2 = AD^2 + AB^2$

⇨ $10^2 = AD^2 + 6^2$

⇨ $100 = AD^2 + 36$

⇨ $AD^2 = 64$

⇨ AD = 8 cm

Area of ABCD = $AD \times AB$

$= 6 \times 8 = 48\ cm^2$

∴ Area of the given rectangle is 48 cm^2.

5. The length of a rectangle is 8 cm and the width is 5 cm. If the length is greater by 2 cm, what should the width be so that the new rectangle has the same area as the first one?

Solution:

Given length of the rectangle = 8 cm

Breadth of the rectangle = 5 cm

So area of the rectangle = $l \times b$ =$8 \times 5 = 40cm^2$

If the length is increased by 2 cm, then the new length of the rectangle = 10 cm.

Area = $l \times b$

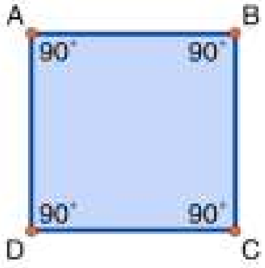
⇨ 40 = 10 × b

⇨ b = 4 cm.

∴ The new width of the rectangle is 4 cm.

Square

A **square** is a regular quadrilateral, which means that it has four equal sides and four equal angles (i.e.$90°$).



Perimeter and area

- The perimeter of a square whose four sides have length l is P = $4\,l$
- And the area A = l^2

Solved examples:

1. Find the area and the perimeter of the square having sides 6 cm.

Solution:

Given length of the side $l = 6\ cm$

So perimeter P = $4\ l$

$= 4 \times 6 = 24\ cm$

Area A = l^2

⇨ A = $6^2 = 36\ cm^2$

∴ Perimeter and area of the given square is 24 cm & 36 cm^2 respectively.

2. Find the perimeter of the square whose area is 100 cm^2.

Solution:

Let the sides of the square be a cm.

Given area of the square = 100 cm^2.

⇨ $a^2 = 100$

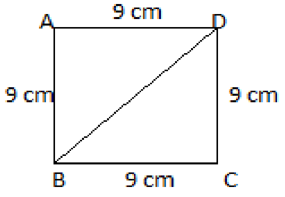
⇨ $a = 10\ cm.$

Perimeter = $4 \times a = 4 \times 10 = 40\ cm$

∴ Perimeter of the square is 40 cm.

3. Find the length of the diagonal of the square having sides 9 cm.

Solution:



Let ABCD be a square having sides 9 cm.

Δ ABD is a right angle triangle. So we have $BD^2 = AD^2 + AB^2$

⇨ $BD^2 = 9^2 + 9^2$

⇨ $BD^2 = 162$

⇨ $BD = 9\sqrt{2}$ cm

∴ Length of the diagonal is $9\sqrt{2}$ cm.

- ❖ If a is the length of the side of a square, then its diagonal = $a\sqrt{2}$
- ❖ If d is the length of the diagonal of a square ,then the length of its sides = $\frac{d}{\sqrt{2}}$

4. Find the area of a square whose diagonal is 4 cm.

Solution:

Given length of the diagonal of a square = 4 cm

Length of its sides = $\frac{d}{\sqrt{2}} = \frac{4}{\sqrt{2}} = 2\sqrt{2}\ cm$

Area of the square = $2\sqrt{2} \times 2\sqrt{2} = 8\ cm^2$

∴ Area of the square is 8 cm^2.

- ❖ Area of square = $\frac{1}{2}(d)^2$ (if length of the diagonal is given)

5. The perimeter of a square courtyard is 100 m. find the cost of cementing it at the rate of Rs. 5 per m^2.

Solution:

Perimeter of square courtyard = 100 m

Therefore, side of the square courtyard = $\frac{100}{4}$ = 25 m

Therefore, area of square courtyard = (25 × 25) m^2 = 625 m^2

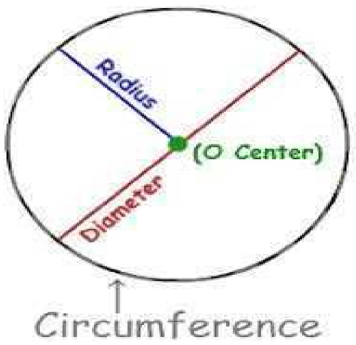
For 1 m^2, the cost of cementing = Rs. 5

For 625 m^2, the cost of cementing = 625 × 5 = Rs. 3125

Circle

A **circle** is a simple closed shape. It is the set of all points in a plane that are at a given distance from a given point, the centre; equivalently it is the curve traced out by a point that moves so that its distance from centre is constant.

- A circle has a total of **360 degrees** all the way around the center,



Perimeter and area

Let the radius of a circle be r. Then,

- Perimeter/Circumference of the circle = $2\pi r$
- Area of the circle = πr^2

Solved examples:

1. Find the circumference of a circle having radius 21cm.

   Solution:

   Given r = 21 cm

   Circumference = $2\pi r$

   $= 2 \times \frac{22}{7} \times 21$

   = 132 cm.

   ∴ Circumference of the circle is 132 cm.

2. Find the area of the circle having radius 7 cm.

   Solution:

   Given radius of the circle (r) = 7 cm

   Area = πr^2

   $= \frac{22}{7} \times 7^2 = 154$ cm^2.

∴ Area of the circle is 154 cm^2.

3. A wheel makes 200 revolutions in covering a distance of 44 km. Find the radius of the wheel.

Solution:

Distance covered in 200 revolutions = 44 km = $(44 \times 1000)\ m$ = 44000 m

⇨ Distance covered in 1 revolution = $\frac{44000}{200} = 220\ m$

Distance covered in 1 revolution = perimeter of the wheel

⇨ $2\pi r = 220$

⇨ $2 \times \frac{22}{7} \times r = 220$

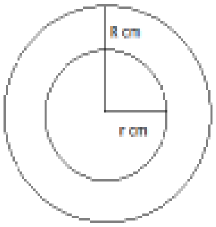
⇨ $r = 220 \times \frac{7}{22} \times \frac{1}{2}$

⇨ $r = 35\ cm.$

∴ Radius of the wheel is 35 cm.

4. Two concentric circles form a ring. The inner and the outer circumference of the ring are 132 cm & 176 cm respectively. Then find the width of the ring.

Solution:



Let R and r be the radii of the outer and inner circles respectively.

According to the question, for the outer circle, $2\pi R = 176\ cm$

⇨ $2 \times \frac{22}{7} \times R = 176$

⇨ R = $176 \times \frac{7}{22} \times \frac{1}{2}$

⇨ R = 28 cm

Similarly for the inner circle, $2\pi r = 132$

⇨ $2 \times \frac{22}{7} \times r = 132$

⇨ $r = 132 \times \frac{7}{22} \times \frac{1}{2}$

⇨ $r = 21\ cm$

∴ Width of the ring = R – r = 28 cm – 21 cm = 7 cm.

5. If the radius of a circle is decreased by 50%, then find the % decrease in area.

Solution:
Let the radius of a circle = r cm
So area of the circle = πr^2
Now if the radius decreases by 50% the new radius (R) = 50% of r

$$= \frac{50}{100} \times r = \frac{r}{2}$$

The new area = $\pi R^2 = \pi \left(\frac{r}{2}\right)^2 = \frac{\pi r^2}{4}$

Decrease in area = $\frac{change\ in\ area}{original\ area} \times 100 = \frac{\pi r^2 - \frac{\pi r^2}{4}}{\pi r^2} \times 100 = \frac{\frac{3\pi r^2}{4}}{\pi r^2} \times 100 = 75\%$

∴ Decrease in area = 75%.

Unit – 5: Raw and Grouped Data, Bar Graphs, Pie charts, Mean, Median and Mode, Events and Sample Space, Probability

Data analysis is an important aspect of almost every competitive exam today. Usually, a table or a bar diagram or a pie chart or a sub-divided bar diagram or a graph is given and candidates are asked questions that test their ability to analyze the data given in those forms.

Raw data

Raw data or primary data are collected directly related to their object of study (statistical units). When people are the subject of an investigation, we may choose the form of a survey, an observation or an experiment.

Examples:

Let us consider the marks secured by 20 students of a class (total mark 500)

453	301	220	485	211
420	143	388	357	229
98	448	429	190	150

490	324	256	373	389

This is called raw data i.e. not processed; only gathered.

Grouped data

Grouped data are data formed by aggregating individual observations of a variable into groups, so that a frequency distribution of these groups serves as a convenient means of summarizing or analyzing the data.

Example:

One way of arranging the above data is as below

Marks	Number of students
0 – 100	1
100- 200	3
200 - 300	4
300 – 400	6
400 - 500	6

This is called grouping of data i.e. arranging data in a particular way.

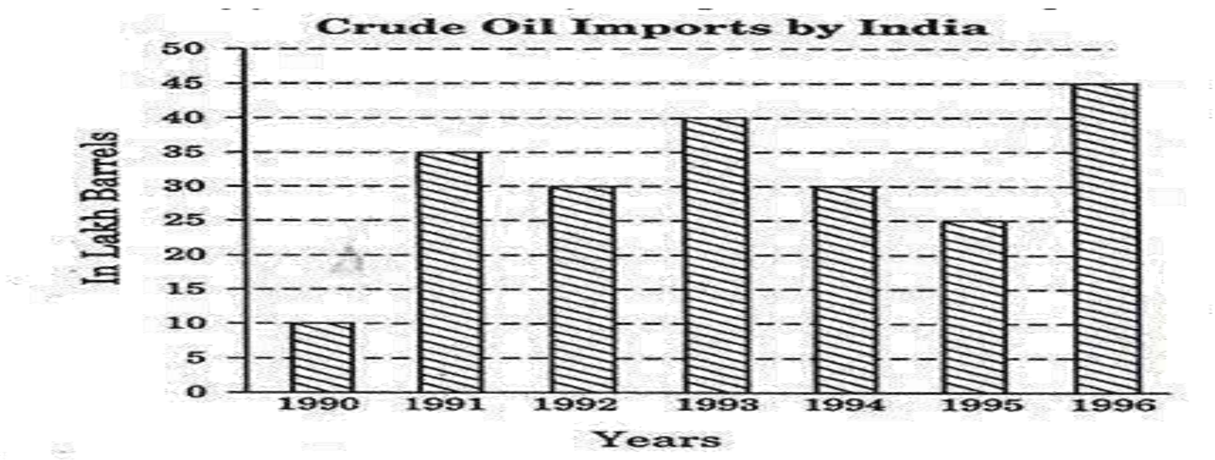
Bar Graphs

A **bar graph** (also called bar chart) is a graphical display of data using bars of different heights.

We can use bar graphs to show the relative sizes of many things, such as what type of car people have, how many customers a shop has on different days and so on.

Solved examples:

1. Study the following graph and answer the questions.



QA. From the graph calculate the sum of crude oil imports in the years 1991 & 1996.

Solution: Crude oil import in the year 1991 = 35 lakh barrels

Crude oil import in the year 1996 = 45 lakh barrels

Sum = 35 + 45 = 80 lakh barrels.

QB. Calculate the average crude oil imports by India during 1990 – 1996.

Solution: sum of crude oil imports during 1990 – 1996 = 10 + 35 + 30 + 40 + 30 + 25 + 45

= 215 lakh barrels.

Hence, average = $\frac{215}{7} = 30.71$ lakh barrels.

QC. In which year(s) the crude oil import was greater than average import?

Solution:

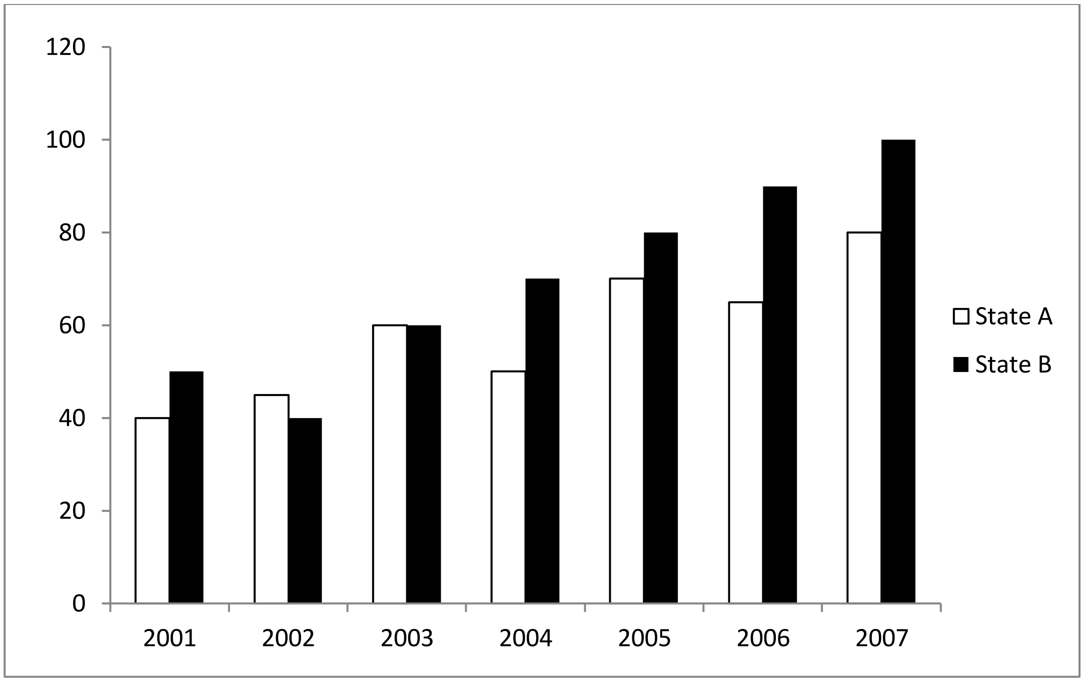
From above we have average $= 30.71$ lakh barrels

Hence, in the years 1991, 1993, 1996 the crude oil import was greater than the average.

2. The following bar graph shows the population of two states A & B in lakhs.

   Answer the following questions based on the data given below.

Population of two states (in lakhs) over the years



Number of years

Q A: Approximately, what is the average population of state A for all the given years?

Solution:

Total population of State A = 410 Lakhs

Average Population of State A = $\frac{\text{Total population of State A}}{\text{Number of Years}} = \frac{40+45+60+50+70+65+80}{7}$

$= \frac{410}{7}$ = 58.57 Lakhs

Therefore, The approx average population of State A is 59 Lakhs.

Q B: What is the ratio of the total population of state A for the years 2001, 2002 and 2003 together to the population of state B for 2005, 2006 and 2007 together?

Solution:

As we need to find ratio, State A (2001 + 2002 + 2003) : State B(2005 + 2006 +2007)

= (40 + 45 + 60) : (80+ 90+100)

= 145: 270 = 29:54

Therefore the ratio of number of people in the state A (2001 + 2002 + 2003) to the number of people in the state B (2005 + 2006+ 2007) is 29 : 54.

Q C: What is the percentage rise in population of state B from the year 2003 to 2004?

Solution:

As we need to find the percentage rise in the population,

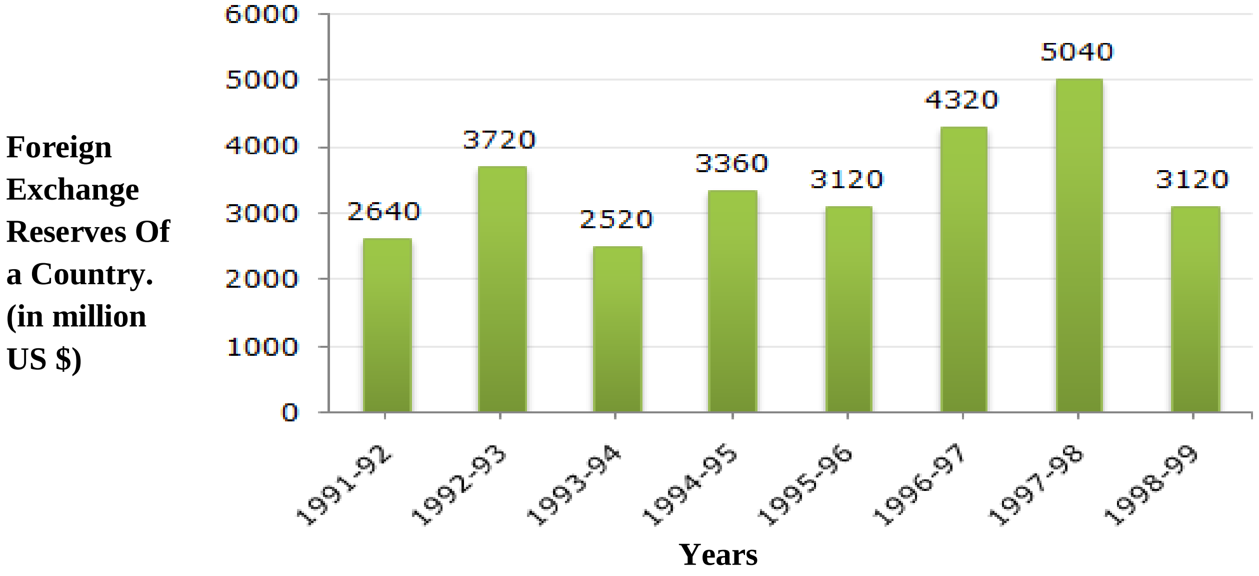
Percentage change = $\frac{\text{change in value}}{\text{reference value}} \times 100$

So, Percentage Increase $= \frac{70-60}{60} \times 100$

$$= \frac{10}{60} \times 100 = 16.66\%$$

Therefore, there has been a rise in 16.66% of population during the year 2003 and 2004 in State B.

3. The bar graph given below shows the foreign exchange reserves of a country (in million US $) from 1991 - 1992 to 1998 - 1999.



Q A. Calculate the average foreign reserves of the country from 1991 - 1992 to 1998 – 1999.

Solution:

Sum of foreign reserves of the country = (2640 + 3720 + 2520 + 3360 + 3120 + 4320 + 5040 + 3120) million US $.

` = 27840 million US $.

Hence, average = $\frac{sum}{8} = \frac{27840}{8} = 3480$ million US \$.

Q B. The foreign exchange reserves in 1997-98 were how many times that in 1994-95?

Solution:

Required ratio = $= \frac{\text{foreign exchange reserves in } 1997-98}{\text{foreign exchange reserves in } 1994-95} = \frac{5040}{3360} = 1.5$.

Q C. What was the percentage increase in the foreign exchange reserves in 1997-98 over 1993-94?

Solution:

Foreign exchange reserves in 1997 - 1998 = 5040 million US \$.

Foreign exchange reserves in 1993 - 1994 = 2520 million US \$.
Increase = (5040 – 2520) = 2520 million US \$.

Percentage increase = $\left(\frac{2520}{2520} \times 100\right)\ \% \ = 100\%$.

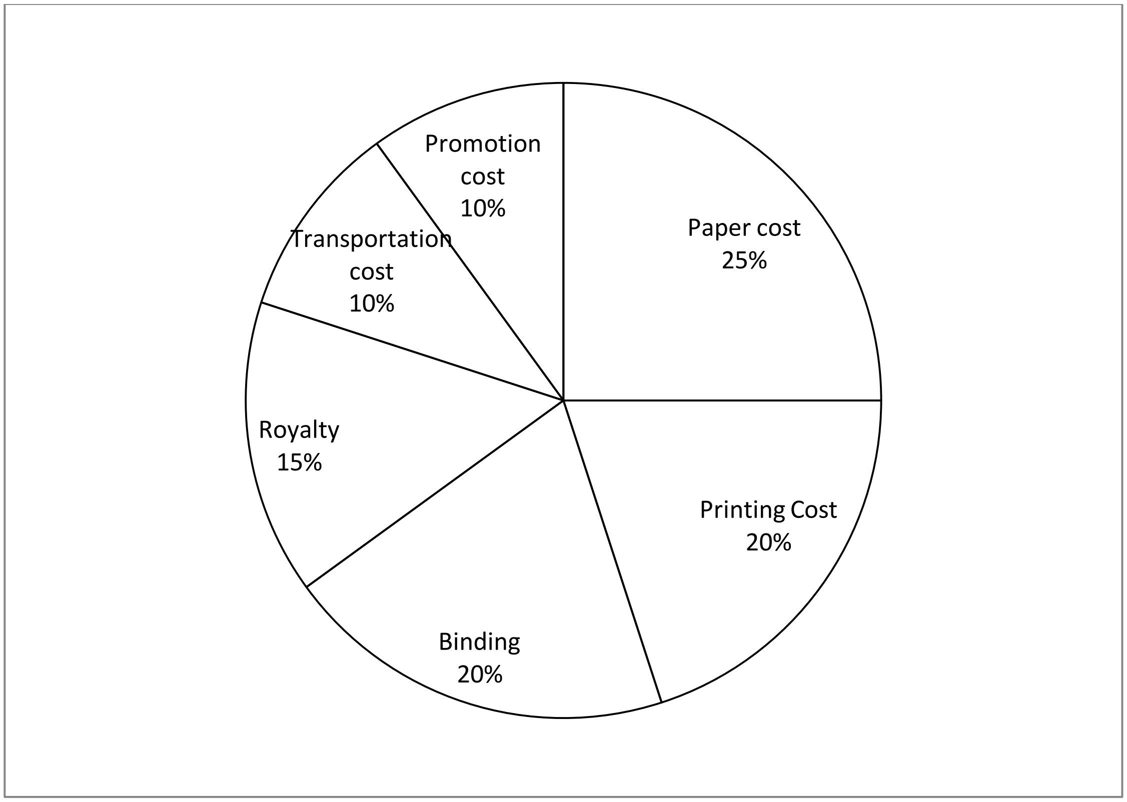
Pie chart

A pie is a baked dish which is round in shape. A pie chart or pie graph is a special chart that uses "pie slices" to show relative sizes of data. The chart is divided into sectors, where each sector shows the relative size of each value.

Solved examples:

1. The following pie-chart shows the percentage distribution of the expenditure incurred in publishing a book. Study the pie-chart and the answer the questions based on it.

Various Expenditures (in percentage) Incurred in Publishing a Book



QA. If for a certain quantity of books, the publisher has to pay Rs. 30,600 as printing cost then, what will be amount of royalty to be paid for these books?

Solution:

Given that the printing cost = Rs. 30,600

Let the royalty to be paid be Rs. x.

So we can write, $\frac{20\%\ of\ total\ cost}{15\%\ of\ total\ cost} = \frac{30{,}600}{x}$

⇨ $20 \times x = 15 \times 30{,}600$

⇨ $x = \frac{15\times 30{,}600}{20}$ = Rs. 22,950

Hence royalty to be paid = Rs. 22,950

Q B. Promotion cost on the book is less than the paper cost by what percentage?

Solution:

Promotion cost of book = 10% of C.P.

paper cost on book = 25% of C.P.

Difference = (25% of C.P.) - (10% of C.P) = 15% of C.P.

Percentage difference = $\left(\frac{\text{Difference}}{paper\ cost} \times 100\right)\%$

$= \left(\frac{15\ \%\ of\ C.P}{25\%\ \text{of C.P.}} \times 100\right)\% = 60\%$.

QC . If the total cost of printing a certain quantity of books is Rs.2,50,000. Then find the sum of its transportation cost, promotion cost and binding cost.

Solution:

Given that the total cost = Rs.2,50,000

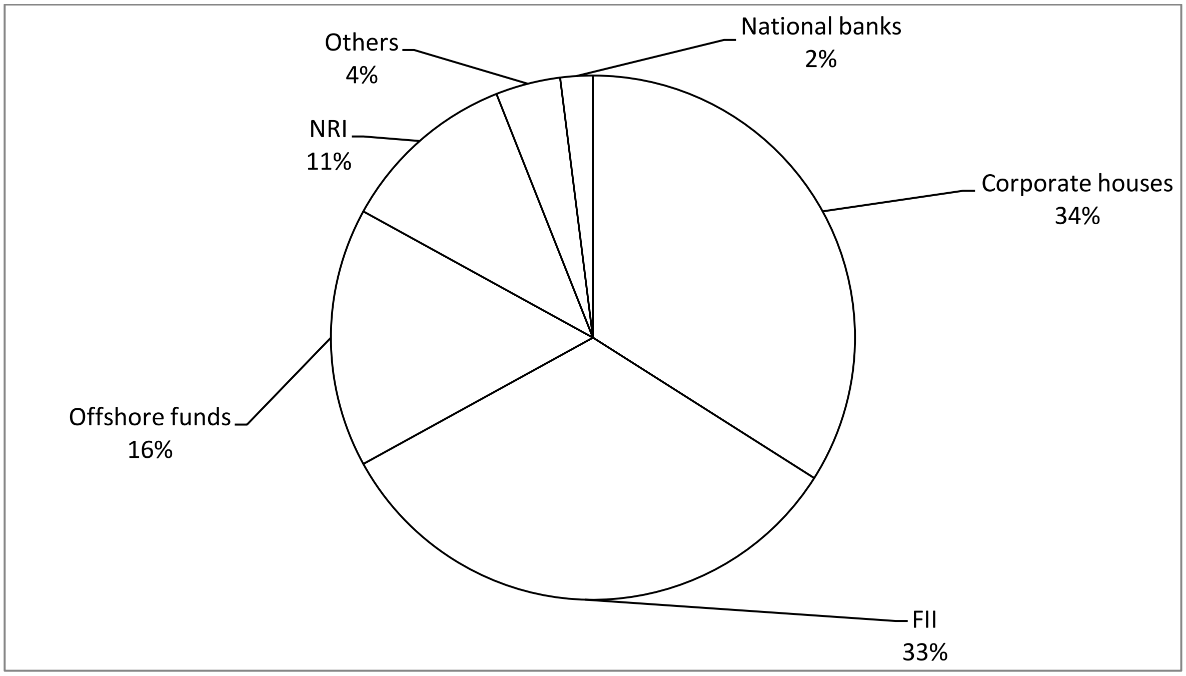
Sum = (10 % of total cost) + (10 % of total cost) + (20 % of total cost)

= (10% + 10% + 20%) of 2,50,000

$= \frac{40}{100} \times 2{,}50{,}000$

= Rs. 1,00,000

2. The following pie chart shows the amount of subscriptions generated for India bonds for different categories of investors.



Q A. If the investments by NRIs are Rs 1100 crore, then the investment by corporate houses and FIIs together is:

Solution:

Let the investment by corporate houses and FIIs together is be x.

So we can write, $\frac{11\% \ of \ total \text{ investments}}{34\ \% \ of \ total \text{ investments} + 33\% \ of \ total \text{ investments}} = \frac{1100}{x}$

⇨ $\frac{11}{34+33} = \frac{1100}{x}$

⇨ $x = \frac{1100 \times 67}{11} = 6700 \ crore$

The investment by corporate houses & FII is = 6700 crore.

Q B. What is the approximate ratio of investment flows into India Bonds from NRIs to corporate houses?

Solution:

Investment flows into India Bonds from NRIs = 11%

Investment flows into India Bonds from corporate houses = 34%

Required ratio = 11 : 34 = 1: 3(approx.)

QC. In the corporate sector, how many degrees should be there in the central angle?

Solution:

From the above pie chart we have corporate sector = 34% of total subscriptions

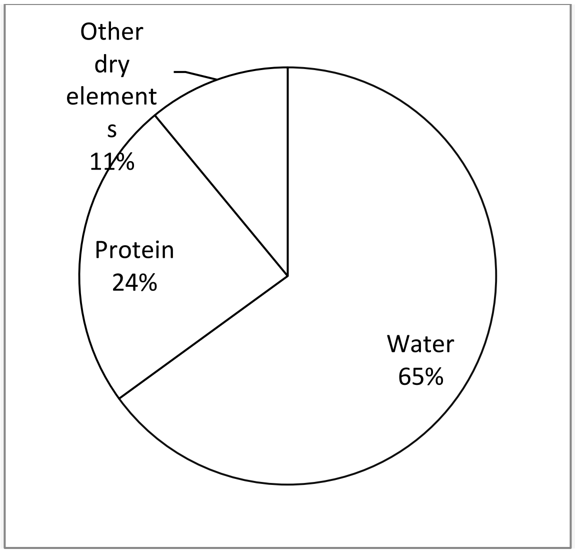
As we know a circle has a total of 360 degrees.

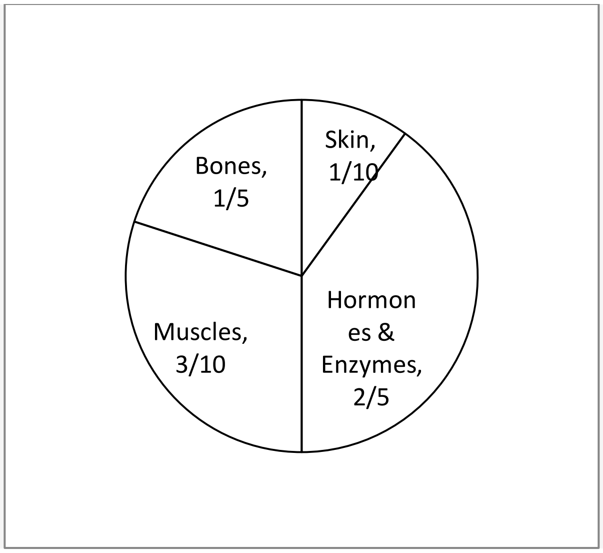
So, 100 % of total subscriptions = 360°

⇨ 1 % of total subscriptions = 3.6°

⇨ 34% of total subscriptions = $34 \times 3.6 = 122.4°$.

3. The following pie charts Figures (a) and (b) give the information about the distribution of weight in the human body according to different kinds of components. Study the pie charts carefully and answer the question given.





QA. What percentage of proteins of the human body is equivalent to the weight of its skin?

Solution:

Proteins contribute 24% of human weight.

Skin contributes $= \frac{1}{10} \times 100$ =10% of human weight.
Let's say weight of human body is 100 kg.

⇨ Weight of proteins = 24% of 100 kg = 24 kg and

Weight of skin = 10% of 100 kg = 10kg

Now 10 kg is equivalent to $\frac{10}{24}\times 100\%$ = 41.66%.

So 41.66% of proteins of the human body is equivalent to the weight of its skin.
Q B. If the skin weighs 12 kg, then find the weight of water.

Solution:
Let the weight of water be x kg.
Given that skin weighs 12 kg

⇨ $\frac{\frac{1}{10}\, of\ total\ body\ weight}{\frac{65}{100}\, of\ total\ body\ weight} = \frac{12}{x}$

⇨ $x = 12 \times \frac{65}{100} \times 10 = 78\ kg.$

Now weight of water = 78 kg.

QC. If the total weight of the body is 47 kg, then find out the difference between weight of bones and other dry elements.

Solution:

Given total weight of the body is 47 kg

Weight of bones = $\frac{1}{5} \times 47 = 9.4$ kg

Weight of dry elements = $\frac{11}{100} \times 47 = 5.17$ kg.

Difference = 9.4 kg – 5.17 kg = 4.23 kg

Mean, Median & Mode

Mean:

Mean is basically the average found by adding all data values and dividing by the number of data values.

The mean (m) of a sample of n values x_1, x_2, x_3 ,x_4,……..x_n, is

$$\boxed{\text{m} = \frac{\text{x1 + x2+ x3+ x4 + …+ xn}}{n}}$$

Examples:

1. Find the mean of 5, 11,16,10,18.

   Solution:

   Mean (m) = $\frac{\text{x1 + x2+ x3+ x4 + …+ xn}}{n} = \frac{5+11+16+10+18}{5} = \frac{60}{5} = 12$

2. Find the mean of 1.2, 3.15, 4.19, 4.22, 5.75, 1.90.

   Solution:

   m = $\frac{\text{x1 + x2+ x3+ x4 + …+ xn}}{n} = \frac{1.2+3.15+4.19+ 4.22+5.75+1.90}{6}$ = 3.4

3. Find the mean of first five multiples of 8.

   Solution:

   The first five multiples of 8 are 8, 16, 24, 32, and 40.

   Mean =$\frac{8+16+24+32+40}{5} = \frac{120}{5} = 24.$

4. There are two sections A and B of a class, consisting of 25 and 32 students' respectively. If the average weight of section A is 45kg and that of section B is 43kg, find the average weight of the whole class.

   Solution:

   Average weight of 25 students of section A = 45 kg

- ⇨ Total weight of 25 students of section A = 45 $\times 25 = 1125$ kg

Average weight of 32 students of section B = 43 kg

- ⇨ Total weight of 32 students of section A = 43 $\times 32 = 1376$ kg

Now average weight of whole class = $\frac{total\ weight}{total\ no\ of\ students} = \frac{1125+1376}{25+32} = \frac{2501}{57} = 43.87$ kg.

5. The mean of 25 numbers is 48. If two numbers, 15 and 17 are discarded, then find the mean of the remaining numbers.

Solution:

Average of 25 numbers = 48

- ⇨ Sum = 48 $\times 25 \ = 1200$

If 15 and 17 are discarded then new sum = 1200 – (15 + 17) =1168

New mean = $\frac{1168}{23} = 50.78.$

Median:

Median is the middle value for a set of data that has been arranged in order of smallest to largest.

To find median of **n** no. of values first we have to arrange the given values in ascending order.

Median = the value in $\left(\frac{n+1}{2}\right)$th place (if n is odd)

$= \frac{\text{the value in } \left(\frac{n}{2}\right)\text{th place + the value in } \left(\frac{n}{2}+1\right)\text{th place}}{2}$ (if n is even)

Solved examples:

1. Find the median for the following data.

96, 37, 14, 35, 55, 110, 24

Solution:

Arranging the above data we have,

14, 24, 35, 37, 55, 96,110

Here n= 7(odd)

So, median = the value in $\left(\frac{n+1}{2}\right)$th place = the value in 4th place = 37.

2. Find the median for the following data set:

140, 27, 38, 23, 69, 121, 15, 52.

Solution:

Arranging the above data we have,

15, 23, 27, 38, 52, 69, 121, 140

Here n= 8(even)

So median = $\frac{\text{the value in } \left(\frac{n}{2}\right)\text{th place + the value in } \left(\frac{n}{2}+1\right)\text{th place}}{2}$

$= \frac{38+52}{2} = 45.$

3. Find the median for the following data set:
36, 53, 1.2, 3.9, 47,12.6

Solution:

Arranging the above data we have,

1.2, 3.9, 12.6, 36, 47, 53

Here n=6(even)

So, median = $\frac{\text{the value in } \left(\frac{n}{2}\right)\text{th place + the value in } \left(\frac{n}{2}+1\right)\text{th place}}{2}$

$= \frac{12.6+36}{2} = 24.3.$

4. Find the median for a set containing squares of all the even numbers between 1 to 20.

Solution:

We need to find median of squares of the set (2, 4, 6, 8, 10, 12, 14, 16, 18)

Here n = 9 (odd)

So desired value is square of 5th value = 10^2= 100

5. Find the median $\frac{3}{5}, \frac{1}{2}, \frac{12}{13}, \frac{6}{5}, \frac{1}{6}, \frac{7}{9}$.

Solution:

Now to arrange the above fractions in ascending order first we have to a common multiple of all the denominators.

So the common multiple of 5, 2, 13, 5, 6, 9 is 1170

$$\frac{3}{5} = \frac{3\times 234}{5 \times 234} = \frac{702}{1170}$$

$$\frac{1}{2} = \frac{1 \times 585}{2 \times 585} = \frac{585}{1170}$$

$$\frac{12}{13} = \frac{12\times 90}{13 \times 90} = \frac{1080}{1170}$$

$$\frac{6}{5} = \frac{6 \times 234}{5 \times 234} = \frac{1404}{1170}$$

$$\frac{1}{6} = \frac{1 \times 195}{6 \times 195} = \frac{195}{1170}$$

$$\frac{7}{9} = \frac{7 \times 130}{9 \times 130} = \frac{910}{1170}$$

Now arranging the above data according to the above values we have,

$\frac{1}{6}, \frac{1}{2}, \frac{3}{5}, \frac{7}{9}, \frac{12}{13}, \frac{6}{5}$

So median = $\frac{\text{the value in } \left(\frac{n}{2}\right)\text{th place + the value in } \left(\frac{n}{2}+1\right)\text{th place}}{2}$

$$= \frac{\frac{3}{5}+\frac{7}{9}}{2} = \frac{31}{45}.$$

Mode

Mode is the most frequent value in a data set. There can be no mode, one mode or multiple modes in a data set.

Solved examples:

1. Find the mode of the following set of scores.

   4, 2, 8, 9, 2, 7,2,11

   Solution:

   Mode = 2,since it occurs 3 times in the given data set, which is more than any other value.

2. Find the mode of the following data set.

   53, 23, 18, 23, 23, 96, 84, 53, 107, 88, 53.

   Solution:

   Mode = 53 and 23 (both occurs most frequently i.e. 3 times)

3. The following frequency table shows the marks obtained by students in a quiz. Given that 3 marks is the only mode, what is the least value for x?

Marks	1	2	3	4	5	6
Number of students	15	13	x	9	7	3

   Solution:

   Given that 3 is the only mode of the data set.

   ⇨ x is at least 16 (if x is less than 16 then 3 will not be the mode)

4. Find the mode of the following data set.

   1020, 962, 321, 1020, 420, 786, 962, 420, 962, 333,469,656.

   Solution:

   1020, 962,420 are the modes. (Each occurs most frequently i.e. 2 times)

5. A marathon race was completed by 5 participants. What is the mode of times taken by them? (given in hours)

   2.7 , 8.3, 3.5, 5.1, 4.9

   Solution:

   Ordering the data in ascending order we get,

   2.7, 3.5, 4.9, 5.1, 8.3

   Since each value occurs only once in the data set, there is no mode for this set of data.

Probability

Probability is a measurement of uncertainty.

- Random experiment:

  A random experiment is an experiment or a process for which the outcome cannot be predicted with certainty and the process repeatedly occurs under homogeneous conditions.

- Outcome:

An **outcome** is a result of a random experiment.

- Sample space(S):

The set of all possible outcomes is called the **sample space**.

- Event(E):

In **probability** theory, an **event** is a set of outcomes of an experiment (a subset of the sample space).

Example

➢ Rolling a dice is a random experiment.

Here the number of possible outcomes 6.

Sample space = $\{1, 2, 3, 4, 5, 6\}$

Getting an even number is an event.

Probability of an event = $\dfrac{\text{total no of elments in the event set } (n(E))}{\text{total no.of elements in the sample space} (n(S))}$

❖ **Points to remember**

- P(S) = 1
- $0 \leq P(E) \leq 1$

Solved examples:

1. Find the probability of getting an odd no. when a dice is thrown?

Solution:

Here S= {1,2,3,4,5,6}

E= {1,3,5}

P (getting an odd number)= $\frac{n(E)}{n(S)} = \frac{3}{6} = \frac{1}{2}$

2. A coin is tossed twice .find the probability of getting at least one head.

Solution:

Here S = $\{HH, HT, TH, TT\}$

E= $\{HT, TH, HH\}$

P (getting at least one head)= $\frac{n(E)}{n(S)} = \frac{3}{4}$

3. A number a is chosen at random from the numbers 4, 6, 1, 92, 32, 56, 98, 11, 55. What is the probability that a < 50.

Solution:

Here S= $\{4, 6, 1, 92, 32, 56, 98, 11, 55\}$

E = $\{4, 6, 1, 32, 11\}$

P (choosing a < 50)= $\frac{n(E)}{n(S)} = \frac{5}{9}$.

4. Two dice are thrown simultaneously. Find the probability of getting a sum greater than or equal to 8 on adding the two faces.

Solution:

Here S ={(1,1)(1,2)(1,3)(1,4)(1,5)(1,6)
(2,1)(2,2)(2,3)(2,4)(2,5)(2,6)
(3,1)(3,2)(3,3)(3,4)(3,5)(3,6)
(4,1)(4,2)(4,3)(4,4)(4,5)(4,6)
(5,1)(5,2)(5,3)(5,4)(5,5)(5,6)
(6,1)(6,2)(6,3)(6,4)(6,5)(6,6)}

E = {(2,6)(3,5)(3,6)(4,4)(4,5)(4,6)(5,3)(5,4)(5,5)(5,6)(6,2)(6,3)(6,4)(6,5)(6,6) }

P (getting a sum greater than or equal to 8) = $\frac{n(E)}{n(S)} = \frac{15}{36}$

5. Tickets numbered 1 to 25 are mixed up and then a ticket is drawn at random. What is the probability that the ticket drawn has a number which is multiple of 3 or 5?

Solution:

Here S = {1, 2, 3,…………, 24, 25}

E = Event of getting a multiple of 3 or 5 = {3, 6, 9, 12, 15, 18, 21, 24, 5, 10, 20, 25}

P(E) = $\frac{n(E)}{n(S)} = \frac{12}{25}$.

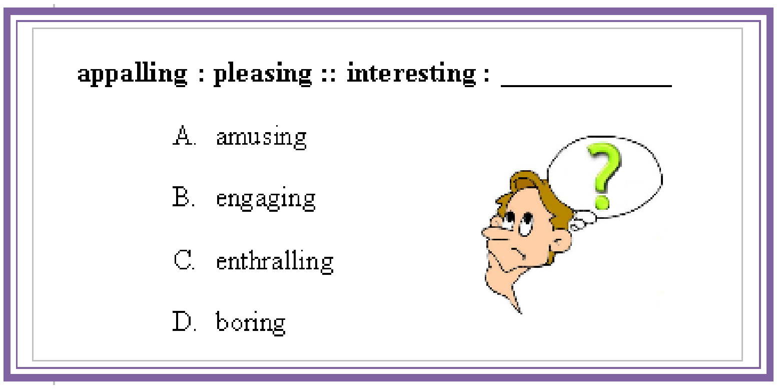
II. LOGICAL REASONING

Unit - 1 : Analogy basing on kinds of relationships, Simple Analogy; Pattern and Series of Numbers, Letters, Figures. Coding-Decoding of Numbers, Letters, Symbols (Figures), Blood relations

1. Analogy

Definition : An analogy compares the relationship between two things or ideas to highlight some point of similarity. It is a way to clarify an idea or an unfamiliar concept by comparing it to something familiar.

Look at this example:



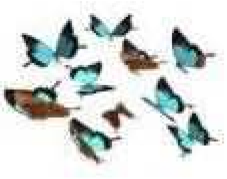
appalling : pleasing :: interesting : ____________

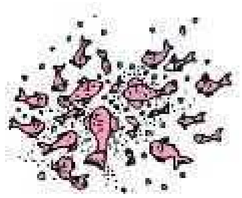
A. amusing
B. engaging
C. enthralling
D. boring

NOTE :

- The example given above asks you to identify the relationship between pairs of words.
- To answer this question, you must first decode the symbols. The colon (:) stands for the phrase “is related to,” and the double colon (::) can be read as “in the same way that.” Thus, you would read the above example like this: “Appalling is to pleasing in the same way that interesting is to…”
- To figure out the missing word, you need to identify the relationship between the first two elements precisely as possible, and choose a word that will make the final pair have a parallel relationship.
- Most accurately, you might describe the relationship between appalling and pleasing as “appalling is an antonym of pleasing.”
- Now read the first word of the second pair, supplying the same relationship: “interesting is an antonym of…”
- The only word that fits this blank adequately is “boring,” the opposite of ‘interesting’. The other three options do not fit the blank as they are the synonyms of interesting.
- In the example above, the relationship between the words in the first pair is compared to the relationship of words in the second pair. This is what we call an analogy is.

For example - **butterflies : swarm :: fish : school**





You can read this analogy as:

Butterflies are to swarm as fishes are to school.

In this example, swarm is the specific term for a group of butterflies. Similarly, school is the specific term for a group of fish.

Both the pairs of words in the analogy illustrate the same relationship.

KINDS OF RELATIONSHIPS

1. Instrument and measurement

- Ex-Barometer : Pressure - Barometer is an instrument used to measure pressure.
- Some more examples -
- Thermometer : Temperature
- Odometer : Speed
- Scale : Length
- Balance :Weight
- Rain gauge : Rain

2. Quantity and Unit -

- Ex- Length : Metre - Metre is the commonly used unit of length.
- Some more examples –
- Mass : Kilogram
- Force : Newton
- Volume : Litre
- Time : Hour
- Temperature : Degrees

3. Individual and group -

- Ex – Sailors : Crew - A group of sailors is called a crew.
- Some more examples –
- Cattle : Herd
- Flowers : Bouquet
- Grapes : Bunch
- Singer : Chorus
- Man : Crowd

4. Animal and young one –

- Ex – Horse : Pony - Pony is the young one of horse.
- Some more examples –
- Cat : Kitten
- Sheep : Lamb
- Cow : Calf
- Dog : Puppy
- Man : Child

5. Male and female –

- Ex- Horse : Mare - Mare is the female horse.
- Some more examples –
- Dog : Bitch
- Son : Daughter
- Lion : Lioness
- Gentleman : Lady
- Nephew : Niece

6. Individual and class –

- Ex – Lizard : Reptile - Lizard belongs to the class of reptiles.
- Some more examples
- Man : Mammal
- Ostrich : Bird
- Butterfly : Insect
- Snake : Reptile
- Whale : Mammal

7. Individual and dwelling places

- Ex – Dog : Kennel - A dog lives in a kennel.
- Some more examples –
- Bee : Apiary
- Cattle : Shed
- Lion : Den
- Poultry : Farm
- Fish : Aquarium

8. Study and topics –

- Ex – Ornithology : Birds - Ornithology is the study of birds
- Some more examples –
- Botany : Plants
- Entomology : Insects
- Zoology : Animals
- Oology : Eggs
- Virology : Viruses

9. Worker and tool –

- Ex – Carpenter : Saw - Saw is a tool used by the carpenter.
- Some more examples –
- Woodcutter : axe
- Tailor : needle
- Soldier : gun
- Doctor : stethoscope
- Farmer : plough

10. Tool and action –

- Ex- Needle : Sew - A needle is used for sewing
- Some more examples –
- Knife : cut
- Pen : write
- Spoon : feed
- Gun : shoot

- Axe : grind

11. Worker and working place-

- Ex – Chef : Kitchen - A chef works in a kitchen
- Some more examples –
- Farmer : field
- Warrior : battlefield
- Teacher : school
- Doctor : hospital
- Clerk : office

12. Worker and product –

- Ex – Mason : Wall - A mason builds a wall.
- Some more examples –
- Farmer : crop
- Hunter : prey
- Carpenter : furniture
- Author : book
- Butcher : meat

13. Product and Raw Material-

- Ex-Prism: Glass- Prism is made of glass.
- Some more examples –
- Butter : Milk
- Wall : Brick
- Furniture : Wood
- Shoes : Leather
- Oil : Seed

14. Part and whole relationship –

- Ex- Pen : Nib - Nib is a part of a pen
- Some more examples –
- Pencil : lead
- House : keychain

- Fan : blade
- Class : student
- Room : Window

15. Word and Intensity -

- Ex- Anger: Rage- Rage is of higher intensity than anger.
- Some more examples –
- Wish: Desire
- Kindle: Burn
- Sink: Drown
- Quarrel: War
- Error: Blunder

16. Word and Synonym –

- Ex- Abode : Dwelling – Abode means the same as dwelling. Thus, dwelling is the synonym of abode.
- Some more examples –
- Ban : Prohibition
- Assign : Allot
- Vacant : Empty
- House : Home
- Flaw : Defect

17. Word and Antonym-

- Ex- Attack : Defend – Defend means the opposite of attack. Thus, Defend is the antonym of Attack
- Some more examples –
- Advance : Retreat
- Cruel : kind
- Best : Worst
- Fresh : Stale
- Ignore : Notice

Examples –

In the following questions, find out the RELATION between given two words in capital letter and pick up one word proportionately from the options that bear the same relation.

1. Day: Night **::** _______ **:** _______
   (1) Half : Full (2) Tall : Fat
   (3) East : West (4) Food : Vegetable

Answer - East : West (Opposite To Each Other).

2. Distance: Mile **::** _______ **:** _______
   (1) Weight : Scale (2) Fame : Television
   (3) Field : Plough (4) Liquid: Litre

Answer - Liquid : Litre (2nd one is the unit of 1st one).

3. Ring: Finger :: Shoe : _______
   (1) Socks (2) Case
   (3) Foot (4) Market

Answer - Foot (2nd one is the body part in which the 1st one is worn)

4. Court: Justice :: School **:** _______
   (1) Teacher (2) Education
   (3) Student (4) Discipline

Answer - Education (The thing that is imparted in the institution).

5. Mouse: Cat :: Worm **:** _______
   (1) Trap (2) Bird
   (3) Paw (4) Grab

Answer - Bird (Prey : Predator)

2. SERIES

- **NUMBER SERIES** –
  A series of numbers which follow a certain pattern throughout.

Case I –

Finding the difference between the terms in the given series –

Ex 1 : Which number would replace ' ? ' in the series : 7 , 12 , 19 , ? , 39

a) 29 b) 28 c) 26 d) 24

Solution - Difference between 7 and 12 = 5
Difference between 12 and 19 = 7
Note – Here the difference increases by 2 , so the next difference should be 9.
Thus, answer = 19 + 9 = 28.

Ex 2 : Which is the number that comes next in the sequence : 0 , 6 , 24 , 60 , 120 , 210 ?
a) 240 b) 290 c) 336 d) 504

Solution – Pattern of the series ; $1^3 - 1$, $2^3 - 2$, $3^3 - 3$, $4^3 - 4$, $5^3 - 5$, $6^3 - 6$
Next number $7^3 - 7 = 343 - 7 = 336$
Hence, the answer is 336.

Ex 3 : Which is the number that comes next in the following sequence : 4 , 6 , 12 , 14 , 28 , 30 , ?
a) 32 b) 60 c) 62 d) 64

Solution – The given sequence is the series 4, 4+2 (=6), 6*2 (=12), 12+2, 14*2, 28+2…
So pattern followed is +2,*2,+2,*2, …..
So, next number is 30*2
Hence, answer = 60

Ex 4 : Find out the missing number in the following sequence : 1 , 3 , 7 , ? , 21

a) 10 b) 11 c) 12 d) 13

Solution - Pattern followed is + 2 , + 4 , …..
Missing number = 7 + 6 = 13
Hence, answer = 13.

Ex 5 : Which fraction comes in the sequence $\frac{1}{2}, \frac{3}{4}, \frac{5}{8}, \frac{7}{16}$, ?

a) $\frac{9}{32}$ b) $\frac{10}{17}$ c) $\frac{11}{34}$ d) $\frac{12}{35}$

Solution- The numerators of the fractions in the series have a difference of 2. The denominators of the fractions form the series 2,4,8,16 i.e 2^1, 2^2, 2^3, 2^4…So the numerator of the next fraction will be 7+2=9 and denominator will be 2^5=32.

Answer = $\frac{9}{32}$

Elementary Idea of Progressions

1. **Arithmetic Progression (A.P)-** The progression of the form a, a+d, a+2d…..is known as AP with first term= a and common difference = d

   Ex 1- 3, 6, 9, 12…… is an AP with a=3, d=6-3=3

   In an AP we have nth term= a + (n-1)d

   Ex 2- In the series 357, 363,369,….,What will be the 10th term ?

   a) 405 b) 411 c) 413 d) 417

   Solution- The given series is an A.P in which a=357, d=6

   $$\begin{aligned}10^{th}\text{ term} &= a+(10-1)d\\ &= a+9d\\ &= (357+9\times 6)\\ &= 357+54\\ &= 411\end{aligned}$$

   Ex3- How many terms are there in the series 201, 208, 215, …, 369 ?

   A) 23 b) 24 c) 25 d)26

   Solution- The given series in an AP in which a=201, d=7

   Let the number of terms be n.

   $369=201+(n-1)\times 7$

   ⇨ $369=201+7n-7$

   ⇨ $168=7n-7$

   ⇨ $7n= 175$

   ⇨ $n = 25$

   Answer = 25

2. **Geometric Progression (G.P)-** The progression of the form a, ar, ar^2, ar^3,…..is known as GP with first term = a and common ratio= r

   Ex 1- 1,5, 25, 125, …. is a GP with a = 1 and $r = \frac{5}{1} = \frac{25}{5}$ =………= 5

   In a GP we have nth term= ar^{n-1}

   Ex 2- In the series 7,14,28,…. What will be the 10th term?

   a) 1792 b) 2456 c) 3584 d) 4096

   Solution- Clearly, 7*2=14, 14*2=28,…..and so on

   In the given series of GP a=7, r =2

   $$\begin{aligned}10^{th}\text{ term} &= ar^{(10-1)}\\ &= ar^9\\ &= 7\times 2^9\\ &= 7\times 512\\ &= 3584\end{aligned}$$

Answer= 3584

Ex 3- Find the number of terns in GP 6, 12 ,24, …….., 1536 ?

a) 7 b)9 c)8 d)10

Solution- $a_1 = 6$ $a_2 = 12$ $a_n = 1536$

$r = \frac{a2}{a1} = \frac{12}{6} = 2$

Now we have, $1536 = ar^{n-1}$

⇨ $1536 = 6 \times 2^{n-1}$

⇨ $256 = 2^{n-1}$

⇨ $2^8 = 2^{n-1}$

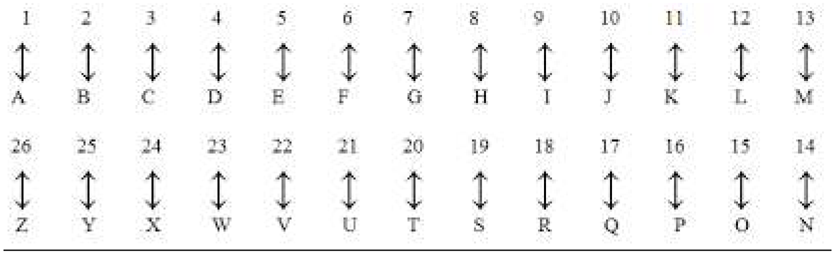
⇨ $8 = n-1$

⇨ $n = 9.$

➢ LETTER SERIES

In this series, only letters are available which follow a certain pattern throughout.

Position of Letters



1	2	3	4	5	6	7	8	9	10	11	12	13
A	B	C	D	E	F	G	H	I	J	K	L	M
26	25	24	23	22	21	20	19	18	17	16	15	14
Z	Y	X	W	V	U	T	S	R	Q	P	O	N

Quick tricks :

1. Starting point of the series is called left end and end point of the series is called right end.
2. To solve the question easily we should break the series in combination of 5-5 elements – ABCDE / FGHIJ / KLMNO / PQRST / UVWXY / Z - it will help in counting the letters.
3. There are some key words which help in remembering the place values of the letters. Once the candidate knows the position of alphabets, he requires to learn time management.

TABLE OF 3

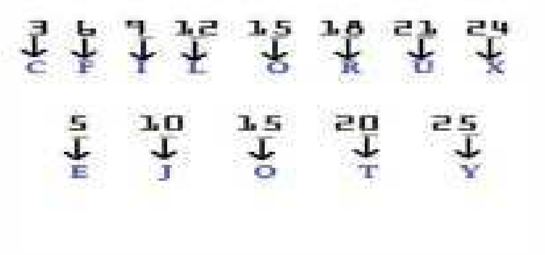


TABLE OF 5

Words given above are the arrangement of alphabets having position multiples of 3 in first line and 5 in second line.

4. The opposite letters

A ↔ Z (**AZ**ad)
B ↔ Y (**B**o**Y**)
C ↔ X (**C**ru**X**)
D ↔ W (**D**e**W**)
E ↔ V **(** **EV**en)

F ↔ U (**FU**ll)
G ↔ T (**G T** road)
H ↔ S (**H**igh **S**chool)
I ↔ R (**I**ndian **R**ailway)
J ↔ Q (**J**ungle **Q**ueen)

K ↔ P (**K**an**P**ur)
L ↔ O (**LO**ve)
M ↔ N (**M**a**N**)

Examples –

1. Solve the series : JAF, JEF, JIF, JOF, ?

a) PIG b) PET c) JUF d) POT

Solution –
The middle letters which are vowels have an increasing trend of A, E, I, O, U and remaining letters have been retained as it is. So answer would be **JUF.**

2. Solve the series - WXCD, UVEF, STGH, QRIJ?

a) OPKL b) AYBZ c) JIRQ d) LRMS

Solution –
The last two letters of every word is in ascending order and the first two letters are in descending order.

OP precedes QR and KL succeeds IJ.

Answer - **OPKL**

3. In the word EMASCULATE let the place value of the letters according to English alphabets be written in descending order then which number is 4th from the left end?

a. 13 b.14 c.12 d.1

Solution –

E M A S C U L A T E

5 13 1 19 3 21 12 1 20 5

Descending order -

21 20 19 **13** 12 5 5 3 1 1

So, answer is 13 , 4th from left end.

4. If only each of the vowels in the word IMPOSE is changed to the next letter in the English alphabet then which of the following will be the fifth letter from the left end ?

a) P b) J c) F d) S

Solution -

I M P O S E

J M P P **S** F

So, the answer is S

- **FIGURE SERIES**

Definition – In a figure series, there is a sequence of figures depicting a change step by step. Either one of these figures is out of order and has to be omitted or figure has to be selected from a separate set of figures which would continue the series.

There are two directions mostly used in the figures – i) clockwise direction ii) anti – clockwise direction. A clockwise direction movement will be as in a square boundary.

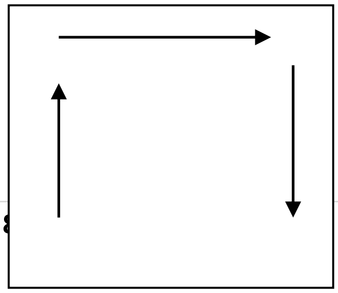


Fig - A clockwise direction movement in a square boundary.

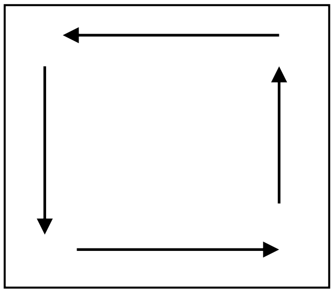


Fig – An anticlockwise direction movement in a square boundary.

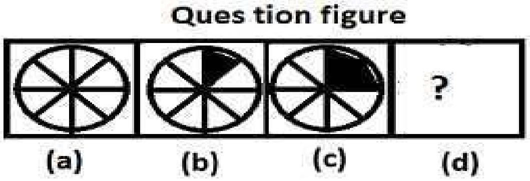
Note – In a square boundary means a square box.

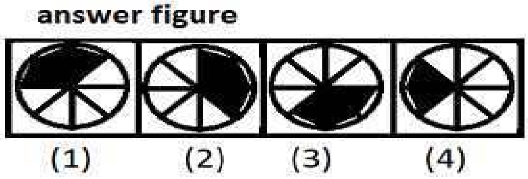
Four Figure series –

In this case , the series or sequence is indicated by four problem figures and it is required to select a figure from amongst the answer figures which would be fifth figure to continue the series.

Examples –

1. Find the figure that will replace the question mark

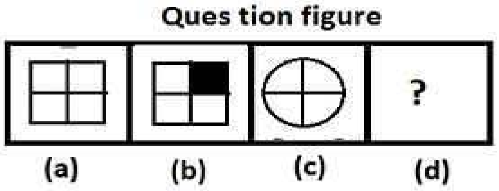

Ques tion figure
?
(a)
(b)
(c)
(d)

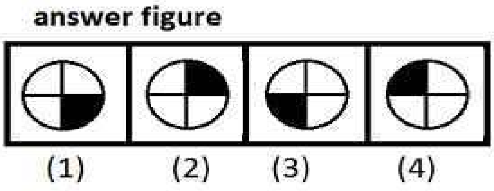

answer figure
(1)
(2)
(3)
(4)

Answer - Option (2)

The sequence of this series is that the circle has been divided into various sectors which are getting shaded in clockwise direction by adding a cord each time.

2. Which figure can be placed in place of question mark?

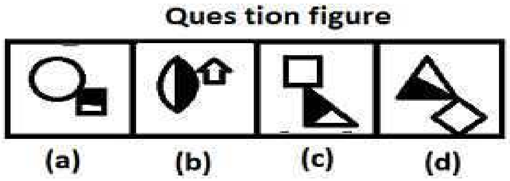

Ques tion figure
?
(a)
(b)
(c)
(d)

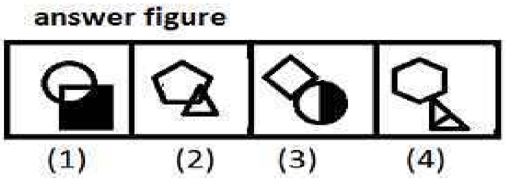

answer figure
(1)
(2)
(3)
(4)

Answer − Option (2)

Figure (a) and (b) are related to each other by getting shade of upper right side quarter therefore in this way figure (2) will make pair with figure (c).

3. Find the similar figure as that of the question figure.

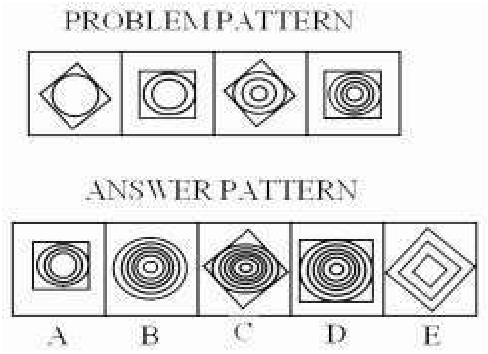




Answer − Figure (3)

In question figure all blocks consist of two figures touching each other and half of any of them is shaded. The sequence in the question figure also shows that in the odd number blocks, top figure is empty and bottom is shaded while in the even number blocks top figure is shaded while the bottom one is empty. Hence figure (3) is same as question figure.

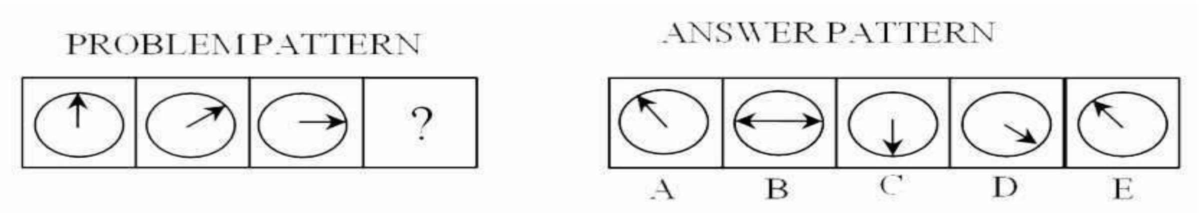
4. If the figures continue to change in the same order what should the fifth figure be?”



Solution: You will see two different things happening here. The number of circles is increasing 1, 2, 3, 4, so that the next figure would have 5 circles. But note that the square is also turning. First the point is up, then the flat side, then again the point is up, and then again the flat side. In the next place, therefore, the point should be up. But in figure C there are 6 circles inside the rectangle.

Answer: So none of the figure is correct.

5. Continue the series :



Answer – D .

Sol: Here the arrow in the circle goes on rotating in clockwise direction at an angle of 45° each time. Hence the answer would be (d).

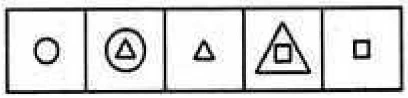
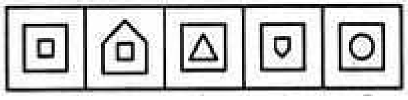
Five figure series:

In this case , the series or sequence is indicated by five problem figures and it is required to select a figure from amongst the answer figures which would be sixth figure to continue the series.

Examples –

1. Select a figure from amongst the answer Figures which will continue the same series as established by the five Problem Figures.

Problem Figures: Answer Figures:

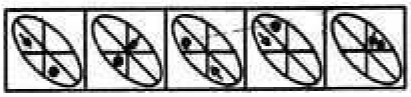
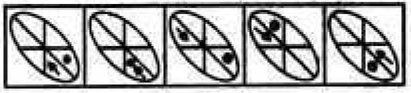
(A) (B) (C) (D) (E) (1) (2) (3) (4) (5)

Answer: Option **(4)**

In one step, the existing element enlarges and a new element appears inside this element. In the next step, the outer element is lost.

2. Select a figure from amongst the Answer Figures which will continue the same series as established by the five Problem Figures.

Problem Figures: Answer Figures:

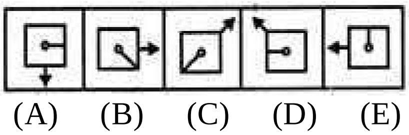
(A) (B) (C) (D) (E) (1) (2) (3) (4) (5)

Answer : Option **(1)**

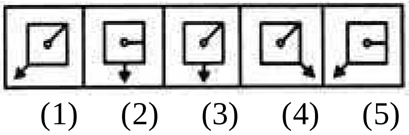
In each step, the dot moves one space clockwise and the arrow moves two spaces clockwise.

3. Select a figure from amongst the Answer Figures which will continue the same series as established by the five Problem Figures.

Problem Figures:



Answer Figures:

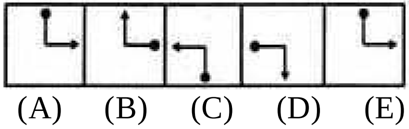


Answer - Option **(3)**

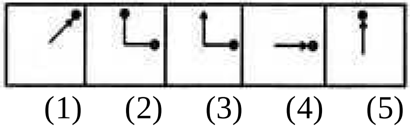
The pin rotates 45° clockwise and 90° clockwise alternately and moves one space (each space is equal to half-a-side of the square) and two spaces clockwise alternately. The arrow rotates 90° anti clockwise and 45° anti clockwise alternately and moves two spaces and one space.

4. Select a figure from amongst the Answer Figures which will continue the same series as established by the five Problem Figures.

Problem Figures:



Answer Figures:

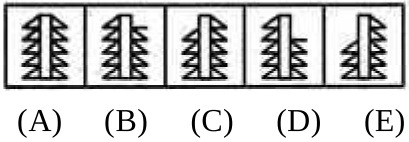


Answer - Option **(3)**

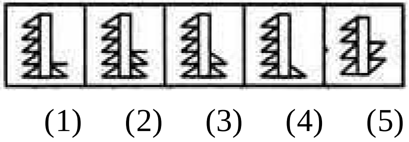
In each step, the pin rotates 90° clockwise and the arrow rotates 90° anti clockwise.

5. Select a figure from amongst the Answer Figures which will continue the same series as established by the five Problem Figures.

Problem Figures:



Answer Figures:



Answer – Option **(2)**

In one step, the figure gets laterally inverted and one line segment is lost from the upper end of the RHS portion of the figure. In the next step, the figure gets laterally inverted and one line segment is lost from the upper end of the LHS portion of the figure.

\

3. CODING & DECODING

- **Coding** is a process in which a word, a number, or a series of combination of words and numbers is expressed in a particular code or pattern based on various rules. You have to answer the questions based on these set of rules.
- **Decoding** is the process of (interpreting) deciphering the coded pattern and reverting it to its original form from the given codes. Hence, you are required to understand the logic behind the coding pattern and then apply this logic to find answers.

LETTER CODING:

Here letters are assigned codes according to a set pattern or rule concerning the movement or reordering / rearranging of letters and you need to detect this rule to decode a massage. Sometimes, specific codes are assigned to particular letters without any set pattern. Observe a few examples to know the various reordering or rearranging techniques.

Ex-1

In a code language if TRAINS is coded as RTIASN, how PISTOL will be coded in the same language?

(a) SITLOP
(b) IPSTLO
(c) SIPTLO
(d) IPTSLO

Solution: (Answer – d)

If we compare the basic word {TRAINS} with the coded word {RTIASN}, we would see that the letters used in the word are same as in the basic word but their order of placement has been changed. Letter T at first position of the basic word has been placed at second position in the coded word and the letter R at the second position has been placed in the first position.

It means that in this question, letters of the basic word have been interchanged i.e. first letter with second, third with the fourth and so on. And thus we get the coded word. So PISTOL will be coded as IPTSLO. Hence option (d) is the answer.

Ex-2

In a certain code, TEACHER is written as VGCEJGT. How is CHILDREN written in that code?

(a) EJKNEGTP (b) EGKNFITP (c) EJKNFGTO (d) EJKNFTGP

Solution: (Answer- d)

Each alphabet in the word "TEACHER " is moved two steps forward to obtain the corresponding alphabet of the code.

T E A C H E R

V G C E J G T
(Each alphabet is increasing by 2)
Similarly, we have
C H I L D R E N
E J K N F T G P

Ex-3

In a certain code language, the word ROAD is written as WTFI. Following the same rule of coding, what should be the word for the code GJFY?

(a) REAP (b) TAKE (c) BEAT (d) LATE

Solution: (Answer- c)

Each alphabet of the word is five steps behind the corresponding alphabet of the given code word.

Hence, BEAT is coded as GJFY.

Ex-4

If ‘tee see pee’ means ‘drink fruit juice’; ‘see kee lee’ means ‘juice is sweet’ and ‘lee ree mee’ means ‘he is intelligent’, which word in that language means ‘sweet’?
(a) see
(b) kee
(c) lee
(d) pee

Solution: (Answer b)

In the first and second statement, the common word is ‘juice’ and the common code word is ‘see’. So, ‘see’ means ‘juice’.

In the second and third statements, the common word is ‘is’ and the common code is ‘lee’. So ‘lee’ means ‘is’. Thus in the second statement, the remaining word ‘sweet’ is coded as ‘kee’. Hence the answer is choice (b).

NUMBER CODING:

Numerical code is given or value is assigned to a word. Here the only way to relate the alphabets & numbers is by associating the positions of the letters in the English alphabet. Sometimes any mathematical operation like addition or subtraction can be performed using the position of the letters. Direct coding questions can also be asked.

Ex-1 If PAINT is coded as 74128 and EXCEL is coded as 93596, then how would you encode ACCEPT?

(a) 455978
(b) 547978
(c) 554978
(d) 735961

Solution: (Answer- a)

In the given code the alphabets have been coded as follows:

P	A	I	N	T	E	X	C	E	L
7	4	1	2	8	9	3	5	9	6

So, in ACCEPT, A is coded as 4, C as 5, E as 9, P as 7 and T as 8. Hence the correct code is 455978 and therefore the answer is Choice (a).

Ex-2 If DELHI is coded as 73541 and CALCUTTA as 82589662, how can CALICUT be coded ?

a. 5279431
b. 5978213
c. 8251896
d. 8543691

Solution.(Answer: c)

`The alphabets are coded as follows :

D	E	L	H	I	C	A	U	T
7	3	5	4	1	8	2	9	6

So, in CALICUT,
C is coded as 8,
A as 2,
L as 5,
I as 1,
U as 9 and
T as 6.
Thus, the code for CALICUT is 8251896.

