HEI Basic Information

Registration ID: **HEI-U-0588**	Name of the HEI: **Vidyasagar University**	Institution Type: State University
Year of Establishment: Jun 1981	Mode of Education: Dual (have both regular courses and distance)	State: WEST BENGAL
Telephone: 03222275297	Email: registrar@mail.vidyasagar.ac.in	Fax: 03222275329
Address: MIDNAPORE,721102, WEST BENGAL , INDIA		Pin Code: 721102
Official Website of HEI: VIDYASAGAR.AC.IN	Official website for distance education: dde.vidyasagar.ac.in	

Department/School/Centre Information

Name of the Department/School/Centre of Distance Education: DIRECTORATE OF DISTANCE EDUCATION	Address of the Department/School/Centre of Distance Education: DIRECTORATE OF DISTANCE EDUCATION, VIDYASAGAR UNIV	
Telephone of the Department/School/Centre of Distance Education: 03222264338	Email of the Department/School/Centre of Distance Education: DIRECTOR.DDEVU@GMAIL.COM	Fax of the Department/School/Centre of Distance Education: 03222275329

HEI Authorities

Name of the Vice Chancellor: PROF. RANJAN CHAKRABARTI	Vice Chancellor Email: vc@mail.vidyasagar.ac.in	Vice Chancellor Mobile: 9476432828
Name of the Pro Vice Chancellor(if any): NA		
Name of Director/Head of Department/Head of School/Centre of Distance Education: PROF PRAKASH CHANDRA DHARA	Designation: DIRECTOR	Mobile No: 9433226695
Name of the Registrar: DR JAYANTA KISHORE NANDI	Registrar Email: registrar@mail.vidyasagar.ac.in	Registrar Mobile: 9434111115

HEI Recognition

Recognition status of the HEI as per UGC Act, 1956: SECTION 2(f)	Is HEI also recognized under 12 B : Yes	Approval of Statutory Authority: Yes
Copy of relevant page of act allowing HEI to offer the programme in ODL : View (/Uploads/Proposal/relevantHEIprgODL/HEI-U-0588/HEI-U-0588_relevantHEIprgODL_20191230132256.pdf)		

NAAC Details

Whether accredited by NAAC? : Yes	Grade: B+	Score: 2.8
Validity of NAAC : 09-12-2019	Upload NAAC Document : View (/Uploads/ODL/NAAC/HEI-U-0588/NAAC_20190909182223.pdf)	
Year of assessment of NAAC: 2014	Whether valid for the academic year 2020-21: Yes	
Whether HEI is ready or has already applied for NAAC assessment: Yes	Reason (s): null	State if NAAC is applicable for 2020-21: Yes

NIRF Ranking

NIRF Ranking : 149

HEI Other Information

Territorial Jurisdiction of HEI as per its Act : Within State	Mention District (s) :	Territorial Jurisdiction as per UGC ODL Regulation : Within State
Mention District (s) :	Whether Center for Internal Quality Assurance (CIQA) is establised or not : Yes	In case of existing recognized HEI, mention letter No. & date of UGC recognition letter : F.No. 1-18/2018(DEB-I) Dated: 31-12-2018

Infrastructure

Total Build up area Exclusively for open and distance learning (Minimum 15000 Sq):

Build-up Area Type	Minimum Built up area required as per Regulations	Built-Up Area available(Carpet Area Sq. ft)	Difference
Academic	7500	8400	-900

Build-up Area Type	Minimum Built up area required as per Regulations	Built-Up Area available(Carpet Area Sq. ft)	Difference
Administrative	1500	12000	-1050
Academic support such as Library, Reading Room, Computer Centre, Information and Communication technology labs, Video and Audio Labs etc.	4500	12000	-7500
Amenities or other support facilities(Excluding toilets)	1500	2800	-1300
Total built-up area for ODL activities	15000	35200	-2020

Activity Calendar

Academic Year Planner [Programmes under yearly system]:

Srno	Name of the Activity	Tentative months schedule (specify months) during Year	
		From (Month)	To (Month)
1	Admission	May	Aug
2	Distribution of SLM	Nov	Dec
3	Contact Programmes(counselling, Practicals,etc.)	Nov	Aug
4	Assignment Submission (if any)	Dec	Feb
5	Evaluation of Assignment	Feb	May
6	Examination	Oct	Jan
7	Declaration of Result	Mar	Apr
8	Re–registration	Apr	May

Academic Year Planner [Programmes under Semester System]:

Srno	Name of the Activity	Tentative months schedule (specify months) during Year			
		From (Month)	To (Month)	From (Month)	To (Month)
1	Admission	Jan	Feb	Jul	Aug
2	Distribution of SLM	Feb	Mar	Aug	Sep
3	Contact Programmes(counselling, Practicals,etc.)	Feb	May	Aug	Nov
4	Assignment Submission (if any)	Mar	Mar	Oct	Oct
5	Evaluation of Assignment	Apr	Apr	Nov	Nov

Srno	Name of the Activity	Tentative months schedule (specify months) during Year			
		From (Month)	To (Month)	From (Month)	To (Month)
6	Examination	Jun	Jun	Dec	Dec
7	Declaration of Result	Jul	Jul	Jan	Jan
8	Re–registration	Aug	Aug	Feb	Feb

DEB RECOGNIZED STATUS

Are you recognized by UGC, DEB unde UGC(ODL) Regulations, 2017?

Yes

Upload the supporting documents i.e. Recognition letters	
2018-19	View File (/Uploads/Proposal/recognitionletters2018/HEI-U-0588/HEI-U-0588_recognitionletters2018_20191228114136.pdf)
2019-20	View File (/Uploads/Proposal/recognitionletters2019/HEI-U-0588/HEI-U-0588_recognitionletters2019_20191228114136.pdf)

Have you filled CIQA Report for academic year 2018-19? : Yes

When was SLM delivered to student for academic year 2019-20

	Month	Year
Printing Material	Nov	2019
Audio-Video Material	NA	2019
Online Material	Nov	2019
Compute based Material	Dec	2019

Proposed Programmes

Details of the programme

Srno	Year	Level	Academic Session	Name of Programme	Duration (In Years)	Number of Credits	Date of Approval of Statutory Authority (s) (DD-MM-YYYY) of HEI	Date of Approval of Regulatory Authority (s) (DD-MM-YYYY) if applicable

Srno	Year	Level	Academic Session	Name of Programme	Duration (In Years)	Number of Credits	Date of Approval of Statutory Authority (s) (DD-MM-YYYY) of HEI	Date of Approval of Regulatory Authority (s) (DD-MM-YYYY) if applicable
1	2020-21	PG	July	Arts/Humanities/Social Sciences - Masters of Arts - English	2	98	24-12-2019	31-12-2018
2	2020-21	PG	July	Arts/Humanities/Social Sciences - Masters of Arts - History	2	96	24-12-2019	31-12-2018
3	2020-21	PG	July	Arts/Humanities/Social Sciences - Masters of Arts - Political Science	2	98	24-12-2019	31-12-2018
4	2020-21	PG	July	Arts/Humanities/Social Sciences - Masters of Arts - Sanskrit	2	100	24-12-2019	31-12-2018
5	2020-21	PG	July	Business Administration/Commerce/ Management/Finance - Master of Commerce - NA	2	98	24-12-2019	31-12-2018
6	2020-21	PG	July	Sciences - Master of Science - Mathematics	2	98	24-12-2019	31-12-2018
7	2020-21	PG	July	Sciences - Master of Science - Environmental Science	2	96	24-12-2019	31-12-2018
8	2020-21	PG	July	Sciences - Master of Science - Geography	2	96	24-12-2019	06-07-2016
9	2020-21	PG	July	Sciences - Master of Science - Physics	2	96	24-12-2019	31-12-2018
10	2020-21	PG	July	Sciences - Master of Science - Zoology	2	96	24-12-2019	06-07-2016
11	2020-21	PG	July	Sciences - Master of Science - Botany	2	96	24-12-2019	06-07-2016
12	2020-21	PG	July	Sciences - Master of Science - Chemistry	2	96	24-12-2019	31-12-2018
13	2020-21	PG	July	Sciences - Master of Science - Computer Science	2	88	24-12-2019	31-12-2018
14	2020-21	PG	July	Sciences - Master of Science - Dietetics & Community Nutrition Management	2	120	24-12-2019	31-12-2018
15	2020-21	PG	July	Arts/Humanities/Social Sciences - Masters of Arts - Bengali	2	116	24-12-2019	31-12-2018

PPR (Programme Project Report)

Srno	Year	Approved Programme	Date of Approval of PPR
1	2020-21	Arts/Humanities/Social Sciences - Masters of Arts - English	24-12-2019
2	2020-21	Arts/Humanities/Social Sciences - Masters of Arts - History	24-12-2019
3	2020-21	Arts/Humanities/Social Sciences - Masters of Arts - Political Science	24-12-2019
4	2020-21	Arts/Humanities/Social Sciences - Masters of Arts - Sanskrit	24-12-2019
5	2020-21	Business Administration/Commerce/ Management/Finance - Master of Commerce - NA	24-12-2019
6	2020-21	Sciences - Master of Science - Mathematics	24-12-2019
7	2020-21	Sciences - Master of Science - Environmental Science	24-12-2019
8	2020-21	Sciences - Master of Science - Geography	24-12-2019
9	2020-21	Sciences - Master of Science - Physics	24-12-2019
10	2020-21	Sciences - Master of Science - Zoology	24-12-2019
11	2020-21	Sciences - Master of Science - Botany	24-12-2019
12	2020-21	Sciences - Master of Science - Chemistry	24-12-2019
13	2020-21	Sciences - Master of Science - Computer Science	24-12-2019
14	2020-21	Sciences - Master of Science - Dietetics & Community Nutrition Management	24-12-2019
15	2020-21	Arts/Humanities/Social Sciences - Masters of Arts - Bengali	24-12-2019

SLM (Self Learning Material)

Srno	Year	Approved Programme	Outline of the Syllabus	Statutory bodies who approved the material	Source of Self Learning Material	Reference of Self Learning Material	When was it prepared?	Last Updated

Srno	Year	Approved Programme	Outline of the Syllabus	Statutory bodies who approved the material	Source of Self Learning Material	Reference of Self Learning Material	When was it prepared?	Last Updated
1	2020-21	Arts/Humanities/Social Sciences - Masters of Arts - English	It is to be offered in 4 semesters, with 20 papers of 50 marks each (18 theory papers and 2 project papers), for a total of 1000 marks, with a total of 98 credits to be offered	Advisory Committee of DDE	Text books, reference books, journals, reports etc. taken as the source for preparing SLMs	Eminent faculties of Vidyasagar University and other universities and reputed academicians of institutes are engaged for writing SLMs. Our university selects and appoints the SLM writers	24-12-2019	24-12-2019
2	2020-21	Arts/Humanities/Social Sciences - Masters of Arts - History	Syllabus of M.A. in History is divided into 4 semesters and bears 800 marks with 96 credits, including 16 theoretical papers.	Advisory Committee of DDE	Text books, reference books, journals, reports etc. taken as the source for preparing SLMs	Eminent faculties of Vidyasagar University and other universities and reputed academicians of institutes are engaged for writing SLMs. Our university selects and appoints the SLM writers	24-12-2019	24-12-2019
3	2020-21	Arts/Humanities/Social Sciences - Masters of Arts - Political Science	It is to be offered in 4 semesters, with 20 papers of 50 marks each (19 theory papers and 1 project paper), for a total of 1000 marks, with a total of 98 credits to be offered	Advisory Committee of DDE	Text books, reference books, journals, reports etc. taken as the source for preparing SLMs	Eminent faculties of Vidyasagar University and other universities and reputed academicians of institutes are engaged for writing SLMs. Our university selects and appoints the SLM writers	24-12-2019	24-12-2019

Srno	Year	Approved Programme	Outline of the Syllabus	Statutory bodies who approved the material	Source of Self Learning Material	Reference of Self Learning Material	When was it prepared?	Last Updated
4	2020-21	Arts/Humanities/Social Sciences - Masters of Arts - Sanskrit	It is to be offered in 4 semesters, with 20 papers of 50 marks each ,for a total of 1000 marks, with a total of 100 credits to be offered	Advisory Committee of DDE	Text books, reference books, journals, reports etc. taken as the source for preparing SLMs	Eminent faculties of Vidyasagar University and other universities and reputed academicians of institutes are engaged for writing SLMs. Our university selects and appoints the SLM writers	24-12-2019	24-12-2019
5	2020-21	Business Administration/Commerce/ Management/Finance - Master of Commerce - NA	The M.Com syllabus consists of 10 papers including one practical paper under the four semesters. Each paper carries 50 marks. The whole syllabus carries a total marks of 1000 with 98 credits.	Advisory Committee of DDE	Text books, reference books, journals, reports etc. taken as the source for preparing SLMs	Eminent faculties of Vidyasagar University and other universities and reputed academicians of institutes are engaged for writing SLMs. Our university selects and appoints the SLM writers	24-12-2019	24-12-2019
6	2020-21	Sciences - Master of Science - Mathematics	Syllabus of M.Sc. in Mathematics consists of 28 theoretical, 3 practical, 1 dissertation papers and bears 1200 marks with 98 credits and conducted in 4 semesters	Advisory Committee of DDE	Text books, reference books, journals, reports etc. taken as the source for preparing SLMs	Eminent faculties of Vidyasagar University and other universities and reputed academicians of institutes are engaged for writing SLMs. Our university selects and appoints the SLM writers	24-12-2019	24-12-2019

Srno	Year	Approved Programme	Outline of the Syllabus	Statutory bodies who approved the material	Source of Self Learning Material	Reference of Self Learning Material	When was it prepared?	Last Updated
7	2020-21	Sciences - Master of Science - Environmental Science	The syllabus carries total 1200 marks and 96 credits which are divided into 4 semesters consisting of 16 theoretical 6 practical one dissertation papers and 2 field work papers	Advisory Committee of DDE	Text books, reference books, journals, reports etc. taken as the source for preparing SLMs	Eminent faculties of Vidyasagar University and other universities and reputed academicians of institutes are engaged for writing SLMs. Our university selects and appoints the SLM writers	24-12-2019	24-12-2019
8	2020-21	Sciences - Master of Science - Geography	Syllabus contains 16 theoretical papers and 8 practical papers under I,II,III,IV Semesters with 96 credits and total marks is 1200	Advisory Committee of DDE	Text books, reference books, journals, reports etc. taken as the source for preparing SLMs	Eminent faculties of Vidyasagar University and other universities and reputed academicians of institutes are engaged for writing SLMs. Our university selects and appoints the SLM writers	24-12-2019	24-12-2019
9	2020-21	Sciences - Master of Science - Physics	The syllabus of M. Sc in Physics is divided into 4 semesters, carrying a total of 1200 marks with 96 credits. Each semester carrying 300 marks for theory and practical. The last semester consists of special paper with project and seminar	Advisory Committee of DDE	Text books, reference books, journals, reports etc. taken as the source for preparing SLMs	Eminent faculties of Vidyasagar University and other universities and reputed academicians of institutes are engaged for writing SLMs. Our university selects and appoints the SLM writers	24-12-2019	24-12-2019

Srno	Year	Approved Programme	Outline of the Syllabus	Statutory bodies who approved the material	Source of Self Learning Material	Reference of Self Learning Material	When was it prepared?	Last Updated
10	2020-21	Sciences - Master of Science - Zoology	The Syllabus of the course is divided into 4 semesters offering 1200 marks with 96 credits having 24 papers ,out of which 16 theory papers, 7 practical papers and 1 project paper.	Advisory Committee of DDE	Text books, reference books, journals, reports etc. taken as the source for preparing SLMs	Eminent faculties of Vidyasagar University and other universities and reputed academicians of institutes are engaged for writing SLMs. Our university selects and appoints the SLM writers.	24-12-2019	24-12-2019
11	2020-21	Sciences - Master of Science - Botany	M.Sc. in Botany, a 4 semesters programme, carrying total 1200 marks with 96 credits and possesses 15 theory papers (including 2 elective papers) and 9 practical papers (including field survey, Seminars and Project Papers)	Advisory Committee of DDE	Text books, reference books, journals, reports etc. taken as the source for preparing SLMs.	Eminent faculties of Vidyasagar University and other universities and reputed academicians of institutes are engaged for writing SLMs. Our university selects and appoints the SLM writers.	24-12-2019	24-12-2019
12	2020-21	Sciences - Master of Science - Chemistry	Syllabus of Chemistry consists 1200 marks with 96 credits including 21 theory, 4 practical and 2 project papers. It will be covered in 4 semesters.	Advisory Committee of DDE	Text books, reference books, journals, reports etc. taken as the source for preparing SLMs	Eminent faculties of Vidyasagar University and other universities and reputed academicians of institutes are engaged for writing SLMs. Our university selects and appoints the SLM writers.	24-12-2019	24-12-2019

Srno	Year	Approved Programme	Outline of the Syllabus	Statutory bodies who approved the material	Source of Self Learning Material	Reference of Self Learning Material	When was it prepared?	Last Updated
13	2020-21	Sciences - Master of Science - Computer Science	The syllabus carryies a total of 1200 marks with 88 credits which are divided into 4 semesters. Each semester carrying 300 marks where each paper carrying 50 for both theory and practical along with 3 elective papers and 1 major project paper	Advisory Committee of DDE	Text books, reference books, journals, reports etc. taken as the source for preparing SLMs	Eminent faculties of Vidyasagar University and other universities and reputed academicians of institutes are engaged for writing SLMs. Our university selects and appoints the SLM writers.	24-12-2019	24-12-2019
14	2020-21	Sciences - Master of Science - Dietetics & Community Nutrition Management	The syllabus carries total 1200 marks and 120 credits which are divided into 4 semesters consisting of 14 theoretical, 10 practical and one project papers. Each paper includes 2 sub topics. Each sub topic carries 25 marks and 2.5 credit scor	Advisory Committee of DDE	Text books, reference books, journals, reports etc. taken as the source for preparing SLMs	Eminent faculties of Vidyasagar University and other universities and reputed academicians of institutes are engaged for writing SLMs. Our university selects and appoints the SLM writers	24-12-2019	24-12-2019
15	2020-21	Arts/Humanities/Social Sciences - Masters of Arts - Bengali	It is to be offered in 4 semesters and consists of 20 papers of 50 marks each (18 theory papers and 2 project papers), for a total of 1000 marks, with a total of 116 credits to be offered.	Advisory Committee of DDE	Text books, reference books, journals, reports etc. taken as the source for preparing SLMs.	Eminent faculties of Vidyasagar University and other universities and reputed academicians of institutes are engaged for writing SLMs. Our university selects and appoints the SLM writers.	24-12-2019	24-12-2019

Regional Centre

Srno	Name of Regional Centre	Address of Regional Centre	Name of the Coordinator/ Counselor	Contact Details of the Coordinator/ Counselor	Email Details of the Coordinator/ Counselor	Qualification of Coordinator/ Counselor	No. of LSCs covered under Regional Centre
1	NA	NA	NA	0000000000	NA	NA	0

Learner Support Centre (LSC) details

Srno	Name of College & Address	Whether the College / institute is Private or Govt	Name of Affiliating University / HEI	Name of Co-ordinator	Contact Details of Co-ordinator	Qualifications	No. of Counsellors
1	JOGESH CHANDRA CHAUDHARI COLLEGE , KOLKATA - 700033	Government	University of Calcutta	DR. PANKAJ KUMAR ROY	PH. NO.- 03324174622	M.COM, PH.D.	33
2	RAMSADAY COLLEGE , AMTA, HOWRAH PIN - 711401	Government	University of Calcutta	DR. DEB KUMAR MUKHERJEE	PH. NO. - 03214260251	M.SC., PH.D	68
3	SHYAMPUR SIDDHESWAR MAHAVIDYALAYA , HOWRAH, PIN - 711321	Government	CALCUTTA UNIVERSITY	DR. SONTU KUMAR BOSE	03214261221	M.A., PH.D.	19
4	KSHUDIRAM BOSE CENTRAL COLLEGE , KOLKATA - 700006	Government	University of Calcutta	DR. SUBIR KUMAR DUTTA	PH. NO. - 03325553889	M.COM, LLB, M.PHIL., AICWA, PH.D	17
5	PANSKURA BANAMALI COLLEGE , PANSKURA, PURBA MEDINIPUR PIN - 721152	Government	Vidyasagar University	PROF. NANDAN BHATTACHARYYA	PH. NO. - 03228252222	M.SC., PH.D.	29
6	IIAS WOMEN`S COLLEGE , BAGBAZAR, KOLKATA - 700003	Government	University of Calcutta	DR. MAHUA DAS	PH. NO. - 03325332435	M.A., PH.D	34
7	DEBRA THANA SAHID KSHUDIRAM SMRITI MAHAVIDYALAYA , DEBRA, PASCHIM MEDINIPUR PIN - 721124	Government	Vidyasagar University	DR. SUPATA PAL	PH. NO - 9434434684	M.A., PH.D.	18

Srno	Name of College & Address	Whether the College / institute is Private or Govt	Name of Affiliating University / HEI	Name of Co-ordinator	Contact Details of Co-ordinator	Qualifications	No. of Counsellors
8	SARSUNA COLLEGE , 4/HB/A, HO-CHI-MINH SARANI, SARSUNA UPANAGARI, KOLKATA - 700061	Government	CALCUTTA UNIVERSITY	DR. SUBHANKAR TRIPATHI	03324523699	M.SC., PH.D.	24
9	VIVEKANANDA COLLEGE , EAST UDAYRAJPUR, MADHYAMGRAM, KOLKATA - 700129	Government	West Bengal State University	DR. CHANDAN KUMAR CHAKRABORTY	PH.NO. - 9830278374	M.A., PH.D	21
10	ASUTOSH COLLEGE , 92, S.P. MUKHERJEE ROAD, KOLKATA - 700026	Government	University of Calcutta	DR. DIPAK KUMAR KAR	PH.NO. - 03324554504	M.SC., PH.D	24
11	HALDIA GOVERNMENT COLLEGE , DEBHOG, HALDIA, PURBA MEDINIPUR, PIN - 721657	Government	Vidyasagar University	DR. DEBASISH BANERJEE	PH.NO. - 03224252278	M.COM, PH.D.	12
12	BAJKUL MILANI MAHAVIDYALAYA , KISMAT BAJKUL, PURBA MEDINIPUR, PIN - 721655	Government	Vidyasagar University	PROF. PIJUSHKANTI DANDAPATH	PH.NO. - 03220274460	M.A., M.PHIL., PH.D.	12
13	SAMMILANI MAHAVIDYALAYA , BAGHAJATIN, EM BYPASS, KOLKATA-700094	Government	University of Calcutta	DR. SANTIRANJAN PALCHOUDHURY	PH.NO. - 03324626869	M.SC., PH.D.	19
14	BANGABASI MORNING COLLEGE , 19, RAJKUMAR CHAKRABORTY SARANI, KOLKATA - 700009	Government	University of Calcutta	SMT. SHIPRA HALDER	PH.NO. - 03323509210	M.COM	26
15	KALIACHAK COLLEGE , SULTANGANJ, KALIACHAK, MALDA, PIN - 732201	Government	University of Gour Banga	DR. NAZIBAR RAHAMAN	PH. NO. - 9733144644	M.A., PH.D	12

Srno	Name of College & Address	Whether the College / institute is Private or Govt	Name of Affiliating University / HEI	Name of Co-ordinator	Contact Details of Co-ordinator	Qualifications	No. of Counsellors
16	BELDA COLLEGE , BELDA, PASCHIM MEDINIPUR PIN - 721424	Government	VIDYASAGAR UNIVERSITY	DR. MANABENDRA MANDAL	03229255246	M.SC., PH.D.	12
17	RAMNAGAR COLLEGE , DEPAL, PURBA MEDINIPUR, PIN - 721453	Government	VIDYASAGAR UNIVERSITY	DR. ANANTA MOHAN MISHRA	03220634241	M.COM, PH.D.	15
18	CHARUCHANDRA COLLEGE , 22, LAKE ROAD, KOLKATA - 700029	Government	CALCUTTA UNIVERSITY	DR. SATRAJIT GHOSH	03324663771	M.SC., PH.D.	10
19	SOVARANI MEMORIAL COLLEGE , AGATBALLAVPUR, HOWRAH, PIN - 711408	Government	CALCUTTA UNIVERSITY	DR. KALYAN KUMAR MANDAL	03214255038	M.SC., B.ED., PH.D.	6
20	VIDYASAGAR EVENING COLLEGE , 39 SANKAR GHOSH LANE,KOLKATA - 700006	Government	CALCUTTA UNIVERSITY	DR. RAMSWARUP GANGOPADHYAY	9433724454	M.SC., PH.D.	5
21	CALCUTTA GIRLS` COLLEGE , 3 Goaltuli Lane, Kolkata - 700013, West Bengal, India.	Government	CALCUTTA UNIVERSITY	DR. SATYA UPADHYAYA	03324450414	M.A., PH.D.	14
22	SHIBPUR DINABANDHOO INSTITUTION , 412/1 GT ROAD (SOUTH), HOWRAH, PIN - 711102	Government	CALCUTTA UNIVERSITY	DR. BHASKAR PURKAYASTHA	03326880496	M.COM., LLB, PH.D.	9
23	BARRACKPUR RASTRAGURU SURENDRANATH COLLEGE , 6, RIVER SIDE ROAD AND 85, MIDDLE ROAD, BARRACKPUR, KOLKATA - 700120	Government	WEST BENGAL STATE UNIVERSITY	DR. MONOJIT RAY	03325928855	M.SC., PH.D.	36

Srno	Name of College & Address	Whether the College / institute is Private or Govt	Name of Affiliating University / HEI	Name of Co-ordinator	Contact Details of Co-ordinator	Qualifications	No. of Counsellors
24	KRISHNA CHANDRA COLLEGE , HETAMPUR, BIRBHUM PIN - 731124	Government	UNIVERSITY OF BURDWAN	DR. GOUTAM CHATTERJEE	03462270236	M.COM, PH.D	20
25	DR. KANAILAL BHATTACHARYA COLLEGE , RAMRAJATALA, HOWRAH PIN- 711104	Government	CALCUTTA UNIVERSITY	DR. KAUSTUBH LAHIRI	03326272490	M.SC., PH.D	27
26	ULUBERIA COLLEGE , ULUBERIA, HOWRAH PIN - 711315	Government	CALCUTTA UNIVERSITY	DR. DEBASISH PAL	03326610322	M.COM, PH.D	44
27	MAHISHADAL RAJ COLLEGE , MAHISHADAL, PURBA MEDINIPUR PIN - 721628	Government	Vidyasagar University	DR. ASIM KUMAR BERA	PH. NO. - 9434964960	M.SC., PH.D.	46
28	SHIRAKOLE MAHAVIDYALAYA , SHIRAKOLE, SOUTH 24 PARGANAS, PIN - 743513	Government	CALCUTTA UNIVERSITY	DR. SUKLA DUTTA	8420250721	M.SC., PH.D.	14
29	BAGNAN COLLEGE , KHALORE, BAGNAN, HOWRAH, PIN - 711303	Government	University of Calcutta	DR. BADAL KUMAR MAITY	03214272396	M.COM., PH.D.	18
30	BHAIRAB GANGULY COLLEGE , FEEDER ROAD, BELGHORIA, KOLKATA - 700056	Government	West Bengal State University	DR. MINAKSHI ROY	03325643191	M.A., PH.D	11
31	TARADEVI HARAKCHAND KANKARIA JAIN COLLEGE , 6, RAMGOPAL GHOSH ROAD, KASHIPUR, KOLKATA - 700002	Private	CALCUTTA UNIVERSITY	DR. MAUSUMI SINGH (SENGUPTA)	9830892492	M.SC., PH.D.	9

Srno	Name of College & Address	Whether the College / institute is Private or Govt	Name of Affiliating University / HEI	Name of Co-ordinator	Contact Details of Co-ordinator	Qualifications	No. of Counsellors
32	East Calcutta Girls' College , P 237 Lake Town Link Road, Block B,Lake Town, Kolkata, West Bengal 700089	Government	West Bengal State University	DR. SUKLA HAZRA	03325348039	M.A., PH.D.	5
33	EGRA SARADA SHASHIBHUSAN COLLEGE , EGRA, PURBA MEDINIPUR, PIN - 721429	Government	Vidyasagar University	DR. DIPAK KUMAR TAMILI	9434014248	M.Sc., Ph.D	4
34	BANKURA CHRISTIAN COLLEGE , COLLEGE ROAD, BANKURA, PIN - 722101	Government	Bankura University	DR. FATIK BARAN MONDAL	9434528475	M.SC., PH.D	5

Examination Centre

Srno	Name of Centre	Address of Centre	A) Proposed Examination Centre for term end examinatino for ODL programme for Upcoming Academic Years	
1	DEBRA THANA SAHID KSHUDIRAM SMRITI MAHAVIDYALAYA	Chakshyampur, Paschim Medinipur, PIN:721124	1	Whether examination centre is within the territorial jurisdiction of the HEI as per Annexure IV of ODL Regulations	Yes
			2	Whether the examination centre is located as per clause 13 (7) of Part IV of Regulations	Yes
			3	Provision of CCTV Cameras	Yes
			4	Provision of Bio-metric attendance	No
			5	Provision of Video recording	Yes

Srno	Name of Centre	Address of Centre	A) Proposed Examination Centre for term end examinatino for ODL programme for Upcoming Academic Years
2	MIDNAPORE INSTITUTE OF EDUCATION	Rangamati, Midnapore,Paschim Medinipur, PIN-721102	1 Whether examination centre is within the territorial jurisdiction of the HEI as per Annexure IV of ODL Regulations: Yes 2 Whether the examination centre is located as per clause 13 (7) of Part IV of Regulations: Yes 3 Provision of CCTV Cameras: Yes 4 Provision of Bio-metric attendance: No 5 Provision of Video recording: Yes
3	K.D. COLLEGE OF COMMERCE & GENERAL STUDIES	Kshudiram Nagar, Midnapore, WB-721101	1 Whether examination centre is within the territorial jurisdiction of the HEI as per Annexure IV of ODL Regulations: Yes 2 Whether the examination centre is located as per clause 13 (7) of Part IV of Regulations: Yes 3 Provision of CCTV Cameras: Yes 4 Provision of Bio-metric attendance: No 5 Provision of Video recording: Yes
4	ASUTOSH COLLEGE	92, S.P.Mukherjee Road, Kolkata-700026.	1 Whether examination centre is within the territorial jurisdiction of the HEI as per Annexure IV of ODL Regulations: Yes 2 Whether the examination centre is located as per clause 13 (7) of Part IV of Regulations: Yes 3 Provision of CCTV Cameras: Yes 4 Provision of Bio-metric attendance: No 5 Provision of Video recording: Yes