Ex-3 If in a certain code, TWENTY is written as 863985 and ELEVEN is written as 323039, how is TWELVE written in that code ?

a) 863203
b) 863584
c) 863903
d) 863063

Solution (Answer: a)
The alphabets are coded as shown :

T	W	E	N	Y	L	V
8	6	3	9	5	2	0

So, In TWELVE ,
T is coded as 8,
W as 6,
E as 3,
L as 2,
V as 0.
Thus, the code for TWELVE is 863203.

Ex-4 In a certain code 'MISSIONS' is written as 'MSIISNOS'. How is 'ONLINE' written in that code?

1. OLNNIE

2. ONILEN

3. NOILEN

4. LNOENI

5. ONNLIE

Solution: Answer - Option 1

Explanation: First and last letter remain same. The others interchange their positions in pair of two.

So, NL become LN and IN become NI so code of ONLINE will be OLNNIE.

SYMBOL CODING

Directions (Q1-5): In each of the following questions, there is a group of letters followed by four combinations of digits/symbols (A), (B), (C) and (D). You have to find out which of the combinations correctly represents the group of letters based on the following digits/symbol coding system and the conditions those follow and mark the number of that combination as the answer. If none of the combinations is correctly represents the group of letters then mark (E).

Letter:	L	H	U	B	E	P	N	A	K	I	R	S	T	M	V
Digits/Symbols:	5	<	4	#	@	3	*	^	8	%	9	!	~	1	$

Conditions:

- **i)** If the first letter is a vowel and the last letter is a consonant, then the codes are to be interchanged.
- **ii)** If both the first and the last letters are vowels, then both are to be coded as the code for the last letter
- **iii)** If any word has more than two vowels, then all vowels are coded to be as the code for I.

Q.1 UNRBV

A. 4*9#$
B. $*9#$
C. $*9#4
D. $*4#9
E. None of these.

Ans. C

Solution: UNRBV - $*9#4 (Condition i)

Q.2 SMALKI

A. %15!8^
B. !1^58%
C. 1#!568
D. !1^5%8
E. None of these

Ans . B

Solution: SMALKI - !1^58%

Q.3 AMBLPU

A. ^5#34^
B. 1#543^
C. ^1#534
D. 41#534
E. None of these

Ans.D

Solution: AMBLPU - 41#534 (Condition ii)

Q.4 KINAHE

A. 9*#%15
B. 8%*%<%
C. @*%$56
D. %^85@1
E. None of these
Ans.B

Solution: KINAHE - 8%*%<% (Condition iii)

Q.5 EMKLVP

A. $5&58^
B. $5&^85
C. @1853$
D. 3185$@
E. None of these
Ans.D

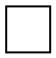
Solution: EMKLVP - 3185$@ (Condition i)

4. BLOOD RELATIONS

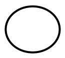
Definition- A person who is related to another by birth rather than by marriage.

NOTE- Relation on the mother side is called **maternal** and that on the father side is called **paternal** and if the relation is on the partner side (Husband or wife) is called **in-law.**

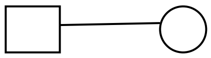
A method known as **FAMILY TREE** is used to solve the questions regarding blood relation which is just a graphical method to show all the possible relation.



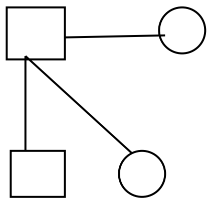
Used for males



Used for females



Husband wife relationship



Son and daughter

Indirect Reference	**The real relation**
Father’s or Mother’s Daughter	Sister
Father’s or Mother’s Son	Brother
Father’s or Mother’s Sister	Aunt
Father’s or Mother’s Brother	Uncle
Father’s or Mother’s Mother	Grandmother
Father’s or Mother’s Father	Grandfather
Daughter’s Husband	Son-in-law
Son’s Wife	Daughter – in – law
Husband’s or Wife’s Brother	Brother – in – law
Husband’s or Wife’s Sister	Sister – In – law
Brother’s Daughter	Niece
Brother’s Son	Nephew
Brother’s Wife	Sister-in-law
Sister’s Husband	Brother- in- law
Aunt’s or Uncle’s Son or Daughter	Cousin
Granddaughter’s or Grandson’s daughter	Great grand daughter

The first step to being able to solve blood relation questions is a logical reasoning of the relations that exist between different members of a family, both close and far.

EXAMPLES

Question 1: Pointing to a girl in the photograph, Ajay said, "Her mother's brother is the only son of my mother's father." How is the girl's mother related to Ajay ?

A) Mother

B) Sister

C) Aunt

D) Grandmother

E) None of these

Solution:

Only son of Ajay's mother's father -- Ajay's maternal uncle.

So, the girl's maternal uncle is Ajay's maternal uncle.

Thus, the girl's mother is Ajay's aunt.

Question 2:

1. A + B means A is the brother of B
2. A × B means A is the father of B
3. A ÷ B means A is the mother of B

Which of the following would mean "G is the son of H"?

A)H ×I × G

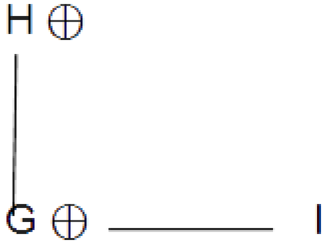
B)H + G × I

C)H ÷ G ÷ I

D) H × G + I

Solution: Answer: Option D

Go by options. In fourth option, our diagram will be like



We don't know the gender of I. So. We will not put any symbol on its side.

Question 3.A is B's sister. C is B's mother. D is C's father. E is D's mother. Then, how is A related to D?

A. Grandfather

B. Grandmother

C. Daughter

D. Granddaughter

Answer: D) Granddaughter

Explanation:

A is the sister of B and B is the daughter of C.

So, A is the daughter of C. Also, D is the father of C.

So, A is the granddaughter of D.

Question 4.P is the brother of Q and R. S is R's mother. T is P's father. Which of the following statements cannot be definitely true ?

A. T is Q's father

B. S is P's mother

C. P is S's son

D. Q is T's son

Answer: D) Q is T's son

Explanation:
P, Q, R are children of same parents. So. S who is R's mother and T, who is R's father will be mother and father of all three.

However, it is not mentioned whether Q is male or female So, D cannot be definitely true.

Question 5.Pointing to a person, a man said to a woman, "His mother is the only daughter of your father." How was the woman related to the person ?

A. Aunt

B. Mother

C. Wife

D. Daughter

Answer: A) Aunt

Explanation:
Daughter of your father — your sister. So, the person's mother is woman's sister or the woman is person's aunt.

UNIT – 2 : Logical Statements – Two premise argument, More than two premise argument using connectives

In logic, any statement is termed as the Proposition. Thus a proposition is a statement expressing certain relation between two or more terms, analogous to a sentence in grammar.

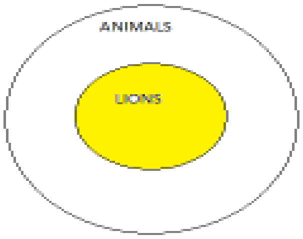
The proposition consists of three parts:

- Subject-The subject is that about which something is said
- Predicate-The predicate is the part of the proposition denoting that which is affirmed or denied about the subject.
- Copula-The copula is that part of the proposition which denotes the relation between the subject and the predicate.
- Consider the proposition(‘Man is cultured’)
  Here ‘man’ is the subject.
  ‘Cultured’ is the quality affirmed for this subject. So it is the predicate.
  ‘is’ denotes the relation between the subject and the predicate. So it is the copula.

FOUR FOLD CLASSIFICATION OF PROPOSITIONS:

a. Universal Affirmative Proposition

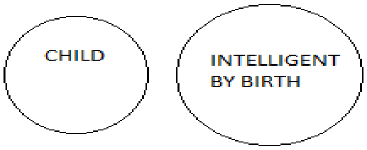
Example-All lions are animals.



From this, we cannot say ‘All animals are lions.

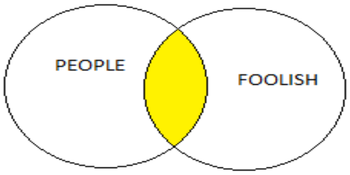
~~b.~~ Universal Negative Proposition

Ex. - No child is intelligent by birth.



c. Particular Affirmative Proposition

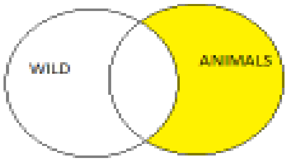
Ex. - Some people are foolish.



Here the subject term 'Some People' is used not for all but only for some people and similarly the predicate term 'Foolish' is affirmed for a part of the subject.

d. Particular Negative Proposition

e.g. " Some animals are not wild "



Here the subject term ' some animals' is used only for a part of its class while the predicate term 'wild' is not denied in entirety to the subject term.

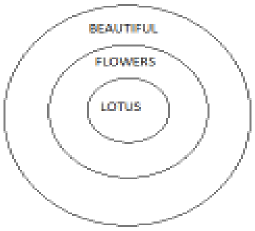
These facts can be summarized as follows :

Proposition	Type
a) Universal Affirmative Proposition	All S is P.
b) Universal Negative Proposition	No S is P.
c) Particular Affirmative Proposition	Some S is P.
d) Particular Negative Proposition	Some S is not P.

SYLLOGISM:
Two premise argument

In Syllogism, a conclusion has to be drawn from two propositions , referred to as the Premises.

Example 1–
a. All lotus are flowers.
b. All flowers are beautiful.
c. All lotus are beautiful.



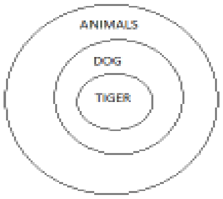
The propositions a) and b) are the Premises and the proposition c) is called the Conclusion which follows from the first two propositions.

Syllogism is concerned with 3 terms –

1. **Major term** : It is the predicate of the conclusion and is denoted by P .
2. **Minor term** : It is the subject of the conclusion and is denoted by S.
3. **Middle term** : It is the term common to both the premises and is denoted by M.

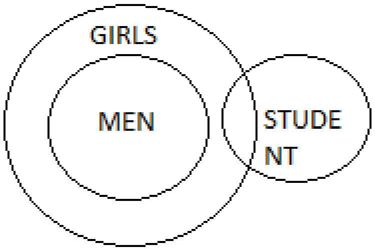
Example 2- Premises : 1. All dogs are animals.
2. Tiger is a dog.

Conclusion : Tiger is an animal.

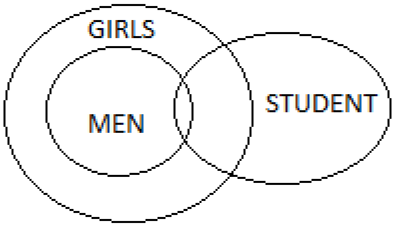


Rules for deriving the conclusion :

I. The conclusion contain the middle term.
Example - Statements : 1. All men are girls.
2. Some girls are students.
Conclusion : 1. All girls are men.
2. Some students are girls.



A

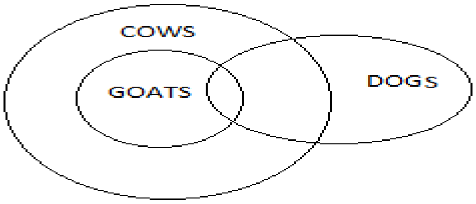


B

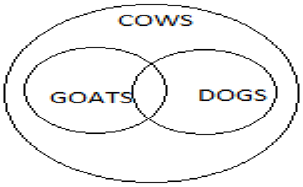
Here both the conclusions 1 and 2 contain the middle term ‘girls’. From the above figures, It is clear that conclusion 1 does not follow, but conclusion 2 follows.

II. No term can be distributed in the conclusion unless it is distributed in the premises.

Example - Statements : 1. Some dogs are goats.
2. All goats are cows.
Conclusions : 1. All cows are goats.
2.Some dogs are cows.



A



B

Statement 1 is an I type proposition which distributes neither the subject nor the predicate . Statement 2 is an A type proposition which distributes the subject i.e ‘goats’ only.

Conclusion 1 is an A type proposition which distributes the subject ‘cow’ only.

Since the term ‘cow’ is distributed in conclusion 1 without being distributed in the premises , so conclusion 1 cannot follow.

III. The middle term (M) should be distributed at least once in the premises. Otherwise, the conclusion cannot follow.

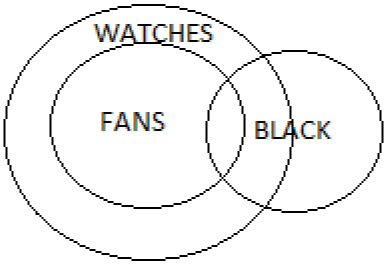
For the middle term to be distributed in a premise,

i) M must be the Subject if premise is an A proposition.
ii) M must be Subject or Predicate if premise is an E proposition.
iii) M must be Predicate if premise is an O proposition.

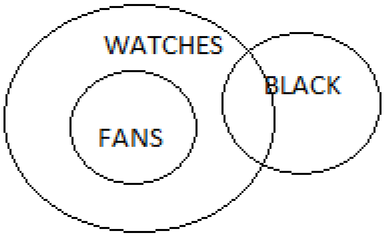
NOTE : In an I proposition, which distributes neither the subject nor the Predicate, the middle term cannot be distributed.

Example : Statements : 1. All fans are watches.
2.Some watches are black.
Conclusions : 1. All watches are fans.

2. Some fans are black.



A



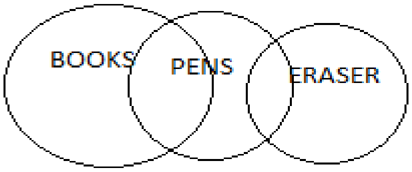
B

In the premises, the middle term is ‘watches’. It is not distributed in the first premise which is an A proposition as it doesn’t form its subject. Also, it isn’t distributed in the second premise which is an I proposition. Since the middle term is not distributed at least once in the premises, so no conclusion follows.

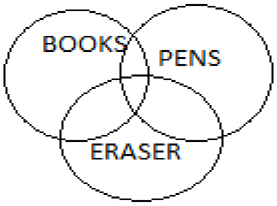
IV. No conclusion follows

a) If both the premises are particular

Example : Statements : 1. Some books are pens.
2.Some pens are erasers.
Conclusions : 1. All books are erasers.
2.Some erasers are books.



A

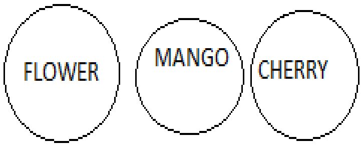


B

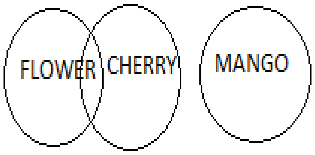
Since both the premises are particular, no conclusion follows.

b) If both the premises are negative

Example : Statements : 1. No flower is mango.
2.No mango is cherry.
Conclusions : 1. No flower is cherry.
2.Some cherries are mangoes.


FLOWER
MANGO
CHERRY

A

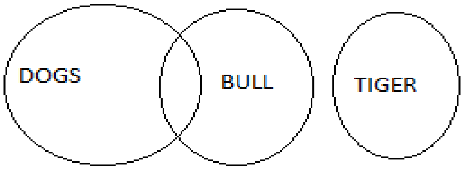

FLOWER
CHERRY
MANGO

B

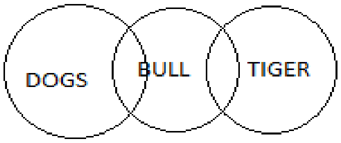
Since both the premises are negative, neither conclusion follows.

c) If the major premise is particular and the minor premise is negative.

Example : Statements : 1. Some dogs are bulls.
2. No tigers are dogs.
Conclusions : 1. No dogs are tigers.
2. Some bulls are tigers.


DOGS
BULL
TIGER

A


DOGS
BULL
TIGER

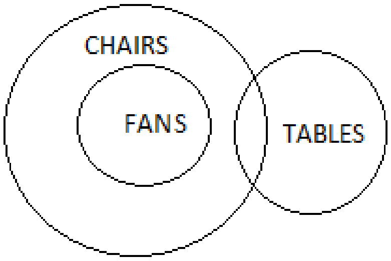
B

Here the first premise containing the middle term ‘dogs’ as the Subject is the major premise and the second premise containing the middle term ‘dogs’ as the Predicate is the minor premise. From the figure it is clear that conclusion 1 follows and conclusion 2 does not follow.

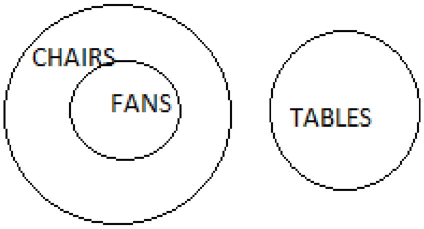
V. If the middle term is distributed twice, the conclusion cannot be universal.

Example: Statements : 1.All fans are chairs.
2.No tables are fans.

Conclusion : 1.No tables are chairs.
2. Some tables are chairs.


CHAIRS
FANS
TABLES

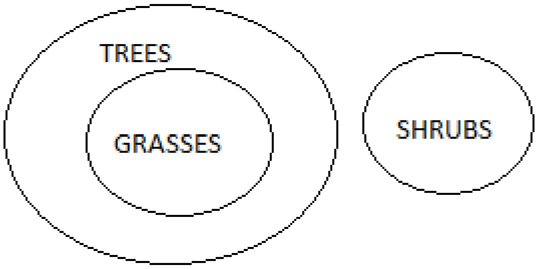
A


CHAIRS
FANS
TABLES

B

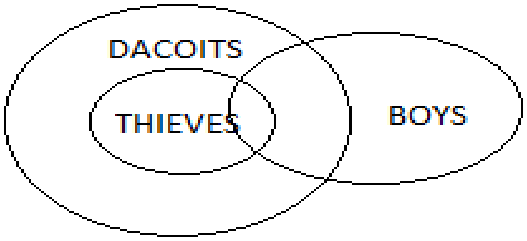
Here the first premise is an A proposition and so the middle term ‘fans’ forming the subject is distributed. The second premise is an E proposition and so the middle term fans forming the predicate is distributed. Since the middle term is distributed twice so the conclusion cannot be universal.

VI. If one premise is negative, the conclusion must be negative.
Example: Statements: 1. All grasses are trees.
2.No tree is shrub.
Conclusion: 1. No grasses are shrubs.
2.Some shrubs are grasses.

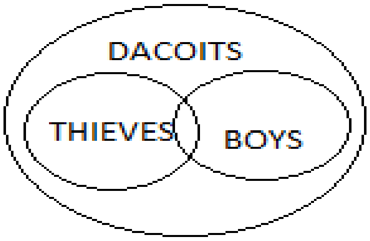


Since one premise is negative the conclusion must be negative. So, only conclusion 1 follows and conclusion 2 cannot follow.

VII. If one is particular the conclusion is particular.
Example: Statements: 1. Some boys are thieves.
2. All thieves are dacoits.
Conclusion: 1. Some boys are dacoits.
2.All dacoits are thieves.



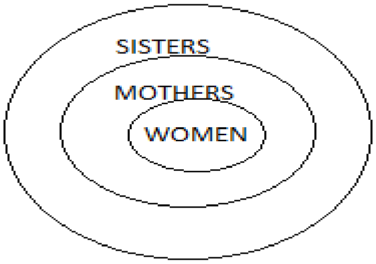
A



B

Since one premise is particular the conclusion must be particular. So, only conclusion 1 follows and conclusion 2 cannot follow.

VIII. If both the premises are affirmative, the conclusion would be affirmative. Example:
Statements: 1.All women are mothers.
2.All mothers are sisters.
Conclusion: 1.All women are sisters.
2.Some women are not sisters.

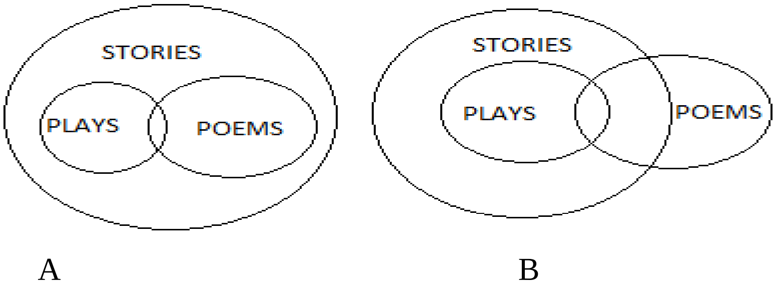


Since both premise are affirmative, the conclusion must be affirmative. So, only conclusion 1 follows and conclusion 2 cannot follow.

IX. If major premise be affirmative the conclusion must be particular.

Example: Statements: 1.All plays are stories.
2.Some poems are plays.

Conclusion: 1.Some poems are stories.
2.All stories are poems.



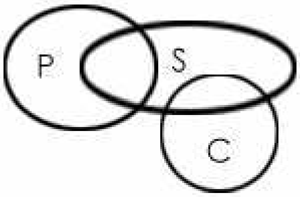
The first premise containing the middle term ‘plays’ as the subject is the major premise. Also, it is affirmative. So, the conclusion must be particular. So, only conclusion 1 follows and conclusion 2 cannot follow.

Example1: Which of the two conclusions can be concluded on the basis of given statements?

Statements: Some parrots are scissors.
Some scissors are not combs.

Conclusions: Some scissors are parrots.
Some combs are parrots.

Solution: Now, in this case, the possible conclusion is: Some scissors are parrots (I to I), as the universal principal no. 4 says, that with two particular statements only I to I is possible. Therefore, only 1 conclusion is possible. Nothing else is possible.



Example 2 : Which of the two conclusions can be concluded on the basis of given statements?

Statements: All flowers are candles.

All lanterns are candles.

Conclusions: Some flowers are lanterns.

Some candles are lanterns.

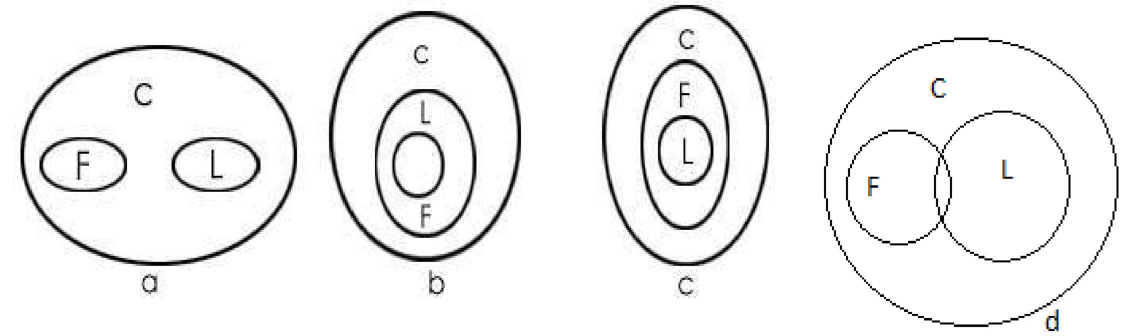
Solution:

Three possible diagrams are shown above for the given statements.

Conclusion I follows from last two possible solutions, but does not follow from the first possible solution. Therefore, this conclusion is false.

Conclusion II follows from all the three possible solutions.

Therefore, conclusion II is true.



Example 3: Which of the two conclusions can be concluded on the basis of given statements?

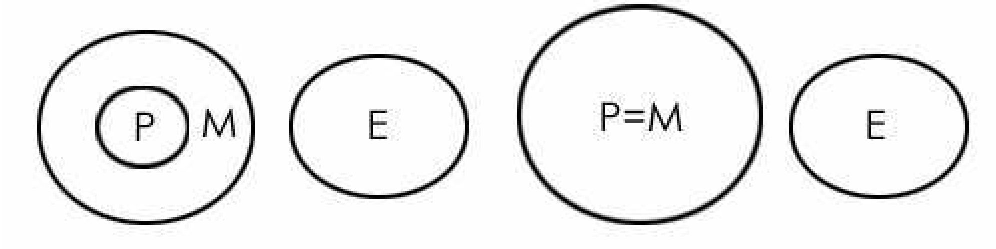
Statements: All prisoners are men.

No man is educated.

Conclusions: All prisoners are uneducated.

Some men are prisoners.

Solution: Two possible diagrams are shown below for the given statements.



A B

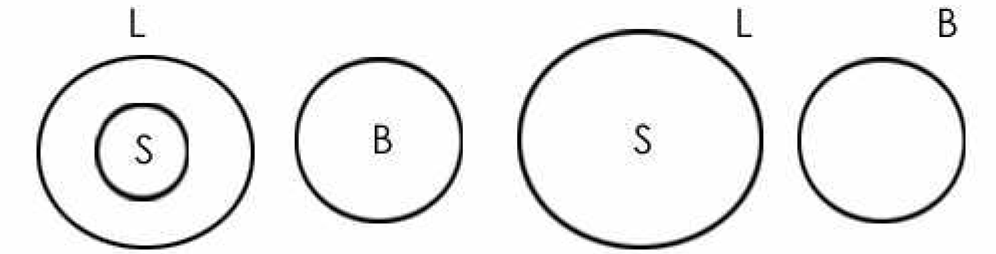
Conclusion I follows from both the possibilities, so conclusion I is true. Conclusion II also follows from both the possibilities, so conclusion II is also true. Therefore, both conclusions are true.

Example 4: Which of the two conclusions can be concluded on the basis of given statements?

Statements: All sides are lengths.
No length is a breadth.

Conclusions: All lengths are sides
No breadth is a side

Solution: Two possible diagrams are shown below for the given statements.



A B

Conclusion I: False (conclusion follows from the second possibility but doesn't follow from the first possibility)

Conclusion II: True (conclusion follows from both the Venn diagram possibilities.)

Therefore, only conclusion II is true.

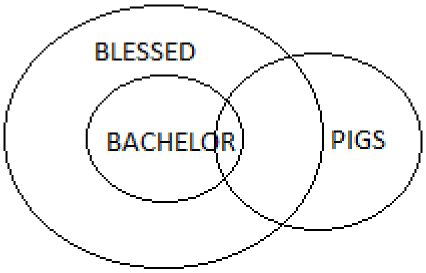
Q 5 - Statements: I. Some pigs are bachelors.
II. All bachelors are blessed.

Conclusions: I. Some pigs are blessed.
II. At least some blessed are bachelors.

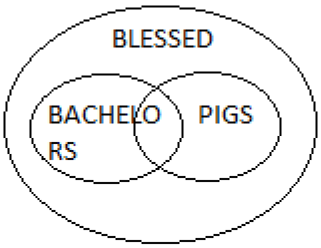
A - If only conclusion I follows.
B - If only conclusion II follows.
C - If either conclusion I or II follows.
D - If neither conclusion I nor II follows.
E - If both conclusion I and II follows.

Answer : E

Explanation



A



B

Some pigs are bachelors (I) + all bachelors are blessed (A) = I + A = I = some pigs are blessed. Hence conclusion I follows. Again all bachelors are blessed - conversion - some blessed are bachelors. Hence conclusion II also follows.

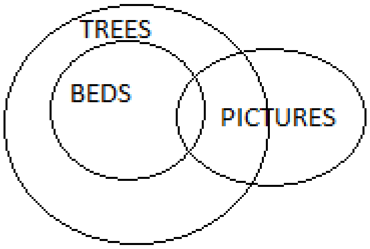
Q 6 - Statements: I. Some pictures are beds.
II. All beds are trees.
Conclusions: I. Some pictures are trees.
II. At least some trees are beds.

A - If only conclusion I follows.
B - If only conclusion II follows.
C - If either conclusion I or II follows.
D - If neither conclusion I nor II follows.

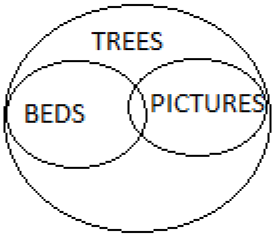
E - If both conclusion I and II follows.

Answer : E

Explanation:



A



B

Some pictures are beds (I) + all beds are trees (A) = I + A = I = some pictures are trees. Hence conclusion I follows. Again all beds are trees - conversion - some trees are beds. Hence conclusion II also follows.

Three premise argument

A syllogism is a form of reasoning in which the conclusion is drawn from the given statements. Three Premise Arguments means that there are 3 statements and 1 or more conclusions. These are same as the two premise arguments. They are also represented in the form of Venn Diagrams.

A. Definite Conclusions

In the three premise arguments, three statements are given. These three statements can be used to draw conclusions or define possibilities. Conclusions are drawn when the statements directly lead to one of the conclusions. Below each set of statements, a set of conclusions will be given. your job is to identify the correct option.Definite conclusions are those conclusions which are definitely true from the given Premises. In the arguments, the premise is very important. The conclusions or the inference are drawn from the premise and the reasoning is entirely based on the premise.

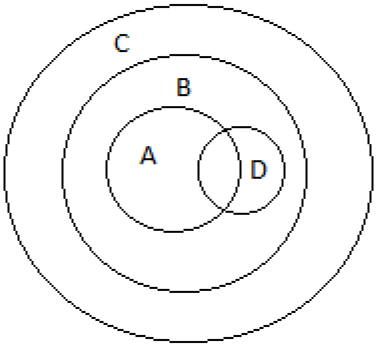
Examples –

1. Statements: I. All A are B
II. All B are C
III. Some D is A

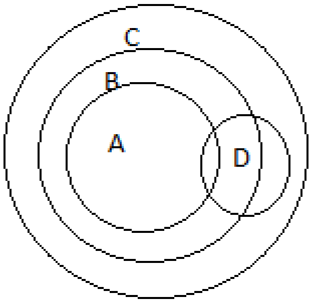
Conclusions: I. All A is C.
II. All A are D
III. Some D is B

A) I, II and III are correct
B) Only I and II are correct
C) Only II and III are correct
D) Only I and III are correct

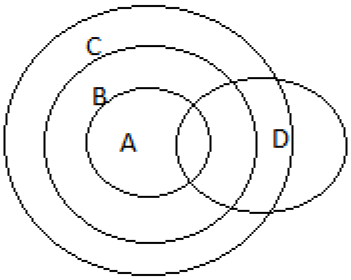
Answer- We can solve this question similarly as we used to solve the Questions of 2 Premises by using the Venn Diagrams. We can use the Venn Diagrams to easily solve this question. In fact, to solve the questions on arguments, we will have to use the Venn diagrams. Let us see below:



A



B



C

From the Venn Diagram, we can see that the conclusions I and III definitely follow.

So the correct option is D) Only I and III are correct.

Explanation: The conclusion II does not follow because in the statement it is given that Some D is A and in the conclusion, it is given that All A is D. There is some part of A about which we do not have any information so any definite conclusion about it will not follow.

B. Possibilities

Possibilities are those conclusions which are not definitely true but they may or may not be true. We can take the same example here as we saw above.

1. Statements : I. All A are B
II. All B are C
III. Some D are A

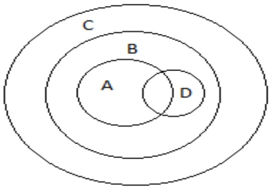
Conclusions : I. All D are A is a possibility.

II. All C are A is a possibility.

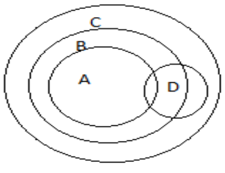
A) Both I, II are correct

B) Only I is correct
C) Only II is correct
D) The data is not sufficient

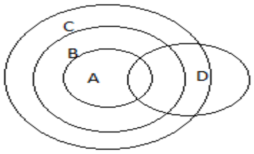
Answer: We can solve this question by using the Venn diagram.



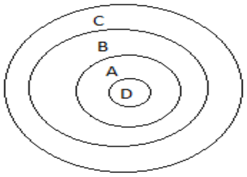
(i)



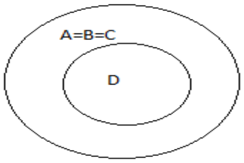
(ii)



(iii)



(iv)



(v)

Here both the conclusions follow.

Explanation: For Conclusion I: From the above Venn diagram (iv) we can conclude that conclusion I clearly follows being a possibility.

For Conclusion II: From the above Venn diagram (iv) we can conclude that conclusion II clearly follows being a possibility.

Hence the correct option is A) Both I, II are correct.

Other Types of Questions

2. Statements : I. Some A is not B

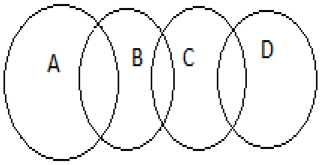
II. Some B are C

III. Some D is C

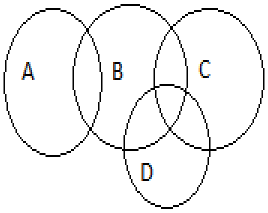
Conclusions: I. All A is not B is a possibility

II. Some B are D

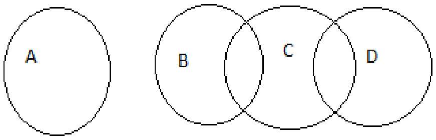
Answer:- We can solve this question by the below Venn Diagram. The cross in the red designates the relation “are not”. We can say that since some A are B, not all A are B is also one possibility. The following Venn Diagram represents the statements present in the above question.



(i)



(ii)



(iii)

Hence only the conclusion I follow.

Explanation: For Conclusion I: It is given that All A is not B is a possibility but in Statement I, it is given that Some A are not B.

So, from the above Venn diagram it is clear that conclusion I is correct.

For Conclusion II: It does not follow because no direct relation between B and D is given. The only relation is between C and D and between B and C. So conclusion II doesn't follow.

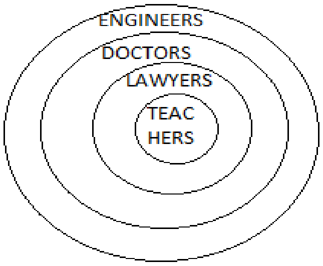
Questions -

1. Statements: I. All Teachers are Lawyers
II. All Lawyers are Doctors
III. All Doctors are Engineers

Conclusions: I. Some Engineers are Lawyers
II. Some Doctors are Teachers

A) Both are the wrong
B) Both are correct
C) They may be correct
D) Data Insufficient

Ans:



B) Both are correct

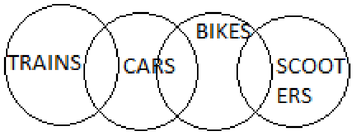
2. Statements: I. Some Trains are not Cars
II. Some Cars are Bikes
III. Some Scooters are Bikes

Conclusions: I. All Trains are not Cars a possibility.

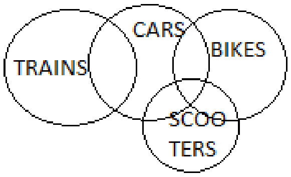
II. Some Scooters are Cars.

A) Both are the wrong
B) Both are correct
C) I is correct
D) II is correct

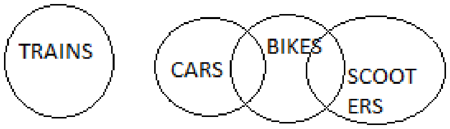
Ans:


TRAINS
CARS
BIKES
SCOOT ERS

A


TRAINS
CARS
BIKES
SCOO TERS

B


TRAINS
CARS
BIKES
SCOOT ERS

C

C) I is correct.

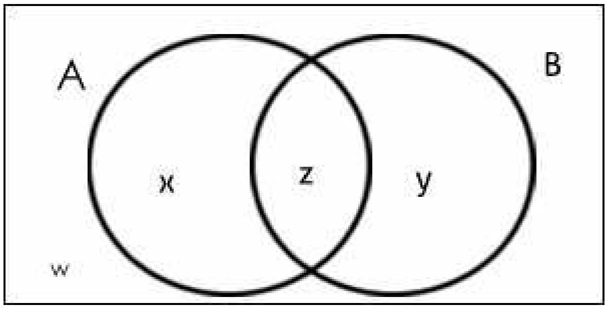
UNIT -3: Venn Diagrams, Mirror Images, Problems on Cubes and Dices

VENN DIAGRAMS

It is a process of showing complex relationship between 2-3 categories diagrammatically through various geometric strictures. Intersection between two geometric structures indicate that they have something in common and total isolation indicates just opposite of that.

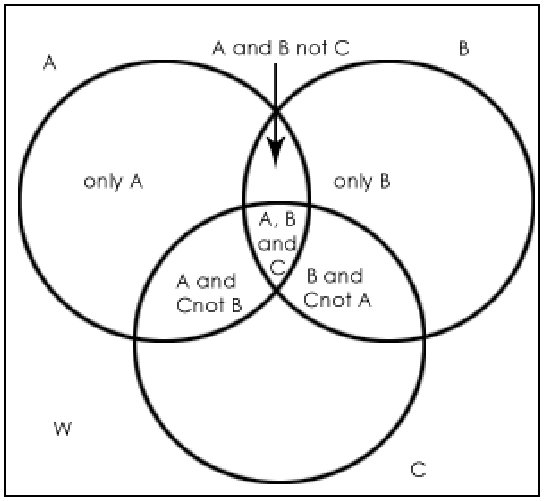
Venn diagram, also known as Euler-Venn diagram is a simple representation of sets by diagrams. The usual depiction makes use of a rectangle as the universal set and circles for the sets under consideration.

(a) Venn Diagram in case of two elements



Where;
X = number of elements that belong to set A only
Y = number of elements that belong to set B only
Z = number of elements that belong to set A and B both ($A \cap B$)
W = number of elements that belong to none of the sets A or B
From the above figure, it is clear that
$n(A) = x + z$;
$n(B) = y + z$;
$n(A \cap B) = z$;
$n(A \cup B) = x + y + z$.
Total number of elements = $x + y + z + w$

Venn Diagram in case of three elements


A
A and B not C
B
only A
only B
A, B and C
A and Cnot B
B and Cnot A
W
C

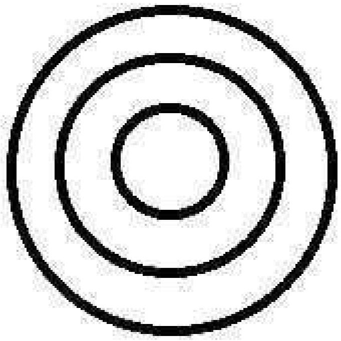
Where,

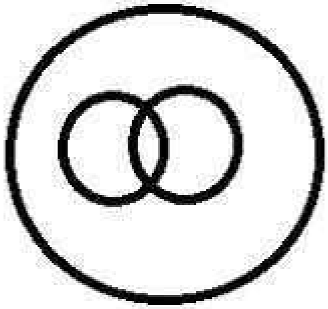
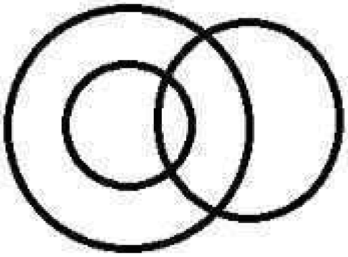
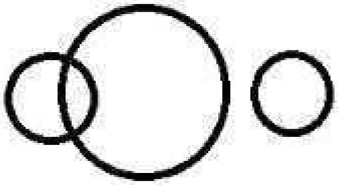
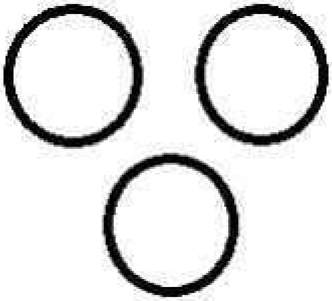
W = number of elements that belong to none of the sets A, B or C

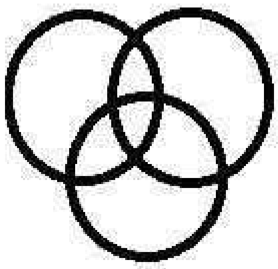
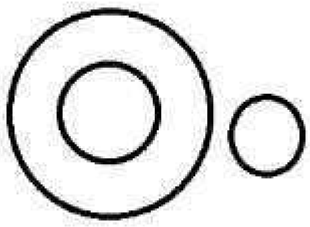
Let's take a look at some basic formulas for Venn diagrams of two and three elements.

n (A ∪ B) = n(A) + n (B) - n (A∩ B)

n (A ∪ B ∪ C) = n(A) + n (B) + n (C) - n (A ∩ B) - n (B ∩ C) - n (C ∩ A) + n (A ∩ B ∩ C)

Venn diagram	Applicable cases	Example
	There will be a series of sub cases one under another.	Colour >Green>light green. Light green colour is a sub part of green colour and both of them belongs to colour group.

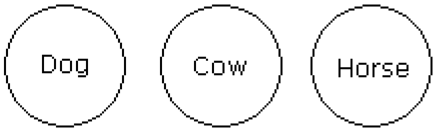
	One main category, under it two sub categories and both bear some similarities among them.	Liquids>Petrol, Car fuel. Here both are flammables in nature, thus bear similarity.
	One category may have one sub category. They both partially satisfy some conditions (not always).	Vegetable>Capsicum>Red. Some capsicums are red and so as some other vegetables.
	Among three different sections, two may have some common properties those do not match with third one.	Actor>Headmaster>Queen. From the above, actor and headmaster are showing masculinity, thus bearing some common properties which is just opposite to Queen.
	Three sections having no common feature.	Tree>Angry>Coffee. There is no logic of finding any common aspect among above three terms.

	There is a chance of finding a common place that satisfies all the properties of three individual sections.	Mother>Step mother>Sister-in law. A single woman can be all of the above said simultaneously.
	This is particular for those cases in which out of three sections, two are inter related as parent child relationship, whereas third one has no relation with them.	Tree>banana tree>Angry. We all know banana tree is coming under tree category but emotion" Angry" has nothing to do with these 2 words.

Example 1:

If all the words are of different groups, then they will be shown by the diagram as given below.

Dog, Cow, Horse

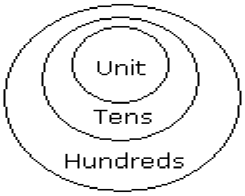


All these three are animals but of different groups, there is no relation between them. Hence they will be represented by three different circles.

Example 2:

If the first word is related to second word and second word is related to third word. Then they will be shown by diagram as given below.

Unit, Tens, Hundreds

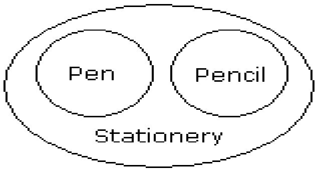


Ten units together make one Tens or in one tens, whole unit is available and ten tens together make one hundreds.

Example 3:

If two different items are completely related to third item, they will be shown as below.

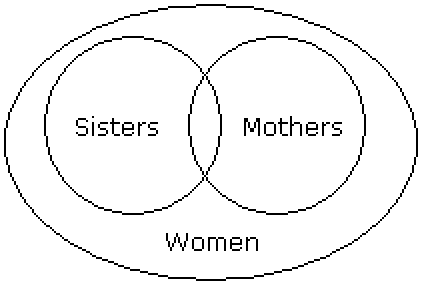
Pen, Pencil, Stationery



Example 4:

If there is some relation between two items and these two items are completely related to a third item they will be shown as given below.

Women, Sisters, Mothers

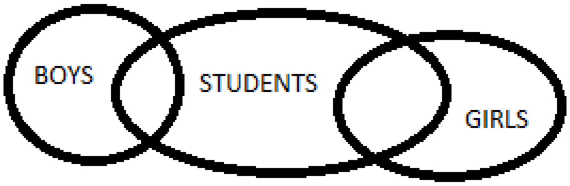


Some sisters may be mothers and vice-versa. Similarly some mothers may not be sisters and vice-versa. But all the sisters and all the mothers belong to women group.

Example 5:

Two items are related to a third item to some extent but not completely and first two items totally different.

Students, Boys, Girls

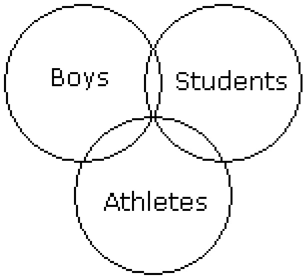


The boys and girls are different items while some boys may be students. Similarly among girls some may be students.

Example 6:

All the three items are related to one another but to some extent not completely.

Boys, Students, Athletes

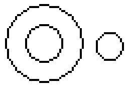


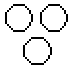
Some boys may be students and vice-versa. Similarly some boys may be athletes and vice-versa. Some students may be athletes and vice-versa.

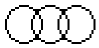
Problems

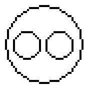
Example-1

Which of the following diagrams indicates the best relation between Travelers, Train and Bus ?

A. 

B. 

C. 

D. 

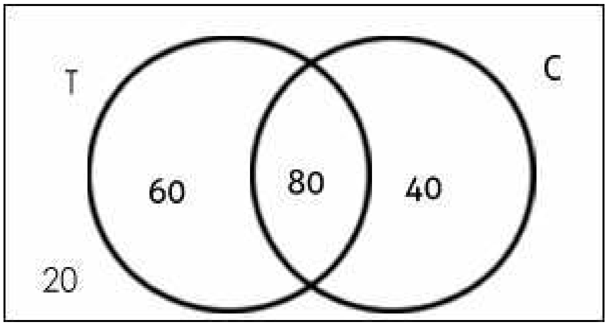
Solution- Option **C**

Bus and Train are different from each other but some travelers travel by bus and some travel by train.

Example 2: In a college, 200 students are randomly selected. 140 like tea, 120 like coffee and 80 like both tea and coffee.

- How many students like only tea?
- How many students like only coffee?
- How many students like neither tea nor coffee?
- How many students like only one of tea or coffee?
- How many students like at least one of the beverages?

Solution: The given information may be represented by the following Venn diagram, where T = tea and C = coffee.



Number of students who like only tea = 60

Number of students who like only coffee = 40

Number of students who like neither tea nor coffee = 20

Number of students who like only one of tea or coffee = 60 + 40 = 100

Number of students who like at least one of tea or coffee = n (only Tea) + n (only coffee) + n (both Tea & coffee) = 60 + 40 + 80 = 180

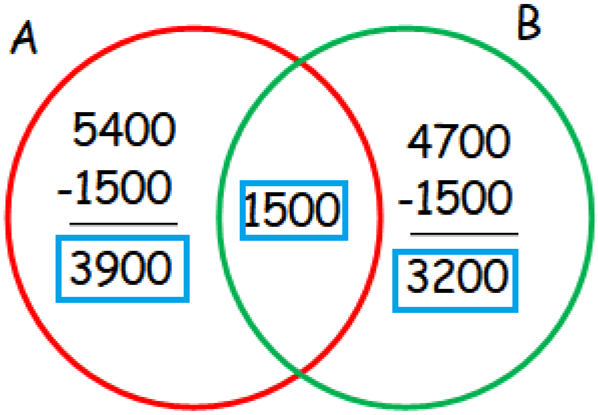
Example 3 :

The population of a town is 10000. Out of these 5400 persons read newspaper A and 4700 read newspaper B. 1500 persons read both the newspapers. Find the number of persons who do not read either of the two papers.

Solution :

Let A = The set of persons who read newspaper A

B = The set of persons who read newspaper B



Number of persons who read at least one news paper = 3900 + 1500 + 3200

= 8600

Total population = 10000

To find the number of persons who do not read either of the two papers, we have to subtract number of persons who read at least one from total population. = 10000 - 8600

= 1400

Hence the number of persons who do not read either of the two papers is 1400.

Example 4:

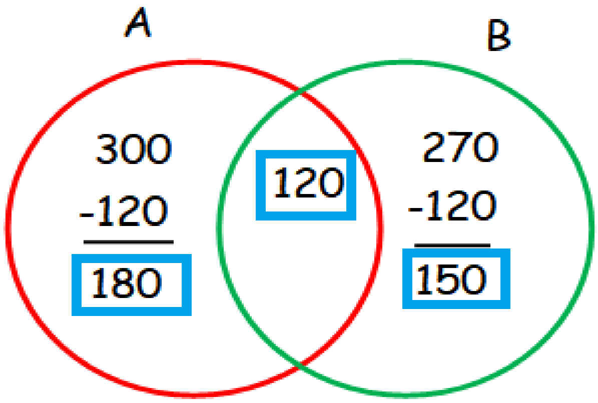
In a school, all the students play either Foot ball or Volley ball or both. 300 students play Foot ball, 270 students play Volley ball and 120 students play both games. Find

(i) the number of students who play Foot ball only
(ii) the number of students who play Volley ball only
(iii) the total number of students in the school

Solution :

Let A = The set of students who play foot ball

B = The set of students who play volley ball



(i) The number of students who play Foot ball only is 180

(ii)The number of students who play Volley ball only is 150

(iii) The total number of students in the school = 180 + 120 + 150

= 450

Example 5 :

In a School 150 students passed X Standard Examination. 95 students applied for Group I and 82 students applied for Group II in the Higher Secondary course. If 20 students applied neither of the two, how many students applied for both groups?

Solution :

A = The set of students who applied for Group I

B = The set of students who applied for Group II

Number of students who applied at least one group = 150 - 20

= 130

n (A) = 95, n (B) = 82 and n (A U B) = 130

n (A U B) = n (A) + n (B) - n (A n B)

130 = 95 + 82 - n (A n B)

130 = 177 - n (A n B)

n (A n B) = 177 - 130 = 47

Hence the number of students applied for both groups is 47.

MIRROR IMAGE

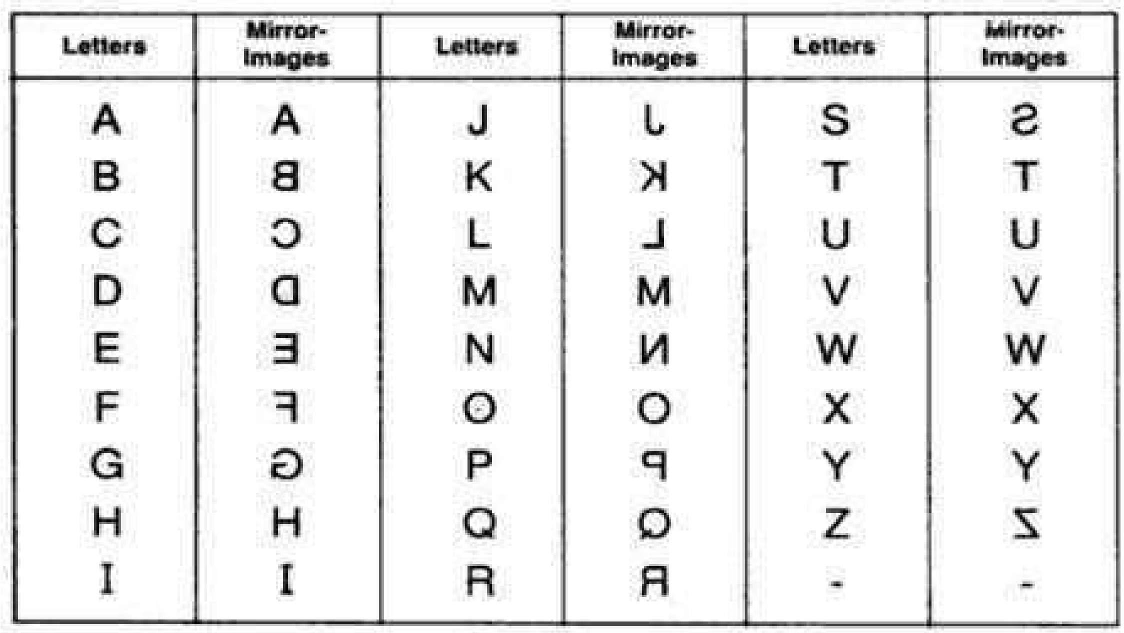
A mirror image (in a plane mirror) is a reflected duplication of an object that appears almost identical, but is reversed in the direction perpendicular to the mirror surface. As an optical effect it results from reflection off of substances such as a mirror or water. It is also a concept in geometry and can be used as a conceptualization process for 3-D structures.

The image of an object as seen in a mirror is its mirror reflection or mirror image. In such an image, the right side of the object appears on the left side and vice versa. A mirror-image is therefore said to be laterally inverted and the phenomenon is called the lateral inversion.

Some letters don’t change upon reflection. In other words, they are the same as that of their Mirror Images. The letters having identical mirror images are A, H, I, M, O, T, U, V, W, X, Y. Similarly, in small letters we have i, l, o, v, w, and x that have the same Mirror Image as that of their original images. The number 1 and 8 are the only two numbers with their identical mirror images.

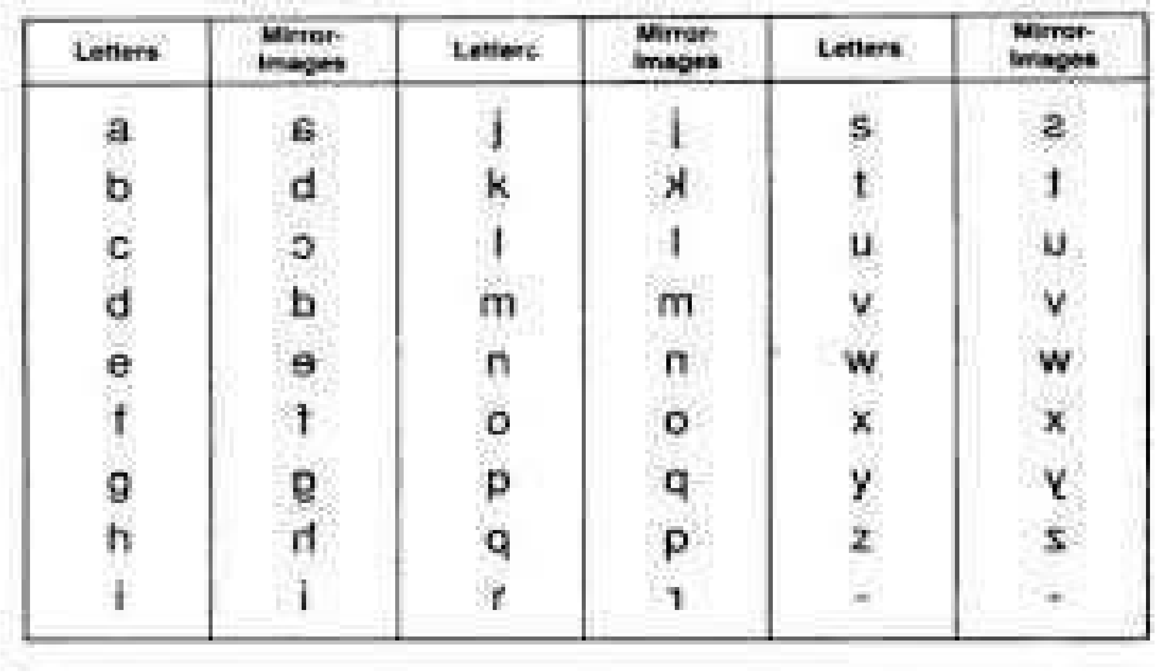
The Left Hand Side (L H S) of real image becomes the Right Hand Side (R H S) in mirror image and the R H S in the real image becomes the L H S in the mirror image.

Mirror Images of Capital Letters –



Letters	Mirror-Images	Letters	Mirror-Images	Letters	Mirror-Images
A	A	J	ᒐ	S	Ƨ
B	ᗺ	K	ꓘ	T	T
C	Ɔ	L	⅃	U	U
D	ᗡ	M	M	V	V
E	Ǝ	N	И	W	W
F	ꟻ	O	O	X	X
G	Ә	P	ꟼ	Y	Y
H	H	Q	Ϙ	Z	Ꙁ
I	I	R	Я	-	-

Mirror Images of Small Letters -



Letters	Mirror-Images	Letterc	Mirror-Images	Letters	Mirror-Images
a	ɒ	j	ᒑ	s	ƨ
b	d	k	ʞ	t	ƚ
c	ɔ	l	l	u	u
d	b	m	m	v	v
e	ɘ	n	n	w	w
f	ɟ	o	o	x	x
g	ϱ	p	q	y	γ
h	ᖹ	q	p	z	ꙁ
i	i	r	ɿ	-	-

Examples -

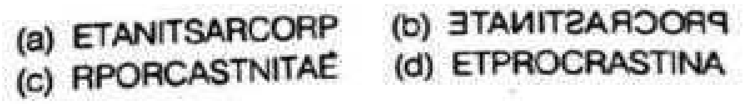
1. Which among the following illustrations specifies the correct mirror image of O B S T I N A T E ?

(a)
(b) BOSTINATE
(c) ETANITSBO
(d) SOBTNIATE

Solution-

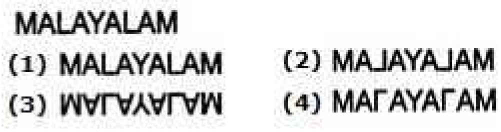
The first step is to check the first and the last letters. We know that the reflection at a mirror is equivalent to an inversion. In other words, we say that in a mirror top and bottom of an image doesn't change but the Left Hand Side (L H S) of real image becomes the Right Hand Side (R H S) in mirror image and the R H S in the real image becomes the L H S in the mirror image. So, (a) is the correct option.

2. Which among the following illustrations specifies the correct mirror image of P R O C R A S T I N A T E ?


(a) ETANITSARCORP
(b)
(c) RPORCASTNITAE
(d) ETPROCRASTINA

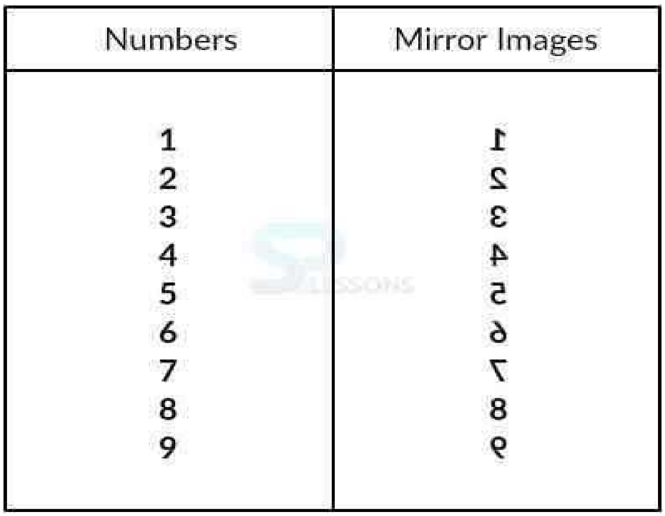
Answer: Let us see the first letter in the mirror image of P R O C R A S T I N A T E. The first letter in the mirror image would be the last letter in the original word P R O C R A S T I N A T E, which is E. The only option that has its first letter as the mirror image of E is option (b). Therefore (b) is the correct option.

3. Choose the alternative which is closely resembles the mirror image of the given combination.


MALAYALAM
(1) MALAYALAM
(2) MAJAYAJAM
(3)
(4) MAΓAYAΓAM

Ans : (2)

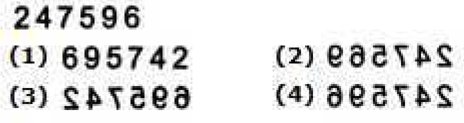
MIRROR IMAGES OF NUMBERS



Numbers	Mirror Images
1	
2	
3	
4	
5	
6	
7	
8	
9	

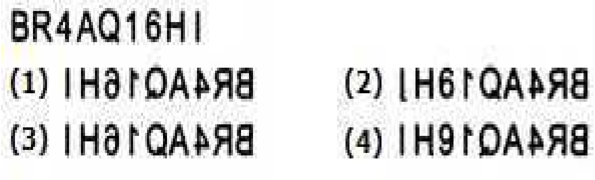
EXAMPLES -

1. Choose the alternative which is closely resembles the mirror image of the given combination.


247596
(1) 695742
(2)
(3)
(4)

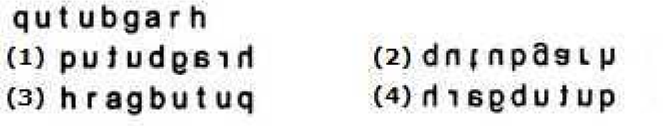
Ans. (4)

2. Choose the alternative which is closely resembles the mirror image of the given combination.


BR4AQ16HI
(1)
(2)
(3)
(4)

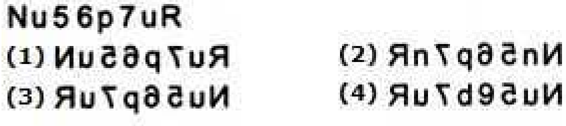
Ans (1)

3. Choose the alternative which is closely resembles the mirror image of the given combination.


qutubgarh
(1)
(2)
(3) hragbutuq
(4)

Ans. (4)

4. Choose the alternative which is closely resembles the mirror image of the given combination.


Nu56p7uR
(1)
(2)
(3)
(4)

Ans. (3)

5.Choose the alternative which is closely resembles the mirror image of the given combination.

ANS43Q12
(1)
(2)
(3)
(4)

Ans. (2)

MIRROR IMAGES OF FIGURES

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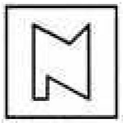
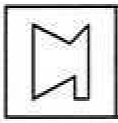
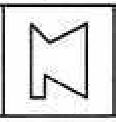
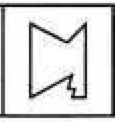
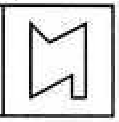
1. Choose the correct mirror image of the given figure (X) from amongst the four alternatives.


(X)


(1)

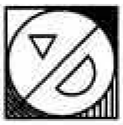

(2)

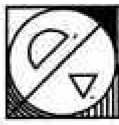

(3)

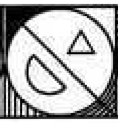

(4)

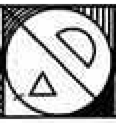
Ans . (4)

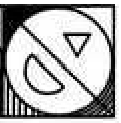
2. Choose the correct mirror image of the given figure (X) from amongst the four alternatives.


(X)


(1)

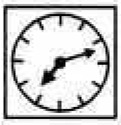

(2)

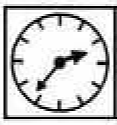

(3)

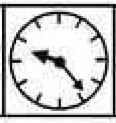

(4)

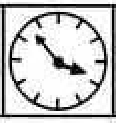
Ans. (4)

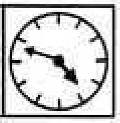
3. Choose the correct mirror image of the given figure (X) from amongst the four alternatives.


(X)


(1)

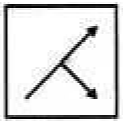

(2)

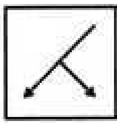

(3)

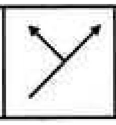

(4)

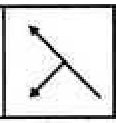
Ans. (4)

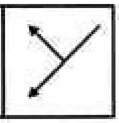
4. Choose the correct mirror image of the given figure (X) from amongst the four alternatives.


(X)


(1)

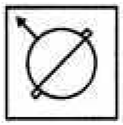

(2)

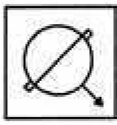

(3)

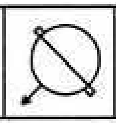

(4)

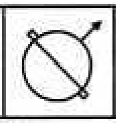
Ans. (3)

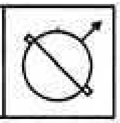
5. Choose the correct mirror image of the given figure (X) from amongst the four alternatives.


(X)


(1)

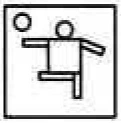

(2)


(3)

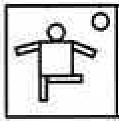

(4)

Ans. (3)

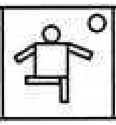
6. Choose the correct mirror image of the given figure (X) from amongst the four alternatives.



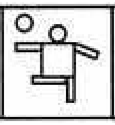
(X)



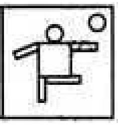
(1)



(2)



(3)



(4)

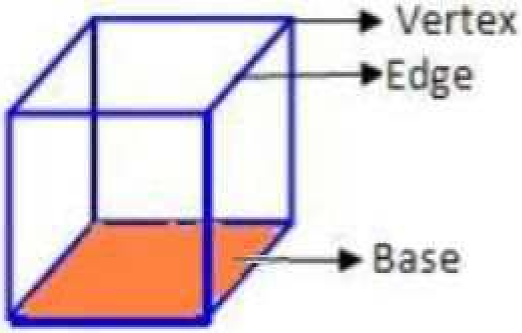
Ans. (4)

PROBLEMS ON CUBES AND DICES

CUBES

Let's first learn some basic terminologies i.e. face, vertex and edge of a cube.

In a cube, there are 6 faces, 8 vertices & 12 edges. Vertex means corners & edge means side.

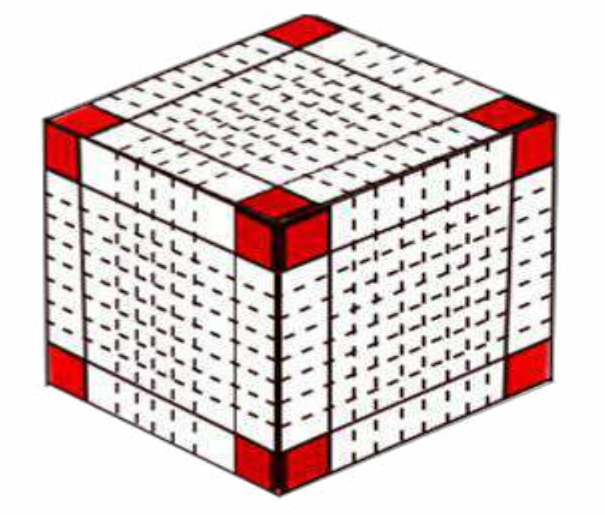


Generally, questions from this topic are of the type wherein, a cube with side measuring unit 'x' is painted on all faces and is cut into smaller cubes with sides measuring unit 'y'. You are then required to find the number of cubes having 'n' faces painted.

The first thing that you need to figure out is the number of smaller cubes. For this, you look at one particular edge of the big cube and figure out how many smaller cubes can fit into this. It will be $\frac{x}{y}$. So, the number of smaller cubes will be $\left(\frac{x}{y}\right)^3$

Since all the smaller cubes will have at least one face facing inside i.e. not on the surface of the original cube, hence, none of the smaller cubes will have all faces painted. Further, since the maximum number of faces of the larger cube that intersect at a point are 3(at the corners), hence, the smaller cubes can have a maximum of 3 faces painted.

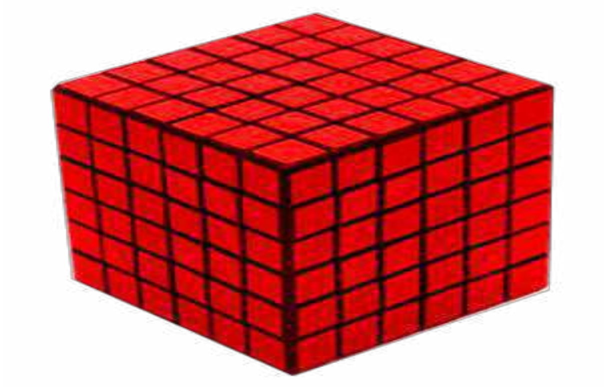
So, the number of smaller cubes with 3 faces painted = No of corners of larger cube = 8 (always), provided none of the faces of the larger cube is left unpainted.



Cube Sample Questions

Example 1: A cube having a side of 6 cm is painted red on all the faces and then cut into smaller cubes of 1 cm each. Find the total number of smaller cubes so obtained.

Solution:



As explained above, the number of smaller cubes = $\left(\frac{6}{1}\right)^3$ = 216 smaller cubes.

(Here x=6 and y=1)

Example 2: In the above example, how many cubes will have three faces painted?

Solution: As explained above, only the corner cubes i.e. the 8 cubes at the corners of the original cube will have three faces painted. Hence the answer will be 8 only. To find the number of smaller cubes with only 2 faces painted, you need to consider the cubes where 2 faces of the bigger cube meet, i.e. the edges. Remember, this includes the cubes present at the corners as well, so you need to remove those 2 cubes from the number of cubes on each edge.

Example 3: In the above example, how many cubes will have only two faces painted?

Solution: As discussed above, only the cubes at the edge of the bigger cube can have two faces painted. The larger cube has 6 cm edge and smaller cube is 1 cm edge. Hence, there are 6 cubes on each edge. However, you need to consider 4 middle cubes only, as the 2 cubes on each corner will have 3 painted faces. Hence, there are 4 such cubes on each edge. As there are 12 edges, there will be $4 \times 12 = 48$ cubes

Example 4: In the above example, how many cubes will have only one face and no side painted?

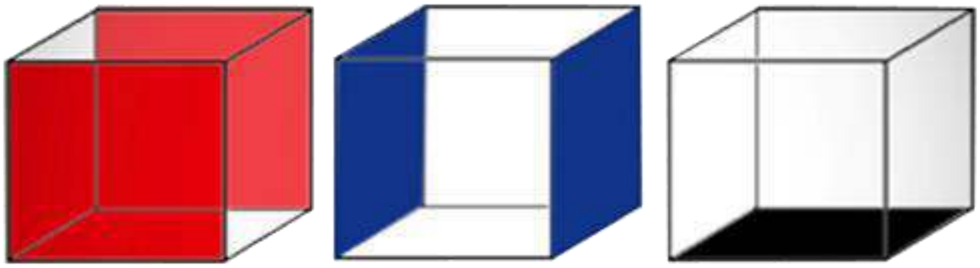
Solution: As discussed above, only the cubes at the face of the bigger cube can have only one painted face. Since the larger cube has 6 cm edge and smaller cube is 1 cm edge, hence, if you see one of the faces of the larger cube, you will see $6 \times 6 = 36$ cubes. Out of these, exclude the cubes which lie on the edges, as they have two or more faces which are painted. Thus, on each face of the original cube, there will be $4 \times 4 = 16$ cubes will have only one face painted.
As there are 6 such faces, the number of such smaller cubes will be $16 \times 6 = 96$.

Lastly, the number of cubes having no faces painted can be found by subtracting the sum of the painted cubes from the total number of smaller cubes. Therefore, the required answer is $216 - (8 + 48 + 96) = 64$ cubes.

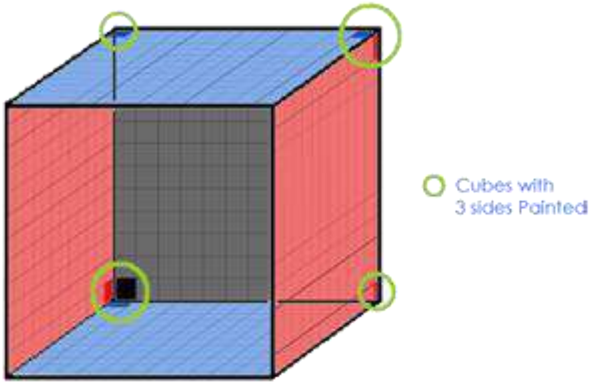
Example 5: A cube having an edge of 12 cm each. It is painted red on two opposite faces, blue on one other pair of opposite faces, black on one more face and one face is left unpainted. Then it is cut into smaller cubes of 1 cm each. Answer the following questions:

- The total no. of smaller cubes/
- The no. of smaller cubes which are having three-faces painted.
- The no. of smaller cubes which are having two-faces painted.
- The no. of smaller cubes which are having one-face painted.
- The no. of smaller cubes which are having zero-face painted.

Solution:



- Total number of cubes= (12× 12 × 12) / (1× 1 × 1)=1728
- For a cube with all sides painted we have 8 cubes with 3 sides colored. But here we have 1 side unpainted. Therefore, we will have only 4 cubes with 3 sides painted. The other 4 cubes will have only 2 sides painted.



- For 2 sides painted, we look for the edges.

  A cube has 12 edges.

  8 edges, each edge having 10 cubes will have 2 sides painted. (4 edges of an unpainted side won't be included).

  We'll also include those 4 cubes (which we didn't count while counting 3 coloured sides, as they have 2 sides painted)

  Cubes on 4 edges of the unpainted side of the cube will have 1 side painted (due to the unpainted side).

  Therefore, total cubes with 2 sides painted= 8 ×10 + 4= 84 cubes.
- For 1 side painted, we look for the faces of the cube.

  A cube has 6 faces.

  5 faces each having (12 – 2) × (12 - 2) = 100 cubes will have one side painted.

  We'll have to include those cubes on the edges linked with an unpainted face.

10 cubes on each of those edges will have 1 side painted.

Therefore, total cubes with 1 side painted= 5 × 100 + 4 × 10 = 540 cubes.

- According to the formula, cubes with no side painted= $\left((12-2)^3\right)$= 1000.

  But we have to include the cubes from the unpainted side too. It will be 10×10=100

  So, total number of unpainted cubes= 1000+100=1100.

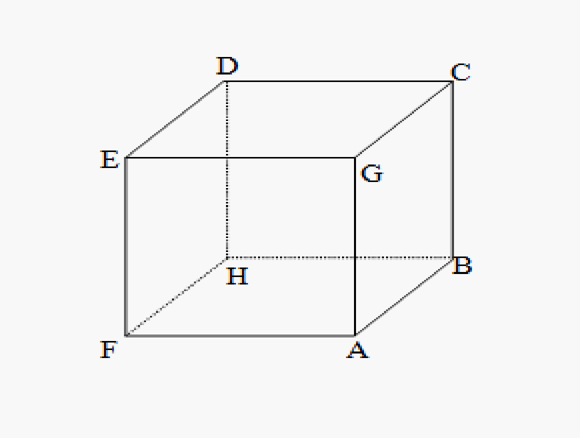
Shortcut Formulae

- For a cube of side n × n × n painted on all sides which is uniformly cut into smaller cubes of dimension 1 × 1 × 1,
- Number of cubes with 0 side painted= $(n-2)^3$
- Number of cubes with 1 sides painted = 6 $(n-2)^2$
- Number of cubes with 2 sides painted= $12(n-2)$
- Number of cubes with 3 sides painted= 8 (**always**)

DICE

A Dice is a cube. In a cube, there are six faces.

The six faces in the cube are– ABCG, GCDE, DEFH, BCDH, AGEF and ABHF.



1. Four faces are adjacent to one face
2. There are pairs of opposing faces e.g. Opposite of DEFH is ABCG and so on
3. CDEG is the upper face of the cube
4. ABHF is the bottom face of the cube

Important Facts:

1. A cube has 6 square faces or sides

2. A cube has 8 points (vertices)
3. A cube has 12 edges
4. Only 3 sides of a cube are visible at a time (known as “Joint Sides”) and these sides can never be on the opposite side of each other
5. Things that are shaped like a cube are often referred to as ‘cubic’
6. Most dice are cube shaped, with the numbers 1 to 6 on the different faces.

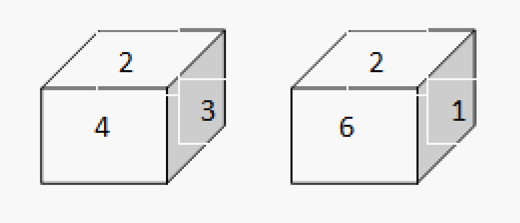
Certain Basic Rules:

There are certain dice rules in reasoning which can be sued to solve dice-based questions:

Rule No. 1:

Two opposite faces of the dice cannot be adjacent to each other.

E.g. Two positions of a dice are shown below.



Here, faces with number 4, 3, 6 and 1 are adjacent to the face number 2.

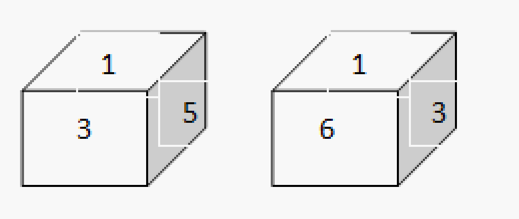
Therefore, the 4,3,6,1 can’t be opposite to the face number 2.

Therefore, face number 5 is opposite to the face number 2.

Rule No. 2:

If two dice are shown as below, and one of the two common faces (Face number 4) is in the same position, then the remaining faces will be opposite to each other.

E.g.: Two dice are shown below.



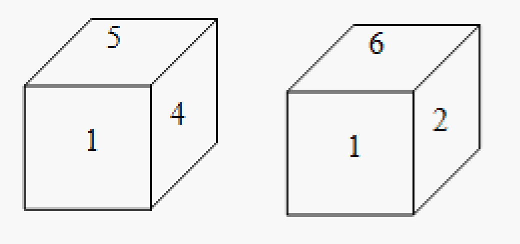
In both the diagrams, two faces numbered 1 & 3 are common.

Also, 5 & 6 are remaining faces. Hence, face which is number 5 is opposite to the face number 6.

Rule No. 3:

If in 2 different positions of the dice, the positions (different), the position of the face that's common is the same, and then the opposite faces of the faces that remain will be in the same positions.

E.g.:

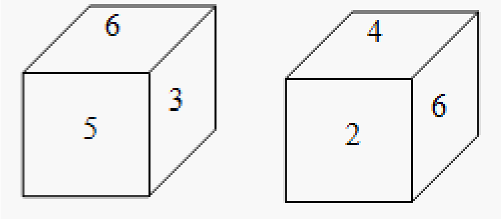


In both the positions, face number 1 is common for both dice is same.Therefore, the opposite of 4 is 2 and the opposite of 5 is 6.

Rule No. 4:

If 2 positions of a die are given (Different) and it is also stated that common face is different then the face opposite to the given common face would be that which is not shown on any given face in the 2 given positions. It is also to be noted that the opposite face of the faces that are left cannot be the same.

E.g.:

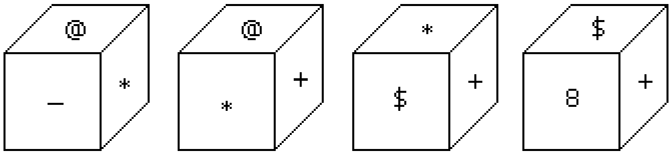


Note, in the above shown dice, the face having value 6 is not in the similar position. The face numbered 1 is not shown. So, the face opposite to the face with number 6 is 1.Also, the opposite face of 3 is the face with number 2 and the opposite to face numbered 5 is the face with number 4.

Now that you know the basic concepts on cubes and dice reasoning tricks. Let us study a few solved examples on dice reasoning

Dice Sample Questions –

1. Which symbol will be on the face opposite to the face with symbol * ?



A. @

B. $

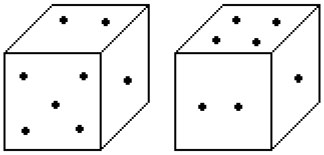
C. 8

D. +

Answer : Option **C**

Explanation: The symbols of the adjacent faces to the face with symbol * are @, -, + and $. Hence the required symbol is 8.

2. Two positions of dice are shown below. How many points will appear on the opposite to the face containing 5 points?



A. 3

B. 1

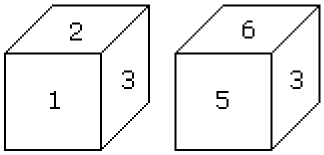
C. 2

D. 4

Answer : Option **D**

Explanation: In these two positions one of the common face having 1 point is in the same position. Therefore according to rule (2), there will be 4 points on the required face.

3. Which digit will appear on the face opposite to the face with number 4?



A. 3

B. 5

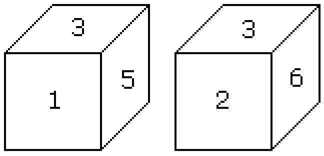
C. 6

D. 2/3

Answer : Option A

Explanation : Here the common faces with number 3, are in same positions. Hence 6 is opposite to 2 and 5 is opposite to 1. Therefore 4 is opposite to 3.

4. Two positions of a dice are shown below. Which number will appear on the face opposite to the face with the number 5?



A. 2/6

B. 2

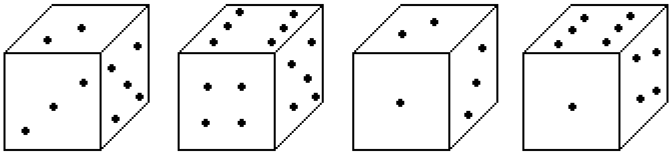
C. 6

D. 4

Answer : Option **C**

Explanation: According to the rule no. (3), common faces with number 3, are in same positions. Hence the number of the opposite face to face with number 5 will be 6.

5. How many points will be on the face opposite to in face which contains 2 points?



A. 1

B. 5

C. 4

D. 6

Answer : Option **D**

Explanation:
In first two positions of dice one common face containing 5 is same. Therefore according to rule no. (3) the face opposite to the face which contains 2 point, will contains 6 points.

SKILL ENHACEMENT COMPUYSLORY COURSE-I

COMMUNICATIVE ENGLISH

(SPECIAL COURSE)

Enriching Linguistic Knowledge &
Communication Proficiency

ODISHA STATE HIGHER EDUCATION COUNCIL
BHUBANESWAR

STATE MODEL SYLLABUS FOR UNDER GRADUATE COURSE IN SKILL ENHANCEMENT COURSE (I)

(Bachelor of Arts/Sc/Com Examination)

UNDER

CHOICE BASED CREDIT SYSTEM

FOREWARD

The higher education system has undergone a paradigm shift in Odisha with the introduction of Choice Based Credit System (CBCS) in academic year 2015-16 as per University Grant Commission regulation. Initially it was adopted in all Autonomous colleges and from 2016-17, in all the colleges of Odisha. CBCS offers students the liberty to choose from available lists of courses under the domains of Ability Enhancement, Skill Enhancement and General electives. This book on English aims to engage the students more creatively to improve their English language and communication skills. This paper will be taught under Skill Enhancement Compulsory Course (SECC).

The main intent of this paper is to strengthen the language competency of graduate students, majority of who are set to enter the job market with high hopes. Needless to say, a good command over English language is one skill which various companies expect from the prospective employees. The course content is adopted from the study material of Infosys Foundation. They have had the experiences of conducting faculty development programme under Project Genesis in Odisha. A group of academicians from state universities were involved in the process of contextualising the material to the needs of students of Odisha. We would like to acknowledge the vital contribution from Infosys Foundation in sharing the study material and conducting faculty training. We hope the students find merit in using this book not just as a course study material but as a life time companion in improving his / her English skills.

Vice Chairperson
OSHEC

Bhubaneswar

Some Useful Apps downloadable from Play store

Dictionary- Word Web

Oxford Dictionary of English

(to add some English learning apps)

Word Connect- Word Games Puzzle

(to add some English learning game apps)

Some Useful links

https://learnenglish.britishcouncil.org/english-grammar

http://library.aceondo.net/ebooks/English_Language/how_english_works_a_grammar_practice_book_oxford_1997.pdf

http://primus.arts.u-szeged.hu/bese/bese.pdf

https://play.google.com/store/apps/details?id=com.radioboxlabs.englishgrammerbywrenmartin&hl=en_US

https://play.google.com/store/apps/details?id=org.cambridge.englishgrammar.egiu&hl=en

https://elt.oup.com/catalogue/items/global/grammar_vocabulary/practical_english_usage_4th_edition/?cc=global&selLanguage=en

Table of Contents

UNIT-I- BUSINESS COMMUNICATION AND GRAMMAR 8

1. Why English Communication is Essential and How to Improve the Skill? 8
2. Introduction to Voice and Accent 8
   - Why do we have such different accents? 8
   - Accent Training-Consequences 9
   - Voice and accent in the Enterprise Industry 11
   - Globally Comprehensible Accent 11
   - Introduction to Phonetics 13
   - International Phonetic Alphabet 15
3. Consonant Sounds 16
4. Vowels 25
5. Diphthongs 28
6. A Few Phonic Rules 31
7. Word Stress: Syllables 34
8. Intonation 37
   - Intonation and Stress 39
9. Pacing and Chunking 41
   - Common Patterns of Pacing 41
   - Importance of Chunking 42
10. Fluency 45
11. Indianisms 48
   - Errors relating to Grammar 48
   - Vocabulary 48

UNIT-II: GRAMMAR 53

1. English: Spoken Versus Written Communication 53
2. Nouns 61
   - 2.1 Kinds of Nouns 61
   - 2.2 Activity 3: Noun Ping-pong 63
   - 2.3 Nouns-Number 64
   - 2.4 Noun-Gender 64

2.5 Countable and Uncountable Nouns 65

3. Pronouns 67

3.1 Reflexive Pronouns 69

3.2 Relative Pronouns 69

3.3 Demonstrative Pronouns 70

3.4 Interrogative Pronouns 71

3.5 Indefinite pronouns 71

3.6 Activity 4: Sentence Auction 72

4. Adjectives 75

4.1 Activity 5 : Picture perfect 75

4.2 Positioning of adjectives 77

4.3 Comparative Degrees of Adjectives 77

4.4 Order of Adjectives 79

5. Adverbs 80

5.1 Kinds of Adverb 81

5.2 Degree of Comparison 81

5.3 Word Order with Adverbs 82

5.4 Activity 6: Relay Race 83

6. Prepositions 85

6.2 Activity 7: Treasure Hunt 91

6.3 Activity 8: Route Map 94

6.4 Prepositions with Adjectives, Nouns and Verbs 96

7. Conjunctions 97

7.1 Coordinating conjunctions 97

7.2 Subordinating Conjunctions 98

7.3 Correlative Conjunctions 99

7.4 Connecting Adverbs 100

7.5 Activity 9: The Socks Story 101

8. Verbs 103

8.1 Verb Classification 103

8.2 List of irregular verbs 106

8.3 Activity 10: Word Search 108

9. Subject and verb agreement 109
9.1 Activity 11: Tossed Word Salad 116
9.2 Activity 12: The Sentence Pageant 120
10. Determiners and Modifiers 123
10.1 Kinds of determiners 123
10.2 The Definite and the Indefinite Article 124
10.3 Definite Article: The 126
Activity 13: Proof Reading 128
11. Tenses 130
11.1 Reference Table 132
11.2 Present Tense 134
11.3 Activity 14: Instruction Manual 135
11.4 Activity 15: Commentary 136
11.5 Past Tense 138
11.6 Activity 16:The Chain List 138
11.7 Activity 17: Transcription 140
11.8 Future Tense 141
11.9 Activity 18: This Week for You 141
11.10 Activity 19: Verb Grand Prix 142
12. Punctuation 154
Forms of Punctuation 154
UNIT-III: READING COMPREHENSION 161
Reading – A 7 Step Process 161
Techniques to enhance students' reading skills 161
Types of reading skills 162
Skimming 162
Scanning 162
Extensive reading 163
Intensive reading 163
Three levels of Reading 164
Improving your reading speed 166
Reading Comprehension Practice Exercises 167

COMMUNICATIVE ENGLISH (SPECIAL COURSE)

UNIT-I- BUSINESS COMMUNICATION AND GRAMMAR

1. **Why English Communication is Essential and How to Improve the Skill?**
   (Extempore discussion. Students to list benefits. Faculty to guide)
2. **Introduction to Voice and Accent**

Introduction - Faculty to elicit answers for this question

Why do we have such different accents?

Answers can primarily be categorized into any one of the aspects mentioned below:

- **First language influence** -Every language has a unique pronunciation system and as little children when we learn our first language, we internalize this pronunciation system. Thus, when we learn a new language (especially after puberty), it is filtered through the pronunciation system of our first language. This process causes the sounds to be influenced by the system of our first language.
  Thus, for most of us- for whom English is not the first language, the accent is influenced by our mother/native tongue.

- **Geographical influence –** Languages have evolved over the years with the dynamic changes in society, cultures and people and so has the accent. The same language is spoken in different ways in various parts of the same country, this is called a dialect. As people travelled around the world and began settling in other countries, they brought about an influence of their language in the way they spoke the foreign languages as well. Over the years (and even to this date), this has changed the way, various groups speak in a place.

- **Socio economic influence-** For many years, our society has shown an evident presence of classes and ranks brought about by the difference in economic standards and social /cultural groups. Due to the closer interaction amongst one's own group/rank, the language and accent have distinct differences that have developed over the years. The intermingling of these classes/ranks in the years of the modern era has also created hybrid dialects with a different pronunciation system.

- **Educational influence**-Every country has its own laws on English as the medium of instruction in schools and colleges; this certainly has an influence in the development of the use of English. With the advent of students travelling to various countries to study, foreign student exchange courses and the rising using of English in higher education-the language has evolved and developed.

- **Climatic influence-** According to a linguistic theory in history, climate has influenced human history a lot with its grasp over language too. In cold counties people speak with tight lips so that the extremely cold weather does not affect them. This results in a distinct accent. Similarly accents of people from tropical countries have a more open phonetic system.

Accent Training-Consequences

What would be the consequence?

What is the importance of Accent Training?

In order to understand the extent to which the business would benefit from Accent Training, let us look at the scenarios mentioned below:

Display the scenarios one-by-one and elicit answers from the students for these questions -what would be the consequence of this situation?

Discuss the answers in alignment with the one on the PPT.

i. **Scenario 1**

Agent: the problem is due to b(p)oor network, ma'am!
Customer: What network?
Agent: Boor network ma'am!
Customer: I am sorry I don't understand!
Consequence: The agent confuses the P/B sounds. This will result in increased call handling time and the customer will get frustrated as she is unable to comprehend the agent.

ii. **Scenario 2**

Agent: Can I have De number on the invoice?
Customer: Sorry, what number?
Agent: De number on the invoice?
Customer: I am sorry, I cannot understand you!
Consequence: The agent pronounces "The" as "De". The customer is confused and is unable to comprehend the word.

iii. **Scenario 3**

Agent: Mrs. Stephen, have YOU made the payments?
Customer: uumm…. No, but my daughter did, is that a problem?
Agent: No, I was just checking if YOU made the payments.
Customer: Like I said, I did not but my Daughter did.
Consequence: The agent stresses on the wrong word and thus the intent of the message is not communicated correctly. The customer is confused.

iv. **Scenario 4:**

Agent: May I speak with Mr. Burton?
Customer: I am sorry dear, he has kicked the bucket.
Agent: uhhh…. So when can I call back to talk with him?
Customer: I am sorry???
Consequence: The agent is not aware of the idiom that conveys that Mr. Burton has passed away. The agent's response shocks the customer.

Debrief:

- The effect of pronunciation errors has grievous consequences, more so when it is a telephonic conversation.
- The possibility of misunderstanding in an inter-country communication scenario is quite high, thus making the improvement of one's language and accent more vital.
- The awareness of the client's language usage is vital in customer service, since this would help create a positive impact on the customer.
- The aim is to ensure our language and accent each comprehensible.

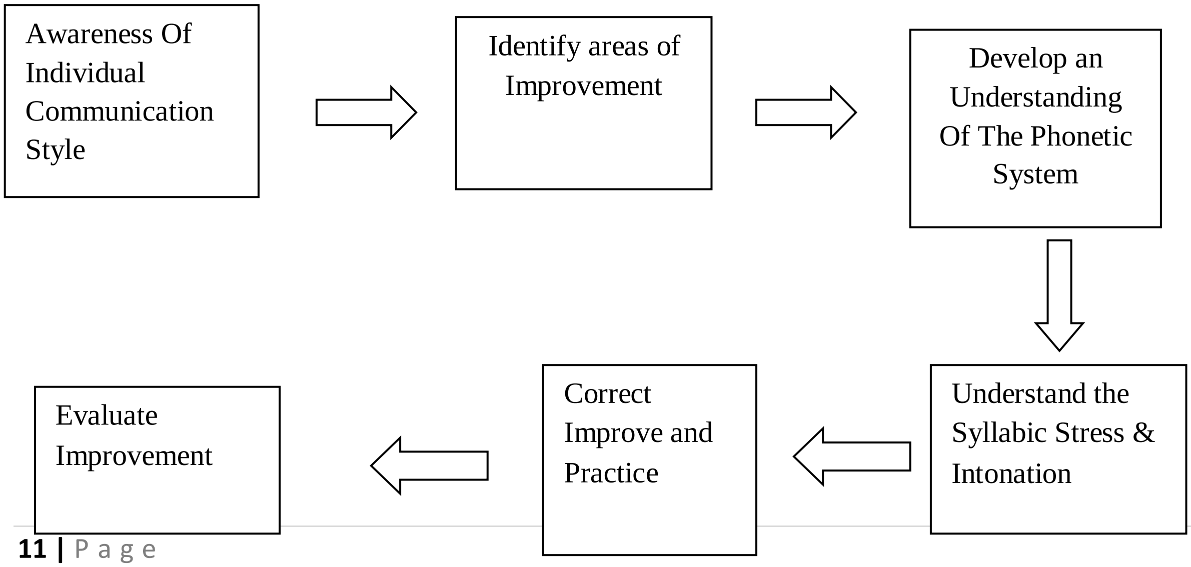
Voice and accent in the Enterprise Industry

- Communication is the heart of the business and the previous examples bring forth the importance of developing one's awareness of the language.
- Training and developing Accent and Language has the following advantages:
  - Enriches customer experience by displaying greater comprehension skills
  - Enhances knowledge of current vocabulary and pronunciation
  - Decreases the chances of inter- cultural communication failure
  - Projects a professional image, as the language is globally understood

Globally Comprehensible Accent

Our accent has developed over the years with the influence of various factors and any change or development that we intend to bring, will only be fruitful with a lot of practice and dedication.

In this training, we will follow the path below to help improve and develop our accent skills.


Awareness Of Individual Communication Style
Identify areas of Improvement
Develop an Understanding Of The Phonetic System
Understand the Syllabic Stress & Intonation
Correct Improve and Practice
Evaluate Improvement

1. **Awareness of individual communication style:** Every student must get feedback from the faculty, other students and from oneself on their communication styles. This would include feedback on :

a) Articulation
b) Pronunciation
c) Syllable/ word/ sentence stress
d) Intonation

This awareness will help the students understand where they stand and will help the faculty draw up a personal improvement plan.

2. **Identify areas of improvement:** The following exercise will illustrate the individual areas of improvement for each training. The primary areas of concern would be around the points mentioned below:

a) Interchanging sounds- for example: interchanging the / s / and / sh/ sounds pronouncing "shame" as "same".
b) MTI- Mother Tongue Influence on the manner of articulation and speech. For example: pronouncing "this" as "dis" due to prominent presence of the / d / sound in one's language.
c) Incorrect stress - pronouncing "technology" as "technoLOgy"- stressing on the third syllable instead of the second.
d) In appropriate intonation – example of this could be the sing song or the flat intonation styles.

3. **Develop an understanding of the phonetic system:** Once students evaluate and understand their strengths and weaknesses in terms of the accent of a language, the importance of learning the English Phonetic system is evident.

This learning will help bring about an awareness of the correct manner and place of articulation for each sound in the English language.

4. **Understand the syllabic stress and intonation:** Students can build on their communication skills through the process of understanding the syllabic patterns and intonation styles appropriate in English. This would also help enhance comprehension and thus improve, communication.

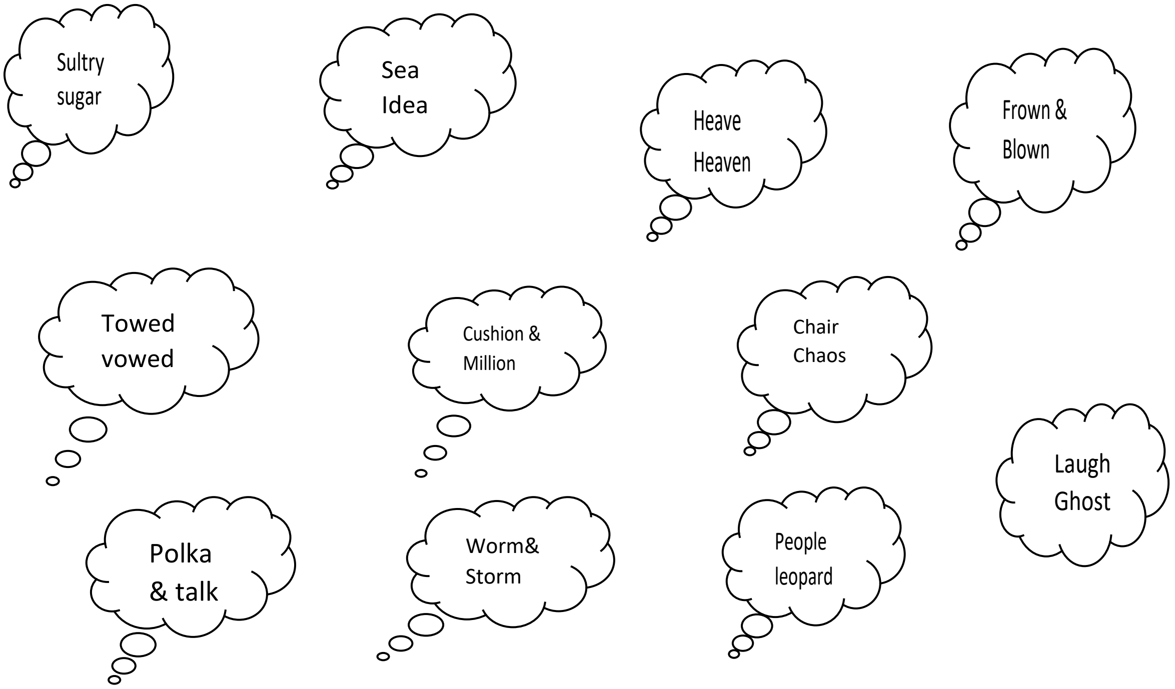
5. **Correct, Improve and Practice:** As students continue to understand and the English phonetic system, the error correction and practice would happen simultaneously. However, please note that this is the most important part of the process, since positive change & improvement is the end objective of accent improvisation.

6. **Evaluate improvement:** the final step is to check the improvement by testing the students. Gauging the level of the improvement and the areas of weakness, the faculty can decide if the student is good to go!

Introduction to Phonetics

Look at the word pairs shown below and ask the students to find out what is being conveyed?

Introduction to phonetics


Sultry sugar
Sea Idea
Heave Heaven
Frown & Blown
Towed vowed
Cushion & Million
Chair Chaos
Laugh Ghost
Polka & talk
Worm& Storm
People leopard

Each of the word pairs have similar words; however each of them is pronounced differently. Let us look at them one by one:

© Can Stock Photo - csp2535832

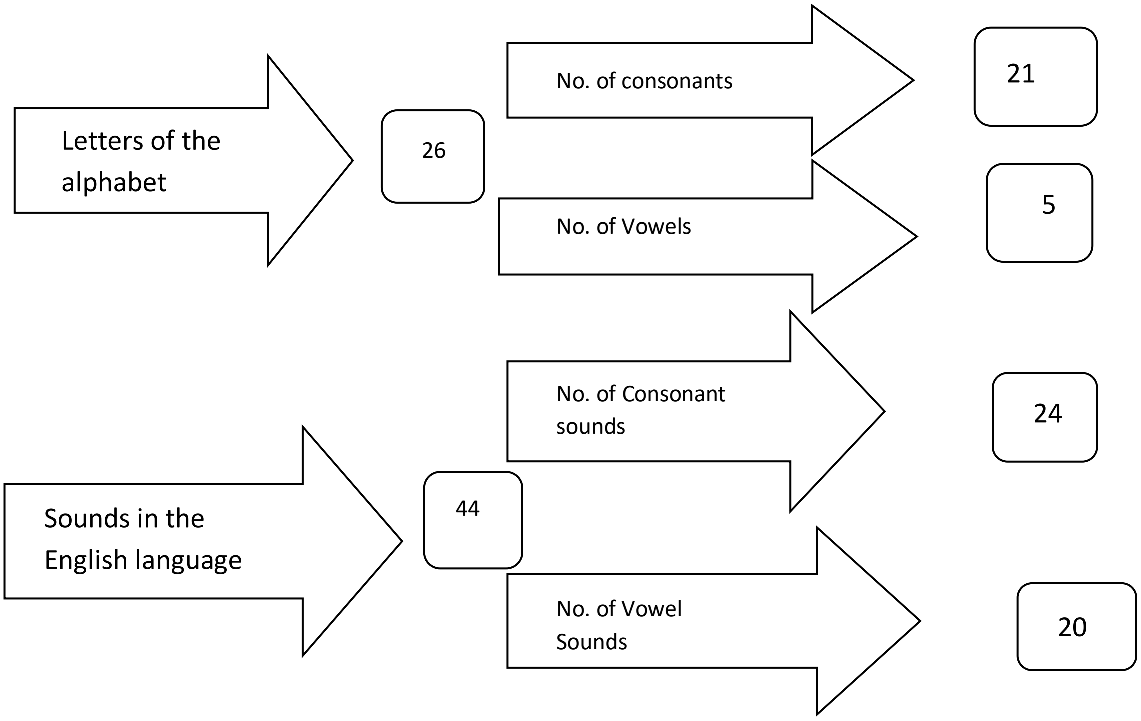
1. **Sultry & sugar:** The two words have the letter of the alphabet ‘s’, however the first word is pronounced with a / s/ sound and the second word has a/ʃ/sound.
2. **Sea & idea:** The two words have the letters of the alphabet ‘ea’, however the first word has a / I: /sound and the second word has a / ∂/ sound.

3. **Heave & Heaven:** The two words have the letters of the alphabet ‘heave’. However the first word has / hi:v/sound and the second word has the /hev/sound.
4. **Towed & vowed:** The two words have the letters of the alphabet ‘owed’ however the first word has the / $\cong Y\delta$/ sound and the second word has the / αYd/ sound.
5. **Cushion & Million:** The two words have the letters of the alphabet ’ion’, however the first word has the /∂n/ sound and the second word has the /j∂n/ sound.
6. **Chair & chaos:** The two words have the letters of the alphabet ‘ch’, however the first word has the /tʃ/ sound and the second word has the /k/ sound.
7. **Frown & blown:** The two words have the letters of the alphabet ‘own’, however the first word has the /$\propto Y$/ sound and the second word has the /≅Y/ sound.
8. **Polka & talk:**The two words have the letters of the alphabet ‘lk’, however the first word has the /Θlk/sound and the second word has the /ɔ:k/sound.
9. **Worm & storm:** The two words have the letters of the alphabet ‘orm’, however the first word has the /ʒ:m/ sound and the second word has the/ɔ:m/sound.
10. **People & leopard:** The two words have the letters of the alphabet ‘eop’, however the first word has the /i:p/ sound and the second word has the /ep/ sound.
11. **Laugh & ghost:** The two words have the letters of the alphabet ‘gh’, however the first word has the /f/ sound and the second word has the /g/ sound.

Debrief:

- The word pairs shown have similar spellings but different pronunciation and thus it is important to have a system that has a one–to-one co relation with what is written and what is pronounced.
- Keeping the thread ,we have two types of languages:
  - Phonetic languages-the words are pronounced exactly the way they are written and are also written exactly the way you hear it. There is a direct relationship between the spelling and the pronunciation. For example: Arabic, Hindi & Spanish.
  - Non-Phonetic languages-The words are not pronounced exactly the way they are written. There is no correlation (one-to-one) between the spelling and the pronunciation. For example: French & English.
- A system that would help us to understand pronunciation better is the IPA –the International Phonetic Alphabet.
- The IPA was published by the International Phonetic Association in 1888.

International Phonetic Alphabet


Letters of the alphabet
26
No. of consonants
21
No. of Vowels
5
Sounds in the English language
44
No. of Consonant sounds
24
No. of Vowel Sounds
20

STOP! GO BACK AND REFLECT!

I learnt ……

I would like to know more about ……………………………………………………………………………….

Activities / tasks I liked / found useful……………………………………………………………………….

Something I would adapt / do differently………………………………………………………………….

3. Consonant Sounds

These 44 sounds constitute the IPA. The breakup of these 44 sounds is shown below.

Plosives (6)

Fricatives (9)

Affricates (2)

Nasals (3)

Semi Vowels (3) ↔ Laterals (1)

Only for Faculty's Knowledge

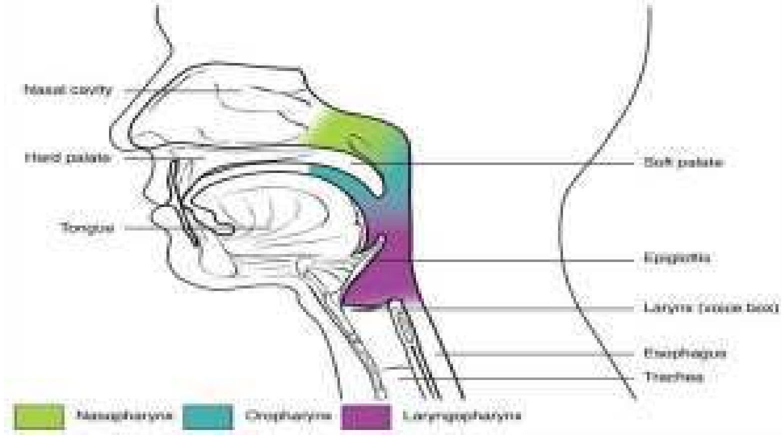
Every sound has two aspects with respect to its articulation:

1. Place of Articulation- This indicates **where** the sound is produced.
2. Manner of Articulation- This indicates **how** the sound is produced.

As faculty, it is important to know the articulation system as this would help enhance the expertise one has.

Let us understand the places of articulation for each of the Consonant sounds. In order to do this we need to familiarize ourselves with the articulators in the mouth.

The picture below illustrates the various articulators:


Nasal cavity
Hard palate
Tongue
Soft palate
Epiglottis
Larynx (voice box)
Esophagus
Trachea
Nasopharynx
Oropharynx
Laryngopharynx

Each of the articulators helps us to produce all various sounds of the English Language. The sound shave been classified according to their places of articulation, as shown below:

I. Bilabial Consonants (Two Lips) – the sounds / p/ b/ m/ w/, both the lips are used to produce the sounds and thus they are called bilabial sounds.
II. Labiodental Consonants (Lips and teeth) – the sounds / v/ f/ are produced by placing the upper teeth of the lower lip.
III. Dental Consonants (Tongue and teeth) – The sounds / t/ d/θ/&/ Δ/, are produced when the tip of the tongue touches the teeth.
IV. Alveolar Consonants (Tongue and Alveolar Ridge)- The sounds /s/,/z/,/t/,/d/,/n/,/r/ and /I / are produced when the tip of the tongue touches the Alveolar ridge.
V. Palatal Consonant (Tongue and Palate) – These sounds /j/ are produced when the blade of the tongue touches the hard palate.
VI. Glottal Consonants (Tongue and Velum- soft part of the palate) –These sounds /g/&/k/ are produced when the back of the tongue touches the velum.

Let’s begin with the understanding of each of the 44 sounds of the IPA.

IPA-44 sounds: Consonant Sounds

Plosives:

Ask students “What word comes to your mind when you hear the word- “PLOSIVES”?

Responses would be around the words mentioned below:

- Explosion, Explosive, Explode, Crackers and other words in the same context.

Plosives,as the word suggests, is a set of sounds that are articulated in the form of a mini explosion in the mouth. They are called stop sounds- the air is blocked in the mouth and is then suddenly released.

We have 6 sounds classified under this category; of which 3 are aspirated and remaining 3 are non-aspirated sounds.

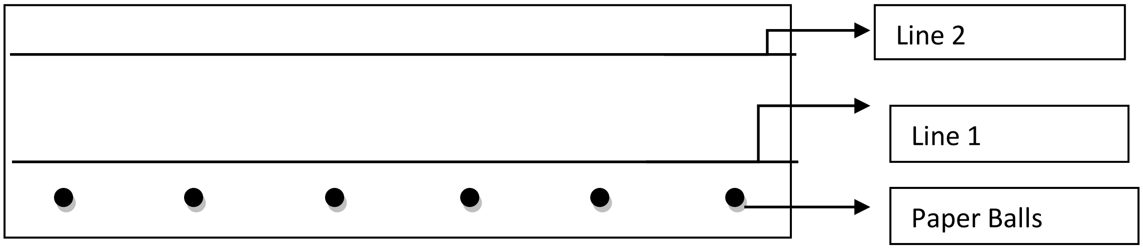
Aspirated Plosives- A puff of air is released during the articulation of these sounds. The aspirated plosives are /p/t/&/k/ .

Non-Aspirated Sounds- No puff of air is released during the articulation of these sounds. The non-aspirated plosives are /b /d/ & /g/.

Activity: Air Football

Materials Required: 2 sheets of paper and a pen.

Instructions: instruct the students to take one of the sheets and tear it into 6 pieces and then scrunch these pieces into small paper balls. Now, ask them to draw two lines on the other sheet of paper and place the paper balls within the first line enclosure (as shown below).



Every student must have the above set-up on their respective desks (faculty to go around the class to check). Now, the faculty would read a word at a time and students must pronounce each word, keeping their mouth at the level of the paper balls. One word for each paper ball they have placed on the paper.

Word List:

1. Gracious
2. Christmas
3. Patience
4. Dungeon
5. Tornado
6. Blessing

Debrief:

After the 6 sounds are pronounced, ask the students to make note of the words whose pronunciation made the ball move. They will notice that when they pronounce the word Christmas, Patience & Tornado the paper balls move. However, the paper balls remain in the same position while pronouncing the words Gracious, Dungeon & Blessing. This is because the /p/, /t/& /k/ sounds are aspirated and thus have a puff of air that is released when it is articulated- making the paper balls move. Since /b/,/d/& /g/ are non-aspirated sounds , the paper balls remain motionless.

Students can practice and check if the articulation of the aspirated sounds is correct by placing their palms before their mouth while pronouncing the sounds (the puff of air would hit their palms).

Plosive Sounds

Aspirated plosives:

1. /p/ - Punctual , Leopard, Gallop
   A poor passenger was poisoned by a Piranha
   Create a sentence with at least five /p/ sounds-
   Example: Peter bought a pile of papers from Mrs. Parkers ‘Pink n Carry’ sale.

2. /t/ - Teeth, Button, Bullet
   A toy train takes Timothy to Trentworld
   Create a grocery list with at least five /t/ sounds-
   Example: Tomatoes, Toilet roll, Turpentine, Potatoes and Castor oil

3. /k/ - Christmas, Trickle, Ballistic
   Kelly complained about the choir at the Cambridge College
   Create a write-up for a Car Ad with at least five /k/ sounds-
   Example- A cool car that can give you great comfort and care.

Non-Aspirated Plosives

4. /b/- Byzantine, Bubbles, Absorb
   Billy bought a big boar from the bounty bargain festival.
   Create a birthday-wish write-up with at least five /b/ sounds-
   Example: Dear Billy Baby, wish you a great big birthday bash!!
   Your brother Bob.

5. /d/ - Dance, Grandeur, Cascade
   Does Dorothy drink detox drinks daily?
   Create a two –line diary entry with at least five /d/ sounds-
   Example- Dear Diary, today was an amazing day since Dunston from Dutch class asked me out for a date.

6. /g/- Grudge, Vagabond, Log
   Green goblins gobble goodies and remain grumpy.
   Create a postal address with at least five /g/ sounds-
   Example: Gate no-17, Goodwill Home, Ghost Street, Greenlight town, Greenland.

The /P/-/b/ divide

Ask the students to read out each of the words (from left to right).

A trick that will help them understand the difference in the articulation of the two sounds would be to look at the 'voiced' and 'voiceless' aspect.

While articulating the /p/ sound, place your hand on your throat- you would feel no vibration however while articulating the /b/ sound you would feel the vibration in your throat.

Any sound that produces vibration is called a Voiced sound and ones that do not produce vibrations are called Voiceless sounds.

Bin	Bat	Bug	Bet	Ben
Pin	Pat	Pug	Pet	Pen
Bill	Beat	Bear	Balm	Best
Pill	Pete	Pear	Palm	Pest

Please bring Peter a Book and post Bob's package today
The building has plenty of beauty salons and posh bookstores.

Bold	Posh	Braille	Pursue
Blend	Polka	Brittle	Plunder
Blush	Plant	Beeper	Poster
Bread	Purse	Boastful	Precarious

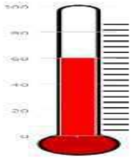
Fricatives

Fricatives are produced when the two parts of the mouth force air through a small space, thus creating audible friction. We have nine sounds classified in the category:

7. /f/- Fish, Stifling, Plaintiff
   Five foreigners left to the famous Filipino fantasy park.
   Create five female names that begin with /f/ sound-
   Example: Fiona, Farah, Faiza, Freeda, Fathima and Feeza.

8. /v/- Victorious, Frivolous, Believe
   Viceroy Vivian was very vindictive and vicious.
   Create a list of five food items that begin with a /v/ sound-
   Example: Vanilla cake, Vermicelli pasta, Vegetables, Vienna Sausage and Veal.

9. /θ/ - Thermometer, Catholic, Aftermath
   Theoretically, three thieves are caught every three hours.
   Create a movie name with at least five /θ/ sounds-
   Example: The theory behind thirty-three thieves and a thistle.



10. /ð/ - Thereafter , Feather, Breath
   The mothers gathered at the feathers hall now and then.
   Create a two line letter with at least five /ð/ sounds-
   Example- Dear father, the gathering has decided to go with leather couches rather than synthetic ones.

11. /s/- Synchronise, Pastry, Meticulous
   A sinister silence followed the song sung by Sasha.
   Create a two- line poem with a at least five /s/ sounds-
   Example: A sweet soldier said to his wife, my sweetheart I will never sell you to solitude.

12. /ʃ/- Champagne, Rational, Polish, Luxury, Fissure
   Shelly is the fashionable cashier at the Lush Shoe Shop.
   Create five sentences with two /ʃ/ sounds-
   Example: She sold all her shares. Puppies take shelter in roadside shacks, She will be in ship shape, Fashionable shoes are out & The railway station is crazy during rush hour.

S/SH Exercise

She	Sea
Ship	Sip
Seat	Sheet
Sell	Shell

Single	Shingle
Leash	Lease
Self	Shelf
Said	Shed

Ask the students to read out the word pairs and identify the difference in the articulation of two sounds.

13. /Z/ - Pleasure, Seizure, Closure, Luxurious
    The pleasure of a leisure break is a luxurious feeling.
    Create a five word list of /Z/ sounds-
    Example: Pleasure, Measure, Enclosure and Explosion

14. /z/ - Zebra, Guzzle, Craze
    Frizzy hair marine likes puzzles and going to the zoo.
    Create a sentence with at least five /z/ sounds-
    Example: The zoo keeper was zapped when he heard the crazy buzzing noise.

15. /h/ - Hilarious, Historical, Stockholm
    He hinted at her to hike with him to the top of Histone hills.
    Create a personal introduction with at least five /h/ sounds-
    Example: My name is Helena and I teach History for high-school kids in the Hispanic part of Holland.

Z/Th Sound Exercise

Bays	Bathe
Breeze	Breathe
Zen	Then

Sues	Soothe
Close	Clothe
Rhythm	Risen

Ask the students to read out the word pairs and identify the difference in the articulation of the two sounds.

Affricates

Affricates are the combination of plosives and fricatives.
We have two sounds classified under this category.

16. /ʧ/- Challenge, Stretchable, Staunch
    I cherish a chilled cherry drink and chocolates.
    Create a 2- line dialogue with at least five/ʧ/ sounds-

Example: Charlotte- “Hey, Charlie! Are you going to the church fare today? “Charlie – “Oh no, Charlotte! I need to fetch chocolates for my sister.

17. /ʤ / - Gigantic, Gorgeous, Marriage
    Gina dressed like a gentle giraffe named Ginger.
    Create five male names that have /ʤ/ sounds-
    Example: George, Sanjay, Jason, Joshua & Josiah

Nasals

Nasals are sounds produced with help from nasal passage.
We have 3 sounds in this category.

18. /m/- Mystical, Fumble, Aquarium
    My mother makes mouth-watering mango milk shakes.
    Create a two- line recipe with at least five /m/ sounds-
    Example: Mushroom Mayo- boil and cook mushrooms in medium hot oil and mix mayo and serve hot with minestrone soup.

19. /n/ - Notorious, Lunatic, Valentine
    Nathaniel is not a nice neighbour, say many in Newcastle.
    Create a list of five places, you‘ve not visited, with /n/ sound-Netherlands, New Zealand, Nebraska, Nottingham & Nepal

20. /**ŋ**/ - Sting, Blaring, Triangle
    The king had a song ringing in his head since morning.
    Create two- liner songs with at least five / **ŋ**/ sounds-
    Examples: The fragrance lingered in the morning; it stung me like the setting of the sun as I knew she left the ring behind.

Semi Vowels

21. /j/ - Yawn, Youngster, Kayak
    Yellow flowers and yummy food is aplenty in Mr. Yuri’s home.
    Create a sentence with at least five /j/ sounds-
    Example: Yellow magazine had an article on how youngsters waste their lives, yearning for luxury and letting their youth and years pass by.

22. /w/ - Winter, Wailing, Powerful
    When Wendy went to the White House she was not well.
    Create a list of five questions you have 1 /w/ sound each –
    Example: Where were you yesterday? When will you arrive? Which dress is a better option? Why were you busy today? I want to know whether this is the right thing to do?

23. /r/- Rustic, Guaranteed, Shopper
    Recently no rooms were free at the romantic River Resort.
    Create a five –line 'To –Do' list with at least five /r/ sounds-
    Example: Run to the local market to buy a bunch of red roses, Raise a request for a new Debit Card, Go to the Rodeo Drive to buy Rayban sunglasses.

Lateral Consonants

24. /l/ - Leprechaun, Fallacy, Coral
    Lincoln lost his lucky locket at the local market.
    Create a list of five gift items that begin with /l/ sound-
    Example: Lilac Lip Gloss, Lotus- shaped candles, Leather Boots, Lavender Stole & Little Black Dress.

Activity: Rhyme time

Materials Required: None

Instructions:

- Tell the students that they will be given five minute to think of a rhyme.
- The rhyme should include the usage of all the consonant sounds.
- The students can be called randomly to make their presentation.
- In case of shortage of time, the students may work in groups and one from the group may make the presentation.
- The faculty will check against a list of consonant sounds listed on the board for usage and pronunciation as well.
- The group that has used all the consonant sounds and finishes the fastest is entitled to a prize.

STOP ! GO BACK AND REFLECT !

I learnt …….

I would like to know more about ……………………………………………………………………………….

Activities / tasks I liked / found useful……………………………………………………………………………

Something I would adapt / do differently…………………………………………………………………………

4. Vowels

We have 20 vowel sounds.

“Vowel” has its roots in the Latin word ‘vocalis’ which means- speaking, since vowels are the most important aspect of speaking any language.

25. /∂/- America, Against, Afraid, Agriculture, Annoy, Another
    Create a sentence with a t least five /∂/sounds

26. /3:/ - Stir, Pearl, First, Hurt, Shirt, Bird, Learn, Burly, Mirth
    Create a sentence with at least five /3:/ sounds

27. /^/- Butter, Stuck, Money, Lucky, Shut, Cutter, Nut
    Create a sentence with at least five /^/ sounds

28. /æ/- Fan, Cramp, Gaggle, Stack, Parasite, Clap
    Create a sentence with at least five /æ/ sounds.

29. /a:/- Farmer, Shark, Chance, Starter, Glass
    Create a sentence with at least five /a:/ sounds.

30. /I/ - Kiss, Sting, Interval, Print, Whimsical, Interest
    Create a sentence with at least five /I/ sounds.

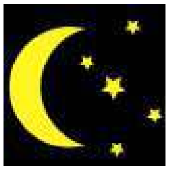
31. /i:/- Heels, Phonics, Devious, Leader, Preacher
    Create a sentence with at least five /i:/ sounds.

32. /Θ/ -Cot, Stock, Potter, Fought, Rotting
Create a sentence with at least five /Θ/ sounds.

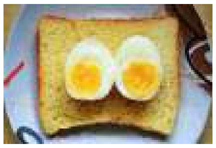
33. /Ɔ:/- Awesome, Awful, Caught, Origin, Four
Create a sentence with at least five /Ɔ:/ sounds.

34. /Y/- Footprints, Good, Should, Look, Hook, Shook
Create a sentence with at least five /Y/sounds.

35. /u:/- Spooky, Foolish, Prudent, Moon, Fume
Create a sentence with at least five /u:/ sounds.



36. /e/- Elephant, Egg, Plenty, Blend, Kentucky
Create a sentence with at least five /e/ sounds.



Activity: The Great Vowel Hunt

Materials required: 10 blank A4 size papers, 4 bowls, a pack of post-its & Sketch pens

Instructions:

- Divide the class into four teams
- Each team will be given 15 minutes to come up with two words for every vowel sound. These 24 words should be written in separate slips of paper, clearly underlining the vowel sound. For example, a slip containing a word that highlights the /e/ sound should look like this:

Mentor

- Once the team has prepared 24 such slips containing words, they fold up the slips, mix it all up and put it into the bowl given to the team.

- Swap the bowls of one team with another.
- Write each vowel sound on a post it (one on each) and place the post-its randomly around the room(on the door, on the white board, on the desk, near the window, etc)
- Instruct the teams to divide their team members into “Runners”, “Callers” & “Readers”.
- Once the teams decide on the members who take on the titles mentioned above, tell them the rules of the game.
- Rules of the game:
    - The “Readers” would pick one word at a time from the bowl and inform the “Caller” of the word and the sound it highlights.
    - The “Caller” then shouts out the word and the sound to the “Runner”.
    - The “Runner” in turn needs to identify the post-it which has the symbol for this sound and needs to run to it and write down the word on the post-it.
    - The process is repeated for every word, the team that finishes first shouts out “Bingo!!!”
    - The game is continued till the final team shouts out “Bingo!!!”
    - The faculty to make note of the order.
    - The final task is to cross check the words and see if the teams have been able to pick out the word in correct post-it: this final check is done by the other teams.
    - Based on the final score (2 points for every correct word in the correct post-it) the winners are declared.

Debrief:

This activity helps the students to apply the understanding of sounds and symbols. This brings about the clear comprehension of the sounds and their distinctions.

5. Diphthongs

A diphthong is made of two vowel sounds placed adjacent to each other within the same syllable. When we represent a diphthong sound using the IPA code we use a combination of two vowel symbols placed next to each other.

Look at the examples below.

37. /εɪ/- Vacation, Placement, Payment, Facial, Baseball
Create a list of 5 words with /εɪ/ sound.

38. /αɪ/- Sunshine, Crime, Behind, Bright, Guide, Style, Shy
Create a list of 5 words with /αɪ/ sound.

39. /Oɪ/- Soil, Oyster, Ploy, Stoic, Boisterous, Boys, Coin
Create a list of 5 words with /Oɪ / sound.

40. /ɪ ≅/- Beer, Sheer, Clear, Fierce, Pioneer, Steer
Create a list of 5 words with /ɪ ≅ / sound.

41. /ε≅/- Bear, Chair, Careful, Scare, Flair, Share, Ware
Create a list of 5 words with /ε≅ / sound.

42. /ʏ≅/- Tour, Poor, Cure, Cruel, Sure
Create a list of 5 words with /ʏ≅ / sound

43. /αʏ/- Flounder, Around, Cow, Couch, Loud, Prowl, Ouch
Create a list of 5 words with /αʏ / sound

44. /≅ ʏ/- Ghost, Post Code, Stole, Boast, Joke, Low
Create a list of 5 words with /≅ ʏ / sound

Activity: Diphthong Drummers
Materials Required: A4 size papers and Pens
Instructions:

- Divide the class into four teams.
- Ask each team to come up with a name for a music band for themselves
- Instruct them that they will be given 20 minutes to come up with a song that has words containing all the diphthongs
- The song should have 2 paragraphs and a two line chorus
- The team can set a tune and provide music (with no instruments- clapping/ beat boxing, using materials available in class, is allowed)
- Give each team 5 to7 minutes to make a presentation
- Rate the team son the usage of the diphthongs and creativity
- Conduct a blind voting score- ask all the students to put down their heads and call out one team at a time, except the team that is being called all the other teams need to raise their hands based on the rating they support. For example, if the faculty calls out "Team 1", then the members of teams 2, 3 and 4 can vote. The ratings that will also be called out by the faculty for each team is- "Amazing", "Average", "Not too good". Calculate the total votes giving "Amazing"- 20 points for every vote, "Average"- 10 points for every vote & "Not too good"- Negative 2 points for every vote

Debrief:

This activity helps the students familiarise themselves with the diphthongs and its classification. The students also practice the correct articulation of these diphthongs.

Pronunciation checker

Purpose	Possibly	Ambiguous
Executive	Recognise	Miser
Cache	Sachet	Business
Photocopier	Genre	Plush
Gather	Manoeuvre	Majority
Decision	Closure	Cabinet
Reservation	Surveillance	Archaic

Ask the students to pronounce each of the word in the grid and correct, if required.

STOP ! GO BACK AND REFLECT !

I learnt ……….

I would like to know more about ……………………………………………………………………………….

Activities / tasks I liked / found useful…………………………………………………………………………

Something I would adapt / do differently……………………………………………………………………

6. A Few Phonic Rules

Sometimes the rules don’t work.

There are many exceptions in English because of the expanse of the language. The rules do apply however, in the majority of the words.

Ask the students to write more examples of their own to better understand the rules:

1. “C” followed by “e, i or y” usually has the soft sound of “s”. For example: “cyst”, “central” and “city”.
2. “G” followed by “e, i or y” usually has the soft sound of “j”. For example: “gem”, ”gym”, “gist”.
3. When a syllable ends in a consonant and has only one vowel, that vowel is short. For example: “fact, bed, fish, spot, luck”.
4. When a syllable ends in a silent “e”, the silent “e” is a signal that the vowel in front of it is long. For example: “make, gene, kite, rope and use”.

Minimal Pairs:

- Pairs of words whose pronunciation differs at only one segment, such as Sleep and Slip or Pair and Pore.
- Since the articulation of these pairs are very similar, they lead to confusion.
- Write ten minimal pairs of your own (especially once that confuse you the most) - give students more examples with the minimal pairs they tend to confuse.

Minimal Pair – Consonant Sounds: read out and ask the students to write more examples of their own.

P B	Patter Batter	Rope Robe	Newspaper Observe
T D	Time Dime	Great Grade	Outside Children
K G	Class Glass	Back Bag	Technical Negligent
F V	Fairy Very	Off Of	After Involve

Th Th	Think These	With Smooth	Something Other
S Z	Sue Zoo	Police Please	Eraser Business
Sh Zh	Pressure Pleasure	Brush Beige	Reservation Decision
Ch J	Choke Joke	Batch Badge	Picture Educate

M N	Male Nail	Same Sane	Remember Convention
W V	Wary Vary	Wire Via	Wane Vein

Activity: The Missing Sound

- In one word in each group, the ‘b’ or ‘p’ is not pronounced. Circle the word
- Example: double [✓ debt] Dublin

a. [✓ lamb] label lap
b. crab robbed [✓ climb]
c. cup [✓ cupboard] copy
d. [✓ photo] potato paper
e. recipe repeat [✓ receipt]
f. possibly [✓ psychology] special
g. Cambridge combine [✓ combing]

Minimal Pair- Vowel Sounds

Read out and ask the students to write more examples of their own.

Loud	Load	Lord
Miss	Mass	Mess

Cot	Curt	Caught
Fair	Fear	Far
Sam	Sum	Psalm
Wheat	Wet	Wit
Shone	Shorn	Shown
Beat	Bid	Bed
Fill	Feel	Fell
Led	Laid	Lad
Cart	Cut	Curt
Pull	Pool	Paul

Activity: They Sound the Same!!!

Ask the students to identify the right word for each sentence.

1. He wanted a Daze/ **Day's** leave.
2. King Henry **rode**/ road on his favourite horse that day.
3. Please **wring**/ ring the clothes before putting them to dry.
4. Her diamond ring shown/**shone** in the ballroom.
5. Mr. Paul has no write/**right** interfering in my business.
6. Ones/ **Once** upon a time.
7. Jones fell down the stares/ **stairs** and broke his leg.
8. Can you make the table with Mahogany would/**wood**.
9. She maid /**made** chocolate chip cookies in the evening.
10. Mary **ate** /eight all the toffees kept for little Ben.

STOP! GO BACK AND REFLECT!

I learnt ……

I would like to know more about …………………………………………………………………………….

Activities / tasks I liked / found useful………………………………………………………………………

Something I would adapt / do differently…………………………………………………………………

7. Word Stress: Syllables

There are two very simple rules about word stress:

1. One word has only one stress
2. We can only stress vowels, not consonants.

Let us understand Syllables:

A syllable is one unit of sound in a word.

3. For example: If you were to clap to the rhythm of every word, you would clap twice for the word “Water”, once for the word “tap” and thrice for the word “Magazine”- this unit of sound is a syllable.
4. Every word is made up of syllables.
5. Each word has either one, two, three or more syllables.

Syllables:

Words with one syllable

Monosyllabic Words:

Hat
Pet
Fun
Pin
Gun
Kin
Cub
Food
Love
Fill
Den
Run
Pen
Wrist
Fish
King

Words with two svllables

Bi syllabic Words:

Water
Joker
Waiter
Falter
Pension
Polka
Polish
Cooker
Ration
Stigma
Ruler
Feline

Words with three syllables

Tri syllabic Words:

Computer
Newspaper
Offensive
Government
Rational
Microsoft

Words with more than three syllables

Polysyllabic words

Predictable
Malnutrition
Presentation
Hallucination
Stability
Technology

Ask students to write examples of their own.

Activity: Syllable Slot

Read out the list below and ask the students to classify them as Mono, Bi, Tri and polysyllabic words.

1. Tear- Monosyllabic
2. Finale- Trisyllabic
3. Greener- Bisyllabic
4. International – Polysyllabic
5. Law- Monosyllabic
6. Police- Bisyllabic
7. Fierce- Monosyllabic
8. Roller coaster – Polysyllabic
9. Princess- Bisyllabic
10. Fishing- Bisyllabic
11. Analysis- Polysyllabic
12. Presentation- Polysyllabic
13. Marker-Bisyllabic
14. Branding-Bisylalbic
15. Advertisement- Polysyllabic
16. College- Bisyllabic
17. Professor- Trisyllabic
18. Interview- Trisyllabic
19. Student- Bisyllabic
20. President- Trisyllabic

Word Stress: Rules

- You could stress on a syllable by using one or more of the following five features:
    - It is l-o-n-g-e-r-
    - It is LOUDER
    - It has a change in pitch
    - It is said more clearly
    - It uses larger fishing movements

Rules:

Stress on first syllable:

Rule	**Example**
Most **2- syllable nouns**	PRESent, EXport, CHIna, TAble
Most **2- syllable adjectives**	PRESent, SLENder, CLEVer, HAPpy

Stress on Second Syllable:

Rule	**Example**
Most **2- syllable verbs**	to preSent, to exPORT, to deCIDE,
	to beGIN

Stress on penultimate syllable (penultimate = second from end)

Rule	**Example**
Words ending in – ic	GRAPHic, geoGRAPHic, geoLOGic
Words ending in –sion and - tion	teleVIsion, reveLAtion

Stress on ante- penultimate syllable (ante- penultimate = third from end)

Rule	**Example**
Words ending in **–cy, -ty, -phy** and **-gy**	deMOcracy, dependaBility, phoTOgraphy, geOLogy
Words ending in **-al**	CRItical, geoLOGical,

Compound words (words with two parts)

Rule	**Example**
For compound **nouns**, **the stress is on the first part**	BLACKbird, GREENhouse,
For compound **adjectives, the stress is on the second part**	bad-TEMpered, old-FASHioned
For compound **verbs, the stress is on the second part**	to underSTAND, to overFLOW

STOP ! GO BACK AND REFLECT !

I learnt ……

I would like to know more about …………………………………………………………………………….

Activities / tasks I liked / found useful…………………………………………………………………………

Something I would adapt / do differently…………………………………………………………………………

7. Intonation Patterns:

Statement

Questions

Phrases

Tag Questions

Items in Series

Statements:

- Downward drop**:**
  - Indicates the end of an idea
  - Indicates that it is another person’s chance to speak.

For example:

  - The students are from National Science Academy.
  - He is capable of maintaining excellent health.
  - My boss decided to hire the five finalists.
  - The judge and jury joked about the arrangement.

Questions:

- Open- ended questions: Drop down at the end.

  Example: **Describe** the city in which you live.
- Closed-ended questions: Begin with a lower pitch and usually end in a rising pitch.

  Example: Have you been here **before**?
- Choice questions: The pitch will go up on the first choice and down on the next choice.

Example: Do you want a **Yellow** or an Orange t-shirt?

- Wh' questions: They have a rhythm that usually ends with a downward drop.
  - Which employee's bag is on the desk?
  - What Indian costumes do travelers find intriguing?
  - Who wrote the lyrics for the album?

- Yes/ No questions: This rhythm signals the listener that it is his turn to respond.
  - Did the couple split?
  - Will they finish the project before March?
  - Is Alisha eligible for the course in Journalism?
  - Does the chart at the end of the text make sense?

Phrases:

- The largest "step down" in pitch and volume usually happens at the end of a statement.
  - Before the author wrote, he thought things through.
  - When wires were crossed, the warehouse lost power.
  - As we walked, we talked about factory management.
  - In early summer, we will visit the western waterfall.

Items in a series:

- When items are presented in a particular order, you will notice upward inflection with each one until the final item, where there is usually a downward step.
- All kinds of data are on the charts, tables, and graphs.
- Desks were covered with computers, manuals and papers.
- Prepositions include "across", "until", "among", and "of".
- The last three letters of the alphabet are X, Y, Z.
- Add flour, sugar and butter to the batter.

Intonation and Stress

New Information:

- When any new information is given, the noun carries the stress in the sentence.
  Example: Meet **Mr.White**.
- The Intonation and stress change after the information is given. The verb takes on the stress.
  Example: He **sells** car accessories.

Contrast:

- Change in pitch indicates the emphasis laid on one thing over another.
- E.g**.** Keith studies **History**.

  Keith **studies** History, but he doesn't **use** it.

Stress changes meaning

Lets us see how the meaning and intention of the sentence changes with variation in stress.

For example: "He did not steal the money"

He did not steal the money- someone else did.
He did not **steal** the money- he borrowed it.
He did not steal the **money**- he stole the bag.

STOP ! GO BACK AND REFLECT !

I learnt ………

I would like to know more about ……………………………………………………………………………….

Activities / tasks I liked / found useful………………………………………………………………………….

Something I would adapt / do differently………………………………………………………………………

9. Pacing and Chunking

Pacing: The method of varying the speed of your speech, the proper pace and rhythm helps a person to be understood better.

Examples:

1. Bad performance costs jobs.
Bad performance/ costs/ jobs

2. This is probably the first time I've fallen in love.
This/ is probably/ the first time / I've fallen in love.

In written English, the use of punctuation marks enables one to observe the punctuation and read the sentence accordingly, but when we speak English, a listener understands what we say because we group words together and pause appropriately to convey the meaning.

This allows us to speak in phrases or thought groups and to pause just after important information that we want to emphasise.

If we speak slowly and clearly, the phrases are shorter, but if we speak fast, the phrases are longer and we don't emphasise as many words.

It's important to know where to put the pauses in the sentences so that you can sound comprehensible to the native speaker.

Common Patterns of Pacing

Examples:

Noun phrases:	the obsolete software Army and Peter
Short subject and verb:	Mary walked The boy smiled
Verb phrases:	Jogged joyfully seemed correct
Prepositional phrases:	In the laboratory with the hammer to the mall
Relative clauses:	…. woman who wore glasses ….. book that I read, is ….
Parenthetical remarks:	Phrase (or thought groups) are … this is, in fact, an example.

Between each thought group, the speaker needs to pause. There are some pauses that are longer and more important than others. These would be marked with commas, semi-colons, colons and full stop in writing and will almost always be pauses, no matter how fast the person is speaking. The other pauses are less evident but definitely in place and they do impact speech.

Importance of Chunking

- A conversation is made more meaningful and clear.
- Helps one to learn to think and speak in complete phrases.
- The pitch, frequency, length and intensity help to add additional and variable meaning to a given statement.
- By deliberately placing the main stress at the beginning or in the middle of a chunk, you can subtly change the meaning of what you say.
- The stressed words tend to be nouns and verbs generally.
- It is better to pause after stressed words.
- Pausing can change the meaning of a sentence. The scope of an adjective can be altered depending upon the pausing.

Activity 1:

Faculty to read each of the three options for each sentence and students need to identify the sentence that has been wrongly paced.

1. a. The person who never made a mistake/ never/ made anything.
   b. The person/ who never made a mistake/ never/ made anything.
   c. The person/ who/ never made a mistake/ never/ made anything.

2. a. Management/ problems always /turn/ out / to/ be people problems.
   b. Management problems/ always turn out/ to be people problems.
   c. Management/ problems/ always turn out / to be people/ problems.

3. a. Big companies / are small companies/ that succeeded.
   b. Big companies / are/ small companies that/ succeeded.
   c. Big companies / are small companies that succeeded.

4. a. Hard work never killed anybody, / but worrying about it did.
   b. Hard/ work/ never/ killed /anybody, / but worrying about it did.
   c. Hard work never killed anybody, / but worrying/ about it did.

5. a. Ideas are/ like children./ Your own are / wonderful.
   b. Ideas are like children./ Your own are wonderful.

c. Ideas/ are like children. Your own/ are / wonderful.

Activity 2

Ask students to work in pairs: Each pair to be given a copy of the poem below. Ask them to read it to each other and with a slash, mark the areas where the appropriate pauses are to be made so that it can be understood better by the listener.

Ask each pair to read it out to you and then provide correction and adequate feedback:

Let's face it;
English is a stupid language.
There is no sand in a sandwich

No ham in a hamburger,
And neither pine nor apple in the pineapple.
Quicksand takes you down slowly,
Boxing rings are square.

If writers write, how come fingers don't fing?

If the plural of tooth is teeth,
Shouldn't the plural of phone booth be phone beeth?

If the teacher taught,
Why didn't the preacher praught?

If a vegetarian eats vegetables,
What does a humanitarian eat!?

When the stars are out they are visible,
But when the lights are out they are invisible.

Why do people recite at a play
Yet play at a recital?

And that is why you fill in a form by filling it out,

And a bell is only heard after it goes.

And why when I wind up my watch,
It starts,
But when I wind up this observation,

It ends.

Activity 3

Here is a short extract from President Obama's speech. Get your class into pairs, ask them to read it through.

Now make them read it again slowly and mark with a slash, the appropriate chunks of the sentence and have them read aloud to their partner. Ensure you give timely correction and feedback.

"It drew strength from the not – so – young people who braved the bitter cold and scorching heat to knock on the doors of perfect strangers and from the millions of Americans who volunteered and organized and proved that more than two centuries later, a government of the people, by the people and for the people has not perished from the Earth".
"This is your victory."

"And I know you didn't do this just to win an election. And I know you didn't do it for me."
"You did it because you understand the enormity of the task that lies ahead. For even as we celebrate tonight, we know the challenges that tomorrow will bring, are the greatest of our lifetime- two words, a planet in peril, the worst financial crisis in a century."

Extract: http://www.independent.co.uk/news

STOP ! GO BACK AND REFLECT !

I learnt ……

I would like to know more about ……………………………………………………………………………….

Activities / tasks I liked / found useful…………………………………………………………………………

Something I would adapt / do differently…………………………………………………………………….

10. Fluency

Fluency denotes language proficiency. It is the ability to be understood by both native and non-native speakers of the language. Fluency in speaking, refers to one's ability to express their thoughts coherently and logically in complete sentences, using appropriate vocabulary and without hesitation.

How to improve fluency:

- Use a **variety of linkers** to organize and link ideas.
- Speak confidently for **long stretches** of time.
- Say things in a different way to **avoid saying the same things twice**.
- Avoid repeating content words and repeating phrases.
- Use synonyms and/ or referencing language (pronouns; this, that it, those, etc.) to avoid repeating things.
- Avoid regular hesitations/ **pausing for too long** (more than 3 seconds) when searching for words and expressions

Activity 1

Explain that there are only three rules to this game:

- No hesitation (more than 3 seconds).
- No repetition (saying the same thing twice; repeating phrases or content words)
- No (going off topic) deviation.

Note: Before getting the participants to do this activity in pairs, demonstrate how the rules get broken by getting one participant to the front of the class. This person is given a topic from the table and is told to speak for a minute on this topic. Tell the other participants that they must stop the speaker if any one of the three rules are broken. If the participants have not stopped the speaker for breaking any of the three rules, **the faculty must do this**.

Highlight which rule has been broken and ask participants what the speaker could have done to avoid breaking the rule; for example, if the speaker has repeated the phrase or content word, the whole class has to think of a synonym or referencing word (pronoun; it, this, that, etc.) to replace this word/ phrase.

Repeat this with more participants so that the three rules are highlighted and ways to avoid breaking these rules have also been brought to the attention of the participants.

Playing the game:

Participants sit in pairs (A and B) facing each other.

Partner A starts talking on one of the topics selected from the table. Partner B must stop A if A breaks one of the three rules. B gets 10 points for this. Then B continues the topic, and this time A must stop B if B breaks one of the three rules. The person who is talking at the end of the minute gets an extra 10 points. Points are added up to find a winner.