Srno	Name of Centre	Address of Centre	A) Proposed Examination Centre for term end examinatino for ODL programme for Upcoming Academic Years
5	SARSUNA COLLEGE	4/HB/A, Ho-Ch-Minh Sarani, Sarsuna, Kol-61	1 Whether examination centre is within the territorial jurisdiction of the HEI as per Annexure IV of ODL Regulations: Yes 2 Whether the examination centre is located as per clause 13 (7) of Part IV of Regulations: Yes 3 Provision of CCTV Cameras: Yes 4 Provision of Bio-metric attendance: No 5 Provision of Video recording: Yes
6	DR. KANAILAL BHATTACHARYA COLLEGE	Dharmatala, Ramrajatala,Santragachi,Howrah-711104	1 Whether examination centre is within the territorial jurisdiction of the HEI as per Annexure IV of ODL Regulations: Yes 2 Whether the examination centre is located as per clause 13 (7) of Part IV of Regulations: Yes 3 Provision of CCTV Cameras: Yes 4 Provision of Bio-metric attendance: No 5 Provision of Video recording: Yes
7	PANSKURA BANAMALI COLLEGE	P.O.: Panskura, Dist.: Purba Medinipur, Pin-721142	1 Whether examination centre is within the territorial jurisdiction of the HEI as per Annexure IV of ODL Regulations: Yes 2 Whether the examination centre is located as per clause 13 (7) of Part IV of Regulations: Yes 3 Provision of CCTV Cameras: Yes 4 Provision of Bio-metric attendance: No 5 Provision of Video recording: Yes

Srno	Name of Centre	Address of Centre	A) Proposed Examination Centre for term end examinatino for ODL programme for Upcoming Academic Years
8	MAHISHADAL RAJ COLLEGE	Mahishadal, Purba Medinipur, WB-721628	1 Whether examination centre is within the territorial jurisdiction of the HEI as per Annexure IV of ODL Regulations: Yes 2 Whether the examination centre is located as per clause 13 (7) of Part IV of Regulations: Yes 3 Provision of CCTV Cameras: Yes 4 Provision of Bio-metric attendance: No 5 Provision of Video recording: Yes
9	ULUBERIA COLLEGE	P.O.:Uluberia, Dist.: Howrah, Pin-711315.	1 Whether examination centre is within the territorial jurisdiction of the HEI as per Annexure IV of ODL Regulations: Yes 2 Whether the examination centre is located as per clause 13 (7) of Part IV of Regulations: Yes 3 Provision of CCTV Cameras: Yes 4 Provision of Bio-metric attendance: No 5 Provision of Video recording: Yes
10	BIRBHUM MAHAVIDYALAYA	Suri, Baruipara, Birbhum, PIN:731101	1 Whether examination centre is within the territorial jurisdiction of the HEI as per Annexure IV of ODL Regulations: Yes 2 Whether the examination centre is located as per clause 13 (7) of Part IV of Regulations: Yes 3 Provision of CCTV Cameras: Yes 4 Provision of Bio-metric attendance: No 5 Provision of Video recording: Yes

Srno	Name of Centre	Address of Centre	A) Proposed Examination Centre for term end examinatino for ODL programme for Upcoming Academic Years
11	KALIYAGANJ COLLEGE OF EDUCATION	Kaliyaganj,Uttar Dinajpur, PIN: 733129	1 Whether examination centre is within the territorial jurisdiction of the HEI as per Annexure IV of ODL Regulations: Yes 2 Whether the examination centre is located as per clause 13 (7) of Part IV of Regulations: Yes 3 Provision of CCTV Cameras: Yes 4 Provision of Bio-metric attendance: No 5 Provision of Video recording: Yes
12	WOMEN'S COLLEGE, CALCUTTA	P-29, Kshirod Vidya Vinod Avenue, Kol-3	1 Whether examination centre is within the territorial jurisdiction of the HEI as per Annexure IV of ODL Regulations: Yes 2 Whether the examination centre is located as per clause 13 (7) of Part IV of Regulations: Yes 3 Provision of CCTV Cameras: Yes 4 Provision of Bio-metric attendance: No 5 Provision of Video recording: Yes
13	EGRA SSB COLLEGE	EGRA, PURBA MEDINIPUR, WB	1 Whether examination centre is within the territorial jurisdiction of the HEI as per Annexure IV of ODL Regulations: Yes 2 Whether the examination centre is located as per clause 13 (7) of Part IV of Regulations: Yes 3 Provision of CCTV Cameras: Yes 4 Provision of Bio-metric attendance: No 5 Provision of Video recording: Yes

Srno	Name of Centre	Address of Centre	A) Proposed Examination Centre for term end examinatino for ODL programme for Upcoming Academic Years
14	BHAIRAB GANGULY COLLEGE	FEEDER ROAD, BELGHORIA KOLKATA - 700056	1 Whether examination centre is within the territorial jurisdiction of the HEI as per Annexure IV of ODL Regulations: Yes 2 Whether the examination centre is located as per clause 13 (7) of Part IV of Regulations: Yes 3 Provision of CCTV Cameras: Yes 4 Provision of Bio-metric attendance: No 5 Provision of Video recording: Yes
15	KALIACHAK SULTANA COLLEGE OF EDUCATION	Maheshpur-Chatra,Kaliachak, Malda, WB-732201	1 Whether examination centre is within the territorial jurisdiction of the HEI as per Annexure IV of ODL Regulations: Yes 2 Whether the examination centre is located as per clause 13 (7) of Part IV of Regulations: Yes 3 Provision of CCTV Cameras: Yes 4 Provision of Bio-metric attendance: No 5 Provision of Video recording: Yes
16	KHARAGPUR TRIBAL B.ED. TRAINING COLLEGE	Matkatpur, Kharagpur-I,Paschim Medinipur,WB-721305	1 Whether examination centre is within the territorial jurisdiction of the HEI as per Annexure IV of ODL Regulations: Yes 2 Whether the examination centre is located as per clause 13 (7) of Part IV of Regulations: Yes 3 Provision of CCTV Cameras: Yes 4 Provision of Bio-metric attendance: No 5 Provision of Video recording: Yes

Srno	Name of Centre	Address of Centre	A) Proposed Examination Centre for term end examinatino for ODL programme for Upcoming Academic Years
17	SYAMAPRASAD COLLEGE (ANNEX BUILDING)	5/B, R. DASGUPTA ROAD, KOLKATA 700026	1 Whether examination centre is within the territorial jurisdiction of the HEI as per Annexure IV of ODL Regulations: Yes 2 Whether the examination centre is located as per clause 13 (7) of Part IV of Regulations: Yes 3 Provision of CCTV Cameras: Yes 4 Provision of Bio-metric attendance: No 5 Provision of Video recording: Yes
18	2nd Campus of Asutosh College	PO- Bishnupur, South 24 Parganas, WB-743503	1 Whether examination centre is within the territorial jurisdiction of the HEI as per Annexure IV of ODL Regulations: Yes 2 Whether the examination centre is located as per clause 13 (7) of Part IV of Regulations: Yes 3 Provision of CCTV Cameras: Yes 4 Provision of Bio-metric attendance: No 5 Provision of Video recording: Yes
19	CALCUTTA GIRLS' COLLEGE	3 Goaltuli Lane, Kolkata - 700013 West Bengal	1 Whether examination centre is within the territorial jurisdiction of the HEI as per Annexure IV of ODL Regulations: Yes 2 Whether the examination centre is located as per clause 13 (7) of Part IV of Regulations: Yes 3 Provision of CCTV Cameras: Yes 4 Provision of Bio-metric attendance: No 5 Provision of Video recording: Yes

Srno	Name of Centre	Address of Centre	A) Proposed Examination Centre for term end examinatino for ODL programme for Upcoming Academic Years
20	VIDYASAGAR TEACHERS' TRAINING COLLEGE	Keranitola,Beside HDFC Bank, Midnapore, WB-721101	

1	Whether examination centre is within the territorial jurisdiction of the HEI as per Annexure IV of ODL Regulations	Yes
2	Whether the examination centre is located as per clause 13 (7) of Part IV of Regulations	Yes
3	Provision of CCTV Cameras	Yes
4	Provision of Bio-metric attendance	No
5	Provision of Video recording	Yes

Human Resources Information

Academic Staff for ODL Programmes			
Type of Staff	**No. of Staff on Full Time and Dedicated Basis**	**No. of Staff Exclusively of ODL**	**No. of Temporary Staff**
Director	1	1	0
Associate Professor	0	0	0
Assistant Professor	30	30	0
NA	0	0	0

Administrative Staff for ODL Programmes			
Type of Staff	**No. of Staff**	**No. of Staff Exclusively of ODL**	**No. of Temporary Staff**
Deputy Registrar	0	0	0
Assistant Registrar	0	0	0
Section Officer	4	4	0
Assistants	8	10	2
Computer Operators	1	3	2
Class-IV / Mult Tasking Staff	20	29	9
Technical / Professional	3	4	1

Administrative Staff for ODL Programmes			
Type of Staff	**No. of Staff**	**No. of Staff Exclusively of ODL**	**No. of Temporary Staff**
Accountant	1	1	0

Faculty Details

Srno	Year	Academic Session	Name of Programmes	Name of faculty	Address	Phone	Email
1	2020-21	July	Masters of Arts - English || [Total Faculties:2]	Mr. Rony Patra	DDE, Vidyasagar University, PIN - 721102	9911066754	rony@mail.vidyasagar.ac.in
2	2020-21	July	Masters of Arts - English || [Total Faculties:2]	Mr. Debabrata Modak	Vill+PO-Malighati, PS-Debra, Dist-Paschim Medinipur, PIN-721211	8617801835	dbbrtmdk@gmail.com
3	2020-21	July	Masters of Arts -History || [Total Faculties:2]	Miss Soma Sannigrahi	C/O Nilmoni Banerjee, Sukanta Statue More, Schooldanga, Bankura, PIN-722101	8145041621	somasannigrahi@gmail.com
4	2020-21	July	Masters of Arts -History || [Total Faculties:2]	Mr. Richik Bhattacharyya	Vill-Dakshin Gotgeria, PO-Balichak, PS-Debra, Dist.-Paschim Medinipur, PIN-721124	7602092878	mailmerichik@gmail.com
5	2020-21	July	Masters of Arts -Political Science || [Total Faculties:2]	Mr. Milan Acharjya	DDE, Vidyasagar University, PIN - 721102	8768331454	milanacharjya153@gmail.com
6	2020-21	July	Masters of Arts -Political Science || [Total Faculties:2]	Mr. Santi Sarkar	Kuikota, Satyajit Nagar, Midnapore, West Bengal	9476420900	santisarkar35@gmail.com
7	2020-21	July	Master of Science - Computer Science || [Total Faculties:2]	Mr. Priyajit Sen	Bora, Bujrukdighi, Raina, Burdwan, PIN-713423	8240337954	priyajit91@gmail.com

Srno	Year	Academic Session	Name of Programmes	Name of faculty	Address	Phone	Email
8	2020-21	July	Master of Science - Dietetics & Community Nutrition Management || [Total Faculties:2]	Mrs. Debarati Roy	50L, Kailash Nagar, Hridaypur Station Road, PO - Hridaypur, PS- Barasat, N 24 Pgs, PIN - 700127	8910160691	roydebarati90@gmail.com
9	2020-21	July	Masters of Arts -Bengali || [Total Faculties:2]	Dr. Sagarika Ghosh	DDE, Vidyasagar University, PIN - 721102	9531506706	sagarikaasiaticsociety@gmail.com
10	2020-21	July	Master of Science - Physics || [Total Faculties:2]	Dr. Dibyendu Chatterjee	Nutanchati, Circus Maidan, PO+Dist-Bankura, PIN - 722101	8910485230	chatterjeedibyendu1984@gmail.com
11	2020-21	July	Master of Science - Zoology || [Total Faculties:2]	Dr. Soma Bhattacherjee	DDE, Vidyasagar University, PIN - 721102	9064238829	sb1proteomics@gmail.com
12	2020-21	July	Master of Science - Botany || [Total Faculties:2]	Dr. Sanjib Kumar Chattopadhyay	DDE, Vidyasagar University, PIN - 721102	9903297165	skcbot@gmail.com
13	2020-21	July	Master of Science - Chemistry || [Total Faculties:2]	Dr. Manisha Das	Sujaganj, Midnapore, PIN - 721101	9474077025	manishachem90@gmail.com
14	2020-21	July	Master of Science - Chemistry || [Total Faculties:2]	Dr. Soma Das	DDE, Vidyasagar University, PIN - 721102	8167092791	soma_das1@rediffmail.com
15	2020-21	July	Master of Science - Computer Science || [Total Faculties:2]	Mr. Debkumar Bera	DDE, Vidyasagar University, PIN - 721102	9002584428	debkumar@mail.vidyasagar.ac.in
16	2020-21	July	Masters of Arts -Sanskrit || [Total Faculties:2]	Mrs. Debarpita Banerjee	DDE, Vidyasagar University, PIN-721102	8910647532	debarpitabanerjee109@gmail.com
17	2020-21	July	Masters of Arts -Sanskrit || [Total Faculties:2]	Mr. Shasanka Shekhar Patra	DDE, Vidyasagar University, PIN - 721102	7583954218	shasankasanskrit@gmail.com

Srno	Year	Academic Session	Name of Programmes	Name of faculty	Address	Phone	Email
18	2020-21	July	Master of Commerce-NA || [Total Faculties:2]	Miss Megha Agarwalla	Belda, Dist - Paschim Medinipur, PIN - 721424	9083319535	megha_belda@rediffmail.com
19	2020-21	July	Master of Science - Mathematics || [Total Faculties:2]	Dr. Atasi Patra Maiti	Vill + PO - Eral, PS - Sabang, Dist - Paschim Medinipur, PIN - 721144	9649186762	atasimaths@gmail.com
20	2020-21	July	Master of Science - Environmental Science || [Total Faculties:2]	Dr. Misha Roy	DDE, Vidyasagar University, PIN - 721102	8335838588	misharoy.india@gmail.com
21	2020-21	July	Master of Science - Geography || [Total Faculties:2]	Dr. Saswati Kapat	DDE, Vidyasagar University, PIN - 721102	8348419758	saswatikapat@gmail.com
22	2020-21	July	Master of Commerce-NA || [Total Faculties:2]	Mr. Krishna Dayal Pandey	Vill+PO - Ghongha, Dist-Purulia, PIN-723149	8116880873	krishna.9800@gmail.com
23	2020-21	July	Master of Science - Mathematics || [Total Faculties:2]	Dr. Tanushree Mitra Basu	17/13 Rabindranagar, PO-Midnapore, Dist- Paschim Medinipur, PIN - 721101	9153836086	tanushreemitra13@gmail.com
24	2020-21	July	Master of Science - Environmental Science || [Total Faculties:2]	Dr. Tarakeshwar Senapati	Vill - Nabin Simla, Po-Harekrishnapur, Dist - Paschim Medinipur, PIN-721211	9475482480	senapatienvs@gmail.com
25	2020-21	July	Master of Science - Geography || [Total Faculties:2]	Dr. Kakoli Das	N9, Saratpally, D$, Rupamalya Appt., Paschim Medinipur, PIN-721101	9564964265	kakolidas87@gmail.com
26	2020-21	July	Master of Science - Physics || [Total Faculties:2]	Dr. Anup Karak	Vill - Bhutsahar, PO-Sanbandha, Dist-Bankura, PIN-722180	9851210031	anupkarak@hotmail.com
27	2020-21	July	Master of Science - Zoology || [Total Faculties:2]	Dr. Barna Chakraborty	North Bhawanipur, PO-Kharagpur, Paschim Medinipur, PIN-721301	7501108213	barnack2020@gmail.com

Srno	Year	Academic Session	Name of Programmes	Name of faculty	Address	Phone	Email
28	2020-21	July	Master of Science - Botany || [Total Faculties:2]	Dr. Shipra Roy	W/O Anantadeb Karmakar, Vill-Basudebpur, PO-Narugram, Burdwan, PIN-713424	9474103330	shipra.tanni@gmail.com
29	2020-21	July	Master of Science - Dietetics & Community Nutrition Management || [Total Faculties:2]	Miss. Ankita Ganguly	193 Andul Road, Sukanta Abasan, Govt. Quarter, Flat No - LC 14, Howrah, PIN-711109	9674162063	ankita.ganguly1994@gmail.com
30	2020-21	July	Masters of Arts -Bengali || [Total Faculties:2]	Dr. Shipra Bhattacharjee	Bidhan Nagar East, Paschim Medinipur, PIN-721101	9002720720	bengalishipra@gmail.com

Computerization / Digitization Status

Srno	Activities	Yes / No
1	Student registration / Admission	Yes
2	Administration	Yes
3	Finance	Yes
4	Academic activities	Yes
5	Student Support System	Yes
6	Continuous Evaluation	No
7	Online Support	Yes

Status of a Court case(s)

Srno	W.P.No	Court / Jurisdiction	Status as on date
1	0	Nil	26.12.2019

Help Desk

Help Desk Address:	Name of Contact Person:	Designation:
Vidyasagar UniversityMidnaporeDist. - Paschim MedinipurWest Bengal, India	Mr. Tapas Jana	Office Assistant University
Phone No: 8373063908	Email: director.ddevu@gmail.coM	Contact hours for Help Desk: 10.00 am to 5.30 pm

Submited Date: 12/30/2019 1:38:28 PM

VIDYASAGAR UNIVERSITY
MIDNAPORE : 721102

Resolutions of the 32nd meeting of the Second Executive Council held on 09.09.94 at 12-00 Noon in the Committee Room of the Vidyasagar University.

Members present

1. Professor S.N.Ghosh, Vice-Chancellor
2. Prof.(Ms) Bithi Sircar
3. Prof. Asok Basu
4. Prof. D. P. Pande
5. Sri Anil Kumar Jana
6. Dr. S. N. Sau
7. Dr. B. R. De
8. Mr. A. H. Mollah
9. Dr. M. Barman
10. Mr. T. K. Maiti
11. Mr. M. K. Roy
12. Dr. S. K. Ghorai
13. Mr. A. Kar.

Professor S. N. Ghosh, the Vice-Chancellor, presided over the meeting.

CONDOLENCE

The members of the Executive Council condoled the death of the following distinguished persons and observed one minute's silence in the memory of the deceased.

1. Com. Erickh Honekar (Died on 23.5.94) : The great freedom fighter and a Communist Leader of Ex-Republic of Germany.

2. Mrs. Saraju Bala (Died on July '94) : A legend in the field of Indian Drama.

3. Mrs. Arati Saha (Gupta) (Died on 23.8.94) : The first Asian lady Swimmer, who crossed the English Channel.

4. Mr. Haraprasad Mitra (Died on 17.8.94) : Famous Poet, essayist, ex-Rabindranath Tagore Professor of Calcutta University.

5. Mr. Tushar Kanti Ghosh (Died on 29.8.94) : A veteran Journalist and news paper editor of the country as well as of the world.

6. Professor Nisith Ranjan Roy (Died on 07.09.94) : The famous Historian of the country. Rabindra award winner, ex-Director of Calcutta Institute of Historical Studies.

ORAL MENTIONING

Sri Arnab Kar drew the attention of the members to a news item published in Bartaman (a Bengali daily) on 8.9.94 relating to some affairs of Anthropology Department of the University and wanted Vice-Chancellor's intervention for settlement of the for the fair name of the University.

date of receipt of the letter. When the application of Dr. Bhaumik was placed before the Vice-Chancellor, he ordered on 20.8.94 to itemise the same for Executive Council with observation, "I think 3 month's notice is necessary for permanent incumbent".

(Relevant papers are kept in the file).

26. To report that the Vice-Chancellor has been pleased to approved the "Notification for Admission to the Correspondence Courses" to expedite the process.

Office Note : In a joint meeting dated 5.4.94 of the Faculty Councils for Post-Graduate Studies in Arts & Commerce and Science, where the Vice-Chancellor reported the proceedings of the meeting of the Advisory Committee of the Vice-Chancellors, presided over by the Minister-in-charge of Higher Education, agreeing to run Correspondence Courses within the infrastructural facilities existing in the University, the members decided to run Correspondence Courses in five subjects, viz. Bengali, English, History, Political Science and Commerce. A study team constituted for the purpose made various recommendations for starting the courses. The Vice-Chancellor has been pleased to approve the Notification for expediting the [illegible]. The provision 21(ii) of the Vidyasagar University Act, 1981 is to be taken into consideration.

(The relevant papers are kept in the file).

enable him to join Calcutta University from forenoon of 14th. September, 1994.

S.N. Members suggested that if possible a suitable candidate may be appointed to the lien bound post, provided that the recommendation comes from the Departmental Committee, Dean or the relevant Faculty Council.

6. To report that the Vice-Chancellor has been pleased to approved the "Notification for Admission to the Correspondence Courses" to expedite the process.

6. Resolved that the action of the Vice-Chancellor approving the "Notification for Admission to the Correspondence Courses to expedite the process" be approved.

7. To consider the observations

7. Resolved that the matter be brought

राष्ट्रीय मूल्यांकन एवं प्रत्यायन परिषद
विश्वविद्यालय अनुदान आयोग का स्वायत्त संस्थान

NATIONAL ASSESSMENT AND ACCREDITATION COUNCIL
An Autonomous Institution of the University Grants Commission

Certificate of Accreditation

The Executive Committee of the
National Assessment and Accreditation Council
on the recommendation of the duly appointed
Peer Team is pleased to declare the
Vidyasagar University
Midnapore, Dist. Paschim Medinipur, West Bengal as
Accredited
with CGPA of 2.86 on four point scale
at B grade
valid up to December 09, 2019

Date : December 10, 2014

Director

Director IQAC <director.iqac@mail.vidyasagar.ac.in>

Naac - Approved

1 message

Admin-Naac <noreply.onlineassessment@gmail.com> Fri, Sep 20, 2019 at 10:03 AM
To: VIDYASAGAR UNIVERSITY <director.iqac@mail.vidyasagar.ac.in>

NATIONAL ASSESSMENT AND ACCREDITATION COUNCIL

Dear VIDYASAGAR UNIVERSITY,

Your registration has been verified and approved. You can start filling IIQA form.

For all further communication on IIQA, please use your MHRD AISHE Id.

THIS IS AN AUTO GENERATED MAIL, PLEASE DO NOT REPLY TO THIS MAIL.

UNIVERSITY GRANTS COMMISSION
Distance Education Bureau

F.No. 1-18/2018 (DEB-I) **Dated: 31-12-2018**

University Grants Commission recognition to the HEI's for academic year 2018-19 and onwards for programmes through the Open & Distance Learning Mode

S.NO	STATE	NAME/CATEGORY OF HEI	PERIOD OF RECOGNITION	LIST OF PROGRAMMES RECOGNISED FOR 2018-19, ACADEMIC SESSION BEGINNING JULY, 2018 AND ONWARDS		LIST OF PROGRAMMES RECOGNISED FOR 2018-19, ACADEMIC SESSION BEGINNING JANUARY, 2019 AND ONWARDS	
				NUMBER OF RECOGNISED PROGRAMMES	NAME OF RECOGNISED PROGRAMMES	NUMBER OF RECOGNISED PROGRAMMES	NAME OF RECOGNISED PROGRAMMES
1	ANDHRA PRADESH	ACHARYA NAGARJUNA UNIVERSITY (STATE UNIVERSITY)	2018-19 TO 2019-20	46	1. BACHELOR OF ARTS (ECONOMICS, HISTORY, POLITICS) 2. BACHELOR OF ARTS (HISTORY, POLITICS, SOCIOLOGY) 3. BACHELOR OF ARTS (PUBLIC ADMINISTRATION, POLITICS, HISTORY) 4. BACHELOR OF ARTS (SPECIAL ENGLISH, HISTORY, TELUGU) 5. BACHELOR OF BUSINESS ADMINISTRATION 6. BACHELOR OF COMMERCE (COMPUTER APPLICATIONS) 7. BACHELOR OF COMMERCE 8. BACHELOR OF LIBRARY AND INFORMATION SCIENCE		

S.NO	STATE	NAME/CATEGORY OF HEI	PERIOD OF RECOGNITION	LIST OF PROGRAMMES RECOGNISED FOR 2018-19, ACADEMIC SESSION BEGINNING JULY, 2018 AND ONWARDS		LIST OF PROGRAMMES RECOGNISED FOR 2018-19, ACADEMIC SESSION BEGINNING JANUARY, 2019 AND ONWARDS	
				NUMBER OF RECOGNISED PROGRAMMES	NAME OF RECOGNISED PROGRAMMES	NUMBER OF RECOGNISED PROGRAMMES	NAME OF RECOGNISED PROGRAMMES
					20) BACHELOR OF SPECIAL EDUCATION (MR,HI,VI) 21) BACHELOR OF ARTS (POLITICAL SCIENCE) 22) BACHELOR OF SCIENCE (CHEMISTRY) 23) BACHELOR OF SCIENCE (PHYSICS) 24) MASTER OF ARTS (POLITICAL SCIENCE)		
78	WEST BENGAL	VIDYASAGAR UNIVERSITY (STATE UNIVERSITY)	2018-19 TO 2019-20	7	1. MASTER OF ARTS (BENGALI) 2. MASTER OF ARTS (SANSKRIT) 3. MASTER OF SCIENCE (CHEMISTRY) 4. MASTER OF SCIENCE (COMPUTER SCIENCE) 5. MASTER OF SCIENCE (DIETETICS AND COMMUNITY NUTRITION MANAGEMENT) 6. MASTER OF SCIENCE (ENVIRONMENTAL SCIENCE) 7. MASTER OF SCIENCE (PHYSICS)	4	1. MASTER OF ARTS (ENGLISH) 2. MASTER OF ARTS (HISTORY) 3. MASTER OF ARTS (POLITICAL SCIENCE) 4. MASTER OF COMMERCE
79	WEST BENGAL	UNIVERSITY OF KALYANI (STATE UNIVERSITY)	2018-19 TO 2019-20	8	1. MASTER OF ARTS (ENGLISH) 2. MASTER OF ARTS (EDUCATION)		

VIDYASAGAR UNIVERSITY
Directorate of Distance Education
Midnapore: 721102

The resolutions of the One hundred fifty first meeting (urgent) of the Advisory Committee of Directorate of Distance Education held on 24th December, 2019 at 2.00 P.M. in the Surya Sen Sabha Kaksha of the Annex Administrative Building of Vidyasagar University.

The meeting was attended by the following members:

1. Prof. Ranjan Chakrabarti, Honourable Vice-Chancellor- Chairman
2. Prof. Subrata Kumar De, Dean, Faculty of Science, V.U.
3. Shri Gautam Pal, Finance Officer, V.U.
4. Dr. Hariprasad Sarkar, Controller of Examination, V.U.
5. Dr. Tarun Kanti Mandal, Secretary, P.G. Faculty Council, V.U.
6. Prof. Satyajit Saha, Dept. of Physics, V.U.
7. Prof. Ajay Misra, Dept. of Chemistry, V.U.
8. Mr. Chinmoy Banerjee, Dy. Director, DDE, V.U.
9. Dr. Saswati Kapat, Core-faculty, DDE, V.U.
10. Mr. Abhijeet Ghose, Asst. Director, DDE, V.U.
11. Prof. Prakash Chandra Dhara, Director (Officiating), DDE, V.U. – Member Secretary.

1. Confirmation

To note and confirm the resolution adopted in 150th Advisory Committee Meeting held on 20th December, 2019.

Resolution: The resolutions of 150th meeting of advisory committee are read and confirmed.

Pdhara
24-12-19

2. For Consideration

2. a) Approval of SLMs and PPRs for new Semester System syllabi for the programmes of DDE.

Resolution: The new 'Self Learning Materials (SLM)' and 'Programme Project Reports (PPR)' of semester system of the following programs of DDE which were reviewed and recommended by 'Centre for Internal Quality Assurance' (CIQA) in meeting dt. 23-12-2019 are placed in DDE Advisory Committee Meeting and those are discussed thoroughly and all SLMs and PPRs are approved.

DDE Programmes:

1. **M.A. in Bengali**
2. **M.A. in English**
3. **M.A. in History**
4. **M.A. in Sanskrit**
5. **M.A. in Political Science**
6. **M.Com.**
7. **M.Sc. in Botany**
8. **M.Sc. in Chemistry**
9. **M.Sc. in Computer Science**
10. **M.Sc. in D.C.N.M.**
11. **M.Sc. in Environmental Science**
12. **M.Sc. in Geography**
13. **M.Sc. in Mathematics**
14. **M.Sc. in Physics**
15. **M.Sc. in Zoology**

The meeting ended with a vote of thanks to the Chair.

Chairperson
Advisory Committee

Vice - Chancellor
VIDYASAGAR UNIVERSITY
Midnapore - 721102, W.B.

24.12.19

Member Secretary
Advisory Committee

Director
Directorate of Distance Education
VIDYASAGAR UNIVERSITY
Midnapore - 721102, W.B.

Programme Project Report (PPR)

Programme: M. A. in Bengali

(a) Programme Mission and objective:

Bengali is linguistically related to Sanskrit. Outstanding enrichment in Bengali literature is noted since Bengali Renaissance with contributions of Bankim Chadra Chattyapadhya, Ishwar Chandra Vidyasagar, Rabindranath Tagore, Sharat Chandra Chattyopadhya, Tarashankar Bandyapadhya and others.

Different courses in Bengali language and literature may provide opportunity to explore linguistic and development of Bengali literature, Bengali literature in different periods, sociology of literature, novel, short stories, poetry, essay and play, women's writing in Bengali, literature in translation, comparative study (Post colonialism & post modernism), linguistic studies etc. Programme project report is prepared considering all these.