Monitor and encourage participants to find participants to find synonyms or other ways of saying something **to avoid repetition of phrases/ content words**. Also, remind them to use a variety of linkers to **organize and connect their ideas.**

Get participants to change partners, and repeat the steps above again with another topic. Now, B starts talking on a new topic from the table A and must stop B.

After some time, get everyone to **change partners** and repeat the activity with a new partner.

Continue until all participants have built up their confidence in talking on a topic for a minute, without any hesitation, repetition and digression.

Activity 2

The participant next get into pairs and choose at least four current affairs topics that they are both comfortable with and have sufficient knowledge of.

Participant A will introduce the topic and share his/ her viewpoint on it. Partner B will play the devil's advocate by disagreeing politely. They will have a structured discussion - give an argument, partner politely disagrees, ask for clarification, reply.

- Pairs discuss while the faculty monitors closely.
- Faculty provides feedback at the end, with special focus on clarifying and disagreement language and the ability to express thoughts fluently.

Activity 3

- Divide the class into groups of five. Ask each group to choose a common topic of interest.
- The group is allotted 10 minutes to brainstorm and make a mind-map of talking points relevant to the topic.
- The group now chooses a person to represent their group who will string these thoughts and make a speech. (if time permits, they could write out their speech.)
- Ask the speaker to address the class.
- At the end of the speech, permit the audience to ask questions.
- Throughout this activity, the faculty should monitor closely, taking note of areas to provide feedback on, later. Also be sensitive to any potential conflicts, defusing any tension, if necessary.

Group Discussion

What is it

In a group discussion, we discuss a topic by sharing different viewpoints. The idea is not to defeat each other but to ask questions and get to know each other's viewpoints and build upon that and if possible reach a final conclusion on a topic.

A group discussion involves discussion i.e. giving your opinion and supporting that with a reason, personal experience etc. participants ask questions to one another, building upon what the other person has said.

Group Discussion Structure

1. Appoint a moderator.
2. Moderator introduces the topic.
3. Then elicits everyone's views on the topic.
4. Ensures everyone gets a chance to share their view.
5. Ensures that the discussion stays on track and use functional language.
6. Summarises the key outcome of the discussion.

Activity 1

- Put participants in groups of 6 and ask them to choose a controversial topic (they can choose one of their own if they don't like the ones given). However, this must be a topic which everyone is comfortable discussing.
- Once they have chosen, give them time to brainstorm ideas on the topic and give reasons for their opinions.
- Highlight the importance of using phrases to introduce their opinion, ask questions and so on.
- Ask them to choose a moderator.
- Give the participants a topic. Give them 5 minutes to prepare their opinions.
- Allow participants 15 to 20 minutes to discuss their chosen topic.
- Monitor and make notes on their performance.
- Share your feedback.

STOP ! GO BACK AND REFLECT !

I learnt ……

I would like to know more about …………………………………………………………………………….

Activities / tasks I liked / found useful……………………………………………………………………….

Something I would adapt / do differently…………………………………………………………………….

11. Indianisms

This refers to usage of certain turns of a phrase and anomalies in the use of a syntactic structure which is typical of the way English is spoken in India.

Most often, this is a result of direct translation from the mother- tongue into English, however such usages sound colloquial and may not be understood by the native speakers of the language. Strangely some of these usages, have, over a period of time, become an accepted way of speaking and goes unnoticed within the country, however they could be disastrous in an international forum.

Errors relating to Grammar

- Progressive tense used in stative verbs: I am knowing the result.
- Variation in noun number and use of determiners:
    - My brother loves to pull your legs.
    - I visited the Mysore.
- One-to – one correspondence of prepositional usage: Let us discuss about the book.
- Word order: my all friends are calling.
- Use of the Indefinite article- ‘a’ before words that start with vowels: I have a uncle who lives in Mumbai.
- Use of only as an intensifier: I only cooked the curry.
- Omission of definite article: Please bring bag when you come.

Vocabulary

Listed below are some of the common errors. There are many more that one can think of.

- Use of open and close/ on it/ off it instead of switch on and instead of switch off.
- Use of the word ‘since’ instead of ‘for’: I have been going to work since four years ago.
- Use of the phrase “I can be able” instead of “I can”.
- Use of the word ‘back’ instead of ‘ago’.
- Uses of the phrase ‘pass out’ to mean graduating from.
- Use of also in the place of ‘too’.
- Doubling of adjectives to show intensification- ‘curly curly’ hair

Activity

Organize the class into pairs and ask them to work on the list below.

Listed below are typical Indian usages. Replace with the appropriate phrase:

1. I’ll be there in 2 hours’ time.	
2. You have trust on me.	
3. I am finding your details.	
4. I am going to my native.	
5. It’s very much hot today.	
6. You have found the details?	
7. You can’t see?	
8. I am having two cars	
9. I am having a bad headache	
10. He is my cousin brother	
11. She is my sister, isn’t it?	
12. You are coming for the party, no?	
13. Are you sister of Reena?	
14. Can you explain me the problem?	
15. I said him that I’ll come.	
16. I’ll explain you how to do it.	
17. I’ll help you out.	
18. It is on the backside of your monitor.	
19. I didn’t went there	
20. I am going to Kerala today evening	
21. I got stuck up in the lift.	
22. She’s got good communication skills.	
23. It’s on the backside of next building.	
24. This has to be done by next to next week.	
25. I had to buy some small small things.	
26. Basically I’m from Delhi	
27. May I just have your account details?	
28. It’ll be done in max to max 2 hours	
29. What is your good name?	

30. Myself Robin	
31. In case if I want it….	
32. This is Ram this side	
33. Me, my family and my friends had a great time at the party.	
34. It’s his happy birthday	
35. The reason is because	
36. Let me check it out for you	
37. I will return it back to you.	
38. Please revert back to us	
39. What I have to do?	
40. I have a small brother	
41. I am very much delighted	
42. What you are waiting for?	
43. I can’t be able to do it?	
44. I am a B.Com graduate	
45. She’s wearing a blue colour dress	
46. He has a book of mine	
47. Who is the person who looks after this?	
48. The meeting has been preponed	
49. Does it pain?	
50. He has taken five offs this month	
51. Hope things are well at your end	
52. I’m going out of station	
53. Just let me tell you	
54. I’ve been working here since quite some time.	
55. I’m not getting you	
56. Could you repeat it once again?	
57. You have found the details?	

58. I got disturbed by the noise	
59. What is your order number?	
60. I’m put up at Benson Town	
61. I wrote to you one week back	
62. His grandfather is 65 years of age	
63. I don’t think so he welcome	
64. Like I said you	
65. I will suggest you to take a look at this	
66. Would you like to go for it?	
67. I am not having any idea about it.	
68. I was not knowing the way to your house	
69. He is more taller than his brother	
70. This shirt is more better	
71. My friends and all went bowling	
72. What all can we do?	
73. Means they are not coming today	
74. This is very near to my place	
75. She is very much beautiful	
76. Today only I’ll do that	
77. I want it done now itself	
78. They are here only	
79. You are not understanding me.	
80. Better you come with me	
81. It was cold yesterday night	
82. I ordered for some food	
83. Something and all he was talking about	
84. Where and all I looked for you	
85. Off/on the lights	
86. I’ll be going tomorrow	

87. My name would be	
88. You are coming to the party no?	
89. Coming, no?	
90. She was saying she’ll come on time	
91. Peoples, childrens, informations, datas, jargons, feedbacks	
92. Meet my better half	
93. Her would be is in US	
94. What for I am reading this book	
95. Just I was telling him this morning	
96. Please do the needful	
97. I need the same by tomorrow	
98. She bought a new dress for her son	
99. I like hot hot food	
100. She’s standing on my head to get it done	

STOP ! GO BACK AND REFLECT !

I learnt ……

I would like to know more about ……………………………………………………………………………….

Activities / tasks I liked / found useful……………………………………………………………………….

Something I would adapt /do differently…………………………………………………………………….

UNIT-II: GRAMMAR

1. English: Spoken Versus Written Communication

Have you often found it difficult to put across your thoughts in English when you speak, but found it easier to put your thoughts to paper? Have you found it easier to convey a written message more easily than a spoken one?

To set the pace and make the students experience it themselves, the facilitator could get one participant to the front of the class and ask him to speak on a topic in English for two minutes, go back to his seat and put down his thoughts on paper- time given for writing: four minutes. (All the students could be asked to participate in the writing experience)

The facilitator then asks the participants to share his thoughts on the process that he went through. Ask the participant to tell the class about all the feelings he experienced, his fears, his body feelings, the tension he felt, any symptoms of stress, etc.

Now ask the entire class to attempt the activity listed below. The build-up is aimed to help the participants realize, both the importance of English as a global language and the need to attain fluency in speech and writing.

Chose one of the topics given below and write a paragraph of about 70 to 100 words in your first language. Time yourself and note it down.

1. **My role model.**
2. **My vision for India.**
3. **My dream holiday destination.**

____

____

____

____

____

____

____

Now write on the same topic on English and time yourself again.

____

____

____

____

____

____

____

Which was the easier of the two choices? Was it easier to write or speak in your mother tongue or in English?

____

____

What were the areas of difficulty that you faced? Did they relate to sentence structure, grammar or vocabulary?

____

____

The facilitator asks the participants to write their individual areas of difficulty. The participants could share this with the facilitator and subsequently map it to their progress along the course.

____

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____

____

____

What is language? Would you say it is a tool that aids communication? When you started to speak as a child, you did not realize the difficulties you faced learning the language, since people all around you spoke it. Besides, that was the only tool you had to get what you wanted, not to forget the tantrums you threw! You picked up the first language effortlessly, and later with the help of other adults learnt to read and write in that language.

In most Indian homes, a child first learns to speak his mother tongue or regional language and learns English only on joining school or perhaps even later while in middle school. In fact if you think about it, your thought process is in your language (mother tongue). Over the years you become very comfortable thinking and speaking in your mother tongue. Subsequently you learn English; you are comfortable writing and reading English but however hesitate to speak the language. English therefore becomes your second language. When force to speak in English you are hesitant and at a loss for words. This grammar translation method makes us dependent on our mother tongue besides which we often struggle for the right words to convey our thoughts.

English is a global language and most of us lack the confidence to speak in English because our form of expression is weak. We have to acknowledge and accept that in the business world particularly when mergers and acquisitions are happening between countries across the world, the link language continues to be English.

Can you give me some more reasons why you should learn English?

Students may put their thoughts down in the space provided below.

1. .____
2. ____
3. ____
4. ____
5. ____
6. ____
7. ____
8. ____
9. ____
10. ____
11. ____

The facilitator may instead engage the participants in a healthy debate, if need be, to convince them about the need to be able to speak fluently in English. The points presented can be listed out on the board.

Well, if you are convinced now about the necessity to be able to write and speak English, let us move on with our discussion.

What would you say are the differences between the spoken and the written language?

When speaking, people use contractions, slang, colloquial expressions and do not always adhere to rules. Would it be appropriate to begin a sentence with ‘but’ or ‘because’ when you write? You would often have often heard such usage in spoken language. If we were to look at grammar, we find that we are very particular with the syntactic structure when we write, but tend to ignore it at times when we speak.

The spoken language is immediate, repetitive and more communicative and therefore there are chances that one makes mistakes and instantly corrects them in the course of speech. Besides, we also tend to intersperse our language with words from the local language. Moreover, we in India are comfortable using Indianisms or words which are unique to Indian English. In spoken language one communicates not just with words, but also with tone, body language, intonation and stress. In short, spoken language is less formal but more communicative whereas the written language is precise, well – ordered and structured.

Try this:-

Students should work together in pairs and read the following dialogue, one student reading the part of caller, the other student reading the part of the receiver. Note the expressions used in the dialogue and the progression of the conversation.

Receiver: Hello

Caller: Let me talk to Radha.

Receiver: Radha? There is no one here by that name.

Caller: You sure? This is the number what she gave me.

Receiver: Quite sure. This is Sharma's residence.

Caller: Haan, what number did I call?

Receiver: what number you were trying to call?

Caller: 2543-3768

Receiver: wrong number. You must have misdialed. That is not this number. Disconnect and try again.

Caller: OK, thanks yaar! sorry for the trouble

Receiver: No problems, that's all right. Good bye.

Caller: Bye.

While speaking, we use simple everyday vocabulary. Besides, our speech is interspersed with words and expressions from the local language (notice the use of ‘yaar, no problems’) while writers use formal and elaborate words. Written language when read out sounds less effective. Try and recollect how often have you been distracted when chunks of text were read out to you in the classroom? It bored you and you looked around at other things to keep you amused.

As second language learners of the language, you are more exposed to the written words and perhaps, also practice the written skills a lot more. The situations and occasions for you to speak in English are limited since your interactions are with your family and friends. Your exposure to first language speakers of the language is also limited. As a result of this predicament you often find that when you speak, your speech sounds stilted and official and lacks the conversational edge. This, in turn impacts your tone and you sound condescending and officious, sometimes rude. The reverse is also true where you sound too informal or casual and inappropriate.

Have you noticed that sometimes you are quicker and more fluent with your expressions when you write, but feel tongue tied when you speak? You feel your vocabulary is good, you are not confused with grammatical structure and convey your thoughts fairly well. However, when you are asked to speak in front of an audience or you are asked to make conversation with someone, your hands sweat, your pulse races and your words are stuck in your throat.

Speaking as a skill involves not just the words but a lot more. The tone, body language, gestures, facial expressions and the environment, all play their part in making you feel the way you do. The only remedy for this is practice, practice and more practice. Just as Rome was not built in a day, language fluency cannot be achieved overnight. It requires constant and conscious effort, a willingness to bring that change in you. Please emphasize with the students, the need for constant practice.

To get over our initial inhibitions, let us try a simple activity. Remember when it is your turn to speak, do not get nervous. Take a deep breath, compose yourself and speak.

1.1 Activity 1: Story Circle:

Subject: Spoken versus Written English

Aim: To learn to speak the English language with ease

Props: None

Instructions:

Facilitator to make the participants sit in a circle.

Facilitator to explain to the participants the concept of telling a story.

The facilitator will tell the group that this is going to be a relaxed session where we are all going to contribute towards creating a story. The participants can also be made aware that working in a group helps to improve the learning experience and helps build the confidence to speak in front of a large group without inhibitions.

Once the facilitator has started the first line, the next participant in the circle continues where the facilitator has left off. The next participant picks up the thread of the story and continues it. The story continues through all the participants until it has reached a conclusion and everybody has contributed to the story.

A good idea would also be to record the story and use it for an exercise for correction of errors.

Some of the starting lines that the facilitator could use are:

I woke up this morning all cold and clammy and I wasn't in my bed ……………………………….

Last night I had the strangest dream………………………………………………………………..

Crash! Bang! What was that…………………………………………………………………………..

I remember a time not so long ago………………………………………………………………….

Debrief: What have I learnt? :

Basics of Grammar

Here is a jigsaw. If you were to piece it together, what would you have? – A complete picture, that's right! In the same manner! I have here an assortment of words. What can you do with them? Let us put them into some order. What do you have? – A sentence.

In today's session we are going to look at the various parts of speech that make a sentence. In the sentence that you have just arranged, pick out the various parts of speech and put them in the respective columns.

The black cat ran **quickly** across **the road but it was** hit by **the truck.**

	Noun
	Pronoun
	Adjective
	Adverb
	Preposition
	Conjunction
	Verb
	Interjection

This was a very simple task and I would now like you to do this by yourself. Let us have a quick activity.

1.2 Activity 2: Meet and Create

Subject: Parts of Speech

Aim: Understanding the importance of the different parts of speech

Props: Squares of paper with words representing different parts of speech written on it.

Sample of words: Nouns – Mosque, Road, Mall , Luxor

Do the same with pronouns, prepositions, conjunctions, verbs, adjectives and maybe adverbs.

Instructions:

The facilitator will distribute a choice of the words to each of the participants. On a signal from the facilitator, the participants will move around the classroom and find at least two other participants with whom they can make a complete sentence with. When everyone in the class has found a partner and is a part of a sentence group, they are asked to come to the head of the class and read out the sentence.

The degree of complexity can be increased by asking the participants to work in larger groups to make longer sentences!

Debrief: What have I learnt? :

STOP ! GO BACK AND REFLECT !

I learnt ……

I would like to know more about …………………………………………………………………………….

Activities / tasks I liked / found useful……………………………………………………………………

Something I would adapt / do differently…………………………………………………………………

2. Nouns

Having identified the different parts of speech, we shall examine each of them individually. What shall we start with?

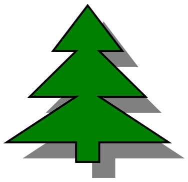
Nouns- A noun is a naming word. What do you understand by the term- naming word ?

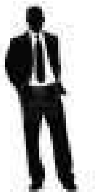
It simply means a word that is used as a name for something. Take a look around the room. Aren’t you able to identify every object around the room with a name ? Say aloud the names of all that you can see. You definitely don’t use gestures to convey the name of an object. Do I draw pictures in the air or use hieroglyphics-certainly not ! In essence, a noun is therefore the name of a person, place, object or idea.

2.1 Kinds of Nouns

There are a variety of nouns and to simplify our understanding we classify them into groups. The primary classification is **Common** and **Proper** nouns**.**

A common noun refers to the name that everyone identifies that object by. For instance- a tree, a man and a shoe.





For most of us any plant with a thick trunk and leaves is a tree, while a covering for the feet is a shoe or a human being a person. How is this different from a proper noun ? A particular name, unique in a way, given to an object, person or place is a proper noun.

If you were to take the example of a shoe, you would have various brands like Nike, Adidas and Lee Cooper which would be proper nouns used to describe the shoe.

Let us look at yet another example. In our daily life as a human being, you play various roles. You are a daughter, a son or an employee, a parent, an aunt or a friend. Would these words you used to describe yourself be common nouns or proper nouns? Are these names particular to one person or does everybody share such similar relationships?

Yes- these are therefore common nouns. However if you were to use your name, say, Alia or Mostafa, would this be a common or a proper noun? This is a name unique to you, your individual identity and hence a proper noun.

Remember the singular form of a common noun in most cases must be preceded by an article; whereas it is alright to avoid the article in the plural form. It is incorrect to say “cat ate the food” while it is alright to say “cats are my favourite animals.”

A proper noun on the other hand is not preceded by an article. Do we say, “Let us go the Egypt” or “The Irene has come”. There are however exceptions to almost every rule and we can discuss it when you come across them.

What are other kinds of nouns?

So far you have looked at words to name things that you can touch, see or feel. What about objects that you cannot touch, see or feel like an idea or a concept, these are intangible. Such nouns are **abstract nouns**. Some such nouns are happiness, youth, grief and brevity.

Close your eyes and try to create an image of these words in your mind. Not an easy task. Right! Check with your partner. Do both of you have the same image? The image would differ. This is not so with common nouns where you will see a greater similarity in the images.

Often, we use single words to describe a group of objects. Such words not only add to your vocabulary but also enable easy communication. For instance, we use words like team, staff, to mean a collective group of like-minded people. These are **collective nouns**.

If I were to call five of you to conduct a discussion, I would address you as a panel of speakers, alternately if you were a group of people breaking into a house you would be called a gang of thieves.

What if you were birds ?- a flock of birds, a gaggle of geese, and a murder of cows !

Fill in the appropriate collective noun from the list below.

Agenda, House, Chain, Host, Convoy, School

Sparrows	
Fish	
Islands	
Tasks	
Trucks	
Senators	

Answers A host of sparrows A school of fish A chain of Islands An agenda of Tasks A convoy of trucks A house of Senators	

It is best to stick to the tried and tested collective nouns and not try to get too imaginative and create your own.

2.2 Activity 3: Noun Ping-pong

Subject: Correlating proper and common nouns.

Aim: Understand the difference between common and proper nouns.

Props: None

Facilitator to be store keeper.

Instructions: Facilitator to divide the class into two groups.

The first group will call out a word which is either a common or proper noun. Any participant from the second team will reply immediately with a corresponding proper noun that identifies the common noun. If the answer is correct, the team wins a point. The facilitator must mark the scores on the board. The next turn now goes on to the winning team. They will again come up with another word and the opposing team has to give a suitable reply.

For Example- if team A says Nike, team B must immediately say Shoes.

Remember, this has to be fast paced. A good idea would be to give them a couple of minutes at the beginning to put down at least 25 common nouns and a similar number of proper nouns. The proper nouns could ideally be brand names of products.

Debrief:
What have I learnt?

2.3 Nouns-Number

One of the deciding factors that impact subject verb agreement which is fundamental to English grammar is the understanding is the singular and plural form of the noun. The plural forms of most nouns are created simply by adding an "s" to the singular form of the noun, e.g Book-Books, Cat-Cats. The list below is an easy reference for you to understand the changes in spellings when forming the plural forms.

Singular	**Rule**	**Examples**
Lamp, Table	Add-s to most nouns	Lamps, Tables
Inch, Fox	Add-es to nouns ending in s, sh, ch, x and z	Inches, Foxes
Radio, Stereo	Add-s to most nouns that end in O	Radios, Stereos
Echo, Hero	Add-es to nouns that end in O preceded by a consonant	Echoes, Heroes
Melody, Fly Monkey, Day	Change the Y to an i add es, if the vowel comes before Y add s	Melodies, Flies Monkeys, Days
Thief, Half	Change the fe to ve and add s	Thieves, Halves
Roof, Cuff	These exceptions just take an s	Roofs, Cuffs
Datum, Matrix	Words of Latin origin	Data, Matrices
Woman, Foot	Irregular forms	Women, Feet
Fungus	Change –us to i	Fungi

However when you have to create the plural form of compound nouns, remember to pluralise the first part of the compound noun.

For Example- A **passer-by** would in plural form, become **passers-by.**

2.4 Noun-Gender

When using English, we also have distinct noun to represent both the masculine and feminine gender.

For Example- You says **tiger** and the feminine gender is **tigress**.
You have the **school master** and the **school mistress.**

However this distinction is slowly blurring in the current global work place, as it is politically incorrect to make any gender-based distinction. In fact, the use of "man" as suffix today is questioned and has been replaced with "person" which is neutral and does not carry any gender bias. So we should rather say 'chairperson' than 'chairman' and 'human kind' rather than 'mankind'.
Think of some more words that have been replaced with more politically correct words.

____
____
____

2.5 Countable and Uncountable Nouns

Nouns are also classified into countable and uncountable nouns. An understanding of this kind of classification is very crucial to subject-verb agreement which we will deal with later.

Countable nouns are those we can count and take both singular and plural forms.

A **boy**, Four **Boys**
A **Book**, five **Books**.

Uncountable nouns are the ones, we cannot count. They don't have a plural form.

Air, Ice, Wisdom (You cannot say airs, ices, wisdoms)

Let us examine the rules that apply to countable nouns. Since it can take on both singular and plural form, it means that a countable noun can be preceded by articles. **a, an** or **the** as is relevant to the noun. It can also be quantified using modifiers like **some, many** or **few**.

For Example- I can say: an egg, the eggs, some eggs or few eggs.

In the case of uncountable nouns we can not use **'a'** or '**an'.** Instead, one can only use the definite article- **'the'**

For Example- I cannot say: "Give me an information" or "I need informations."
Instead I say "I need some information."

Uncountable nouns can be quantified using the modifier **much** and **some**.
For Example: "I need some rice."

In fact, you may indicate quantities through terms denoting measurements such as – a grain of sand, a glass of milk, etc..

Moreover, an uncountable noun being a singular form of the noun will always take on a singular verb.

For example- The sand is hot.

The information is wrong.

There are some common words which are uncountable nouns, and English speakers often make mistakes with them. Remember that all the words in the box an uncountable and you should not try to make them plural:

advice, equipment, furniture, homework, information, luggage, transport, accommodation, baggage

STOP! GO BACK AND REFLECT!

I learnt………

I would like to know more about…………………………………………………………………………………….

Activities/Tasks I liked/found useful………………………………………………………………………………

Something I would adapt/do differently……………….…………………………………………………………

3. Pronouns

Imagine trying to tell someone a story where you cannot substitute a noun with a pronoun. Listen to this story that I am going to read to you.

Radha listened keenly for sounds in the hall. Hearing no sounds in the hall Radha tiptoed out of Radha's room, slipped out through the kitchen door, quickly jumped into Radha's car and drove as first as Radha could. Radha had to find Shyam and warn Shyam about the mysterious message………

Lost your patience? I would not blame you. The thrill of reading the story is dampened to plod through the endless list of repetitive nouns.

Pronouns would make the story easier to read

Radha listened keenly for sounds in the hall. Hearing no sounds in the hall she tiptoed out of her room, slipped out through the kitchen door, quickly jumped into her car and drove as first as she could. She had to find Shyam and warn him about the mysterious message …………………..

"Pro" means acting for and therefore a pronoun implies a 'word' that takes the place of a noun. Without pronouns, both reading and writing would become a tedious process. You just had a taste of it! Like nouns, pronouns too come in several types. The ones we use most often, are the **personal pronouns** which refer to specific people and sometimes two things. In the example above, '**she**' and '**her**' refers to Radha, and '**him**' refers to Shyam. Like nouns, pronouns also take on singular and plural forms. However unlike the nouns, they change to show :

The first person (the one who is speaking)

The second person (the one who is being spoken to**)** and

The third person(the one who is being spoken about).

Study the chart showing the different forms of personal pronouns.

	Subject Pronouns
1st Person	**I**
2nd Person	**You**
3rd Person(M)	**He**
3rd Person(F)	**She**
3rd Person(Neutral)	**It**
1st Person(Pl)	**We**
2nd Person(Pl)	**You**
3rd Person(Pl)	**They**

	Object Pronouns
1st Person	**Me**
2nd Person	**You**
3rd Person(M)	**Him**
3rd Person(F)	**Her**
3rd Person(Neutral)	**It**
1st Person(Pl)	**Us**
2nd Person(Pl)	**You**
3rd Person(Pl)	**them**

	Possessive Pronouns
1st Person	**Mine**
2nd Person	**Yours**
3rd Person(M)	**His**
3rd Person(F)	**Hers**
3rd Person(Neutral)	**Its**
1st Person(Pl)	**Ours**
2nd Person(Pl)	**Yours**
3rd Person(Pl)	**Theirs**

	Possessive Adjective
1st Person	**My**
2nd Person	**Your**
3rd Person(M)	**His**
3rd Person(F)	**Her**
3rd Person(Neutral)	**Its**
1st Person(Pl)	**Our**
2nd Person(Pl)	**Your**
3rd Person(Pl)	**Their**

	Reflexive Pronouns
1st Person	**Myself**
2nd Person	**Yourself**
3rd Person(M)	**Himself**
3rd Person(F)	**She**
3rd Person(Neutral)	**Itself**
1st Person(Pl)	**Ourselves**
2nd Person(Pl)	**Yourselves**
3rd Person(Pl)	**themselves**

Ahmed (the first person) spoke to Anita (the second person) about Rita (the third person)

When we use personal pronouns, we would say:

Ahmed spoke about **her** to **her**

Look at the chart to understand under which column these pronouns would fall.

In case you use the plural form:

The boys spoke about the teachers to the parents

They spoke about **them** to **us.**

Remember a subject pronoun which is ideally your first person, comes before the verb in the ordering of the sentence. When a pronoun is used as an object pronoun which is either direct, indirect or objects of preposition you used an objective form of the pronoun like- me, her etc.

She hates eating apples.

Ali gave the book to me.

The possessive pronouns show ownership, in a way they act as adjectives.

My friend found **his** dog.

Their friend is a happy man.

That bag is **mine**.

What is the difference between **it** and **it's**? Which is the pronoun here?

Let us look at **Relative** and **Reflexive** pronouns.

3.1 Reflexive Pronouns

A reflexive pronoun is used generally for emphasis and is also called emphatic pronoun. Here the action of the doer goes back to himself so that the subject of the sentence is the same as the object of the sentence.

I hurt myself.
She answered the phone herself.

Such pronouns end with the word 'self' and can be recognized easily. They are used in everyday speech along with your tone of voice to convey a sense of emphatic ownership they may also be used as intensive pronouns to add emphasis as in "Arun himself saw the ghost."

	Singular	**Plural**
First person	**Myself**	**Ourselves**
Second person	**Yourself**	**Yourselves**
Third person	**Himself**	**Themselves**
	Herself	**Themselves**
	Itself	**themselves**

3.2 Relative Pronouns

Look at these words – **who, which, that, whom, these.**

Are these also pronouns? Yes they are. They take the place of nouns and are used much like conjunctions to join two statements about the same person or object. Given a choice of these pronouns, how does one understand where to use each of these? Simply stated **who, which** and

whom are used to mix statements about people and **which** and **that** are used to make statements about animals and objects.

Look at these two sentences: **The girl is an actor. She danced for an hour.**

We join the two sentences using a relative pronoun – who

The girl who **is an actor danced for an hour.**

The pronoun **whose** is used to show possession. For most learners of the English language, it is difficult to understand when to use **who** or **whom.** The use of **which** is fairly clear, since we use it to indicate objects and it follows the noun in terms of placement.

This is the dress **which** costs USD 500. (follows the noun – dress)

This is the camera **which** he bought.

Here is the book **which** Tom borrowed from you.

So, you see '**which**' can be followed by a noun, pronoun or verb.

When does one use 'whom' / 'who' and how would you make a choice between the two.

Look at these sentences :

The girl **who** is my sister, is a painter.

The girl **whom** you met at the mall, is my sister.

A simple tip to remember is that '**whom**' is normally followed by a pronoun while '**who**' is followed by a verb.

3.3 Demonstrative Pronouns

Some pronouns like **this, that, these, those , none** and **neither** are used to substitute nouns and the nouns – they replace – can be understood from the context. These are **demonstrative pronouns**. Moreover, they also indicate whether they are replacing singular or plural nouns, as also state the location of the object. '**This**' is singular and indicates proximity to the speaker, while **that** though singular, indicates distance from the speaker. On the other hand, '**these**' and '**those**' are both plural, the former indicates proximity while the latter indicates distance.

You take **these** books and I will take **those.**

We bought **this** house last year.

(This refers to one house, singular, near the speaker and is easily understood in the context of the conversation.)

3.4 Interrogative Pronouns

Questioning words starting with ‘**wh**’ like **what, whom, which** and **who** are interrogative pronouns. We use these pronouns to ask questions. The interrogative pronouns that you use, represents the thing that we don’t know. You use them at the beginning of a sentence to ask a direct question.

“**Whose**” can also be used as an interrogative pronoun.

“**What**” is your name ?

“**Who**” is in charge of this project?

“**Whose**” car has not arrived?

“**What**” do you mean?

Notice the word order in the formation of questions.

Using the suffix ‘**ever**’ with whom or who as in – whoever – is just for the sake of emphasis and does not require any other rule!

3.5 Indefinite pronouns

We now come to the last of this lot which is **indefinite pronouns**. These pronouns refer to people or things without making a mention of who or what they are. When we spoke of personal pronouns, we had definite people whom we were referring to. But when we use indefinite pronouns, we are not sure of the identity of the person or thing we are speaking of.

Indefinite pronouns also have singular and plural forms.

Singular : another, anybody, no one, anyone, anything, either, everybody, everyone, everything, little, something, much, neither, nobody, nothing, one, other, somebody, someone, each.

The pronoun **one** for instance can refer to a person or thing.

> **One** of the boys is missing.
>
> **One** of the boxes is missing.

All such pronouns take the singular form of the verb.

> **Something** is missing.
>
> **Nobody** is answering the phone.

Either of the gifts is fine.

Is someone coming over today?

Plural : many, others, several, both, few.

These pronouns will always take the plural form of the verb.

Many bottles of water are required.

Both the chairs are dirty.

Several pictures were released by the press.

A good tip to remember is that, indefinite pronouns ending in **one** or **body** refers to the persons and those ending in **thing / things** refer to objects. Often we tend to misunderstand words like everything and everybody to mean the plural form and use a plural verb with these words. Just remember a word ending with – one, thing or body should be a clear indication of a singular form.

There are some others that fall into both categories, but we shall address them later, when we look at subject – verb agreement.

Let us now conduct an auction. Have all of you heard about the great Sotheby's auction held in Britain. Well, we are trying to do that on a smaller scale. The objects put up for auction are some sentences, which are highly in demand.

3.6 Activity 4: Sentence Auction

Subject: PRONOUNS

Aim: To understand the different kinds of pronouns.

Props:

Make believe currency – slips of paper with the amount printed on it

A bell to indicate that the sentence has been auctioned.

A sheet of paper with about 25 sentences with pronoun errors.

Instructions:

Divide the class into groups of 4 students.

Explain to the group that an auction of sentences is to be conducted.

The aim of each team must be to buy as many correct sentences as possible.

At the beginning, assign a sum of money to each team. This could be limited to INR 3000.

The bids begin at INR 200 and every subsequent bid increases by INR 50.

The sentence will be sold to the highest bidder.

The winning team is determined to be the one which has bought the most number of correct sentences.

Debrief:

What have learnt?

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……………………………

The sentences can be reviewed with the whole group for a better understanding of grammatical usage.

AUCTION SHEET

Sentences

1. **Everyone were singing from their books as they entered the room.**
2. **Either of the boys are acceptable to do the errands.**
3. **When one is ill, he is likely to be impatient.**
4. **Joe is one of the boys who is on time.**
5. **It is I who is to make a call**
6. **The dog has its bone.**
7. **I shall go bathing today if the water is warm enough.**
8. **The dog we always feed is the one who wags his tail furiously.**
9. **I shall speak to whomever is there.**
10. **Whom do you want to help you?**
11. **Harrison and I are the first in line.**
12. **Whomever it may be, I wish him success.**
13. **If I were he, I should not accept the post.**
14. **The principal put another group and us in the same room.**
15. **I had a swim, quickly dried myself and put on my clothes.**

16. She quickly dressed herself and went down for breakfast.
17. This is a newspaper whose circulation has risen rapidly.
18. The Johnsons and us are going swimming.
19. That was me whom you saw yesterday.
20. The leaders, Amrita and I had a score of 25.
21. We are not impressed by his speaking softly.
22. We pictured him shouting at the audience.
23. Mother detected his eating an apple.
24. She chose Basu and myself for the task.
25. Please read Rashmi and I that story.

STOP ! GO BACK AND REFLECT !!

I learnt ……………………………………………………………………………………...............................

I would like to know more about ………………………………………………………………………..

Activities / tasks I liked / found useful ……………………………………………………………………

Something I would adapt / do differently……………………………………………………………..

4. Adjectives

Would you all like to play a guessing game with me? Well lets start …I want you to look around the class and put down five attributes/qualities about any one person in the class room. Put down only the attributes and don't mention the name of the person. You may take two minutes to think that through, alright I would like any one of you to volunteer to read out the attributes you have put down, to the class. Well, the rest of you can make three guesses to identify the name of the person who the speaker has in mind. (You may do a couple of rounds to set the pace)

I suppose you found that fun to do. Now let us get to the topic that we intend working on today adjectives.

Tell me something, how you would like to accesssorise yourself when you are coming into college/ work in the morning. The question is addressed to both the boys and girls! You do take the trouble to do that don't you? In the same manner can we accessorise or adorn our sentences?

Yes, we do, and for this purpose we use a part of speech that we call the adjective. An adjective, technically speaking, is a part of speech that modifies a noun or a pronoun. By using adjectives, you not only provide more information about the noun, which is often the subject or object of your sentence, but also enrich your vocabulary. In fact, vocabulary building to a large extent is about using appropriate adjectives to describe something.

A lot of adjectives can be formed from nouns and verbs. Sit along with your partner and each of you put down a list of ten nouns. Having done that, exchange the sheets and try to convert the nouns into adjectives.

Here,s an example:

Destruction-destructive

Adjectives are wonderful addition to your vocabulary and give you a great sense of confidence when you speak. Let us work together on an activity.

4.1 Activity 5 : Picture perfect

Subject: Adjectives

Aim: using adjectives to increase vocabulary.

Props

- Sheets of chart paper
- Sketch pens

- Interesting photographs or pictures of crowded places that include a lot of people, object and colour. These can be cut out from magazines or brochures.

Instructions :

- Facilitator to divide the class into groups.
- Each group to be given a picture and a sheet of chart paper.
- The group has to settle on a theme name for the picture they have.
- Next they identify the main objects/people in the picture and within that context come up with adjectives.
- Within a given time span, say, five minutes they must write down as many adjectives as they can think of to describe the picture. For example, if they have a tall well built man in the picture they could have a series of adjectives to describe the man e.g. strapping, stocky, handsome, sober, thoughtful etc.
- At the end of the activity the faculty reviews the lists and puts them up on display. One could further build on this and proceed to list out the adjectives and get the participants to write down the comparative and superlative forms as well.

Debrief :

What have I learnt?

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..
..
..
....

Adjectives fortunately do not take on any gender and that is surely a saving grace! You have a wide range of adjectives to choose from.

Give me a list of adjectives to show (ask the class to come up with the list)

Opinion: nice, beautiful, excellent

e.g. She was a nice girl.

Numeric : eight, one

Quantitative : more, some, half

Qualitative: red, big , fragrant, square

e.g. The big woman.

The square box.

Origin : German, Japanese

Material: cotton, tin,

Distance: long, short

Time: early, late

Purpose: sleeping, leaking (theses adjectives always end with -ing).

e.g. Sleeping bag.

Ownership: mine, yours

‘which’, ‘whose’, ‘what’, ‘this’, ‘that’ and ‘those’ also function as adjectives. In fact ‘a’, ‘an’ and ‘the’ are also adjectives of shorts since they qualify a noun!

4.2 Positioning of adjectives

Most adjectives appear immediately before the noun or noun phrase. Suppose you have an indefinite pronoun then the adjective comes after the pronoun.
Example:

The **big** balloon floated over the **arid** land.
Anyone capable of doing this should be rewarded.

4.3 Comparative Degrees of Adjectives

Adjectives, like adverbs can be used for the purpose of comparison. The degrees of comparison are positive, superlative, comparative. In reality only comparative and superlative show degrees, while positive show the adjective in its base form.

Take this example:

Mahima is a **rich** lady, but Ahmed is **richer** than Mahima. and Harish is the **richest** person in the community.

The comparative form is used to compare two things and you will find that the word ‘than’ frequently follows the comparative form. On the other hand, the superlative form is used to compare more than three objects and the word ‘the’ precedes the superlative form of the adjective.

Examples:

She is **taller** than Maria.
Alice is the **tallest** of the sisters.

Generally, the suffixes –er and –est are used to form the comparative and superlative forms respectively. You must remember that at times there can be a change in the spellings when these suffixes are added. However, when an adjective has more than one syllable, we use 'more' and 'most' respectively to form the comparative and the superlative.

Example:

She is **more beautiful** than her sister.
Tom is the **most eloquent** speaker in the group.

True to the nature of the English language most rules also have exceptions. Certain adjectives take on irregular forms when being compared.

Good	**Better**	**Best**
Bad	**Worse**	**Worst**
Much, Many	**More**	**Most**
Little	**Less**	**Least**
Far	**Farther**	**Farthest**

Certain adjectives like unique, perfect and ideal are incomparable and do not take on more or most. They can exist only in the positive form. Can you think up some more?

Example:

This is a **unique** plan.
I cannot say – This plan is more unique than that one.

A pitfall that most second language speakers of the English language should avoid is the tendency to use a double comparative or superlative. This is often the influence of the first language on our speech.

Have you often heard yourselves say, "This is more better" or "She is more prettier than her" ?

4.4 Order of Adjectives

Do I say a little yellow car or a yellow little car ? when a number of adjectives are to be placed before a noun what is the order you will consider? The order is a pre established one. This comes through practice and after a point it becomes instinctive. Till then follow the pattern and try saying it aloud. Hearing yourself say it will help you to determine whether you have the right order in place. It is based that you stick to using a maximum of three adjectives to describe something. The order follows this pattern:

Determiner	**a/an/the**
Observation	**Beautiful/pretty**
Size and shape	**Large/rich**
Age	**Ancient/young**
Colour	**Red/yellow**
Origin	**Indian/Japanese**
Material	**Wooden/ metallic**
Qualifier	**Rocking chair/ book cover(part of noun)**

STOP ! GO BACK AND REFLECT !!

I learnt ……………………………………………………………………………………………………

I would like to know more about ……………………………………………………………………

Activities / tasks I liked / found useful ……………………………………………………………

Something I would adapt / do differently……………………………………………………………

5. Adverbs

You just saw how an adjective modifies a noun; in the same manner an adverb primarily modifies a verb. Most of us are confused when we are told to distinguish between the adverb and the adjective. A simple primary school technique is to address questions to the noun and the verb. The ‘**Wh’** questions like **what**, **when** and **how** are the ones that you use. If you address a question the verb and you get an answer then, that answer is the adverb. On the other hand, if you address the question to the noun and get an answer, that is the adjective.

Sounds confusing, let us understand this through an example.

I have two sentences-

The black cat ran across the road.

The girl sang happily.

If I were to address the question to the noun-

Which **cat** ran across the road?

My answer would be-

The **black** cat.

This then, is the adjective of my sentence.

Alternately I address a question to the verb –

How did the girl **sing**?

My answer would be –

‘**Happily’**

This then, is the adverb in my sentence.

You now have a basic understanding of adverbs. Adverbs give you more information about the way an action is done. They typically modify a verb, an adjective or sometimes another adverb.

She walked **quickly**. (quickly describes the verb-walked)
I accepted the gift **gracefully**. (gracefully describes the verb- accepted)
He drove a **very** fast car. (how fast was his car? Modifies the adjective)
She moved **quite** slowly down the ramp.(How slowly did she move? Modifies another adverb.)

The easiest adverbs to identify are those that end in – **ly, briefly, happily, sweetly**. Sometimes you may be confronted with adjectives which have a – **ly** ending; for instance- **lovely.**

Confused?

Simple, remember an adjective can qualify only a noun or a pronoun while an adverb qualifies most others!

Example:

The **lovely** lady lives in a **friendly** neighborhood.

5.1 Kinds of Adverb

Adverbs cover a wide range based on their functions.

An adverb of manner answers the question- **How?**

I play well.

An adverb of time answers the question- **When**?

He has not played golf recently.

An adverb of location or direction answers the question – **Where**?

I will meet you outside.

Adverbs of degree answers the question **-How Much**?

I am too tired to go to the party.

Adverb of frequency answer the question – **How Often?**

He rarely visits his parents.

Do not forget the connecting adverbs, which are a great help in our conversation and help us to establish continuity of thought and fluency.

I want to sleep; however, I need to finish the task.

Some of the most common conjunctive adverbs that we use, are **: accordingly still, anyhow, furthermore, however, moreover, otherwise, therefore, also etc.**

5.2 Degree of Comparison

Like adjectives, adverbs too have degrees of comparison.

Positive	**Comparative**	**Superlative**
Clearly	More Clearly	Most Clearly
Happily	More Happily	Most Happily
Loudly	More Loudly	Most Loudly
Noisily	More Noisily	Most Noisily

Most adverbs that end in 'ly' form, their comparative and superlative forms are created by adding '**more'** and '**most'**, respectively.

An advantage that an adverb has over the adjective is in terms of positioning. The adverbs of manner particularly have this advantage.

It is acceptable to use any one of the three sentences listed below. Notice the positioning of adverbs in each of these sentences.

- Solemnly, the priest addressed his congregation.
- The priest solemnly addressed his congregation.
- The priest addressed his congregation solemnly.

Adverbs of frequency and time are ideally placed before the verb or between the auxiliary and the main verb.

- I never get up before nine o' clock.(before the main verb)
- I have rarely written to my brother without a genuine need.(between the auxiliary and the main verb)
- He has recently retired from service.

5.3 Word Order with Adverbs

Often thoughts flood our minds, and we are unaware of the word order when we speak. This can lead to serious errors that will make you the laughing stock of the group.
Take a look at these sentences. Read them once and read them again. Notice the mistakes?

They reported that Michael Jackson, an American pop star, has died on the six o' clock news.

Did the man die on television? Where could one place the underlined modifier?

Misplacement is also possible with simple modifiers like, **barely** and **only**

Sara only grew to be four feet tall.(not an appropriate usage)
Only Sara grew to be four feet tall.
She grew to be only four feet tall.

Word order in the sentence structure is very important and a culprit that often contributes to wrong word order is the adverb. You definitely need a lot of practice with adverbs. Let us work on this activity. Remember, speed matters!

5.4 Activity 6: Relay Race

Subject: Adverbs
Aim: Understand the positioning of adverbs in a sentence.
Props: multiple copies of task sheets

Instructions:
Facilitator to divide the class into groups of five.
Each group has three tasks that need to be done.
One person from the group to collect the first task from the facilitator.
On finishing the task, the task sheet to be returned to the facilitator and the second task sheet to be collected.

In the meanwhile, the facilitator will correct the first task sheet.
On returning the second task sheet, the third task is to be given.
The group that finishes all the tasks and reports to the facilitator, wins a prize.

TASKSHEET 1: Unscramble the sentences below:

1. speaks fluently He five languages:
   ____
2. car new i bought. have a just sports:
   ____
3. became soon bored Susan with new boy friend her:
   ____
4. already three presents given has leaving We been:
   ____
5. hardly days at are home There ever these:
   ____
6. never to been He Chandpur before. had:
   ____

7. comes home after regularly midnight She: ____

8. some has food My mother only brought: ____

9. the house led later than to built had of a me that rest been room the he obviously: ____

10. India a days Generally letter it three to for reach takes: ____

Courtesy: http://www.johnsesl.com

TASK SHEET 2

Diana is unhappy at work and this is what she said when she came home.
Replace all the examples of 'quite' with either 'completely' or an adverb with a similar meaning or 'fairly' or an adverb with similar meaning.
Help list: wholly, absolutely, moderately, totally, fully
"It is quite (1) unusual for me to get annoyed but I was quite (2) appalled by my boss's attitude. He'd asked me to finish the report by next week. Well, even that would be quite (3) difficult. But then this morning he told me that he wanted it by tomorrow. He knew that it was quite (4) impossible for me to finish it by then. But he's quite (5) determined to have it. It's not fair. He knows I am quite (6) good at writing reports but he also knows I am quite (7) useless at working under pressure like that. My old boss was quite (8) different. He was quite (9) thoughtful and quite (10) brilliant at organizing people. I think it's quite (11) likely that I will start looking for a job elsewhere."

Answers:
2,4,5,7,8,10 should be replaced by completely or adverbs like totally, fully, entirely, wholly, absolutely, utterly
1,3,6,9,11 are to be replaced by fairly or adverbs like rather, reasonably, moderately, comparatively

TASK 3
Unscrambled the words below:

1. ylouisxna ____
2. yyatlbonu ____
3. yliylacnc ____
4. lldlfyuoe ____
5. haryazahpdl ____
6. oiyomdl ____
7. arwtlodyu ____
8. rylpta ____

9. ayiltplyc ____

10. rnyovuitlal ____

courtesy : www.teach-nology.com

Debrief:

What have I learnt?

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……………………………

STOP! GO BACK AND REFLECT!

I learnt………

I would like to know more about………………………………………………………………………….

Activities/Tasks I liked/found useful……………………………………………………………………

6.Prepositions

What do you understand by the term ‘preposition’ ? The word by itself does not give you a clue. So how could you like to explain what prepositions are?

Take a look at the prepositions that you commonly use –

At , in , on , of , up , and , to

By itself a ‘preposition’ is meaningless and difficult to describe. It is pronounced softly in a sentence and not emphasized on.

Short words, but they play a very essential role in the sentence.

Prepositions show relationship between nouns, pronouns and other words. Often, they come before a noun.

After class, before noon

The prepositions stay the way they are and never change form, regardless of the gender or case of the words they are referring to.

A preposition helps to connect the object with the rest of the sentence. The preposition usually helps establish the chronological, spatial or logical relationship of its object to the rest of the sentence.

Example:

- **The book is on the desk.**
- **The book is beside the table.**
- **She read the book during class.**

In all these sentences, the preposition used, locates the noun **book** in relation to space and time.

There are more than a hundred prepositions. Though they appear simple, the use of prepositions is a little tricky. This is because most prepositions have more than one meaning. They can be used as adverbs and are also used along with verbs to form phrasal verbs and prepositional phrases. Besides, they are used in many idioms and along with adjectives and nouns, as well.

Think of this, we say :

We are **at** the hospital to visit an aunt who is **in** hospital.
We watch a movie **at** the movie hall but not **on** television.

Any wonder that these troublesome little words are a nuisance for most speakers? Prepositions can at times be used as adverbs or conjunctions. A word such as since or until functions both as a ‘preposition’ as also a ‘conjunction’. Some prepositions are interchangeable and to add that, a preposition used in combination with another word may have different meanings.

What’s more, prepositions do not have equivalent meaning in other languages.

Let us understand this through the use of Hindi prepositions “se”. This preposition has a wide range of meanings and can be used differently each time.
Look at the following sentences and understand the meaning of the preposition “se”.

1. Woh Dilli (Delhi) se aaya hai.(He has come from Delhi.)
2. Woh kal se gaayab hai.(He is missing since yesterday.)
3. Woh train se jaa raha hai. (He is going by the train.)

You have seen that “se” ends in the sentences above mean from, by and since. Under these circumstances can we apply the same logic to English prepositions? Not at all. Therefore, we face the problem of using the wrong preposition in the course of translation from one language to the other.

It is indeed difficult to state rules for using prepositions; however we could try and understand them in the context of the specific word meaning and also in the context of usage. Prepositions can be broadly categorized into three groups- prepositions of place, time and direction.

In this session, we shall not look at them in these separate categories but understand them with reference to the context of the sentence and the meaning of the particular preposition.

The only way to master your prepositions is by paying close attention to the spoken and written word. Practice, practice and more practice!!

One can broadly classify prepositions into prepositions of time, place and location.

6.1 List of Common Prepositions

Let us look at the most commonly used ones along with an example to understand its usage.

Above : higher than, earlier on a page,

The plane flew above the roof.

There is a title above each diagram.

About : on the subject of, approximately

This is a a story about aliens.

My mother is about sixty years old.

Against : opposing, touching something

I am against this idea.

I leaned against the wall.

Across : from one side to the other, on the other side

We walked across the road.

Let us go to the store across the road.

After : later in time, later in series, to chase
I will meet you after lunch.
B comes after A in the sequence.
The cat ran after the mouse.

Along : follow the length of
I walked along the street.

Among : within a group (amid/ amongst)
We share the money among us.

Around : going around something, surrounding, in other direction, approximately
We walked around the garden.
There is a moat around the castle.
We turned around and went home.
He is around 5 feet.

At : a specific location, point in time, an activity, a condition
Turn right at the end of the street.
I will meet you at 6 o' clock.
The countries are at war.
She is at work.

Before : earlier in time, earlier in a sequence
We can meet before Christmas.
A comes before B.

Behind : at the back of, late, cause of
The girl hid behind the car.
I am behind in my assignment.
Who was behind this scheme?

Below: lower than, later on a page
The temperature is below freezing point.

Notes are provided below the text.

Beneath: lower than and making contact
The earth beneath my feet is wet.

Beside: next to
Angel sits beside me.

Besides: also, as well as
There is no one in the room besides Aisha.

Between: an intermediate location, time series, within a group of two
The building stands between the mall and the mosque.
B comes between A and C.
We have no holidays between Christmas and New Year.
Please share it between the two of you.

Beyond: further than, farther, exceeding
The mountain lies far beyond the horizon.
This is beyond my expectations.

By: near, passed, not later than, through
I live in a house by the sea.
I waved as I drove by the house.
Finish it by next week.
Do you travel by the bus?

Down: in a lower position, further along
The ball rolled down.
He lives down the road.

During: throughout a period, sometime within a period
She watched during the night.
A mishap occurred during the night.

For: purpose, in the direction of, in favour of, considering, duration of time
I walked for two hours.
She left for Kanpur.
We are for this proposal.
I bought the sweater for you.

She is clever for her age.

From: place of origin, starting point of time, start of a range, cause and source
We left from Allahabad .
He comes from his home.
From now on, please be on time.
He suffers from anxiety.
I first heard about it from you.

In: a general area, within a location, large units of time, within a certain time, by means of, condition, a member of, wearing, with reference to.
I live in Egypt.
The chair is in the room.
I will return in an hour.
This happened in December.
The girl is in a white skirt.
The Middle East is rich in oil.
When in doubt call me.
Speak in English.
Inside: within
They are inside the room.

Into: to the inside of, changing conditions
We stepped into the hall.
The frog changed into a prince.

Near: close to
I live near the mall

Of: location, possession, part of a group, measurement
It is in the middle of the room.
A friend of mine is visiting.
One of you can do it.
Give me a cup of milk.

Off: not on, away from, at some distance from
Please keep off the glass.
There are islands off the Hawaiian coast.

On: touching the surface of, a certain day, a certain street, about, a state or condition, by means of

The clock is on the wall.
I live on Cox Street.
The house is on fire.
The book is on aliens.
My birthday is on the 6th of June.

Having run through a fair number of prepositions, let us practice some of these usages before we learn some more.

6.2 Activity 7: Treasure Hunt

Subject: preposition
Aim: to practice the use of prepositions.
Props:
Instructions:
The facilitator would hide a piece of paper (a clue) containing an important announcement of a surprise element in some part of the room, which is rather difficult to find. This must be done before the beginning of the session.

Build up the excitement to finding the clue.

Instructions:
Participants are told to guess where the clue has been placed by using prepositions showing direction or location.

Any of the participants can guess, but ensure that everyone in the class participates.

Clues that the participants ask would be : is it on top of the table, behind the bag, etc.

As a facilitator, you are allowed to only reply saying yes or no.

Once any participant makes the right guess, you may pull out the clue and announce to the class what was on the sheet of paper.

Debrief:
What have I learnt?
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Getting back to our list of prepositions:

Onto: to a position on

The baby climbed onto the chair.

Opposite : facing

The store is opposite my house.

Out of: to the outside of, from among, a motive, material, beyond

She went out of the room.
We won two out of three.
We spoke out of courtesy.
It is made out of waste material.
We are out of danger.

Outside: on the outer side, beyond the limits of

Outside our house, I have a garden.
It is outside of my area of interest.

Over: higher than, covering, across, more than, during, by means of

There is a bridge over the river.
I spread the cover over the table.
I jumped over the puddle of water.
It cost over two dollar.
I saw her several times over the past one week.
We made plans over the phone.

Past: beyond, after

I walked past her house.
It was past two o' clock.

Since: from a specific time in the past, from a past time until now

I have been waiting since 3 o' clock.
I have been waiting here since you called.
I have known him since January.

Through: cross, for a whole period, by means of
The road through town is closed.
I slept through the night.
It will improve through hard work.

To: in the direction of, destination, until, compared with, with indirect object, as part of an infinitive, in order to
Turn to the left.
We are working from Monday to Saturday.
They prefer tea to coffee.
I am going to Alexandria.
Please give it to me.
I like to ski.
We went to the store to buy a pen.

Towards: in the direction of, near
We walked towards the bus stop.
It rains towards late evening.

Under: beneath, less than, in circumstances of
I lay down under the trees.
Under ten people came in.
The bike is under repair.

Underneath: below, making contact with
The book was underneath the carpet.

Up: to a higher place, in a higher place
We went up the stairs.
She lives up the hills.

Up to: as far as, depending upon, as good as
I have read up to the 55th page.
The decision is up to you.
His work is not up to the mark.

With: accompany, having manner, by means of, because of
He came with her.
Here is a book with a map.
I washed with soap.

We read it with ease.
He was paralyzed with fear.

Within: inside of

Be here within ten minutes.
There are no hospitals within a kilometer.

Without: not having,

Do not leave without money.

6.3 Activity 8: Route Map

Subject- Prepositions

Aim- To gain an understanding of prepositions of place and direction.

Props-

Multiple copies of the printed maps of the layout of Harvard.

Instructions-

Study the map showing the layout of Harvard business school along with your partner. You have to give direction to your friend professor Yokogawa- a visiting professor from Japan who is waiting at the Gordon road entrance. Since you are busy and will not be able to escort him, please give him direction to the Dean's house.

You will join him there for a cup of tea. While you continue your meeting with the Dean, your friend would like to visit one of the blocks-Hamilton.

After this, he would like to visit the Baker Library and then head for the parking lot.

Please put down the directions on paper from point so that your friend will not lose his way.

Directions would be in four separate groups-

1. Gordon Road entrance to Dean's house.
2. Dean's house to the Hamilton Bock.
3. Hamilton Block to the Baker Library.

4. Baker Library to the visitor section and finally to the parking lot.

Debrief:

What have I learnt?

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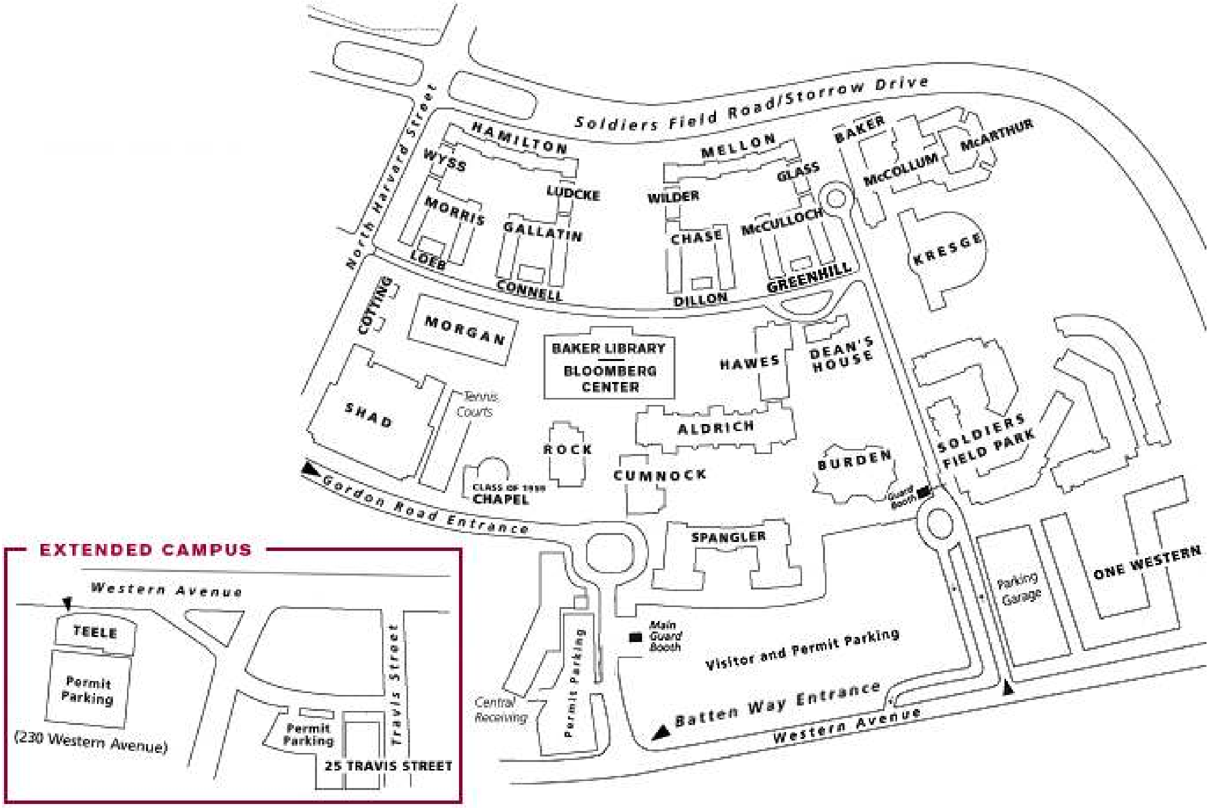

Soldiers Field Road/Storrow Drive
North Harvard Street
HAMILTON
WYSS
MORRIS
LUDCKE
GALLATIN
LOEB
CONNELL
MELLON
WILDER
GLASS
CHASE
McCULLOCH
DILLON
GREENHILL
BAKER
McCOLLUM
McARTHUR
KRESGE
COTTING
MORGAN
BAKER LIBRARY
BLOOMBERG CENTER
HAWES
DEAN'S HOUSE
SHAD
Tennis Courts
ROCK
ALDRICH
CUMNOCK
BURDEN
SOLDIERS FIELD PARK
Guard Booth
CLASS OF 1959 CHAPEL
Gordon Road Entrance
SPANGLER
Parking Garage
ONE WESTERN
Main Guard Booth
Visitor and Permit Parking
Permit Parking
Central Receiving
Batten Way Entrance
Western Avenue
EXTENDED CAMPUS
Western Avenue
TEELE
Permit Parking
(230 Western Avenue)
Travis Street
Permit Parking
25 TRAVIS STREET

Prepositions cannot stand by themselves and must therefore exist along with another word, which could be an adjective, verb or noun. Certain prepositions at times are so firmly wedded to certain adjectives, nouns or verbs that they seem like one word.

6.4 Prepositions with Adjectives, Nouns and Verbs

Let us run through a list of such words to familiarize ourselves with these usages.

Adjectives and Prepositions	**Nouns and Prepositions**	**Verbs and Prepositions**
Afraid of	Precautions against	Complain about
Careless about	Insight into	Protest against
Familiar with	Example of	Stare at
Accustomed to	Faith in	Think about
Accused of	Evidence of	Apologise for
Parallel to	Impression on	Abstain from
Acquainted with	Animosity towards	Believe in
Resistant to	Siege to	Approve of
Suspected of	Connections with	Preside over
Intent on	Response to	Concentrate on
Oblivious to	Symbol of	Adhere to
Devoid of	Acknowledgement of	Comply with
Descended from	Respect for	Mingle with
Noted for	Understanding of	Succumb to
Torn between	Belief in	Refrain from
Isolated from	Hatred of	Abide by
Married to	Token of	Strive towards
Worried about	Pity on	Pry into
Jealous of	Dependence on	React against

STOP ! GO BACK AND REFLECT !!

I learnt ……………………………………………………………………………………………………

I would like to know more about ………………………………………………………………………

Activities / tasks I liked / found useful ……………………………………………………………………

Something I would adapt / do differently……………………………………………………………………

7. Conjunctions

Connecting words are called conjunctions. They can join two parts of sentence, two independent clauses or two separate sentences to create a single sentence. So they are a very useful part of speech and play a very important role too.

Using conjunctions enables to give continuity to your narrative, set a logical flow to your line of thought and most importantly combine two ideas into one.

Broadly speaking, conjunctions fall into 3 categories :

- **Coordinating**
- **Subordinating**
- **Co-relative**

But let us not limit ourselves by these classifications; instead let us look at the vast cache of words that can come to our aid.

Let us look at our first list of joiners. These are mostly short words.

7.1 Coordinating conjunctions

For	**And**	**Nor**	**But**	**Or**	**Yet**	**So**

Represented by the mnemonic (memory aid) FANBOYS, these are easy to remember. These conjunctions join two similar grammatical constructions, for example, two subjects, two clauses or two phrases.

Let us see how we can use them:

He was poor. He was honest.

We have joined two sentences together by using the conjunction **but**

He was poor **but** honest.

In this example, we used the conjunction **and**

Ashita wrote the letter. Anita posted it.

Ashita wrote the letter **and** Anita posted it.

Look at the sentences below and you will see that not only two conjunctions join sentences together; they also show how they are related.

a. He is slow **but** steady (Contrast)
b. Angel wrote the essay **and** the teacher read it (Addition)
c. She sent in her application **and** waited for a response (Sequence of action)
d. Take it **or** leave it (alternative / possibility)
e. He is very rich, **yet** very unhappy (Contrast)
f. Abhinay thought he had a good chance to get the job, **for** his uncle was on the board of directors (reason for preceding clause- italicized)

Remember when a coordinate conjunction joins two verbs which share the same subject, you need not repeat the subject.

She tried and **she** succeeded can be replaced with " **She tried and succeeded".**

7.2 Subordinating Conjunctions

This word is usually placed at the beginning of the dependant or subordinate clause and establishes the relationship between that part of the sentence and the rest of the sentence. It joins two unequal parts of the sentence. In fact, it makes the clause depend on the rest of the sentence for its meaning.

Analyse this sentence:

As he was not there, I left the package with his mother.

The conjunction in this sentence is **as** and is placed at the beginning of the dependent clause which is – **He was not there**. This is now connected with the use of the conjunction to the second half of the sentence which is – **I left the package with his mother**.

Listed below are some of the common subordinating conjunctions.

After	**If**	**Though**
Although	**If only**	**Till**
As	**In order that**	**Unless**
As if	**Now that**	**Until**
As long as	**Once**	**When**
Though	**Rather than**	**Whenever**
Because	**Since**	**Where**
Before	**So that**	**Whereas**
Even though	**Than**	**Wherever**
Even if	**That**	**While**
Supposing	**Provided**	**As long as**

Examples :

Answer the question **before** you move further.

I have not seen her **since** she was a baby.

I have to go **as** I have a meeting.

You will win **if** you practice everyday.

He plays hard **though** he is weak.

My brother takes me to school **when** I am late.

I couldn’t buy a gift **because** I have no money.

Supposing she is late, she will miss the interview.

Although it was raining, I walked to the shop.

She passed the exam **while** I had to do it again.

Neelima got the job **even though** she wasn’t qualified.

Having listed examples of the usage of some of these conjunctions, practice with your partner to confirm your understanding of the others. With such a wide variety of choices, remember to choose a conjunction that makes your sentence crisp and concise.

7.3 Correlative Conjunctions

Certain conjunctions can be used only in pairs. They join grammatically equal sentence elements and are used to express the relationship between ideas in different parts of the sentence.

Both …....and
Neither …….nor
Not only ……But also
Either ………..or
Hardly ………when
No sooner ……..than
Scarcely………than
Rather………..than
If……………..then

Examples-

Neither Nancy **nor** Tina could give me the answer.

He is **both** friendly **and** affectionate.

She will **either** stay **or** take the late train.

She is **not only** pretty **but also** intelligent.

No sooner had I come out of the building **than** she rushed at me.

Scarcely had I opened the cupboard **when** the body fell out.

I would **rather** stay at home **than** go out.

If that is false **then** I am not to blame.

When you use co-relative conjunctions, remember to maintain the parallelism of construction.

You do not say:

He has both a good job and he has a good salary.

She turned the car neither right nor to the left.

The chateau is spacious, charming and not expensive.

Instead, use the correct form of punctuation:

He has both a good job and a good salary.

She neither turned the car right nor left.

The chateau is spacious, charming and inexpensive.

Some words in the list like **until, since, after** and **before** – function as both prepositions and conjunctions.

7.4 Connecting Adverbs

Similarly connecting adverbs also function as conjunctions. We had made a mention of this in the chapter on adverbs.

These are some of the connecting adverbs listed along with their meanings.

Accordingly	So
Nevertheless	But
Consequently	So
However	But
Moreover	In addition to
Otherwise	If not, else

Many connecting adverbs have meaning similar to the conjunctions- and, but and so.

And: also, moreover, besides, furthermore, likewise.

But: however, nonetheless, still, nevertheless.

So: accordingly, consequently, hence, therefore.

These are good additions to your vocabulary and using them to join or start sentences, helps to avoid delays and hemming and hawing, while speaking.

7.5 Activity 9: The Socks Story

Subject: Conjunctions

Aim: To understand the replacement of conjunctions in a sentence.

Props: A puppet, if needed.

Instructions:

Announce to the class that it is story telling time and that you have an interesting story to share with them.

Outline of the story: Two men on a journey on a train – settle down – talk – decide to rest a while – takes off shoes and socks – oversleeps – train reaches destination – have to rush out – mistakenly exchange their socks

Carry the story up to this point and then tell the participants that they now have to come up with reasons why the two men exchanged socks.

The sentence should start with : The two men exchanged socks……………………………………

Participants will work in pairs and complete the sentence with a reason as to why they exchanged their socks by using a suitable conjunction.

Example: The two men exchanged socks since they couldn't exchange their visiting cards.

Each pair will come up with 10 reasons.

Tell them it is alright to be whacky and funny.

The focus is on the appropriate use of conjunctions.

The facilitator may ask the participants to read out their sentences and make the corrections where needed.

Debrief:

What have I learnt?

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STOP ! GO BACK AND REFLECT !

I learnt ……

I would like to know more about …………………………………………………………………………….

Activities / tasks I liked / found useful……………………………………………………………………….

Something I would adapt / do differently……………………………………………………………………

8. Verbs

Can one imagine the English language, or for that matter any language without verbs? As the axis is to the earth, or the sun to the solar system, so is the verb to the English language. One cannot form a sentence without a verb. You saw that in the very first lesson we started with. You would not have a phrase without a verb.

So, what are verbs? Most of us understand verbs as action words. They give an idea of action, of doing something. But how would you explain this, a little further?

- Verbs are that part of speech which denote action or an idea of existence or a state of being.
- A verb always has a subject. A verb tells you what the subject is doing.
- Verbs change form.
- A verb must agree with the subject in terms of number- singular and plural.

Let us take an example of a simple sentence.

Aswin speaks English.

A simple sentence of three words, let’s see if it confirms to our description illustrated above.

The subject in this sentence is Aswin and the verb “speaks”.

While Aswin is the subject of the verb- speaks, Aswin being singular, we use a singular form of the verb- speaks and not the plural form – speak. This explains the agreement of the subject to the verb.

8.1 Verb Classification

Verbs are divided into two basic groups

- Helping verbs
- Main verbs

A helping verb by the very term implies something that provides assistance. In other words, it assists something else. It may also be called as auxiliary verb.

Let us take a helping verb and put it into a sentence.

People are.

Do you understand anything from this sentence? I guess not. The sentence has both a subject and a verb. In spite of which you fail to make sense of it. This is simply because a helping verb cannot exist by itself and needs to accompany or support a main verb. They don't mean anything when they are by themselves; however, they are absolutely essential to complete the grammatical structure of the sentence. They go hand in hand with main verbs.

The main helping verbs are:

Be and its forms.
Have and its forms.
Do and its forms.

There are other helping verbs called modal verbs. These are helping verbs which modify the meaning of the main verb in some way and express possibility or necessity. We shall examine them separately in a later chapter. Similarly, you also have yet another group of verbs called **linking verbs**. These verbs connect a subject with an adjective or a noun that describes the subject.

Example:

The flowers smelled wonderful.
The students felt delighted.

The common linking verbs are :

Be, appear, become, sound, taste, smell, remain, seem, feel, grow, look, go,turn

Let us expand on our earlier sentence.

People are walking.

By adding the main verb walking, there is a greater clarity to the sentence. It is complete by assisting the main verb, the helping verb has played its role of providing assistance.