The proposed programme has the mission and objectives in relation to the teaching and learning in open and distance mode. In order to afford Quality Education for every one through distance learning mode, need based academic programmes for livelihood and lifelong learning at post graduate level has been adopted. In order to set highest benchmark for quality and standards of Indian open distance learning strategy introduction of this programme has enormously been spread.

The post graduate Programme in Arts, Science and Commerce to be offered through ODL mode will have certain learning outcomes. This programme will help the learners-

- To spread higher education especially among the rural people who are socio economically backward.
- To rid underprivileged society of social evils
- Capacity building among the rural population.
- To reach the unreached and provide education at the doorsteps of the learners and according to their convenience.

Concept of open learning and distance education system focuses on open access education and training to make the learners free from the constraints of time and place, and offering flexible learning opportunities to individuals and group of learners. Open and distance learning (ODL) is one of the most rapidly growing fields of education now a days and it has substantial impact on all education delivery systems. The new ODL system growing fast because of the development of Internet-based information technologies. The concept of ODL education came from idea where the learners and the teachers can not be in a class room and they should be separated by some geographical distance or may be they cannot come close to each other to make the entire education system flexible.

Open and Distance Learning system has tremendous potential of inclusive growth of education because of its distinctive nature of being a user friendly system. ODL system is not only cost effective but it can also contribute in the sustainable development through learning processes that transcend distance, gender, regional, cultural and socio-economic barriers.

> Higher education playing the role of leadership in the society education act as catalyst of social change and spread of education in a society is the foundation of success in countries that are latecomers for development. Distance education is playing an important role in providing higher education to those who are unable to be the part of conventional system. The main objective of ODL is to reach the unreached and provide education at the doorstep of the learners and according to their convenience.

Formal system was unable to meet the demand of higher education and alternatively distance education was adopted as an alternative mode at the University stage.

Most ODL learners have professional responsibilities (jobs), social responsibilities (families), are interested in part time studies, lack of access to on-campus based studies or are away from formal education and ODL becomes the readily available option for them to upgrade their qualifications.

Typical distance learners are regular students as we all know them, but also parents, physically challenged people, and working/business people who are looking for ways to enhance their skills next to their busy schedule.

(b) Relevance of the programme with HEI Mission

Mission of the Vidyasagar University is defined in its logo "Education, Knowledge and Progress" with special emphasis on a curriculum relevant to the ethnic, sociological and geographical needs on the catchment region, yet not ignoring the demands of mainstream education.

The main missions of the university are-

i. To improve the economic condition of the region and offer courses which should have the potential to garner employment.

ii. To build human resource with strong character and competence, having the strength to face the challenges of the changing realities both in global and local levels and to adapt to the fast evolving technologies.

iii. To promote an all round development of its students with a proper blending of knowledge and wisdom acquiring adequate skill in his own subject or trade or vocation through teaching learning process and human qualities like compassion, a sense of social responsibility and commitment and ethical sense (honesty), tolerance and empathy through various social, cultural, sports and ethical value addition programs.

iv. To strive for the creation and dissemination of knowledge through continuous research and learning process.

v. To strive for academic excellence

vi. To strengthen student support system

The missions of the proposed Programme are in conformity with the missions of the institute. It aims to enable learners to learn and retain a broad base of knowledge in the various domains of the subject. The distance mode education has been started in the university with a mission to revitalize educational leadership, to set the standard for the production and dissemination of knowledge as well as to become an effective instrument of change in the society. Keeping priority with the view of "Education For All", PG courses in Arts, Science and Commerce to be offered or being offered through ODL mode is very much relevant to the HEI's mission and goals as it aims to provide quality education to those aspiring candidates who are deprived of higher education due to the limited number of intake in the formal mode of higher education in the University. Moreover, to keep the quality intact the curriculum and syllabus has been designed at par with the conventional mode keeping in mind the specific needs and acceptability of the learners in the distance mode and in keeping with the aims and objectives of the University. The proposal of the present subject will fulfil the above objectives of the university as well as distance mode education.

(c) Nature and target group of learners:

For the present subject the following groups of learners have been targeted:

(1) The people who are interested in vernacular and wish to learn more about this language.

(2)Those are distracted from the admission in the regular mode due to limited intake capacity of HEIs.

(3) Those employed in various organizations who desire to track higher education as a passion or as a means for movement up the promotional ladder.

(4) Drop outs primarily due to social, financial and economic compulsions as well as population related factors.

(5) Rural population those living in remote areas where higher education institutes are not easily accessible.

(6) Job seekers of particular field or subjects

(7) People of any age can participate in higher education programmes as there is no age bar in ODL mode education.

.

(d) Appropriateness of the programme to be conducted in the ODL mode for acquiring specific skills and competence -

Vidyasagar University emphasized in innovative approach towards curriculum designing, while conforming to the basic or core requirements to create a common knowledge base for the state and the nation. Post graduate Programme in Arts, Commerce and Science to be offered through

ODL mode will have certain learning outcomes. This programme will help the learners to spread higher education in all sectors of community.

• Capacity building among the students particularly from the rural population.

• To apply skills and knowledge in an internship experience.

• To develop skills on hand practical related to science subject and also hands on training in field exposure.

The distance learning under Vidyasagar University offer programme in a expanded mode both in volume and the type of programmes: online, open and blended learning: PG degree endowed with credit system. As technology has been getting more affordable and widely available, the interest of both learners and institutions in this special kind of education is increased enormously.

Bengali known by its synonym Bangla is an Indo Aryan language predominantly spoken in West Bengal. This subject is also involved with several innovative programme for developing literacy and skill to raise economically deprived community. Keeping this view, Bengali syllabus has been prepared. It opens many career opportunities after its successful passing.

(e) Instructional Design:

The first step of instructional design in distance mode is curriculum design. A growing number of students globally are enrolling in distance education programs and it is becoming important now, more than ever before, to design curriculum that reflects educational principles, represents elements of engagement and pedagogy and meets institutional and social requirements. In doing so, it is vital to design contemporary curriculum that ensures these outcomes are attained. In order to effectively design curriculum, the role of the educator as a conductor, technician and choreographer. Finally, a triad has been proposed comprising of pedagogy, technology and an engaged community of learners as a basis for ensuring curriculum meets contemporary practices. For All these subjects the objective of this Open & Distance Learning (ODL) system of education is to develop capacity within and across the region to organize distance learning effectively in order to address the educational challenges and opportunities, particularly in higher education.

a). Curriculum Design: The curriculum is designed by a committee comprising experts from the parent department of the Vidyasagar University along with external expert keeping in view the needs of the diverse groups of learners. Efforts has been made to adopt the syllabus at par with the regular courses in the university as far as practicable. The syllabus is prepared by the Subject Committee is placed in the Advisory Committee of Directorate of Distance Education for approval. Then the syllabus is uploaded in the website of the university.

b**) Syllabus:** M.A. in Bengali

Subject: Bengali

Syllabus at a glance
Course structure

SEMESTER - I

TYPE	COURSE NUMBER	TOPIC	WRITTEN	INTERNAL ASSESSMENT	Credits
Theory	BNG-101	BHASHATATWA	40	10	6
Theory	BNG-102	BANGLA-BANGALIR PARICHAY O PRACHIN-MADHYAYUGER BANGL A SAHITYA	40	10	6
Theory	BNG-103	MADHYAYUGER BANGLA SAHITYA	40	10	6
Theory	BNG-104	BANGLA GADYA O PRABANDHA SAHITYER DHARA	40	10	6
Theory	BNG-105	BANGLA KABYA SAHITYER DHARA	40	10	6

SEMESTER – II

TYPE	COURSE NUMBER	TOPIC	WRITTEN	INTERNAL ASSESSMENT	Credits
Theory	BNG-201	BANGLA BHASA BIGJAN	40	10	6
Theory	BNG-202	MADHYAYUGER SAHITYAPATH	40	10	6
Theory	BNG-203	BANGLA KABYA O KABITAPATH	40	10	6
Theory	BNG-204	RAMYARACHANAR DHARA PARICHAY O GADYASAHITYA PATH	40	10	6
Theory	BNG-205	BANGLA NATYASAHITYER ITIHAS O NATAKPATH	40	10	6

SEMESTER- III

TYPE	COURSE NUMBER	TOPIC	WRITTEN	INTERNAL ASSESSMENT	Credits
Theory	BNG-301	BHASACHARCHA O BHASABIGJAN	40	10	6
Theory	BNG-302	BANGLA KATHASAHITYER ITIHAS O KATHASAHITYA PATH	40	10	6
Theory	BNG-303	PRACHYA SAHITYATATWA	40	10	6
Theory	BNG-304	SAHITYER ANUBAD, PATHANTAR O PRAVAB-PRERANA	40	10	6
Theory	BNG-305	SAHITYER ITIHAS O RABINDRASAHITYA PATH	40	10	6

SEMESTER-IV

TYPE	COURSE NUMBER	TOPIC	WRITTEN	INTERNAL ASSESSMENT	Credits
Theory	BNG-401	PASCHATYA SAHITYATATWA O SAMALOCHANA ADDHATI	40	10	6
Theory	BNG-402	LOKASAHITYA O LOKASANSKRITI	40	10	**6**
Theory	BNG-403	BISHES PATRA BARGA 1- KATHASAHITYA BARGA 2-RABINDRAJIBAN O RABINDRASAHITYA PATH BARGA 3-NATYATATWA O NATAK BARGA 4-SAHITYATATWA O SAHITYA ANDOLAN	40	10	**6**
Project	BNG-404	PROJECT WORK	35	15	4
Project	BNG-405	PROJECT WORK	35	15	4

Total credit point 116 and Total marks 1000.

Note : The details of the text of syllabus is given in the hard copy of the application.

i) **Duration of the Program**: 2 (two) years. However, the learners are given time to complete the course within 5 (five) years from the date of admission.

ii) **Instructional Delivery Mechanism**: The programme shall be delivered in two years. The learners shall be provided with the printed SLM which covers almost all the contents in the syllabus. Apart from this the students will be provided with the SLM in electronic media depending on the choice of the learner. The PCP programmes are announced well ahead from the date of commencement. The examination programmes are also announced well before its commencement. The announcement for PCP or Examination is published in university website and leading news paper of the state. We have a well structured data base of the contacts of the learners and a system of delivering information to students using ICT. The students are also informed about those programmes by SMS. Counselling is also held in various affiliated study centres, in addition to university centre itself. The progress of the learners shall be evaluated by semester system examination. Examination rules are adopted as per the rules and regulation regular system of the university.

iii**) Faculty**: Regular mode Faculties and Distance mode dedicated Faculties of Vidyasagar University both are engaged in teaching, in addition counsellors from experience teachers of colleges, other universities and research institutes. UGC norms are followed for selecting the counsellors.

iv) **Media**: SLM will be provided in both Print Media, and e-media. The learners will be given choice to avail print media or e-media or both.

v) **Learner Support Service**: Existing facilities of central library, photo copying facilities, free internet and WIFI facility will be available to the students. The students are provided with facilities for canteen, food corners of the university during holding PCP even in holidays. Further, in order to successfully execute the programme, a wide range of support services are provided to the ODL learners.

Network of Study Centres: To assist its learners of Directorate of Distance Education of Vidyasagar University has established 36 study centres so that learner can choose a study centre according to their convenience or nearest to the residence. All the study centres are well connected with the Vidyasagar University and vice-versa by means of telephone, email and other electronic medium.

(f) Procedure for admissions, Curriculum Transaction and evaluation:

Vidyasagar University has taken a concrete admission policy for all courses offered in distance mode. This policy includes notification, minimum eligibility criteria and fee structure. In every academic session the notifications are published in news papers (national level and local level) and also in the university website. For different subjects the minimum eligibility criteria for admission is different. There is a fixed fee structure for each subject. The learners are instructed to deposit the fees by online transaction. The system of online admission is also in the pipe line.

Fee Structure

SUBJECT	SEMESTER - I	SEMESTER - II	SEMESTER - III	SEMESTER - IV
Bengali	2,650.00	2,650.00	2,800.00	2,800.00

Curriculum Transaction incorporates effective planning for providing learning experiences for its learners, organization of planning, administration/implementation of the organized planning and evaluation of the implementations by the implementer and the experts in the relevant field. Curriculum Transaction or Curriculum management is the process of planning and organizing the curriculum in a particular subject area for different levels of education and continuously monitor it while being implemented. The main responsibility of the curriculum transaction lies on the teachers and trainers who may use different types of pedagogies to create a nice academic environment in the institution and students can be benefited in gaining knowledge and developing skills. Curriculum transaction is always done through Personal Contact Programmes (PCP). The PCP should aim to address not only the problems faced by the individual learners but also compensate the pedagogic limitations of the SLM. So it will not just bring together learners to solve their problems but will be an intervention for organizing activities to be carried out in teams, using multiple sources of information available in the university. The activities presently supposed to be carried out at the PCP such as clarification of doubts; laboratory work and so on will be a part of the curriculum transaction process planned for the PCP. Efforts are being done to provide e-learning facility.

Evaluation: The evaluation of learners will be made by two modes – internal assessment/assignments and six month examination (written). For the evaluation of scripts there is a system of spot evaluation for expediting the publication of result, i.e., the examiners will come to Directorate of Distance Education and will examine the answer scripts and submit the marks on the spot. In some cases answer scripts are sent to the examiners and evaluated scripts are collected by messengers within a stipulated time. There is a system of re-examination of scripts after publication of results. The computerized system of database formation and preparation mark sheet and certificate will be employed for correct and speedy delivery of results to the learners.

(g) Requirement of Library resource:

Library facility: The students are provided with library facility in the central library of the University. They are used to get reading room as well as lending facilities. The central library is equipped with a numbers of e-books and e-journals too. The learners may also avail such facilities. The faculty members are provided with remote user facility by the central library of Vidyasagar University.

(h) Cost Estimate of the Programme and the Provisions:

The estimated cost of the programme is given below:

Subject	Development (Lakh)	Delivery (Lakh)	Maintenance (Lakh)	Total (Lakh)
Bengali	11	9	15	35

Provisions: As it is a continued programme the infrastructure is already in existence. The other expenses will be fulfilled from the fees collected from the students.

(i) Quality Assurance Mechanism and Expected Programme outcome:

Quality assurance (QA) for distance higher education is one of the main concerns among institutions and stakeholders today. Quality has always been an issue in distance education (DE) and distance learning (DL). Quality assurance in distance and higher education has gained serious attention by institutions, stakeholders, and scholars. In response to QA line of inquiry, institutions have begun to re-define and re-orient their institutional missions and strategic visions to incorporate and address quality issues. QA has now reached an important turning point and is influencing DE institution's management strategies and cultures. Learners are demanding better quality educational services and provisions. To fulfil these demands, our Directorate of Distance Education must pay close attention to quality in terms of study material, quality of PCP counsellor, delivery systems and administrative facility to the learner.

The following major steps would be taken for quality assurance:-

i) Establishment of Centre for Internal Quality Assurance (CIQA)
ii) Revision of curriculum in a regular years interval
iii) Quality improvement of SLM
iv) Emphasize for online learning system
v) Centralize on line admission
vi) Providing SLM in electronic media

The expected outcome of the programme is to develop the knowledge and skill of learners of the specific field. The learner may go for further higher education programmes, e.g., M. Phil, Ph. D, M. Tech and other professional programmes. After completion of the programme by distance mode the learner may prepare themselves for different job oriented entrance examinations, e.g. NET, SET, College service commission (CSC), School Service commission (SSC) etc., Thus they may be employed in Govt. and non-govt like academic institute in relation to comparative Indian Bengali literature, translation studies and Indian folklore and journalism based job.

Programme Project Report (PPR)

Programme: M. Sc. in Dietetics and Community Nutrition Management (DCNM)

(a) Programme Mission and objective:

Food and nutrition is an increasingly important priority for populations around the world. Learn to develop strategies to improve nutrition and promote physical health, making a true difference in the lives of others. Graduates will benefit in a sector with strong job growth as public health issues such as obesity and poor diet affect health care systems of the country.

The proposed programme, M. Sc. in Dietetics and Community Nutrition Management (DCNM) has the mission and objectives in relation to the teaching and learning in distance mode of learning. In order to afford Quality Education for every one through distance learning mode need based academic programmes for livelihood and lifelong learning at post graduate level has been adopted. In order to set highest benchmark for quality and standards of Indian open distance learning strategy introduction of this programme has enormously been spread.

The post graduate programme in Arts, Science and Commerce to be offered through ODL mode will have certain learning outcomes. This programme will help the learners-

- To spread higher education in DCNM especially among the rural people who are socio economically backward.
- To rid underprivileged society of social evils through proper education
- Capacity building among the students especially in rural population.
- To reach the unreached and provide education at the doorstep of the learners and according to their convenience.

Concept of open learning and distance education system focuses on open access education and training to make the learners free from the constraints of time and place, and offering flexible learning opportunities to individuals and groups of learners. Open and Distance Learning (ODL)is one of the most rapidly growing fields of education now a days and it has substantial impact on all education delivery systems. The new ODL system growing fast because of the development of Internet-based information technologies. The concept of ODL education came from idea where the learners and the teachers cannot be in a class room and they should be separated by some geographical distance or maybe they cannot come close to each other to make the entire education system flexible.

Open and Distance Learning system has tremendous potential of inclusive growth of education because of its distinctive nature of being a user friendly system. ODL system is not only cost effective but it can also contribute in the sustainable development through learning processes that transcend distance, gender, regional, cultural and socio-economic barriers.

Most ODL learners have professional responsibilities (jobs), social responsibilities (families), are interested in part time studies, lack of access to on-campus based studies or are away from formal education and ODL becomes the readily available option for them to upgrade their qualifications.

Typical distance learners are regular students as we all know them, but also parents, physically challenged people, and working/business people who are looking for ways to enhance their skills next to their busy schedule.

The proposed programme, M. Sc. in DCNM will be helpful to meet the high demand of the students for studying the applied aspects of nutrition and dietetics. The specific objectives of this programme are

- To produce postgraduates in the field of Dietetics and Nutrition recognized for their practical and public health skills.

- To acquaint postgraduates with advanced clinical nutrition, understand the basis of nutritional status assessment, biochemical basis of nutrition, nutrition related disorders, and the role of nutrition in therapeutic diets.
- The course also aims at teaching skills of menu planning for quality and quantity preparation and management of resources.
- The students also learn about new and expanding areas of research in the field of dietetics and nutrition and acquire necessary research oriented skills.

(b) Relevance of the programme with HEI Mission

Mission of the Vidyasagar University is defined in its logo "Education, Knowledge and Progress" with special emphasis on a curriculum relevant to the ethnic, sociological and geographical needs on the catchment region, yet not ignoring the demands of mainstream education.

The main missions of the university are-

i. To improve the economic condition of the region and offer courses which should have the potential to garner employment.

ii. To build human resource with strong character and competence, having the strength to face the challenges of the changing realities both in global and local levels and to adapt to the fast evolving technologies.

iii. To promote an all-round development of its students with a proper blending of knowledge and wisdom acquiring adequate skill in his own subject or trade or vocation through teaching learning process and human qualities like compassion, a sense of social responsibility and commitment and ethical sense (honesty), tolerance and empathy through various social, cultural, sports and ethical value addition programs.

iv. To strive for the creation and dissemination of knowledge through continuous research and learning process.

v. To strive for academic excellence

vii. To strengthen student support system

The missions of the proposed programme are in conformity with the missions of the institute. It aims to enable learners to learn and retain a broad base of knowledge in the various domains of the subject. The distance mode education has been started in the university with a mission to revitalize educational leadership, to set the standard for the production and dissemination of knowledge as well as to become an effective instrument of change in the society. Keeping priority with the view of "Education For All", PG courses in Arts, Science and Commerce to be offered or being offered through ODL mode is very much relevant to the HEI's mission and goals as it aims to provide quality education to those aspiring candidates who are deprived of higher education due to the limited number of intake in the traditional mode of higher education in the Universities. Moreover, to keep the quality intact the curriculum and syllabus has been designed at par with the conventional mode keeping in mind the specific needs and acceptability of the learners in the distance mode and in keeping with the aims and objectives of the University. The proposal of the present subject will fulfill the above objectives of the university as well as distance mode education.

Programme Project Report (PPR)

(c) Nature and target group of learners:

For the Programme M. Sc. in DCNM the following groups of learners have been targeted:

1. Those are distracted from the admission in the regular mode due to limited intake capacity of Vidyasagar University and other Higher Education Institutions (HEIs). In Vidyasagar university only 20% of the students graduated with B. Sc. with nutrition get chance in the PG course in Nutrition and dietetics under regular mode. Remaining 80% graduated will be targeted.
2. Those employed in various organizations who desire to track higher education as a passion or as a means for movement up the promotional ladder.
3. Drop outs primarily due to social, financial and economic compulsions as well as population related factors.
4. Rural population those living in remote areas where higher education institutes are not easily accessible.
5. Job seekers of particular field or subjects.
6. People of any age can participate in higher education programmes as there is no age bar in ODL mode education.
7. The persons related to the medical and health services who are interested in Dietetics and Nutrition will be another target group.

(d) Appropriateness of the programme to be conducted in the ODL mode for acquiring specific skills and competence

Vidyasagar University emphasized in innovative approach towards curriculum designing, while conforming to the basic or core requirements to create a common knowledge base for the state and the nation. Post graduate Programme in Arts, Commerce and Science to be offered through ODL mode will have certain learning outcomes. This programme will help the learners to spread higher education in all sectors of community.

- Capacity building among the students particularly from the rural population.
- To apply skills and knowledge in an internship experience.
- To develop skills on hand practical related to science subject and also hands on training in field exposure.

The distance learning under Vidyasagar University offer programme in an expanded mode both in volume and the type of programmes. As technology has been getting more affordable and widely available, the interest of both learners and institutions in this special kind of education may be increased enormously.

Nutrition and Dietetics is closely related to personal as well as community health. The learners can be trained in this field through this programme. The students passing graduation with this subject can serve in the medical field for improvement of public health and hygiene. There is professional demand in these subjects. They can be employed in Govt. and private health service sector. Further they may be self employed for assisting the patients for diet planning and therapy.

(e) Instructional Design:

The first step of instructional design in distance mode is curriculum design. A growing number of students globally are enrolling in distance education programs and it is becoming important now, more than ever before, to design curriculum that reflects educational principles, represents elements of engagement and pedagogy and meets institutional and industry requirements. In doing so, it is vital to design contemporary curriculum that ensures these outcomes are attained. Finally, a triad has been proposed comprising of pedagogy, technology and an engaged community of learners as a basis for ensuring curriculum meets contemporary practices. For All these subjects the objective of this Open and Distance Learning (ODL) system of education is to develop capacity within and across the region to organize distance learning effectively in order to address the educational challenges and opportunities, particularly in higher education.

Programme Project Report (PPR)

i) **Curriculum Design**: The curriculum is designed by a committee comprising experts from the parent department of the Vidyasagar University along with external expert keeping in view the needs of the diverse groups of learners. Efforts have been made to adopt the syllabus at par with the regular courses in the university as far as practicable. The syllabus is prepared by the Subject Committee is placed in the Advisory Committee of Directorate of Distance Education for approval. Then the syllabus is circulated among the students and teachers and it is also uploaded in the website of the university.

ii) Detailed Syllabus:

Subject: **DCNM**

Syllabus at a glance

Semester I:		**Semester II :**		**Semester III :**		**Semester IV:**		**Total**	
Theory	Practical	Theory	Practical	Theory	Practical	Theory	Practical	Theory	Practical
150	150	200	100	150	150	200	100	700	500

M. Sc. Semester I				
Type	**Paper**	**Topic**	**Full Marks**	**Credit**
Theory	ND 01	Advanced Human Physiology –I	25	2.5
		Advanced Human Physiology –II	25	2.5
	ND 02	Food science and Nutrition	25	2.5
		Vitamins and Minerals in Nutrition	25	2.5
	ND 03	Nutritional Biochemistry- I	25	2.5
		Nutritional Biochemistry- II	25	2.5
Practical	ND 04	Experiments on Physiology-I	25	2.5
		Experiments on Physiology-II	25	2.5
	ND 05	Biochemical analysis in Nutrition –I	25	2.5
		Biochemical analysis in Nutrition –II	25	2.5
	ND 06	Biochemical analysis in Nutrition –III	25	2.5
		Nutritional Anthropometrics	25	2.5
M. Sc. Semester II				
Theory	ND 07	Advanced Human Physiology –III	25	2.5
		Molecular Biology in Nutrition	25	2.5
	ND 08	Food Microbiology and Toxicology	25	2.5
		Food Biotechnology	25	2.5
	ND 09	Food Hygiene and Sanitation	25	2.5
		Assessment of Nutritional Status	25	2.5
	ND 10	Nutrition through Lifecycle- I	25	2.5
		Nutrition through Life cycle- II	25	2.5
Practical	ND 11	Experiments on Food Microbiology	25	2.5
		Growth Chart and Clinical Assessment of Malnutrition	25	2.5
	ND 12	Review work – report	25	2.5
		Review work – Viva-Voce	25	2.5

Programme Project Report (PPR)

M. Sc. SEMESTER-III

Theory / Practical	Paper	Unit	Topic	Full Marks	Credit
Theory	ND 13	25	Research Methodology and Statistics In Nutrition	25	2.5
		26	Bioinformatics and Computer application in nutrition	25	2.5
	ND 14	27	Food and Nutrition Services in Hospital and Other Organizations	25	2.5
		28	Drug nutrient interactions and nutrigenomics	25	2.5
	ND 15	29	Diet Therapy I	25	2.5
		30	Diet Therapy II	25	2.5
Practical	ND 16	31	Advanced Food Analysis-I	25	2.5
		32	Advanced Food Analysis-II	25	2.5
	ND 17	33	Preparation of Diet chart-I	25	2.5
		34	Preparation of Diet chart-II	25	2.5
	ND 18	35	Energy Requirement in Different Physical Activities Level	25	2.5
		36	Nutritional Survey	25	2.5

SEMESTER-IV

Theory / Practical	Paper	Unit	Topic	Full Marks	Credit
Theory	ND 19	37	Advanced Diet therapy	25	2.5
		38	Nutrition in Sports and Fitness	25	2.5
	ND 20	39	Community Nutrition	25	2.5
		40	Special Aspects of Community Nutrition	25	2.5
	ND 21	41	Nutrition in Emergencies	25	2.5
		42	Nutritional Counseling	25	2.5
	ND 22	43	Neutracuticals	25	2.5
		44	Food Additives	25	2.5
Practical	ND 23	45	Statistical Analysis in Nutrition	25	2.5
		46	Computer Analysis in Nutrition	25	2.5
	ND 24	47	Project Work – Report Submission	25	2.5
		48	Project Work – Viva-Voce	25	2.5

Note: The details of the text of syllabus is given in the hard copy of the application

iii) **Duration of the Program**: 4 (Four) Semesters i.e. 2 (Two) years

However, the learners are given time to complete the course within 5 (five) years from the date of admission.

iv) **Instructional Delivery Mechanism**: The programme shall be delivered in 4 semester system (two years). The learners shall be provided with the printed SLM which covers almost all the contents in the syllabus. Apart from this the students will be provided with the SLM in electronic media depending on the choice of the learner. The PCP programmes are announced well ahead from the date of commencement. The examination programmes are also announced well before its commencement. The announcement for PCP is published in university website and announcement of examination is published in university website and leading newspaper of the state. We have a well structured data base of the contacts of the learners and a system of delivering information to students using ICT. The students are also informed about those programmes by SMS. Counselling is also held in various affiliated study centers. The progress of the learners shall be evaluated by semester examination. Examination rules are adopted as per the rules and regulation regular system of the university.

v) **Faculty**: Faculties are engaged in this programme mainly the departmental teachers from both regular and distance mode of Vidyasagar University. In addition counsellors from experience teachers of colleges, other universities and research institutes are also employed.UGC norms are followed for selecting the counsellors.

vi) **Media**: SLM will be provided in both Print Media, and e-media. The learners will be given choice to avail print media or e-media or both.

vii) **Student Support Service**: Existing facilities of central library, photo copying facilities, free internet and WIFI facility will be available to the students. The students are provided with facilities for canteen, food corners of the university during holding PCP even in holidays. Further, in order to successfully execute the programme, a wide range of support services are provided to the ODL learners.

Network of Study Centers: To assist its learners of Directorate of Distance Education of Vidyasagar University has established 36 study centers so that learner can choose a study center nearest to the residence.

(f) Procedure for admissions, Curriculum Transaction and evaluation:

Vidyasagar University has taken a concrete admission policy for all courses offered in distance mode. This policy includes notification, minimum eligibility criteria and fee structure. In every academic session the notifications are published in news papers (National Level and local level) and also in the university website. For different subjects the minimum eligibility criteria for admission is different. There is a fixed fee structure for each subject. The learners are instructed to deposit the fee by cheque or draft. The system of on line admission is also in the pipe line.

Semester -wise Fees Structure

Subject	Semester - I	Semester - II	Semester - III	Semester - IV
M.Sc. in DCNM	Rs. 10,700.00/-	Rs. 10,650.00/-	Rs. 10,850.00/-	Rs. 10,800.00/-

Programme Project Report (PPR)

Curriculum Transaction incorporates effective planning for providing learning experiences for its learners, organization of planning, administration/implementation of the organized planning and evaluation of the implementations by the implementer and the experts in the relevant field. Curriculum Transaction or Curriculum management is the process of planning and organizing the curriculum in a particular subject area for different levels of education and continuously monitors it while being implemented. The main responsibility of the curriculum transaction lies on the teachers and trainers who may use different types of pedagogies to create a nice academic environment in the institution and students can be benefited in gaining knowledge and developing skills. Curriculum transaction is always done through Personal Contact Programmes (PCP). The PCP should aim to address not only the problems faced by the individual learners but also compensate the pedagogic limitations of the SLM. So it will not just bring together learners to solve their problems but will be an intervention for organizing activities to be carried out in teams, using multiple sources of information available in the university. The activities presently supposed to be carried out at the PCP such as clarification of doubts; laboratory work and so on will be a part of the curriculum transaction process planned for the PCP. Efforts are being done to provide e-learning facility.