A main verb can exist by itself and does not need the assistance of a helping verb, at all times.

In this example:

People eat.

We have the subject and the main verb. They agree with each other in number and are complete in their meaning.

There are thousands of main verbs and similarly, there are different kinds of classifications as well. Essentially, it needs to be remembered that a verb can take a direct object as in the sentence-

I saw an elephant.

Or it may stay without one as in the sentence-

He has arrived.

A classification that is both interesting and confusing is that of regular and irregular verbs. If you are not fluent in the language, this could be an area of improvement that you would need to look at.

An understanding of verbs and their forms is essential as we would need to deal with tenses later.

In the English language, regular verbs consist of three main parts: the root form which is expressed in the simple present form of verb, the simple past and the past participle form.

The easiest way to remember or identify a regular verb is to look out for – ed ending added to the root form to create the past and past participle form of the verb.

Example:

Root form(present)	Simple past	Past participle
dance	danced	Danced
create	created	created
Play	played	Played
Act	Acted	Acted
walk	walked	Walked

Irregular verbs also have the same three forms; however, they are not formed in the same manner. The past and past participle forms differ and one can learn this only through practice. Some irregular verbs do not change at all in all three forms, while some change across all three.

8.2 List of irregular verbs

Study the list below and identify the common patterns. A point to remember is that there are no fixed rules for the formation of irregular verbs. You may identify a sort of pattern but just when you think you have mastered it, you will come across an exception.

Root form	**Simple past**	**Past participle**
Awake	Awoke	Awaken
Send	Sent	Sent
Bring	Brought	Brought
Freeze	Froze	Frozen
Creep	Crept	Creep
Make	Made	Made
Blow	Blew	Blown
Drive	Drove	Driven
Break	Broke	Broken
Write	Wrote	Written
Rise	Rose	Risen
Weave	Wove	Woven
Teach	Taught	Taught
Bite	Bit	Bitten
Slide	Slid	Slid
Weep	Wept	Wept
Fly	Flew	Flown
Know	Knew	Known
Meet	Met	Met
Drink	Drank	Drunk
Flee	Fled	Fled
Leave	Left	Left
Deal	Dealt	Dealt
Swell	Swelled	Swollen
Dream	Dreamt/dreamed	Dreamt/ Dreamed
Shrink	Shrank	Shrunk

Go	Went	Gone
Forgive	Forgave	Forgiven
Spend	Spent	Spent
Lend	lent	lent
Fling	Flung	Flung
Grind	Ground	Ground
Ring	Rang	Rung
Mean	Meant	Meant
Forget	Forgot	Forgotten

That was an exhausting list. Don’t get fazed by it. Go through the list very slowly and see whether you can identify a pattern which will help you understand and remember the forms. Let me give you a clue.

Look at the words which end with- nd, what is the pattern you see?

The –nd changes to-nt in the past and past participle forms. Try and establish similar patterns.

Let us try using these in some sentences so you understand the need to learn them.

I write my diary every day.

Last evening I wrote a long mail to my friend.

She had not written to me for many months.

Or let us see an irregular verb that does not change form. Observe its usage whether used in the present, past or future.

She cut the cake last evening.

We will cut the cake later in the evening.

I cut her hair this morning.

Here is a more complicated example.

She spoke to me and said that if I speak behind her back she will have me spoken to, by the principal.

8.3 Activity 10: Word Search

Subject: Verb forms
Aim: To practice using various verb forms.
Props: Multiple copies of word search and filling sheets.
Instructions: Facilitator to distribute copies of word search.
Time allotted for participants to find the 20 words and put them in the columns along with the corresponding forms. – 15 minutes.

Debrief:

What have I learnt?

STOP ! GO BACK AND REFLECT !

I learnt ……

I would like to know more about ………………………………………………………………………………….

Activities / tasks I liked / found useful………………………………………………………………………

Something I would adapt / do differently………………………………………………………………………

9. Subject and verb agreement

Communication is the key to success. In the global business world, the language that links people from across the globe is English. There are many dialects to any language. Pronunciation, phraseology and turn of phrases will vary from country to country. However there is a common consensus on one aspect and that is the grammatical structure of the language. There is no debate on this score, I am sure!

Having understood the various parts of speech, the challenge that lies ahead is to string these parts together in a manner that makes what you say coherent, logical and fluent.

Recollect the process of learning any new language. You have learnt the alphabet, the syntactic structure, some vocabulary-all separately. Moreover you have also scored very well in your written test, yet you are not able to converse with ease. Fluency seems like a distant dream.

Professionalism at the work place is reflected to a large extent through your communication. Being able to convey your thoughts and ideas effectively in English will help you clinch the deal. However, English which is a language that has evolved through the influences of various languages through the ages is fairly confusing and has more exceptions to the rules that govern the syntactic structure then the rules themselves!

The idea is not to scare you, but to make you realize that subject-verb agreement which is the topic of our discussion today is very crucial to understanding English. In addition, if you understand and analyze each of these rules in a very logical and mathematical manner it is actually very simple and can be a lot of fun too!

The rules of English grammar are quite straight forward and logical, it’s definitely not rocket science! For a sentence to exist you know that it must have a subject and verb. So what is the subject and what is the **verb**?

The **subject** in a sentence is the **doer** of the action which is represented by a part of speech- the noun or the pronoun.

Some sentences will also have an **object**. This is the **receiver** of the action again a noun or pronoun.

The verb signifies the transmission of the action from the **doer** to the **receiver**.

The basic rule for forming a correct sentence is

Singular subject takes a singular verb and a plural subject takes a plural verb. Simple isn't it!

Example:

The **boy** reads a book.
The **boys** read books .

So where is the problem?

Well, the first part of the problem is in knowing whether the subject is singular or plural and the next is in knowing whether the verb is singular or plural.

Knowing whether a subject is singular or plural is basic and cones through practices. We have observed this and learnt about it in the chapter on nouns.

So you have:

Chair-chairs
Student –students

Right! But verbs do not form their plurals in this manner. The reverse logic works here. A singular verb takes an's' at the end of the verb and the plural verb stays the way as it is!

DANCE + S = SINGULAR VERB
DANCE = PLURAL VERB
CHAIR = SINGULAR NOUN
CHAIR + S = PLURAL NOUN

This table will help you see the difference in the formation of plurals of the verb and the noun.

Let me take you back to your school days. The focus in your grammar class was on teaching you the plurals of nouns. Am I right? Somewhere the mind at that point registered that the formation of the plural was simply a process of adding- s to the word. Subsequently you learnt about verbs. Grammar was then your dreaded subject and you push the rules away to the far corner of your minds. Somewhere along you failed to analyse that the plural of the verb is formed differently. In fact, in direct contrast to the formation of nouns!

At a later stage, you adopted the process the generalisation and formed a blanket rule.

Plurals- **add s**

One of my friend is sick.
The friends is very important in our life.
They makes me happy.

Therefore you made mistakes in your subject verb agreement! Does that sound plausible? Look at the example of the verb.

Talk
Talks

Which one is the singular form? Which form of the verb would you use with "he".

.

He talks

Therefore "talks " is a singular form of the verb .

They talk.

Therefore talk is the plural form of the verb.

Be conscious and hear yourself speak, it makes it easier to identify errors in your own speech.

Le t us look at some more examples.

She does her work
They do their work.
The students come late.
The student comes late.

This is the cornerstone rule that forms the basic concept. There are about 20 or 24 rules of subject verb agreement of which 12 are crucial to our understanding.

Let us try and approach this topic in very logical manner.

In the sentences above, you had one subject in your sentence. These were – **she, they, students, student.**

You have now understood what the rule of agreement when you have singular subject.

SINGULAR SUBJECT- SINGULAR VERB
PLURAL SUBJECT- PLURAL VERB

So you now know what to do when you have one subject in the sentence.

What if you were to have two subjects in a sentence?

If both your subjects are singular and connected by **'or' 'nor' 'either/or'** or **'neither/nor'** you use a singular verb.

My **brother** or my **sister** is arriving today.

Neither **Mohammed** nor **Amrish** is available.
Either **Asha** or A**ngel** is coming for the meeting.
Either / Angel is
Either/ Asha is

An exception to this usage is the use of the pronoun 'I'. If 'I' is one of the subjects – place it 2nd and follow it with the verb that agrees with 'I' which is 'am'.
Neither she nor I am going to the Park today.

Instead if both your subjects were in the plural form and connected by **'or' 'nor' 'either/or'** or **'neither/nor'** then the verb that follows will naturally be a plural form of the verb.

Neither we nor they are going to the office today.
The participants or the faculties are answerable for the delay.
In the sentences above, you see. That the subjects used, were in their plural form and therefore the verb that follows, is also in the plural form.
Let us now change the situation slightly. If one of the subjects were altered, what would happen? What is the form of the verb that has to be used in this context?

The simple rule to follow in this case is the rule of proximity.

What do you understand by this?
Identify the noun that is placed closest to the verb. Your verb has to agree with the subject that is closest to it.

Example:
The textbooks or the **pencil is** on the table.
The pencil or the **textbooks are** on the table.
Neither the professor nor the **students are** available.
Neither the students nor the **professor is** available.
Either the children or the **parent is** coming to meet you.

Either the parent or the **children are** coming to meet you.

However, the two subjects in your sentence are joined by **'and'**, as a general rule it takes plural verb. The parents and the children are attending the concert today.
The exception to this rule is the usage of two nouns which may look like two different subjects but in reality refer to one entity. An understanding of this usage comes through practice and a lot of additional reading.

Examples:

His companion and **friend** is devoted to him.
His friend and **fellow worker** is very knowledgeable.
Our cook and **housekeeper** is on a holiday.
In these sentences the two subjects refer to the same person.

How would you understand the difference?

Simple-the subjects in these sentences refer to two individuals, you would find a modifier or a determiner preceding the noun.

My friend and the **fellow worker** are very knowledgeable.
Our cook and our **housekeeper** are ill.
His **companion** and his **friend** are devoted to him.

By placing the word **his/ the/ my** before two nouns respectively, you clearly indicate that they are two different individuals.
Sometimes the subject is followed by prepositional phrases or expressions such as **along with, as well as, besides, together with**. Remember the subject in these sentences does not get affected by these intervening phrases.

Ignore these phrases when determining which form of the verb to use. The nouns that follow these phrases is not the main subject. They provide additional information which is not a pre-requisite for determining the form of the verb.

Materials (for the building have been transported)
In this sentence the subject is the word M**aterials**. The subject is plural and the verb must be plural. The prepositional phrase for the building does not affect the number of the subject.

Let us take another example

My **cousin** with her children **has** flown to Spain.

In this sentence the phrase **with her children** does not affect the number of subject. The subject is **cousin** which is singular and the verb is **has** which is singular. So the agreement of the subject and the verb is complete.

You could review some more examples

My sister, together with her husband and sons, **lives** here.
The **politicians** along with the president **have** disappeared.

Singular indefinite pronouns always take on a singular verb.

Each of these boxes **has** been examined.
Anyone has the right to offer an opinion.
Somebody is **responsible** for the theft.

The same rule applies to other singular, indefinite pronouns.
Someone, something much, neither, each, nobody, nothing, everything, everyone, every

Indefinite pronouns like **many a** and **many an** may be misleading because of the presence of the word many. These are singular and take on a singular verb.

Many a man **wishes** that he had better education.

Plural indefinite pronouns like several, few, both and many take on plural verbs.

Several were called to the stage.
A few were opposed to the idea.
Both were anxious to receive the award.

Let us now take a look at the fence sitters! Indefinite pronouns like **some, more, most, none** and **all** are singular or plural according to the meaning of the sentence.

A good technique to use to understand this is to remember that if a pronoun refers to an uncountable noun or a quantity or a mass then it takes on a singular verb and if it refers to a countable noun or a number, it takes on plural verb or in the words, these pronouns refer to a quantity or mass there considered singular and when they refer to a number they are considered plural in meaning.

You will understand this better through a series of example.

Some of the officers **are** going by plane. (More than one- plural)

The indefinite pronoun **some** refers to a countable quantity-**officers**. It is plural and so the verb is also plural.

Some of the **ice cream** is left. (Mass or uncountable quantity)

The indefinite pronoun **some** refers to an uncountable quantity- **ice cream**. It is singular and so the verb is also singular.

More chairs are needed in this room. (More than one- plural)

The indefinite pronoun **more** refers to countable quantity- **chairs.** It is plural and so the verb is also plural.

Is there **any milk** in the freeze? (Mass or uncountable quantity)

The indefinite pronoun **any** refers to an uncountable quantity- **milk**. It is singular and so the verb is also singular.

All of the children **have** brought gifts. (More than one- plural)

The indefinite pronoun **all** refers to countable quantity- **children.** It is plural and so the verb is also plural.

All of the gasoline **has been** sold. (Mass or uncountable quantity)

The indefinite pronoun **all** refers to an uncountable quantity- **gasoline.** It is singular and so the verb is also singular.

Look at how the indefinite pronoun none is used. It can be used to mean both singular and plural and you use the appropriate form of the verb by basing it on the context of the sentence.

None of these mangoes **are** ripe. (More than one- plural)
We needed a book but **none was** available. (Not one – singular)

With indefinite pronouns neither and either, remember to use a singular verb even though they may seem to refer to two things. Neither and either fall under the category of singular indefinite pronouns and take on a singular verb.

Neither of the bags is useful.
Either of the coats is fine.

In the sentence such as these the element of confusion lies in the choice between the pronoun and noun as the subject of the sentence. Remember that the first thing to do is to be clear about the subject of the sentence. The subjects in the sentences above are **either** and **neither**. These are singular indefinite pronouns and naturally take a singular verb.

We have covered some of the important rules of subject and verb agreement. A little practice will help you reinforce the concepts that we have covered, so shall we have an activity now?

What about making some salad? Are you game for it?

9.1 Activity 11: Tossed Word Salad

Subject: subject verb agreement.
Aim : To practice creating sentences.
Practice subject- verb agreement.

Props: Blank paper, pencil, scissors
Paper cut into small squares.

Instructions:

Facilitator to list out the various parts of speech covered so far, on the board.
As the facilitator calls out each part of speech participants (could work in pairs) put down two words belonging to that category on the squares of paper.

Vary the degree of difficulty by asking them to put down- past participle form of the verb or a correlative conjunction.

A square can contain only one word.

There is no restriction on using any tensed form with the verbs.

Once the participants or the pairs have a sufficient number of words ask them to toss the word salad mixing up all the words.

Now allot a span of time – say 15 minutes and ask them to put down as many correct sentences as they can.

The pair that comes up with the maximum number of sentences within the given time can be suitably rewarded.

Debrief:

What have I learnt?

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Words that indicate parts or portions- **per cent, part, majority, some** and **half** are singular or plural, according to the meaning of the sentence. When these words refer to a mass or section, they are singular. When they refer to a number of individuals or things they are plural.

In the examples look at the noun in the '**of phrase**' which is the object of your preposition. This helps you determine whether to use a plural or a singular verb. If the object of the preposition is plural – use a plural verb and if the object of the preposition is singular- use a singular verb.

Fifty percent of the **cake** has been eaten. (Cake is the object of the preposition **of** and you are referring to a single unit of cake)

Fifty percent of the **cakes** have been eaten. (Cake is the object **of** the preposition of and you are referring to a number of units of cake).

Half of the **boys** are in the class. (Boys- plural)
Half of the **cake** is left. (Mass or section of one unit.)

In a similar fashion, when the word **number** is preceded by the article **a**, it takes a plural verb and if it is instead preceded by the article **the**, it takes a singular verb.

In other words a number refers to a countable quantity and the number refers to an uncountable mass.

A number of men **were** working under project. (Plural- countable)
The number of men present **was** small. (Singular – refers to one group)

A plural noun which shows weight, quantity or extent is always singular and takes a singular verb.
Alternately, you could say that units of measurement are always expressed in the singular.

Ten **miles** is a long distance to walk.
Five hundred **pounds** is a big price to pay for this.
Ten **inches** is the correct length.

Words like **scissors, pants, tongs and spectacles** indicate a unit that has two parts. It is incorrect to say scissor, pant or tong. Whether you use it to mean a singular or a plural unit it always takes a plural verb. But if the word **pair** is used to donate the subject, it is then considered as singular and takes a singular verb.

The **scissors are** very sharp. (Plural)
A **pair** of scissors **was** left on my table. (Singular)

Analyse these two sentences in greater detail. In the first sentence, we do not indicate whether we are speaking of an individual or multiple units. As a rule, such words are considered plural and take on a plural verb.

In the second sentence what would be the subject of your sentence? Obviously, the word– pair. Do not mistake scissors as the subject of your sentence. A good tip to remember here is that a noun that follows a preposition is not the main subject. It only adds further information to the main subject.

Look at a few more examples:
The **pants are** long but this **pair** of black pants is short.
The new **pair** of spectacles is too expensive but the **spectacles are** an important part of my wardrobe.

Think over these sentences. Why is it possible to use these in the singular form?
My **eyes are** hurting.
My left **eye hurts**.
Yes, those regular exceptions which have become more the rule, than an exception!!
Sometimes a sentence begins with the word **here** or **there.** It is often tempting to assume that these are subjects of the sentence, since in most sentences the subject is usually placed in the first part of the sentence.

There **are ten** members on the committee.

These words like here and there are not the subjects of the sentence but as considered as adverbs of place. In such sentences, the subject normally follows the verb. To determine whether the subject is singular or plural, transpose the adverb so as to bring it in the middle of the sentence.

Ten members are there on the committee. (Plural subject – plural verb)

Here **comes** the **teacher** with her staff.

The **teacher comes** here with her staff. (Singular subject and singular verb)

You still remember your collective nouns, don’t you?

Collective nouns represent a collection of objects – **jury, board, committee, flock, pack,** and **herd** - and is considered is one unit. Therefore, the verb that goes with a collective noun is a singular verb.

Ideally, when a collective noun in a particular sentence represents the individuals acting as unit, the noun is singular.

The **team is** playing.

The **herd** of elephants **is** grazing.

If the sentence indicates that the individuals are acting separately, the noun is considered plural.

The **jury is** opposed to the plan. (Jury is projected as one unit)

The **families have** given their approval for the project. (As individual – as members of the family)

The **staff** is in a meeting. (Acting as a unit – a group of personnel)

The **staff are** in disagreement about the project. (As individual members of staff)

Correctly speaking, it would have been better to use the following

The members of the family have given their approval.

The members of the staff are in disagreement about the project.

However, the earlier usage is universally accepted.

Some nouns are plural in form but singular in meaning. Take the example of subjects like Mathematics and Physics or diseases like measles and mumps.

Physics is a very interesting subject.

Measles is an infectious disease.

The addition of **S** may indicate that it is a plural noun but as a noun it refers to a single subject or one kind of disease.

Look at these sentences and see why they are different

Politics is an interesting subject.

The **politics** of the ANZ party **are** pro-democracy.

In the first sentence the word politics refers to the subject – Politics, but in the second sentence the word politics refers to the political views or beliefs. This rule bears resemblance to that of the collective nouns. It would have been better to say:

The political **views** of the ANZ party **are** pro-democracy.

The relative pronouns **who**, **that** or **which** – can at times become the subject of a verb in the middle of the sentence. The pronouns **who**, **that** and **which** become singular or plural, according to the noun directly in-front of them. So, if that noun is singular, use a singular verb. If it is plural, use a plural verb.

Harsha is the scientist **who** writes the reports.

The word in front of **who** is **scientist**, which is singular. Therefore use the singular verb **writes**.

He is one of the men who do not work.

The word in front of **who** is **men** which is plural, therefore use the plural verb – do.

So that in short, covers the important rule of subject – verb agreement. It may seem very dense and confusing to you, not to worry, a little practice and you should be fine.

We have an interesting activity that we will do together. It is going to be a lot of fun and a big challenge too.

9.2 Activity 12: The Sentence Pageant

Subject: Subject and verb agreement

Aims: To practice and detect errors in subject and verb agreement.
Props: Slips of paper cut into small squares to represent currency
Instructions: This is an all group – activity based on the popular game- Just a Minute.
This game involves all the participants and keeps them on their toes. Inform the class that the focus of this activity is grammar (all aspects of subject and verb agreement). Tell the participants to be alert to any errors that the speaker may make.

Each group to be given ten squares of paper at the start of the game. These would be their currency.

- One participant from the group will be asked to speak without long pauses on a topic provided by the facilitator or another participant from the class. The topic should relate to daily life as this would enable easy flow of thought. All the other participants need to listen keenly for any grammatical errors that either the speaker or the challenger could make.
- As soon as a participant hears a mistake, the participant indicates this, by raising a hand and the speaker stops speaking, at this point.
- The challenger at this point of time does not reveal the error that he has noticed but keeps it in mind till he is asked so by the facilitator.
- The members of the group vote by placing money on either the speaker or the challenger. No fence sitting is allowed. The participants' choice to choose between the speaker and the challenger is based on his understanding of the grammatical structure. The faculty now, goes around the group and collects the currency slips in two different boxes- one marked "speaker" and the other "challenger".
- The challenger now identifies and states the mistake and corrects it as well.
- The facilitator then gives the verdict. The facilitator is the judge in this activity and his/ her verdict is considered final.
- If the correction is right the money collected, both for the challenger and the speaker goes to the challenger. In turn, the challenger now becomes the speaker and starts the next round with yet another new topic.
- In case the challenger corrects the speaker wrongly, he loses all the money and additionally needs to give one unit of his currency as well to the speaker. In case, the challenger makes a bogey call (a bogey call happens when the challenger stops the speaker and is unable to identify or has forgotten the error) he still needs to give a unit of currency to the speaker, but the speaker can carry on with his topic.
- Supposing the challenger proposes a wrong correction but some other participant from the group gives out the right correction, the person who gives the right correction wins the money placed and becomes the new speaker.
- Errors that the group can lookout for

    - Syntax, structure errors

- Wrong agreement of subject and verb
- Word order
- Wrong word: vocabulary out- of –context
- Long pauses of more than five seconds

STOP ! GO BACK AND REFLECT !

I learnt ……….

I would like to know more about …………………………………………………………………………….

Activities / tasks I liked / found useful……………………………………………………………………………

Something I would adapt / do differently…………………………………………………………………………

10. Determiners and Modifiers

While we were discussing nouns, you may remember that we made a mention of articles that preceded common nouns. Articles fall in the category of determiners. Determiners may not be a familiar term to most of us, since they include more than just articles.

Determiners are the words that are used along with nouns to clarify an understanding of the noun. The Oxford dictionary defines a determiner in this manner: **a modifying word that determines the kind of reference a noun or noun group has, for example a, an** and **the.** It is therefore a word belonging to a group of noun modifiers, which includes articles, demonstratives, possessive adjectives and words such as any, both, or whose and in English, it occupies the first position in a noun phrase or follows another determiner.

10.1 Kinds of determiners

Determiners are of various kinds. The ground rule states that all singular nouns must be preceded by a determiner but it is optional in the case of plural and uncountable nouns.

Determiners are used for the following purposes:

- To define something or someone
- To define the number of people or things
- To define something or someone specific
- To state possessives
- To show the difference between nouns
- To show distribution of nouns

There are about 50 determiners in the English language. You will find them referred to, as determiners, quantifiers or modifiers. They refer to the same category of words. Essentially, they modify a noun like an article, show the possessive adjectives or quantify a noun.

Demonstratives: Words that point to one or more particular things or persons. E.g: This, that, these, those, which etc (this has already been addressed in the chapter on pronouns.)

Possessives: Words such as – my, your, our, their, his, her, whose, my friend's, our friends' etc (discussed earlier in the chapter on pronouns.)

Quantifiers: Words used to state the amount or quantity. They answer the questions- How many/ how much? We have addressed the use of these words when we spoke of indefinite pronouns, however, we will go into further details when dealing with subject and verb agreement. E.g.: few, a few, many, much, each, every, some, any etc .

- There are a few apples.
- They know little English.

Cardinal Numbers: refer to the number of items in a group , E.g.: one, two, three, twenty, forty.

- Three women were waiting at the hospital gate.

Ordinals: refer to the order of items within a group, E.g. first, second, 1st , 2nd, 3rd, last, next etc.

- Tina's story won the first prize.
- The sixth chapter describes the plot.

Articles: a, an, the

- The story was short.
- A black cat ran across the road.
- Give me an ice-cream cone.

Seem a little confused? Are you wondering why we are harping on the same topic, if it has already been covered? Is it confusing to understand why the same words are categorized under two different heads? Not to worry. The intention was to remind you that certain words play a range of roles in English language. In addition, these are words which most of us find difficult to use appropriately. Though the error in slight, it impacts your overall fluency.

10.2 The Definite and the Indefinite Article

Articles are again very small words, probably inconspicuous not just in speech but also perhaps, in writing. However they contribute greatly to the overall understanding and intonation of speech.

Articles are three in number- **a, an & the,** however, we have a large number of rules governing their usage. They are very simply classified into two groups:

Definite article: the

Indefinite article: a, an: these are used before any noun that is singular, countable and indefinite.

Example:

A woman earns more than **a** man, who does the same job.

An apple fell on my head.

Both these articles are used before a singular countable noun. The choice of a/an is made based on the sound of the word that follows it. If a word starts with a consonant sound then it must be preceded by **a,** and if it starts with a vowel sound then it must be preceded by **an**. Note the insistence on the sound rather than the mere choice of vowels and consonants. You will soon see the difference. In the examples above, the word woman starts with **W** and the word apple starts with **A**.

You also use **an** when the first letter of the word that follows it starts with **H** and is **followed** by a vowel.

An hour

An heir

An honest man

'A' or '**an**' should never be used before an uncountable noun:

I asked my friend for an advice. ×

She was awarded the medal for a bravery. ×

I want an accommodation. ×

Similarly, do not use **a/an** before a plural noun:

A paperback books are available at the mall. ×

Paperback books are available at the mall.

Omitting an article where required is equally serious an offence:

Antony Gomez was brilliant scientist.

Antony Gomez was a brilliant scientist.

She studies variety of subjects.

She studies a variety of subjects.

Some of the exceptions to the use of a/ an, are words that start with a vowel but do not have a vowel sound: Instead – they have a consonant sound. Such words take on **a** and not **an** before it.

Take the example of the word once. It starts with O. Say the word aloud – **won-s.** What does it sound like? The sound that it starts with is a consonant sound – **w** and not a vowel sound. Therefore it takes the article **a** before it.

Example:

That is a once in-a lifetime opportunity.

A European friend of mine is in town.

Fortunately, words of this kind are limited in number. Here are some of them:

Words starting with ‘E’ but sound like the consonant Y: European, Europe

Words starting with ‘U’ but sound like Y: universal, unicorn, university, unit, usual. Notice how they differ in pronunciation from umbrella and uncle which also start with U.

A university student met me at the gate.

The mobile phone is a useful device.

I have an umbrella in the bag.

10.3 Definite Article: The

The article ‘**the’** is used before nouns, that refer to one or more specific things or persons.

She gained **the** sheet on her own, in **the** elections.

The men from **the** factories came out in large groups.

We may also use ‘**the’** before superlative form of the adjective.

This is **the biggest** balloon I have seen.

I chanced upon **the most** beautiful sight.

When an adjective functions as a noun, use ‘**the’** before it.

The rich and **the poor** do not share much in common.

The sick and **the suffering** all need your help.

The is used with specific nouns that about things which are one of its kind.

The earth is round.

The sun rises in **the** east.

Certain nouns that refer to places of primary purpose don’t use an article at all. For instance, words such as school, college, church, prison and court.

I go to college.

She goes to church every Sunday.

Most children go to school at an early age.

Proper nouns which are names of people or brand names of products do not take on articles.

The Maria came late to the office.

Maria came late to office.

Are those Nike shoes?

Talking of geographical locations, the use of the definite article can get a little confusing. When we talk of political and economic unions, rivers, mountain ranges and geographical regions we use '**the'** before these names. We also use it before the names of monuments and oceans.

The European Union.

The Arctic.

The Mississippi.

The Himalayas.

The Caspian Sea.

The Pacific Ocean

The Eiffel tower.

The Sphinx

When we talk of names of countries, names of towns or cities, lakes or bays we don't use the definite article.

I live in **Cairo**.

Lakshadweep is a beautiful place to visit.

However there are certain exception to this rule. When we talk of countries that are a united group under a single entity the article precedes it.

The United States of America

The United Arab Emirates

These nouns omit the use of the article before it.

- Names of languages under nationalities like Spanish, Chinese.
- Names of sports like football and volleyball.

- Names of academic subjects like History and Computer science

Abstract noun may or may not take an article.

It was **a grief** that she had never experienced before.

Her body was racked with **grief**.

So you see how these little words have an important role to play. In spite of learning all the rules related to the use of articles, you will still find situations where you are wondering about the choice of articles. Only practice and keen ear will help you master the language.

Activity 13: Proof Reading

Subject: Determiners and Articles

Aim: To practice appropriate use of determiners and articles

Props: Multiple copies of the speeches

Instructions: Facilitator to distribute multiple copies of the speech

Participants to work alone and fill in the required articles.

Here is a copy of the letter that Ashima wrote to her daughter, however when she was typing it out on her PC, a certain virus on her computer deleted all the articles from her letter. Ashima is frustrated as she does not speak or write English fluently and had got her friend Alisha to translate this letter into English. Please help Ashima put in the articles at the appropriate places so that she can mail out the letter to her daughter.

My dear little one,

I have not written letter to you for quite while. Six months have passed since that fateful day when your father left us – six months of sorrow, pain and tears. World goes on, oblivious of the trials and tribulations in our life. I do not know where to begin. Would your tender mind even understand repercussions of void created by your father's departure from our lives?

That day was great day for us; your father had landed himself new job. Pay pocket that he would bring home would change our lifestyle. I remember your eyes lighting up with excitement, incessant prattle between your brother and you: many plans that both of you were drawing up – travel, holidays, gizmos, works. Sitting out on terrace with his arms around two of you, your father had promised that he would see that all your plans see light of the day.

But fate dictated otherwise. Your dreams turned to dust in the flash of second when that unknown intruder shot at your father at point – blank range from house across. You screamed, your brother cowered in fright behind me while I looked on unwilling to believe what my eyes saw.

The police have yet to find killer or worthwhile motive. Wheels of bureaucracy turn slowly and life time may go by with questions unanswered. I have done all that I possibly can, running from one office to another to nail killer, but my attempts have been in vain.

I have a lot of explaining to do, amends to make and answers to give. You may not understand and I will not explain. Staying with your aunt was perhaps only rightful thing I did at that point of time. I do not know what both of you will make of it.

When the time is right and pain has eased little I will sit both of you down and explain in my clumsy manner why I made choice to send you away to my sister. Till then, bear with me, my little one. Stoical as you are, you have accepted everything with equanimity. May God continue to give you strength to bear the crosses that he has in store for you.

Mom

My dear little one,

I have not written a letter to you for quite a while. Six months have passed since that fateful day when your father left us –six months of sorrow, pain and tears. The world goes on, oblivious of the trials and tribulations in our life. I do not know where to begin. Would your tender mind even understand the repercussions of the void created by your father’s departure from our lives?

That day was a great day for us; your father had landed himself a new job. The pay packet that he would bring home would change our lifestyle. I remember your eyes lighting up with excitement, the incessant prattle between your brother and you: the many plans that both of you were drawing up – travel, holidays, gizmos, the works. Sitting out on the terrace with his arms around the two of you, your father had promised that he would see that all your plans see the light of day.

But fate dictated otherwise. Your dreams turned to dust in the flash of a second when that unknown intruder shot at your father at point – blank range from the house across. You screamed, your brother cowered in fright behind me while I looked on unwilling to believe what my eyes saw.

The police are yet to find the killer or a worthwhile motive. The wheels of bureaucracy turn slowly and a life-time may go by with questions unanswered. I have done all that I possibly can, running from one office to the other to nail the killer, but my attempts have been in vain.

I have a lot of explaining to do, amends to make and answers to give. You may not understand and I will not explain. Staying with your aunt was perhaps the only rightful thing I did at that point of time. I do not know what both of you will make of it.

When the time is right and pain has eased a little I will sit both of you down and explain in my clumsy manner why I made the choice to send you away to my sister. Till then, bear with me, my little one. Stoical as you are, you have accepted everything with equanimity. May God continue to give you the strength to bear the crosses that he has in store for you.

Mom

Debrief:

What have I learnt? : ---

STOP ! GO BACK AND REFLECT !

I learnt ……

I would like to know more about ……………………………………………………………………………….

Activities / tasks I liked / found useful……………………………………………………………………….

Something I would adapt / do differently…………………………………………………………………………

Let us do a quick recapitulation of verb forms. Would you agree that a verb is the most important word in any sentence? Verbs have a number of properties which other parts of speech do not have; besides, most grammatical constructions depends upon the verb than any other part of speech.

The exclusive property that verbs enjoy is tense. In the context of grammar what do you understand by the word tense? Tense means time. Verbs have six tenses which show differences in the time of action or the time of the state of being or conditioned.

Let me illustrate this for you with a couple of examples.

I see a bird on the fence. (Present time)

I saw a bird on the fence. (Past time)

I shall see a number of birds when I go out into the countryside. (Future tense)

Do these sentences mean the same thing? No they don't. The commonality is the verb used in these sentences which is –**"see**". The meaning of the sentence has changed in each of these sentences based on the verb forms used to show the time of the action.

The first sentence means that the action expressed by the verb- **see** is going on now.

The second sentence means that the action expressed by the verb form **saw** happened at some time in the past. The third sentence means that the action expressed by the verb form **shall see** will occur at some time in the future.

Let us through a table understand the forms of tenses that we will deal with.

PRESENT	**PAST**	**FUTURE**
Simple present tense	Simple past tense	Simple future tense
Present progressive tense	Past progressive tense	Future progressive tense
Present perfect tense	Past perfect tense	Future perfect tense
Present perfect continuous tense	Past perfect continuous tense	Future perfect continuous tense

If I were to create tables of the same forms using a verb instead, along with a subject let us see how it works.

My choice of subject is **he / she** and the verb – **walk**.

PRESENT	**PAST**	**FUTURE**
He/ she walks	He/ she walked	He/ she will walk
He/ she is walking	He/ she was walking	He/ she will be walking
He/she has walked	He/she had walked	He/she will have walked
He/she has been walking	He/she had been walking	He/she will have been walking

Observe the changes in the verb forms- walks, walking, walked.

Do you notice how easy it is to form the future tense of a verb? It is simply a matter of adding the verbs "**will or would**" to the present form of the verb (will walk). This has in fact given rise to a lot of debate, questioning the very existence of the future tense form.

Observe the addition of the auxiliary verb forms of- **be** like **is, was, been**, that has been used.

Before we proceed any further, let us get familiar with the forms of verb- **to be**. It is the most irregular and most commonly used as well. Besides being an independent verb, it also functions as an auxiliary verb. It is used to form the progressive forms as also the passive voice.

11.1 Reference Table

Present Tense

Singular	**Plural**
I am	We are
You are	You are
He, she, it is	They are

Past Tense

Singular	**Plural**
I was	We were
You were	You were
He, she , it was	They were

Future Tense

Singular	**Plural**
I shall be	We shall be
You will be	You will be
He, she, it will be	They will be

Present Perfect Tense

Singular	**Plural**
I have been	We have been
You have been	You have been
He, she, it has been	They have been

Past Perfect Tense

Singular	**Plural**
I had been	We had been
You had been	You had been
He, she, it had been	They had been

Future Perfect Tense

Singular	**Plural**
I shall have been	We shall have been
You will have been	You will have been
He, she, it will have been	They will have been

Let us try and work out one, individually.

The choice of the subject is- '**They**' and the verb form is **'ing'**

PRESENT	PAST	FUTURE

11.2 Present Tense

Simple Present Tense

So you see, the simple present tense denotes the present time. Let us the various uses of the present tense.

It is used to refer to actions which are part of a routine or those that happen at regular intervals.

Helen **works** in an airline office. (Habitual Action)
Geese **fly** south every autumn. (Part of a routine)

The present tense is used to express general truths like proverbs and accepted facts.

The sun **rises** in the East. (Accepted truth)
A stitch in time **saves** nine. (Proverb)
Honesty **is** the best policy.

Headlines in newspapers are always stated in the present tense. Note that the news being reported has already happened the day before!!

Government **explores** increases in IT exemptions limit.
Cement companies **see** dip in profit margins.

Occasionally, the simple present form may be used **to express future time**. The ground rule to be remembered in this context is that this incidents that you are reporting in future should be something which is in the immediate future and which you are sure will happen.

> I leave for Mumbai tomorrow night.
> Our lease on the factory **expires** tomorrow.

The simple present is also used **to give instructions**. Read any instruction booklet or a recipe and you will see it for yourself.

11.3 Activity 14: Instruction Manual

Subject: Simple Present Tense

Aim: To practice the use of simple present tense.

Props: Paper and pen

Instructions: Students to work individually.

Facilitator to revise the use of simple present tense.

In this context, the participants are asked to prepare an instruction leaflet with about 8 to 10 instructions.

Handouts may be created on any of the following:

Starting of the laptop

Recipe for a successful career

Preparing for an interview

Debrief:

What have I learnt? : ---
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--
--

Present Continuous Tense

The continuous or progressive form of a tense indicates that the action is continuing at the time stated by the particular tense.

The progressive form of the verb is made by using some form of the verb- **to be** with the- **ing** form of the principal verb. This form is called the present participle.

For example,**" I am studying."**

In this sentence the progressive form of the verb is – am studying. It is made up of the verb from of be which is – am to match with the pronoun- I and the present participle of the principal verb, which is **studying.**

The present continuous tense is used to express an action that is continuing to happen at the moment of speaking or writing.

I **am cooking** breakfast.

I **am working** on my assignment.

At times, this form of the tense like the simple present is used to express a future event.

I **am going** to America next week.

We **are leaving** for Greece next week.

11.4 Activity 15: Commentary

Subject: Present continuous tense
Aim : To practice the use of present continuous tense.
Props : none
Instructions:

Participants to work in group of four.
Each group should have one person give a commentary to the group. The person should speak as if he or she is currently observing the activity.

Topics that they can give a commentary on:

A police man at the traffic signal reporting on traffic movement
A football match
A beauty pageant
An accident on the over bridge

Debrief:

What have I learnt? : -- --- -- --- ------------------------

Present Perfect Tense

In English grammar, the word perfect implies that an action has been perfected or completed at the time of the action.

Look at these sentences:

I **have done** the assignment.
She **has answered** half of the tricky questions.

In the first example, the use of the perfect tense (have done) states that at the time of speaking the assignment has already been completed. While in the second example, (has answered) it indicates that at the time of speaking half the tricky question have been answered.

The present perfect is used to talk about experiences:

Arpita has never broken a bone.
Have you ever eaten pasta?

To talk about an action in the past that has a result in the present.

I have lost my identity card.
Have you finished your assignment?

Present Perfect Continuous Tense

This form of the tense is used to express continuous action which have already been completed.

Look at this sentence:

The cab **has been waiting** for two hours .

This indicates that the time of writing or speaking the sentence, the cab has completed two hour of waiting.

The present continuous tense uses two auxiliaries- **have** or **has** and **been.**

11.5 Past Tense

Simple past tense

The formation of the verb in the simple past requires you to familiarize yourself with the irregular verb forms. Please go through the verb form chart given in the chapter on verbs.

The simple past states actions that have occurred at regular intervals in the past.

Last year, **I drove** to electronic city everyday.

It can also be used to describe situations which existed for a span of time in the past.

Millions of years ago, the mammoth **inhabited** the earth.

It can also be used to talk about certain actions which happened at a definite time in the past.

I **graduated** from school in 1998.

It can be used to list a series of actions completed in the past.

I finished reading, walked to the market and bought some books.

11.6 Activity 16:The Chain List

Subject: Simple past
Aim : To practice the use of simple past tense
Props:
Instructions: Facilitator to tell the participants that this activity involves both grammar and memory power as well.

The focus is on using the appropriate form of the verb in the simple past.

Facilitator to start the activity with a sentence such as

“I woke up in the night”.

Following this she points to another participant.

This participant has to repeat the sentence and follow up with one of his/ her own.
For example:

“I woke up in the night and drank a glass of water.”

He / she now points to another participant, who continues with the repetition and adds one of his/ her own.

Continue till all participants have had a chance. Chances can be repeated again and names called out at random to prevent anticipation of terms and prior preparation.

Debrief:

What have I learnt? : ---

Past Continuous Tense

This form of the tense indicates a continuous action in the past.

They **were playing** billiards last afternoon.

He **was holidaying** in Mauritius last summer.

It can also be used to indicate an ongoing action which was happening when something else occurred in the past.

For example:

I **was cleaning** the room when the door bell rang.

In this sentence the use of the past continuous indicates that the action of cleaning the room was happening when the door bell rang.

Past perfect tense

This is used to indicate an action in the past which was already completed by the time or before another action took place in the past.

She **had seen** the car before **I saw** her.

I **had finished** my homework before **I prepared** dinner.

In both these examples the verbs- **had seen** and **had finished** are in the past perfect tense while the verbs **saw** and **prepared** are in simple past. The use of the perfect tense here, indicates that the action of seeing the car and finishing the home work were already completed by the time the actions expressed by the verbs in the simple past happened.

It is also used to talk about a past conditional.

If she had **studied harder**, she **would have** passed the exam.

I hope this is clear to you.

11.7 Activity 17: Transcription

Subject: simple past and past progressive

Aim: to practice using tense forms

Instructions: show the class a short movie clip of about five minutes.

While they are watching the movie clip, the participants must be told to make notes.

Divide the class into groups of four and ask them to compare notes.

Working as a group they write the summary using the simple past and the past progressive.

The clip is played once more if it helps to fill in the missing gaps.

The participants then read out their summaries to the class while the facilitator checks for errors.

Debrief:

What have I learnt? : --

Past Perfect Continuous

This form of tense refers to a continuous action in the past, already completed by the time another action also in the past took place.

I **had been waiting** for two weeks before I received the offer letter.

He **had been thinking** about his manager shortly before he called.

As in the previous example the verbs **had been waiting** and **had been thinking** refer to a continuous action and are in the past perfect continuous tense. It indicates that the actions were completed by the time the action denoted by the verbs **received** and **called** in the simple past were completed.

11.8 Future Tense

Simple Future Tense

This is used to express actions which may take place in the future.

They **will finish** the test tomorrow.

He **will arrive** in Delhi on Saturday.

Like we discussed earlier, the simple future is formed from the auxiliary verb- **will and shall** – **followed** by the simple present form of the verb.

Future continuous tense

This is used to express ongoing actions which may take place in the future.

She **will be waiting** for them.

They **will be coming** tomorrow.

11.9 Activity 18: This Week for You

Subject: Future tense

Aim : To practice the use of future tense

Props: Sheets of paper.

Instructions: Facilitator to explain to the participants that they will write the week's prediction on a slip of paper and deposit it in a basket in front of the class. Remind them to use the forms of future tense. (explain how most magazines or newspapers have a horoscope column.)

The prediction should be pleasant and have an element of fun. Keep away from morbid predictions.

The prediction could be about 6 to 8 sentences.

Once everyone has submitted their slips of paper, juggle it.

Everyone picks up a slip and that is your forecast for the week.

The facilitator can discuss any errors that have come up in the writing.

Debrief:

What have I learnt? : ---

Future perfect tense

This is not an oft used form of tense. It refers to an action which will be completed by a certain time in the future. It shows an action that has started sometime in the past or is starting in the future and will also get completed at some point of time in the future.

She **will have started** the project by Thursday.

I **will have cleaned** up the house before the family arrives.

The use of these verbs indicates that the action of starting the project and cleaning the house will have been completed before Thursday and before the family arrives.

Future perfect continuous tense

This form is used to express a continuous action which will be completed by a particular time in the future.

By next March, you **will have been training** for a year.

He **will have been working** for two years by the time he finishes his studies.

The action of training and working would have been completed before the coming of March and before two years is completed.

11.10 Activity 19: Verb Grand Prix

Subject: Verb tense

Aim: To practice all forms of tense

Props:

Instructions: Ample space for movement.

Divide the group into four teams.

Allocate each group- a section of the blackboard and give each team a marker.

The facilitator calls out three words at a time relating to time, gender and activity.

For example- She, basketball, yesterday. The facilitator shouts- go- immediately following this.

One student from each group runs to the board and in the space allocated writes a sentence using the three words given.

For example-

- She played basketball yesterday.
- She watched a game of basketball yesterday.

Participants cannot write out a sentence on paper and then copy it onto the board.

They can ask for assistance from the team if needed.

Allot points to the teams based on which team finishes first.

Debrief:

What have I learnt? : ---

STOP ! GO BACK AND REFLECT !

I learnt ……

I would like to know more about …………………………………………………………………………….

Activities / tasks I liked / found useful……………………………………………………………………………

Something I would adapt / do differently…………………………………………………………………………

Evaluation papers

Paper 1

Basics of grammar

Choose the correct option from the choices listed below each question. You have 15 minutes to complete the 30 questions.

1. The crowd ___________ restless as the day got hotter.
    a) was getting
    b) were getting
    c) is getting
2. People ________ running away in all directions.
    a) was
    b) is
    c) were
3. Her _________ must have cost her a lot of money.
    a) jewellery
    b) jewelleries
    c) jewelers
4. I have always wanted to own ________silver coloured car.
    a) a
    b) an
    c) the
5. Close _________ and then the other.
    a) a
    b) an
    c) one
6. _________telephone has had an enormous impact on the way we communicate.
    a) A
    b) An
    c) The
7. The ________faulty.
    a) equipments are
    b) equipment was
    c) equipment were
8. "We need new curtains." Okay let's buy______
    a) ones
    b) one
    c) some
9. I asked James to clean the car and he did_______

    a) a well job
    b) the job good
    c) a good job

10. I still feel very tired ______ in the morning.
    a) when i wake up
    b) as i wake up
    c) while i will wake up
11. My mother was the first person I saw______ the hospital
    a) by leaving
    b) on leaving
    c) in leaving
12. It is Vijay's birth day some time ______ the middle of June.
    a) in
    b) on
    c) at
13. Your writing is bad but mine is _______
    a) badder
    b) worse
    c) worst
14. The waitress ______ an extra cup of tea.
    a) give
    b) gave
    c) giving
15. The enemy _______ of the public buildings.
    a) has bombed
    b) had bombed
    c) will have bombed
16. They _____ the train if they don't hurry.
    a) are missing.
    b) will miss
    c) will have missed
17. Each year we______ to Istanbul for a holiday.
    a) are going
    b) go
    c) went
18. If you look carefully, you ________ find writing scratched on the window pane.
    a) can
    b) shall
    c) are going to
19. She speaks French ________.

  - a) fluent
  - b) fluently
  - c) more fluently

20. What have we got ________?
    - a) for the dinner
    - b) for a dinner
    - c) for dinner
21. I try to visit my relatives in my home town_______other month.
    - a) every
    - b) each
    - c) some
22. The _______ notice the boy lying on the pavement.
    - a) passer by
    - b) passers by
    - c) passer bys
23. A number of refugees ________turned back at the border.
    - a) has been
    - b) have been
    - c) will have been
24. As I walked, the dog _______ towards me.
    - a) came charging
    - b) is charging
    - c) had charged
25. He based his calculation _____ survey statistics.
    - a) on
    - b) in
    - c) by
26. __________ of the countries voted against the sanction?
    - a) Who
    - b) Which
    - c) What
27. I can't get the laptop to work. ________ have you done to it?
    - a) what
    - b) which
    - c) where
28. The storm _______ have a damaging effect on the crops.
    - a) did
    - b) make
    - c) do
29. An important file _______ from the office.

a) disappear
b) went
c) had disappeared

30. The men worked __________ they were underpaid.

a) although
b) as if
c) because

Answers

1	a	16	b
2	c	17	b
3	a	18	a
4	a	19	b
5	c	20	c
6	c	21	a
7	b	22	b
8	c	23	b
9	c	24	a
10	a	25	a
11	b	26	b
12	a	27	a
13	b	28	a
14	b	29	c
15	a	30	a

Paper 2

Listed below are 25 sentences that need to be corrected.

1. All the dogs in the settlement were /was barking when the burglar entered the house.
2. The Recession, not to mention the falling dollar influence/influences the voting turnout during elections.
3. The monotonous sounds of the constant pounding of the waves is/ are calming.
4. The team along with the band is/are on the field.
5. Jenna or Doris writes/write to inform us about the change in interest rates.
6. Neither Irene nor Vijay was/were excluded from the meeting.
7. Neither the fruits nor the wrapping was/were inexpensive.
8. Either the nurses or the doctors was to be held responsible for the death of the patient.
9. Either Tejas or Suren is/are to attend the budget meeting in building number 36.
10. Either you or Manya is/are late for the session.
11. Neither Manya nor you is/are early for the trip.

12. The hardest hit in the tsunami was/were the farmers.
13. Each of them take/takes a good portion of the produce.
14. Five Million liters of petrol is/are a lot of oil to be illegally suctioned out of the tanks.
15. Each dog and each cat is given its own toy to play with the new kennel on Church Street.
16. Every piece of furniture has/have to be counted.
17. The jury vote/votes at 11 o' clock and the verdict will be out at five in the evening.
18. The joint planning commission is/are meeting today for a final sitting before sharing the report with the ministry.
19. The number of new recruits is/are very less.
20. A number of students has/have taken the CET this year.
21. Statistics is/are an interesting subject if you are inclined to Math.
22. The census statistics is/are often misleading.
23. The majority of us is/are in favour of the trip to Andaman.
24. Bread and butter is/are my staple for breakfast.
25. My mentor and guide is/are Mr. Thomson who was my English teacher at school.

Answers

a) All the dogs in the settlement were barking when the burglar entered the house.
b) The Recession, not to mention the falling dollar influences the voting turnout during elections.
c) The monotonous sound of the constant pounding of the waves is calming.
d) The team along with the band is on the field.
e) Jenna or Doris writes/write to inform us about the change in interest rates.
f) Neither Irene nor Vijay was excluded from the meeting.
g) Neither the fruits nor the wrapping was inexpensive.
h) Either the nurses or the doctor was to be held responsible for the death of the patient.
i) Either Tejas or Suren is to attend the budget meeting in building number 36.
j) Either you or Manya is late for the session.
k) Neither Manya nor you is early for the trip.
l) The hardest hit in the tsunami were the farmers.
m) Each of them takes a good portion of the produce.

n) Five Million liters of petrol is a lot of oil to be illegally suctioned out of the tanks.

o) Each dog and each cat is given its own toy to play within the new kennel on Church Street.

p) Every piece of furniture has to be counted.

q) The jury votes at 11 o' clock and the verdict will be out at five in the evening.

r) The joint planning commission is meeting today for a final sitting before sharing the report with the ministry.

s) The number of new recruits is very less.

t) A number of students have taken the CET this year.

u) Statistics is an interesting subject if you are inclined to Math.

v) The census statistics is/are often misleading.

w) The majority of us is in favour of the trip to Andaman.

x) Bread and butter is my staple for breakfast.

y) My mentor and guide is Mr. Thomson who was my English teacher at school.

Paper 3

Put a/an, the or zero article where necessary.

1. Are you going to party with ____ Johnsons?
2. She usually stays in ____ bed till late in the weekend.
3. There's ____ Dr. Suresh Raghavan on the phone.
4. The car has been stolen from outside ___ house.
5. Jenna bought ___ fridge and a washing machine for her mother.
6. They offered to sell her mother _____ smaller one.
7. I must buy ____ paper cutter.
8. What is in ____ sauce? It really tastes lovely.
9. There's _____ bus coming but does _____ go to MG Road.
10. What ____ great idea!

Choose the correct option from the adjectives listed.

1. Alia's dress today is __________ (pretty, prettier, prettiest) than the one she wore last Sunday.
2. This has, by far, been the __________ (bad, worse, worst) birthday ever.
3. This lecture has been __________ (useful, more useful, most useful) then Mrs. Whiteney's.
4. You are a ________ (bold, bolder, boldest) little girl.

5. I can tell you which university offers the ____________ (good, better, best) courses.
6. The second half of the match was _____________ (little, less, least) interesting.
7. What is the ____________ (far, farther, farthest) you have ever walked?
8. She has _____________ money left in her bank. (little, less, least)
9. This show is not as ___________ (funny, funnier, funniest) as the previous one.
10. The priest was the ______________ (tall, taller, tallest) person in that room.

Fill in the blanks with suitable Personal Pronouns

1. The manager said to his team, "When ______________ (you, they) complete the tasks, please mail _______________ (it, us) to me".
2. Mohammad works in the Chocolate factory. ____________ (him/ he) says________________ (they/ it) is an interesting place.
3. I met Rasha at the mall yesterday. ________________ (she/ they) invited me to ____________ (her/ they) grandmother's house.
4. I am sure _______ (they/ them) bought the laptops from _________ (we/ us).
5. President Obama welcomed _______ (they/them) to _______(his/him) office for the cultural event.
6. I hope ________(him/he) knows that _______(me/I) was present for his class.
7. The police told________(we/us) that due to the cyclone________(we/us) need to vacate the house.
8. Please inform ________(she/her) that _________(I/me) have finally obtained a degree in Anthropology.
9. I am sure _____(it/they) cannot be used since _____(it/I) is broken.
10. The dog chased him and _____(him/he) ran as fast as ________(him/he) could.

Answers

Put a/an, the or zero article where necessary.

1. Are you going to party with ____ Johnsons? **the**
2. She usually stays in ____ bed till late in the weekend. **zero**
3. There's ____ Dr. Suresh Raghavan on the phone. **a**
4. The car has been stolen from outside ___ house. **the**
5. Jenna bought ___ fridge and a washing machine for her mother. **a**
6. They offered to sell her mother _____ smaller one. **a**
7. I must buy ____ paper cutter. **a**
8. What is in ____ sauce? It really tastes lovely. **the**
9. There's _____ bus coming but does _____ go to MG Road. **a, the**
10. What ____ great idea! **a**

Choose the correct option from the adjectives listed.

1. Alia's dress today is **prettier** (pretty, prettier, prettiest) than the one she wore last Sunday.
2. This has, by far, been the **worst** (bad, worse, worst) birthday ever.
3. This lecture has been **more useful** (useful, more useful, most useful) then Mrs. Whiteney's.
4. You are a **bold** (bold, bolder, boldest) little girl.
5. I can tell you which university offers the **best** (good, better, best) courses.
6. The second half of the match was **less** (little, less, least) interesting.
7. What is the **farthest** (far, farther, farthest) you have ever walked?
8. She has **little** money left in her bank. (little, less, least)
9. This show is not as **funny** (funny, funnier, funniest) as the previous one.
10. The priest was the **tallest** (tall, taller, tallest) person in that room.

Fill in the blanks with suitable Personal Pronouns

1. The manager said to his team, "When you (you, they) completes the tasks, please mail it (it, us) to me".
2. Mohammad works in the Chocolate factory. He (him/ he) says it (they/ it) is an interesting place.
3. I met Rasha at the mall yesterday. She (she/ they) invited me to her (her/ they) grandmother's house.
4. I am sure they (they/ them) bought the laptops from us (we/ us).
5. President Obama welcomed them (they/them) to his (his/him) office for the cultural event.
6. I hope he (him/he) knows that I (me/I) was present for his class.
7. The police told us (we/us) that due to the cyclone we (we/us) need to vacat the house.
8. Please inform her (she/her) that I (I/me) have finally obtained a degree in Anthropology.
9. I am sure it (it/they) cannot be used since it (it/I) is broken.
10. The dog chased him and he (him/he) ran as fast as he (him/he) could.

Paper 4

Choose the right option from within the brackets.

1. We set ___________ the Cairo office a year ago. (up, in, on)
2. We are not interested ___________ your family problems. (on, in, of)
3. I am quite contented listening ______ what you have to say to me. (to, for, through)
4. I need a room to myself ________ that I can do my work quietly. (so, as, although, because)
5. _______ you left the atmosphere at Aunt Sheila's home has not been nice .(although, since, because)

6. _______ we would like to open a new branch in Mumbai, we would probably wait for another year. (since, although, when)
7. She is just ______ (a silly old woman, an old silly woman).
8. He bought a ______ (new powerful bike, a powerful new bike).
9. The weather in Africa ________ than the weather in Europe. (more humid, humider, most humid).
10. I am not keen on the burgers they serve in _____ school canteen.(a, an, the)
11. Since the monsoon is going to start I need to buy ______umbrella. (an, a, the).
12. Most wedding rings are made of ________gold.(a ,an , the ,none).
13. The flower _______ into bloom.(bursted, burst)
14. Do you know someone ____________could help me fix my laptop.(who, whom, which)
15. Can you return the pen ________ you borrowed yesterday?(who, whose, whom, that)
16. The lady to ____ you sent the parcel has moved to a new address. (who, whom, whose, that).
17. She has ______ around here for a long time. (be, been, are, is)
18. Three_____ and a dozen _____ walked past my window. (mouses, mice, sheep, sheeps.)
19. The dentist cleaned my _____ with some floss.(tooth, teeth)
20. How ____ loaves of bread do we need for the party?(many, much)
21. I didn’t see _______ (anyone, no one)
22. It was ______ hot to drink at once. (too, much, so)
23. Everything ____ she did that night was just right. (what, that)
24. It is considered ______ the best hotel in town. (as, to be)
25. Take _____ books and pencils with you when you go. (this, these)

Answers

.

1. Up
2. In
3. To
4. So
5. Since
6. Although
7. A silly old woman
8. A powerful new
9. More humid
10. The
11. An
12. None
13. Burst
14. Who

15. That
16. Whom
17. Been
18. Mice, sheep
19. Teeth
20. Anyone
21. Many
22. Too
23. That
24. To be
25. These

12. Punctuation

Punctuation is used to ensure clarity, to make sense of what is being said and to structure and organise the meaning of language.

Forms of Punctuation

Full- stop, comma, semicolon, colon, question mark, capitals, quotation mark, dash, parentheses, exclamation mark

Lets see how some of the most important ones are used:

The Full Stop

The full–stop is one of the simplest punctuation marks to use. It is used:

1. To indicate the end of a logical thought in a sentence
    a. E.g.The rays of the morning sun are good for health.
2. To mark the end of a statement.
    a. E.g. We just returned from the concert.
3. To indicate an abbreviation.
    a. E.g. Inc. Ltd. Misc. No.
4. At the end of formal titles
    a. E.g. Mr. Mrs. Ms. Dr.

However:

1. Do not use a full- stop:
    a) After a heading or a title
        30 Leadership Secrets
        Managing Change
    b) For organizational names that are abbreviated.
        FBI, FDA, IBM,
    c) At the end of brief bullet points

The Comma

A comma is used to indicate a pause or separate blocks of thought and to :

1. Separate a series of words, phrases or clauses in a list.

    e.g. Her breakfast usually includes bread, butter and jam.

    To celebrate her promotion, we went out for dinner, watched a movie and then went dancing.

2. Set off an appositive- i.e. a word or group of words that are not really essential to the meaning of the subject that they modify

   e.g. The manager, who was 35 years old, was asked to give evidence for the case.
3. After an introductory phrase in a sentence,

   e.g. while I was at work, the workmen came to the house and cleaned it.
4. With introductory words or phrases,

   e.g. On the contrary , In addition, For instance, As a matter of fact etc.
5. For explanatory expressions : e.g. degrees or titles that follow a person's name, state following a city, the year from the month

   e.g. Alan Hertz, M.D.;Denver, Colorado, October, 1988

The Semi – Colon

A semi colon is used between two independent clauses that are related or closely connected. It is usually used in a place where one could use a full – stop, but chooses to use a semi – colon to show a close relationship between the two independent clauses. It is used

1. When the conjunction is omitted

   e.g. The stationery has been ordered; it will arrive on Saturday.

2. When conjunctive adverbs are used to join two sentences

   e.g The match will be played in the morning; however, the rules will remain the same.

3. To separate items that have commas in them and are in a series

   e.g. Our new offices will come up in Arcadia, Los Angeles; Jacksonville, Florida; and Denver, Colorado.

The Colon

A colon is used for material that follows as a list:

2. Before a formal list in a sentence

e.g. Your performance will be judged by: attendance, punctuality, grades.

2. Before a quotation

e.g. As Martin Luther King said: At the centre of non-violence stands the principle of love.

3. After a salutation in a business letter (in the US format)

e.g. Dear Mr. Patton:

4. Between a title and sub-title

e.g. GE Capital: The Growth Engine

5. Between the hour and minutes of a time reference

e.g. 10:45 AM

The Question Mark

A question mark is used at the end of an interrogative sentence.

1. At the end of an direct question:

   e.g. Where is the office located ?

2. At the end of a statement that has a question tag:

   e.g. This is not the way it is to be done, is it?

Capitals

Capitals are used:

1. At the beginning of a sentence

   e.g.The sun is now behind the clouds.

2. With proper nouns

   e.g.Matilda is a very bright student.

3. For words that denote a title

e.g The office held a farewell for Mr. Brown.
This year the prizes will be given out by the Principal.

4. With adjectives that are formed from proper nouns

   e.g. Her favorite gift was the Japanese fan.

5. With the names of organizations and institutions

   e.g. He started the Heather View Medical Association in 1986.

6. With days of the week, months of the years and names of holidays

   e.g Every Thursday in July, will be commemorated as Women's Day.

Quotation Marks

Quotation marks are used

1. To enclose a quotation or the exact words of a speaker

   e.g. He said, "I will see you tomorrow."

2. As a symbol for inches

   e.g. 5'6" (5 feet 6 inches)

Apostrophe

The apostrophe is used

1. To show possession

   e.g. Mathew's bicycle ; the vendor's cart ; my mother-in-law's opinion

2. As a single quotation mark to indicate a symbol for feet

   e.g. 6'2" (Six feet, two inches)

ACTIVITY

Steps: Give the class the following instruction. Re-write the passage with the punctuation you think is appropriate.

Concept check: To make sure that the participants have understood the usage of the various punctuation marks ask questions to check understanding along with an example.

Re-write the passage below making sure to insert the correct punctuation

The first generation to come of age in an era of widespread divorce has now grown up because they lived it these men and women know that even a good divorce carries away a heavy burden that shapes their moral identities for years they also know what they want a home a strong marriage and a sense that society understands what it's like to grow up as they did above all they want a secure world for their own children one world not the two they grew up flying between like footballs kicked high in the summer sky

KEY

The first generation to come of an age in an era of widespread divorce has now grown up. Because they lived it, these men and women know that even a good divorce carries away a heavy burden that shapes their moral identities for years. They also know what they want: a home, a strong marriage, and a sense that society understands what it's like to grow up as they did. Above all, they want a secure world for their own children. One world, not the two they grew up flying between like footballs kicked high in the summer sky.

ACTIVITY

Steps: Get the participants to read the sentences given below and re-write them using correct capitalization and punctuation.

Concept check: Ensure that the participants are thorough with the usage of both capitals and punctuation marks.

1. When astronaut Neil Armstrong stepped out of the lunar module he said one small step for man one giant step for mankind

   ………………………………………………………………………………………………
   ………………………………………………………………………………………………

2. I enjoyed mark bunyans column the sonorous snore in the people magazine

…………………………………………………………………………………………
…………………………………………………………………………………………

3. The forum mall in Bengaluru Karnataka is listed as one of the Asia's largest malls.

…………………………………………………………………………………………
…………………………………………………………………………………………

KEY

1. When Astronaut Neil Armstrong stepped out of the lunar module, he said," One small step for man; one giant step for mankind."

2. I enjoyed Mark Bunyan's column: "The Sonorous Snore" in the People magazine.

3. The Forum Mall in Bengaluru, Karnataka is listed as one of the Asia's largest malls.

Evaluations

1. **Write an email to renowned celebrity in your town to invite him/her to a meeting or event at your college**

   Suggestions
   - Explain the function that you would like them to attend
   - Would he be required to speak?
   - Preparations needed
   - Details of time /venue and date
   - Arrangements to pick and drop the celebrity
   - Directions to the venue
   - Confirmation of acceptance or rejection

2. **Write a paragraph of 300 words on any one of the following topics.**

a) India in 2050
b) My life
c) A memorable holiday (vacation)
d) An ideal weekend getaway

3. **Read the paragraph below and make a list of synonyms which you can use to replace the words in bold**

He **ran** away quickly down the street. He looked anxiously, left and right. He felt **tired** and unhappy to be running away from home. He stopped on reaching the crossroads. He knew he would miss the **wonderful** food at home. Life was going to be **difficult**, he knew it. Yet, he felt **good**, knowing that he was not answerable to anyone.

Ran:

Good:

Difficult:

Wonderful:

Tired:

KEY:

Darted, dashed, sprinted, scurried, rushed

Great, wonderful, fine, all right, okay

Hard, tricky, not easy, complicated, risky, complex

Appetizing, yummy, scrumptious, tasty, mouth watering

Worn out, drained, exhausted, weary, fatigued

UNIT-III: READING COMPREHENSION

Reading – A 7 Step Process

1. **Recognition** - of the alphabet, the words and punctuation symbols.
2. **Assimilation** - of what is read and communicated through the eyes to the brain.
3. **Integration** - or basic comprehension of the matter being read.
4. **Association** - with previous knowledge connecting ideas appropriately.
5. **Retention** - storing the facts effectively.
6. **Recall** - being able to retrieve the stored information, especially when required.
7. **Communication** - being able to put the information to use immediately in a form that is easily and completely understood.

Therefore, what is necessary to be able to read effectively?

- **Vocabulary practice**
- **Instruction or reading comprehension**
- **Reading practice**
- **Reading aloud**
- **Oral summary – of the text that was read**
- **Noting of key facts**
- **Prediction , summary , questioning , clarification of parts of a text**
- **Written summary - after every paragraph**
- **Promoting remembering**

Techniques to enhance students' reading skills

Prior knowledge – Using what we already know of a topic or subject to understand something new is a good way to give a background to reading any text.

Making connections with other related text or experiences – Similar to having prior knowledge, understanding text through some other text that they have already met or relating it to an experience they have had, will help to give a wide-ranging appreciation of the context of what is being read.

Questioning – Asking relevant questions will help to reinforce the text.

Testing understanding – Testing a reader's understanding is important with the help of exercises that would be indicative of how much was grasped.

Evaluating – Evaluating or making judgments about what is read and explaining why the judgments were made is a good way of analyzing the text.

Application – Any learning must be application – oriented to be successful. Readers should be able to read any text, follow the same steps and be able to comprehend what they have read.

Visualizing while reading – Creating an image or a movie in their minds while reading is a very good memory technique. It ensures that the content is not easily forgotten.

Making inferences – Readers do actually make sense of clues in the text to understand the meaning of what is written. Figuring out what is meant from clues given in the text, is much like being a detective and solving a mystery.

Discussing the text – Higher level thinking can be promoted by discussing what has been read. Group discussions on the topic that is read will add a larger dimension to the text.

Making judgments – Gauging how well, the text covers the topic or understanding the stand taken by the author and whether the text is truth or fiction related, is an essential part of reading to understand. It also gives the students a questioning mind and helps them to better appreciate the nuances of reading.

Types of reading skills

Skimming

This technique is used to understand the main idea of the text. The way to do it is to run your eyes over the text and make a mental note of the important information. It is not necessary to make sense of every word.

When do we use the skimming technique?
While reading newspapers, magazines, pamphlets or brochures. We do not take in the entire text.

Scanning

In this method, it is only specific information that is being sought. We run our own eyes over the text, looking for numbers, words, phrases, etc.
E.g. While looking for dates or amounts on an Accounting Sheet, Names of people, places , or certain key phrases from the Newspaper or Travel brochures, Timings or names of Places in a Train or Air Travel Schedule.

Again, there is no need to try and understand each word while scanning.

Extensive reading

We generally use this method while reading for fact or fiction for pleasure. Longer texts are read at length, but again it is not necessary to understand every word of every line.

E.g. We do extensive reading of self – help and business books, magazine articles, or fiction that one may read at night or to relax.

Intensive reading

Normally, intensive reading is done for shorter books or text that needs to be studied for examination or detailed understanding.

Here it would be crucial that every word is understood. The process of reading is far slower and more laboured.

E.g. For more important documents where understanding every word matters: reports, contracts, sale deeds, legal documents etc.

Reading Cues

Three important cues must be kept in mind for a reader to be successfully independent.

An integration of the three cues will help a reader to efficiently predict words and thoughts from the text. Getting a confirmation of the accuracy of what one has understood and being able to correct one if one goes wrong is also a key factor to reading well.

1. **Meaning (Semantics)** : Background knowledge of the vocabulary and understanding of words used in a text is necessary. The context of the sentence or the paragraph or even the whole text is important to be able to figure out what the text is really about. A reader has to constantly evaluate the information he / she takes in and analyze whether it makes sense.

2. **Syntax or Language Structure:** Knowledge of English grammar is required to make sense of the text.

3. **Visual information**: A reader has to use all the information in the text to make sense of what he/ she is reading. E.g. details of formatting, letter- to – sound associations and punctuation.

   As a reader moves towards his / her goal of being more efficient and accurate readers, he / she could be encouraged in the process. All readers, in the initial or advanced stages of reading, do tend to make errors of judgment in the cues for reading.

However, unless the error changes the meaning of the sentence giving the text a totally different context, it is preferable to overlook small errors of misjudgment which could be termed as Miscues. Readers may substitute their own words for the actual words that appear in the print, yet the goal is to get them to make sense of what they read by understanding the meaning of the text. Hence, unless this is compromised, the small errors can be ignored.

Some of the ways in which a reader can be helped along in the journey of reading are:

1. Ask the reader to look at the picture. If there is no picture, get the reader to draw upon his / her imagination of the scene.
2. Encourage him / her to re-read the sentence if the meaning of the sentence was not understood. It improves the word prediction ability.
3. Check with the reader whether what he / she is reading makes sense.
4. If a word is not understood the reader can move on to the end of the sentence leaving out the difficult word. This would help the reader to get a sense of the context and maybe figure out a word that may fit as a substitute.

A reader should be able to identify the main ideas in the text he/ she reads.
What are some of the ways in which a reader can do this?

Being able to infer - i.e. deduce or understand the context of what he / she reads is another important point.

One way to ensure understanding is to get the reader to summarise the text that has been read.

Questions should be asked about the text that has been read to unable the deeper understanding of the context of the subject.

Three levels of Reading

The reader should use the three levels of reading to be able to completely understand what he / she reads:

1. **On the lines -** This is the sense made at the literal level of the text. It is what the author has said and it is clear what opinion the reader should have. This requires the reader to have previous knowledge of the language the text is in, to be able to recognize and make sense of the grammatical structure and the meaning of the words in the text.
   This level is the basic level of reading. A reader should at least be able to understand the literal meaning of the text.