Evaluation: The evaluation of learners will be made by two modes – internal assessment/assignments and end-semester examination. For the evaluation of scripts there is a system of spot evaluation for expediting the publication of result, i.e., the examiners will come to Directorate of Distance Education and will examine the answer scripts and submit the marks on the spot. In some cases answer scripts are sent to the examiners and evaluated scripts are collected by messengers within a stipulated time. There is a system of re-examination of scripts after publication of results. The use of ICT for the preparation of Mark sheet and certificate and its delivery to the learners will be employed.

(g) Requirement of Laboratory Support and Library resource:

Laboratory support is essential to the learner of distance education system in case of laboratory based subjects. Directorate of Distance Education, Vidyasagar University have established dedicated laboratory in the directorate of Distance Education for the laboratory based subjects like, physics, chemistry, mathematics, environmental science, geography, Zoology and Nutrition and Dietetics to give exposure of practical knowledge to the learners. Our laboratories are well equipped with sophisticated instruments:

- DCNM Laboratory: Anthropometric Set, callipers (spreading and sliding), Skinfold Calliper, spectrophotometer, water bath, incubator, hot air oven, hemoglobinometer etc.

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Practical classes of a particular subject are arranged group wise so that all the learners get sufficient attention and proper training from counsellors and laboratory instructors. Like theory classes, practical PCP schedule is announced by SMS, newspaper and university website at least before 15 days.

Apart from the dedicated laboratory of DDE, the students are also trained in regular departments of the university.

Library facility: The students are provided with library facility in the central library of the University. They are used to get reading room as well as lending facilities. There are large numbers of printed books and journals for Nutrition and Dietetics are available in the central library. Moreover it is equipped with a numbers of e-book and e-journals. The learners may also avail such facilities

(g) Cost Estimate of the Programme and the Provisions:

The followings are the cost estimate for the programme M. Sc in Dietetics and Community Nutrition Management:

Subject	Development	Delivery	Maintenance	Total amount

Dietetics and Community Nutrition Management (D.C.N.M)	11 Lakhs	9 Lakhs	15 Lakhs	35 Lakhs

Provisions: As the proposed programme was offered for more than 11 years in recent past the infrastructure is already in existence. The other expenses will be met from the fees collected from the students.

(i) Quality Assurance Mechanism and Expected Programme outcome:

Quality assurance (QA) for distance higher education is one of the main concerns among institutions and stakeholders today. Quality has always been an issue in distance education (DE) and distance learning (DL). Quality assurance in distance and higher education has gained serious attention by institutions, stakeholders, and scholars. In response to QA line of inquiry, institutions have begun to re-define and re-orient their institutional missions and strategic visions to incorporate and address quality issues. QA has now reached an important turning point and is influencing DE institution's management strategies and cultures. Learners are demanding better quality educational services and provisions. To fulfill these demands, our Directorate of Distance Education must pay close attention to quality in terms of study material, quality of PCP counsellor, delivery systems and administrative facility to the learner.

The following major steps would be taken for quality assurance:-

i) Establishment of Center for Internal Quality Assurance
ii) Revision of curriculum in 3 -5 years interval
iii) Quality improvement of SLM
iv) Emphasize for online learning system
v) More emphasis of practical training of the learners in science subjects by improving the quality of laboratories with sophisticated instruments.
vi) More use of ICT for the management of DL of the university

The expected outcome of the programme is to develop the knowledge and skill of learners of the specific field. The learner may go for further higher education programmes, e.g., M. Phil, Ph. D, M. Tech and other professional programmes. After completion of the programme by distance mode the learner may prepare themselves for different job oriented entrance examinations, e.g. NET, GATE, College service entrance (CSC), School Service Entrance (SSC) etc., Thus they may be employed in Govt. and non-govt. sectors. Apart from this, their training may enable them for self-employment.

The followings are specific scopes of the learners after getting M. Sc. in DCNM:

- Clinical Dietetics /Nutrition: Hospitals or Clinics (healthcare, clinical management, counseling, etc.)
- Community Nutrition / Public Health / Community outreach
- Nutrition & Diet Consultancy in Health Resorts, Fitness Centers (e.g. VLCC), Gymnasiums
- Industry (e.g. corporate health and wellness)
- Academia and research: Teaching Dietetics / Nutrition or Nutrition Research
- Private Practice / Self Employed/Freelance Consultancy Services
- Medical Nutritional Companies (e.g. nutrition and dietetics advisor, nutritional representative)
- Sports and Exercise Nutrition (e.g. elite and recreational sports teams, fitness industry).

Programme Project Report (PPR)

Programme: M. A. in History

(a) Programme Mission and objective:

The study of History is extremely important in contemporary society, not only to remember the past but also to shape the future by learning from it. This master degree program in History helps students further develop their critical thinking, independent researching and writing skills in an effort to gain knowledge and advance their careers across a variety of disciplines. Students who successfully complete a Master of Arts in History program have the educational foundation necessary for pursuing independent research projects, analyzing historical documents and arguments, creating bibliographies from an assortment of different resources and mediums and writing essays, research papers and book reviews with historical focuses.

The proposed M. A. in History has the mission and objectives in relation to the teaching and learning in open and distance mode. In order to afford Quality Education for everyone through distance learning mode, need based academic programmes for livelihood and lifelong learning at post graduate level has been adopted. In order to set highest benchmark for quality and standards of Indian open distance learning strategy introduction of this programme has enormously been spread.

The post graduate Programme in Arts, science and commerce to be offered through ODL mode will have certain learning outcomes. This programme will help the learners-

- To spread higher education especially among the rural people who are socio-economically backward.
- To rid underprivileged society of social evils through proper education
- Capacity building among the students especially in rural population.
- To reach the unreached and provide education at the doorstep of the learners and according to their convenience.

Concept of open learning and distance education system focuses on open access education and training to make the learners free from the constraints of time and place, and offering flexible learning opportunities to individuals and groups of learners. Open and distance learning (ODL) is one of the most rapidly growing fields of education nowadays and it has substantial impact on all education delivery systems. The new ODL system is growing fast because of the development of Internet-based information technologies. The concept of ODL education came from idea where the learners and the teachers can not be in a class

room and they should be separated by some geographical distance or maybe they cannot come close to each other to make the entire education system flexible.

Open and Distance Learning system has tremendous potential of inclusive growth of education because of its distinctive nature of being a user friendly system. ODL system is not only cost-effective but it can also contribute in the sustainable development through learning processes that transcend distance, gender, regional, cultural and socio-economic barriers.

Higher education playing the role of leadership in the society education acts as catalyst of social change and spread of education in a society is the foundation of success in countries that are latecomers for development. Distance education is playing an important role in providing higher education to those who are unable to be the part of conventional system. The main objective of ODL is to reach the unreached and provide education at the doorstep of the learners and according to their convenience. Formal system was unable to meet the demand of higher education and alternatively distance education was adopted as an alternative mode at the University stage.

Most ODL learners have professional responsibilities (jobs), social responsibilities (families), are interested in part time studies, lack of access to on-campus based studies or are away from formal education and ODL becomes the readily available option for them to upgrade their qualifications.

Typical distance learners are regular students as we all know them, but also parents, physically challenged people, and working/business people who are looking for ways to enhance their skills next to their busy schedule. The proposed programme in History in distance mode will enhance the scope of learning the subject for a large number of intended students in the locality.

(b) Relevance of the programme with HEI Mission

The mission of Vidyasagar University is defined in its logo “Education, Knowledge and Progress” with special emphasis on a curriculum relevant to the ethnic, sociological and geographical needs on the catchment region, yet not ignoring the demands of mainstream education.

The main missions of the university are-

i. To improve the economic condition of the region and offer courses which should have the potential to garner employment.

ii. To build human resource with strong character and competence, having the strength to face the challenges of the changing realities both in global and local levels and to adapt to the fast evolving technologies.

iii. To promote an all round development of its students with a proper blending of knowledge and wisdom acquiring adequate skill in his own subject or trade or vocation through teaching learning process and human qualities like compassion, a sense of social responsibility and commitment and ethical sense (honesty), tolerance and empathy through various social, cultural, sports and ethical value addition programs.

iv. To strive for the creation and dissemination of knowledge through a continuous research and learning process.

v. To strive for academic excellence

vi. To strengthen student support system

The missions of the proposed Programme are in conformity with the missions of the institute. It aims to enable learners to learn and retain a broad base of knowledge in the various domains of the subject. The distance mode education has been started in the university with a mission to revitalize educational leadership, to set the standard for the production and dissemination of knowledge as well as to become an effective instrument of change in the society. Keeping priority with the view of "Education For All", PG courses in Arts, Science and Commerce to be offered or being offered through ODL mode is very much relevant to the HEI's mission and goals as it aims to provide quality education to those aspiring candidates who are deprived of higher education due to the limited number of intake in the traditional mode of higher education in the Universities. Moreover, to keep the quality intact the curriculum and syllabus has been designed at par with the conventional mode keeping in mind the specific needs and acceptability of the learners in the distance mode and in keeping with the aims and objectives of the University.
The proposal of M, A. in History will fulfil the above objectives of the university as well as distance mode education. A large number of learners will be benefited.

(c) Nature and target group of learners:

For the present subject the following groups of learners have been targeted:
(1) Those are distracted from the admission in the regular mode due to limited intake capacity of Vidyasagar University and other universities.

(2) Those employed in various organizations who desire to track higher education as a passion or as a means for movement up the promotional ladder.
(3) Drop outs primarily due to social, financial and economic compulsions as well as population related factors.
(5) Rural population those living in remote areas where higher education institutes are not easily accessible.
(4) Job seekers of particular field or subjects
(5) People of any age can participate in higher education programmes as there is no age bar in ODL mode education.

(d) Appropriateness of the programme to be conducted in the ODL mode for acquiring specific skills and competence:

Vidyasagar University emphasized in innovative approach towards curriculum designing, while conforming to the basic or core requirements to create a common knowledge base for the state and the nation. Post graduate Programme in History to be offered through ODL mode will have certain learning outcomes. This programme will help the learners to spread higher education in all sectors of community.

- Capacity building among the students particularly from the rural population.
- To apply skills and knowledge in an internship experience.
- To develop skills on hand practical related to science subject and also hands on training in field exposure

The distance learning under Vidyasagar University offer programme in an expanded mode both in volume and the type of programmes. As technology has been getting more affordable and widely available, the interest of both learners and institutions in this special kind of education may be increased enormously. **History** is, of course, in reality not one subject but many. This is one reason that it is such a popular choice for postgraduate study. Subjects available to postgraduate History students currently include those concentrating on a particular time periods – Classical History, Medieval History, Modern History or Victorian History. There's a plethora of transferable skills you can develop through studying history. Be a postgraduate student may be expected to become teachers, librarians or politicians. In addition to this the research and analysis skills you develop through finding and working with primary and secondary source materials are perfectly transferrable into industries including law, marketing, finance, lobbying and politics, to name a few. There is a very wide scope for research and analytics jobs and the master degree in history will set the learners up perfectly with the skills required.

(e) Instructional Design:

The first step of instructional design in distance mode is the curriculum design. A growing number of students globally are enrolling in distance education programs and it is becoming important now, more than ever before, to design curriculum that reflects educational principles, represents elements of engagement and pedagogy and meets institutional and industry requirements. In doing so, it is vital to design contemporary curriculum that ensures these outcomes are attained. Finally, a triad has been proposed comprising of pedagogy, technology and an engaged community of learners as a basis for ensuring curriculum meets contemporary practices. For all these subjects the objective of this Distance Learning (DL) system of education is to develop capacity within and across the region to organize distance learning effectively in order to address the educational challenges and opportunities, particularly in higher education.

i) **Curriculum Design**: The curriculum is designed by a committee comprising experts from the parent department of the Vidyasagar University along with external expert keeping in view the needs of the diverse groups of learners. Efforts has been made to adopt the syllabus at par with the regular courses in the university as far as practicable. The syllabus is prepared by the Subject Committee is placed in the Advisory Committee of Directorate of Distance Education for approval. Then the syllabus is uploaded in the website of the university.

ii) **Detailed Syllabus**:

Programme: M. A. in History

Syllabus at a glance

SEMESTER	COURSE NO.	COURSE TITLES	FULL MARKS	CREDITS
I	HIS 101	HISTORY AND HISTORIOGRAPHY: WESTERN HISTORY WRITING APPROACHES	50	6
	HIS 102	HISTORY AND HISTORIOGRAPHY: INDIAN HISTORY WRITING APPROACHES	50	6
	HIS 103	STATE AND ECONOMY IN COLONIAL INDIA I	50	6
	HIS 104	STATE AND ECONOMY IN COLONIAL INDIA II	50	6

	TOTAL		200	24
II	HIS 201	ANTI-COLONIAL MOVEMENTS IN INDIA	50	6
	HIS 202	POST –INDEPENDENCE INDIA	50	6
	HIS 203	ANCIENT INDIA	50	6
	HIS 204	MEDIEVAL INDIA	50	6
	TOTAL		200	24
III	HIS 301	INDUSTRIAL REVOLUTION: THE NATURE OF THE INDUSTRIAL REVOLUTION AND THE ENGLISH EXPERIENCE	50	6
	HIS 302	INDUSTRIAL REVOLUTION-II: THE CONTINENTAL EXPERIENCE	50	6
	HIS 303	THE TWENTIETH-CENTURY WORLD: EVENTS BETWEEN THE TWO WORLD WARS	50	6
	HIS 304	THE TWENTIETH-CENTURY WORLD: VARIOUS ASPECTS OF CONTEMPORARY WORLD	50	6
	TOTAL		200	24
IV	HIS 401	SOCIAL HISTORY OF SCIENCE, TECHNOLOGY AND ENVIRONMENT IN COLONIAL INDIA	50	6
	HIS 402	SOCIAL HISTORY OF MEDICINE IN COLONIAL INDIA	50	6
	HIS 403	SOCIAL HISTORY OF COLONIAL INDIA I	50	6
	HIS 404	SOCIAL HISTORY OF COLONIAL INDIA II	50	6
	TOTAL		200	24
	GRAND TOTAL		**800**	**96**

Detailed text of syllabus will be submitted with hard copy of application

iii) **Duration of the Program**: 2 (two) years.

However, the learners are given time to complete the course within 5 (five) years from the date of admission.

iv) **Instructional Delivery Mechanism**: The programme shall be delivered in two years. The learners shall be provided with the printed SLM which covers almost all the contents in the syllabus. Apart from this the students will be provided with the SLM in electronic media depending on the choice of the learner. The PCP programmes are announced well ahead from the date of commencement. The examination programmes are also announced well before its commencement. The announcement for PCP or Examination is published in university website and leading newspapers of the state. We have a well structured database of the contacts of the learners and a system of delivering information to students using ICT. The students are also informed about those programmes by SMS. Counselling is also held in various affiliated study centres. The progress of the learners shall be evaluated by mid-term and end-year examination. Examination rules are adopted as per the rules and regulations of regular system of the university.

v) **Faculty**: Faculties of Vidyasagar University engaged in regular mode teaching, in addition to counsellors from experienced teachers of colleges, other universities and research institutes. UGC norms are followed for selecting the counsellors.

vi) **Media**: SLM will be provided in both Print Media, and e-media. The learners will be given the choice to avail print media or e-media or both.

vii) **Student Support Service**: Existing facilities of central library, photocopying facilities, free internet and WIFI facility will be available to the students. The students are provided with facilities for canteen, food corners of the university during holding PCP even in holidays. Further, in order to successfully execute the programme, a wide range of support services are provided to the ODL learners.

Network of Study Centres: To assist its learners, the Directorate of Distance Education of Vidyasagar University has established 36 study centres so that learners can choose a study center nearest to the residence.

(f) Procedure for admissions, Curriculum Transaction and evaluation:

Vidyasagar University has taken a concrete admission policy for all courses offered in distance mode. This policy includes notification, minimum eligibility criteria and fee structure. In every academic session the notifications are published in newspapers (National Level and local level) and also in the university website. For different subjects the minimum eligibility criteria for admission is different. There is a fixed fee structure for each subject. The learners are instructed to deposit the fee by cheque or draft. The system of online admission is also in the pipe line.

Fee structure

Subject	Sem-I	Sem-II	Sem-III	Sem-IV
History	2650/-	2650/-	2800/-	2800/-

Curriculum Transaction incorporates effective planning for providing learning experiences for its learners, organization of planning, administration/implementation of the organized planning and evaluation of the implementations by the implementer and the experts in the relevant field. Curriculum Transaction or Curriculum management is the process of planning and organizing the curriculum in a particular subject area for different levels of education and continuously monitor it while being implemented. The main responsibility of the curriculum transaction lies on the teachers and trainers who may use different types of pedagogies to create a nice academic environment in the institution and students can be benefited in gaining knowledge and developing skills. Curriculum transaction is always done through Personal Contact Programmes (PCP). The PCP should aim to address not only the problems faced by the individual learners but also compensate the pedagogic limitations of the SLM. So it will not just bring together learners to solve their problems but will be an intervention for organizing activities to be carried out in teams, using multiple sources of information available in the university. The activities presently supposed to be carried out at the PCP such as clarification of doubts; laboratory work and so on will be a part of the curriculum transaction process planned for the PCP. Efforts are being done to provide e-learning facility.

Evaluation: The evaluation of learners will be made by two modes – internal assessment/assignments and end-year examination. For the evaluation of scripts there is a system of spot evaluation for expediting the publication of result, i.e., the examiners will come to Directorate of Distance Education and will examine the answer scripts and submit the marks on the spot. In some cases answer scripts are sent to the examiners and evaluated scripts are collected by messengers within a stipulated time. There is a system of re-examination of scripts after publication of results. The computerized system of database formation and preparation mark sheet and certificate will be employed for correct and speedy delivery of results to the learners.

(g) Requirement of Laboratory Support and Library resource:

For the programme M. A. in History no laboratory support will be required. However, the students will be provided with library facility in the central library of the University. They are used to get reading room as well as lending facilities. There are large numbers of printed books and journals are available in the central library. The central library is equipped with a numbers of e-book and e-journals. The learners may

also avail such facilities. The faculty members are provided with ‘remote user’ facility by the central library of Vidyasagar University.

(g) Cost Estimate of the Programme and the Provisions:

The estimated cost of the programme and the provisions are as follows:

Subject	Development (Lakh)	Delivery (Lakh)	Maintenance (Lakh)	Total (lakhs)
History	11	9	15	35

(i) Quality Assurance Mechanism and Expected Programme outcome:

Emphasis will be given on the maintenance of quality of the proposed programme – M. A. in History. Quality assurance (QA) for distance higher education is one of the main concerns among institutions and stakeholders today. Quality has always been an issue in distance education (DE) and distance learning (DL). Quality assurance in distance and higher education has gained serious attention by institutions, stakeholders, and scholars. In response to QA line of inquiry, institutions have begun to re-define and re-orient their institutional missions and strategic visions to incorporate and address quality issues. QA has now reached an important turning point and is influencing DE institution's management strategies and cultures. Learners are demanding better quality educational services and provisions. To fulfil these demands, our Directorate of Distance Education must pay close attention to quality in terms of study material, quality of PCP counsellor, delivery systems and administrative facility to the learner.

The following major steps would be taken for quality assurance:-

i) Establishment of Center for Internal Quality Assurance

ii) Revision of curriculum in 3 years interval

iii) Quality improvement of SLM

iv) Emphasize for online learning system

v) More emphasis of practical training of the learners in science subjects by improving the quality of laboratories with sophisticated instruments.

vi) More use of ICT for the management of DL of the university

The expected outcome of the programme is to develop the knowledge and skill of learners of the specific field. The learner may go for further higher education programmes, e.g., M. Phil, Ph. D., M. Tech and other professional programmes. After completion of the programme by distance mode the learner may prepare themselves for different job oriented entrance examinations, e.g. NET, GATE, College service entrance (CSC), School Service Entrance (SSC) etc., Thus they may be employed in Govt. and non-govt. sectors. Apart from this, their training may enable them for self employment.

Obtaining a Master of Arts in History degree is a great option for those looking to further study the globe's great events, personalities, progressions and time periods. Earning an advanced history degree can help expedite a successful and profitable career as a teacher, professor, museum curator, historian, researcher or any number of related positions. Graduates of History MA programs are also prepared to take on additional degree work in history, law, business and other related fields. Moreover, students who successfully complete a Master of Arts in History program have the educational foundation necessary for pursuing independent research projects, analyzing historical documents and arguments, creating bibliographies from an assortment of different resources and mediums and writing essays, research papers and book reviews with historical focuses.

Programme Project Report (PPR)

Programme: M. A. Political Science

(a) Programme Mission and Objective:

Political science is that branch of the social sciences that studies the state, politics, and government. Political Science deals extensively with the analysis of political systems, the theoretical and practical applications to politics, and the examination of political behaviour. Political science is not a standalone field and it intersects many other branches like sociology, economics, history, anthropology, public policy among others. Political scientists are much sought after these days because of the changing landscape of politics across the world and since the society wants to understand how the political world works, they need someone to explain the nuances of the political economy. Any casual perusal of the newspapers and the television channels reveals that political scientists are at the forefront of debates and discussions for their knowledge and expertise.

The proposed programme - M. A. in Political Science - has the mission and objectives in relation to the teaching and learning in open and distance mode. In order to afford Quality Education for every one through distance learning mode need based academic programmes for livelihood and lifelong learning at post graduate level has been adopted. In order to set highest benchmark for quality and standards of Indian open distance learning strategy introduction of this programme has enormously been spread.

The Post Graduate Programme in Political Science offered through ODL mode will have certain learning outcomes. This programme will help the learners-

- To spread higher education especially among the rural people who are socio economically backward.
- To rid underprivileged society of social evils through proper education
- Capacity building among the students especially in rural population.
- To reach the unreached and provide education at the doorstep of the learners and according to their convenience.

Concept of open learning and distance education system focuses on open access education and training to make the learners free from the constraints of time and place, and offering flexible learning opportunities to individuals and groups of learners. Open and distance learning (ODL) is one of the most rapidly growing fields of education now a days and it has substantial impact on all education delivery systems. The new ODL system is growing fast because of the development of Internet-based information technologies. The concept of ODL education came from idea where the learners and the teachers can not be in a class room and they should be separated by some geographical distance or maybe they cannot come close to each other to make the entire education system flexible.

Open and Distance Learning system has tremendous potential of inclusive growth of education because of its distinctive nature of being a user friendly system. ODL system is not only cost effective but it can also contribute in the sustainable development through learning processes that transcend distance, gender, regional, cultural and socio-economic barriers.

Higher education playing the role of leadership in the society education act as catalyst of social change and spread of education in a society is the foundation of success in countries that are latecomers for development. Distance education is playing an important role in providing higher education to those who are unable to be the part of conventional system. The main objective of ODL is to reach the unreached and provide education at the doorstep of the learners and according to their convenience.

Formal system was unable to meet the demand of higher education and alternatively distance education was adopted as an alternative mode at the University stage

Most ODL learners have professional responsibilities (jobs), social responsibilities (families), are interested in part time studies, lack of access to on-campus based studies or are away from formal education and ODL becomes the readily available option for them to upgrade their qualifications.

Typical distance learners are regular students as we all know them, but also parents, physically challenged people, and working/business people who are looking for ways to enhance their skills next to their busy schedule.

Political science is a discipline that uses different approaches. The course can train learner in a number of different critical skills that will help them succeed in almost any career. The proposed courses develop

skills in quantitative reasoning. The political theory courses train the students in analytical thinking, an essential skill for almost all attractive careers.

(b) Relevance of the programme with HEI Mission

Mission of the Vidyasagar University is defined in its logo "Education, Knowledge and Progress" with special emphasis on a curriculum relevant to the ethnic, sociological and geographical needs on the catchment region, yet not ignoring the demands of mainstream education.
The main missions of the university are-

i. To improve the economic condition of the region and offer courses which should have the potential to garner employment.

ii. To build human resource with strong character and competence, having the strength to face the challenges of the changing realities both in global and local levels and to adapt to the fast evolving technologies.

iii. To promote an all round development of its students with a proper blending of knowledge and wisdom acquiring adequate skill in his own subject or trade or vocation through teaching learning process and human qualities like compassion, a sense of social responsibility and commitment and ethical sense (honesty), tolerance and empathy through various social, cultural, sports and ethical value addition programs.

iv. To strive for the creation and dissemination of knowledge through continuous research and learning process.

v. To strive for academic excellence.

vii. To strengthen student support system.

The missions of the proposed Programme in Political Science are in conformity with the missions of the institute. It aims to enable learners to learn and retain a broad base of knowledge in the various domains of the subject. The distance mode education has been started in the university with a mission to revitalize educational leadership, to set the standard for the production and dissemination of knowledge as well as to become an effective instrument of change in the society. Keeping priority with the view of "Education For All", PG courses in Arts, Science and Commerce to be offered or being offered through ODL mode is very much relevant to the HEI's mission and goals as it aims to provide quality education to those aspiring candidates who are deprived of higher education due to the limited number of intake in the traditional mode of higher education in the Universities. Moreover, to keep the quality intact the curriculum and syllabus has been designed at par with the conventional mode keeping in mind the specific needs and acceptability of the learners in the distance mode and in keeping with the aims and objectives of the University. The proposal of the M. A. in Political Science will fulfil the above objectives of the university as well as distance mode education.

(c) Nature and target group of learners:

For the present subject the following groups of learners have been targeted:
(1) Those are distracted from the admission in the regular mode due to limited intake capacity of HEIs
(2) Those employed in various organizations who desire to track higher education as a passion or as a means for movement up the promotional ladder.
(3) Drop outs primarily due to social, financial and economic compulsions as well as population related factors.
(5) Rural population those living in remote areas where higher education institutes are not easily accessible.
(4) Job seekers of particular field of Political Science

(5) People of any age can participate in higher education programmes as there is no age bar in ODL mode education.

(d) Appropriateness of the programme to be conducted in the ODL mode for acquiring specific skills and competence

Vidyasagar University emphasized in innovative approach towards curriculum designing, while conforming to the basic or core requirements to create a common knowledge base for the state and the nation. Post graduate Programme in Arts to be offered through ODL mode will have certain learning outcomes. This programme will help the learners to spread higher education in all sectors of community.

• Capacity building among the students particularly from the rural population as well as backward areas of the districts
• To apply skills and knowledge in an internship experience.
• To develop skills training through the field exposure.

The distance learning under Vidyasagar University offer programme in an expanded mode both in volume and the type of programmes. As technology has been getting more affordable and widely available, the interest of both learners and institutions in this special kind of education may be increased enormously.

Political Science as one of the oldest branches of social science has always been very popular among distant learners throughout the world. India and West Bengal are no exception. The Study of Political Science, apart from being a promoter of professional career in civil service, journalism, management and academics also induces citizens about the functions and structures of government rights and duties of the citizens and also trains them to critical thinking to make the present state and society a better one. Thus good, responsible and participatory citizens are produced.

(e) Instructional Design:

The first step of instructional design in distance mode is curriculum design. A growing number of students globally are enrolling in distance education programs and it is becoming important now, more than ever before, to design curriculum that reflects educational principles, represents elements of engagement and pedagogy and meets institutional and industry requirements. In doing so, it is vital to design contemporary curriculum that ensures these outcomes are attained. Finally, a triad has been proposed comprising of pedagogy, technology and an engaged community of learners as a basis for ensuring curriculum meets contemporary practices. For All these subjects the objective of this Distance Learning (DL) system of education is to develop capacity within and across the region to organize distance learning effectively in order to address the educational challenges and opportunities, particularly in higher education.

i) **Curriculum Design:** The curriculum of M. A. in Political Science is designed by a committee comprising experts from the parent department of the Vidyasagar University along with external expert keeping in view the needs of the diverse groups of learners. Efforts have been made to adopt the syllabus at par with the regular courses in the university as far as practicable. The syllabus is prepared by the Subject Committee is placed in the Advisory Committee of Directorate of Distance Education for approval. Then the syllabus is circulated among the learners and faculty members an also uploaded in the website of the university.

ii) Detailed Syllabus:

Programme: M. A. in Political Science

Syllabus at a Glance

	Semester-I	**Semester-II**	**Semester-III**	**Semester-IV**	**Total : 1000 marks (98 credits)**
Marks	250	250	250	250	
Credits	25	24	24	25	

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Semester	Course No.	Course Titles	Full Marks	Credit
I	**PLS 101**	Western Political Thought	**50**	**5**
	PLS 102	Modern Indian Political Thought	**50**	**5**
	PLS 103	Politics in India (Concept and Process)	**50**	**5**
	PLS 104	Politics in India (Issues and Challenges)	**50**	**5**
	PLS 105	Comparative Politics and Political Analysis	**50**	**5**
	Total		**250**	**25**
II	**PLS 201**	International Relations(Theories and Issues)	**50**	**5**
	PLS 202	International Relations :Institutions and Processes	**50**	**5**
	PLS 203	Rural Society, Politics and Administration in India	**50**	**5**
	PLS 204	Indian Constitution and Government	**50**	**4**
	PLS 205	Modern State and Its Contemporary Challenges	**50**	**5**
	Total		**250**	**24**
III	**PLS 301**	Public Administration and Indian Practices	**50**	**5**
	PLS 302	Liberal Political Theories	**50**	**5**
	PLS 303	Marxist and Radical Theories: Contemporary Trends	**50**	**5**
	PLS 304	Politics in the Contemporary World (Issues and Institution)	**50**	**4**
	PLS 305	Research Mehodology	**50**	**5**
	Total		**250**	**24**
IV	**PLS 401**	Major Political Thinkers: Textual Readings	**50**	**5**
	PLS 402	Dissertation and Viva	**50**	**5**
	Special Paper			
	Society And Politics In South Asia (SPSA)			
	PLS 403	Major Issues in South Asian Politics	**50**	**5**
	PLS 404	Civil Society in South Asia	**50**	**5**
	PLS 405	Social and Political Movements in South Asia	**50**	**5**
	Total		**250**	**25**

	All Total	**1000**	**98**

Full Marks, 50 = End Semester Examination (40) + Internal Assessment (10)

Note : The details of the text of syllabus is given in the hard copy of the application

iii) **Duration of the Program**: 4 Semester, i.e. 2 (two) years.
However, the learners are given time to complete the course within 5 (five) years from the date of admission.

iv) **Instructional Delivery Mechanism**: The programme shall be delivered in two years. The learners shall be provided with the printed SLM which covers almost all the contents in the syllabus. Apart from this the students will be provided with the SLM in electronic media depending on the choice of the learner. The PCP programmes are announced well ahead from the date of commencement. The examination programmes are also announced well before its commencement. The announcement for PCP or Examination is published in university website. We have a well structured data base of the contacts of the learners and a system of delivering information to students using ICT. The students are also informed about those programmes by SMS. Counselling is also held in various affiliated study centres. The progress of the learners shall be evaluated by mid-term and end year examination. Examination rules are adopted as per the rules and regulation regular system of the university.

v) **Faculty**: Faculties are engaged from both distance and regular mode of Vidyasagar University, in addition counsellors from experience teachers of colleges, other universities and research institutes.UGC norms are followed for selecting the counsellors.

vi) **Media**: SLM will be provided in both Print Media, and e-media. The learners will be given choice to avail print media or e-media or both.

vii) **Student Support Service**: Existing facilities of central library, photo copying facilities, free internet and WIFI facility will be available to the students. The students are provided with facilities for canteen, food corners of the university during holding PCP even in holidays. Further, in order to successfully execute the programme, a wide range of support services are provided to the ODL learners.
Network of Study Centres: To assist its learners of Directorate of Distance Education of Vidyasagar University has established 36 study centres so that learner can choose a study centre nearest to the residence.