2. **Between the lines** **-** At this level, the reader is making inferences about the interpretation of the text by trying to understand what the author meant. The reader would have to draw on his / her own prior knowledge and experience to be able to construct the meaning of the text.
   This could be considered a secondary level of reading where the reader is able to draw meaning from the text which is deeper than the literal or obvious meaning.

3. **Beyond the lines -** This is where the connections are made outside of and within the text. The reader has to critically evaluate the text in order to identify if he / she is able to understand what the author is trying to say. The reader is expected to differentiate between the information in the text which is the author's opinion against his / her own.
   This is an advanced level of reading. It will take time and a lot of reading practice for a reader to get to this level.

Speed Reading

Speed Reading is a method of rapid reading where we skim through the text and read only words that are relevant to the context. With practice, the speed with which we can do this could be improved. However, the rate of comprehension should not be compromised.

Earlier it was believed that our reading speed was like our adult height or the colour of our eyes – unchangeable. However, appropriate mental and visual exercises can improve our speed of reading. This can be achieved with focussed practice and the correct method of Speed Reading.

According to Tony Buzan, in his book, 'Speed Reading', he says that "Reading is to the mind as aerobic training is to the body". He adds that if a reader improves his / her reading speed, he / she would be able to think a lot faster and more creatively.
While studying, he / she could take better notes and pass exams with greater ease because he / she was able to study more effectively. All this would save time not just in days but perhaps, even months.

Barriers to speed reading

Reading word by word – Initially , this is how we learn to read – one word at a time. This method reduces speed and comprehension. However, with time, we need to be able to take in a few words in a glance.

Reading aloud - Most of us have a tendency to read aloud, and if not, we tend to read the text ‘ aloud’ in our minds – sub- vocalizing the text. This habit also reduces reading speed.

Re – reading - Going back to what one has read is a waste of time. This could happen because something was not understood, or not absorbed the first time due to a lack of concentration. Increasing vocabulary and noting down a word that was not understood and checking it later is a good way to proceed. It would be better to go by the general meaning of the word from the context.

Reading too fast - If the text is being skimmed faster than it is being understood, the reader will miss the main points of the matter and his / her ability to process the information being read would be diminished. This would make the exercise pointless. Besides, it will require the reader to re-read the text and hence slow him / her down.

Improving your reading speed

How could one improve one’s reading speed? This is a question that is often asked. Here are some tips:

1. Check your normal reading speed and comprehension – Read a passage. Time yourself while you do this and then ask yourself questions about what you read to check for comprehension.
2. Repeat the process and in time you will see a difference in the quantum of material that you are able to assimilate in shorter time spans.
3. Your concentration, memory, creative thinking, imagination and ability to assimilate new information will improve drastically as you keep practicing speed reading.
4. Constantly check your comprehension ability to ensure that you get the most of the reading you are doing.
5. Practice chunking. Read a group of words or a phrase at a time. Move your eyes from the left to the right and then diagonally to the next line.
6. Ensure that you only stop to glance at the words once. Hence, you have two stops per line.
7. In time your eyes will get used to absorbing the text in chunks and will begin to make sense of the text. You will find yourself reading larger chunks in shorter span of time.
8. Use your mind to concentrate on the reading. Concentration is key to understanding, retaining, and recalling what you read.

STOP ! GO BACK AND REFLECT !

I learnt ………………………………………………………………………………………………….

I would like to know more about ………………………………………………………………………………

Reading Comprehension Practice Exercises

Activity 1: Read the passage and answer the questions that follow:

Play outdoors for better sight

According to Kate Johnson, children are ending up spending more time inside the house doing homework on computers, and playing video games, and less time on outdoor activities. This is taking a toll on children's eyes. Kate, an optometrist who lives in Brisbane, says that children as young as six now need glasses. In her view, these children are sporting glasses due to their indoor lifestyle. The occurrences are more in children with no family history of myopia. They spend so much more time in close work with computers and reading doing the damage.

Her recommendation is that children need to be encouraged to run outdoors and look more at objects in the distance for better eye – health. Parents have to enforce a balance in the time spent indoors.

Research findings of Kara Schmidt, Associate Professor, are that it is not simply looking into the distance that prevents myopia, but actually being outside in the sunlight. Sunlight helps in the release of high amounts of retinal transmitters. One of these is dopamine which prevents the eye elongation that is caused by spending long periods doing intense 'near' work.

1. Playing outdoors causes eyesight to go weak.
   (a) True
   (b) False*

2. What does the word 'sporting' mean in line 5 ?
   (a) games (b) spotted (c) wearing * (d) for sports

3. What does Johnson say is helpful about looking at objects in the distance?
   (a) Children can do their homework better on computers.
   (b) It would have a beneficial effect on children's eyesight.*
   (c) Playing video games would be more fun.
   (d) It would improve their balance problems.

4. Katrina Schmidt explains that sunlight releases high transmitters for retina.
   (a) True*
   (b) False

5. What is the role of dopamine that is released by exposure to sunlight?
   (a) It prevents eye elongation*.
   (b) It reduces the history of myopia.
   (c) It will reduce the time spent indoors.
   (d) It will increase the time spent outdoors.

6. What does the phrase ‘taking a toll‘ in line 3 mean? Choose the answer that most closely fits the meaning.
   (a) Taking a fee for spending time indoors.
   (b) Taking a nap in the afternoon would help.
   (c) Causing damage to their eyesight*
   (d) Causing them to lose in the video games.

7. What does the term ‘as young as six’ in line 4 mean?
   (a) Six young children play sports with glasses.
   (b) Six children have changed their lifestyle and wear glasses.
   (c) At the young age of six, children are wearing glasses.*
   (d) The optometrist has six young children who wear glasses.

8. What does the passage recommend for young children?
   (a) Children should spend more time outdoors playing in the sunshine.*
   (b) Children should spend more time indoors doing their homework.
   (c) More children should begin wearing glasses at the age of six.
   (d) Children should learn how to balance themselves on the see-saw.

9. What is the reason that children’s eyes are being damaged?
   (a) Doing homework near the computers.
   (b) Playing video games inside the house.
   (c) Spending time reading indoors.
   (d) Spending more time working closely with computers.*

Activity 2: Read the passage and answer the questions that follow:

The Coming of Fire

One of the most important things the men of long ago found out was how to make and use fire. No one knows who first discovered this. Perhaps they found fire burning on the edge of a peat moss, and at first they were frightened. But when they knew how warm and comfortable fire made them feel, they wanted to make it for themselves.

We are not sure what they did to make fire. Perhaps they rubbed two dried sticks together until they became alight. When once the fire had begun they fed it with wood, and kept it going all day and all night.

Just try to think what a difference having fire made to these early people. It warmed them, it roasted the raw meat, and it frightened away the wild animals. All animals fear fire. Watch your dog or cat when a spark jumps out of the fire.

Extract from " The Stream of Time" by S.O. Ambler & The Coatman

1. What was one of the most important things that man found out long ago?
   (a) The burning edge of peat moss.
   (b) How to make and use fire*.
   (c) That they could be frightened.
   (d) They knew who discovered how to make fire.

2. How did man first react to fire? Which of the following was the most significant reaction?
   (a) They were surprised that it made them warm and comfortable.
   (b) They discovered how to keep a fire going all day and night.
   (c) They found their dogs and other animals afraid of fire.
   (d) They wanted to make fire for themselves.*

3. What more would be a good substitute for the adjectival phrase " of long ago"?
   (a) Longest (b) Ancient * (c) Aged (d) Omniscient

4. Look up the dictionary for the meaning of the word 'alight'. Do you know if it has more than one meaning?

   Alight -………

   [Answer -: Alight- verb forms

   i. To come down and settle as after flight: a bird alighting on a twig.

ii. To get down, as from a vehicle; dismount: the lady alighted from the train.
iii. To come by chance(archaic form): alight on a successful alternative.

Alight- adjective forms

iv. .Burning; lighted: the match he threw out of the window was still alight.
v. Illuminated : the tiara was alight with a million starry diamonds.]

5. Write down 3 things that fire would be useful for, in the lives of the early men?

(a) ……………………………………………………………………….
(b) ……………………………………………………………………….
(c) ……………………………………………………………………….

******************************END*****************************

ENVIRONMENTAL STUDIES
&
DISASTER MANAGEMENT
(AECC I)
SEMESTER-1
FOR UNDER-GRADUATE COURSES ARTS, SCIENCE AND COMMERCE (2021-22)

Course Objectives:

The following objectives have been framed for the proposed curriculum to: -

1. Find out solutions for a sustainable Earth for future generation
2. Make the stakeholders aware of their rights, responsibilities, consequences of their conduct towards nature and build resilience
3. Develop a sense of equitable use of resources and their preservation for the future generation
4. Sensitize the stakeholders on Disaster and Pandemic preparedness

Learning Outcome:

On successful completion of the course students will be able to:

1. Identify the historical origins of destructive attitudes and practices toward the natural environment;
2. Know the compatibility of human and environmental/ecological values
3. Know the natural resources available on earth and how to conserve and manage them
4. Understand the disasters and pandemic they are facing and empower the new generation to face the new challenges

Pedagogy/ Teaching Transaction

1. Classroom teaching
2. Self- Study
3. E-Learning
4. Guest Lectures
5. Case Study Analysis and Discussion
6. Field Trip/Visit
7. Seminars
8. Audio, Video, Film Based Discussion/Analysis
9. Group Exercises
10. Group Discussions

Model Syllabus

ENVIRONMENTAL STUDIES
&
DISASTER MANAGEMENT

(AECC I)
SEMESTER-1
FOR UNDER-GRADUATE COURSES ARTS, SCIENCE AND COMMERCE (2021-22)
FULL MARK-100 (Credit-4)

Unit-I (Environment)

(13 periodsx45 min)

The Environment: The Atmosphere, Lithosphere, Hydrosphere, Biosphere (01 period)

Ecosystem: Energy flow in the ecosystem (01 period)

Biogeochemical Cycle: Water Cycle, Carbon Cycle, Nitrogen Cycle (02 periods)

Pollution: Water Pollution, Air Pollution, Soil Pollution, Radiation Pollution, Industrial Pollution, Light Pollution, Sound Pollution (05 periods)

Environmental Laws (Water Act 1974, Air Act 1981, The Wildlife Protection Act 1972, The Environment Protection Act 1986), The Forest Conservation Act 1980 (04 periods)

Unit-II (Climate Change & Sustainable Development) **(13 periodsx45 min)**

Population Ecology: Individuals, Species, Population, Community (01 period)

Human Population Growth, Population Control Methods (01 period)

Urbanization and its effect on society (01 period)

Climate Change: Causes, effect, Global Warming, Carbon footprint and environmental protection (05 periods)

Steps taken towards sustainable development: Ban of single-use plastics, Automobile Scrapping Policy, Promotion of Electrical Vehicles (03 periods)

Brief idea on Sustainable Development Goals (SDGs), Agenda 21 of Rio Earth Summit (02 periods)

Unit-III (Disaster Management) (13 periods x 45 min)

Disaster Management: Types of disasters (Natural and Man-made) and their causes and effect) (02 periods)

Vulnerability Assessment and Risk Analysis: Vulnerability to various disasters (Flood, Cyclone, Earthquake, Heat waves and Lightning) (02 periods)

Institutional Framework: Institutional arrangements for disaster management (National Disaster Management Authority (NDMA), State Disaster Management Authority (SDMA), District Disaster Management Authority (DDMA), National Disaster Response Force (NDRF) and Odisha Disaster Rapid Action Force (ODRAF) (02 periods)

Preparedness Measures: Disaster Management Cycle, Early Warning System, Pre-Disaster and Post-Disaster Preparedness, Strengthening of SDMA and DDMA, Community Preparedness, Stakeholder participation, Corporate Social Responsibility (CSR) (05 periods)

Survival Skills: Survival skills adopted during and after disaster (Flood,

Unit-IV (Public Health Management) (13 periods x 45min)

Brief idea on Epidemics and Pandemics (01 period)

Non-communicable diseases with special reference to Cardiovascular diseases, Cancer, Diabetes, Hypertension and Obesity and their prevention (02 periods)

Communicable diseases with special reference to Covid-19, Flu, Hepatitis, AIDS and Tuberculosis and their transmission (02 periods)

Dynamics of Disease Transmission: Mode of transmission (Direct/Indirect), Events after infection: Immunity (Active vrs Passive, Innate vrs Acquired, Herd Immunity), Incubation Period (02 periods)

Prevention of Epidemics/Pandemics Diseases: Preventing Measures (Quarantine, Sanitization, Personal Protective measures such as Hand washing and use of protective devices, Vaccination); Control Measures (Surveillance, Isolation, Contact Tracing) (03 Periods)

Life Style management (Diet, Physical Exercise, Yoga and sleeping habit) (02 periods)

Role of Different Sectors in Managing Health Disaster: Role of Government (Centre and State), Community, Civil Society, Student mass, NGOs (01 period)

Books Recommended:

1. Asthana DK and Asthana M: A Text Book of Environmental Studies, S. Chand, New Delhi
2. Bharucha E: A Text Book of Environmental Studies, New Delhi: UGC
3. Dash MC and Mishra PC: Man and Environment, McMillan, London
4. Disaster Management and Mitigation Plan,2013 of Dept. of Health & Family Welfare, Govt. of Odisha*
5. Mishra DD: *Fundamental Concepts in Environmental Studies*, S. Chand, New Delhi
6. National Policy on Disaster Management,2009*
7. National Disaster Management Plan,2019*
8. Odum EP: *Fundamentals of Ecology*, Natraj Publications
9. State Disaster Management Plan, 2019 of Government of Odisha*
10. Standard Operating Procedure (SOP) issued by Govt. of India and Govt. Of Odisha on Public Health Managements in the websites: www.mohfw.gov.in and health.odisha.gov.in*
11. The Disaster Management Act, 2005 of Government of India*

[Note: Star (*) marked References, published by the State as well as Central Government are available in the open sources]

SYLLABUS FOR UNDERGRADUATE COURSE IN ZOOLOGY

(Bachelor of Science Examination)

UNDER

CHOICE BASED CREDIT SYSTEM

Course Structure of U.G. Zoology Honours				
Semester	**Course**	**Course Name**	**Credit**	**Total marks**
Semester-I	AECC I	AECC I	4	100
	Core I (Theory)	Non-chordates I: Protista to Pseudocoelomates	4	75
	Core I (Practical)	Non-chordates I: Protista to Pseudocoelomates	2	25
	Core II (Theory)	Principles of Ecology	4	75
	Core II (Practical)	Principles of Ecology	2	25
	GE 1 (Theory)	GE 1 (Theory)	4	75
	GE I (Practical)	GE I (Practical)	2	25
Semester-II	AECC 2	AECC 2	4	100
	Core III (Theory)	Non chordates II: Coelomates	4	75
	Core III (Practical)	Non chordates II: Coelomates	2	25
	Core IV (Theory)	Cell biology	4	75
	Core IV (Practical)	Cell biology	2	25
	GE II (Theory)	GE II (Theory)	4	75
	GE II (Practical)	GE II (Practical)	2	25
Semester-III	Core V (Theory)	Diversity of Chordates	4	75
	Core V (Practical)	Diversity of Chordates	2	25
	Core VI (Theory)	Physiology: Controlling and Coordinating systems	4	75
	Core VI (Practical)	Physiology: Controlling and Coordinating systems	2	25
	Core VII (Theory)	Fundamentals of Biochemistry and microbiology	4	75
	Core VII (Practical)	Fundamentals of Biochemistry and microbiology	2	25
	SEC 1	SEC 1	4	100
	GE III (Theory)	GE III (Theory)	4	75
	GE III (Practical)	GE III (Practical)	2	25
Semester-IV	Core VIII (Theory)	Comparative anatomy of Vertebrates	4	75

	Core VIII (Practical)	Comparative anatomy of Vertebrates	2	25
	Core IX (Theory)	Physiology: Life Sustaining Systems	4	75
	Core IX (Practical)	Physiology: Life Sustaining Systems	2	25
	Core X (Theory)	Biochemistry of Metabolic Processes	4	75
	Core X (Practical)	Biochemistry of Metabolic Processes	2	25
	SEC 2	SEC 2	4	100
	GE IV (Theory)	GE IV (Theory)	4	75
	GE IV (Practical)	GE IV (Practical)	2	25
Semester-V	Core XI (Theory)	Molecular Biology	4	75
	Core XI (Practical)	Molecular Biology	2	25
	Core XII (Theory)	Principles of Genetics	4	75
	Core XII (Practical)	Principles of Genetics	2	25
	DSE I (Theory)	DSE 1	4	75
	DSE I (Practical)	DSE 1	2	25
	DSE II (Theory)	DSE II	4	75
	DSE II (Practical)	DSE II	2	25
Semester-VI	Core XIII (Theory)	Developmental Biology	4	75
	Core XIII (Practical)	Developmental Biology	2	25
	Core XIV (Theory)	Evolutionary Biology	4	75
	Core XIV (Practical)	Evolutionary Biology	2	25
	DSE III (Theory)	DSE III	4	75
	DSE III (Practical)	DSE III	2	25
	DSE IV (Theory with Practical /Project)	Project/ Economic Zoology	6	100
		Total	**148**	**2600**

ZOOLOGY

HONOURS PAPERS:

Core course – 14 papers

Discipline Specific Elective – 4 papers (Out of 9 suggested papers)

Generic Elective for Non Zoology students – 4 papers. Incase University offers 2 subjects as GE, then papers 1 and 2 will be the GE paper.

Marks per paper - Midterm: 15 marks, End term: 60 marks (Theory) + 25 marks (Practical), Total – 100 marks

Credit per paper – 6

Teaching hours per paper – 40 hours (theory) + 10 hours (practical)

Core Paper I

Non-Chordates I: Protista to Pseudocoelomates

Unit 1: Protista, Parazoa, Metazoa and Porifera

General characteristics and Classification up to classes. Study of Euglena, Amoeba. Life cycle and pathogenicity of Plasmodium vivax and Entamoeba histolytica. Locomotion and Reproduction in Protista.General characteristics and Classification up to classes, Canal system and spicules in sponges.

Unit 2: Cnidaria & Ctenophora

General characteristics and Classification up to classes, Metagenesis in Obelia, Polymorphism in Cnidaria, Corals and coral reefs. General characteristics and Evolutionary significance of Ctenophora.

Unit 3: Platyhelminthes

General characteristics and Classification up to classes. Life cycle and pathogenicity of Fasciola hepatica and Taenia solium.

Unit 4: Nemathelminthes

General characteristics and Classification up to classes. Life cycle, and pathogenicity of Ascaris lumbricoides and Wuchereria bancrofti. Parasitic adaptations in helminthes.

Note: Classification to be followed from “Barnes, R.D. (1982). Invertebrate Zoology, V Edition”

PRACTICAL

1. Study of whole mount of Euglena, Amoeba and Paramecium, Binary fission and Conjugation in Paramecium.
2. Examination of pond water collected from different places for diversity in protista.
3. Study of Sycon (T.S. and L.S.), Hyalonema, Euplectella, Spongilla.
4. Study of Obelia, Physalia, Millepora, Aurelia, Tubipora, Corallium, Alcyonium, Gorgonia,

Metridium, Pennatula, Fungia, Meandrina, Madrepora.

5. One specimen/slide of any ctenophore.

6. Study of adult Fasciola hepatica, Taenia solium and their life cycles (Slides/microphotographs).

7. Study of adult Ascaris lumbricoides and its life stages (Slides/micro-photographs).

8. To submit a Project Report on any related topic on life cycles/coral/ coral reefs.

Note: Classification to be followed from "Ruppert and Barnes (2006) Invertebrate Zoology,

8th edition, Holt Saunders International Edition"

TEXT BOOKS

1. Kotpal RL; Modern Textbook of Zoology – Invertebrates; Rastogi Publications - Meerut; 2016 edition
2. Richard Busca, W. Moore, Stephen M. Shuster. Invertebrates; OUP USA; 3rd edition (19 January 2016)

SUGGESTED READINGS

1. Richard Fox , Robert D. Barnes, Edward E. Ruppert, Invertebrate Zoology: A Functional Evolutionary Approach, Brooks/Cole; 7th edition 2003
2. Barrington, E.J.W.Invertebrate Structure and Functions. II Edition, E.L.B.S. and Nelson.
3. Hyman, L.H. Invertebrate Series (Recent edition)
4. Verma P. S. A Manual of Practical Zoology: Invertebrates. S Chand Publication
5. Parker JJ and WA Haswel Textbook of Zoology. Vol I and II

Core Paper II

Principles of Ecology

Unit 1: Ecosystem and Applied Ecology

Ecology: Autecology and synecology, Types of ecosystems with one example in detail, Food chain: Detritus and grazing food chains, Linear and Y-shaped food chains, Food web, Energy flow through the ecosystem, Ecological pyramids Nutrient and biogeochemical cycle with one example of Nitrogen cycle. Ecology in Wildlife Conservation and Management. Laws of limiting factors, Study of physical factors- (Light, temperature).

Unit 2: Population

Attributes of population: Density, natality, mortality, life tables, fecundity tables, survivorship curves, age ratio, sex ratio, dispersal and dispersion Exponential and logistic growth, equation and patterns, r and K strategies. Population regulation - density-dependent and independent factors, Population interactions, Gause's Principle with laboratory and field examples.

Unit 3: Community

Community characteristics: species richness, dominance, diversity, abundance,vertical stratification, Ecotone and edge effect; Ecological succession with one example. Theories pertaining to climax community.

Unit – 4: Biometry

Biological data, graphical representation of data (frequency polygon and histogram), sampling techniques, measures of central tendency (Mean, median and mode), Measures of dispersion (range, quartile deviation, mean deviation and standard deviation), Hypothesis and hypothesis testing (Chi-square test, t- test)

PRACTICAL

1. Study of life tables and plotting of survivorship curves of different types from the hypothetical/real data provided.
2. Determination of population density in a natural/hypothetical community by quadrate method and calculation of Shannon-Weiner diversity index for the same community.
3. Study of an aquatic ecosystem: Phytoplankton and zooplankton collection, preservation and mounting, Measurement of temperature, turbidity/penetration of light, determination of pH, Dissolved Oxygen content (Winkler's method), BOD, COD, Free CO_2, Hardness, TDS.
4. Report on a visit to National Park/Biodiversity Park/Wild life sanctuary.
5. Chi-square analysis using seeds/beads/Drosophila.
6. Problems on standard deviation.
7. Graphical representation of data (Frequency polygon and Histogram).

Text Book

1. Odum, E.P. and Barrett, G.W., (2018). Fundamentals of Ecology, 5th Edition
2. Smith and Smith, Elements of Ecology, Global Edition; Pearson Education India; ninth edition (14 May 2015)
3. Myra Samuels, J. Witmer,A. Schaffner, Statistics for the life sciences, Prentice Halls, Boston, 4th edition, 2012

Suggested Readings

1. Kormondy, (2017). Concepts of Ecology, Updated 4/e, Pearson
2. Colinvaux, P. A. (1993). Ecology. II Edition. Wiley, John and Sons, Inc. Krebs, C. J. (2001). Ecology. VI Edition. Benjamin Cummings.
3. Ricklefs, R.E., (2000). Ecology. 5th Edition. Chiron Press
4. Dash M.C., Fundamentals of Ecology. Mc GrawHill
5. Smith TM and Smith RL, Elements of Ecology, 8th Edition,Pearson education INC, USA
6. Miller, G.T. and Spoolman, S.E. (2017) Environmental Science, 14th Edition. Cengage Publication, New Delhi.
7. Baneerjee Pranab Kumar, Introduction to biostatistics, S Chand & Company; 3rd Rev. Edn. 2006 edition
8. Chainy GBN, Mishra G, Mohanty PK, 2016, Basic Biostatistics, Kalyani Publisher 3rd edition

Core Paper III

Non- Chordates II: Coelomates

Unit 1: Coelomates and Annelids

Evolution of coelom and metamerism. General characteristics and Classification up to classes; Excretion in Annelida.

Unit 2: Arthropoda and Onychophora

General characteristics and Classification up to classes. Vision and Respiration in Arthropoda. Metamorphosis in Insects. Social life in bees and termites. Onychophora: General characteristics and Evolutionary significance.

Unit 3: Mollusca

General characteristics and Classification up to classes. Respiration in Mollusca. Torsion and detorsion in Gastropoda. Evolutionary significance of trochophore larva.

Unit 4: Echinodermata

General characteristics and Classification up to classes. Water-vascular system in Asteroidea, Larval forms in Echinodermata, Affinities with Chordates.

Note: Classification to be followed from "Ruppert and Barnes (2006)Invertebrate Zoology,8th edition, Holt Saunders International Edition"

PRACTICAL

1. Study of following specimens:
2. Annelids - Aphrodite, Nereis, Heteronereis, Sabella, Serpula, Chaetopterus, Pheretima, Hirudinaria
3. Arthropods – Tachypleus,Carcinoscorpious, Palamnaeus, Palaemon, Daphnia, Balanus, Sacculina, Cancer, Eupagurus, Scolopendra, Julus, Bombyx, Periplaneta, termites and honey bees
4. Onychophora –Peripatus
5. Molluscs - Chiton, Dentalium, Pila, Doris, Helix, Unio, Ostrea, Pinctada, Sepia, Octopus, Nautilus
6. Echinodermates - Pentaceros/Asterias, Ophiura, Clypeaster, Echinus, Cucumaria and Antedon
7. Study of digestive system, nephridia of earthworm (Virtual).
8. T.S. through pharynx, gizzard, and typhlosolar intestine of earthworm.
9. Mount of mouth parts and dissection of digestive system and nervous system of Periplaneta.
10. To submit a Project Report on any related topic to larval forms (crustacean, mollusc and echinoderm)

Text Books

1. Kotpal RL (2014) Text book of Zoology, Invertebrate, Rastogi Publication
2. Jordan and Verma PS (2009) Invertebrate Zoology. S Chand publication.

Suggested Readings

1. Barrington, E.J.W. (1979). Invertebrate Structure and Functions. II Edition, E.L.B.S. and Nelson.
2. Barnes, R.S.K., Calow, P., Olive, P. J. W., Golding, D.W. and Spicer, J.I. (2002). The Invertebrates: A New Synthesis, III Edition, Blackwell Science
3. Verma P S. (2010) A Manual of Practical Zoology: Non-chordates. S Chand Publication

Core Paper IV

Cell biology

Unit 1: Overview of cells and plasma membrane

Prokaryotic and Eukaryotic cells, Virus, Viroids, Mycoplasma, Prions, Various models of plasma membrane structure. Transport across membranes: Active and Passive transport, Facilitated transport. Cell junctions: Tight junctions, Desmosomes, Gap junctions.

Unit 2: Cytoskeleton & Endomembrane System

Structure and Functions: Microtubules, Microfilaments and Intermediate filaments; Structure and Functions: Endoplasmic Reticulum, Golgi apparatus, Lysosomes.

Unit 3: Mitochondria and Peroxisomes

Mitochondria: Structure, Semi-autonomous nature, Endosymbiotic hypothesis; Mitochondrial Respiratory Chain, Chemi-osmotic hypothesis. Peroxisomes.

Unit 4: Nucleus, Cell Division and Cell signalling

Structure of Nucleus: Nuclear envelope, Nuclear pore complex, Nucleolus; Chromatin: Euchromatin and Hetrochromatin and packaging (nucleosome); Mitosis, Meiosis, Cell cycle and its regulation; GPCR and Role of second messenger (cAMP)

Practical

1. Preparation of temporary stained squash of onion root tip to study various stages of mitosis.
2. Study of various stages of meiosis.
3. Preparation of permanent slide to show the presence of Barr body in human female blood cells/cheek cells.
4. Preparation of permanent slide to demonstrate:
    i. DNA by Feulgen reaction
    ii. DNA and RNA by MGP
    iii. Mucopolysaccharides by PAS reaction
    iv. Proteins by Mercuric bromophenol blue/Fast Green
5. Demonstration of osmosis (RBC/ Egg etc.).

Text Books

1. Karp, G. (2010). Cell and Molecular Biology: Concepts and Experiments. VI Edition. John Wiley and Sons. Inc.
2. De Robertis, E.D.P. and De Robertis, E.M.F. (2006). Cell and Molecular Biology. VIII Edition. Lippincott Williams and Wilkins, Philadelphia.
3. S Harisha (2007) Biotechnology procedures and experiments handbook., Infinity Science Press, Hingham

Suggested Readings

1. Bruce Albert, Bray Dennis, Levis Julian, Raff Martin, Roberts Keith and Watson James (2008). MolecularBiology of the Cell, V Edition, Garland publishing Inc., New York and London.
2. Becker, W.M., Kleinsmith, L.J., Hardin. J. and Bertoni, G. P. (2009). The World of the Cell. VII Edition. Pearson Benjamin Cummings Publishing, San Francisco.
3. Suvarna S, Lyton C, Bancroft JD (2013) Theory and practice of histological techniques, Churchill Livingstone, Elsevier, UK
4. Cooper, G.M. and Hausman, R.E. (2009). The Cell: A Molecular Approach. V Edition. ASM Press and Sunderland, Washington, D.C.; Sinauer Associates, MA.

Core Paper V

Diversity and distribution of Chordates

Unit 1: Protochordates and Origin of Chordates

Protochordata: General characteristics of Hemichordata, Urochordata and Cephalochordata; Study of larval forms in protochordates; Retrogressive metamorphosis in Urochordata.
General characteristics and outline classification Chordata. Dipleurula concept and the Echinoderm theory of origin of chordates.

Unit 2: Agnantha, Pisces & Amphibia

General characteristics of Agnatha: General characteristics and classification of cyclostomes up to class Chondrichthyes and Osteichthyes: classification up to order, Migration, Parental care in fishes, Accessory respiratory organs in pisces, Evolutionary significance of Dipnoi.
Amphibian: Origin of Tetrapoda (Evolution of terrestrial ectotherms); General characteristics and classification up to order. Parental care in Amphibia.

Unit 3: Reptilia& Aves

General characteristics and classification up to order in reptiles; Affinities of Sphenodon; Poison apparatus and Biting mechanism in snakes. General characteristics and classification up to order in Aves Archaeopteryx - a connecting link; Flight adaptations and Migration in birds.

Unit 4: Mammals & Zoogeography

General characters and classification up to order; Affinities of Prototheria; Adaptive radiation with reference to locomotory appendages. Zoogeographical realms, Theories pertaining to distribution of animals, Plate tectonic and Continental drift theory, distribution of vertebrates in different realms.

PRACTICAL

1. Protochordata: Balanoglossus, Herdmania, Branchiostoma, Colonial Urochordata, Sections of Balanoglossus through proboscis and branchio-genital regions, Sections of Amphioxus through pharyngeal, intestinal and caudal regions. Permanent slides of Herdmania spicules.
2. Agnatha: Petromyzon and Myxine.
3. Fishes: Scoliodon, Sphyrna, Pristis, Torpedo, Chimaera, Mystus, Heteropneustes, Labeo, Exocoetus, Echeneis, Anguilla, Hippocampus, Tetrodon/ Diodon, Anabas, Flat fish.

4. Amphibia: Ichthyophis/Ureotyphlus, Necturus, Bufo, Hyla, Alytes, Salamander.
5. Reptilia: Chelone, Trionyx, Hemidactylus, Varanus, Uromastix, Chamaeleon, Ophiosaurus, Draco, Bungarus, Vipera, Naja, Hydrophis, Zamenis, Crocodylus. Key for Identification of poisonous and non-poisonous snakes
6. Aves: Study of six common birds from different orders. Types of beaks and claws. Study of feathers.
7. Mammalia: Sorex, Bat (Insectivorous and Frugivorous), Funambulus, Loris, Herpestes, Erinaceous.
8. Power point presentation on study of any two animals from two different classes by students. Submission of album of local species.

TEXT BOOKS

1. Kotpal RL; Modern Textbook of Zoology –Vertebrates; Rastogi Publications - Meerut; 2016 edition
2. Young, J. Z. (2004). The Life of Vertebrates. III Edition. Oxford University Press.
3. Tiwari SK (2006) Fundamentals of World Zoogeography, Sarup & Sons

SUGGESTED READINGS

1. Pough H. Vertebrate life, VIII Edition, 2007 Pearson International.
2. Hall B.K. and Hallgrimsson B. (2008). Strickberger's Evolution. IV Edition. Jones and Bartlett Publishers Inc.
3. Hickman CP, Roberts LS, Keen S, Larson A, I'AnsonH, Isenhour DJIntegrated Principle of Zoology, 14th edition, 2008, McGrawHill publication
4. Verma PS and Srivastava PC. (2011)Advanced Practical Zoology. S Chand Publication.

Core Paper VI

Physiology: Controlling and Coordinating Systems

Unit 1: Tissues & Tissue system

Structure, location, classification and functions of epithelial tissue, connective tissue, muscular tissue and nervous tissue. Structure and types of bones and cartilages, Ossification, bone growth and resorption.

Unit 2: Muscle & Nervous System

Histology of different types of muscle; Ultra structure of skeletal muscle; Molecular and chemical basis of muscle contraction. Structure of neuron, resting membrane potential, Origin of action potential and its propagation across the myelinated and unmyelinated nerve fibers; Types of synapse, Synaptic transmission and, Neuromuscular junction; Reflex action and its types - reflex arc; Physiology of hearing and vision.

Unit 3: Reproductive System

Histology of testis and ovary; Physiology of male and female reproduction; Hypothalamus-Pituitary & Gonadal axis. Puberty, Ovarian Cycle, Methods of contraception in male and female, Placental hormones.

Unit 4: Endocrine System

Histology of endocrine glands – Hypothalamus (Neuroendocrine gland) pineal, pituitary, thyroid, parathyroid, pancreas, adrenal; hormones secreted by them and their mechanism of action; Classification of hormones and mechanism of hormone action, (steroidal and non-steroidal hormones).

PRACTICAL

1. Demonstration of the unconditioned reflex action (Deep tendon reflex such as knee jerk reflex).
2. Study of permanent slides- Squamous epithelium, Striated muscle fibres and nerve cells.
3. Study of permanent slides-Pancreas, Testis, Ovary, Adrenal, Thyroid and Parathyroid.
4. Microtomy: Preparation of permanent slides/photographs/computer models of any five types of mammalian (Goat/rat,etc) tissues

TEXT BOOKS

1. Marieb EN and Hoehn K, Human Physiology,(2013), 9th edition, Pearson Education, USA.
2. Endocrinology, Hadley ME and Levine JE (2009), Pearson Education India; 6 edition
3. Textbook of Medical Physiology, Guyton & Hall, Elsevier, 12th edition, 2016

SUGGESTED BOOKS

1. Victor P. Eroschenko. (2008). diFiore's Atlas of Histology with Functional correlations. XII Edition., Lippincott W. & Wilkins
2. Martini F H, Nath J L and Bartholomew E F.(2015) Fundamentals of Anatomy and Physiology. Pearson Education Publication,
3. Guyton, A.C. & Hall, J.E. (2006). Textbook of Medical Physiology. XI Edition. Hercourt Asia PTE Ltd. /W.B.Saunders Company.
4. Tortora, G.J. & Grabowski, S. (2006). Principles of Anatomy & Physiology. XI Edition John Wiley & sons.

Core Paper VII

Fundamentals of Biochemistry and microbiology

Unit 1: Carbohydrates & Lipids

Structure and Biological importance: Monosaccharides, Disaccharides, Polysaccharides andGlycoconjugates; Structure and Significance: Physiologically important saturated and unsaturated fatty acids, Tri-acylglycerols, Phospholipids, Glycolipids, Steroids.

Unit 2: Proteins

Amino acids: Structure, Classification and General properties of α-amino acids; Physiological importance of essential and non-essential α-amino acids.

Proteins: Bonds stabilizing protein structure; Levels of organization in proteins; Renaturation, Denaturation; Introduction to simple and conjugate proteins

Immunoglobulins: Basic Structure, Classes and Function, Antigenic Determinants.

Unit 3: Enzymes

Nomenclature and classification; Cofactors; Specificity of enzyme action; Isozymes; Mechanism of enzyme action; Enzyme kinetics; Factors affecting rate of enzyme-catalyzed reactions; Derivation of Michaelis-Menten equation, Concept of Km and Vmax, Lineweaver-Burk plot; Multi-substrate reactions; Enzyme inhibition; Allosteric enzymes and their kinetics; Regulation of enzyme action.

Unit 4: Microbiology

Bacteria: Classification, structure and reproduction

Virus: classification, structure and reproduction, bacteriophages, viriods, prions, microbes of food, agriculture and industry

Bacterial (typhoid, cholera and tuberculosis) and viral (swine flu, zika fever and AIDS) diseases of human

PRACTICAL

1. Qualitative tests of functional groups in carbohydrates, proteins and lipids.
2. Paper chromatography of amino acids.
3. Action of salivary amylase under optimum conditions.
4. Effect of pH, temperature and inhibitors on the action of salivary amylase./Urease/acid or alkaline phosphatase
5. Demonstration of proteins separation by SDS-PAGE.
6. Identification of different bacteria and viruses through slide/photographs

TEXT BOOKS

1. Satyanarayan and Chakrapani , (2017) Biochemistry, Elsevier; Fifth edition
2. Cox, M.M and Nelson, D.L. (2008). Lehninger's Principles of Biochemistry, V Edition, W.H. Freeman and Co., New York.
3. Jeremy M. Berg, Lubert Stryer, John L. Tymoczko, Gregory J. Gatto, Biochemistry, 8th edition, 2015.
4. Victor W., Rodwell, David A., Bender, Kathleen M., Botham, Peter J., Kennelly, P. Anthony,Harper's Illustrated Biochemistry, 31st edition.
5. Tortora GJ, Funke BR and Case CL (2016) Microbiology: An introduction, Pearson India Education Services Pvt.Ltd.11th edition

SUGGESTED READING

1. Murray, R.K., Bender, D.A., Botham, K.M., Kennelly, P.J., Rodwell, V.W. and Well, P.A. (2009). Harper's Illustrated Biochemistry, XXVIII Edition, International Edition, The McGraw- Hill Companies Inc.
2. Watson, J.D., Baker, T.A., Bell, S.P., Gann, A., Levine, M. and Losick, R. (2008). Molecular Biology of the Gene, VI Edition, Cold Spring Harbor Lab. Press, Pearson Publication.
3. Hames, B.D. and Hooper, N.M. (2000). Instant Notes in Biochemistry, II Edition, BIOS Scientific Publishers Ltd., U.K.
4. Devasena T. (2010). EnzymologyOxford University Press; 1 edition
5. Berg, J.M., Tymoczko, J.L. and Stryer, L. (2007). Biochemistry, VI Edition, W.H. Freeman and Co., New York.
6. Pelezar Jr.MJ,Chan E.C.S. and Krieg NR (2001) Microbiology, Mc-Graw Hill Education

Core Paper VIII

Comparative Anatomy of Vertebrates

Unit 1: Integumentary & Skeletal System

Structure, functions and derivatives of integument (Scale, claw, nail, hair, feather and dentition). Axial and appendicular skeleton, Jaw suspensorium, Visceral arches.

Unit 2: Digestive & Respiratory System

Alimentary canal and associated glands; Respiration through skin, gills, lungs and air sacs; Accessory respiratory organs.

Unit 3: Circulatory and Urinogenital system

General plan of circulation, evolution of heart and aortic arches; Succession of kidney, Evolution of urinogenital ducts, Types of mammalian uteri.

Unit 4: Nervous System & Sense Organs

Comparative account of brain;Nervous system, Spinal cord, Cranial nerves in mammals. Classification of receptors: Brief account of visual and auditory receptors in man. Chemo and mechano receptors

PRACTICAL

1. Study of placoid, cycloid and ctenoid scales through permanent slides/photographs
2. Disarticulated skeleton of Frog, Varanus, Fowl, Rabbit.
3. Carapace and plastron of turtle /tortoise (Photographs, charts etc).
4. Mammalian skulls: One herbivorous and one carnivorous animal.
5. Study of structure of any two organs (heart, lung, kidney, eye and ear) from video recording (may be included if dissection not permitted).
6. Project on skeletal modifications in vertebrates (may be included if dissection not permitted).

TEXT BOOKS

1. Kardong, K.V. (2005) Vertebrates' Comparative Anatomy, Function and Evolution. IV Edition. McGraw-Hill Higher Education
2. Kent, G.C. and Carr R.K. (2000). Comparative Anatomy of the Vertebrates. IX Edition. The McGraw-Hill Companies
3. R. K. Saxena and Sumitra Saxena (2016). Comparative Anatomy of Vertebrates 2nd edition.

SUGGESTED READINGS

1. Hilderbrand, M and Gaslow G.E. Analysis of Vertebrate tructure, John Wiley and Sons
2. Walter, H.E. and Sayles, L.P; Biology of Vertebrates, Khosla Publishing House

Core Paper IX

Physiology: Life Sustaining Systems

Unit 1: Physiology of Digestion

Structural organization and functions of gastrointestinal tract and associated glands; Mechanical and chemical digestion of food; Absorptions of carbohydrates, lipids, proteins, water, minerals and vitamins; Hormonal control of secretion of enzymes in gastrointestinal tract.

Unit 2: Physiology of Respiration

Histology of trachea and lung; Mechanism of respiration, Pulmonary ventilation; Respiratory volumes and capacities; Transport of oxygen and carbon dioxide in blood; Respiratory pigments, Dissociation curves and the factors influencing it; Carbon monoxide poisoning; Control of respiration.

Unit 3: Renal Physiology and Blood

Structure of kidney and its functional unit; Mechanism of urine formation; Regulation of water balance; Regulation of acid-base balance. Components of blood and their functions; Structure and functions of haemoglobin haemostasis: Haemopoiesis, Blood clotting system, Blood groups: Rh factor, ABO and MN.

Unit 4: Physiology of Heart

Structure of mammalian heart; Coronary circulation; Structure and working of conducting myocardial fibers. Origin and conduction of cardiac impulses Cardiac cycle; Cardiac output and its regulation, Frank-Starling Law of the heart, nervous and chemical regulation of heart rate. Electrocardiogram, Blood pressure and its regulation.

PRACTICAL

1. Determination of ABO Blood group
2. Enumeration of red blood cells and white blood cells using haemocytometer
3. Estimation of haemoglobin using Sahli's haemoglobinometer
4. Preparation of haemin and haemochromogen crystals
5. Recording of blood pressure using a sphygmomanometer
6. Examination of sections of mammalian slides: oesophagus, stomach, duodenum, ileum, rectum liver, trachea, lung, kidney.

TEXT BOOKS

1. Marieb E.N. and Hoehn K.N. (2009) Human Physiology. Pearson Education Publication , 9th edition
2. Tortora, G.J. & Grabowski, S. (2006). Principles of Anatomy & Physiology. XI Edition John Wiley & sons.
3. Guyton & Hall, (2016) Textbook of Medical Physiology. Elsevier, 12th edition,

SUGGESTED READINGS

1. Victor P. Eroschenko. (2008). diFiore's Atlas of Histology with Functional correlations. XII Edition. Lippincott W. & Wilkins.
2. Vander A, Sherman J. and Luciano D. (2014). Vander's Human Physiology: The Mechanism of Body Function. XIII Edition, McGraw Hills.
3. Moyes C.D., Schulte PM (2016), Principles of physiology, 2nd edition, Pearson education, 3rd.
4. Guyton, A.C. & Hall, J.E. (2006). Textbook of Medical Physiology. XI Edition. Hercourt Asia PTE Ltd. W.B. Saunders Company.

Core Paper X

Biochemistry of Metabolic Processes

Unit 1: Overview of Metabolism

Catabolism vs Anabolism, Stages of catabolism, Compartmentalization of metabolic pathways, Shuttle systems and membrane transporters; ATP as "Energy Currency of cell"; coupled reactions; Use of reducing equivalents and cofactors; Intermediary metabolism and regulatory mechanisms.

Unit 2: Carbohydrate Metabolism

Sequence of reactions and regulation of glycolysis, Citric acid cycle, Phosphate pentose pathway, Gluconeogenesis, Glycogenolysis and Glycogenesis.

Unit 3: Lipid and protein Metabolism

β-oxidation and omega -oxidation of saturated fatty acids with even and odd number of carbon atoms; Biosynthesis of palmitic acid; Ketogenesis

Catabolism of amino acids: Transamination, Deamination, Urea cycle; Fate of C-skeleton of Glucogenic and Ketogenic amino acids.

Unit 4: Oxidative Phosphorylation

Redox systems; Review of mitochondrial respiratory chain, Inhibitors and un-couplers of Electron Transport System

PRACTICAL

1. Estimation of total protein in given solutions
2. Detection of SGOT and SGPT or GST and GSH in serum/ tissue
3. To study the enzymatic activity of Trypsin/ Lipase.
4. To perform the Acid and Alkaline phosphatase assay from serum/ tissue.
5. Dry Lab (Virtual): To trace the labelled C atoms of Acetyl-CoA till they evolve as CO_2 in the TCA cycle.

TEXT BOOKS

1. Satyanarayan and Chakrapani , (2017) Biochemistry, Elsevier; Fifth edition.
2. Cox, M.M and Nelson, D.L. (2008). Lehninger Principles of Biochemistry, V Edition, W.H. Freeman and Co., New York.

SUGGESTED READINGS

1. Murray, R.K., Bender, D.A., Botham, K.M., Kennelly, P.J., Rodwell, V.W. and Well, P.A. (2009). Harper's Illustrated Biochemistry, XXVIII Edition, International Edition, The McGraw-Hill Companies Inc.
2. Berg, J.M., Tymoczko, J.L. and Stryer, L. (2007).Biochemistry, VI Edition, W.H. Freeman and Co., New York.
3. Hames, B.D. and Hooper, N.M. (2000). Instant Notes in Biochemistry, II Edition, BIOS Scientific Publishers Ltd., U.K.

Core Paper XI

Molecular Biology

Unit 1: Nucleic Acids, DNA Replication & Repair

Salient features of DNA and RNA, Watson and Crick model of DNA.,Nucleic acids cot curves, denaturation and renaturation of DNA, DNA Replication in prokaryotes and eukaryotes, mechanism of DNA replication, Semi-conservative, bidirectional and semi-discontinuous replication, RNA priming, Replication of circular and linear ds-DNA, replication of telomeres, Pyrimidine dimerization and mismatch repair.

Unit 2: Transcription & Translation

RNA polymerase and transcription Unit, mechanism of transcription in prokaryotes and eukaryotes, synthesis of rRNA and mRNA, transcription factors and regulation of transcription.

Genetic code, Degeneracy of the genetic code and Wobble Hypothesis; Process of protein synthesis in prokaryotes: Ribosome structure and assembly in prokaryotes, fidelity of protein synthesis, aminoacyl tRNAsynthetases and charging of tRNA; Proteins involved in initiation, elongation and termination of polypeptide chain; Inhibitors of protein synthesis; Difference between prokaryotic and eukaryotic translation.

Unit 3: Post Transcriptional Modifications and Processing of Eukaryotic RNA

Structure of globin mRNA; Split genes: concept of introns and exons, splicing mechanism, alternative splicing, exon shuffling, and RNA editing, Processing of tRNA.

Unit 4: Gene Regulation & Regulatory RNAs

Transcription regulation in prokaryotes: Principles of transcriptional regulation with examples from lac operon and trp operon; Transcription regulation in eukaryotes: Activators, repressors, enhancers, silencer elements; Gene silencing, RNA interference, miRNA, siRNA.

PRACTICAL

1. Study of Polytene chromosomes from Chironomous / Drosophila larvae
2. Preparation of liquid culture medium (LB) and raise culture of E. coli
3. Estimation of the growth kinetics of E. coli by turbidity method
4. Preparation of solid culture medium (LB) and growth of E. coli by spreading and streaking
5. Quantitative estimation of Salmon sperm/calf thymus DNA using colorimeter (Diphenylamine reagent) or spectrophotometer (A_{260}nm measurement)
6. Quantitative estimation of RNA using Orcinol reaction
7. Study and interpretation of electron micrographs/ photograph showing

(a) DNA replication, (b) Transcription and (c) Split genes.

TEXT BOOKS

1. Karp, G. (2010) Cell and Molecular Biology: Concepts and Experiments. VI Edition. John Wiley and Sons. Inc.
2. Lewin B. (2013). Gene XI, Jones and Bartlett.
3. De Robertis E.D.P. (2017) Cell and Molecular Biology 8Ed.
4. Arnold Berk , Chris A. Kaiser, Harvey Lodish , Angelika Amon , Hidde Ploegh, Anthony Bretscher, Monty Krieger Kelsey C. Martin(2016) Molecular Cell Biology. 8th edition.

SUGGESTED READINGS

1. Becker, W.M., Kleinsmith, L.J., Hardin. J. and Bertoni, G. P. (2009). The World of the Cell. VII Edition. Pearson Benjamin Cummings Publishing, San Francisco.
2. Bruce Alberts, Alexander Johnson, Julian Lewis, Martin Raff, Keith Roberts, Peter Walter: Molecular Biology ofthe Cell, IV Edition.
3. Cooper G. M. and Robert E. Hausman R. E. The Cell: A Molecular Approach**,** V Edition, ASM Press and Sinauer Associates.
4. McLennan A., Bates A., Turner, P. and White M. (2015). Molecular Biology IV Edition. GS, Taylor and Francis Group, New York and London.

Core Paper XII

Principles of Genetics

Unit 1: Mendelian Genetics, Linkage, Crossing Over and Chromosomal Mapping

Principles of inheritance, Incomplete dominance and co-dominance, Multiple alleles, Lethal alleles, Epistasis, Pleiotropy, Sex-linked, sex-influenced and sex-limited characters inheritance. Polygenic inheritance with suitable examples; simple numericals based on it.

Linkage and crossing over, Cytological basis of crossing over, Molecular mechanisms of crossing over including models of recombination, Recombination frequency as a measure of linkage intensity, Two factor and three factor crosses, Interference and coincidence, Somatic cell hybridization.

Unit 2: Mutations

Types of gene mutations (Classification), Types of chromosomal aberrations (Classification, figures and with one suitable example of each), Molecular basis of mutations in relation to UV light and chemical mutagens; Detection of mutations: CLB method, attached X method.

Unit 3: Sex Determination & Extra-chromosomal Inheritance

Chromosomal mechanisms of sex determination in Drosophila and Man; Criteria for extra-chromosomal inheritance, Antibiotic resistance in Chlamydomonas, Mitochondrial mutations in Saccharomyces, Infective heredity in Paramecium and Maternal effects.

Unit 4: Recombination in Bacteria and Viruses & Transposable Genetic Elements

Conjugation, Transformation, Transduction, Complementation test in Bacteriophage.

Transposons in bacteria, Ac-Ds elements in maize and P elements in Drosophila, Transposons in human.

PRACTICAL

1. Study of Mendelian laws and gene interactions.
2. Linkage maps based on data from conjugation, transformation and transduction.
3. Linkage maps based on data from Drosophila crosses.
4. Study of human karyotype (normal and abnormal).
5. Pedigree analysis of some human inherited traits.

TEXT BOOKS

1. Benjamin Pierce, (2015) Genetics- A Conceptual Approach, 5th edition, WH Freeman publication
2. Klug, W.S., Cummings, M.R., Spencer, C.A. (2012). Concepts of Genetics. X Edition.

SUGGESTED READINGS

1. Benjamin Cummings. Russell, P. J. (2009). Genetics- A Molecular Approach.III Edition.
2. Snustad, D.P., Simmons, M.J. (2009). Principles of Genetics. V Edition. John Wiley and Sons Inc.
3. Griffiths, A.J.F., Wessler, S.R., Lewontin, R.C. and Carroll, S.B.Introduction to Genetic Analysis. IX Edition. W. H. Freeman and Co.
4. Fletcher H. and Hickey I. (2015). Genetics. IV Edition. GS, Taylor and Francis Group, New York and London.

Core Paper XIII

Developmental Biology

Unit 1: Introduction to Developmental Biology, Gametogenesis & Fertilization

Historical perspective and basic concepts: Phases of development, Cell-Cell interaction, Pattern formation, Differentiation and growth, Differential gene expression, Cytoplasmic determinants and asymmetric cell division. Gametogenesis, Spermatogenesis, Oogenesis; Types of eggs, Egg membranes; Fertilization (External and Internal): Changes in gametes, Blocks to polyspermy.

Unit 2: Early Embryonic Development

Cleavage: Planes and patterns of cleavage; Types of Blastula; Fate maps (including Techniques); Early development of frog and chick up to gastrulation; Embryonic induction and organizers.

Unit 3: Late Embryonic Development

Fate of Germ Layers; Extra-embryonic membranes in birds; Implantation of embryo in humans, Placenta (Structure, types and functions of placenta).

Unit 4: Post Embryonic Development & Implications of Developmental Biology

Metamorphosis: Changes, hormonal regulations in amphibians and insects; Regeneration: Modes of regeneration, epimorphosis, morphallaxis and compensatory regeneration (with one example each); Ageing: Concepts and Theories. Teratogenesis: Teratogenic agents and their effects on embryonic development; In vitro fertilization, Stem cell (ESC), Amniocentesis.

PRACTICAL

1. Study of whole mounts and sections of developmental stages of frog through permanent slides: Cleavage stages, blastula, gastrula, neurula, tail-bud stage, tadpole (external and internal gill stages).
2. Study of whole mounts of developmental stages of chick through permanent slides: Primitive streak (13 and 18 hours), 21, 24, 28, 33, 36, 48, 72, and 96 hours of incubation (Hamilton and Hamburger stages).
3. Study of the developmental stages and life cycle of Drosophila from stock culture.

4. Study of different sections of placenta (photomicropgraph/ slides).
5. Project report on Drosophila culture/chick embryo development.
6. Study of developmental stages by raising chick embryo in the laboratory

TEXT BOOKS

1. Lewis Wolpert (2010). Principles of Development. II Edition, Oxford University Press.

2. Gilbert, S. F. (2017). Developmental Biology, XI Edition, Sinauer Associates, Inc., Publishers, Sunderland, Massachusetts, USA.

SUGGESTED READINGS

1. Carlson, R. F. Patten's Foundations of Embryology.
2. Kalthoff (2008). Analysis of Biological Development, II Edition, McGraw-Hill Publishers.
3. Verma PS and Agrawal VK, Chordata Embryology (2010) (S Chand Publication).

Core Paper XIV

Evolutionary Biology

Unit 1: Theories, Evidences of Evolution and Extinction

Life’s Beginnings: Chemogeny, RNA world, Biogeny, Origin of photosynthesis, Evolution of eukaryotes. Historical review of evolutionary concept: Lamarckism, Darwinism, Neo-Darwinism.Evidences of Evolution: Fossil record (types of fossils, transitional forms, geological time scale, evolution of horse, Sources of variations: Heritable variations and their role in evolution. Extinctions, Back ground and mass extinctions (causes and effects), detailed example of K-T extinction.

Unit 2: Process of Evolutionary changes

Population genetics: Hardy-Weinberg Law (statement and derivation of equation, application of law to human Population); Evolutionary forces upsetting H-W equilibrium; Natural selection (concept of fitness, selection coefficient, derivation of one unit of selection for a dominant allele, genetic load, mechanism of working, types of selection, density-dependent selection, heterozygous superiority, kin selection, adaptive resemblances, sexual selection). Genetic Drift (mechanism, founder’s effect, bottleneck phenomenon); Role of Migration and Mutation in changing allele frequencies.

Unit 3: Species concept and Speciation

Product of evolution: Micro evolutionary changes (inter-population variations, clines, races, Species concept, Isolating mechanisms, modes of speciation—allopatric, sympatric, Parapatric. Adaptive radiation / macroevolution (exemplified by Galapagos finches);

Unit 4: Concept of Origin and Evolution of man

Origin and evolution of man, Unique hominin characteristics contrasted with primate characteristics, primate phylogeny from Dryopithecus leading to Homo sapiens, molecular analysis of human origin. Phylogenetic trees, Multiple sequence alignment, construction and interpretation of phylogenetic trees.

PRACTICAL

1. Study of fossils from models/ pictures
2. Study of homology and analogy from suitable specimens
3. Study and verification of Hardy-Weinberg Law by chi square analysis
4. Demonstration of role of natural selection and genetic drift in changing allele frequencies using simulation studies
5. Graphical representation and interpretation of data of height/ weight of a sample of 100 humans in relation to their age and sex.
6. Construction of phylogenetic trees with the help of bioinformatics tools (Clustal X, Phylip, NJ) and its interpretation.

TEXT BOOKS

1. Campbell, N.A. and Reece J.B (2011). Biology. IX Edition. Pearson, Benjamin, Cummings.
2. Rastogi B.B., (2018). Organic Evolution, MedTech; 3rd edition

SUGGESTED READINGS

1. B.K. and Hallgrimson, B. (2008). Evolution IV Edition. Jones and Barlett Publishers.
2. Douglas, J. Futuyma (1997). Evolutionary Biology. Sinauer Associates. Snustad. S Principles of Genetics.
3. Ridley,M (2004) Evolution III Edition Blackwell publishing Hall.

Discipline Specific Elective Paper-1

Animal Behaviour and Chronobiology

Unit 1: Animal Behaviour

Origin and history of Ethology; Brief profiles of Karl von Frisch, Ivan Pavlov, Konrad Lorenz, Niko Tinbergen; Proximate and ultimate behavior; Objective of behaviour, Behaviour as a basis of evolution; Behaviour as a discipline of science; Innate behaviour, Instinct, Stimulus filtering, Sign stimuli and Code breakers.

Unit 2: Patterns of Behaviour

Stereotyped Behaviours (Orientation, Reflexes); Individual behavioural patterns; Instinct vs. Learnt Behaviour; Associative learning, classical and operant conditioning, Habituation, Imprinting.

Unit 3: Social and Sexual Behaviour

Social Behaviour: Concept of Society; Communication and the senses; Altruism; Insects' society with Honey bee as example; Foraging in honey bee and advantages of the waggle dance.

Sexual Behaviour: Asymmetry of sex, Sexual dimorphism, Mate choice, Intra-sexual selection (male rivalry), Inter-sexual selection (female choice), Sexual conflict in parental care.

Unit 4: Chronobiology

Historical developments in chronobiology; Biological oscillation: the concept of Average, amplitude, phase and period. Adaptive significance of biological clocks, Relevance of biological clocks, Types and characteristics of biological rhythms: Short- and Long-term rhythms; Circadian rhythms; Tidal rhythms and Lunar rhythms; Concept of synchronization and masking; Photic and non-photic zeitgebers; Circannual rhythms; Photoperiod and regulation seasonal reproduction of vertebrates; Role of melatonin.

PRACTICAL

1. To study nests and nesting habits of the birds and social insects.
2. To study the behavioural responses of wood lice in dry and humid condition.
3. To study geotaxis behaviour in earthworm.
4. To study the phototaxis behaviour in insect larvae.
5. Study and actogram construction of locomotor activity of suitable animal models.
6. Study of circadian functions in humans (daily eating, sleep and temperature patterns).
7. Visit to Forest/ Wild life Sanctuary/Biodiversity Park/Zoological Park to study behavioral activities of animals and prepare a short report.

TEXT BOOKS

1. John A (2009) Animal Behaviour.9th edition, Sinauer Associate Inc., USA.
2. Vinod Kumar (2002) Biological Rhythms: Narosa Publishing House, Delhi/ Springer-Verlag, Germany.

SUGGESTED READINGS

1. AK Pati. Chronobiology: The Dimension of Time in Biology and Medicine. PINSA (Bilogical Sciences). Part B 67 (6). 323-372, Dec., 2001.
2. David McF. Animal Behaviour. Pitman Publishing Limited, London, UK.
3. Manning A and Dawkins MS. An Introduction to Animal Behaviour. Cambridge University Press, USA.
4. Paul WS and John A (2013) Exploring Animal Behaviour. 6th Edition. Sinauer Associate Inc., Massachusetts, USA.
5. Jay. C. Dunlap, Jennifer. J. Loros, Patricia J. DeCoursey (ed). 2004, Chronobiology Biological Timekeeping: J, Sinauer Associates, Inc. Publishers, Sunderland, MA, USA.

OR

Animal Biotechnology

Unit 1. Introduction to Animal Biotechnology

Concept and scope of biotechnology, Cloning vectors: Plasmids, Cosmids, Phagemids, Lambda Bacteriophage, M13, BAC, YAC and Expression vectors (characteristics).

Restriction enzymes: Nomenclature, detailed study of Type II, Construction of genomic and cDNA libraries and screening by colony and plaque hybridization Transformation techniques: Calcium chloride method and electroporation

Unit 2. Molecular Techniques

Southern, Northern and Western blotting, DNA sequencing: Sanger method Polymerase Chain Reaction, DNA Finger Printing and DNA microarray

Unit 3. Genetically Modified Organisms

Production of cloned and transgenic animals: Nuclear Transplantation, Retroviral Method, DNA microinjection, Applications of transgenic animals: Production of pharmaceuticals, production of donor organs, knock-out mice.

Unit 4. Culture Techniques and Applications

Animal cell culture, Expressing cloned genes in mammalian cells, Molecular diagnosis of genetic diseases (Cystic fibrosis, Thalassemia, Haemophilia and Sickle cell anemia),Recombinant DNA in medicines: Recombinant insulin and human growth hormone, Gene therapy.

PRACTICAL

1. Genomic DNA isolation from E. coli / Animal tissue
2. Plasmid DNA isolation (pUC 18/19) from E. coli
3. Restriction digestion of plasmid DNA / Lambda Phage DNA
4. Construction of circular and linear restriction map from the data provided.
5. Calculation of transformation efficiency from the data provided.
6. To study following techniques through photographs
    a. Southern Blotting
    b. Northern Blotting
    c. Western Blotting
    d. DNA Sequencing (Sanger's Method)
    e. PCR
    f. DNA fingerprinting

TEXT BOOKS

1. BD Singh, (2014) Biotechnology: Expanding Horizons, Kalyani Publishers
2. U.Satyanarayan and U Chakrapani, (2014) Biotechnology, Books & Allied Ltd

SUGGESTED READINGS

1. Griffiths, A.J.F., J.H. Miller, Suzuki, D.T., Lewontin, R.C. and Gelbart, W.M. (2009). An Introduction to GeneticAnalysis. IX Edition. Freeman and Co., N.Y.,USA.
2. Watson, J.D., Myers, R.M., Caudy, A. and Witkowski, J.K. (2007). Recombinant DNA- Genes and Genomes- AShort Course. III Edition, Freeman and Co., N.Y.,USA.
3. Brown, T.A. (2015). Gene Cloning and DNA Analysis. 7th Edition, Academic Press, California, USA.

OR

ENDOCRINOLOGY

Unit 1: Introduction to Endocrinology

History of endocrinology, Types of endocrine glands and hormones, Characteristic and Transport of Hormones, Neurosecretions and Neurohormones.

Unit 2: Epiphysis, Hypothalamo-hypophysial Axis

Structure of pineal gland, Secretions and their functions in biological rhythms and reproduction. Structure of hypothalamus, Hypothalamic nuclei and their functions, Regulation of neuroendocrine glands, Feedback mechanisms Structure of pituitary gland, Hormones and their functions, Hypothalamohypophysial portal system, Disorders of pituitary gland.

Unit 3: Peripheral Endocrine Glands

Structure, Hormones, Functions and Regulation of Thyroid gland, Parathyroid, Adrenal, Pancreas. Structure, Hormones, Functions and Regulation of Ovary and Testis.
Hormones in homeostasis, Disorders of endocrine glands.

Unit 4: Regulation of Hormone Action

Hormone action at Cellular level: Hormone receptors, transduction and regulation Hormone action at Molecular level: Molecular mediators, Genetic control of hormone action.

PRACTICAL

1. Dissect and display of Endocrine glands in laboratory bred rat*
2. Study of the permanent slides of all the endocrine glands
3. Compensatory ovarian/ adrenal hypertrophy in vivo bioassay in laboratory bred rat*
4. Demonstration of Castration/ ovariectomy in laboratory bred rat*
5. Estimation of plasma level of any hormone using ELISA
6. Designing of primers of any hormone
7. Report on endocrine disorders in human

(*Subject to UGC guidelines)

TEXT BOOKS

1. C. Donnell Turner (2012) General Endocrinology Pub- Affiliated East-West press Pvt. Ltd.-New Delhi; 6th Edition
2. Hadley, M.E. and Levine J.E. (2007). Endocrinology, 6th Edition. Pearson Prentice-Hall, Pearson Education Inc., New Jersey

SUGGESTED READINGS

1. Stephen Nussey and Saffron Whitehead (2001). Endocrinology: An Integrated Approach; Oxford: BIOS Scientific Publishers

Discipline Specific Elective Paper-1I

Basics of Neuroscience

Unit 1: Introduction to Neuroscience & Nervous System

Origins of Neuroscience; Neuroanatomy, Neurophysiology, and Systems Neurobiology. Introduction to the structure and function of the nervous system: Cellular components: Neurons; Neuroglia; Neuron doctrine; The prototypical neuron – axons and dendrites as unique structural components of neurons.

UNIT 2: Cellular and Molecular Neurobiology

Molecular and cellular approaches used to study the CNS at the level of single molecules, The ionic bases of resting membrane potential; The action potential- its generation and properties; The action potential conduction. Synapse: Synaptic transmission, Types of synapses; synaptic function; Principles of chemical synaptic transmission; Principles of synaptic integration; EPSPs and IPSPs. Ion channels, Neural transmission.

Unit 3. Neurotransmitters

Different types of neurotransmitters– catecholamines, amino acidergic and peptidergic neurotransmitters; Transmitter gated channels; G-protein coupled receptors and effectors, neurotransmitter receptors; Ionotropic and metabotropic receptors.

UNIT 4: Neurobiology and Neuropharmacology of Behaviour

The principles of signal transduction and information processing in the vertebrate central nervous system, and the relationship of functional properties of neural systems with perception and behavior; sensory systems, molecular basis of behavior including learning and memory. Molecular pathogenesis of pain and neurodegenerative diseases such as Parkinson’s, Alzheimer’s, psychological disorders, Addiction.

PRACTICAL

1. Dissection and study of Drosophila nervous system using GFP reporter.
2. Observation and quantitation of Drosophila photoreceptor neurons in healthy and diseased condition.
3. Nerve Cell preparation from the spinal cord.
4. Study of neurons and/ or myelin by Nissl, Giemsa or Luxol Fast Blue staining.
5. Study of olfaction in Drosophila.
6. Study of novelty, anxiety and spatial learning in mice.

TEXT BOOKS

1. Kandel, Schwartz and Jessell (2000) Principles of Neural Science-4th Edn-Eds. - McGraw- Hill Companies
2. Mark F. Baer; Barry W. Connors,(2015) Neuroscience: Exploring the brain . Lippincott Williams and Wilkins

SUGGESTED READINGS

1. From Molecules to Networks: An Introduction to Cellular and Molecular Neuroscience by John H. Byrne. Ruth Heidelberg and M. Neal Waxham.
2. Neuroscience-Eds. Dale Purves (3rd Edn)-Sinauer Associates, Inc.-2004.
3. Nerve Cells and Animal Behaviour-2nd Edn-Peter J Simmons and David Young-CUP-2003.
4. Essential Psychopharamacology- Neuroscientific Basis and Practical Applications-2nd Edn.-Stephan M. Stahl-CUP-2000.
5. Phantoms in the Brain - Vilayanur S. Ramachandran and Sandra Blakeslee-1998 The Human Brain Book - Rita Carter-2009

OR

Reproductive Biology

Unit 1: Reproductive System and Endocrinology

Reproductive System: Development and differentiation of gonads, genital ducts, external genitalia,mechanism of sex differentiation.

Gonadal hormones and mechanism of hormone action, steroids, glycoprotein hormones, and prostaglandins, hypothalamo – hypophyseal – gonadal axis, regulation of gonadotrophin secretion in male and female.

Unit 2: Functional anatomy of male reproduction

Outline and histology of male reproductive system in rat and human; Testis: Cellular functions, germ cell, system cell renewal; Spermatogenesis: kinetics and hormonal regulation; Androgen synthesis and metabolism; Epididymal function and sperm maturation; Accessory glands functions; Sperm transportation in male tract

Unit 3: Functional anatomy of female reproduction

Outline and histology of female reproductive system in rat and human; Ovary: folliculogenesis, ovulation, corpus luteum formation and regression; Steroidogenesis and secretion of ovarian hormones; Reproductive cycles (rat and human) and their regulation, changes in the female tract; Ovum transport in the fallopian tubes; Sperm transport in the female tract, fertilization, prevention of polyspermy; Hormonal control of implantation; Hormonal regulation of gestation, pregnancy diagnosis, foeto- maternal relationship; Mechanism of parturition and its hormonal regulation; Lactation and its regulation

Unit 4: Reproductive Health

Infertility in male and female: causes, diagnosis and management; Assisted Reproductive Technology: sex selection, sperm banks, frozen embryos, in vitro fertilization, ET, EFT, IUT, ZIFT, GIFT, ICSI, PROST; Modern contraceptive technologies; Demographic terminology used in family planning.

PRACTICAL

Study of animal house: set up and maintenance of animal house, breeding techniques, care of normal and experimental animals.

1. Examination of vaginal smear rats from live animals.
2. Surgical techniques: principles of surgery in endocrinology. Ovarectomy, hysterectorny, castration and vasectomy in rats.
3. Examination of histological sections from photomicrographs/ permanent slides of rat/human: testis, epididymis and accessory glands of male reproductive systems; Sections of ovary, fallopian tube, uterus (proliferative and secretory stages), cervix and vagina.
4. Human vaginal exfoliate cytology.
5. Sperm count and sperm motility in rat
6. Study of modern contraceptive devices.

TEXT BOOKS

1. Austin, C.R. and Short, R.V. (1982) Reproduction in Mammals. Cambridge University Press.
2. C. Donnell Turner (2012) General Endocrinology Pub- Affiliated East-West press Pvt. Ltd.-New Delhi; 6th Edition
3. Tandulwadkar Sunita R (2015) The Art & Science of Assisted Reproductive Technology,Jaypee Brothers Medical Publishers

SUGGESTED READINGS

1. Tony M. Plant and Anthony J. Zeleznik (2015) Knobil and Neill's Physiology of Reproduction, Academic Press

OR

Immunology

Unit 1: Innate and Adaptive Immunity

Historical perspective of Immunology, Early theories of Immunology, Cells and organs of the Immune system. Anatomical barriers, Inflammation, Cell and molecules involved in innate immunity, Adaptive immunity (Cell mediated and humoral), Passive: Artificial and natural Immunity, Active: Artificial and natural Immunity, Immune dysfunctions (brief account of autoimmunity with reference to Rheumatoid Arthritis and tolerance, AIDS).