(f) Procedure for admissions, Curriculum Transaction and evaluation:

Vidyasagar University has taken a concrete admission policy for all courses offered in distance mode. This policy includes notification, minimum eligibility criteria and fee structure. In every academic session the notifications are published in news papers (National Level and local level) and also in the university website. For different subjects the minimum eligibility criteria for admission is different. There is a fixed fee structure for each subject. The learners are instructed to deposit the fee by cheque or draft. The system of on line admission is also in the pipe line.

Fee structure

Subject	Semistar - I	Semistar - II	Semistar - III	Semistar - IV
M.A. in Political Science	**2,650.00**	**2,650.00**	**2,800.00**	**2,800.00**

Curriculum Transaction incorporates effective planning for providing learning experiences for its learners, organization of planning, administration/implementation of the organized planning and evaluation of the implementations by the implementer and the experts in the relevant field. Curriculum Transaction or

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Curriculum management is the process of planning and organizing the curriculum in a particular subject area for different levels of education and continuously monitor it while being implemented. The main responsibility of the curriculum transaction lies on the teachers and trainers who may use different types of pedagogies to create a nice academic environment in the institution and students can be benefited in gaining knowledge and developing skills. Curriculum transaction is always done through Personal Contact Programmes (PCP). The PCP should aim to address not only the problems faced by the individual learners but also compensate the pedagogic limitations of the SLM. So it will not just bring together learners to solve their problems but will be an intervention for organizing activities to be carried out in teams, using multiple sources of information available in the university. The activities presently supposed to be carried out at the PCP such as clarification of doubts; laboratory work and so on will be a part of the curriculum transaction process planned for the PCP. Efforts are being done to provide e-learning facility.

Evaluation: The evaluation of learners will be made by two modes – internal assessment/assignments and end-semester examination. For the evaluation of scripts there is a system of spot evaluation for expediting the publication of result, i.e., the examiners will come to Directorate of Distance Education and will examine the answer scripts and submit the marks on the spot. In some cases answer scripts are sent to the examiners and evaluated scripts are collected by messengers within a stipulated time. There is a system of re-examination of scripts after publication of results. The computerized system of database formation and preparation mark sheet and certificate will be employed for correct and speedy delivery of results to the learners.

(g) Requirement of Laboratory Support and Library resource:

As the curriculum of Political Science does not possess laboratory work, no laboratory support is required for this programme.

Library Facility: The students are provided with library facility in the central library of the University. They are used to get reading room as well as lending facilities. The central library is equipped with a numbers of e-book and e-journals. The learners may also avail such facilities. The faculty members are provided with 'remote user' facility by the central library of Vidyasagar University

(h) Cost Estimate of the Programme and the Provisions:

The cost estimate of the programme M. A. in Political Science is as follows:

Programme	Development	Delivery	Maintenance	Total amount
M. A. in Political Science	11 Lakhs	9 Lakhs	15 Lakhs	35 Lakhs

Provisions: As it is a continued programme the infrastructure is already in existence. The other expenses will be fulfilled from the fees collected from the students.

(i) Quality Assurance Mechanism and Expected Programme outcome:

Quality assurance (QA) for distance higher education is one of the main concerns among institutions and stakeholders today. Quality has always been an issue in distance education (DE) and distance learning (DL). Quality assurance in distance and higher education has gained serious attention by institutions, stakeholders, and scholars. In response to QA line of inquiry, institutions have begun to re-define and re-orient their institutional missions and strategic visions to incorporate and address quality issues. QA has now reached an important turning point and is influencing DE institution's management strategies and cultures. Learners are demanding better quality educational services and provisions. To fulfil these demands, our Directorate of Distance Education must pay close attention to quality in terms of study material, quality of PCP counsellor, delivery systems and administrative facility to the learner.

The following major steps would be taken for quality assurance:-

i) Establishment of Center for Internal Quality Assurance (CIQA)

ii) Revision of curriculum in 3 – 5 years interval
iii) Quality improvement of SLM
iv) Emphasize for online learning system
v) More emphasis of practical training of the learners in science subjects by improving the quality of laboratories with sophisticated instruments.
vi) More use of ICT for the management of DL of the university

The expected outcome of the programme is to develop the knowledge and skill of learners of the specific field. The learner may go for further higher education programmes, e.g., M. Phil, Ph. D and other professional programmes. After completion of the programme by distance mode the learner may prepare themselves for different job oriented entrance examinations, e.g. NET, GATE, College service entrance (CSC), School Service Entrance (SSC) etc., Thus they may be employed in Govt. and non-govt. sectors. Apart from this, their training may enable them for self employment.

Career options in political science the position of power from appointments with mayors, governors and even presidents. Teaching is another popular profession for political science students. Research is the next main career option within political science related to teaching. Many teaching positions, particularly in the universities but also in colleges, Information Technology Institutes, Management Institution require research activities. One can do research in a variety of employment settings-in a university, institute, business or industrial firm, N.G.O. or even in the non-profit or advocacy sector. In addition to teaching and researching, political scientists write books and articles based on their studies. Political journalist is also an attractive option. Political science graduates choose to become involved in print, television or radio journalism, where they apply their expert understanding of political systems to create reports about current events. Political scientists might cover elections, conduct interviews, or attend press conferences where they often have the opportunity to ask questions. Political science graduates can also join the media as political correspondent/analyst/researcher. The study of political science enables to understand governance and how it functions, as well as a detailed knowledge of public administration, political theory and philosophy that can helps in career in government. Political advisors are political science experts who work alongside politicians and government officials, helping them make important decisions in a number of different situations. International Relations - with a background in law, public administration and communications, political science graduates are best suited for such a career.

Programme Project Report (PPR)

Programme: M. A. Sanskrit

(a) Programme Mission and objective:

Sanskrit is a repository of unlimited invaluable knowledge of Ancient Indian Heritage. There is an urgent need for knowledge mining from Ancient Sanskrit texts for bridge building between the past and the future through the present. The course can act as an interface between Sanskrit and the sub-fields of the Humanities, Social Science and the Sciences**.**

The proposed programme, M. A. in Sanskrit, has the mission and objectives in relation to the teaching and learning in open and distance mode. In order to afford Quality Education for every one through distance learning mode need based academic programmes for livelihood and lifelong learning at post graduate level has been adopted. In order to set highest benchmark for quality and standards of Indian open distance learning strategy introduction of this programme has enormously been spread.

The post graduate Programme in Arts, science and commerce to be offered through ODL mode will have certain learning outcomes. This programme will help the learners-

- To spread higher education especially among the rural people who are socio economically backward.
- To rid underprivileged society of social evils
- Capacity building among the rural population.

Concept of open learning and distance education system focuses on open access education and training to make the learners free from the constraints of time and place, and offering flexible learning opportunities to individuals and groups of learners. Open and distance learning (ODL)is one of the most rapidly growing fields of education now a days and it has substantial impact on all education delivery systems.The new ODL system growing fast because of the development of Internet-based information technologies.. The concept of ODL education came from idea where the learners and the teachers can not be in a class room and they should be separated by some geographical distance or may be they cannot come close to each other to make the entire education system flexible.

Open and Distance Learning system has tremendous potential of inclusive growth of education because of its distinctive nature of being a user friendly system. ODL system is not only cost effective but it can also contribute in the sustainable development through learning processes that transcend distance, gender, regional, cultural and socio-economic barriers.

Higher education playing the role of leadership in the society education act as catalyst of social change and spread of education in a society is the foundation of success in countries that are latecomers for development. Distance education is playing an important role in providing higher education to those who are unable to be the part of conventional system. The main objective of ODL is to reach the unreached and provide education at the doorstep of the learners and according to their convenience.

Formal system was unable to meet the demand of higher education and alternatively

distance education was adopted as an alternative mode at the University stage

Most ODL learners have professional responsibilities (jobs), social responsibilities (families), are interested in part time studies, lack of access to on-campus based studies or are away from formal education and ODL becomes the readily available option for them to upgrade their qualifications.

Typical distance learners are regular students as we all know them, but also parents, physically challenged people, and working/business people who are looking for ways to enhance their skills next to their busy schedule.

The followings are the specific objective of the programme M. A. in Sanskrit:

- a basic understanding of the grammar, syntax, and usage of Classical Sanskrit
- the ability to reproduce the nominal and verbal systems of the language
- the ability to comprehend Sanskrit prose
- the ability to compose simple Sanskrit prose
- knowledge and understanding of the role of language in general, and Sanskrit in particular, in language-based scholarship and research

(b) <u>Relevance of the programme with HEI Mission</u>

Mission of the Vidyasagar University is defined in its logo "Education, Knowledge and Progress" with special emphasis on a curriculum relevant to the ethnic, sociological and geographical needs on the catchment region ,yet not ignoring the demands of mainstream education.

The main missions of the university are-

i. To improve the economic condition of the region and offer courses which should have the potential to garner employment.

ii. To build human resource with strong character and competence, having the strength to face the challenges of the changing realities both in global and local levels and to adapt to the fast evolving technologies.

iii. To promote an all round development of its students with a proper blending of knowledge and wisdom acquiring adequate skill in his own subject or trade or vocation through teaching learning process and human qualities like compassion, a sense of social responsibility and commitment and ethical sense (honesty), tolerance and empathy through various social, cultural, sports and ethical value addition programs.

iv. To strive for the creation and dissemination of knowledge through continuous research and learning process.

v. To strive for academic excellence

vii. To strengthen student support system

The missions of the proposed programme M. A. in Sanskrit are in conformity with the missions of the institute. It aims to enable learners to learn and retain a broad base of knowledge in the various domains of the subject. The distance mode education has been started in the university with a mission to revitalize educational leadership, to set the standard for the production and dissemination of knowledge as well as to become an effective instrument of change in the society.Keeping priority with the view of

"Education For All", PG courses in Arts, Science and Commerce to be offered or being offered through ODL mode is very much relevant to the HEI's mission and goals as it aims to provide quality education to those aspiring candidates who are deprived of higher education due to the limited number of intake in the traditional mode of higher education in the Universities. Moreover, to keep the quality intact the curriculum and syllabus has been designed at par with the conventional mode keeping in mind the specific needs and acceptability of the learners in the distance mode and in keeping with the aims and objectives of the University. The proposal of the programme M. A. in Sanskrit will fulfill the above objectives of the university as well as distance mode education.

Introduction of the programme M.A in Sanskrit in distance mode along with the existing course in regular mode will be a step for serving the mission of the University for spreading of knowledge and awareness about importance of our ancient language Sanskrit .

(C) <u>Nature and target group of learners:</u>

For the present subject the following groups of learners have been targeted:

(1) Those are distracted from the admission in the regular mode due to limited intake capacity of Vidyasagar University and other HEIs

(2) Those employed in various organizations who desire to track higher education as a passion or as a means for movement up the promotional ladder.

(3) Drop outs primarily due to social, financial and economic compulsions as well as population related factors.

(5) Rural population those living in remote areas where higher education institutes are not easily accessible.

(4) Job seekers of particular field of Sanskrit.

People of any age can participate in higher education programmes as there is no age bar in ODL mode education.

(D) Appropriateness of the programme to be conducted in the ODL mode for acquiring specific skills and competence:

Vidyasagar University emphasized in innovative approach towards curriculum designing, while conforming to the basic or core requirements to create a common knowledge base for the state and the nation. Post graduate Programme in Arts, Commerce and Science to be offered through ODL mode will have certain learning outcomes. This programme will help the learners to spread higher education in all sectors of community.

- Capacity building among the students particularly from the rural population as well as backward areas of the districts
- To apply skills and knowledge in an internship experience.
- To develop skills on hand practical related to science subject and also hands on training in field exposure

The distance learning under Vidyasagar University offer programme in an expanded mode both in volume and the type of programmes. As technology has been getting more affordable and widely available, the interest of both learners and institutions in this special kind of education may be increased enormously.

This programme distinguishes itself from others in the field, as it prioritizes research by enabling the student to access knowledge from Sanskrit classical texts and Indian Knowledge Traditions (IKT), such that they may use this knowledge for furthering their studies in either their own specializations or in new areas that they may become interested in. Furthermore, this course will also provide students with the requisite knowledge to be able to teach the Sanskrit language and related courses in the future. This programme is thus unique in not only providing students with the needful ability in research and teaching, thus enabling them to benefit from the numerous opportunities arising in these areas, but also in laying a good platform for their successful professional and spiritual life.

The relevance and importance of Sanskrit is not just restricted to culture and academics. Some of the major fields that Sanskrit students join as a career include teaching, research and civil services.

The followings are the relevance of the programme:

- To build bridges between the Ancient Indian knowledge systems and the current knowledge systems.
- To explore Ancient literature, customs, sciences and technologies with a modern perspective to build alternate viable systems for the future.

To train learners in order to undertake research in application oriented knowledge mining

(E) Instructional Design:

The first step of instructional design in distance mode is curriculum design. A growing number of students globally are enrolling in distance education programs and it is becoming important now, more than ever before, to design curriculum that reflects educational principles, represents elements of engagement and pedagogy and meets institutional and industry requirements. In doing so, it is vital to design contemporary curriculum that ensures these outcomes are attained. In order to effectively design curriculum, the role of the educator as a conductor, technician and choreographer. Finally, a triad has been proposed comprising of pedagogy, technology and an engaged community of learners as a basis for ensuring curriculum meets contemporary practices. For All these subjects the objective of this Open & Distance Learning (ODL) system of education is to develop capacity within and across the region to organize distance learning effectively in order to address the educational challenges and opportunities, particularly in higher education.

i) **Curriculum Design**: The curriculum in M. A. in Sanskrit is designed by a committee comprising experts from the parent department of the Vidyasagar University along with external expert keeping in view the needs of the diverse groups of learners. An effort has been made to adopt the syllabus at par with the regular courses in the university as far as practicable. The syllabus is prepared by the Subject Committee is placed in the Advisory Committee of Directorate of Distance Education for approval. Then the syllabus is uploaded in the website of the university.

ii) **Detailed Syllabus**:

Programme: M. A. in Sanskrit

Course Structure of M.A. in Sanskrit:

Semester	Course no.	Course Title	Full Marks	Credit
I	SAN-101	Vedic Hymns	50	5
	SAN-102	Brahmanas & Upanisadas	50	5
	SAN-103	Grammar- I	50	5
	SAN-104	Drama & Dramaturgy	50	5
	SAN-105	Linguistics & Manuscriptology	50	5
	Total-		**250**	**25**
II	SAN-201	Vedic Studies	50	5
	SAN-202	Grammar-II	50	5
	SAN-203	Poetry-I	50	5
	SAN-204	History of Sanskrit literature & General Grammar	50	5
	SAN-205	Philosophy-I	50	5
	Total-		**250**	**25**
III	SAN-301	Grammar-III	50	5
	SAN-302	Poetics-I	50	5
	SAN-303	Poetics-II	50	5
	SAN-304	Drama & Modern Sanskrit Short Stories	50	5
	SAN-305	Philosophy-II	50	5
	Total-		**250**	**25**
IV	**Special Paper : Philosophy**			
	SAN-401	Sarvadarsanasamgraha	50	5
	SAN-402	Sankhya-yogadarsana	50	5
	SAN-403	Nyaya-vaisesikadarsana	50	5
	SAN-404	Purvottaramimamsadarsana	50	5
	SAN-405	Vyakaranadarsana	50	5
	Total-		**250**	**25**
	Grand Total-		**1000**	**100**
Each of paper Full Marks, 50 = end semester examination (40) + internal assesment (10)				

- **Details text of syllabus will be submitted with hard copy**

iii) **Duration of the Program**: 4 semesters i.e 2 years. However, the learners are given time to complete the course within 5 (five) years from the date of admission.

iv) **Instructional Delivery Mechanism**: The programme shall be delivered in two years. The learners shall be provided with the printed SLM which covers almost all the contents in the syllabus. Apart from this the students will be provided with

the SLM in electronic media depending on the choice of the learner. The PCP programmes are announced well ahead from the date of commencement. The examination programmes are also announced well before its commencement. The announcement for PCP or Examination is published in university website and leading news paper of the state. We have a well structured data base of the contacts of the learners and a system of delivering information to students using ICT. The students are also informed about those programmes by SMS. Counselling is also held in various affiliated study centres. The progress of the learners shall be evaluated by mid-term and end year examination. Examination rules are adopted as per the rules and regulation regular system of the university.

v) **Faculty**: Faculties are selected from the teachers engaged in both regular mode and distance mode of Vidyasagar University, in addition counsellors from experience teachers of colleges, other universities and research institutes. UGC norms are followed for selecting the counsellors.

vi) **Media**: SLM will be provided in both Print Media, and e-media. The learners will be given choice to avail print media or e-media or both.

vii) **Student Support Service**: Existing facilities of central library, photo copying facilities , free internet and WIFI facility will be available to the students. The students are provided with facilities for canteen, food corners of the university during holding PCP even in holidays. Further, in order to successfully execute the programme, a wide range of support services are provided to the ODL learners.

Network of Study Centres: To assist its learners of Directorate of Distance Education of Vidyasagar University has established 36 study centres so that learner can choose a study center nearest to the residence.

viii. Procedure for admissions, Curriculum Transaction and evaluation:

Vidyasagar University has taken a concrete admission policy for all courses offered in distance mode. This policy includes notification, minimum eligibility criteria and fee structure. In every academic session the notifications are published in news papers (National Level and local level) and also in the university website. For different subjects the minimum eligibility criteria for admission is different. There is a fixed fee structure for each subject. The learners are instructed to deposit the fee by cheque or draft. The system of on line admission is also in the pipe line.

Fee structure

Subject	*Semistar - I*	*Semistar - II*	*Semistar - III*	*Semistar - IV*
***M.A. in* Sanskrit**	**2,650.00**	**2,650.00**	**2,800.00**	**2,800.00**

Curriculum Transaction incorporates effective planning for providing learning experiences for its learners, organization of planning, administration/implementation of the organized planning and evaluation of the implementations by the implementer and the experts in the relevant field. Curriculum Transaction or Curriculum management is the process of planning and organizing the curriculum in a particular

subject area for different levels of education and continuously monitors it while being implemented. The main responsibility of the curriculum transaction lies on the teachers and trainers who may use different types of pedagogies to create a nice academic environment in the institution and students can be benefited in gaining knowledge and developing skills. Curriculum transaction is always done through Personal Contact Programs (PCP). The PCP should aim to address not only the problems faced by the individual learners but also compensate the pedagogic limitations of the SLM. So it will not just bring together learners to solve their problems but will be an intervention for organizing activities to be carried out in teams, using multiple sources of information available in the university. The activities presently supposed to be carried out at the PCP such as clarification of doubts; laboratory work and so on will be a part of the curriculum transaction process planned for the PCP. Efforts are being done to provide e-learning facility.

Evaluation: The evaluation of learners will be made by two modes – internal assessment/assignments and end-semester examination. For the evaluation of scripts there is a system of spot evaluation for expediting the publication of result, i.e., the examiners will come to Directorate of Distance Education and will examine the answer scripts and submit the marks on the spot. In some cases answer scripts are sent to the examiners and evaluated scripts are collected by messengers within a stipulated time. There is a system of re-examination of scripts after publication of results.

ix. Requirement of Laboratory Support and Library resource

The programme M. A. Sanskrit does not require any laboratory support.

Library facility: The students are provided with library facility in the central library of the University. They are used to get reading room as well as lending facilities. In addition to the huge collections of printed books and journals the central library is equipped with a numbers of e-book and e-journals. The learners may also avail such facilities. The faculty members are provided with 'remote user' facility by the central library of Vidyasagar University.

x. Cost Estimate of the Programme and the Provisions:

The estimated cost of M. A. Sanskrit is as follows:

Programme	Development (Lakhs)	Delivery (Lakhs)	Maintenance (Lakhs)	Total (Lakhs)
M. A. Sanskrit	11	9	19	35

Provisions: This is a new programme applied for introduction from the next session.However,some of the infrastructures of the regular dept. will be used. The other expenses will be fulfilled from the fees collected from the learners.

(i) Quality Assurance Mechanism and Expected Programme outcome:

Quality assurance (QA) for distance higher education is one of the main concerns among institutions and stakeholders today. Quality has always been an issue in distance education (DE) and distance learning (DL). Quality assurance in distance and higher education has gained serious attention by institutions, stakeholders, and scholars. In response to QA line of inquiry, institutions have begun to re-define and re-orient their institutional missions and strategic visions to incorporate and address quality issues. QA has now reached an important turning point and is influencing DE institution's management strategies and cultures. Learners are demanding better quality educational services and provisions. To fulfil these demands, our Directorate of Distance Education must pay close attention to quality in terms of study material, quality of PCP counsellor, delivery systems and administrative facility to the learner.

The following major steps would be taken for quality assurance:-

i) Establishment of Center for Internal Quality Assurance
ii) Revision of curriculum in 3 years interval
iii) Quality improvement of SLM
iv) Emphasize for online learning system
v) More emphasis of practical training of the learners in science subjects by improving the quality of laboratories with sophisticated instruments.
vi) More use of ICT for the management of DL of the university

The expected outcome of the programme is to develop the knowledge and skill of learners of the specific field. The learner may go for further higher education programmes, e.g., M. Phil, Ph. D. ,

After completion of the programme by distance mode the learner may prepare themselves for different job oriented entrance examinations, e.g. NET, SET, College service entrance (CSC), School Service Entrance (SSC) etc., Thus they may be employed in Govt. and non-govt. sectors.Apart from this, their training may enable them for self employment.

Some of the major fields that Sanskrit students after passing M. A. join as a career include teaching, research and civil services, but subjects such as library science, law, water conservation, archaeology, environmental science and media are also becoming the preferred choice of Sanskrit students.

Programme Project Report (PPR)

Programme: M. Com

(a) Programme Mission and Objective:

Commerce as a stream of education can be defined as a study on trade and business activities that basically involves the transfer of goods and services from producer to final consumer in exchange of money. The proposed programme (M. Com.) has the mission and objectives in relation to the teaching and learning in open and distance mode. In order to afford quality education for every one through distance learning mode, need-based academic programmes for livelihood and lifelong learning at post graduate level has been adopted. In order to set highest benchmark for quality and standards of Indian open distance learning strategy, introduction of this programme has enormously been spread.

The post graduate programme in Commerce offered through ODL mode will have certain learning outcomes. This programme will

- Spread higher education especially among the rural people who are socio economically backward.
- Ensure capacity building among the students especially in rural population.
- Reach the unreached and provide education at the doorstep of the learners and according to their convenience.

Concept of open learning and distance education system focuses on open access education and training to make the learners free from the constraints of time and place, and offering flexible learning opportunities to individuals and groups of learners. Open and distance learning (ODL) is one of the most rapidly growing mode of education now a days and it has substantial impact on all education delivery systems. The new ODL system is growing fast because of the development of internet-based information technologies. The concept of ODL education came from idea where the learners and the teachers cannot be in a class room and they should be separated by some geographical distance or they cannot come close to each other to make the entire education system flexible.

Open and distance learning system has tremendous potential of inclusive growth of education because of its distinctive nature of being a user friendly system. ODL system is not only cost effective but it can also contribute in the sustainable development through learning processes that transcend distance, gender, regional, cultural and socio-economic barriers.

Programme Project Report (PPR)

Higher education playing the role of leadership in the society education act as catalyst of social change and spread of education in a society is the foundation of success in countries that are latecomers for development. Distance education is playing an important role in providing higher education to those who are unable to be the part of conventional system. The main objective of ODL is to reach the unreached and provide education at the doorstep of the learners and according to their convenience.

Formal system was unable to meet the demand of higher education and alternatively distance education was adopted as an alternative mode at the university stage

Most ODL learners have professional responsibilities (jobs), social responsibilities (families), are interested in part time studies, lack of access to on-campus based studies or are away from formal education and ODL becomes the readily available option for them to upgrade their qualifications.

Typical distance learners are regular students as we all know them, but also parents, physically challenged people, and working/business people who are looking for ways to enhance their skills next to their busy schedule.

Commerce stream opens doors that lead to professional courses, which acts like foundations. For example, if we consider B.Com., this 3 years long undergraduate degree program is like a foundation course. After completing it, one may choose from a wide variety of PG professional courses and specialize in many other fields/areas.

(b) Relevance of the Programme with HEI Mission

Mission of the Vidyasagar University is defined in its logo "Education, Knowledge and Progress" with special emphasis on a curriculum relevant to the ethnic, sociological and geographical needs on the catchment region, yet not ignoring the demands of mainstream education.

The main missions of the university are-

i. To improve the economic condition of the region and offer courses which should have the potential to garner employment.

ii. To build human resource with strong character and competence, having the strength to face the challenges of the changing realities both in global and local levels and to adapt to the fast evolving technologies.

iii. To promote an all round development of its students with a proper blending of knowledge and wisdom acquiring adequate skill in his own subject or trade or vocation through teaching learning process and human qualities like compassion, a sense of social responsibility and commitment and

ethical sense (honesty), tolerance and empathy through various social, cultural, sports and ethical value addition programs.

iv. To strive for the creation and dissemination of knowledge through continuous research and learning process.

v. To strive for academic excellence

vii. To strengthen student support system

The missions of the M. Com programme are in conformity with the missions of the institute. It aims to enable learners to learn and retain a broad base of knowledge in the various domains of the subject. The distance mode education has been started in the university with a mission to revitalize educational leadership, to set the standard for the production and dissemination of knowledge as well as to become an effective instrument of change in the society. Keeping priority with the view of "Education For All", PG courses in Commerce to be offered or being offered through ODL mode is very much relevant to the HEI's mission and goals as it aims to provide quality education to those aspiring candidates who are deprived of higher education due to the limited number of intake in the traditional mode of higher education in the Universities. Moreover, to keep the quality intact the curriculum and syllabus has been designed at par with the conventional mode keeping in mind the specific needs and acceptability of the learners in the distance mode and in keeping with the aims and objectives of the university. The proposal of the present programme will fulfil the above objectives of the university as well as distance mode education.

Masters in Commerce (M.Com) is postgraduate degree which includes advanced study of accounts, finance, commerce and economics related subjects. This PG course is purposive to provide higher level of studies to those candidates who are willing to become an expert in any of the commerce related subjects. Many students prefer to go for correspondence M.Com program so that can enhance their skills while working at the same time. In this way distance M.Com will help them get an edge in today's competitive marketplace.

(c)Nature and Target Group of Learners

For the present subject the following groups of learners have been targeted:

(1) Those are distracted from the admission in the regular mode due to limited intake capacity of HEIs

(2) Those employed in various organizations who desire to track higher education as a passion or as a means for movement up the promotional ladder.

(3) Drop outs primarily due to social, financial and economic compulsions as well as population related factors.

(4) Rural population those living in remote areas where higher education institutes are not easily accessible.

(5) Job seekers in different fields of commerce

(6) People of any age can participate in higher education programmes as there is no age bar in ODL mode education.

(d) Appropriateness of the Programme to be Conducted in the ODL Mode for Acquiring Specific Skills and Competence

Vidyasagar University emphasized in innovative approach towards curriculum designing, while conforming to the basic or core requirements to create a common knowledge base for the state and the nation. Post graduate programme in Commerce to be offered through ODL mode will have certain learning outcomes. This programme will help the learners to spread higher education in all sectors of community.

- Capacity building among the students particularly from the rural population.
- To apply skills and knowledge in an internship experience.
- To develop skills training through the field exposure

The distance learning under Vidyasagar University offer programme in an expanded mode both in volume and the type of programmes: online, open and blended learning: PG degree endowed with credit system. As technology has been getting more affordable and widely available, the interest of both learners and institutions in this special kind of education is increased enormously.

The Masters in Commerce degree enables the best students to pursue specialised knowledge through independent research, and is designed to prepare them for specialist positions in the public and private sector.

The study of Commerce works to characterize the marketplace, looking at case studies and economic systems together to identify key factors of success or failure in certain business activities. Graduates from Masters in Commerce programs will be highly qualified for senior positions in business in many areas in the public and private sectors. Masters in Commerce programs are designed to further education obtained during a student's undergraduate studies and improve qualifications toward higher level specialist positions in consulting, finance, accounting, information systems, marketing, human resource management, international business and more.

If one would like to learn more about how to gain the necessary qualifications to land great positions and develop a dream career in business, finance, accounting, marketing, human resources or any other area related to Commerce, the learners will be interested to get admission in master degree course in commerce.

(e) Instructional Design

The first step of instructional design in distance mode is curriculum design. A growing number of students globally are enrolling in distance education programs and it is becoming important now, more than ever before, to design curriculum that reflects educational principles, represents elements of engagement and pedagogy and meets institutional and industry requirements. In doing so, it is vital to design contemporary curriculum that ensures these outcomes are attained. A triad has been proposed comprising of pedagogy, technology and an engaged community of learners as a basis for ensuring curriculum meets contemporary practices. For all these subjects the objective of this Open and Distance Learning (ODL) system of education is to develop capacity within and across the region to organize distance learning effectively in order to address the educational challenges and opportunities, particularly in higher education.

a) Curriculum Design: The Masters in Commerce typically requires two years under the four semesters of full-time study. The curriculum is generally concentrated on one subject area — such as financial accounting, business management, corporate financial management and policy, taxation, human resource management, economics, statistics, finance, cost and management accounting, and emphasizes underlying theory

The curriculum is designed by a committee comprising experts from the parent department of the Vidyasagar University along with external expert keeping in view the needs of the diverse groups of learners. Efforts have been made to adopt the syllabus at par with the regular courses in the university as far as practicable. The syllabus is prepared by the Subject Committee is placed in the Advisory Committee of Directorate of Distance Education for approval. Then the syllabus is uploaded in the website of the university.

Programme Project Report (PPR)

b) Detailed Syllabus:

SEMESTER	COURSE NO.	COURSE TITLES	FULL MARKS	CREDIT
I	DCOM 101	ORGANISATION THEORY AND ORGANISATION BEHAVIOUR	50	5
	DCOM 102	BUSINESS STATISTICS	50	5
	DCOM 103	QUANTITATIVE TECHNIQUES FOR MANAGERIAL DECISIONS	50	5
	DCOM 104	FINANCIAL INSTITUTIONS AND MARKETS	50	5
	DCOM 105	FINANCIAL SERVICES	50	4
		TOTAL	250	24
II	DCOM 201	FINANCIAL MANAGEMENT AND POLICY	50	5
	DCOM 202	ADVANCED BUSINESS STATISTICS	50	5
	DCOM 203	TAX LAWS AND PLANNING	50	5
	DCOM 204	MARKETING MANAGEMENT AND HUMAN RESOURCE MANAGEMENT	50	5
		PRACTICAL		
	DCOM 295	COMPUTER APPLICATIONS IN BUSINESS	50	5
		TOTAL	250	25
III	DCOM 301	SECURITY ANALYSIS AND PORTFOLIO MANAGEMENT	50	5
	DCOM 302	RESEARCH METHODOLOGY	50	5
	DCOM 303A	ADVANCED MANAGEMENT ACCOUNTING	50	5
	DCOM 304	MANAGERIAL ECONOMICS	50	4
	DCOM 305A	ADVANCED FINANCIAL ACCOUNTING	50	5
		TOTAL	250	24
IV	DCOM 401	STRATEGIC MANAGEMENT AND CORPORATE GOVERNANCE	50	5

	DCOM 402	INTERNATIONAL FINANCIAL MANAGEMENT	50	5
	DCOM 403	CORPORATE INDIRECT TAXES	50	5
	DCOM 404A	FINANCIAL STATEMENT ANALYSIS	50	5
	DCOM 405A	ADVANCED COST ACCOUNTING	50	5
	TOTAL		250	25
	ALL TOTAL		1000	98

c) Duration of the Program: Minimum 2 (two) years for four semesters

However, the learners are given time to complete the course within 5 (five) years from the date of admission.

d) Instructional Delivery Mechanism: The programme shall be delivered in two years. The learners shall be provided with the printed SLM which covers almost all the contents in the syllabus. Apart from this the students will be provided with the SLM in electronic media depending on the choice of the learner. The PCP programmes are announced well ahead from the date of commencement. The examination programmes are also announced well before its commencement. The announcement for PCP or examination is published in university website and leading newspaper of the state. We have a well structured data base of the contacts of the learners and a system of delivering information to students using ICT. The students are also informed about those programmes by SMS. Counselling is also held in various affiliated study centres. The progress of the learners shall be evaluated by semester examination. Examination rules are adopted as per the rules and regulation regular system of the university.

e) Faculty: Faculties of Vidyasagar University engaged in regular mode teaching, in addition counsellors from experience teachers of colleges, other universities and research institutes.UGC norms are followed for selecting the counsellors.

f) Media: SLM will be provided in both Print Media, and e-media. The learners will be given choice to avail print media or e-media or both.

g) Student Support Service: Existing facilities of central library, photo copying facilities, free internet and WIFI facility will be available to the students. The students are provided with facilities for canteen, food corners of the university during holding PCP even in holidays.

Further, in order to successfully execute the programme, a wide range of support services are provided to the ODL learners.

Network of Study Centres: To assist its learners of Directorate of Distance Education of Vidyasagar University has established 36 study centres so that learner can choose a study centre nearest to the residence.

(f) Procedure for Admissions, Curriculum Transaction and Evaluation

Vidyasagar University has taken a concrete admission policy for all courses offered in distance mode. This policy includes notification, minimum eligibility criteria and fee structure. In every academic session the notifications are published in newspapers (National Level and local level) and also in the university website. For different subjects the minimum eligibility criteria for admission is different. There is a fixed fee structure for each subject. There is a fixed fee structure for each subject. The learners are instructed to deposit the fee by cheque or draft. The system of on line admission is also in the pipe line.

Fee structure

Subject	Semester I	Semester II	Semester III	Semester IV
M.Com	Rs. 2650.00	Rs. 2650.00	Rs. 2800.00	Rs. 2800.00

Curriculum Transaction incorporates effective planning for providing learning experiences for its learners, organization of planning, administration/implementation of the organized planning and evaluation of the implementations by the implementer and the experts in the relevant field. Curriculum Transaction or Curriculum management is the process of planning and organizing the curriculum in a particular subject area for different levels of education and continuously monitor it while being implemented. The main responsibility of the curriculum transaction lies on the teachers and trainers who may use different types of pedagogies to create a nice academic environment in the institution and students can be benefited in gaining knowledge and developing skills. Curriculum transaction is always done through Personal Contact Programmes (PCP). The PCP should aim to address not only the problems faced by the individual learners but also compensate the pedagogic limitations of the SLM. So it will not just bring together learners to solve their problems but will be an intervention for organizing activities to be carried out in teams, using multiple sources of information available in the university. The activities presently supposed to be carried out at the PCP such as clarification of doubts; laboratory work and so on will be a part of the curriculum transaction process planned for the PCP. Efforts are being done to provide e-learning facility.

Evaluation: The evaluation of learners will be made by two modes – internal assessment/assignments and semester examination. For the evaluation of scripts there is a system of spot evaluation for expediting the publication of result, i.e., the examiners will come to Directorate of Distance Education and will examine the answer scripts and submit the marks on the spot. In some cases answer scripts are sent to the examiners and evaluated scripts are collected by messengers within a stipulated time. There is a system of re-examination of scripts after publication of results.

(g) Requirement of Laboratory Support and Library Resource

The students are provided with library facility in the central library of the University. They are used to get reading room as well as lending facilities. The central library is equipped with a numbers of e-book and e-journals. The learners may also avail such facilities. A large number of printed books and journals are available in the central library.

(h) Cost Estimate of the Programme and the Provisions

Estimated cost of the programme is given as below:

SUBJECT	DEVELOPMENT	DELIVERY	MAINTENANCE	TOTAL AMOUNT
Commerce	11 Lakhs	9 Lakhs	15 Lakhs	35 Lakhs

Provisions: As it is a continued programme the infrastructure is already in existence. The other expenses will be fulfilled from the fees collected from the students.

(i) Quality Assurance Mechanism and Expected Programme Outcome

Quality assurance (QA) for distance higher education is one of the main concerns among institutions and stakeholders today. Quality has always been an issue in distance education (DE) and distance learning (DL). Quality assurance in distance and higher education has gained serious attention by institutions, stakeholders, and scholars. In response to QA line of inquiry, institutions have begun to re-define and re-orient their institutional missions and strategic visions to incorporate and address quality issues. QA has now reached an important turning point and is influencing DE institution's management strategies and cultures. Learners are demanding better quality educational services and provisions. To fulfil these demands, our Directorate of Distance Education must pay close attention to quality in terms of study material, quality of PCP counsellor, delivery systems and administrative facility to the learner.

The following major steps would be taken for quality assurance:-

i) Establishment of quality assurance committee

ii) Revision of curriculum in 3 years interval

iii) Quality improvement of SLM

iv) Emphasize for online learning system

v) More emphasis of practical training of the learners in science subjects by improving the quality of laboratories with sophisticated instruments.

vi) More use of ICT for the management of DL of the university

The expected outcome of the programme is to develop the knowledge and skill of learners of the specific field. The learner may go for further higher education programmes, e.g., M. Phil, Ph. D and other professional programmes. After completion of the programme by distance mode the learner may prepare themselves for different job oriented entrance examinations, e.g. NET, GATE, College service entrance (CSC), School Service Entrance (SSC) etc., Thus they may be employed in Govt. and non-govt. sectors. Apart from this, their training may enable them for self-employment. The career prospects in commerce and its interdisciplinary domains such as Banking, Chartered Accountancy, Company Secretary, Economics, Stock Broking, Cost and Works Accountancy and Agricultural Economics are extremely bright. M.Com along with Chartered Accountancy or MBA will pay to a larger extent. This degree enables a good position in public and private organisations.

With the positive changing scenario around the world in the realm of economic activity, selecting Commerce as a career option is one of the best to grab. Commerce students get familiar with knowledge of business, trade, market fluctuation, basics of economics, fiscal policies, industrial policies, share market, stock markets, etc. Considering the burgeoning activity of market, talented commerce graduate are needed to make a balance in the demand and supply.

Programme Project Report (PPR)

Programme: M. Sc. in Botany

(a) Programme Mission and objective:

Botany or Plant biology is branch of biology that involves the scientific study of plant life. Botany covers a wide range of scientific disciplines concerned with the study of plants, algae, fungi including structure, growth, development, metabolism, reproduction, diseases, chemical properties and evolutionary relationship among taxonomic groups. The course covers all the related topics of the study fields. Courses in this area offer a wide range of specialisations, including Ethnobotany, Systematic Botany, Plant Genetics and Crop Improvement. A mixture of practical training, academic study and fieldwork has been offered. We focus on the patterns and processes that enable predictive understanding of plants and their environments at local, regional, and global scales, leading to strengths in the areas of ecology, evolution, and Systematics as well as equip with modern technological interventions to the biosphere.

The proposed programme, M. Sc. in Botany, has the mission and objectives in relation to the teaching and learning in open and distance mode. In order to afford Quality Education for every one through distance learning mode, need based academic programmes for livelihood and lifelong learning at post graduate level has been adopted. In order to set highest benchmark for quality and standards of Indian open distance learning strategy introduction of this programme has enormously been spread.

The post graduate Programme in Arts, science and commerce to be offered through ODL mode will have certain learning outcomes. This programme will help the learners.

- To spread higher education especially among the rural people who are socio economically backward.
- A holistic development and academic excellence to contribute effectively to the understanding of the subject with the basic skills and an aptitude towards science and nature.
- To impart quality education in the field of Botany and capacity building among the learners especially in rural population.
- To spread ever changing concepts in the frontline areas for respective opportunities and to rid underprivileged society of social evils through proper education.
- To produce entrepreneurs for prosperous ventures in the selected fields.

Concept of open learning and distance education system focuses on open access education and training to make the learners free from the constraints of time and place, and offering flexible learning opportunities to individuals and groups of learners. Open and distance learning (ODL)is one of the most rapidly growing fields of education now a days and it has substantial impact on all education delivery systems. The new ODL system growing fast because of the development of Internet-based information technologies.. The concept of ODL education came from idea where the learners and the teachers can not be in a class room and they should be separated by some geographical distance or may be they cannot come close to each other to make the entire education system flexible.

Open and Distance Learning system has tremendous potential of inclusive growth of education because of its distinctive nature of being a user friendly system. ODL system is not only cost effective but it can also contribute in the sustainable development through learning processes that transcend distance, gender, regional, cultural and socio-economic barriers.

Higher education playing the role of leadership in the society education act as catalyst of social change and spread of education in a society is the foundation of success in countries that are latecomers for development. Distance education is playing an important role in providing higher education to those who are unable to be the part of conventional system. The main objective of ODL is to reach the unreached and provide education at the doorstep of the learners and according to their convenience.

Formal system was unable to meet the demand of higher education and alternatively distance education was adopted as an alternative mode at the University stage

Most ODL learners have professional responsibilities (jobs), social responsibilities (families), are interested in part time studies, lack of access to on-campus based studies or are away from formal education and ODL becomes the readily available option for them to upgrade their qualifications.

Typical distance learners are regular students as we all know them, but also parents, physically challenged people, and working/business people who are looking for ways to enhance their skills next to their busy schedule.

The proposed course in Botany will offer broad skills including project design, data collection, data analysis and the preparation of reports. Graduates are therefore prepared for careers such as research scientists, biotechnologists or conservationists in places such as government organisations, parks and wildlife management, conservation, medical science, horticulture and agriculture.

(b) Relevance of the programme with HEI Mission

Mission of the Vidyasagar University is defined in its logo "Education, Knowledge and Progress" with special emphasis on a curriculum relevant to the ethnic, sociological and geographical needs on the catchment region ,yet not ignoring the demands of mainstream education.

The main missions of the university are-

i. To improve the economic condition of the region and offer courses which should have the potential to garner employment.

ii. To build human resource with strong character and competence, having the strength to face the challenges of the changing realities both in global and local levels and to adapt to the fast evolving technologies.

iii. To promote an all round development of its students with a proper blending of knowledge and wisdom acquiring adequate skill in his own subject or trade or vocation through teaching learning process and human qualities like compassion, a sense of social responsibility and commitment and ethical sense (honesty), tolerance and empathy through various social, cultural, sports and ethical value addition programs.

iv. To strive for the creation and dissemination of knowledge through continuous research and learning process.

v. To strive for academic excellence

vi. To strengthen student support system

The missions of the proposed Programme M. Sc. in Botany are in conformity with the missions of the institute. It aims to enable learners to learn and retain a broad base of knowledge in the various domains of the subject. The distance mode education has been started in the university with a mission to revitalize educational leadership, to set the standard for the production and dissemination of knowledge as well as to become an effective instrument of change in the society. Keeping priority with the view of "Education For All", PG courses in Arts, Science and Commerce to be offered or being offered through ODL mode is very much relevant to the HEI's mission and goals as it aims to provide quality education to those aspiring candidates who are deprived of higher education due to the limited number of intake in the traditional mode of higher education in the Universities. Moreover, to keep the quality intact the curriculum and syllabus has been designed at par with the conventional mode keeping in mind the specific needs and acceptability of the learners in the distance mode and in keeping with the aims and objectives of the University. The proposal of M. Sc in Botany will fulfil the above objectives of the university as well as distance mode education.

(c) Nature and target group of learners:

For the present subject the following groups of learners have been targeted:

1. Those are distracted from the admission in the regular mode due to limited intake capacity of Vidyasagar University and other HEIs.
2. Those employed in various organizations who desire to track higher education as a passion or as a means for movement up the promotional ladder.
3. Drop outs primarily due to social, financial and economic compulsions as well as population related factors.
4. Rural population those living in remote areas where higher education institutes are not easily accessible.
5. Job seekers of particular field or subjects
6. People of any age can participate in higher education programmes as there is no age bar in ODL mode education.

(d) Appropriateness of the programme to be conducted in the ODL mode for acquiring specific skills and competence:

Vidyasagar University emphasized in innovative approach towards curriculum designing, while conforming to the basic or core requirements to create a common knowledge base for the state and the nation. Post graduate Programme in Arts, Commerce and Science to be offered through ODL mode will have certain learning outcomes. This programme will help the learners to spread higher education in all sectors of community.

- ✯ Capacity building among the students particularly from the rural population as well as backward areas of the districts.
- ✯ To apply skills and knowledge in an internship experience.
- ✯ To develop skills on hand practical related to science subject and also hands on training in field exposure.

The distance learning under Vidyasagar University offer programme in an expanded mode both in volume and the type of programmes. As technology has been getting more affordable and widely available, the interest of both learners and institutions in this special kind of education may be increased enormously.

Botany is the plant science including plant biology or phytology. Each climate has its own particular botany. Today emphasis is also given on study regarding bacteria ,fungi and algae. It is also concerned with plant fossils. Botany is a broad multi disciplinary subject with inputs from most other areas of science and technology. Research topic include the study of plant structure and growth and differentiation, reproduction biochemistry and primary metabolism, chemical products , evolutionary relationship, and Plant taxonomy. Moleculer genetics and epigenetic are taken into consideration with special emphasis. Divers application in terms of staple food , timber, fiber, drug, horticulture, forestry, genetic modification and maintaintenence of biodiversity. It is to be mentioned that Vidyasagar university lies in Jangal Mahal area characterised by reserve forest in monsoon climate (enriched with different species of Deciduous trees). So there are many scopes for forestry based study. Keeping this view, the present syllabus has been prepared and offered for M. Sc. in Botany under distance mode.

(e) Instructional Design:

The first step of instructional design in distance mode is curriculum design. A growing number of students globally are enrolling in distance education programs and it is becoming important now, more than ever before, to design curriculum that reflects educational principles, represents elements of engagement and pedagogy and meets institutional and industry requirements. In doing so, it is vital to design contemporary curriculum that ensures these outcomes are attained. In order to effectively design curriculum, the role of the educator as a conductor, technician and choreographer. Finally, a triad has been proposed comprising of pedagogy, technology and an engaged community of learners as a basis for ensuring curriculum meets contemporary practices. For All these subjects the objective of this Open & Distance Learning (ODL) system of education is to develop capacity within and across the region to organize distance learning effectively in order to address the educational challenges and opportunities, particularly in higher education.

i) **Curriculum Design:** The curriculum for M. Sc. in Botany is designed by a committee comprising experts from the parent department of the Vidyasagar University along with external expert keeping in view the needs of the diverse groups of learners. Efforts have been made to adopt the syllabus at par with the regular courses in the university as far as practicable. The syllabus is prepared by the Subject Committee is placed in the Advisory Committee of Directorate of Distance Education for approval. Then the syllabus is circulated among the teachers and students and also uploaded in the website of the university.

ii) **Detailed Syllabus:** Please See the next Page

Subject :Botany

Syllabus at a glance

	COURSE NO.		COURSE TITLES	Full Marks #	Credit
SEMESTER I	BOT 101		Microbiology	50	4
	BOT 102		Phycology & Bryology	50	4
	BOT 103		Mycology & Plant Pathology	50	4
	BOT 104		Pteridophytes & Gymnosperms	50	4
	BOT 195	BOT 195.1	Microbiology (P)	25	2
		BOT 195.2	Phycology & Bryology (P)	25	2
	BOT 196	BOT 196.1	Mycology & Plant Pathology (P)	25	2
		BOT 196.2	Pteridophytes & Gymnosperms (P)	25	2
			Total	**300**	**24**
SEMESTER II	BOT 201		Angiosperm Taxonomy & Biosystematics	50	4
	BOT 202		Palaeobotany, Palynology & Plant Reproductive Biology	50	4
	BOT 203		Plant Anatomy And Pharmacognosy	50	4
	BOT 204		Plants And Society-I (CBCS)	50	4
	BOT 295	BOT 295.1	Angiosperm Taxonomy & Biosystematics (P)	25	2
		BOT 295.2	Palaeobotany, Palynology & Plant Reproductive Biology (P)	25	2
	BOT 296	BOT 296.1	Plant Anatomy & Pharmacognosy (P)	25	2
		BOT 296.2	**Field Survey Report**	25	2
			Total	**300**	**24**
SEMESTER III	BOT 301		Cell Biology, Genetics & Biotechnology	50	4
	BOT 302		Plant Physiology, Biochemistry & Molecular Biology	50	4
	BOT 303		Ecology & Environmental Biology	50	4
	BOT 304		Plants And Society-II (CBCS)	50	4
	BOT 395	BOT 395.1	Cell Biology, Genetics & Biotechnology (P)	25	2
		BOT 395.2	Plant Physiology, Biochemistry & Molecular Biology (P)	25	2
	BOT 396	BOT 396.1	Ecology & Environmental Biology (P)	25	2
		BOT 396.2	**Seminar**	25	2
			Total	**300**	**24**
SEMESTER IV	BOT 401		Silviculture, Forest Mensuration, Silviculture System & Forest Management	50	4
	BOT 402**	BOT 402A#	Microbiology: Basic	50	4
		BOT 402B#	Plant Physiology		
	BOT 403**	BOT 403A#	Microbiology: Applied	50	4
		BOT 403B#	Biochemistry And Molecular Biology		
	BOT 494		Forest Mensuration & Survey (P)	25	2
	BOT 495**	BOT 495A#	Microbiology (P)	50	4
		BOT 495B#	Plant Physiology, Biochemistry & Molecular Biology (P)		
	BOT 496		Project Work (Special Paper Based)	50	4
	BOT 497		**Grand Viva**	25	2
			Total	**300**	**24**
			GRAND TOTAL	**1200**	**96**

** BOT 402, BOT 403 and BOT 495 correspond to Special Papers. Learners have to opt any one paper accordingly.
# ***Full Marks = End Semester Examination (80%) + Internal assessment (20%)***
Note : The details of the text of syllabus is given in the hard copy of the application

iii) **Duration of the Program**: 4 semesters i.e. 2 (two) years
However, the learners are given time to complete the course within 5 (five) years from the date of admission.

iv) **Instructional Delivery Mechanism**: The programme shall be delivered in two years. The learners shall be provided with the printed SLM which covers almost all the contents in the syllabus. Apart from this the students will be provided with the SLM in electronic media depending on the choice of the learner. The PCP programmes are announced well ahead from the date of commencement. The examination programmes are also announced well before its commencement. The announcement for PCP or Examination is published in university website and leading news paper of the state. We have a well structured data base of the contacts of the learners and a system of delivering information to students using ICT. The students are also informed about those programmes by SMS. Counselling is also held in various affiliated study centres. The progress of the learners shall be evaluated by mid-term and end year examinations. Examination rules are adopted as per the rules and regulation regular system of the university.

v) **Faculty**: Faculties of both regular and distance department of Vidyasagar University engaged in teaching will act as PCP counsellors. In addition counsellors from experience teachers of colleges, other universities and research institutes are to be employed. UGC norms are followed for selecting the counsellors.

vi) **Media**: SLM will be provided in both Print Media, and e-media. The learners will be given choice to avail print media or e-media or both.

vii) **Learner Support Service**: Existing facilities of central library, photo copying facilities , free internet and WIFI facility will be available to the students. The students are provided with facilities for canteen, food corners of the university during holding PCP even in holidays. Further, in order to successfully execute the programme, a wide range of support services are provided to the ODL learners.

viii) **Network of Study Centres:** To assist its learners of Directorate of Distance Education of Vidyasagar University has established 36 study centres so that learner can choose a study center nearest to the residence.

(f) Procedure for admissions, Curriculum Transaction and evaluation:

Vidyasagar University has taken a concrete admission policy for all courses offered in distance mode. This policy includes notification, minimum eligibility criteria and fee structure. In every academic session the notifications are published in news papers (National Level and local level) and also in the university website. For different subjects the minimum eligibility criteria for admission is different. There is a fixed fee structure for each subject. The learners are instructed to deposit the fee by cheque or draft. The system of on line admission is also in the pipe line.

Fee structure:

Subject	*Semistar - I*	*Semistar - II*	*Semistar - III*	*Semistar - IV*
Botany	**10,700.00**	**10,650.00**	**10,850.00**	**10,800.00**

- **Curriculum Transaction** incorporates effective planning for providing learning experiences for its learners, organization of planning, administration/implementation of the organized planning and evaluation of the implementations by the implementer and the experts in the relevant field. Curriculum Transaction or Curriculum management is the process of planning and organizing the curriculum in a particular subject area for different levels of education and continuously monitor it while being implemented. The main responsibility of the curriculum transaction lies on the teachers and trainers who may use different types of pedagogies to create a nice academic environment in the institution and students can be benefited in gaining knowledge and developing skills. Curriculum transaction is always done through Personal Contact Programmes (PCP). The PCP should aim to address not only the problems faced by the individual learners but also compensate the pedagogic limitations of the SLM. So it will not just bring together learners to solve their problems but will be an intervention for organizing activities to be carried out in teams, using multiple sources of information available in the university. The activities presently supposed to be carried out at the PCP such as clarification of doubts; laboratory work and so on will be a part of the curriculum transaction process planned for the PCP. Efforts are being done to provide e-learning facility.
- **Evaluation**: The evaluation of learners will be made by two modes – internal assessment/assignments and end-year examination. For the evaluation of scripts there is a system of spot evaluation for expediting the publication of result, i.e., the examiners will come to Directorate of Distance Education and will examine the answer scripts and submit the marks on the spot. In some cases answer scripts are sent to the examiners and evaluated scripts are collected by messengers within a stipulated time. Qualified examiners will be appointed for this purpose. There is a system of re-examination of scripts after publication of results. The computerized system of database formation and preparation mark sheet and certificate will be employed for correct and speedy delivery of results to the learners.

(g) Requirement of Laboratory Support and Library resource:

Laboratory support is essential to the learner of distance education system in case of laboratory based subjects, M. Sc, in Botany. Directorate of Distance Education, Vidyasagar University have established two dedicated laboratory in the directorate of Distance Education to give exposure of practical knowledge to the learners. All the laboratories are well equipped facilitated with sophisticated instruments:

Botany Laboratory: It is equipped with different types of microscopes, LAF Chamber, Centrifuge, Electronic Balance, Incubator, Hot air Oven; Soil testing kits, Electrophoresis gel apparatus, ground survey based instruments as related to forest survey, various types of specimens and chemicals.

Practical classes of a particular subject are arranged group wise so that all the learners get sufficient attention and proper training from counsellors and laboratory instructors. Like theory classes, practical PCP schedule is announced by news paper and university website at least before 15 days.

Apart from the dedicated laboratory of DDE, the students are also trained in regular departments of the university.

Library facility: The students are provided with library facility in the central library of the University. They are used to get reading room as well as lending facilities. The central library is equipped with a numbers of e-book and e-journals. The learners may also avail such facilities.

(h) Cost Estimate of the Programme and the Provisions:

The estimated cost of the programme M. Sc in Botany is given in the following table:

Programme	Development (Lakh)	Delivery (Lakh)	Maintenance (Lakh)	Total (lakhs)
M. sc in Botany	11	9	15	35

Provisions: As it is a continued programme the infrastructure is already in existence. The other expenses will be fulfilled from the fees collected from the students.

(i) Quality Assurance Mechanism and Expected Programme outcome:

Quality assurance (QA) for distance higher education is one of the main concerns among institutions and stakeholders today. Quality has always been an issue in distance education (DE) and distance learning (DL). Quality assurance in distance and higher education has gained serious attention by institutions, stakeholders, and scholars. In response to QA line of inquiry, institutions have begun to re-define and re-orient their institutional missions and strategic visions to incorporate and address quality issues. QA has now reached an important turning point and is influencing DE institution's management strategies and cultures. Learners are demanding better quality educational services and provisions. To fulfil these demands, our Directorate of Distance Education must pay close attention to quality in terms of study material, quality of PCP counsellor, delivery systems and administrative facility to the learner.

The following major steps would be taken for quality assurance:-

1. Establishment of Center for Internal Quality Assurance
2. Revision of curriculum in 3 years interval
3. Quality improvement of SLM
4. Emphasize for online learning system
5. More emphasis of practical training of the learners in science subjects by improving the quality of laboratories with sophisticated instruments.
6. More use of ICT for the management of DL of the university

The expected outcome of the programme is to develop the knowledge and skill of learners of the specific field. The learner may go for further higher education programmes, e.g., M. Phil, Ph. D., M. Tech and other professional programmes. After completion of the programme by distance mode the learner may prepare themselves for different job oriented entrance examinations, e.g. NET, GATE, College service entrance (CSC), School Service Entrance (SSC) etc., Thus they may be employed in Govt. and non-govt. Sectors relating to farm / nursery management, agriculture, forestry etc. Apart from this, their training may enable them for self employment.

There are numerous careers in botany, including soil and plant scientist, biophysicist and biochemist, biological technician, environmental scientist and specialist, mycologist, plant breeder and horticulturist. While a bachelor's degree might get you started in this field, a master's degree or doctorate is generally needed to advance. Botany careers largely deal with the biology of fossil and living plants along with their relationship to the environment. Education in botany includes many specializations in areas such as the taxonomy, physiology and anatomy of plants and their processes. A bachelor's degree is required for career entry, but advanced degree options are often required for teaching or research positions. Some of the government organizations that provides opportunities to M. Sc. in Botany candidates are Departments of Conservation and Land Management, Public Health Service, Forest Service, National Park Service, Animal and Plant Health Inspection Services, Department of Agriculture, etc. The learners taking the course M. Sc. in Botany in distance mode may avail the above opportunities.

Programme Project Report (PPR)

Programme: M. Sc. in Chemistry

(a) Programme Mission and Objective:

Chemistry is one of the leading branches of science and a number of good students are attracted to get highest degree in this discipline. The proposed programme has the mission and objectives in relation to the teaching and learning in open and distance mode. In order to afford Quality Education for every one through distance learning mode need based academic programmes for livelihood and lifelong learning at post graduate level has been adopted. In order to set the highest benchmark for quality and standard of Indian open distance learning (ODL) strategy, introduction of this programme has enormously been spread.

The post graduate programmes in arts, science and commerce which are to be offered through ODL mode will have certain learning outcomes. This programme will help the learners in the following ways:-

- To spread higher education especially among the rural people who are socio economically backward.
- To rid underprivileged society from social evils through proper education.
- Capacity building among the students especially in rural population.
- To reach the unreached and provide education at the doorstep of the learners and according to their convenience.

Concept of open learning and distance education system focuses on open access education and training to make the learners free from the constraints of time and place, and offering flexible learning opportunities to individuals and groups of learners. Open and distance learning (ODL) is one of the most rapidly growing fields of education now a days and it has substantial impact on all education delivery systems. The new ODL system has been growing fast because of the development of internet-based information technologies. The concept of ODL education came from the idea where both the learners and the teachers can not be in a class room and they are separated by some geographical distance or may be they cannot achieve direct contact to make the entire education system flexible.

Programme Project Report (PPR)

The ODL system has tremendous potential of inclusive growth in the academic area because of its distinctive nature of being user friendly system. ODL system is not only cost effective but it can also contribute to the sustainable development through learning processes that transcend distance, gender, regional, cultural and socio-economic barriers.

Higher education playing the role of leadership in the society education acts as catalyst in social change and spread of education in a society which is the foundation of success in countries that are latecomers for development. Distance education is playing important roles in providing higher education to those who are unable to be the part of conventional system.

Formal system was unable to meet the demand of higher education, and, distance education was adopted as an alternative mode at the University level.