Unit 2: Antigens and Immunoglobulins

Antigenicity and immunogenicity, Immunogens, Adjuvants and haptens, Factors influencing immunogenicity, B and T-Cell epitopes, Immunoglobulins: Structure and functions of different classes of immunoglobulins, Antigen antibody interactions, Immunoassays (ELISA-Direct, Indirect, Competitive, Sandwich and RIA)

Unit 3: Major Histocompatibility Complex, Cytokines and Complement system

Structure and functions of MHC molecules. Endogenous and exogenous pathways of antigen processing and presentation; Cytokines -Properties and functions of cytokines, Therapeutics Cytokines Complement System **-**Components and pathways of complement activation.

Unit 4: Hypersensitivity and Vaccines

Gell and Coombs' classification and brief description of various types of hypersensitivities Vaccines **-v**arious types of vaccines, Advances in vaccine production.

PRACTICAL

1. Study of lymphoid organs.
2. Histological study of spleen, thymus and lymph nodes through slides/ photographs
3. Preparation of stained blood film to study various types of White blood cells.
4. ABO blood group determination.
5. Total WBC counting.
6. Demonstration of ELISA.
7. Demonstration of Bone marrow smears to study Immune cells.

TEXT BOOKS

2. Abbas K. Abul and Lechtman H. Andrew (2017) Cellular and Molecular Immunology. V Edition. Saunders Publication.
3. Kindt, T. J., Goldsby, R.A., Osborne, B. A. and Kuby, J (2017). Immunology, VI Edition. W.H. Freeman and Company.

SUGGESTED READINGS

1. Peter J. Delves and Seamus J. Martin (2017) Roitt′s Essential Immunology, Wiley-Blackwell; 13th edition

Discipline Specific Elective Paper-III

Fish and Fisheries

Unit 1: Systematics, Morphology and Physiology

Systematic classification of native/exotic fishes (upto classes), Types of fins and their modification; Locomotion in fishes; Hydrodynamics; Types of scales, Use of scales in classification and determination of age of fish; Gills and gas exchange; Swim bladder; Reproductive strategies (Special reference to Indian fishes); Electric organs; Bioluminescence; Mechanoreceptors; Schooling; Migration

Unit 2: Fisheries

Inland fisheries; Marine fisheries; Environmental factors influencing the seasonal variation in fish; Fishing crafts and Gears; Depletion of Fisheries resources; Fisheries laws and regulations.

Unit 3: Aquaculture

Sustainable aquaculture; Extensive, semi-intensive and intensive culture of fish; Polyculture; Composite fish culture; brood stock management; Induced breeding of fish; Management of fin fish hatcheries; Preparation and maintenance of fish aquarium. Factors affecting aquaculture.

Unit 4:Fish Pathology and Transgenesis

Fish diseases: bacterial, viral and parasites; Preservation, diagnosis and treatment, Processing of harvested fish, Fishery byproducts; Transgenic fish, zebrafish as a model organism in research.

PRACTICAL

1. Study of Petromyzon, Myxine, Pristis, Chimaera, Exocoetus, Hippocampus, Gambusia, Labeo, Heteropneustes, Anabas
2. Study of different types of scales (Through permanent slides and photographs)
3. Study of crafts and gears used in fisheries.
4. Water quality criteria for aquaculture: assessment of pH, conductivity, total solids and total dissolve solids.
5. Study of air breathing organs in Channa, Heteropneustes, Anabas and Clarias.
6. Demonstration of induced breeding in fishes (Virtual).
7. Demonstration of parental care in fishes (Virtual).
8. Project report on a visit to any fish farm/ pisciculture unit/ zebra fish rearing lab

TEXT BOOKS

1. Q Bone and R Moore (2008), Biology of fishes, Taylor and Francis group, CRC Press, UK
2. S.S. Khanna and H.R. Singh (2014) A textbook of fish biology and fisheries, Narendra Publishing House, 3rd edition.

SUGGESTED READINGS

1. D H Evans and J D Claiborne, The Physiology of fishes, Taylor and Francis group, CRC, UK
2. R J Mogdans and B G Kapoor, The senses of fish: Adaptations for the reception of natural stimuli, Springer, Natherland

3. C B L Srivastava, Fish biology, Narendra Publishing House
4. J R Norman, A History of fishes, Hill and Wang Publishers.

OR

Wildlife Conservation And Management

Unit 1: Wildlife

Values of wild life - positive and negative; Conservation ethics; Importance of conservation; Causes of depletion; World conservation strategies, Conservation and protection Laws, wild animal of India and Odisha.

Habitat analysis, Physical parameters: Topography, Geology, Soil and water; Biological Parameters: food, cover, forage, browse and cover estimation; Standard evaluation procedures: remote sensing and GIS.

Unit 2: Management of habitats

Setting back succession; Grazing logging; Mechanical treatment; Advancing thesuccessional process; Cover construction; Preservation of general genetic diversity;Restoration of degraded habitats, In situ and Ex situ conservation, Wild life Protection act, wildlife trade and related laws.

Unit 3: Population estimation

Population density, Natality, Birth rate, Mortality, fertility schedules and sex ratio computation; Faecal analysis of ungulates and carnivores: Faecal samples, slide preparation, Hair identification, Census methods; Bio- telemetry; Care of injured and diseased animal; Quarantine; Common diseases of wild animals.

Unit 4: Management planning of wildlife in protected areas

Estimation of carrying capacity; Eco tourism / wild life tourism in forests; Concept of climax persistence; Ecology of perturbence, National parks & sanctuaries, Community reserve; Important features of protected areas in India; Tiger conservation - Tiger reserves in India; Management challenges in Tiger reserve.

PRACTICAL

1. Identification of flora, mammalian fauna, avian fauna, herpeto-fauna India and Odisha.
2. Demonstration of basic equipment needed in wildlife studies use, care and maintenance (Compass, Binoculars, Spotting scope, Range Finders, Global Positioning System,Various types of Cameras and lenses).
3. Familiarization and study of animal evidences in the field; Identification of animals through pug marks, hoof marks, scats, pellet groups, nest, antlers, animal sounds.
4. Demonstration of different field techniques for flora and fauna.
5. Trail / transect monitoring for abundance and diversity estimation of mammals and bird (direct and indirect evidences)
6. Submission of field study report (national park/ reserve forest/ sanctuary)

TEXT BOOKS

1. Gopal Rajesh (2011) Fundamentals of Wildlife Management, Natraj Publishers.
2. Caughley, G., and Sinclair, A.R.E. (1994). Wildlife Ecology and Management. Blackwell Science.

SUGGESTED READINGS

1. Woodroffe R., Thirgood, S. and Rabinowitz, A. (2005). People and Wildlife, Conflict or Co-existence? Cambridge University.
2. Bookhout, T.A. (1996). Research and Management Techniques for Wildlife and Habitats, 5 th edition. The Wildlife Society, Allen Press.
3. Sutherland, W.J. (2000). The Conservation Handbook: Research, Management and Policy. Blackwell Sciences.
4. Hunter M.L., Gibbs, J.B. and Sterling, E.J. (2008). Problem-Solving in Conservation Biology and Wildlife Management: Exercises for Class, Field, and Laboratory.Blackwell Publishing.

Discipline Specific Elective Paper-IV

Economic Zoology

Unit 1: Bee-keeping and Bee Economy (Apiculture)

Varieties of honey bees and Bee pasturage; Setting up an apiary: Langstroth’s/Newton’s hive, bee veil, brood and storage chambers, iron frames and comb sheets, drone excluder, rearing equipments, handling of bees, artificial diet; Honey extraction techniques; Physico-chemical analysis of honey; Other beneficial products from bee.

Unit 2: Silk and Silk Production (Sericulture)

Different types of silk and silk worms in India; Rearing of Bombyx mori, Rearing racks and trays, disinfectants, rearing appliances, black boxing, Chawki rearing, bed cleaning, mountages, harvesting of cocoons; Silkworm diseases: Pebrine, Flacherie, Grasserie, Muscardine and Aspergillosis, and their management; Silkworm pests and parasites: Uzi fly, Dermestid beetles and their management; Silk reeling techniques and Quality assessment of silk fibre.

Unit 3: Aquaculture

Induced breeding of fish; Management of hatchery of fish; Management of nursery, rearing and stocking ponds; Preparation and maintenance of fish aquarium; Preparation of compound diets for fish; Role of water quality in aquaculture; Fish diseases: Bacterial, viral and parasitic; Preservation and processing of harvested fish; Fishery by-products. Prawn farming; Culture of crab; Pearl culture.

Unit 4: Dairy and Poultry Farming

Introduction; Indigenous and exotic breeds; Rearing, housing, feed and rationing; Commercial importance of dairy and poultry farming; Varietal improvement techniques; Diseases and their management; Dairy or poultry farm management and business plan; Visit to any dairy farm or Poultry farm.

PRACTICAL

1. Submission of report on anyone field visits related to Aquaculture/Apiculture/ Sericulture/Poultry/ Dairy farm.
2. Study of different types of bees (Queens, Drones and Worker bees).
3. Study of different types of silk moths.
4. Study of different types of pearls.
5. Study of different types of fish diseases.
6. Identification of different types of scales in fishes.
7. Study of different types of fins.

8. Study of different modified structures of fishes (Saw of sawfish, Hammer of hammer head fish, tail of sharks etc.)
9. Identification of various types of natural silks.

TEXT BOOKS

1. Sarkar, Kundu and Chaki. (2014) Introduction to Economic Zoology. NCBA Publisher.
2. T.V.R. Pillay (Author), M.N. Kutty (2011) Aquaculture: Principles and Practices, Wiley India Pvt Ltd; Second edition

SUGGESTED READINGS

1. Dhyan Singh Bisht, Apiculture, ICAR Publication.
2. Dunham RA (2004) Aquaculture and Fisheries Biotechnology – Genetic Approaches. CABI publications, U.K.
3. Hafez ESE (1962) Reproduction in Farm Animals. Lea and Fabiger Publishers.
4. Knobil E and Neill JD (2006) The Physiology of Reproduction. Vol.2. Elsevier Publishers, USA.
5. Prost PJ (1962) Apiculture. Oxford and IBH, New Delhi.
6. Singh S. Beekeeping in India, Indian council of Agricultural Research, New Delhi.
7. Srivastava CBL (1999) Fishery Science and Indian Fisheries. Kitab Mahal publications, India.

OR

Project Work

Each student has to undertake a project work under the guidance of a teacher and submit the project report in the form of a thesis. There will be a presentation of the project work before an external examiner.

Generic Elective Paper I

Animal Diversity

Unit 1: Protista, Porifera, Radiata, Aceolomates and Pseudocoelomates

General characters of Protozoa; Life cycle of Plasmodium, General characters and canal system in Porifera, General characters of Cnidarians and polymorphism, General characters of Helminthes; Life cycle of Taenia solium, General characters of Nemethehelminthes; Parasitic adaptations

Unit 2: Coelomate Protostomes, Arthropoda, Mollusca and Coelomate Deuterostomes

General characters of Annelida, Metamerism, General characters, Social life in insects,General characters of mollusca, torsion in gastropod, pearl formation, General characters of Echinodermata, larval form in Echinodermata.

Unit 3: Protochordata , Pisces, Amphibia

Salient features, Osmoregulation, Migration of Fishes, General characters, Adaptations for terrestrial life, Parental care in Amphibia.

Unit 4: Reptiles, Aves and Mammals

Amniotes, Origin of reptiles, Terrestrial adaptations in reptiles, Origin of birds; Flight adaptations, early evolution of mammals; Primates; Dentition in mammals.

PRACTICAL

1. Study of following specimens:

Non Chordates: Euglena, Noctiluca, Paramecium, Sycon, ,Physalia, Tubipora,
Metridium, Taenia, Ascaris, Nereis, Aphrodite, Leech, Peripatus, T. gigas, Limulus, Hermitcrab, Daphnia, Millipede, Centipede, Beetle, Chiton, Dentalium, Octopus, Asterias and Antedon.

Chordates: Balanoglossus, Amphioxus, Petromyzon, Pristis, Hippocampus, Labeo,
Icthyophis/Uraeotyphlus, Salamander, Rhacophorus Draco, Uromastix, Naja, Viper, model of Archaeopteryx, any three common birds-(Crow, duck, Owl), Squirrel and Bat.

2. Study of following Permanent Slides:

Cross section of Sycon, Sea anemone and Ascaris (male and female). T. S. of Earthworm passing through pharynx, gizzard, and typhlosolar intestine. Bipinnaria and Pluteus larva

3. Temporary mounts of Septal & pharyngeal nephridia of earthworm.

Unstained mounts of Placoid, cycloid and ctenoid scales.

TEXT BOOKS

1.Kotpal RL. (2016) Modern Textbook of Zoology –Vertebrates; Rastogi Publications – Meerut.

2. Kotpal RL.(2016) Modern Textbook of Zoology –Invertebrates; Rastogi Publications – Meerut.

SUGGESTED READINGS

1. Barnes, R.D. (1992). Invertebrate Zoology. Saunders College Pub. USA.
2. Campbell & Reece (2005). Biology, Pearson Education, (Singapore) Pvt. Ltd.
3. Raven, P.H. and Johnson, G. B. (2004). Biology, 6th edition, Tata McGraw Hill Publications, New Delhi.
4. Kardong, K.V. (2002). Vertebrates Comparative Anatomy. Function and Evolution. Tata McGraw Hill Publishing Company. New Delhi.

OR

Insect Vectors and Diseases

Unit 1: Insects, Concept of Vectors, Insects as Vectors

General Features of Insects, Morphological features, Head – Eyes, Types of antennae, Mouth parts with reference to. feeding habits, Brief introduction of Carrier and Vectors (mechanical and biological vector),Reservoirs, Host-vector relationship, Vectorial capacity, Adaptations as vectors, Host Specificity, Classification of insects up to orders, detailed features of orders with insects as vectors – Diptera, Siphonaptera, Siphunculata, Hemiptera

Unit 2: Dipteran as Disease Vectors

Dipterans as important insect vectors – Mosquitoes, Sand fly, Houseflies; Study of mosquito-borne diseases – Malaria, Dengue, Chikungunya, Viral encephalitis, Filariasis; Control of mosquitoes Study of sand fly-borne diseases – Visceral Leishmaniasis, Cutaneous Leishmaniasis, Phlebotomus fever; Control of Sand fly, Study of house fly as important mechanical vector, Myiasis, Control of house fly

Unit 3: Siphonaptera and Siphunculata as Disease Vectors

Fleas as important insect vectors; Host-specificity, Study of Flea-borne diseases – Plague, Typhus fever; Control of fleas, Human louse (Head, Body and Pubic louse) as important insect vectors; Study of louse-borne diseases –Typhus fever, Relapsing fever, Trench fever, Vagabond’s disease, Phthiriasis; Control of human louse

Unit 4: Hempitera as Disease Vectors

Bugs as insect vectors; Blood-sucking bugs; Chagas disease, Bed bugs as mechanical vectors, Control and prevention measures

PRACTICAL

1. Study of different kinds of mouth parts of insects
2. Study of following insect vectors through permanent slides/ photographs: Aedes, Culex, Anopheles, Pediculushumanuscorporis, Phithirus pubis, Xenopsylla cheopis, Cimexlectularius, Phlebotomus argentipes, Musca domestica through permanent slides/ photographs
3. Study of different diseases transmitted by above insect vectors.
4. Submission of a project report on any one of the insect vectors and disease transmitted.

TEXT BOOKS

1. Mathews, G. (2011). Integrated Vector Management: Controlling Vectors of Malaria and Other Insect Vector Borne Diseases. Wiley-Blackwel
2. Chapman, R.F. (1998). The Insects: Structure and Function. IV Edition, Cambridge University Press, UK

SUGGESTED READINGS

1. Mike Service (2012) Medical Entomology for StudentsCambridge University Press; 5th edition.
2. Pedigo L.P. (2002). Entomology and Pest Management. Prentice Hall Publication

5

Generic Elective Paper II

Aquatic Biology

UNIT 1: Aquatic Biomes

Brief introduction of the aquatic biomes: Freshwater ecosystem (lakes, wetlands,
Streams and rivers), estuaries, intertidal zones, oceanic pelagic zone, marine benthic zone and coral reefs

UNIT 2: Freshwater Biology

Lakes: Origin and classification, Lake as an Ecosystem, Lake morphometry,
Physico–chemical Characteristics: Light, Temperature, Thermal stratification,
Dissolved Solids, Carbonate, Bicarbonates, Phosphates and Nitrates, Turbidity; dissolved gases (Oxygen, Carbon dioxide). Nutrient Cycles in Lakes-Nitrogen,
Sulphur and Phosphorous

Streams: Different stages of stream development, Physico-chemical, environment, Adaptation of hill-stream fishes.

UNIT 3: Marine Biology

Salinity and density of Sea water, Continental shelf, Adaptations of deep sea organisms, Coral reefs, Sea weeds.

UNIT 4: Management of Aquatic Resources

Causes of pollution: Agricultural, Industrial, Sewage, Thermal and Oil spills, Eutrophication, Management and conservation (legislations), Sewage treatment Water quality assessment-BOD and COD.
015

PRACTICAL

1. Determine the area of a lake using graphimetric and gravimetric method.
2. Identify the important macrophytes, phytoplanktons and zooplanktons present in a lake ecosystem.
3. Determine the amount of Turbidity/transparency, Dissolved Oxygen, Free, Carbon dioxide, Alkalinity (carbonates & bicarbonates) in water collected from nearby lake/ water body.
4. Instruments used in limnology (Secchi disc, Van Dorn Bottle, Conductivity meter, Turbidity meter, PONAR grab sampler) and their significance.
5. A Project Report on a visit to a Sewage treatment plant/Marine bioreserve/ Fisheries Institutes.

TEXT BOOKS

1. Wetzel RG (2001)Limnology: Lake and River Ecosystems, Academic Press; 3rd edition

SUGGESTED READINGS

1. Anathakrishnan : Bioresources Ecology 3rd Edition
2. Odum and Barrett : Fundamentals of Ecology, 5th Edition
3. Pawlowski: Physicochemical Methods for Water and Wastewater Treatment, 1st Edition
4. Trivedi and Goyal : Chemical and biological methods for water pollution studies
5. Welch : Limnology Vols. I-II

OR

Food, Nutrition And Health

Unit 1: Basic concept of food and nutrition

Food Components and food-nutrients, Concept of a balanced diet, nutrient needs and dietary pattern for various groups, adults, pregnant and nursing mothers, infants, school children, adolescents and elderly

Unit 2: Nutritional Biochemistry:

Carbohydrates, Lipids, Proteins- Definition, Classification, their dietary source and role Vitamins- Fat-soluble and Water-soluble vitamins- their dietary source and importance Minerals- Iron, calcium, phosphorus, iodine, selenium and zinc: their biological functions

Unit 3: Health

Introduction to health- Definition and concept of health, Major nutritional Deficiency diseases- Protein Energy Malnutrition (kwashiorkor and marasmus), Vitamin A deficiency disorders, Iron deficiency disorders, Iodine deficiency disorders- their causes, symptoms, treatment, prevention and government programmes, if any. Life style related diseases- hypertension, diabetes mellitus, and obesity- their causes and prevention through dietary and lifestyle modifications, Social health problems- smoking, alcoholism, drug dependence and Acquired Immuno Deficiency Syndrome (AIDS) - their causes, treatment and prevention, Common ailments- cold, cough, and fevers, their causes and treatment

Unit 4: Food hygiene:

Potable water- sources and methods of purification at domestic level Food and Water borne infections: **Bacterial infection**: Cholera, typhoid fever, dysentery; **Viral infection**: Hepatitis, Poliomyelitis, **Protozoan infection**: amoebiasis, giardiasis; **Parasitic infection**: taeniasis and ascariasis their transmission, causative agent, sources of infection, symptoms and prevention. Brief account of food spoilage: Causes of food spoilage and their preventive measures
01

PRACTICAL

1. To detect adulteration in a) Ghee b) Sugars c) Tea leaves and d) Turmeric
3. Estimation of Lactose in milk
4. Ascorbic acid estimation in food by titrimetry
5. Estimation of Calcium in foods by titrimetry
6. Study of the stored grain pests from slides/ photograph (Sitophilus oryzae, Trogoderma granarium, Callosobruchus chinensisand Tribolium castaneum): their identification, habitat and food sources, damage caused andcontrol. Preparation of temporary mounts of the above stored grain pests.
7. Project- Undertake computer aided diet analysis and nutrition counseling for different age groups. OR Identify nutrient rich sources of foods **(fruits and vegetables),** their seasonal availability and price OR Study of nutrition labeling on selected foods

TEXT BOOKS

1. Mudambi, SR and Rajagopal, MV (2018). Fundamentals of Foods, Nutrition and Diet Therapy; Sixth Ed; New Age International Publishers.
2. Bamji MS, Rao NP, and Reddy V.(2017) Text Book of Human Nutrition; Oxford & IBH Publishing Co. Pvt Ltd., 4th edition

SUGGESTED READINGS

1. Srilakshmi B. Nutrition Science; 2002; New Age International (P) Ltd.
2. Srilakshmi B. Food Science; Fourth Ed; 2007; New Age International (P) Ltd.
3. Swaminathan M. Handbook of Foods and Nutrition; Fifth Ed; 1986; BAPPCO

Generic Elective Paper III

Human Physiology

Unit 1: Digestion and Respiratory Physiology

Structure and function of digestive glands; Digestion and absorption of carbohydrates, fats and proteins; Nervous and hormonal control of digestion (in brief), Ventilation, External and internal Respiration, Transport of oxygen and carbon dioxide in blood, Factors affecting transport of gases.

Unit 2: Functioning of Excitable Tissue (Nerve and Muscle)

Structure of neuron, Propagation of nerve impulse (myelinated and non-myelinated nerve fiber); Structure of skeletal muscle, Mechanism of muscle contraction (Sliding filament theory), Neuromuscular junction

Unit 3: Renal Physiology and Cardiovascular Physiology

Functional anatomy of kidney, Mechanism and regulation of urine formation, Structure of heart, Coordination of heartbeat, Cardiac cycle, ECG

Unit 4: Endocrine and Reproductive Physiology

Structure and function of endocrine glands (pituitary, thyroid, parathyroid, pancreas, adrenal, ovaries, and testes), Brief account of spermatogenesis and oogenesis, Menstrual cycle.

PRACTICAL

1. Preparation of temporary mounts: Neurons and Blood film.
2. Preparation of haemin and haemochromogen crystals.
3. Estimation of haemoglobin using Sahli’s haemoglobinometer.
4. Examination of permanent histological sections of mammalian oesophagus, stomach, duodenum, rectum, lung, kidney, thyroid, pancreas, adrenal, testis, ovary.

TEXT BOOKS

1.Marieb EN and Hoehn K, (2015) Human Physiology, 10th global edition, Pearson Education, USA.

2. Guyton, A.C. and Hall, J.E. (2011). Textbook of Medical Physiology, XII Edition, Harcourt Asia Pvt. Ltd/ W.B. Saunders Company.

SUGGESTED READINGS

1. Widmaier, E.P., Raff, H. and Strang, K.T. (2008). Vander’s HumanPhysiology, XI Edition, McGraw Hill.
2. Kesar, S. and Vashisht, N. (2007). Experimental Physiology, Heritage Publishers.
3. Prakash, G. (2012). Lab Manual on Blood Analysis and Medical Diagnostics, S. Chand and Company Ltd.
4. Tortora, G.J. and Derrickson, B.H. (2009). Principles of Anatomy and Physiology, XII Edition, John Wiley and Sons, Inc.

OR

Environment and Public Health

UNIT 1: Environmental hazards

Sources of Environmental hazards, hazard identification and accounting, fate of toxic and persistent substances in the environment, dose Response Evaluation, exposure Assessment.

UNIT 2: Pollution

Air, water, noise pollution sources and effects, Pollution control; Greenhouse gases and global warming, Acid rain, Ozone layer destruction, Effect of climate change on public health

Unit 3: Waste Management Technologies

Sources of waste, types and characteristics, Sewage disposal and its management,
Solid waste disposal, biomedical waste handling and disposal, nuclear waste handling and disposal, Waste from thermal power plants, Case histories on Bhopal gas tragedy, Chernobyl disaster, Seveso disaster and Three Mile Island accident and their aftermath

Unit 4 Diseases

Causes, symptoms and control of: Tuberculosis, Asthma, Cholera, Typhoid, Malaria and AIDS

PRACTICAL (Credits 2)

1. To determine pH, Cl, SO_4, NO_3 in soil and water samples from different locations.

TEXT BOOKS

1. Cutter, S.L. (1999) Environmental Risk and Hazards, Prentice-Hall of India Pvt. Ltd., New Delhi.
2. Park K (2017) Parks Text Book Of Preventive & Social Medicine, Banarsidas Bhanot Publishers

SUGGESTED BOOKS

1. Kolluru Rao, Bartell Steven, Pitblado R and Stricoff 1996. “Risk Assessment and Management Handbook”, McGraw Hill Inc., New York.
2. Kofi Asante Duah 1998 “Risk Assessment in Environmental management”, John Wiley and sons, Singapore.
3. Kasperson, J.X. and Kasperson, R.E. and Kasperson,R.E., 2003. Global Environmental Risks, V.N.University Press, New York,
4. Joseph F Louvar and B Diane Louver 1997 Health and Environmental Risk Analysis fundamentals with applications, Prentice Hall, New Jersey.
5. Wardlaw GM, Hampl JS. Perspectives in Nutrition; Seventh Ed; 2007; McGraw Hill.
6. Lakra P, Singh MD. Textbook of Nutrition and Health; First Ed; 2008; Academic Excellence.
7. Manay MS, Shadaksharaswamy. Food-Facts and Principles; 1998; New Age International (P) Ltd.

Generic Elective Paper IV

Animal Biotechnology

UNIT 1: Introduction and Techniques in Gene manipulation

Concept and Scope of Biotechnology, Outline process of genetic engineering and recombinant DNA technology, Isolation of genes, Concept of restriction and modification: Restriction endonucleases, DNA modifying enzymes, Cloning Vectors: Plasmids, Phage vectors, Cosmids, Phagemids, BAC, YAC, HAC. Shuttle and Expression Vectors**,** Construction of Genomic libraries and cDNA libraries, Transformation techniques: microbial, plants and animals: Cloning in mammalian cells, Integration of DNA into mammalian genome- Electroporation and Calcium, Phosphate Precipitation method.

UNIT2: Animal cell Culture

Basic techniques in animal cell culture and organ culture, Primary Culture and Cell lines, Culture media- Natural and Synthetic, Stem cells, Cryopreservation of cultures.

Agarose and Polyacrylamide Gel Electrophoresis, Southern, Northern and Western blotting, DNA sequencing: Sanger method, Polymerase chain reaction, DNA Fingerprinting and DNA microarrays

UNIT 3: Fermentation

Different types of Fermentation: Submerged & Solid state; batch, Fed batch & Continuous; Stirred tank, Air Lift, Fixed Bed and Fluidized, Downstream Processing: Filtration, centrifugation, extraction, chromatography, spray drying and lyophilization

UNIT 4: Transgenic Animal Technology and Application in Health

Production of transgenic animals: nuclear transplantation, retroviral method,

DNA microinjection method, Dolly and Polly, Development of recombinant Vaccines, Hybridoma technology, Gene Therapy, Production of recombinant Proteins: Insulin and growth hormones.

PRACTICAL

1. Packing and sterilization of glass and plastic wares for cell culture.
2. Preparation of culture media.
3. Preparation of genomic DNA from E. coli/animals/ human.
4. Plasmid DNA isolation (pUC 18/19) and DNA quantitation using agarose gel electrophoresis (by using lambda DNA as standard).
5. Restriction digestion of lambda (λ) DNA using EcoR1 and Hind III.
6. Preparation of competent cells and Transformation of E. coli with plasmid DNA using CaCl2, Selection of transformants on X-gal and IPTG (Optional).
7. Techniques: Western Blot, Southern Hybridization, DNA Fingerprinting, PCR, DNA Microarrays.

TEXTBOOKS

1. BD Singh, (2014) Biotechnology: Expanding Horizons, Kalyani Publishers
2. U.Satyanarayan and U Chakrapani, (2014) Biotechnology, Books & Allied Ltd

SUGGESTED READINGS

1. T.A. Brown (2008): Gene cloning and DNA analysis: An Introduction, Blackwell Science.
2. Animal Cell Culture Methods Academic Press
3. P.K. Gupta: Biotechnology and Genomics, Rastogi publishers (2017).

4. B.D. Singh: Biotechnology, Kalyani publishers, 1998 (Reprint 2001).
5. Griffiths, A.J.F., J.H. Miller, Suzuki, D.T., Lewontin, R.C. and Gelbart, W.M. (2009). An introduction to genetic analysis, IX Edition, Freeman & Co., N.Y., USA
6. Verma S A, Das S and Singh (2014) A. Laboratory Manual for Biotechnology. S Chand Publication.

OR

Cell and Molecular Biology

Unit 1: Cells and Plasma Membrane

Prokaryotic and Eukaryotic cells, Various models of plasma membrane; Transport across membranes, The Endoplasmic Reticulum; Golgi apparatus; Lysosomes; Structure and function of mitochondria

Unit 2: Nucleus, cell division

Ultra structure of nucleus; Mitosis, Meiosis, Cell cycle and its regulation

Unit 3: Nucleic Acids and DNA Replication

Salient features of DNA double helix; Watson and Crick model of DNA, Structure of RNA, tRNA, DNA Replication in prokaryotes and eukaryotes; Mechanism of DNA replication

Unit 4: Transcription and Translation

Mechanism of transcription in prokaryotes and Eukaryotes, Process of protein synthesis in prokaryotes and translation

PRACTICAL

1. Study of prokaryotic and eukaryotic cell types through permanent slides.
2. Study of mitosis and meiosis through squashing in Grasshopper.
3. Demonstration of transport through cell membrane.
4. Preparation of DNA and RNA models.
5. Demonstration of protein synthesis through models.

TEXT BOOKS

1. Karp, G. (2010). Cell and Molecular Biology: Concepts and Experiments. VI Edition. John Wiley and Sons. Inc.
2. De Robertis, E.D.P. and De Robertis, E.M.F. (2006). Cell and Molecular Biology. VIII Edition. Lippincott Williams and Wilkins, Philadelphia.

SUGGESTED READINGS

1. Bruce Albert, Bray Dennis, Levis Julian, Raff Martin, Roberts Keith and Watson James (2008) Molecular Biology of the Cell. 5th Edition. Garland publishing Inc., New York.
2. Becker WM, Kleinsmith LJ, Hardin J and Bertoni G P (2009) The World of the Cell. 7th Edition. Pearson Benjamin Cummings Publishing, San Francisco.
3. Cooper GM and Hausman RE (2009) The Cell: A Molecular Approach. 5th Edition. ASM Press, Washington D.C.
4. S Harisha (2007) Biotechnology procedures and experiments handbook., Infinity Science Press, Hingham

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ZOOLOGY Papers for PASS students

Discipline Specific Core – 4 papers
Discipline Specific Elective – 2 papers
Marks per paper - Midterm: 15 marks, End term: 60 marks, Practical: 25 marks,
Total – 100 marks
Credit per paper – 6
Teaching hours per paper – 40 hours (theory) + 20 hours (practical)

Semester	**Course Opted**	**Course Name**	**Credit**	**Marks**
Semester-I	DSC-1(Theory)	Non-Chordata, Chordata, Comparative Anatomy, Evolution and Animal Behaviour	4	75
	DSC-1 (Practical)	Non-Chordata, Chordata, Comparative Anatomy, Evolution and Animal Behaviour	2	25
Semester-II	DSC-2(Theory)	Cell Biology, Genetics, Conservation Biology, Biostatistics and Aquatic Biology	4	75
	DSC-2 (Practical)	Cell Biology, Genetics, Conservation Biology, Biostatistics and Aquatic Biology	2	25
Semester-III	DSC-3(Theory)	Developmental Biology, Immunology, Endocrinology and Microbiology	4	75
	DSC-3 (Practical)	Developmental Biology, Immunology, Endocrinology and Microbiology	2	25
Semester-IV	DSC-4(Theory)	Physiology,Biochmistry and Molecular Biology	4	75
	DSC-4 (Practical)	Physiology,Biochmistry and Molecular Biology	2	25
Semester-V	DSE-1(Theory)	Economic Zoology	4	75
	DSE-1 (Practical)	Economic Zoology	2	25
Semester-VI	DSE-2(Theory),	Wildlife Conservation And Management	4	75
	DSE-2 (Practical)	Wildlife Conservation And Management	2	25
		Total:	**36**	**600**

Discipline Specific Core Paper I

Non-Chordata, Chordata, Comparative Anatomy, Evolution and Animal Behaviour

Unit 1: Non-Chordata

General characteristics and classification up to classes, Locomotion and reproduction in Protozoa, Canal system in sponges, Corals and coral reefs, Life cycle of Fasciola hepatica, Metamerism in Annelida, Metamorphosis in insects, Foot in Mollusca. Larval forms in Echinodermata.

Unit 2: Chordata & Comparative anatomy

General characters of Protochordata and Chordata with examples, Parental care in fishes and Amphibia, Poison apparatus and biting mechanism of snakes, Flight adaptation in birds, Dentition in mammals. Structure, functions and derivatives of integument, Alimentary canal and associated glands

Unit 3: Evolution

Lamarckism, Darwinism, Neo-Darwinism, Phylogeny of human, Natural selection, Modes of speciation (Allopatric, Sympatric and Parapatric).

Unit 4: Animal Behaviour

Primary and secondary orientation, Taxes of animals, Social structure in honey bee, Pheromones, Biological clocks.

PRACTICAL

1. Morphology of Paramecium, Binary fission and conjugation in Paramecium.
2. Life stages of Plasmodium vivax.
3. Study of Sycon (including T.S. and L.S.), Hyalonema, and Euplectella.Temporary mounts of spicules, gemmules, Study of Obelia, Physalia, Millepora, Aurelia, Ephyra larva.
4. Study of adult Fasciola hepatica Study of adult Ascaris lumbricoides
5.Balanoglossus, Herdmania and Branchiostoma
6. Torpedo, Notopterus, Mystus, Heteropneustes, Hippocampus, Exocoetus, Echeneis, Anguilla, Tetrodon, Diodon, Anabas and Flat fish. Ichthyophis/Ureotyphlus, Necturus, Duttaphrynus, Polypedates, Hyla, Alytes and Salamandra.Chelone, Trionyx, Hemidactylus, Varanus, Uromastix, Chamaeleon, Draco, Ophiosaurus, Bungarus, Vipera, Naja and Hydrophis.

TEXT BOOKS

1. Kotpal RL; Modern Textbook of Zoology – Invertebrates; Rastogi Publications - Meerut; 2016 edition
2. Kotpal RL; Modern Textbook of Zoology –Vertebrates; Rastogi Publications - Meerut; 2016 edition
3. Young, J. Z. (2004). The Life of Vertebrates. III Edition. Oxford University Press.
4. R. K. Saxena and Sumitra Saxena (2016). Comparative Anatomy of Vertebrates, Viva Books 2nd edition.
5. Rastogi B.B., (2018). Organic Evolution, MedTech; 3rdedition
6. Mathor Reena (2014) Animal behavior, Rastogi Publication

Discipline Specific Core Paper II

Cell Biology, Genetics, Conservation Biology, Biostatistics and Aquatic Biology

Unit 1: Cell Biology

Prokaryotic and Eukaryotic cells, Plasma membrane, Lysosomes, Mitochondria, Ultra structure of nucleus.

Unit 2: Genetics

Ultrastructure of chromosomes, Sex-linked inheritance, Chromosomal mechanisms of sex determination, Chromosomal and Gene mutation.

Unit 3: Conservation Biology & Aquatic Biology

Importance of conservation, Ex situ and In situ conservation methods, Evaluation and management of wildlife, Wildlife (Protection) Act, 1972,Protected areas (Sanctuaries, National Parks, Biosphere reserves). Physico-chemical condition of water of fish pond, Composite pisciculture, Ornamental pisciculture,

Unit 4: Biostatistics

Measures of central tendency (mean, median and mode), Measures of dispersion (Standard deviation), Hypothesis and testing of hypothesis (chi square test, t test and Z test),Correlation and regression analysis.

PRACTICAL

1.Study various stages of mitosis from permanent slides.
2.Study various stages of meiosis from permanent slides.
3.Preparation of temporary squashing of onion root tip.
4.Study of oral squamous cells.
5.Study of different types of aquatic insects and aquatic weeds.
6.Study of different types of major carps, minor carps and catfishes.
7.Mounting of cycloid and ctenoid scales of fish.

TEXT BOOKS

1. Karp, G. (2010). Cell and Molecular Biology: Concepts and Experiments. VI Edition. John Wiley and Sons. Inc.
2. Klug, W.S., Cummings, M.R., Spencer, C.A. (2012). Concepts of Genetics. X Edition.
3. GopalRajesh (2011) Fundamentals of Wildlife Management, Natraj Publishers.
4. Caughley, G., and Sinclair, A.R.E. (1994). Wildlife Ecology and Management. Blackwell Science.
5. Myra Samuels, J. Witmer,A. Schaffner, Statistics for the life sciences, Prentice Halls, Boston, 4th edition, 2012
6. Sarkar, Kundu, Chaki (2016) Introduction to Economic Zoology, New Central Book Agency; New edition edition

Discipline Specific Core Paper III

Developmental Biology, Immunology, Endocrinology and Microbiology

Unit 1: Developmental Biology

Gametogenesis (Spermatogenesis, Oogenesis), Types of eggs, early development of frog and chick up to gastrulation, Placenta.

Unit 2: Immunology

Cells and organs of the immune system, Antigens, Structure and functions of different classes of immunoglobulin, Vaccines.

Unit 3: Endocrinology

Types of endocrine glands of human body, Classification of hormones and mechanism of hormone action, Structure and function of Pituitary, Thyroid and Gonads.

Unit 4: Microbiology

Structure of a typical bacterium, Structure of bacteriophage, Bacterial and viral diseases of human, Microbes of food, agriculture and industry.

PRACTICAL

1. Study of whole mounts of developmental stages of chick through permanent slides: Primitive streak (13 and 18 hours), 21, 24, 28, 33, 36, 48, 72, and 96 hours of incubation (Hamilton and Hamburger stages).
2. Temporary preparation of chick embryo.
3. ABO blood group determination.
4. Cleaning of glass wares, Principle and methods of sterilization-moist heat, dry heat and filtration methods.
5. Media preparation: Liquid media, Solid media.
6. Slides of different mammalian endocrine glands.

TEXT BOOKS

1. Tortora GJ, Funke BR, Case CL (2016) Microbiology – an introduction, Pearson Education India; Eleventh edition
2. Abbas KA and Lechtman HA (2003) Cellular and Molecular Immunology. 5th Edition. Saunders Publication, Philadelphia.
3. Gilbert SF (2010) Developmental Biology. 9th Edition. Sinauer Associates, Inc., USA.
4. Hadley, M.E. and Levine J.E. (2007). Endocrinology, 6th Edition. Pearson Prentice-Hall,

Discipline Specific Core Paper IV

Physiology, Biochemistry and Molecular Biology

Unit 1: Physiology I

Digestion, Structural organization, histology and functions of gastrointestinal tract and its associated glands, Mechanical and chemical digestion of food, Respiration: Transport of respiratory gases, Structure of heart and cardiac cycle, Composition and clotting of blood, Blood group.

Unit 2: Physiology II

Excretion in human, Structure of neuron and transmission of nerve impulse, Structure of skeletal muscle and muscle contraction.

Unit 3: Biochemistry I

Structures and properties of important mono-, di- and polysaccharides, Fatty acids, triglycerides and steroids, Amino acids and Proteins. Glycolysis, Citric acid cycle, β-oxidation of saturated fatty acids, Urea cycle.

Unit 4: Molecular Biology

Structure and types of DNA and RNA, DNA replication, Genetic code, Transcription and Translation.

PRACTICAL

1. Enumeration of red blood cells using haemocytometer.
2. Estimation of haemoglobin using Sahli'shaemoglobinometer.
3. Identification of unknown carbohydrates in given solutions (Starch, Sucrose, Lactose, Galactose, Glucose, Fructose).
4. Colour tests of functional groups in protein solutions.
5. Action of salivary amylase under optimum conditions.

TEXT BOOKS

1. Marieb E.N. and Hoehn K.N. (2009) Human Physiology. Pearson Education Publication , 9th edition
2. Satyanarayan and Chakrapani , (2017) Biochemistry, Elsevier; Fifth edition.
3. Karp, G. (2010) Cell and Molecular Biology: Concepts and Experiments. VI Edition. John Wiley and Sons. Inc

Discipline Specific Elective Paper I

Economic Zoology

Unit 1: Bee-keeping and Bee Economy (Apiculture)

Varieties of honey bees, Setting up an apiary: Lang troth's/Newton's hive, brood and storage chambers, iron frames and comb sheets, drone excluder, rearing equipments, handling of bees, artificial diet, Diseases of honey bee, honey extraction techniques, -chemical analysis of honey, Other beneficial products from bee; Visit to an apiculture institute and honey processing Units.

Unit 2: Silk and Silk Production (Sericulture)

Different types of silk and silkworms in India, Rearing of Bombyx mori, Rearing racks and trays, disinfectants, rearing appliances, black boxing, Chawki rearing, bed cleaning, mountages, harvesting of cocoons, Silkworm diseases: Pebrine, Flacherie, Grasserie, Muscardine and Aspergillosis, and their management; Silkworm pests and parasites: Uzi fly, Dermestid beetles, and their management; Silk reeling techniques and Quality assessment of silkfibre.

Unit 3: Aquaculture I

Brood stock management; Induced breeding of fish, Management of hatchery of fish, Management of nursery, rearing and stocking ponds, Preparation and maintenance of fish aquarium, Preparation of compound diets for fish, Role of water quality in aquaculture, Fish diseases: Bacterial, viral and parasitic, Preservation and processing of harvested fish, Fish by-products. Prawn farming, Culture of crab, Pearl culture and Culture of air breathing fishes.

Unit 4: Dairy and Poultry Farming

Introduction, Indigenous and exotic breeds, Rearing, housing, feed and rationing, Commercial importance of dairy and poultry farming, Varietal improvement techniques, Diseases and their management, Dairy or poultry farm management and business plan, Visit to any dairy farm or Poultry farm.

* Submission of report on anyone field visits mentioned above.

PRACTICAL

1. Study of different types of bees (Queens, Drones and Worker bees).
2. Study of different types of silk moths.
3. Study of different types of pearls.
4. Study of different types of fish diseases.
5. Identification of different types of scales in fishes.
6. Study of different types of fins.
7. Study of different modified structures of fishes (Saw of sawfish, Hammer of hammer head fish, tail of sharks etc.)
8. Identification of various types of natural silks.

TEXT BOOKS

1. Sarkar, Kundu and Chaki. (2014)Introduction to Economic Zoology. NCBA Publisher.
2. T.V.R. Pillay (Author), M.N. Kutty (2011) Aquaculture: Principles and Practices, Wiley India Pvt Ltd; Second edition

Discipline Specific Elective Paper II

Wildlife Conservation And Management

Unit 1: Wildlife: Values of wildlife, positive and negative; Our conservation ethics, Importance of conservation, Causes of depletion and World conservation strategies. Habitat analysis; Management of habitats; Biological parameters: food, cover, forage, browse and cover estimation, Standard evaluation procedures: remote sensing and GIS

Unit 2: Population estimation: Population density, Natality, Birth rate, Mortality, fertility Schedules and sex ratio computation, Faecal analysis of ungulates and carnivores: Faecal samples, slide preparation, Hair identification, Pug marks and census method

Unit 3: National Organizations involved in wildlife conservation, Wild life Legislation: Wildlife (Protection) Act, 1972, its amendments and implementation, Management planning of wildlife in protected areas, Estimation of carrying capacity, Eco tourism/wildlife tourism in forests, Concept of climax persistence.

Unit 4: Management of excess population & translocation, Bio- telemetry, Care of injured and diseased animal, Quarantine and common diseases of wild animal, Protected areas National parks & sanctuaries, Community reserve, Important features of protected areas in India, Tiger conservation: Tiger reserves in India and Management challenges in Tiger reserve.

PRACTICALS

1. Identification of flora, mammalian fauna, avian fauna, herpeto-fauna.
2. Demonstration of basic equipment needed in wildlife studies use, care and maintenance (Compass, Binoculars, Spotting scope, Range Finders, Global Positioning System, Various types of Cameras and lenses).
3. Familiarization and study of animal evidences in the field; Identification of animals through pug marks, hoof marks, scats, pellet groups, nest, antlers etc.
4. Demonstration of different field techniques for flora and fauna.
5. PCQ, Ten tree method, Circular, Square & rectangular plots, Parker's 2 Step and other methods for ground cover assessment, Tree canopy cover assessment, Shrub cover assessment.
6. Trail / transect monitoring for abundance and diversity estimation of mammals and bird (direct and indirect evidences).

TEXT BOOKS

1. Gopal Rajesh (2011) Fundamentals of Wildlife Management, Natraj Publishers.
2. Caughley, G., and Sinclair, A.R.E. (1994). Wildlife Ecology and Management. Blackwell Science.

OPTIONAL FOR SECC II PAPER

SKILL ENHANCEMENT COURSE (SECC II Option I)

Apiculture

Unit 1: History – Biology and classification of honey bee species of honey bees, Social Organization of honey bee colony.

Unit 2: Bee hive, Flora for apiculture, Selection of bees for apiculture, Method of bee Keeping and Indigenous method of extraction of honey.

Unit 3: Modern methods of apiculture, Appliances for modern method, Products of bee keeping: Honey, Bee wax, Chemical composition and economic importance of honey bee wax.

Unit 4: Diseases of honey bee and control measures, Bee enemies, Bee keeping industry, Modern method in employing honey bees for cross pollination in horticultural gardens.

TEXT BOOKS:

1. Abrol, D.P. (2013) Beekeeping : A Compressive Guide To Bees And Beekeeping, Scientific Publishers, India
2. Singh S. (1982) Beekeeping in India, Indian Council of Agricultural Research, New
3. Delhi.

SKILL ENHANCEMENT COURSE (SECCII Option II)

Aquarium Fish Keeping

Unit 1: The potential scope of aquarium Fish Industry as a cottage Industry, Exotic and endemic species of aquarium Fishes, Food and feeding of aquarium fishes, Use of live fish feed organisms, Preparation and composition of formulated fish feeds.

Unit 2: Common characters and sexual dimorphism of fresh water and marine aquarium fishes such as Guppy, Molly, Sword tail, Gold fish, Angel fish, Blue morph, Anemone fish and Butterfly fish.

Unit 3: Live fish transport, Fish handling, packing and forwarding techniques, General aquarium maintenance, budget for setting up an aquarium fish farm as a cottage industry.

Unit 4: Health education in India, WHO programmes, Government and voluntary Organizations and their health services, Precautions, First Aid and awareness on sporadic diseases.

TEXT BOOKS

1. Srivastava CBL (2006) Fishery Science and Indian Fisheries. KitabMahal publications, India.
2. Gina Sandford (2003) Aquarium Owner's Manual, Dorling Kindersley; 2Rev Ed edition

SKILL ENHANCEMENT COURSE (SECC Option III)

Medical Diagnostics

Unit 1: Introduction to Medical Diagnostics and its Importance

Diagnostic methods used for analysis of Blood, Blood composition, Preparation of blood smear and Differential Leucocyte Count(D.L.C) using Leishman's stain, Platelet count using haemocytometer, Erythrocyte, Sedimentary Rate (E.S.R), Packed Cell Volume (P.C.V.).

Unit 2: Diagnostic Methods Used for Urine Analysis

Urine, Composition of urine, Urine Analysis: Physical characteristics; Abnormal constituents of urine.

Unit 3:Non-infectious Diseases and Infectious Diseases

Causes, types, symptoms, complications, diagnosis and prevention of Diabetes (Type I and Type II), Hypertension (Primary and secondary), Testing of blood glucose using Glucometer/Kit, Commercial diagnostic kits for identification of infectious diseases. Causes, types, symptoms, diagnosis and prevention of Tuberculosis and Hepatitis.

Unit 4: Tumours

Types (Benign/Malignant), Detection and metastasis; Medical imaging: X-Ray of Bone fracture, PET, MRI and CT Scan (using photographs).

TEXT BOOKS

1. Vinay Kumar, Abul K. Abbas , Jon C. Aster (2014) Robbins and Cortan, Pathologic Basis of Disease, Elsevier India; 1 edition
2. Godkar P.B. and Godkar D.P. (2005) Textbook of Medical Laboratory Technology, Vol. I & II, Bhalani Publishing House.

SUGGESTED READINGS

1. Guyton A.C. and Hall J.E. Guyton & Hall Physiology Review, Saunders; 3 edition (13 July 2015)
2. Park, K. (2007), Preventive and Social Medicine, B.B. Publishers
3. Cheesbrough M., A Laboratory Manual for Rural Tropical Hospitals, A Basis forTraining Courses
4. Prakash, G. (2012), Lab Manual on Blood Analysis and Medical Diagnostics, S.
5. Chand and Co. Ltd.

SKILL ENHANCEMENT COURSE (SECC Option IV)

Research Methodology

Unit 1: Foundations of Research

Meaning, Objectives, Motivation: Research Methods vs Methodology, Types of Research: Analytical vs Descriptive, Quantitative vs Qualitative, Basic vs applied.

Unit 2: Research Design

Need for research design: Features of good design, important concepts related to good design- Observation and Facts, Prediction and Explanation, Development of Models. Developing a research plan: Problem identification, Experimentation, Determining experimental and sample designs.

Unit 3: Data Collection, Analysis and Report Writing

Observation and Collection of Data-Methods of data collection- Sampling, Methods, Data Processing and Analysis Strategies, Technical Reports and Thesis, writing, Preparation of Tables and Bibliography. Data Presentation using digital technology.

Unit 4: Ethical Issues

Intellectual property Rights, Commercialization, Copy Right, Royalty, Patent law, Plagiarism, Citation, Acknowledgement.

TEXT BOOKS

1. Nicholas Walliman, (2017) Research Methods: The Basics:Routledge
2. C.R.Kothari and Gaurav Garg (2019) Research Methodology, New Age International.

SUGGESTED READINGS

1. Anthony, M, Graziano, A.M. and Raulin, M.L. (2009) Research Methods: A Process of Inquiry, Allyn and Bacon.
2. Wadhera, B.L.: Law Relating to Patents, Trade Marks, Copyright Designs and Geographical Indications, , Universal Law publishing
3. Coley, S.M. and Scheinberg, C.A. (1990) “Proposal writing”. Stage Publications.

SKILL ENHANCEMENT COURSE (SECC Option V)

Sericulture

Unit 1: Biology of Silkworm

Life cycle of Bombyx mori, Structure of silk gland and secretion of silk, Sericulture: Definition, history and present status; Silk route, Types of silkworms, Distribution and Races, Exotic and indigenous races, Mulberry and non-mulberry Sericulture.

Unit 2: Rearing of Silkworms

Selection of mulberry variety and establishment of mulberry garden, Rearing house and rearing appliances, Disinfectants: Formalin, bleaching powder, RKO, Silkworm rearing technology: Early age and Late age rearing, Types of mountages, Spinning, harvesting and storage of cocoons.

Unit 3: Pests and Diseases

Pests of silkworm: Uzi fly, dermestid beetles and vertebrates, Pathogenesis of silkworm diseases: Protozoan, viral, fungal and bacterial, Control and prevention of pests and diseases.

Unit 4: Entrepreneurship in Sericulture

Prospectus of Sericulture in India: Sericulture industry in different states, employment, potential in mulberry and non-mulberry sericulture. Visit to various, sericulture centers.

TEXT BOOKS

1. P. Venkatanarasaiah (2013) Sericulture, APH Publishing
2. S.R. Ullal and M.N. Narasimhanna (1987), Handbook of Practical Sericulture: CSB, Bangalore

SUGGESTED READINGS

1. M. S. Jolly, Appropriate Sericultural Techniques; (Ed., Director,) CSR & TI, Mysore.
2. M. N. Narasimhanna (1988), Manual of Silkworm Egg Production;, CSB, Bangalore.
3. K. Sengupta (1989) A Guide for Bivoltine Sericulture; Director, CSR & TI, Mysore.
4. S. Krishnaswamy (1986) Improved Method of Rearing Young age silkworm;reprinted CSB,Bangalore.

Part of syllabus (ZOOLOGY B.Sc.) to be covered in Refresher Course

Theory

1. Linear and Y-shaped food chains
2. Energy flow through the ecosystem
3. Ecology in Wildlife Conservation and Management.
4. Laws of limiting factors
5. Gause's Principle with laboratory and field examples
6. Hypothesis and hypothesis testing (Chi-square test, t- test)
7. Global warming and Climate change
8. Impacts of environmental disturbances
9. Biodiversity patterns and global biodiversity hot spots; India as a mega-biodiversity nation
10. Solid waste management: Control measures of urban and industrial wastes
11. Convention on Biological Diversity (CBD)
12. Mitochondrial Respiratory Chain
13. Chemi-osmotic hypothesis
14. Cell signaling
15. Origin of chordates and Tetrapoda (Evolution of terrestrial ectotherms)
16. Adaptive radiation in mammals
17. Plate tectonic and Continental drift theory
18. Distribution of vertebrates in different realms
19. Ossification, bone growth and resorption
20. Neural receptors and transmission
21. Hypothalamus-Pituitary & Gonadal axis
22. Mechanism of hormone action
23. Structural organization of Proteins
24. Hypo-Hyperchromaticity of DNA
25. Enzyme kinetics
26. Respiratory pigments
27. Regulation of water and acid-base balance
28. Haemoglobin and haemopoiesis
29. Cardiac cycle
30. Biological oxidation reduction reactions
31. Oxidative Phosphorylation
32. Electron Transport System
33. DNA Damage & Repair
34. Regulation of transcription and translation
35. RNA editing
36. Operon concept
37. Gene silencing
38. RNA interference
39. Polygenic inheritance
40. Chromosome mapping

41. Molecular mechanisms of recombination
42. Detection of mutations
43. Molecular mechanism of sex determination in Drosophila and Man
44. Transposons
45. Cell-Cell interaction
46. Pattern formation
47. Differential gene expression
48. Metamorphosis and Regeneration
49. Teratogenesis
50. In vitro fertilization
51. Stem cell
52. Natural selection
53. Genetic drift
54. Species concept and Speciation
55. Phylogenetic trees
56. Insect vectors borne diseases and their control
57. RNA world & origin of life
58. Extinctions
59. Hardy-Weinberg Law
60. Coral reefs diversity and their role in ecosystem
61. Origin and morphometry of lakes
62. Adaptation of hill-stream fishes.
63. Eutrophication and management of aquatic resources and conservation (legislations), Sewage
64. Nutritional Biochemistry
65. Life style related diseases
66. Social health problems
67. Food spoilage and their preventive measures
68. Environmental hazards
69. Effect of climate change on public health
70. Biomedical waste handling and disposal
71. Nuclear waste handling and disposal
72. Waste from thermal power plants
73. Cloning Vectors
74. Genomic libraries and cDNA libraries
75. Cloning in mammalian cells, Integration
76. Animal cell culture and organ culture
77. DNA sequencing
78. DNA Fingerprinting and DNA microarrays
79. Ttransgenic animals
80. Development of recombinant Vaccines
81. Gene Therapy
82. Artificial beehives and cross pollination
83. Aquarium Fish Industry

84. Hypertension
85. Commercial diagnostic kits
86. Research Design
87. Technical Reports and Thesis writing
88. Intellectual property Rights and Patent law
89. Plagiarism
90. Entrepreneurship in Sericulture
91. Behaviour as a basis of evolution
92. Social Behaviour in Honey bee
93. Biological clocks, and Circadian rhythms
94. Restriction enzymes
95. DNA Finger Printing
96. Transgenic animals
97. Molecular diagnosis of genetic diseases
98. Cells of the Nervous system
99. Neurotransmitters
100. Neurodegenerative diseases
101. Psychological disorders
102. MHC molecules
103. Therapeutics Cytokines
104. Complement System
105. Hypersensitivity
106. Advances in vaccine production
107. Sustainable aquaculture
108. Census methods in wildlife
109. Common diseases of wild animals
110. Eco tourism
111. Bee Economy
112. Dairy or poultry farm management and business plan
113. Developing Projects for students

Practical

1. Examination of pond water collected from different places for diversity in protista.
2. Study of life tables and plotting of survivorship curves of different types from the hypothetical/real data provided.
3. Determination of population density in a natural/hypothetical community by quadrate method and calculation of Shannon-Weiner diversity index for the same community.
4. Preparation of permanent slide to show the presence of Barr body in human female blood cells/cheek cells.
5. Preparation of permanent slide to demonstrate: DNA by Feulgen reaction; DNA and RNA by MGP; Mucopolysaccharides by PAS reaction; Proteins by Mercuric bromophenol blue/Fast Green
6. Microtomy: Preparation of permanent slides/photographs/computer models of any five types of mammalian (Goat/rat,etc) tissues
7. Paper chromatography of amino acids.

8. Effect of pH, temperature and inhibitors on the action of salivary amylase./Urease /acid or alkaline phosphatases
9. Demonstration of proteins separation by SDS-PAGE.
10. Determination of ABO Blood group
11. Estimation of total protein in given solutions
12. Detection of SGOT and SGPT or GST and GSH in serum/ tissue
13. To study the enzymatic activity of Trypsin / Lipase.
14. To perform the Acid and Alkaline phosphatase assay from serum/ tissue.
15. Study of Polytene chromosomes from Chironomous / Drosophila larvae
16. Preparation of liquid culture medium (LB) and raise culture of E. coli
17. Study of Mendelian laws and gene interactions.
18. Linkage maps based on data from conjugation, transformation and transduction.
19. Linkage maps based on data from Drosophila crosses.
20. Study of human karyotype (normal and abnormal).
21. Pedigree analysis of some human inherited traits.
22. Study of homology and analogy from suitable specimens
23. Study and verification of Hardy-Weinberg Law by chi square analysis
24. Demonstration of role of natural selection and genetic drift in changing allele frequencies using simulation studies
25. Determine the area of a lake using graphimetric and gravimetric method.
26. Identify the important macrophytes, phytoplanktons and zooplanktons present in a lake ecosystem.
27. Estimation of Lactose in milk
28. Ascorbic acid estimation in food by titrimetry
29. Estimation of Calcium in foods by titrimetry
30. Preparation of temporary mounts: Neurons and Blood film.
31. Preparation of genomic DNA from E. coli/animals/ human.
32. Techniques: Western Blot, Southern Hybridization, DNA Fingerprinting, PCR, DNA Microarrays.
33. Study of mitosis and meiosis through squashing in Grasshopper.
34. Plasmid DNA isolation (pUC 18/19) from E. coli
35. Restriction digestion of plasmid DNA / Lambda Phage DNA
36. Construction of circular and linear restriction map from the data provided.
37. Estimation of plasma level of any hormone using ELISA
38. Observation and quantitation of Drosophila photoreceptor neurons in healthy and diseased condition.
39. Nerve Cell preparation from the spinal cord.
40. Study of neurons and/ or myelin by Nissl, Giemsa or Luxol Fast Blue staining.
41. Human vaginal exfoliate cytology.
42. Sperm count and sperm motility in rat
43. Demonstration of ELISA.
44. Demonstration of Bone marrow smears to study Immune cells.
45. Demonstration of different field techniques for flora and fauna.
46. Trail / transect monitoring for abundance and diversity estimation of mammals and bird (direct and indirect evidences)

List of instruments/equipments

SL No	Name of the equipment
1	Students' Compound Microscope
2	Stereo Microscope
3	Haemocytometer
4	pH Meter
5	UV-Visible Spectrometer
6	Bench Top Centrifuge
8	Paper Chromatography Unit
9	Digital Weighing balance
10	Laminar Airflow
11	BOD Incubator
12	Refrigerator
13	Hot Air Oven
14	Autoclave
15	Magnetic Stirrer with Hot Plate
16	Microtome
17	Gel electrophoresis unit with accessories
18	Trans illuminator
19	Water bath

ବ୍ରୋଲ ପରୀକ୍ଷା, ଓଡ଼ିଆ ଭାଷା ଓ ସାହିତ୍ୟ ବିଭାଗ
କାପ୍ତିପଦା ଡିଗ୍ରୀ କଲେଜ, ନୂଆସାହି।

୧. ଓଡ଼ିଆ ଭାଷାର ବର୍ଣ୍ଣ ସଂଖ୍ୟା କେତେ ?

୨. ଚର୍ଯ୍ୟା ସାହିତ୍ୟର ସଂଗ୍ରାହକ କିଏ ?

୩. ଲୋକଗୀତ ଓ ଲୋକକାହାଣୀର ରଚୟିତା କଏ ?

୪. ସୋମନାଥ ବ୍ରତ କେଉଁ ଧର୍ମର ରଚନା ?

୫. କପିଳେନ୍ଦ୍ର ଦେବଙ୍କ ସମସାମୟିକ କବି କିଏ ?

୬. ପଞ୍ଚସଖା ଯୁଗର କେଉଁ କବି ଭାଗବତ ରଚନା କରିଛନ୍ତି ?

୭. ଦ୍ୱାରକା ପତ୍ର କିଏ ସମ୍ପାଦନ କରିଥିଲେ ?

୮. କୋଟି ବ୍ରହ୍ମାଣ୍ଡ ସୁନ୍ଦରୀ କାହାର ରଚନା ?

୯. ଭୀମ ଭୋଇ କେଉଁ ଧର୍ମ ସହିତ ଜଡ଼ିତ ?

୧୦. ସୁନରେ ଦୁନିଆର ଅବଧାନ ନାହିଁ :- କାହାର ରଚନା ?

—o—

Behera

Principal
Kaptipada Degree College
Nuasahi Mayurbhanj

KAPTIPADA DEGREE COLLEGE, NUASAHI

[illegible] EXAMINATION 201

NAME Manasi Mishra SUBJECT ଓଡ଼ିଆ ଭାଷା ବିଜ୍ଞାନ

ROLL NO. BA22 - 028 STREAM-ARTS/ SCI./ COM

DATE 06-08-2024 SITTING

ADDL. PAPER USED

Namita Behera

Signature of the Invigilator

09/10

① ଓଡ଼ିଆ ଭାଷାରେ ବର୍ଣ୍ଣ ସଂଖ୍ୟା କେତେ ?

ଓଡ଼ିଆ ଭାଷାର ବର୍ଣ୍ଣ ସଂଖ୍ୟା ପଚାଶଟି ।

② ଚର୍ଯ୍ୟା ସାହିତ୍ୟର ସଂଗ୍ରାହକ କିଏ ?

ଚର୍ଯ୍ୟା ସାହିତ୍ୟକୁ ନେପାଳର ରାଜ ଦରବାରରୁ ହରପ୍ରସାଦ ଶାସ୍ତ୍ରୀ ସଂଗ୍ରହ କରିଥିଲେ । ପରେ ସେ ଏହାକୁ "ବୌଦ୍ଧଗାନ ଓ ଦୋହା" ନାମରେ ପ୍ରକାଶିତ କରିଥିଲେ ।

③ ଲୋକ ଗୀତ ଓ ଲୋକ କାହାଣୀର ଉଦ୍‌ଗାତା କିଏ ?

ଲୋକ ଗୀତ ଓ ଲୋକ କାହାଣୀର ଉଦ୍‌ଗାତା ହେଉଛନ୍ତି ଲୋକମାନେ । ଲୋକ ଗୀତ ଓ ଲୋକ କାହାଣୀ ଲୋକମାନଙ୍କ ମୁଖରୁ ମୁଖ ଜରିଆରେ ଆସି ଯୁଗ ଯୁଗ ଧରି [illegible] ହୋଇ ଓଡ଼ିଆ ସାହିତ୍ୟ ଭଣ୍ଡାରକୁ ସମୃଦ୍ଧ କରୁଛି ।

④ ସୋମନାଥ ଜେନା କୃତ କେଉଁ ପର୍ଯ୍ୟାୟର ରଚନା ?

ସୋମନାଥ କୃତ ଲୋକ କାହାଣୀ ଓ ଲୋକଗୀତ ସଂକଳନ । ସୋମନାଥ କୃତ ବିନ୍ଦୁ ପର୍ଯ୍ୟାୟର ରଚନା ।

⑤ କବିଚନ୍ଦ୍ର ଦେବଙ୍କ ସମସାମୟିକ କବି କିଏ ?

କବିଚନ୍ଦ୍ର ଦେବ ହେଉଛନ୍ତି ଆଦିର ମହାକବି ତଥା ଶୂଦ୍ରମୁନି ସାରଳା ଦାସଙ୍କ ସମସାମୟିକ । ତାଙ୍କ ରଚନା ଗୁଡ଼ିକ ହେଉଛି ବିଲଙ୍କା ରାମାୟଣ, ଚଣ୍ଡୀ ପୁରାଣ, ମହାଭାରତ, ଲକ୍ଷ୍ମୀନାରାୟଣ ବଚନିକା ଇତ୍ୟାଦି ।

⑥ ପଞ୍ଚସଖା ଯୁଗର କେଉଁ କବି ଭାଗବତ ରଚନା କରିଥିଲେ ?

ପଞ୍ଚସଖା ଯୁଗ ହେଉଛି ଜ୍ଞାନ, ବଳରାମ, ଶିଶୁ, ଅନନ୍ତ, ଅଚ୍ୟୁତ, ଭକ୍ତିର ଉଦୟ ଯୁଗ । ପଞ୍ଚସଖାଙ୍କ ମଧ୍ୟରୁ ଭକ୍ତି ଭାବର ପ୍ରବର୍ତ୍ତକ ଥିଲେ ଜଗନ୍ନାଥ ଦାସ । ତାଙ୍କର ଭାଗବତ ଶ୍ରେଷ୍ଠ ଏବଂ ଅମର କୃତି ।

Zoology department

Surprise test by
Dr Mamata Mahanty
Lecturer in English

Question

(1) Father of Zoology?

(2) Who invented Compound Microscope?

(3) Branch of fossil deals with?

(4) No of chamber in heart of human, Fish, Reptilee?

(5) Largest organ in human body

(6) Name two homeotherm animals?

(7) Respiration through skin is called ________

Every stroke brings new ideas!

Kaptipada Degree collage. Nuasahi
© Surprise-test Rasan Deogam, Roll No-5947M23010
Sub- Zoology

(1) father of Zoology ?
Ans → Aristotle.

(2) who ~~inde~~ invented compound microscope.
Ans → Zacharias Janssen

(3) Branch of fossil deals with ?
Ans → palaeontology

(4) No. of chamber in heart of human. fish. Reptiles ?
Ans → Human - 4 chamber
fish - 2 chamber
Reptiles - 3 chamber

(5) Largest organ in human body ?
Ans → Skin

(6) Name to ~~human~~ homeo therm animal
Ans → Birds and mammals

(7) Respiration through skin is called ___ ?

Ans → Cutaneous respiration

(8) Blood is a fluid connective ~~its~~ tissue (T/F)

Ans → True

(9) Blood pressure is measured by an instrument is called ___

Ans → Sphygmomanometer

(10) Name two examples of Lungfish ?

Ans. → Neoceratodus, Protopterus

10/10

Name - Sarmistha Behera
Subject - History
Roll No - BA22-029

10/10

27/07/24

1. what is History ?
2. who is regraded as the father of history ?
3. what is BC in History ?
4. what is AD in History ?
5. what is veda ?
6. Bones of which animals were found at harrappan cities ?
7. Name to cities which were finet to be Indus valley civilisation ?
8. who founded the maurya dyansty ?
9. when did the Kalinga war held ?
10. who founded Buddhism ?

Ans

1. History is the study of change over time and it covers all aspects of human socity. 1
2. Herodotus is regraded as the father of history. 1
3. Before crist meening before the birth of chriest. 1
4. AD is a way of counting years based on the estimated birth of jesus chriest. 1

5. veda is a collection of poems or hymans composed in archic sanskrit by Indo-European-speaking peoples who lived in northwest india during the 2nd milleninium BCE.

6. Animals bones found at harppan sites include - those of cattle, sheep, goat, buttalo and pig.

7. The cities include Harappa, and mohenjo-daro.

8. The mauryan Empire was founded formed by chandragupta maurya.

9. Kalinga war held BC 261

10. The founder of Buddhism siddhartha gautama.

Surprise Test
Sub :- Political Science

09/10

Roll No - 059
Name - Ankita Nayak

1. who is the father of political science ?
Ans:- Aristotle 01

2. who is known as the father of Indian constitution?
Ans:- B. R. Ambedkar 01

3. what is the minimum voting age in India ?
Ans:- 18 01

4. which article of the Indian constitution Deals with the right to equality.
Ans:- 14 art 01

5. what is the upper house of the Indian parliament called.
Ans:- Raya sabha 0.5

6. which part of the Indian constitution deals with the foundamental rights.
Ans:- 3rd part 01

7. who is the head of the panchayat samity or black ?
Ans:- Chairman 01

8. who wrote the book the republic ?
Ans:- plato 01

9. How many articles in our Indian constitution?
Ans:- 395 01

10. what is the full form of DPSP ?
Ans:- Directive principle of state policy. 01

Surprise Test-
Sub: Pol. science

Answer all Questions: F.M-10
Time-15 mnt.

Q- 1. who is the Father of Pol. science?
Aristotle.

2. who is known as the Father of the Indian Constitution? Dr. B.R. Ambedkar.

3. what is the minimum voting age in India? 18

4. which article of the Indian constitution deals with the "Right to Equality".
Art-14

5. what is the upper house of the Indian Parliament called? Rajyasabha.

6. which Part of the Indian constitution deals with Fundamental Rights? III

7. who is the head of the Panchayat Samiti or Block? Chairman.

8. who wrotes the Book "The Republic"?
Plato

9. How many Articles in our Indian Constitution? 395

10. what is the full form of DPSP?
Directive Principles of State Policy.