Distant learners have professional responsibilities (jobs), social responsibilities (families), are interested in part time studies, lack of access to on-campus based studies or are away from formal education where ODL becomes the readily available option for them in upgrading their qualifications.

Typical distant learners are regular students as they are known, besides some of them are parents, physically challenged people, and working/business people who has been looking for ways to enhance their skills in spite of their busy schedule.

As there is high demand of learning of chemistry from under-graduate level, the proposed programme will later the demand through the ODL mode.

(b) Relevance of the programme with HEI Mission

Mission of Vidyasagar University (VU) is defined in its logo “Education, Knowledge and Progress” with special emphasis on a curriculum relevant to the ethnic, sociological and geographical needs of the catchment region, yet not ignoring the demands of mainstream education.

The main missions VU are:-

i. To improve the economic condition of the region and offer courses which should have the potential to garner employment.

ii. To engender human resource with potential character and competence, having the strength to face the challenges of the changing realities both in the global and local levels and to adapt the fast evolving technologies.

iii. To promote all round developments of its students with proper blending of knowledge and wisdom, acquiring adequate skill in her own subject or trade or vocation through teaching learning process and human qualities like compassion, a sense of social responsibility and commitment and ethical sense (honesty), tolerance and empathy through various social, cultural, sports and ethical value added programs.

iv. To strive for the creation and dissemination of knowledge through continuous research and learning process.

v. To strive for academic excellence

vii. To strengthen student support system.

The missions of the proposed programme in chemistry are in conformity with the missions of Vidyasagar University. It aims to enable the learners to learn and retain broad based knowledge in various domains of the subject. The ODL system was started in the university with a mission to revitalize educational leadership, to set the standard in producing and disseminating knowledge as well as to become an effective instrument of change in the society. Keeping priority with the view of "Education for All", PG courses in Arts, Science and Commerce to be offered or being offered through ODL mode is very much relevant to the higher education institutes' (HEI) mission and goals as it aims to provide quality education to those aspiring candidates who are deprived of higher education due to the limited number of intake in the traditional mode in the Universities. Moreover, to keep the quality intact, the curriculum and syllabus have been designed at par with the conventional mode keeping in mind the specific needs and acceptability of the learners in the distance mode and in keeping with the aims and objectives of the University. The proposal of the present programme (M.Sc. in Chemistry) will fulfil the above objectives of the university as well as distance mode education.

(c) Nature and target group of learners:

The following groups of learners have been targeted:

(1) Those who are distracted from the admission in the regular mode due to limited intake capacity of Vidyasagar University as well as other HEIs
(2) Those who are employed in various organizations who desire to track higher education as passion or as means for movement up the promotional ladder.
(3) The drop outs primarily due to social, financial and economic compulsions as well as population related factors.
(5) The rural population living in remote areas where higher education institutes are not easily accessible.
(4) Job seekers of particular field related to chemistry / chemical sciences
(5) People of any age can participate in higher education programmes as there is no age bar.

(d) Appropriateness of the programme to be conducted in the ODL mode for acquiring specific skills and competence:

Vidyasagar University emphasizes in innovative approaches towards the curriculum designing, while conforming to the basic or core requirements in creating the common knowledge base for the state and the nation. Post graduate programme in **Chemistry** to be offered through ODL mode will help the learners to spread higher education in all sectors of community in the following ways:

• Capacity building among the students particularly from the rural population as well as backward areas of the districts
• To apply skills and knowledge in an internship experience.
• To develop skills on hand practical related to science subject and also hands on training in field exposure

The ODL program in Vidyasagar University offers expanded mode both in volume and the type. As technology has been getting more affordable and widely available, the interest of both the learners and institutions in this special kind of education is expected to increase enormously.
Many top research and teaching positions require students to have at least an M.Sc. in Chemistry. A Master's degree is also the gateway to all other types of post-graduate work, including a Doctoral program. Additionally, postgraduate students in chemistry can have the access to equipment and facilities that are not available at the undergraduate level. A Master's degree in

chemistry qualifies the incumbent in the expert positions in a wide range of fields, such as industry, research or education. The chemical industry is one of the major employers in our country for the postgraduates. As chemistry is also involved in the applications of environmental and biological sciences, the qualified students of chemistry may serve in the pharmaceutical sectors, or the development of technological materials or new energy solutions.

(e) Instructional Design:

The first step of instructional design in distance mode is curriculum design. A growing number of students globally are enrolling in ODL programs and are becoming important, more than ever before, to design curriculum that reflects educational principles, represents elements of engagement and pedagogy and meets institutional and industry requirements. In doing so, it is vital to design contemporary curriculum which ensures that the outcomes are achived. In order to effectively design curriculum, the role of the educator as a conductor, technician and choreographer. Finally, a triad has been proposed comprising of pedagogy, technology and an engaged community of learners as a basis for ensuring curriculum meets contemporary practices. For all these subjects the objective of ODL system of education is to develop capacity within and across the region, to organize distance learning effectively in order to address the educational challenges and opportunities, particularly in higher education.

i). **Curriculum Design**: The curriculum of M.Sc. in Chemistry has been designed by a committee comprising experts from the parent department of Vidyasagar University along with some external experts keeping in view the needs of the diverse group of learners. Efforts have been made to adopt the syllabus at par with the regular courses in the university as far as practicable. The syllabus prepared by the Subject Committee was placed before the Advisory Committee of Directorate of Distance Education for approval. The syllabus is available online in the university website.

Programme Project Report (PPR)

ii) Detailed Syllabus:

M.Sc. in Chemistry (Four Semester Program)

Syllabus at a glance

SEM-I 300 Marks: 24Credits		**SEM-II** 300 Marks: 24Credits		**SEM-III** 300 Marks: 24Credits		**SEM-IV** 300 Marks: 24Credits		**TOTAL** 1200 Marks: 96Credits	
Theory	Practical	Theory	Practical	Theory	Project	Theory	Project	Theory	Practical /Project
200	100	200	100	200	100	200	100	800	400

M. Sc. SEM I

SEMESTER	**COURSE NO**	**COURSE TITLES**	**FULL MARKS**	**CREDIT**
I	CEM 101	PHYSICAL CHEMISTRY-I	50	4
	CEM 102	ORGANIC CHEMISTRY-I	50	4
	CEM 103	INORGANIC CHEMISTRY-I	50	4
	CEM 104	INDUSTRIAL CHEMISTRY-I / FOOD PROCESSING AND PRESERVATION AND COMPUTER BASICS	50	4
	CEM 195	INORGANIC CHEMISTRY (practical)	50	4
	CEM 196	FOOD PROCESSING AND PRESERVATION (practical)	50	4
	TOTAL		300	24

M. Sc. SEM II

SEMESTER	**COURSE NO**	**COURSE TITLES**	**FULL MARKS**	**CREDIT**
II	CEM 201	PHYSICAL CHEMISTRY-II	50	4
	CEM 202	ORGANIC CHEMISTRY-II	50	4
	CEM 203	INORGANIC CHEMISTRY-II	50	4
	C-CEM 204	POLYMER CHEMISTRY/ NANOTECHNOLOGY: PRINCIPLES AND PRACTICES (CBCS)	50	4
	CEM 295	ORGANIC CHEMISTRY (practical)	50	4
	CEM 296	PHYSICAL CHEMISTRY (practical)	50	4
	TOTAL		300	24

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M. Sc. SEM III

SEMESTER	COURSE NO	COURSE TITLES	FULL MARKS	CREDIT
III	CEM 301	ADVANCED SPECTROSCOPY-I	50	4
	PHYSICAL CHEMISTRY SPECIALISATION			
	CEM 302	ADVANCED PHYSICAL CHEMISTRY-I	50	4
	CEM 303	ADVANCED PHYSICAL CHEMISTRY-II	50	4
	ORGANIC CHEMISTRY SPECIALISATION			
	CEM 302	ADVANCED ORGANIC CHEMISTRY-I	50	4
	CEM 303	ADVANCED ORGANIC CHEMISTRY-II	50	4
	C-CEM 304	POLYMER CHEMISTRY-II/INTRODUCTION TO PHARMACEUTICAL CHEMISTRY(CBCS)	50	4
	CEM 395	CHEMISTRY PROJECT-I(PHYSICAL SPL/ORGANIC SPL)	100	8
	TOTAL		300	24

M. Sc. SEM IV

SEMESTER	COURSE NO	COURSE TITLES	FULL MARKS	CREDIT
IV	CEM 401	ADVANCED SPECTROSCOPY-II	50	4
	PHYSICAL CHEMISTRY SPECIALISATION			
	CEM 402	ADVANCED PHYSICAL CHEMISTRY-III	50	4
	CEM 403	ADVANCED PHYSICAL CHEMISTRY-IV	50	4
	CEM 404	CHEMISTRY IN TECHNOLOGY	50	4
	ORGANIC CHEMISTRY SPECIALISATION			
	CEM 402	ADVANCED ORGANIC CHEMISTRY-III	50	4
	CEM 403	ADVANCED ORGANIC CHEMISTRY-IV	50	4
	CEM 404	INDUSTRIAL CHEMISTRY-II /CHEMICAL PRINCIPLES IN FOOD SCIENCE AND TECHNOLOGY	50	4
	CEM 495	CHEMISTRY PROJECT-II (PHYSICAL SPL/ORGANIC SPL)	100	8
	TOTAL		300	24

- Students have to opt either Organic or Physical special in SEM-III and SEM-IV.

iii) Duration of the Program: Two years.

However, the learners are given time to complete the course within 5 (five) years from the date of admission.

Programme Project Report (PPR)

iv) **Instructional Delivery Mechanism**: The programme is being delivered in two years. The learners shall be provided with the printed Self Learning Materials (SLM). Apart from this, the students are provided with the SLM in electronic media, depending on the choice of the learner. The Personal Contact Programs (PCP) are announced well ahead from the commencement of the session. The examination programmes are also announced well ahead. The announcement for PCP or examination are published in university website and leading news papers. A well structured data base of the contacts of the learners and a system of delivering information to students using ICT is already available. The students are also informed about those programmes by SMS. Student counselling are also held in different affiliated study centres. The progress of the learners are evaluated by mid-term and end year examinations. Examination rules are adopted as per the rules and regulation of system of the regular mode of examination in the university.

v) **Faculty:** Faculties of Vidyasagar University, engaged in regular mode teaching also act as PCP counsellors. In addition, counsellors from experienced teachers of colleges, other universities and research institutes are employed. UGC norms are followed in selecting the counsellors.

vi) **Media:** SLMs are provided in both print media, and e-media. The learners are given options to avail print media or e-media or both.

vii) **Student Support Service**: Existing facilities of central library, photo copying facilities, internet and WiFi facilities will be available to the students. The students are provided with facilities for canteen, food corners of the university even in the holidays. Furthermore, in order to successfully execute the programme, a wide range of support services are provided to the ODL learners.

Network of Study Centres: To assist its learners, the Directorate of Distance Education of Vidyasagar University has established 36 study centres so that learners can choose the study center according to their conveniences.

Programme Project Report (PPR)

(f) Procedure for admissions, Curriculum Transaction and evaluation:

Vidyasagar University has taken a concrete admission policy for all courses offered in distance mode. This policy includes notification, minimum eligibility criteria and fee structure. In every academic session the notifications are published in news papers (National Level and local level) and also in the university website. There is a fixed fee structure for each subject. The learners are instructed to deposit the fee by cheque or draft. The system of online admission is also in the pipe line.

Fee Structure

Subject	Semester-I	Semester-II	Semester-III	Semester-IV
M.Sc. (Chemistry)	11,650.00	11,600.00	12,200.00	12,150.00

Curriculum Transaction incorporates effective planning for providing learning experiences for its learners, organization of planning, administration/implementation of the organized planning and evaluation of the implementation by the implementer and the experts in the relevant field. Curriculum Transaction or Curriculum Management is the process of planning and organizing the curriculum in a particular subject area for different levels of education and continuously monitor it while being implemented. The main responsibility of the curriculum transaction lies on the teachers and trainers who may use different types of pedagogies to create a nice academic environment in the institution and students can be benefited in gaining knowledge and developing skills. Curriculum transaction is always done through Personal Contact Programmes (PCP). The PCP should aim to address not only the problems faced by the individual learners but also compensate the pedagogic limitations of the SLM. Hence it not only bring together learners to solve their problems but also an intervention for organizing activities to be carried out in teams, using multiple sources of information available in the university. The activities presently supposed to be carried out at the PCP such as clarification of doubts; laboratory work and so on will be a part of the curriculum transaction process planned for the PCP. Efforts are being done to provide e-learning facility in the near future.

Evaluation: The evaluation of learners are made by two modes – internal assessment/assignments and end-year examination. For the evaluation of scripts there is a system of **spot evaluation** for expediting the publication of result, i.e., the examiners come to Directorate of Distance Education and examine the answer scripts and submit the marks on the spot. In some cases, answer scripts are sent to the examiners and the evaluated scripts are collected by messengers within a stipulated time. Qualified examiners are appointed for this purpose. There is a system of re-examination of the scripts after publication of results. The computerized system of database formation and preparation of mark sheet and certificates for correct and speedy delivery of results to the students.

(g) Requirement of Laboratory Support and Library resource:

Laboratory support is essential to the learner of distance education system in case of laboratory based subjects. Directorate of Distance Education, Vidyasagar University have established dedicated laboratory in the directorate of Distance Education in **Chemistry** to give exposure of practical knowledge to the learners. The laboratories are well equipped with the facilities like:

Chemistry Laboratory (physical) has Polarimeter, Potentiometer, Conductometer, pH meter, Spectrophotometer (Double-beam), Distilled water plant and different chemicals & glass goods.

Besides, these the students are also trained with other instruments available in the laboratories of the regular department.

Practical classes of a particular subject are arranged group wise so that all the learners get sufficient attention and proper training from counsellors and laboratory instructors. Like theory classes, practical PCP schedule is also announced in the news papers and university website at least before fifteen days. Apart from the dedicated laboratory of DDE, the students are trained in regular departments of the university.

Library facility: The students are provided with library facility in the central library of the University. They are used to get reading room as well as lending facilities. The central library is also equipped with a numbers of e-books and e-journals in addition to the hard copies. The learners can avail such facilities. The faculty members are provided with ‘remote user’ facility by the central library of Vidyasagar University.

Programme Project Report (PPR)

(h) Cost Estimate of the Programme and the Provisions:

The estimated cost of M.Sc. in Chemistry is given in the following table:

Programme	Development (INR in lakh)	Delivery (INR in lakh)	Maintenance (INR in lakh)	Total Amount (INR in lakh)
Chemistry	11	9	15	35

Provisions: As it is a continued programme, the infrastructure is already in existence. The other expenses will be fulfilled from the fees collected from the students.

(i) Quality Assurance Mechanism and Expected Programme outcome:

Quality assurance (QA) for distance higher education is one of the main concerns among institutions and stakeholders today. Quality has always been an issue in distance education (DE) and distance learning (DL). Quality assurance in distance and higher education has gained serious attention by institutions, stakeholders, and scholars. In response to QA line of inquiry, institutions have begun to re-define and re-orient their institutional missions and strategic visions to incorporate and address quality issues. QA has now reached an important turning point and is influencing DE institutions' management strategies and cultures. Learners are demanding better quality educational services and provisions. To fulfil these demands, the Directorate of Distance Education has been paying close attention to quality in terms of study material, quality of PCP counsellor, delivery systems and administrative facility to the learner.

The following have been prioritized steps for quality assurance:-

i) Establishment of Center for Internal Quality Assurance
ii) Revision of curriculum in every three year
iii) Quality improvement of SLM
iv) Emphasize for online learning system.
v) Higher emphasis on practical training of the learners in science subjects by improving the quality of laboratories with sophisticated instruments.
vi) Better uses of ICT for the management of DL of the university.

Programme Project Report (PPR)

Expected outcome:

It is strongly believed that the program will be able to develop the knowledge and skill of learners in Chemistry. There are various higher study options for candidates who have completed their post graduation in Chemistry. They will be able to join various other post graduation and research programs. The learner may go for further higher education programmes, e.g., M.Phil, Ph.D., M.Tech. and other professional programmes. After the completion of the programme, learners will be able to comply themselves for different job oriented entrance examinations, e.g., NET, GATE, College service commission (CSC), School Service commission (SSC) etc., They will be competent to be employed in Govt. and non-govt. sectors. Apart from this, their training will enable them for self employment. The learners trained in varied aspects chemistry have enough scope joining in different chemical, agrochemical industry, plastic manufacturing units, chemical manufacturers, food processing firms, paint manufacturing companies, textile industries and pharmaceutical industries and the scopes for joining in different organizations in abroad may be open up for the students.

Programme Project Report (PPR)

Programme: M. Sc. in Computer Science

(A) Programme Mission and objective:

The most important aspect of computer science is problem solving, an essential skill for life. Students study the design, development and analysis of software and hardware used to solve problems in a variety of business, scientific and social contexts. Because computers solve problems to serve people, there is a significant human side to computer science as well.

The proposed programme M. Sc. in Computer science has the mission and objectives in relation to the teaching and learning in open and distance mode. In order to afford Quality Education for every one through distance learning mode need based academic programmes for livelihood and lifelong learning at post graduate level has been adopted. In order to set highest benchmark for quality and standards of Indian open distance learning strategy introduction of this programme has enormously been spread.

The post graduate Programme in Arts, science and commerce to be offered through ODL mode will have certain learning outcomes. This programme will help the learners-

- To extend higher education among the larger section of the society.
- To spread the opportunity of getting master course especially among the rural people who are socio economically backward.
- Capacity building among the students especially in rural population.
- To reach the unreached and provide education at the doorstep of the learners and according to their convenience.

Concept of open learning and distance education system focuses on open access education and training to make the learners free from the constraints of time and place, and offering flexible learning opportunities to individuals and groups of learners. Open and distance learning (ODL)is one of the most rapidly growing fields of education now a days and it has substantial impact on all education delivery systems. The new ODL system growing fast because of the development of Internet-based information technologies. The concept of ODL education came from idea where the learners and the teachers can not be in a class room and they should be separated by some geographical distance or maybe they cannot come close to each other to make the entire education system flexible.

Open and Distance Learning system has tremendous potential of inclusive growth of education because of its distinctive nature of being a user friendly system. ODL system is not only cost effective but it can also contribute in the sustainable development through learning processes that transcend distance, gender, regional, cultural and socio-economic barriers.

Higher education playing the role of leadership in the society education act as catalyst of social change and spread of education in a society is the foundation of success in countries that are latecomers for development. Distance education is playing an important role in providing higher education to those who are unable to be the part of conventional system. The main objective of ODL is to reach the unreached and provide education at the doorstep of the learners and according to their convenience.

Formal system was unable to meet the demand of higher education and alternatively distance education was adopted as an alternative mode at the University stage

Most ODL learners have professional responsibilities (jobs), social responsibilities (families), are interested in part time studies, lack of access to on-campus based studies or are away from formal education and ODL becomes the readily available option for them to upgrade their qualifications.

Typical distance learners are regular students as we all know them, but also parents, physically challenged people, and working/business people who are looking for ways to enhance their skills next to their busy schedule.

As application of computer become part and parcel of the society, there is an enhanced interest of the people of present generation. Thus the demand of learning computer science at master level has

highly increased. Such demand can partially be fulfilled by offering the course on distance learning mode.

(B) Relevance of the programme with HEI Mission

Mission of the Vidyasagar University is defined in its logo "Education, Knowledge and Progress" with special emphasis on a curriculum relevant to the ethnic, sociological and geographical needs on the catchment region, yet not ignoring the demands of mainstream education.
The main missions of the university are-

i. To improve the economic condition of the region and offer courses which should have the potential to garner employment.
ii. To build human resource with strong character and competence, having the strength to face the challenges of the changing realities both in global and local levels and to adapt to the fast evolving technologies.
iii. To promote an all-round development of its students with a proper blending of knowledge and wisdom acquiring adequate skill in his own subject or trade or vocation through teaching learning process and human qualities like compassion, a sense of social responsibility and commitment and ethical sense (honesty), tolerance and empathy through various social, cultural, sports and ethical value addition programs.
iv. To strive for the creation and dissemination of knowledge through continuous research and learning process.
v. To strive for academic excellence
vi. To strengthen student support system

The missions of the proposed Programme are in conformity with the missions of the institute. It aims to enable learners to learn and retain a broad base of knowledge in the various domains of the subject. The distance mode education has been started in the university with a mission to revitalize educational leadership, to set the standard for the production and dissemination of knowledge as well as to become an effective instrument of change in the society. Keeping priority with the view of "Education For All", PG courses in Arts, Science and Commerce to be offered or being offered through ODL mode is very much relevant to the HEI's mission and goals as it aims to provide quality education to those aspiring candidates who are deprived of higher education due to the limited number of intake in the traditional mode of higher education in the Universities. Moreover, to keep the quality intact the curriculum and syllabus has been designed at par with the conventional mode keeping in mind the specific needs and acceptability of the learners in the distance mode and in keeping with the aims and objectives of the University. The proposal of M. Sc. in Computer Science will fulfil the above objectives of the university as well as distance mode education.
Introduction of the programme M. Sc. in computer Science in distance mode along with the existing course in regular mode will be a step for serving the mission of the University for spreading of knowledge of computer in the society.

(C) Nature and target group of learners:

For the present subject the following groups of learners have been targeted:

1) Learners who particularly desire to make career in computer technology and software industries
2) Those are not able to get admission in the regular mode due to limited intake capacity of HEIs
3) Those employed in various organizations who desire to track higher education as a passion or as a means for movement up the promotional ladder.
4) Drop outs primarily due to social, financial and economic compulsions as well as population related factors.
5) Rural population those living in remote areas where higher education institutes are not easily accessible.

6) Job seekers of particular field or subjects
7) People of any age can participate in higher education programmes as there is no age bar in ODL mode education.

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(D) Appropriateness of the programme to be conducted in the ODL mode for acquiring specific skills and competence

Vidyasagar University emphasized in innovative approach towards curriculum designing, while conforming to the basic or core requirements to create a common knowledge base for the state and the nation. Post graduate Programme in Arts, Commerce and Science to be offered through ODL mode will have certain learning outcomes. This programme will help the learners to spread higher education in all sectors of community.

- Capacity building among the students particularly from the rural population as well as backward areas of the districts
- To apply skills and knowledge in an internship experience.
- To develop skills on hand practical related to science subject and also hands on training in field exposure

The distance learning under Vidyasagar University offer programme in an expanded mode both in volume and the type of programmes. As technology has been getting more affordable and widely available, the interest of both learners and institutions in this special kind of education may be increased enormously.

Computer science is a field that has been rapidly expanded with the growth of technological development. According to definition, it is a practical and scientific approach to computation. This involves the algorithms that deal with obtaining, processing and representing information. **Computer Science** is an extremely important field as it holds relevancy in the majority of aspects in our society. The field encompasses the theories of computation and their application and the design of computing systems. The course has been specifically designed to prepare comprehensively trained computing professionals, at the same time fill up the skill gaps and market demand for skills in the world. For this reason the degree has a strong focus on all aspects of Computer Science and includes modules such as Artificial Intelligence, Mobile Computing, Image Processing and Information Security – topics in which a skills shortage has been identified.

(E) Instructional Design:

The first step of instructional design in distance mode is curriculum design. A growing number of students globally are enrolling in distance education programs and it is becoming important now, more than ever before, to design curriculum that reflects educational principles, represents elements of engagement and pedagogy and meets institutional and industry requirements. In doing so, it is vital to design contemporary curriculum that ensures these outcomes are attained. In order to effectively design curriculum, the role of the educator as a conductor, technician and choreographer. Finally, a triad has been proposed comprising of pedagogy, technology and an engaged community of learners as a basis for ensuring curriculum meets contemporary practices. For All these subjects the objective of this Open & Distance Learning (ODL) system of education is to develop capacity within and across the region to organize distance learning effectively in order to address the educational challenges and opportunities, particularly in higher education.

a) Curriculum Design: The curriculum is designed by a committee comprising experts from the parent department of the Vidyasagar University along with external expert keeping in view the needs of the diverse groups of learners. An effort has been made to adopt the syllabus at par with the regular courses in the university as far as practicable. The syllabus is prepared by the Subject Committee is placed in the Advisory Committee of Directorate of Distance Education for approval. Then the syllabus is uploaded in the website of the university.
b) Detailed Syllabus:

Programme: M. Sc. in Computer Science
Syllabus at a glance

FIRST YEAR FIRST SEMESTER (1st Semester)				
Subjects		**Marks Distribution**		**Credit Points**
Subject Code	Subject Name	Theoretical/Practical Examination	Internal Assessment	
COS-101	Data Structure and Algorithm	40	10	4
COS-102	Advanced Computer Architecture	40	10	4
COS-103	Data Communication and Computer Network	40	10	4
COS-104	Software Engineering and Project Management	40	10	4
COS-191	Data Structure Lab	40	10	3
COS-192	Network Programming Lab	40	10	3
Total		240	60	22

FIRST YEAR SECOND SEMESTER (2nd Semester)				
Subjects		**Marks Distribution**		**Credit Points**
Subject Code	Subject Name	Theoretical/Practical Examination	Internal Assessment	
COS-201	Advanced Database Management System	40	10	4
COS-202	M-I: Automata Theory M-II: Compiler Construction	40	10	4
COS-203	M-I:OOPS with Java M-II: Programming in R	40	10	4
COS-204	Data Science	40	10	4
COS-291	DBMS Lab	40	10	3
COS-292	M-I:OOPs Lab M-II: R lab	20 20	05 05	3
Total		240	60	22

SECOND YEAR FIRST SEMESTER (3rd Semester)				
Subjects		**Marks Distribution**		**Credit Points**
Subject Code	Subject Name	Theoretical/Practical Examination	Internal Assessment	
COS-301	Advanced Operating System	40	10	4
COS-302	M-I: Computer Graphics M-II: Image Processing	40	10	4
COS-303	Elective-I	40	10	4
COS-304	IoT	40	10	4
COS-391	M-I: Graphics Lab M-II: OS Lab	20 20	05 05	3
COS-392	M-I: IoT Lab M-II: Term Paper	20 00	05 25	3
Total		220	80	22

SECOND YEAR SECOND SEMESTER (4th Semester)				
Subjects		**Marks Distribution**		**Credit Points**
Subject Code	Subject Name	Theoretical/Practical Examination	Internal Assessment	
COS-401	Artificial Intelligence	40	10	4
COS-402	Elective-II	40	10	4
COS-403	Elective-III	40	10	4
COS-491	AI Lab	20	05	2
COS-492	Project Work	00	100	6
COS-493	Grand Viva	00	25	2
Total		140	160	22

List of electives:		
COS-303: Elective I	**COS-402: Elective II**	**COS-403: Elective III**
Mobile Computing	Cryptography and Steganography	Multimedia
Soft Computing	Web Technology	Cloud Computing
Machine Learning	Parallel Computing	Bio Informatics

Note: The details of the text of syllabus is given in the hard copy of the application

c) Duration of the Program: 4 semesters i.e. 2 years.
However, the learners are given time to complete the course within 5 (five) years from the date of admission.

d) Instructional Delivery Mechanism: The programme shall be delivered in two years. The learners shall be provided with the printed SLM which covers almost all the contents in the syllabus. Apart from this the students will be provided with the SLM in electronic media depending on the choice of the learner. The PCP programmes are announced well ahead from the date of commencement. The examination programmes are also announced well before its commencement. The announcement for PCP or Examination is published in university website. We have a well structured data base of the contacts of the learners and a system of delivering information to students using ICT. The students are also informed about those programmes by SMS. Counselling is also held in various affiliated study centres. The progress of the learners shall be evaluated by semester examination. Examination rules are adopted as per the rules and regulation regular system of the university.

e) Faculty: Both regular and distance mode faculties of Vidyasagar University engaged in teaching, in addition counsellors from experience teachers of colleges, other universities and research institutes. UGC norms are followed for selecting the counsellors.

f) Media: SLM will be provided in both Print Media, and e-media. The learners will be given choice to avail print media or e-media or both.

g) Student Support Service: Existing facilities of central library, photo copying facilities, free internet and WIFI facility will be available to the students. The students are provided with facilities for canteen, food corners of the university during holding PCP even in holidays. Further, in order to successfully execute the programme, a wide range of support services are provided to the ODL learners.

Network of Study Centres: To assist its learners of Directorate of Distance Education of Vidyasagar University has established 36 study centres so that learner can choose a study center nearest to the residence.

(F) Procedure for admissions, Curriculum Transaction and evaluation:

Vidyasagar University has taken a concrete admission policy for all courses offered in distance mode. This policy includes notification, minimum eligibility criteria and fee structure. In every academic session the notifications are published in news papers (National Level and local level) and also in the university website. For different subjects the minimum eligibility criteria for admission is different. There is a fixed fee structure for each subject. The learners are instructed to deposit the fee by cheque or draft. The system of on line admission is also in the pipe line.

Fee structure

Subject	Semester - I	Semester - II	Semester - III	Semester - IV
M.Sc. (Computer Science)	14,000.00	14,000.00	14,000.00	14,000.00

Curriculum Transaction incorporates effective planning for providing learning experiences for its learners, organization of planning, administration/implementation of the organized planning and evaluation of the implementations by the implementer and the experts in the relevant field. Curriculum Transaction or Curriculum management is the process of planning and organizing the curriculum in a particular subject area for different levels of education and continuously monitors it while being implemented. The main responsibility of the curriculum transaction lies on the teachers and trainers who may use different types of pedagogies to create a nice academic environment in the institution and students can be benefited in gaining knowledge and developing skills. Curriculum transaction is always done through Personal Contact Programmes (PCP). The PCP should aim to address not only the problems faced by the individual learners but also compensate the pedagogic limitations of the SLM. So it will not just bring together learners to solve their problems but will be an intervention for organizing activities to be carried out in teams, using multiple sources of information available in the university. The activities presently supposed to be carried out at the PCP such as clarification of doubts; laboratory work and so on will be a part of the curriculum transaction process planned for the PCP. Efforts are being done to provide e-learning facility.

Evaluation: The evaluation of learners will be made by two modes – internal assessment/assignments and semester examination. For the evaluation of scripts there is a system of spot evaluation for expediting the publication of result, i.e., the examiners will come to Directorate of Distance Education and will examine the answer scripts and submit the marks on the spot. In some cases answer scripts are sent to the examiners and evaluated scripts are collected by messengers within a stipulated time. There is a system of re-examination of scripts after publication of results.