=0=

Kaptipada deg. college, Nuasahi
Surepreise Test

Physics question

Fullmark - 10

Time - 15 min

Questions - 1

1. What is the SI unit of electric Charge ?

2. Define electric potential.

3. State Gauss's law in electrostatic ?

4. Define magnetic field intensity (H).

5. What is Faraday's law of electromagnetic induction ?

6. Explain Lenz's Law.

7. What is the difference between electric potential and electric potential energy ?

8. Define capacitance.

9. Explain the concept of magnetic Permeability.

10. State the principle of Superposition in the [illegible] Context of electric field.

Kapilpada deg. college, Nuasahi

Name - Gayatri Pakei

Roll No - BS(P)-22-028

Department. Physics

—Himansu Bhusan Behera

9.5/10

1. What is the SI unit of electric charge?
2. Define electric potential.
3. State Gauss's law in electrostatic?
4. Define magnetic filed intensity (H)
5. What is Faraday's law of electromagnetic induction?
6. Explain Lenz's law?
7. What is the difference between electric potential and electric potential energy?
8. Define capacitance.
9. Explain the concept of magnetic permeability.
10. State the principle of superposition in the context of electric filed.

Ans: —

1. The SI unit of electric charge is columb.
2. Electric potential is defined as the amount of energy needed to move a unit positive charge from one location to another in an electric filed without accelerating it.

$V = \frac{W}{q}$

3. Gauss's law states that the total electric flux through any closed is equal to 1/ε times the total electric charge in closed within that surface.

mathematically $\phi = \frac{q}{\epsilon_0}$

4. magnetic field intensity (H) is defined as the force experienced by the unit north pole that point. It is also known as magnetic field strength. The SI unit of (H) is Ampere/meter (A/m).

5. Faraday's law describes the magnitude of the electromotive force (emf), or voltage. Induced (generated) in a conductor due to electromagnetic induction (changing magnetic field)

→ It state the induced in a conducting circuit is proportional to the rate of change of magnetic flux linkage ϕ with in circuit.

6. Lenz's law states that when a changing magnetic field induce an electric current in a conductor the current will flow in a direction that opposes the change in the magnetic field.

The law was deduced in 1834 by Russian physicist Heinrich Friedrich Emil Lenz's.

Electric potential (V)	Electric Potential Energy (U)
Electric potential at a point in an electric filed is the amount of work done in moving a unit positive test charge from infinity to that point against the electrostatic ~~point~~ force.	Electric potential energy of a system of charge is the amount of work done is moving these charges from infinity to their respective positions.
$V = \frac{1}{4\pi\epsilon_0} \frac{q}{r}$	$U = \frac{1}{4\pi\epsilon_0} \frac{q q_0}{r}$

8. The capacitance (c) of a capacitor is defined as the ratio of the magnitude of the charge on their conductor to the potential difference betn the conductor.

$$C = \frac{Q}{\Delta V}$$

→ SI unit is farad (F)

9. magnetic permeability is a material's ability to allow or resist magnetic flux or magnetic field lines, to pass through it.

→ It also measured of how much a meterial becomes magnetized in response to an applied magnetic filed.

10. The principle of superposition states that the electric filed produced by a charge at a point in space is independent of the presence of other charges in the medium. The resulting electric filed is the vector sum of the electric fileds due to the individual charges.

D.

Surprise Test

Kaptipada Degree College, Nuasahi

Sub- Commerce
F.M - 10
Time - 15 Minutes

Answer All the Questions:-

1. Full form of GAAP?
2. What is the 'Golden Rule' of Accounting?
3. 'Partnership Act' formed in the year ___.
4. 'Check' is a ___.
5. What is 'Cost Accounting'?
6. Income Tax Act formed in the year ___ & Amendment was Made in the year ___.
7. Full form of 'EDP' is ___.
8. 'Cash' is a ___ A/c.
9. At the time of Purchase a bike worth Rs. 1,00,000/- What will be the Journal entries.
10. Balance sheet is a ___.

-x-x-x-

KAPTIPADA DEGRE COLLEGE NUASAHI

Name - Anam majhi

10/10

Ex Roll No- 8147M23001 College Rollno- 23005 ⇒ BC 28

~~D~~ Dhanumati Raul

1/ Full from of GAAP

Ans ⇒ GAAP (Generally (Accounting) Accepted Accounting priciples.)

2/ What is the golden rules) of Accounting

Ans ⇒ The Three golden rules accounting are

(a) Debit what comes in- Credit what goes

(b) Credit the given and Debit the Reciever

(c) Credit all income and debit all expenses

3/ Partnership Act formed in the year 1932

4/ check is a writhen dated and signed instrument thet ~~direct~~ directs a bank to pay a specific sum of money and the bearer.

5/ What is the cost Accounting ?

⇒ Cost Accounting is a form of managerial accounting that aims to capture a company's total cost of production by assessing the variable costs of each step of production as will as Fixed cost such as a lease expense.

6/ Income Tax Formed in the year 1961

7/ full form of EDP ?

⇒ (Electronic Data Processing

8/ Cash is a (Real) Account 2013 A/c.

purchase a bike

Sub-Botany
F.M - 10
Time - 15 mins

Fill in the Blanks [1X10=10]

1) ______ deals with the Study of plant.
2) Flower is a modified ______.
3) ______ is Known as the Father of Botany.
4) The branch of Science which deals with the Study of Fungi is called ______.
5) The Botanical name of Rice is ______
6) Basil Plant (Tulsi) belongs to ______ Fami
7) ______ are Known as the Building Block of Protein.
8) The genetic material in TMV is ______
9) ______ is an example of "Sac Fungi"
10) Guttation Occurs through ______.

Ipsita Panda

—— x ——

Name - Manika Giri
Roll No - BS(B)-22.038
Class - +3, 2nd yr. Sc., [illegible], Botany (H)

F.M - 10
Time - 15 mins

9/10

① ____ deals with the study of plant.
→ Botany 1.0

② Flower is a modified ____.
→ Shoot 1.0

③ ____ is known as the Father of Botany.
→ Theoprastus 0 Theophrastus

④ The branch of science which deals with the study of Fungi is called ____.
→ Mycology. 1.0

⑤ The Botanical name of Rice is ____.
→ oryza - sativa 1.0

⑥ Basil plant (Tulsi) belongs to ____ family.
→ Lamiaceae 1.0

⑦ ____ are known as the Building Block of Protein.
→ Amino acid 1.0

⑧ The genetic material in TMV is ____.
→ SSRNA 1.0

⑨ ____ is an example of "Sac fungi".
→ Yeast 1.0

⑩ Guttation occurs through ____.
→ Hydathodes 1.0

Behera

OFFICE OF THE PRINCIPAL

KAPTIPADA DEGREE COLLEGE, NUASAHI

Nuasahi, Dist.- Mayurbhanj, Odisha

E-mail: kaptipadadegree.nuasahi@gmail.com, Website:www.kdcn.ac.in

Ref ………………… *Date*…………………

DETAILS OF TEACHING EQUIPMENTS

Sl No.	Equipments	Prior to Preceding year of Admission	During Preceding year of Admission	Total
1	Iron/Wood Desk & Bench	0	0	0
2	Smart Board	0	0	0
3	Projector with Screen	02	0	02
4	Steel Almira	19	0	19
5	Laptop	01	0	01
6	Desktop	06	0	06
7	Computer Table	04	0	04
8	Printer with Scanner	02	0	02
9	Xerox Machine	01	0	01
10	Teaching Table with Chair	36	0	36
11	Big Table	06	0	06
12	Ceiling Fan	55	0	0
13	Refrigerator	01	0	01
14	Aquaguard with Cold Water Supply	01	0	01
15	Led TV with Dish Connection	01	0	01
16	Aquaguard Plain	01	0	01

Principal
Kaptipada Degree College, Nuasahi
Mayurbhanj

Principal
Kaptipada Degree College
Nuasahi, Mayurbhanj

Proctorial Class: eCH-10 4th semester (2nd yr)
Education 2023 - 24

KAPTIPADA DEGREE COLLEGE, NUASAHI, MAYURBHANJ, +3 ARTS / SCIENCE / COMMERCE

STUDENTS ATTENDANCE

SL. NO.	NAME	ROLL NO.	DATE 19/1/24	19/2/24	25/2/24	4/3/24	13/3/24	18/3/24	1/4/24	09/4/24	15/4/24	23/4/24	30/4/24	24/06/24	01/07/24	05/07/24	16/07/24	23/07/24	30/07/24	TOTAL CLASS HELD	TOTAL OF ATT.	PERCENTAGE OF ATT.	REMARKS
1	Pramila Biswala		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
2	Sasmita Mohanty		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
3	Nirupama Mohanta		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
4	Giridhari Sing		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
5	Nanikasing Pirdy		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
6	Suryasnata Mohana		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
7	Kalyani Behera		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
8	Mansing Tudu		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
9	Mamata Biswal		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
10	Jhumarani Khandei		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
11	Alok Ku. Das		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
12	Deepak Ku. Mishra		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
13	Gayatri Behera		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
14	Trilochan Pradhan		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
15	Jayanti Panda		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
16	Pankita Patra		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
17	Dushmanta Sethi		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
18	Sadhucharan Buruma		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
19	Mani Jarika		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
20	Purnima Kantabanira		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
21	Sandhyarani Majhi		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
22	Truptimaya Pramanika		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
23	Subhalaxmi Behera		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
24	S. M. Swayan		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
25	Rakesh Dash		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
26	Gobinda ch. Sing		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
27	Dibyajyoti Behera		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
28	Rabindra Ku. Nayak		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
29	Lipsa Puthal		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
30	Pinkmani Soren		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
31	Rinu Tudu		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
	SIGNATURE OF PRINCIPAL	INITIAL OF THE LECTURER																					

Proctorial Attendance - 2021-22 DSE-3

KAPTIPADA DEGREE COLLEGE, NUASAHI, MAYURBHANJ, +3 ARTS / SCIENCE / COMMERCE

STUDENTS ATTENDANCE

SL NO.	NAME	ROLL NO.	DATE 14/1/22	8/01	22/1	29/1	5/2	12/2	20/2	27/2	5/3	19/3	26/3	2/4	8/4	15/4	TOTAL CLASS HELD	TOTAL OF ATT.	PERCENTAGE OF ATT.	REMARKS
1	Debasish Mohanty		1	2	X	3	4	5	6	7	8	9	10	11	12	13				
2	Rajashree Sendha		1	2	3	4	5	6	7	8	9	10	X	11	12	13				
3	Silpa Behera		1	2	3	4	5	6	7	8	9	10	11	12	X	13				
4	Alok Kumar Pradhan		1	2	3	4	5	X	6	7	8	9	10	11	12	13				
5	Sandhyarani Hadi		1	2	3	4	5	6	X	7	8	9	10	11	12	13				
6	Suryakanta Raut		1	2	3	4	5	6	7	8	9	10	11	12	13	X				
7	Sesthashree Patra		1	2	3	4	5	6	7	8	9	X	10	11	12	13				
8	Banitarani Behera		1	2	3	4	5	6	7	8	9	10	11	X	12	13				
9	Soumya Mohanty		1	2	3	4	5	6	7	8	9	10	11	12	X	13				
10	Nagi Sinku		X	1	2	3	4	5	6	7	8	9	10	11	12	13				
11	Raktipurnima Beshra		1	2	3	4	5	6	7	X	8	9	10	11	12	13				
12	Debasish Sahoo		1	2	3	4	X	5	6	7	8	9	10	11	12	13				
13	Rabindra Kumar Tudu		1	2	3	4	5	6	X	7	8	9	10	11	12	13				
14	Sanu Mallick		1	2	X	3	4	5	6	7	8	9	10	11	12	13				
15	Pratima Purty		1	2	3	4	5	6	7	8	9	10	X	11	12	13				
16	Majhia Hembram		1	2	X	3	4	5	6	7	8	9	10	11	12	13				
17	Dhirendra Behera		1	2	3	4	5	6	7	8	9	10	X	11	12	13				
18	Dargun Purty		X	1	2	3	4	5	6	7	8	9	10	11	12	13				
19	Sukumari Purty		1	2	3	4	5	6	7	8	9	10	11	12	X	13				
20	Lacky Kuanar		1	2	3	4	5	6	7	8	9	X	10	11	12	13				
21	Tagyaseni Majhi		1	2	3	X	4	5	6	7	8	9	10	11	12	13				
22	Taranisen Mallick		1	2	3	4	5	6	X	7	8	9	10	11	12	13				
23	Kenita Senapati		1	2	3	4	5	6	7	8	9	10	X	11	12	13				
24	Singuray Sing		1	2	3	4	5	6	7	8	9	10	11	X	12	13				
25	Nibedita Raut		1	2	3	4	5	6	7	8	9	10	11	12	X	13				
26	Desi Raut		1	2	3	4	5	6	7	8	9	10	11	12	13	X				
27	Baburam Barda		1	2	3	4	5	6	7	8	9	10	11	X	12	13				
28	Sanali Sing		1	X	2	3	4	5	6	7	8	9	10	11	12	13				
29	Bajamani Sing		1	2	3	4	5	6	X	7	8	9	10	11	12	13				
30	Ramakanta Raut		1	2	3	4	5	6	7	X	8	9	10	11	12	13				
31	Karishma Mallick		1	2	X	3	4	5	6	7	8	9	10	11	12	13				

SIGNATURE OF PRINCIPAL

INITIAL OF THE LECTURE

Practorial Attendance - education P-14

KAPTIPADA DEGREE COLLEGE, NUASAHI, MAYURBHANJ, +3 ARTS / SCIENCE / COMMERCE

STUDENTS ATTENDANCE

SL. NO.	NAME	ROLL NO.	15/1/24	22/1/24	29/1/24	6/2/24	12/2/24	20/2/24	27/2/24	5/3/24	19/3/24	26/3/24	2/4/24	3/4/24	5/4/24	TOTAL CLASS HELD	TOTAL OF ATT.	PERCENTAGE OF ATT.	REMARKS
1	Debasish Mohanty		1	2	3	4	5	6	7	8	9	10	X	11	12				
2	Rajashree Gontha		1	X	2	3	4	5	6	7	8	9	10	11	12				
3	Sipa Behera		1	2	3	4	5	6	7	8	9	10	11	12	13				
4	Sandhyarani Hati		1	2	3	4	5	6	7	8	9	10	11	12	13				
5	Alok Kr. Pradhan		X	1	2	3	4	5	6	7	8	9	10	11	12				
6	Subhashree Dalai		1	2	3	4	5	6	7	8	9	10	11	12	13				
7	Suryakanta Rout		1	2	X	3	4	5	6	7	8	9	10	11	12				
8	Baitarani Behera		1	2	3	4	5	6	X	7	8	9	10	11	12				
9	Saumya Mohanty		1	2	3	4	5	6	7	8	9	10	11	12	13				
10	Debasish Sahoo		1	2	3	4	5	6	7	8	9	10	11	12	13				
11	Nagi Sinku		X	1	2	3	4	5	6	7	8	9	10	11	12				
12	Rakhi Purnima Behera		1	2	3	4	5	6	7	8	9	10	11	12	13				
13	Rabindra Kr. Tudu		1	2	3	4	5	6	7	8	X	9	10	11	12				
14	Sonie Mallick		1	2	3	4	5	6	7	8	9	10	11	12	13				
15	Balima Purty		1	2	3	4	5	6	7	8	9	10	11	12	13				
16	Dhirendra Behera		1	2	3	4	5	6	7	8	9	10	11	12	13				
17	Pangren Purty		1	2	3	4	5	6	7	8	9	10	11	12	13				
18	Sukamati Purty		1	2	3	4	5	6	7	8	9	10	11	12	13				
19	Lacky Kuanar		1	2	3	4	5	6	7	8	9	10	11	12	13				
20	Taranisen Mallick		1	2	3	4	5	6	7	8	9	10	11	12	13				
21	Jagyaseni Majhi		1	2	3	4	5	6	7	8	9	10	11	12	13				
22	Singray Sing		1	2	3	4	5	6	7	8	9	10	11	12	13				
23	Baburam Barda		1	2	3	4	5	6	7	8	9	10	11	12	13				
24	Nibedita Rout		1	2	3	4	5	6	7	8	9	11	12	13	14				
25	Bezi Rout		1	2	X	3	4	5	6	7	8	9	10	11	12				
26	Bolamani Sing		1	2	3	4	5	6	7	8	9	10	11	12	13				
27	Sonali Sing		1	2	3	4	5	6	7	8	9	10	11	12	13				
28	Ramakanta Rout		1	2	3	4	5	6	7	8	9	10	11	12	13				
29	Karishma Mallick		1	2	3	4	5	6	7	8	9	10	11	12	13				

Behera

SIGNATURE OF PRINCIPAL

INITIAL OF THE LECTURE

KAPTIPADA DEGREE COLLEGE, NUASAHI, MAYURBHANJ, +3 ARTS / SCIENCE / COMMERCE

Education

STUDENTS ATTENDANCE

SL NO.	NAME	ROLL NO.	DATE 18/11/23	21/11/23	22/11/23	24/11/23	6/12/23	12/12/23	20/12/23	27/12/23	5/1/24	11/1/24	26/1/24	2/2/24	8/2/24	13/2/24	TOTAL CLASS HELD	TOTAL OF ATT.	PERCENTAGE OF ATT.	REMARKS
1	Debasish Mohanty		1	2	3	4	x	5	6	7	8	9	10	11	12	13				
2	Runashree Sanda		1	x	2	3	4	5	6	7	8	9	10	11	12	13				
3	Shru Behera		1	2	3	4	5	6	7	8	9	x	10	11	12	13				
4	Sukhrani Hati		1	2	3	4	5	6	7	8	9	10	11	12	x	13				
5	Alok kumar Rufan		1	2	3	4	5	6	7	8	x	9	10	11	12	13				
6	Subhashree pakra		1	2	3	4	5	6	x	7	8	9	10	11	12	13				
7	Surjyakanta Raut		x	1	2	3	4	5	6	7	8	9	10	11	12	13				
8	Banikumari Behera		1	2	3	4	5	6	7	8	9	10	11	x	12	13				
9	Sonya Mahanty		1	2	3	4	5	6	7	8	9	10	11	12	13	x				
10	Debasis Sahoo		1	2	3	4	5	6	7	8	9	10	11	12	13	x				
11	Nagi sinku		1	2	3	4	5	6	7	8	9	10	x	11	12	13				
12	Rakhipurnima Bashra		1	2	3	4	5	6	7	8	9	x	10	11	12	13				
13	Rabindrakumar Juhi		1	2	3	4	5	6	7	x	8	9	10	11	12	13				
14	Mashia Hembram		1	2	3	4	5	6	7	8	9	10	11	12	x	13				
15	Saru malik		1	2	3	4	x	5	6	7	8	9	10	11	12	13				
16	Basima purty		1	2	3	4	5	x	6	7	8	9	10	11	12	13				
17	Dhirendra Behera		1	2	3	x	4	5	6	7	8	9	10	11	12	13				
18	pangun purty		x	1	2	3	4	5	6	7	8	9	10	11	12	13				
19	Sukumati purty		1	2	2	4	5	6	7	8	9	10	x	11	12	13				
20	Lucky kumar		1	2	x	3	4	5	6	7	8	9	10	11	12	13				
21	Taranisen Mallik		1	x	2	3	4	5	6	7	8	9	10	11	12	13				
22	Jagyaseni majhi		1	x	2	3	4	5	6	7	8	9	10	11	12	13				
23	Singaray sing		1	2	3	4	5	6	7	8	9	10	11	12	13	x				
24	Sunita Soraph		1	2	3	4	5	6	7	8	9	10	11	12	13	x				
25	Baburam Barda		1	2	3	4	x	5	6	7	8	9	10	11	12	13				
26	Nibedita pad		1	2	3	4	5	6	7	8	x	9	10	11	12	13				
27	Devi Raut		1	x	2	3	4	5	6	7	8	9	10	11	12	13				
28	Belamani sing		1	2	3	4	5	6	7	8	9	x	10	11	12	13				
29	Sunali sing		1	2	3	x	4	5	6	7	8	9	10	11	12	13				
30	Ramakanta pad		1	2	3	4	5	6	7	8	9	10	11	12	13	x				
31	Karishma mallik		1	2	x	3	4	5	6	7	8	9	10	11	12	13				

SIGNATURE OF PRINCIPAL

INITIAL OF THE LECTURER

Proctorial Attendance 2022-2023 - P 8

Education

KAPTIPADA DEGREE COLLEGE, NUASAHI, MAYURBHANJ, +3 ARTS / SCIENCE / COMMERCE

STUDENTS ATTENDANCE

SL. NO.	NAME	ROLL NO.	DATE 02/02/23	10/02/23	16/02/23	04/03/23	11/03/23	18/03/23	01/04/23	08/04/23	13/04/23	29/04/23	30/05/23	06/06/23	14/06/23	01/07/23	07/07/23	15/07/23	20/07/23	29/07/23	TOTAL CLASS HELD	TOTAL OF ATT.	PERCENTAGE OF ATT.	REMARKS
1	Pramila Biswal		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18				
2	Gasmita Mahanty		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18				
3	Nirupama Mohanta		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18				
4	Gidiyan Sing		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18				
5	Nanika Sing Purty		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18				
6	Suryasnata Mishra		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18				
7	Kalyani Behera		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18				
8	Mansing Tudu		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18				
9	Mamata Biswal		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18				
10	Jhumarani Khandei		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18				
11	Alok kr. Das		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18				
12	Deepak kr. Majhi		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18				
13	Gayatri Behera		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18				
14	Trilochana Pradhan		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18				
15	Jayanti Panda		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18				
16	Pankita patra		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18				
17	Dushmanta Gohi		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18				
18	Sidhucharan Banara		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18				
19	Masuni Janika		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18				
20	Purnima kandabania		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18				
21	Sandhyarani Majhi		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18				
22	Trupti mayee Simaka		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18				
23	Subhadarshani Behera		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18				
24	S. M. Sawayan		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18				
25	Rajesh Dash		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18				
26	Gobindach. Sing.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18				
27	Dibyajoti Behera		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18				
28	Rajendra ku. Nayak		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18				
29	Lipsa Prakal		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18				
30	Pinkirani Soren		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18				
31	Kunu Tudu.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18				
	SIGNATURE OF PRINCIPAL	INITIAL OF THE LECTURER																						

Behera

Practical Attendance – 22-23 P-7

KAPTIPADA DEGREE COLLEGE, NUASAHI, MAYURBHANJ, +3 ARTS / SCIENCE / COMMERCE

Education

STUDENTS ATTENDANCE

SL. NO.	NAME	ROLL NO.	12/3/24	19/3/24	26/3/24	4/3/24	11/3/24	18/3/24	1/04/24	05/04/24	15/04/24	22/04/24	29/04/24	[illegible]	01/07/24	08/07/24	15/07/24	22/07/24	29/07/24	TOTAL CLASS HELD	TOTAL OF ATT.	PERCENTAGE OF ATT.	REMARKS
1	Pramita Biswala		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
2	Sasmita Mahanty		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
3	Nirupama Mahanta		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
4	Gidhian Sing		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
5	Nanika Sing Purty.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
6	Sunyasmita mishra		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
7	Kalyani Behera		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
8	Mansing Tudu		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
9	Mamata Biswala		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
10	Jhumarani Khandei		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
11	Alok Kumar Das		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
12	Deepak Kumar Majhi		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
13	Gayatri Behera		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
14	Trilochan Pradhan		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
15	Jayanti Nanda		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
16	Pankita Patra		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
17	Dumani Sethi		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
18	Sadhucharan Marana		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
19	Mauni Jarika		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
20	Purnima Kandabanula		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
21	Sandhyarani Majhi		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
22	Truptimayee Simarakia		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
23	Subhadarshini Behera		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
24	S. M. Sarbayan		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
25	Rajesh Dash		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
26	Gobinda Ch. Sing.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
27	Dibyajyoti Behera		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
28	Rajendra Kr. Nayak		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
29	Lipsa Puthal		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
30	Pinkirani Soren		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
31	Runu Tudu.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				

SIGNATURE OF PRINCIPAL

INITIAL OF THE LECTURE

Practicum Attendance 2022-23 P-10
education

KAPTIPADA DEGREE COLLEGE, NUASAHI, MAYURBHANJ, +3 ARTS / SCIENCE / COMMERCE

STUDENTS ATTENDANCE

SL. NO.	NAME	ROLL NO.	DATE 19/[illegible]	19/[illegible]	26/[illegible]	4/[illegible]	11/[illegible]	18/[illegible]	1/[illegible]	8/[illegible]	15/[illegible]	22/[illegible]	29/[illegible]	24/[illegible]	1/[illegible]	8/[illegible]	15/[illegible]	22/[illegible]	29/[illegible]																											TOTAL CLASS HELD	TOTAL OF ATT.	PERCENTAGE OF ATT.	REMARKS
1	Pramila Biswala		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17																														
2	Sasmita mahanti		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17																														
3	Nirupama Mohanta		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17																														
4	Gidhian Sing .		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17																														
5	Manika Sing Punty		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17																														
6	Sunyasngta Mishra		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17																														
7	Kanjani Behera		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17																														
8	Mansing Tudu		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17																														
9	Mamata Biswal		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17																														
10	Jhunarani Khandei		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17																														
11	Alok Kumar Das		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17																														
12	Deepak Kumar majhi		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17																														
13	Gayatri Behera		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17																														
14	Trilochan Pradhan		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17																														
15	Jayanti Marndi		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17																														
16	Pankita Patra		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17																														
17	Dumanta Sethi		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17																														
18	Sadhucharan Barana		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17																														
19	Mamuni Jarika		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17																														
20	Purnima Kantbanuia		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17																														
21	Sandhyarani majhi		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17																														
22	Truptimayee Simaria		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17																														
23	Subhadarani Behera		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17																														
24	S.M. Sailoryan		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17																														
25	Rajesh Dash		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17																														
26	Gobinda Ch. Sing		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17																														
27	Dibyajyoti Behera		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17																														
28	Rajendra Ku. Nayak		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17																														
29	Lipsa Puthal		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17																														
30	Maktmani Soren		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17																														
31	Kunu Tudu .		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17																														
SIGNATURE OF PRINCIPAL		INITIAL OF THE LECTURE	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L																														

Practical class Register

Education - CC-11-9

KAPTIPADA DEGREE COLLEGE, NUASAHI, MAYURBHANJ, +3 ARTS / SCIENCE / COMMERCE

STUDENTS ATTENDANCE

	NAME	ROLL NO.	DATE 1[illegible]/3/24	19/3/24	26/3/24	4/3/24	11/3/24	18/3/24	01/4/24	08/4/24	15/4/24	22/4/24	24/4/24	24/6/24	1/7/24	8/7/24	15/7/24	22/7/24	29/7/24	TOTAL CLASS HELD	TOTAL OF ATT.	PERCENTAGE OF ATT.	REMARKS
	Pramila Biswal		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
	Sasmita Mohanty		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
	Nirupama Mohanta		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
	Gidhyan Sing		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
	Nandita Sing Deity		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
	Anyasnata Mishra		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
	Kalyani Behera		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
	Mansing Tudu		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
	Mamata Biswal		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
	Jhumarani Khandei		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
	Alok Ku. Das		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
	Deepak Ku. Majhi		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
	Gayatri Behera		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
	Trilochan pradhan		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
5	Jayanti Barda		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
6	Pankita Patra		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
7	Dusmanta Sethi		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
8	Sadhu charan Soren		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
9	Mami Tanika		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
	Anima Kantabanra		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
1	Sandhyarani Majhi		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
2	Truptimayee Samanta		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
3	Mahadanshali Behera		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
4	S. M. Saniyan		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
5	Rajesh Das		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
26	Gobinda chandra Sing		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
7	Dibyajyoti Behera		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
8	Rajendra Ku. Nayak		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
9	Lipsa Puthal		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
30	Pinkirani Soren		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
1	Kunu Tudu		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
	SIGNATURE OF PRINCIPAL	INITIAL OF THE LECTURE																					

Practical Class Register
Education – CC H-8

KAPTIPADA DEGREE COLLEGE, NUASAHI, MAYURBHANJ, +3 ARTS / SCIENCE / COMMERCE

STUDENTS ATTENDANCE

SL. NO.	NAME	ROLL NO.	07/02/24	10/02/24	27/02/24	04/03/24	13/03/24	18/03/24	11/04/24	09/04/24	16/04/24	23/04/24	29/04/24	07/05/24	14/05/24	02/05/24	08/05/24	16/05/24	20/05/24	29/05/24	TOTAL CLASS HELD	TOTAL OF ATT.	PERCENTAGE OF ATT.	REMARKS
1	Pramila Biswal		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18				
2	Susmita Mahanty		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18				
3	Niranjana Mohanta		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18				
4	Gitajyan Sing		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18				
5	Nanik Sing Pandy		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18				
6	Sinyasnata Mishra		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18				
7	Kalyani Behera		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18				
8	Manisha Tudu		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18				
9	Mamata Biswal		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18				
10	Jhunarani Khandei		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18				
11	Alok ku Das		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18				
12	Deepak ku. Majhi		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18				
13	Gayatri Behera		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18				
14	Trilochana Pradhan		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18				
15	Jayanti Panda		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18				
16	Pankita Patra		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18				
17	Dushmanta Sethi		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18				
18	Sadhucharan Swain		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18				
19	Mausumi Jarika		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18				
20	Purnima Kantakumari		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18				
21	Sandhyarani Majhi		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18				
22	Truptimayee Samantra		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18				
23	Subhasmita Behera		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18				
24	S. M. Suwayan		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18				
25	Rajesh Dash		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18				
26	Subhamaka Sing		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18				
27	Dibyajyoti Behera		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18				
28	Rajendra Ku. Nayak		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18				
29	Lipsa Pathal		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18				
30	Pratimani Soren		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18				
31	Kuni Tudu		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18				
	SIGNATURE OF PRINCIPAL	INITIAL OF THE LECTURE																						

Proctoricial class Register
D.C.T.E. (Education)

KAPTIPADA DEGREE COLLEGE, NUASAHI, MAYURBHANJ, +3 ARTS / SCIENCE / COMMERCE

STUDENTS ATTENDANCE

NAME	ROLL NO.	[illegible]	8/01/24	22/01/24	27/01/24	6/2/24	12/2/24	20/2/24	27/2/24	5/3/24	19/3/24	28/3/24	2/4/24	8/4/24	15/4/24	TOTAL CLASS HELD	TOTAL OF ATT.	PERCENTAGE OF ATT.	REMARKS
Debasish Mohanty		1	2	3	4	5	6	7	8	9	10	11	12	13	14				
Basashree Sendha		1	2	3	4	x	6	7	8	9	10	11	12	13	14				
Silpa Behera		1	2	x	3	4	5	6	7	8	9	10	11	x	12				
Sanjyarani Hali		1	2	3	4	5	6	7	8	9	10	11	12	13	14				
Alok kumar pradhan		1	2	3	4	5	x	6	7	8	9	10	11	12	13				
Subhashree pradhan		1	2	3	4	5	6	7	x	8	9	10	11	12	13				
Durgakanta Rout		1	2	3	A	5	6	7	8	9	10	11	12	13	14				
Banikarani Behera		1	2	3	A	5	6	7	8	9	10	11	12	13	14				
Soumya Mohanty		1	2	3	A	5	6	7	8	9	10	11	12	13	14				
Debasis Sahoo		1	2	3	A	5	6	7	8	9	10	11	12	13	14				
Nagi Sinku		1	2	3	A	5	6	7	8	9	10	11	12	13	14				
Rakhiyanima Besra		1	2	3	A	5	6	7	8	9	10	11	12	13	14				
Rabindra kumar Tudu		1	2	3	A	5	6	7	8	9	10	11	12	13	14				
Mashia Hembram		1	2	3	A	5	6	7	8	9	10	11	12	13	14				
Sonu Mallik		1	2	3	A	5	6	7	8	9	10	11	12	13	14				
Balina Purty		1	2	3	A	5	6	7	8	9	10	11	12	13	14				
Dhirendra Behera		1	2	3	A	5	6	7	8	9	10	11	12	13	14				
Pangun purty		1	2	3	A	5	6	7	8	9	10	11	12	13	14				
Sukumati purty		1	2	3	A	5	6	7	8	9	10	11	12	13	14				
Lucky kumar		1	2	3	A	5	6	7	8	9	10	11	12	13	14				
Tanaisen Mallick		1	2	3	A	5	6	7	8	9	10	11	12	13	14				
Jagyaseni Majhi		1	2	3	A	5	6	7	8	9	10	11	12	13	14				
Singaray sing		1	2	3	A	5	6	7	8	9	10	11	12	13	14				
Sunita Samal		1	2	3	A	5	6	7	8	9	10	11	12	13	14				
Baburam Banda		1	2	3	A	5	6	7	8	9	10	11	12	13	14				
Nibedita Rout		1	2	3	A	5	6	7	8	9	10	11	12	13	14				
Devi Rout		1	2	3	A	5	6	7	8	9	10	11	12	13	14				
Belarani Sing		1	2	3	A	5	6	7	8	9	10	11	12	13	14				
Sunali Sing		1	2	3	A	5	6	7	8	9	10	11	12	13	14				
Ramakanta Rout		1	2	3	A	5	6	7	8	9	10	11	12	13	14				
Karishma Mallick		1	2	3	A	5	6	7	8	9	10	11	12	13	14				
SIGNATURE OF PRINCIPAL	INITIAL OF THE LECT.																		

Proctorial class Register 21-22
education- cc 11-12.

KAPTIPADA DEGREE COLLEGE, NUASAHI, MAYURBHANJ, +3 ARTS / SCIENCE / COMMERCE

STUDENTS ATTENDANCE

SL. NO.	NAME	ROLL NO.	[illegible]	6/01/22	22/01/22	20/01/22	01/02/22	12/02/22	20/02/22	23/02/22	25/02/22	19/03/22	26/03/22	02/04/22	08/04/22	15/04/22	TOTAL CLASS HELD	TOTAL OF ATT.	PERCENTAGE OF ATT.	RE-MARKS
1	Debasish Mohanty		1	2	3	4	5	6	7	8	9	10	11	12	13	14				
2	Rajashree Sendha		1	2	3	4	5	6	7	8	9	10	11	12	13	14				
3	Sipa Behera		1	2	3	4	5	6	7	8	9	10	11	12	13	14				
4	Sandhyarani Hati		1	2	3	4	5	6	7	8	9	10	11	12	13	14				
5	Alok kr. Pradhan		1	2	3	4	5	6	7	8	9	10	11	12	13	14				
6	Subhashree Patra		1	2	3	4	5	6	7	8	9	10	11	12	13	14				
7	Suryakanta Rout		1	2	3	4	5	6	7	8	9	10	11	12	13	14				
8	Banita rani Behera		1	2	3	4	5	6	7	8	9	10	11	12	13	14				
9	Soumya Mohanty		1	2	3	4	5	6	7	8	9	10	11	12	13	14				
10	Debasish Sahoo		1	2	3	4	5	6	7	8	9	10	11	12	13	14				
11	Nagi Sinku		1	2	3	4	5	6	7	8	9	10	11	12	13	14				
12	Rakhipurnima Behera		1	2	3	4	5	6	7	8	9	10	11	12	13	14				
13	Rabindra kr. Tudu		1	2	3	4	5	6	7	8	9	10	11	12	13	14				
14	Sonia Mallick		1	2	3	4	5	6	7	8	9	10	11	12	13	14				
15	Dalima Purty		1	2	3	4	5	6	7	8	9	10	11	12	13	14				
16	Dhirendra Behera		1	2	3	4	5	6	7	8	9	10	11	12	13	14				
17	Dangeri Purty		1	2	3	4	5	6	7	8	9	10	11	12	13	14				
18	Sukramati Purty		1	2	3	4	5	6	7	8	9	10	11	12	13	14				
19	Lucky Kisanar		1	2	3	4	5	6	7	8	9	10	11	12	13	14				
20	Taranisen Mallick		1	2	3	4	5	6	7	8	9	10	11	12	13	14				
21	Jagyaseni Majhi		1	2	3	4	5	6	7	8	9	10	11	12	13	14				
22	Singray Sing		1	2	3	4	5	6	7	8	9	10	11	12	13	14				
23	Baburam Banda		1	2	3	4	5	6	7	8	9	10	11	12	13	14				
24	Nibedita Rout		1	2	3	4	5	6	7	8	9	10	11	12	13	14				
25	Desi Rout		1	2	3	4	5	6	7	8	9	10	11	12	13	14				
26	Bolamani Sing		1	2	3	4	5	6	7	8	9	10	11	12	13	14				
27	Sonali Sing		1	2	3	4	5	6	7	8	9	10	11	12	13	14				
28	Ramakanta Rout		1	2	3	4	5	6	7	8	9	10	11	12	13	14				
29	Karishma Mallick		1	2	3	4	5	6	7	8	9	10	11	12	13	14				
	SIGNATURE OF PRINCIPAL	INITIAL OF THE LECTURE																		

Practical class Register
Education - cc 11 - 19

KAPTIPADA DEGREE COLLEGE, NUASAHI, MAYURBHANJ, +3 ARTS / SCIENCE / COMMERCE

STUDENTS ATTENDANCE

SL. NO.	NAME	ROLL NO.	[illegible]	2/2/19	22/2/19	26/2/19	4/3/19	12/3/19	26/3/19	29/3/19	5/3/19	14/3/19	27/3/19	2/4/19	10/4/19	15/4/19	TOTAL CLASS HELD	TOTAL OF ATT.	PERCENTAGE OF ATT.	REMARKS
	Debasish mohanty		1	2	3	4	5	6	7	x	8	9	10	11	12	13				
	Rajashree sendha		1	2	3	4	5	6	7	8	9	10	11	12	13	14				
	Slipa Behera		1	2	3	4	5	6	7	8	9	10	11	12	13	14				
	Alok Kumar Pathan		1	2	3	4	5	6	7	8	9	10	11	12	13	14				
	Sandyarani Hati		1	2	3	4	5	6	7	8	9	10	11	12	13	14				
	Suryakanta Raut		1	2	3	4	5	6	7	8	9	10	11	12	13	14				
	Subhashree patra		1	2	3	4	5	6	7	8	x	9	10	11	12	13				
	Banitarani Behera		1	2	3	4	5	6	7	8	9	10	11	12	13	14				
	Soumya mohanty		1	2	3	4	5	6	7	8	9	10	11	12	13	14				
	Nagi singu		1	2	3	4	x	5	6	7	8	9	10	11	12	13				
	Rakhipurnima Besha		1	2	3	4	5	6	7	8	9	10	11	12	13	14				
	Debasish sahoo		1	2	3	4	5	6	7	8	9	10	11	12	13	14				
	Rabindra kumar tudu		1	2	3	4	5	6	7	8	9	10	11	12	13	14				
	Saru mallick		1	2	3	4	5	6	7	8	9	10	11	12	13	14				
	Rasima purty		1	2	3	4	5	6	7	8	9	10	11	12	13	14				
	Mashia Hembram		1	2	3	4	5	6	7	8	9	10	11	12	13	14				
	Dhirendra behera		1	2	3	4	5	6	7	8	9	10	11	12	13	14				
	Pargen purty		1	2	3	4	5	6	7	8	9	10	11	12	13	14				
	Sreekamani purty		1	2	x	3	4	5	6	7	8	9	10	11	12	13				
	Lacky Kuanar		1	2	3	4	5	6	7	8	9	10	11	12	13	14				
	Jagyaseni majhi		1	2	3	4	5	6	7	8	9	10	11	12	13	14				
	Taranisen mallick		1	2	3	4	5	6	7	8	9	10	11	12	13	14				
	Sunita Senapati		1	2	3	4	5	6	7	8	9	10	11	12	13	14				
	Singaray sing		1	2	3	4	x	5	6	7	8	9	10	11	12	13				
	Nibedita Rout		1	2	3	4	5	6	7	8	9	10	11	12	13	14				
	Dezi Rout		1	2	3	4	5	6	7	8	9	10	11	12	13	14				
	Bakuram Behera		1	2	3	4	5	6	7	8	9	10	11	12	13	14				
	Sunali sing		1	2	3	4	5	6	7	8	9	10	11	12	13	14				
	Balamani sing		1	2	3	4	5	6	7	8	9	10	11	12	13	14				
	Ramakanta Raut		1	2	3	4	5	6	7	8	9	10	11	12	13	14				
	Karishma mallick		1	2	3	4	5	6	7	8	9	10	11	12	13	14				
	SIGNATURE OF PRINCIPAL	INITIAL OF THE LECTURER																		

2021-22 (Monday) Proctorial Class Regi
Philosophy - CC 11 - 13

KAPTIPADA DEGREE COLLEGE, NUASAHI, MAYURBHANJ, +3 ARTS / SCIENCE / COMMERCE

STUDENTS ATTENDANCE

SL. NO.	NAME	ROLL NO.	[illegible]	[illegible]	[illegible]	13/07	20/07	27/07	3/08	10/08	17/08	24/08	31/08	7/09	14/09	21/09	19/10	26/10	[illegible]	[illegible]	[illegible]	23/11	30/11	7/12	14/12	21/12	TOTAL CLASS HELD	TOTAL OF ATT.	PERCENTAGE OF ATT.	RE-MARKS
1	Baisakhi Panda		1	2	3	4	5	6	7	X	X	X	X	X	X	>	Y	5	7	8	9	10	Y	11	X	12				
2	Banchamani Bagal		X	X	X	X	1	1	X	X	2	4	X	X	X	5	6	7	8	9	10	X	X	11	12	13				
3	Chinmay Ku Naik		1	X	X	X	X	X	X	X	1	2	3	4	X	Y	X	X	5	6	[illegible]	Y	7	8	X	X				
4	Gayatri Rout		X	X	X	Y	1	2	X	X	X	X	X	X	3	4	Y	7	5	6	Y	8	9	X	X	X				
5	Jiban Khandei		1	2	3	4	X	X	X	X	X	X	5	6	X	X	X	X	7	X	Y	8	9	X	10	11				
6	Kabuli Bindhani		1	2	X	X	X	X	X	X	X	X	X	X	X	3	4	5	6	7	8	8	X	9	X	10				
7	Kalsim Hembram		X	X	X	X	X	X	X	X	1	2	3	4	5	6	X	X	7	8	9	X	10	11	12	13				
8	Mamun Mohanty		X	X	X	X	X	X	X	Y	1	2	Y	X	3	4	X	X	5	6	7	8	9	X	X	10				
9	RajKumari Banik		X	X	X	Y	1	2	Y	X	X	X	3	4	X	X	X	X	5	6	7	8	9	X	10	11				
10	Rabani Murmu		1	2	3	4	X	X	Y	X	X	X	X	Y	5	6	^	X	7	8	9	10	11	X	X	12				
11	Ritesh Ku Banik		X	X	X	X	1	2	3	4	X	X	X	5	6	X	Y	X	7	8	9	10	11	12	X	X				
12	Sumanta Ku Sethi		1	2	3	4	X	Y	Y	X	X	X	X	X	X	X	5	6	7	8	9	10	X	X	11	12				
13	Sasmita Sangita Panda		X	X	Y	X	X	X	1	2	3	4	X	X	X	X	5	6	7	8	X	9	10	11	12	13				
	SIGNATURE OF PRINCIPAL	INITIAL OF THE LECTURE																												

TUG-day

Philosophy

Crostorial class Register - CC H-14

KAPTIPADA DEGREE COLLEGE, NUASAHI, MAYURBHANJ, +3 ARTS / SCIENCE / COMMERCE

STUDENTS ATTENDANCE

SL NO.	NAME	ROLL NO.	DATE [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	TOTAL CLASS HELD	TOTAL OF ATT.	PERCENTAGE OF ATT.	REMARKS
01	Baisakhi Parida		1	2	3	4	5	6	7	8	9	x	x	10	11	x	12	13	15	16				
02	Barshanari Bagal		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18				
03	Chinmay Ku. Naik		1	2	x	3	4	x	5	6	7	x	x	8	9	10	11	12	13	14				
04	Gujani Pant		x	x	1	2	3	4	4	5	6	7	8	9	x	10	11	12	13	14				
05	Jitun Khandei		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	x	16	17				
06	Kabuli Bindhani		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	x	x	16				
07	Kalim Hembram		1	2	3	4	5	6	7	8	9	x	10	11	12	13	x	14	15					
08	Mamuni Mohanty		x	x	x	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15				
09	Raikumar Banik		x	1	2	3	4	5	6	7	8	9	10	11	12	13	14	x	x	15				
10	Radani Munmu		1	2	3	x	x	4	5	6	7	8	9	10	11	12	13	14	15	x				
11	Bitesh Ku. Naik		1	2	3	4	x	5	x	6	x	7	x	8	9	10	11	12	13	14				
12	Sumanta Ku. Sethi		1	2	3	4	5	6	x	7	8	9	x	10	11	12	13	14	15	16				
13	Subhree Sasmita Parida		1	2	x	x	3	4	x	x	5	6	x	x	x	x	7	8	9	10				

SIGNATURE OF PRINCIPAL

INITIAL OF THE LECTURE

Practional Class Attendance Register = 2022-23
Political Science

KAPTIPADA DEGREE COLLEGE, NUASAHI, MAYURBHANJ, +3 ARTS / SCIENCE / COMMERCE

STUDENTS ATTENDANCE

SL NO.	NAME	ROLL NO.	DATE [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	TOTAL CLASS HELD	TOTAL OF ATT.	PERCENTAGE OF ATT.	REMARKS
1	Seema Naik		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				
2	Sarita Patra		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				
3	Pritirekha Giri		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				
4	Smita Hembram		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				
5	[illegible] Murmu		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				
6	Priyanka Mahanta		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				
7	Kabita Naik		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				
8	Anjali Mahali		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				
9	Sasmita Giri		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				
	Smita Dhan		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				
1	Doli Murmu		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				
2	Sulochana Hembram		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				
3	[illegible] Behera		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				
4	Manasi Dehury		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				
5	Debasmita Parida		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				
6	Rani Bindhani		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				
7	Ankita Nayak		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				
8	Priyanka Jena		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				
9	Chhabirani Jena		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				
0	Parbati Soren		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				
1	Debasri Khandei		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				
	Hemanta Ku Jena		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				
	Gambari Kumbhakar		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				
	[illegible] Hembram		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				
	Raja Kumari Pradhan		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				
	Purna Charan Mahanta		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				
	Seema Rani Nayak		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				
	Rajashyam Singh		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				
	Bela Tiria		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				
	Gitanjali Dash		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				
	Anjali Behera		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

SIGNATURE OF PRINCIPAL

INITIAL OF THE LECTURE

Principal
Kaptipada Degree College
Nuasahi, Mayurbhanj

Proctorial class Register-2021-2022
English

KAPTIPADA DEGREE COLLEGE, NUASAHI, MAYURBHANJ, +3 ARTS / SCIENCE / COMMERCE

STUDENTS ATTENDANCE

NAME	ROLL NO.	DATE [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	TOTAL CLASS HELD	TOTAL OF ATT.	PERCENTAGE OF ATT.	REMARKS
Kalyani Behera		1	2	3	x	4	x	5	6	7				
Debasish Mohanty		x	x	x	1	2	3	4	x	5				
Rajashree Sethi		1	2	x	x	3	x	4	x	5				
Lipa Behera		1	2	3	4	5	6	7	8	9				
Sandhya Rani Hati		1	2	x	3	4	5	6	7	8				
[illegible] Behera		x	x	1	2	x	3	4	5	6				
Subhashree Patra		1	2	3	4	5	6	7	8	x				
Swagatika Rout		1	2	3	x	4	5	6	7	8				
Binati Rani Behera		x	x	1	2	x	3	4	5	x				
Pramod Ojha		1	x	x	2	3	4	5	6	7				
Soumya Mohanty		1	2	3	4	x	5	6	7	8				
Deepika [illegible]		1	2	3	4	5	6	7	8	9				
Kalpana Jena		1	2	x	3	4	5	6	7	8				
Nandini Das		x	x	1	2	3	x	4	5	x				
Mamata Rani Behera		1	2	3	x	x	4	5	6	7				
Debalin Sahu		1	2	x	x	3	4	x	5	6				
Monalisha Behera		1	2	3	4	5	6	7	8	9				
Mandei Hing		1	2	3	4	5	6	x	7	8				
Jyotirmaya Pathal		x	x	x	1	2	x	3	4	5				
Alagi Singh		1	2	3	x	x	4	5	x	6				
Rashipurnima Behera		1	2	3	4	5	6	7	x	8				
Bijayini Behera		x	x	1	2	3	4	5	6	7				
[illegible] Das		1	2	3	4	5	6	x	7	8				
Bishnupriya Mandal		1	2	3	x	x	4	5	6	7				
[illegible] Parida		1	x	x	x	x	2	3	4	5				
Rabindra Kr Tudu		1	2	3	4	x	x	5	6	7				
Sabita Senapati		1	2	3	4	5	6	x	7	8				
Majhia Hembram		x	x	x	1	2	x	3	4	5				
Sonia Mallick		1	2	x	x	3	4	x	5	6				
Bidyasagar Singh		x	x	x	1	x	2	x	3	4				
Padma Pusty		1	2	3	4	5	6	7	8	x				
Nirupama Patra		1	2	3	4	5	6	x	x	7				
Jyotirekha Behera		1	2	3	4	5	6	7	8	x				
Sthitiprajna Behera		1	x	x	2	x	3	4	5	6				
Anita Khandai		x	x	1	2	3	x	4	5	x				
Dhirendra Behera		1	2	3	x	x	4	x	5	6				
SIGNATURE OF PRINCIPAL	INITIAL OF THE LECTURE													

English
Honours class Register — 2022 - 023

KAPTIPADA DEGREE COLLEGE, NUASAHI, MAYURBHANJ, +3 ARTS / SCIENCE / COMMERCE

STUDENTS ATTENDANCE

NAME	ROLL NO.	DATE 4-8-22	11-8-22	18-8	25-8	11-9-22	15-9-22	22-9-22	6-10-22	29-9-22	3-12-22	10-12-22	17-12-22	TOTAL CLASS HELD	TOTAL OF ATT.	PERCENTAGE OF ATT.	REMARKS
Basmita Pradhan	[illegible]	1	2	3	4	x	x	5	6	7	x	x	9				
Seema Naik	02	x	x	1	2	3	4	5	x	x	6	7	8				
Seema Mahanta	04	1	2	3	4	5	6	7	8	9	10	11	12				
Balabhadra Routa	05	1	2	x	x	3	4	x	5	6	7	x	8				
Salge Mashi	06	1	2	3	4	x	5	6	7	x	x	8	9				
Pramila Mishra	07	1	x	x	2	3	4	5	6	7	8	9	x				
Sanita Padhan	08	x	x	1	2	3	x	x	4	5	6	7	x				
Jagdevrekha Sankhua	09	1	2	3	4	5	6	7	8	9	10	11	x				
Susmita Mohanty	11	1	2	3	4	x	x	x	5	x	6	7	x				
Swasti Sagarika Sena	12	x	x	x	x	x	1	2	[illegible]	3	4	5	6				
Rasmita Naik	13	x	x	1	2	x	x	x	3	4	x	5	x				
Nirupama ~~Naik~~ Mohanta	14	1	x	x	x	2	3	x	x	4	x	5	x				
Srilekha Sing	15	1	2	3	4	x	x	5	6	7	8	9	10				
Sadhi Sing	16	x	x	1	2	3	4	5	x	6	7	x	8				
Savita Hembram	17	1	2	3	4	x	5	6	7	x	x	x	x				
Manika Singhparty	18	x	x	1	2	3	x	4	5	6	x	x	x				
Basana Sing	19	x	x	1	2	3	4	x	x	5	x	6	7				
Lakhiram Murmu	20	x	1	2	x	x	3	4	5	x	6	x	x				
Surya Kanta Mishra	21	1	2	x	x	3	x	x	4	x	5	6	7				
Madhai Mishra	22	x	1	2	3	x	4	5	6	7	x	8	9				
Priyanshu Mohanta	25	1	2	x	x	3	4	x	5	6	x	7	x				
Kalyani Behera	26	1	2	3	4	5	x	x	6	x	7	x	8				
Mansing Tudu	27	x	x	x	1	2	x	3	x	4	5	6	7				
Sasmitha Acharya	28	1	2	3	4	5	6	7	8	x	x	9	10				
Anjali Senapati	29	1	2	x	x	3	4	5	6	7	x	8	9				
Mamata Biswal	30	1	2	3	4	5	6	x	x	7	8	9	10				
Sumitra Sing	31	1	2	3	4	5	6	7	x	x	x	8	x				
Subhasmita Pradhan	32	x	x	x	x	1	2	x	3	4	x	x	5				
Lacita Pahan	33	1	2	x	x	3	4	x	5	6	7	x	8				
Bharati Nayak	34	1	2	x	x	3	x	4	5	x	x	6	7				
Auli Marana	35	x	x	1	2	x	3	4	5	6	x	x	7				
Priyanka Pandhe	36	1	2	3	4	5	6	7	8	x	x	9	10				
Sukhanti Hembram	37	1	x	x	2	x	3	4	x	x	5	x	6				
Tapas Behera	38	1	2	3	x	x	4	x	5	6	x	x	7				
Jhumarani Ghanda	39	x	x	1	2	3	x	x	4	x	5	x	6				
Alok Kr. Das	41	x	x	1	2	x	x	x	3	x	x	x	x				
SIGNATURE OF PRINCIPAL	INITIAL OF THE LECTURE																

2022-23 (Monday) Proctorial class Register
Philosophy / CCH-8

KAPTIPADA DEGREE COLLEGE, NUASAHI, MAYURBHANJ, +3 ARTS / SCIENCE / COMMERCE

STUDENTS ATTENDANCE

SL. NO.	NAME	ROLL NO.	DATE	20/10	[illegible]	[illegible]	[illegible]	10/10	17/10	31/10	7/11	14/11	21/11	28/11	5/12	12/12	19/12	2/01	9/01	30/01	6/02	13/02	20/02	27/02	6/03	13/03	20/03	TOTAL CLASS HELD	TOTAL OF ATT.	PERCENTAGE OF ATT.	REMARKS
1	Spastisaganika Jena	BA-22/012	1	2	3	4	5	X	X	X	6	7	8	X	X	9	10	X	11	X	12	X	X	X	X	13	14				
2.	Subhasmita Puhan	093	X	1	2	3	X	X	X	X	4	5	X	X	X	6	7	8	9	10	11	12	13	X	X	14	15				
3.	Rohit Behera.	050	1	2	3	X	X	X	X	X	4	5	6	7	8	X	X	X	X	X	9	10	11	12	13	14	X				
4	Jemasing Chattar	060	X	1	2	3	4	5	6	7	8	9	X	X	X	10	X	11	12	13	14	15	16	17	18	X	X				
5	Madhusmita Naik.	068	1	2	3	4	5	X	6	7	8	9	10	X	X	11	12	13	14	15	16	X	X	X	17	18	19				
6	Agasti Kumar Bisoi	671	1	2	3	X	X	4	5	6	7	8	9	10	X	11	12	X	13	14	15	16	17	18	19	20	X				
7	Mandakini Madhi	072	1	2	3	X	4	5	6	X	7	8	X	X	9	10	11	12	13	14	15	16	17	18	X	19	20				
8	Franck Hembrum	086	1	2	3	4	5	6	7	8	9	10	11	12	13	X	X	X	14	15	16	X	17	X	18	19	20				
9.	Pankaj Kumar Sahu.	106	X	X	X	1	2	3	4	5	X	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	X				
10	Gyanaranjan Nayak	114	X	1	2	X	3	4	X	5	6	X	X	7	8	9	10	11	12	13	14	X	15	16	17	18	19				
11	Shiba Sing	125	1	2	3	4	5	6	7	X	8	8	9	10	11	12	13	14	15	16	X	17	18	19	20	X	21				
12.	Satani Sing	131	X	X	X	X	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	X	16	17	18	19	20				
13.	Ananya Mohapatra	135	1	2	3	4	5	6	7	8	9	10	X	X	11	12	13	X	14	X	15	16	17	X	18	X	19				

Practical Class. CC-10, Philosophy.

KAPTIPADA DEGREE COLLEGE, NUASAHI, MAYURBHANJ, +3 ARTS / SCIENCE / COMMERCE

STUDENTS ATTENDANCE

SL NO	NAME	ROLL NO	DATE 27/1/24	10/2	26/2	4/3/24	11/3/24	18/3	1/4	8/4	15/4	22/4	29/4	24/6	1/7	8/7	15/7	22/7	29/7	TOTAL CLASS HELD	TOTAL OF ATT.	PERCENTAGE OF ATT.	REMARKS
1	Susmitasangita Jena		X	X	X	X	1	2	3	4	5	X	6	7	8	X	X	9	10				
2	Subhasmita Pradhan		1	2	3	4	5	6	X	X	X	X	X	X	7	X	8	9	X				
3	Rohit Behera		X	X	X	1	2	X	3	4	5	X	6	7	8	9	10	X	X				
4	Jemasing Chattar		1	2	3	4	5	X	X	X	X	X	6	7	8	9	10	11	12				
5	Madhusmita Naik		1	2	3	4	5	6	X	X	X	7	8	9	10	11	12	X	X				
6	Agasti Ku. Biruli		1	2	3	4	5	6	X	X	X	7	8	X	X	9	X	X	X				
7	Mandakini Majhi		X	X	X	X	1	2	3	4	X	X	X	X	X	X	5	X	6				
8	Francis Hembram		X	1	2	3	4	5	6	7	8	X	X	X	X	X	X	X	9				
9	Pankaj Ku. Sahu		X	1	X	2	3	4	X	5	6	7	8	9	10	X	X	11	12				
10	Gyanaranjan Nayak		X	1	2	3	4	5	X	X	X	X	X	X	6	7	8	9	10				
11	Shiba Sing		X	X	1	2	3	4	5	6	7	8	9	X	X	X	X	X	10				
12	Sarani Sing		X	1	2	3	4	5	6	7	8	X	X	X	X	X	9	X	10				
13	Ananya Mohapatra		X	X	X	X	1	X	2	3	4	5	6	7	8	9	10	11	12				

Behera
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Proctorial class CC-9

Philosophy

KAPTIPADA DEGREE COLLEGE, NUASAHI, MAYURBHANJ, +3 ARTS / SCIENCE / COMMERCE

STUDENTS ATTENDANCE

SL NO.	NAME	ROLL NO.	15/02/24	19/2	26/2	4/3	11/3	18/3	8/4	15/4	22/4	29/4	24/6	1/7	8/7	15/7	22/7	29/7																	TOTAL CLASS HELD	TOTAL OF ATT.	PERCENTAGE OF ATT.	REMARKS
01	Srusti Sagarika Jena	BA-22 012	X	X	1	2	X	X	3	4	5	6	X	X	X	X	X	X																				
02	Subhalaxmi Puhan		X	X	1	2	X	X	X	X	X	X	X	3	4	X	X	X																				
03	Rohit Behera		1	2	X	X	X	X	3	4	5	6	X	7	8	X	X	9																				
04	Jema Sing Chattar		X	X	X	X	X	1	2	X	3	4	5	X	X	6	7	8																				
05	Madhusmita Naik		X	X	X	X	1	2	3	4	X	X	X	X	X	X	X	X																				
06	Agasti Kumar Bisoi		1	2	3	4	X	X	X	5	6	X	X	X	X	X	X	X																				
07	Mandakini Nadei		1	2	3	4	X	X	X	X	X	X	5	6	X	X	X	X																				
08	Francis Hembram		X	1	2	3	4	5	X	X	6	7	8	9	10	11	X	X																				
09	Sabari Sing		X	X	X	X	X	X	1	2	3	4	5	6	X	X	X	X																				
10	Pankaj Ku. Sahu		X	X	X	1	2	3	4	5	6	X	X	7	8	9	X	X																				
11	Gyana Ranjan Nayak		1	2	3	4	5	6	7	8	9	10	X	X	X	X	11	12																				
12	Siba Sing		1	2	3	4	X	X	5	6	7	8	9	10	X	X	11	12																				
13	Ananya Holipan		X	1	X	2	X	X	3	X	X	4	X	X	5	6	X	X																				
SIGNATURE OF PRINCIPAL		INITIAL OF THE LECTURE																																				

Practical class Attendance Register - 2022-23
Political Science

KAPTIPADA DEGREE COLLEGE, NUASAHI, MAYURBHANJ, +3 ARTS / SCIENCE / COMMERCE

STUDENTS ATTENDANCE

SL NO.	NAME	ROLL NO.	DATE 26/08	28/08	1/09	5/09	12/09	14/10	15/10	2/11	7/11	14/11	21/11	28/11	5/12	12/12	19/12	2/01	23/01	31/01	6/02	13/02	20/2	27/02	6/03	13/03	20/03	TOTAL CLASS HELD	TOTAL OF ATT.	PERCENTAGE OF ATT.	REMARKS
01	Seema Naik		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25				
02	Sarita Patra		x	x	1	2	3	4	x	x	1	7	8	9	10	11	12	13	14	x	16	17	18	19	20	21	22				
03	Dipti Sing		1	2	3	4	5	6	7	8	9	10	x	11	12	13	x	14	15	16	17	18	19	20	21	22	23				
04	Savita Hembram		1	2	3	4	x	x	4	5	6	7	x	8	9	10	x	11	12	13	14	15	16	17	18	19	20				
05	Lakhan Miram		1	2	3	4	5	6	x	x	7	8	x	9	10	11	12	13	14	15	16	17	18	19	20	21	22				
06	Priyanka Mohanta		1	2	3	4	5	6	7	8	9	x	10	x	11	12	13	14	15	x	16	17	18	19	20	21	22				
07	Krishna Maity		1	2	3	4	5	6	7	8	9	10	11	12	13	14	x	x	15	16	17	18	19	20	21	22	23				
08	Anjali Senapati		x	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24				
09	Susmita Sing		1	x	2	3	x	4	5	6	x	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22				
10	Sprita Bihari		1	2	3	4	5	x	x	6	7	8	9	10	11	12	13	x	14	x	15	16	17	18	19	20	21				
11	Debasmita Dandia		1	2	3	4	5	6	7	8	x	9	10	x	11	12	13	x	x	14	15	16	17	18	19	20	21				
12	Gauri Bindhani		x	x	1	2	3	4	5	6	7	x	8	9	10	11	12	13	14	x	15	16	17	18	19	20	21				
13	Ankita Nayak		1	2	3	x	4	5	6	7	8	9	10	x	11	12	x	13	14	x	15	16	17	18	19	20	21				
14	Priyanka Jena		x	x	x	1	2	3	4	5	6	7	8	9	x	10	11	12	13	x	x	14	15	16	17	18	19				
15	Parbati Soren		1	2	3	4	5	6	7	x	x	8	9	10	11	12	13	14	15	x	16	17	18	19	20	21	22				
16	Debani Khandei		1	2	3	4	x	5	6	7	8	9	10	x	11	12	13	14	15	16	17	18	19	x	20	21	22				
17	Hemanta Ku Jena		1	2	x	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	x	x	18	19	20	21	22				
18	Puli Murmu		1	2	3	4	5	6	7	8	9	10	11	12	x	x	x	13	14	15	16	17	18	19	20	21	22				
19	Susanta Hembram		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	x	x	17	18	19	20	x	21	22				
20	Chhabi Jena		1	2	x	x	x	3	4	5	6	7	8	9	10	11	12	13	x	14	15	16	17	18	19	20	21				
21	Debaki Khandei		1	x	2	3	4	5	6	7	8	9	10	11	12	13	x	x	x	14	15	x	16	17	18	19	20				
22	Jaminikanta Ku Jena		1	2	3	4	5	6	7	8	9	10	11	12	x	13	14	15	16	17	18	19	20	21	22	23	24				
23	Sambari Sumbrui		1	2	3	x	4	5	6	7	8	9	10	11	12	x	13	14	15	16	17	18	19	20	21	22	23				
24	Baidyanadha Hansda		1	x	2	3	4	5	6	7	8	9	10	x	11	12	13	14	15	16	17	18	19	20	21	22	23				
25	Rajalaxmi Bihari		1	2	3	4	5	6	7	8	9	x	x	10	11	12	13	14	15	16	17	18	19	x	20	21	22				
26	Prince Aryan Murmu		1	2	3	4	5	6	x	x	x	x	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21				
27	Chandramani Nayak		1	2	3	4	5	6	7	8	9	10	x	x	x	11	12	13	14	15	16	17	18	19	20	21	22				
28	Rajashree Sethi		1	2	3	x	x	x	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22				
29	Puja Tudu		1	2	x	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24				
30	Sulekha Sahu		1	x	2	x	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23				
31	Anjali Behera		1	2	3	x	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24				
SIGNATURE OF PRINCIPAL		INITIAL OF THE LECTURE	DB	DB	DB	DB	DB	DB	DB	DB	DB	DB	DB	DB	DB	DB	DB	DB	DB	DB	DB	DB	DB	DB	DB	DB	DB				

Principal,
Kaptipada Degree College
Nuasahi Mayurbhanj

Practical Class Attendance Register = 2022-23
Political Science

KAPTIPADA DEGREE COLLEGE, NUASAHI, MAYURBHANJ, +3 ARTS / SCIENCE / COMMERCE

STUDENTS ATTENDANCE

SL. NO.	NAME	ROLL NO.	DATE 9/08/22	22/08	29/08	5/09	12/09	19/09	16/10	31/10	7/11	14/11	21/11	28/11	5/12	12/12	19/12	2/01	9/01	23/01	30/01	6/02	13/02	20/02	27/02	6/03	13/03	20/03	TOTAL CLASS HELD	TOTAL OF ATT.	PERCENTAGE OF ATT.	RE-MARKS
1	Seema Nag		1	2	3	4	5	×	6	7	8	9	10	11	12	13	14	15	16	×	17	18	19	20	21	22	×	23				
2	Sasita Patar		1	2	3	4	×	5	6	7	8	9	10	11	12	13	14	15	16	×	×	17	18	19	20	21	22	23				
3	Paiti odio Giri		1	2	×	3	4	5	6	7	8	9	10	11	×	12	13	14	15	16	×	×	17	18	19	20	21	22				
4	Sarita Hembram		1	2	3	4	5	6	7	8	9	×	×	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24				
5	Cakran Murmu		1	2	×	3	4	5	6	7	8	×	9	10	11	12	13	14	15	16	×	17	18	19	20	21	22	23				
6	Priyanka Mohanta		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	×	22	23	24	25				
7	Kabita Naik		1	2	3	4	5	×	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25				
8	Anjali Sinkui		1	×	2	3	4	5	6	7	×	8	9	10	11	12	13	14	15	16	17	×	18	19	20	21	22	23				
9	Susmita Giri		1	2	3	4	5	6	7	×	8	9	×	10	11	12	13	14	15	16	17	18	×	19	20	21	22	23				
10	Jasmita Pidhan		×	1	2	3	4	5	6	7	8	×	9	10	11	12	13	14	15	16	17	18	×	19	20	21	22	23				
11	Dili Murmu		1	2	3	4	5	×	6	7	8	9	10	×	11	12	13	14	15	16	17	18	19	20	21	22	23	24				
12	Sushanti Hembram		1	2	3	4	5	6	7	×	8	9	10	11	12	13	14	15	16	17	18	19	×	20	21	22	23	24				
13	Purbi Behera		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	×	22	23	24	25				
14	Mamuni Pidhan		1	2	3	×	×	4	5	6	7	×	8	9	10	×	11	12	13	14	15	16	17	18	19	20	21	22				
15	Debasmita Parida		1	2	3	4	×	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25				
16	Rani Pradhan		1	2	3	4	5	6	7	8	9	10	11	×	12	13	14	15	16	17	18	19	20	21	22	23	24	25				
17	Ankita Nayak		1	×	2	3	4	5	6	7	8	9	10	×	11	12	13	14	15	16	17	18	19	20	21	22	23	24				
18	Priyanka Jena		1	2	3	4	5	6	×	7	8	9	10	11	12	13	14	15	16	17	×	×	18	19	20	21	22	23				
19	Chinmoyee Jena		1	2	×	3	4	5	×	6	7	8	9	×	10	11	12	13	×	14	15	16	17	18	×	19	20	21				
20	Parbati Soren		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	×	22	23	24	25				
21	Debasi Khandei		1	2	3	4	5	×	6	7	×	8	9	10	×	11	12	13	14	15	16	17	18	19	20	21	22	23				
22	Hemanta Kr Jena		1	2	3	4	5	6	7	8	×	9	10	11	12	13	14	15	×	×	×	×	16	17	18	19	20	21				
23	Sambari Tudu		1	2	3	4	5	6	7	×	8	9	10	11	12	×	13	14	15	16	17	18	19	×	×	20	21	22				
24	Baidyanath Hembram		1	2	3	4	5	×	×	6	7	8	9	10	11	12	13	14	15	×	16	17	18	19	20	×	21	22				
25	Rajlaxmi Pidhan		1	2	3	4	5	6	7	8	×	×	9	10	11	12	13	14	×	15	16	17	18	19	×	20	21					
	Rudra Charan Mohanta		1	2	3	×	4	5	6	7	×	×	9	10	×	×	12	13	14	15	16	17	×	18	19	20	21	22				
	Seema Mani Nayak		×	×	1	2	3	4	5	6	7	×	×	8	9	10	11	12	13	14	15	16	×	17	18	19	20	21				
	Radhashyam Sing		1	2	×	3	4	5	6	7	8	9	10	×	×	11	12	13	14	15	16	17	×	18	19	20	21					
	Bela Tiwe		1	2	3	4	5	6	×	7	8	9	10	11	×	12	13	14	15	16	×	17	18	19	20	×	21	22				
	Gurucha Sahu		1	2	3	4	5	6	7	8	9	×	10	11	12	13	14	15	16	×	17	18	19	20	×	×	22	23				
	Anjali Behera		1	2	×	3	4	5	6	7	8	×	9	10	11	12	×	13	14	15	×	16	17	18	×	19	20	21				
SIGNATURE OF PRINCIPAL		INITIAL OF THE LECTURE																														

Principal
Kaptipada Degree College
Nuasahi, Mayurbhanj

OFFICE OF THE PRINCIPAL,
KAPTIPADFA DEGREE COLLEGE NUASAHI, MAYURBHANJ.

Information about LIBRARY BOOK stocks status report -2023 24

Library stock position.

Serial No.	Name of the subject	Total no. of books	
1	Text books	4123	
2	Reference books	135	
3	Total	4258	

Principal
Kaptipada Degree College Nuasahi
Mayurbhanj

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