(G) Requirement of Laboratory Support and Library resource:

Laboratory support is essential to the learner of distance education system in case of laboratory based subjects. Directorate of Distance Education, Vidyasagar University have established dedicated laboratory in the directorate of Distance Education for the laboratory based subjects like Computer Science to give exposure of practical knowledge to the learners. The Dept. of Computer Science has four Software Laboratories and one Hardware Laboratory out of which two are thin client lab with 90 terminals along with two high end servers. All software labs are equipped with latest software with internet facility as well as 24 x 7 Wi-Fi availability. Hardware lab also contains latest hardware devices like Microprocessor Kits, Oscilloscope and Digital devices.

Practical classes of a particular subject are arranged group wise so that all the learners get sufficient attention and proper training from counsellors and laboratory instructors. Like theory classes, practical PCP schedule is announced by news paper and university website at least before 15 days.

Apart from the computer laboratories of the regular department, the Directorate of Distance Education possesses a well equipped computer laboratory. Moreover, there are computer facilities in the Computer centre of the university also. The students can be trained in those laboratories.

Library facility: The students are provided with library facility in the central library of the University. They are used to get reading room as well as lending facilities. In addition to the huge collections of printed books and journals the central library is equipped with a numbers of e-book and e-journals. The learners may also avail such facilities

(H) Cost Estimate of the Programme and the Provisions:

Estimated cost of M. Sc. in Computer Science is as follows:

Subject	Development	Delivery	Maintenance	Total
Computer Science	11 Lakhs	9 Lakhs	15 Lakhs	35 Lakhs

Provisions: This is a new programme applied for introduction from the next session. However, some of the infrastructures of the regular dept. will be used. The other expenses will be fulfilled from the fees collected from the learners.

(i) Quality Assurance Mechanism and Expected Programme outcome:

Quality assurance (QA) for distance higher education is one of the main concerns among institutions and stakeholders today. Quality has always been an issue in distance education (DE) and distance learning (DL). Quality assurance in distance and higher education has gained serious attention by institutions, stakeholders, and scholars. In response to QA line of inquiry, institutions have begun to re-define and re-orient their institutional missions and strategic visions to incorporate and address quality issues. QA has now reached an important turning point and is influencing DE institution's management strategies and cultures. Learners are demanding better quality educational services and provisions. To fulfil these demands, our Directorate of Distance Education must pay close attention to quality in terms of study material, quality of PCP counsellor, delivery systems and administrative facility to the learner.

The following major steps would be taken for quality assurance:-

i) Establishment of Centre for Internal Quality Assurance
ii) Revision of curriculum in 3 years interval
iii) Quality improvement of SLM
iv) Emphasize for online learning system
v) More emphasis of practical training of the learners in science subjects by improving the quality of laboratories with sophisticated instruments.
vi) More use of ICT for the management of DL of the university

The expected outcome of the programme is to develop the knowledge and skill of learners of the specific field. The learner may go for further higher education programmes, e.g., M. Phil, Ph. D. , M. Tech and other professional programmes. After completion of the programme by distance mode the learner may prepare themselves for different job oriented entrance examinations, e.g. NET, GATE, College service entrance (CSC), School Service Entrance (SSC) etc., Thus they may be employed in Govt. and non-govt. sectors. Apart from this, their training may enable them for self-employment.

There are bright career prospects for computer science professionals or software professionals in recent scenario. With the opening of huge software and IT companies in India, the job opportunities for trained professionals have increased considerably. India is known to be a leader in software and IT sector.

Computer science graduates find job opportunities in a variety of environments in academia, research, industry, government, private, business organizations and so on. They are involved in analyzing problems for solutions, formulating and testing, using advanced communications or multi-media equipment, or working in teams for product development. The software and IT companies are the major employers of computer science graduates. They offer the best packages to the young graduates which are unmatched with other branches of science.

Programme Project Report (PPR)

Programme: M. Sc. in Dietetics and Community Nutrition Management (DCNM)

(a) Programme Mission and objective:

Food and nutrition is an increasingly important priority for populations around the world. Learn to develop strategies to improve nutrition and promote physical health, making a true difference in the lives of others. Graduates will benefit in a sector with strong job growth as public health issues such as obesity and poor diet affect health care systems of the country.

The proposed programme, M. Sc. in Dietetics and Community Nutrition Management (DCNM) has the mission and objectives in relation to the teaching and learning in distance mode of learning. In order to afford Quality Education for every one through distance learning mode need based academic programmes for livelihood and lifelong learning at post graduate level has been adopted. In order to set highest benchmark for quality and standards of Indian open distance learning strategy introduction of this programme has enormously been spread.

The post graduate programme in Arts, Science and Commerce to be offered through ODL mode will have certain learning outcomes. This programme will help the learners-

- To spread higher education in DCNM especially among the rural people who are socio economically backward.
- To rid underprivileged society of social evils through proper education
- Capacity building among the students especially in rural population.
- To reach the unreached and provide education at the doorstep of the learners and according to their convenience.

Concept of open learning and distance education system focuses on open access education and training to make the learners free from the constraints of time and place, and offering flexible learning opportunities to individuals and groups of learners. Open and Distance Learning (ODL)is one of the most rapidly growing fields of education now a days and it has substantial impact on all education delivery systems. The new ODL system growing fast because of the development of Internet-based information technologies. The concept of ODL education came from idea where the learners and the teachers cannot be in a class room and they should be separated by some geographical distance or maybe they cannot come close to each other to make the entire education system flexible.

Open and Distance Learning system has tremendous potential of inclusive growth of education because of its distinctive nature of being a user friendly system. ODL system is not only cost effective but it can also contribute in the sustainable development through learning processes that transcend distance, gender, regional, cultural and socio-economic barriers.

Most ODL learners have professional responsibilities (jobs), social responsibilities (families), are interested in part time studies, lack of access to on-campus based studies or are away from formal education and ODL becomes the readily available option for them to upgrade their qualifications.

Typical distance learners are regular students as we all know them, but also parents, physically challenged people, and working/business people who are looking for ways to enhance their skills next to their busy schedule.

The proposed programme, M. Sc. in DCNM will be helpful to meet the high demand of the students for studying the applied aspects of nutrition and dietetics. The specific objectives of this programme are

- To produce postgraduates in the field of Dietetics and Nutrition recognized for their practical and public health skills.

- To acquaint postgraduates with advanced clinical nutrition, understand the basis of nutritional status assessment, biochemical basis of nutrition, nutrition related disorders, and the role of nutrition in therapeutic diets.
- The course also aims at teaching skills of menu planning for quality and quantity preparation and management of resources.
- The students also learn about new and expanding areas of research in the field of dietetics and nutrition and acquire necessary research oriented skills.

(b) Relevance of the programme with HEI Mission

Mission of the Vidyasagar University is defined in its logo "Education, Knowledge and Progress" with special emphasis on a curriculum relevant to the ethnic, sociological and geographical needs on the catchment region, yet not ignoring the demands of mainstream education.

The main missions of the university are-

i. To improve the economic condition of the region and offer courses which should have the potential to garner employment.

ii. To build human resource with strong character and competence, having the strength to face the challenges of the changing realities both in global and local levels and to adapt to the fast evolving technologies.

iii. To promote an all-round development of its students with a proper blending of knowledge and wisdom acquiring adequate skill in his own subject or trade or vocation through teaching learning process and human qualities like compassion, a sense of social responsibility and commitment and ethical sense (honesty), tolerance and empathy through various social, cultural, sports and ethical value addition programs.

iv. To strive for the creation and dissemination of knowledge through continuous research and learning process.

v. To strive for academic excellence

vii. To strengthen student support system

The missions of the proposed programme are in conformity with the missions of the institute. It aims to enable learners to learn and retain a broad base of knowledge in the various domains of the subject. The distance mode education has been started in the university with a mission to revitalize educational leadership, to set the standard for the production and dissemination of knowledge as well as to become an effective instrument of change in the society. Keeping priority with the view of "Education For All", PG courses in Arts, Science and Commerce to be offered or being offered through ODL mode is very much relevant to the HEI's mission and goals as it aims to provide quality education to those aspiring candidates who are deprived of higher education due to the limited number of intake in the traditional mode of higher education in the Universities. Moreover, to keep the quality intact the curriculum and syllabus has been designed at par with the conventional mode keeping in mind the specific needs and acceptability of the learners in the distance mode and in keeping with the aims and objectives of the University. The proposal of the present subject will fulfill the above objectives of the university as well as distance mode education.

Programme Project Report (PPR)

(c) Nature and target group of learners:

For the Programme M. Sc. in DCNM the following groups of learners have been targeted:

1. Those are distracted from the admission in the regular mode due to limited intake capacity of Vidyasagar University and other Higher Education Institutions (HEIs). In Vidyasagar university only 20% of the students graduated with B. Sc. with nutrition get chance in the PG course in Nutrition and dietetics under regular mode. Remaining 80% graduated will be targeted.
2. Those employed in various organizations who desire to track higher education as a passion or as a means for movement up the promotional ladder.
3. Drop outs primarily due to social, financial and economic compulsions as well as population related factors.
4. Rural population those living in remote areas where higher education institutes are not easily accessible.
5. Job seekers of particular field or subjects.
6. People of any age can participate in higher education programmes as there is no age bar in ODL mode education.
7. The persons related to the medical and health services who are interested in Dietetics and Nutrition will be another target group.

(d) Appropriateness of the programme to be conducted in the ODL mode for acquiring specific skills and competence

Vidyasagar University emphasized in innovative approach towards curriculum designing, while conforming to the basic or core requirements to create a common knowledge base for the state and the nation. Post graduate Programme in Arts, Commerce and Science to be offered through ODL mode will have certain learning outcomes. This programme will help the learners to spread higher education in all sectors of community.

- Capacity building among the students particularly from the rural population.
- To apply skills and knowledge in an internship experience.
- To develop skills on hand practical related to science subject and also hands on training in field exposure.

The distance learning under Vidyasagar University offer programme in an expanded mode both in volume and the type of programmes. As technology has been getting more affordable and widely available, the interest of both learners and institutions in this special kind of education may be increased enormously.

Nutrition and Dietetics is closely related to personal as well as community health. The learners can be trained in this field through this programme. The students passing graduation with this subject can serve in the medical field for improvement of public health and hygiene. There is professional demand in these subjects. They can be employed in Govt. and private health service sector. Further they may be self employed for assisting the patients for diet planning and therapy.

(e) Instructional Design:

The first step of instructional design in distance mode is curriculum design. A growing number of students globally are enrolling in distance education programs and it is becoming important now, more than ever before, to design curriculum that reflects educational principles, represents elements of engagement and pedagogy and meets institutional and industry requirements. In doing so, it is vital to design contemporary curriculum that ensures these outcomes are attained. Finally, a triad has been proposed comprising of pedagogy, technology and an engaged community of learners as a basis for ensuring curriculum meets contemporary practices. For All these subjects the objective of this Open and Distance Learning (ODL) system of education is to develop capacity within and across the region to organize distance learning effectively in order to address the educational challenges and opportunities, particularly in higher education.

Programme Project Report (PPR)

i) **Curriculum Design**: The curriculum is designed by a committee comprising experts from the parent department of the Vidyasagar University along with external expert keeping in view the needs of the diverse groups of learners. Efforts have been made to adopt the syllabus at par with the regular courses in the university as far as practicable. The syllabus is prepared by the Subject Committee is placed in the Advisory Committee of Directorate of Distance Education for approval. Then the syllabus is circulated among the students and teachers and it is also uploaded in the website of the university.

ii) Detailed Syllabus:

Subject: **DCNM**

Syllabus at a glance

Semester I:		**Semester II :**		**Semester III :**		**Semester IV:**		**Total**	
Theory	Practical	Theory	Practical	Theory	Practical	Theory	Practical	Theory	Practical
150	150	200	100	150	150	200	100	700	500

M. Sc. Semester I				
Type	**Paper**	**Topic**	**Full Marks**	**Credit**
Theory	ND 01	Advanced Human Physiology –I	25	2.5
		Advanced Human Physiology –II	25	2.5
	ND 02	Food science and Nutrition	25	2.5
		Vitamins and Minerals in Nutrition	25	2.5
	ND 03	Nutritional Biochemistry- I	25	2.5
		Nutritional Biochemistry- II	25	2.5
Practical	ND 04	Experiments on Physiology-I	25	2.5
		Experiments on Physiology-II	25	2.5
	ND 05	Biochemical analysis in Nutrition –I	25	2.5
		Biochemical analysis in Nutrition –II	25	2.5
	ND 06	Biochemical analysis in Nutrition –III	25	2.5
		Nutritional Anthropometrics	25	2.5
M. Sc. Semester II				
Theory	ND 07	Advanced Human Physiology –III	25	2.5
		Molecular Biology in Nutrition	25	2.5
	ND 08	Food Microbiology and Toxicology	25	2.5
		Food Biotechnology	25	2.5
	ND 09	Food Hygiene and Sanitation	25	2.5
		Assessment of Nutritional Status	25	2.5
	ND 10	Nutrition through Lifecycle- I	25	2.5
		Nutrition through Life cycle- II	25	2.5
Practical	ND 11	Experiments on Food Microbiology	25	2.5
		Growth Chart and Clinical Assessment of Malnutrition	25	2.5
	ND 12	Review work – report	25	2.5
		Review work – Viva-Voce	25	2.5

Programme Project Report (PPR)

M. Sc. SEMESTER-III

Theory / Practical	Paper	Unit	Topic	Full Marks	Credit
Theory	ND 13	25	Research Methodology and Statistics In Nutrition	25	2.5
		26	Bioinformatics and Computer application in nutrition	25	2.5
	ND 14	27	Food and Nutrition Services in Hospital and Other Organizations	25	2.5
		28	Drug nutrient interactions and nutrigenomics	25	2.5
	ND 15	29	Diet Therapy I	25	2.5
		30	Diet Therapy II	25	2.5
Practical	ND 16	31	Advanced Food Analysis-I	25	2.5
		32	Advanced Food Analysis-II	25	2.5
	ND 17	33	Preparation of Diet chart-I	25	2.5
		34	Preparation of Diet chart-II	25	2.5
	ND 18	35	Energy Requirement in Different Physical Activities Level	25	2.5
		36	Nutritional Survey	25	2.5

SEMESTER-IV

Theory / Practical	Paper	Unit	Topic	Full Marks	Credit
Theory	ND 19	37	Advanced Diet therapy	25	2.5
		38	Nutrition in Sports and Fitness	25	2.5
	ND 20	39	Community Nutrition	25	2.5
		40	Special Aspects of Community Nutrition	25	2.5
	ND 21	41	Nutrition in Emergencies	25	2.5
		42	Nutritional Counseling	25	2.5
	ND 22	43	Neutracuticals	25	2.5
		44	Food Additives	25	2.5
Practical	ND 23	45	Statistical Analysis in Nutrition	25	2.5
		46	Computer Analysis in Nutrition	25	2.5
	ND 24	47	Project Work – Report Submission	25	2.5
		48	Project Work – Viva-Voce	25	2.5

Note: The details of the text of syllabus is given in the hard copy of the application

iii) **Duration of the Program**: 4 (Four) Semesters i.e. 2 (Two) years

However, the learners are given time to complete the course within 5 (five) years from the date of admission.

iv) **Instructional Delivery Mechanism**: The programme shall be delivered in 4 semester system (two years). The learners shall be provided with the printed SLM which covers almost all the contents in the syllabus. Apart from this the students will be provided with the SLM in electronic media depending on the choice of the learner. The PCP programmes are announced well ahead from the date of commencement. The examination programmes are also announced well before its commencement. The announcement for PCP is published in university website and announcement of examination is published in university website and leading newspaper of the state. We have a well structured data base of the contacts of the learners and a system of delivering information to students using ICT. The students are also informed about those programmes by SMS. Counselling is also held in various affiliated study centers. The progress of the learners shall be evaluated by semester examination. Examination rules are adopted as per the rules and regulation regular system of the university.

v) **Faculty**: Faculties are engaged in this programme mainly the departmental teachers from both regular and distance mode of Vidyasagar University. In addition counsellors from experience teachers of colleges, other universities and research institutes are also employed.UGC norms are followed for selecting the counsellors.

vi) **Media**: SLM will be provided in both Print Media, and e-media. The learners will be given choice to avail print media or e-media or both.

vii) **Student Support Service**: Existing facilities of central library, photo copying facilities, free internet and WIFI facility will be available to the students. The students are provided with facilities for canteen, food corners of the university during holding PCP even in holidays. Further, in order to successfully execute the programme, a wide range of support services are provided to the ODL learners.

Network of Study Centers: To assist its learners of Directorate of Distance Education of Vidyasagar University has established 36 study centers so that learner can choose a study center nearest to the residence.

(f) Procedure for admissions, Curriculum Transaction and evaluation:

Vidyasagar University has taken a concrete admission policy for all courses offered in distance mode. This policy includes notification, minimum eligibility criteria and fee structure. In every academic session the notifications are published in news papers (National Level and local level) and also in the university website. For different subjects the minimum eligibility criteria for admission is different. There is a fixed fee structure for each subject. The learners are instructed to deposit the fee by cheque or draft. The system of on line admission is also in the pipe line.

Semester -wise Fees Structure

Subject	Semester - I	Semester - II	Semester - III	Semester - IV
M.Sc. in DCNM	Rs. 10,700.00/-	Rs. 10,650.00/-	Rs. 10,850.00/-	Rs. 10,800.00/-

Programme Project Report (PPR)

Curriculum Transaction incorporates effective planning for providing learning experiences for its learners, organization of planning, administration/implementation of the organized planning and evaluation of the implementations by the implementer and the experts in the relevant field. Curriculum Transaction or Curriculum management is the process of planning and organizing the curriculum in a particular subject area for different levels of education and continuously monitors it while being implemented. The main responsibility of the curriculum transaction lies on the teachers and trainers who may use different types of pedagogies to create a nice academic environment in the institution and students can be benefited in gaining knowledge and developing skills. Curriculum transaction is always done through Personal Contact Programmes (PCP). The PCP should aim to address not only the problems faced by the individual learners but also compensate the pedagogic limitations of the SLM. So it will not just bring together learners to solve their problems but will be an intervention for organizing activities to be carried out in teams, using multiple sources of information available in the university. The activities presently supposed to be carried out at the PCP such as clarification of doubts; laboratory work and so on will be a part of the curriculum transaction process planned for the PCP. Efforts are being done to provide e-learning facility.

Evaluation: The evaluation of learners will be made by two modes – internal assessment/assignments and end-semester examination. For the evaluation of scripts there is a system of spot evaluation for expediting the publication of result, i.e., the examiners will come to Directorate of Distance Education and will examine the answer scripts and submit the marks on the spot. In some cases answer scripts are sent to the examiners and evaluated scripts are collected by messengers within a stipulated time. There is a system of re-examination of scripts after publication of results. The use of ICT for the preparation of Mark sheet and certificate and its delivery to the learners will be employed.

(g) Requirement of Laboratory Support and Library resource:

Laboratory support is essential to the learner of distance education system in case of laboratory based subjects. Directorate of Distance Education, Vidyasagar University have established dedicated laboratory in the directorate of Distance Education for the laboratory based subjects like, physics, chemistry, mathematics, environmental science, geography, Zoology and Nutrition and Dietetics to give exposure of practical knowledge to the learners. Our laboratories are well equipped with sophisticated instruments:

- DCNM Laboratory: Anthropometric Set, callipers (spreading and sliding), Skinfold Calliper, spectrophotometer, water bath, incubator, hot air oven, hemoglobinometer etc.

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Practical classes of a particular subject are arranged group wise so that all the learners get sufficient attention and proper training from counsellors and laboratory instructors. Like theory classes, practical PCP schedule is announced by SMS, newspaper and university website at least before 15 days.

Apart from the dedicated laboratory of DDE, the students are also trained in regular departments of the university.

Library facility: The students are provided with library facility in the central library of the University. They are used to get reading room as well as lending facilities. There are large numbers of printed books and journals for Nutrition and Dietetics are available in the central library. Moreover it is equipped with a numbers of e-book and e-journals. The learners may also avail such facilities

(g) Cost Estimate of the Programme and the Provisions:

The followings are the cost estimate for the programme M. Sc in Dietetics and Community Nutrition Management:

Subject	Development	Delivery	Maintenance	Total amount

Dietetics and Community Nutrition Management (D.C.N.M)	11 Lakhs	9 Lakhs	15 Lakhs	35 Lakhs

Provisions: As the proposed programme was offered for more than 11 years in recent past the infrastructure is already in existence. The other expenses will be met from the fees collected from the students.

(i) Quality Assurance Mechanism and Expected Programme outcome:

Quality assurance (QA) for distance higher education is one of the main concerns among institutions and stakeholders today. Quality has always been an issue in distance education (DE) and distance learning (DL). Quality assurance in distance and higher education has gained serious attention by institutions, stakeholders, and scholars. In response to QA line of inquiry, institutions have begun to re-define and re-orient their institutional missions and strategic visions to incorporate and address quality issues. QA has now reached an important turning point and is influencing DE institution's management strategies and cultures. Learners are demanding better quality educational services and provisions. To fulfill these demands, our Directorate of Distance Education must pay close attention to quality in terms of study material, quality of PCP counsellor, delivery systems and administrative facility to the learner.

The following major steps would be taken for quality assurance:-

i) Establishment of Center for Internal Quality Assurance
ii) Revision of curriculum in 3 -5 years interval
iii) Quality improvement of SLM
iv) Emphasize for online learning system
v) More emphasis of practical training of the learners in science subjects by improving the quality of laboratories with sophisticated instruments.
vi) More use of ICT for the management of DL of the university

The expected outcome of the programme is to develop the knowledge and skill of learners of the specific field. The learner may go for further higher education programmes, e.g., M. Phil, Ph. D, M. Tech and other professional programmes. After completion of the programme by distance mode the learner may prepare themselves for different job oriented entrance examinations, e.g. NET, GATE, College service entrance (CSC), School Service Entrance (SSC) etc., Thus they may be employed in Govt. and non-govt. sectors. Apart from this, their training may enable them for self-employment.

The followings are specific scopes of the learners after getting M. Sc. in DCNM:

- Clinical Dietetics /Nutrition: Hospitals or Clinics (healthcare, clinical management, counseling, etc.)
- Community Nutrition / Public Health / Community outreach
- Nutrition & Diet Consultancy in Health Resorts, Fitness Centers (e.g. VLCC), Gymnasiums
- Industry (e.g. corporate health and wellness)
- Academia and research: Teaching Dietetics / Nutrition or Nutrition Research
- Private Practice / Self Employed/Freelance Consultancy Services
- Medical Nutritional Companies (e.g. nutrition and dietetics advisor, nutritional representative)
- Sports and Exercise Nutrition (e.g. elite and recreational sports teams, fitness industry).

Programme Project Report (PPR)

Programme:M. Sc. in Environmental Science

(a) Programme Mission and objective:

Environmental Science is just not a subject it provides a connection between human and environment, it connects us with our nature and at the same time tells us how human activities are damaging the nature. For the last few decades, several environmental problems-pollution, global warming, ozone layer depletion, acid rain, deforestation, and desertification have emerged as severe crisis for the survival of mankind. These problems are perceived as the major threats to the life-supporting environment of the earth, thus making our survival on the planet increasingly unsafe. In order to tackle these challenges, holistic knowledge about working of environment and thorough understanding of the dynamics of these problems becomes imperative. Since no other academic discipline covers the above knowledge requirements completely, environmental science evolved as an academic discipline to fill in this gap. Our life-supporting environment and its associated problems are highly complex and require interdisciplinary efforts to understand them. Environmental Science, therefore, integrates various academic disciplines to fulfil these objectives. Environmental Science is amultidisciplinary subject that integrates various academic disciplines (Zoology, Botany, Physiology, Microbiology, Chemistry, Geography, Physics, Economics, *etc*) to study the structure and function of our life-supporting environment and to understand causes, effects, and solutions of different environmental problems.

M. Sc in Environmental Sciences is an advanced course of study that can lead to employment in the public or private sectors. Students in this program can specialize in many different areas such as Environmental biology, Atmospheric science, Oceanography, Environmental engineering, Conservation ecology, Environmental chemistry, Geology and Geography. Generally speaking, the graduate will work in areas related to locating and protecting the earth's resources and environment. This can include predicting hazards and advising on issues related to regulatory compliance *etc*. Students can narrow their focus to areas of particular interest during the course of study.
The proposed programme, M. Sc in Environmental Sciences,has the mission and objectives in relation to the teaching and learning in open and distance mode.In order to afford Quality Education for every one through distance learning mode need based academic programmes for livelihood and lifelong learning at post graduate level has been adopted.In order to set highest benchmark for quality and standards of Indian open distance learning strategy introduction of this programme has enormously been spread.

The post graduate Programme in Environmental Science offered through ODL mode will have certain learning outcomes. This programme will help the learners-

- To spread higher education in Environment especially among the rural people who are socio economically backward.
- To rid underprivileged society of social evils through proper education
- Capacity building among the students especially in rural population.
- To reach the unreached and provide education at the doorstep of the learners and according to their convenience.

Concept of open learning and distance education system focuses on open access education and training to make the learners free from the constraints of time and place, and offering flexible learning opportunities to individuals and groups of learners. Open and distance learning (ODL)is one of the most rapidly growing fields of education now a days and it has substantial impact on all education delivery systems.The new ODL system growing fast because of the development of internet-based information technologies. The concept of ODL education came from idea where the learners and the teachers cannot be in a class room and they should be separated by some geographical distance or maybe they cannot come close to each other to make the entire education system flexible.
Open and Distance Learning system has tremendous potential of inclusive growth of education because of its distinctive nature of being a user friendly system. ODL system is not only cost effective but it can also

contribute in the sustainable development through learning processes that transcend distance, gender, regional, cultural and socio-economic barriers.

Higher education playing the role of leadership in the society education act as catalyst of social change and spread of education in a society is the foundation of success in countries that are latecomers for development. Distance education is playing an important role in providing higher education to those who are unable to be the part of conventional system. The main objective of ODL is to reach the unreached and provide education at the doorstep of the learners and according to their convenience.Formal system was unable to meet the demand of higher education and alternatively distance education was adopted as an alternative mode at the University stage. Most ODL learners have professional responsibilities (jobs), social responsibilities (families), are interested in part time studies, lack of access to on-campus based studies or are away from formal education and ODL becomes the readily available option for them to upgrade their qualifications.
Typical distance learners are regular students as we all know them, but also parents, physically challenged people, and working/business people who are looking for ways to enhance their skills next to their busy schedule.
MSc in Environmental Sciences can lead an understanding of our environment, which creates awareness in the society regarding the degradation of our environment which is very essential in the present day scenario.Graduating with an MSc in Environmental Sciences also creates many career opportunities in this fast-growing field. Based on the student's interests, specializations and undergraduate work, he or she might choose to work as an environmental engineer, as a conservationist or perhaps in waste management. Besides working for private industry, the graduate will have the requisite skills to work in government or in education.

(b) Relevance of the programme with HEI Mission

Mission of the Vidyasagar University is defined in its logo "Education, Knowledge and Progress" with special emphasis on a curriculum relevant to the ethnic, sociological and geographical needs on the catchment region, yet not ignoring the demands of mainstream education.
The main missions of the university are-

i. To improve the economic condition of the region and offer courses which should have the potential to garner employment.

ii. To build human resource with strong character and competence, having the strength to face the challenges of the changing realities both in global and local levels and to adapt to the fast evolving technologies.

iii. To promote an all-round development of its students with a proper blending of knowledge and wisdom acquiring adequate skill in his own subject or trade or vocation through teaching learning process and human qualities like compassion, a sense of social responsibility and commitment and ethical sense (honesty), tolerance and empathy through various social, cultural, sports and ethical value addition programs.

iv. To strive for the creation and dissemination of knowledge through continuous research and learning process.

v. To strive for academic excellence

vii. To strengthen student support system

The missions of the proposed programme are in conformity with the missions of the institute. It aims to enable learners to learn and retain a broad base of knowledge in the various domains of the subject. The distance mode education has been started in the university with a mission to revitalize educational leadership, to set the standard for the production and dissemination of knowledge as well as to become an effective instrument of change in the society. Keeping priority with the view of "Education For All", PG courses in Arts, Science and Commerce to be offered or being offered through ODL mode is very much relevant to the

HEI's mission and goals as it aims to provide quality education to those aspiring candidates who are deprived of higher education due to the limited number of intake in the traditional mode of higher education in the Universities. Moreover, to keep the quality intact the curriculum and syllabus has been designed at par with the conventional mode keeping in mind the specific needs and acceptability of the learners in the distance mode and in keeping with the aims and objectives of the University. The proposal of the M.Sc. in Environmental Science will fulfil the above objectives of the university as well as distance mode education.

(c) Nature and target group of learners:

For the present subject the following groups of learners have been targeted:

(1) Those are distracted from the admission in the regular mode due to limited intake capacity of HEIs

(2) Those employed in various organizations who desire to track higher education as a passion or as a means for movement up the promotional ladder.

(3) Drop outs primarily due to social, financial and economic compulsions as well as population related factors.

(4) Rural population those living in remote areas where higher education institutes are not easily accessible.

(5) Job seekers of particular field of Environmental Science.

(6) People of any age can participate in higher education programmes as there is no age bar in ODL mode education.

(7) As Environmental Science is a multidisciplinary subject, graduates of different science subjects will be targeted.

(d) Appropriateness of the programme to be conducted in the ODL mode for acquiring specific skill and competence

Vidyasagar University emphasized in innovative approach towards curriculum designing, while conforming to the basic or core requirements to create a common knowledge base for the state and the nation. Post graduate Programme in Arts, Commerce and Science to be offered through ODL mode will have certain learning outcomes. This programme will help the learners to spread higher education in all sectors of community.

- Capacity building among the students particularly from the rural population.
- To apply skills and knowledge in an internship experience.
- To develop skills on hand practical related to science subject and also hands on training in field exposure

The distance learning under Vidyasagar University offer programme in an expanded mode both in volume and the type of programmes. As technology has been getting more affordable and widely available, the interest of both learners and institutions in this special kind of education may be increased enormously.

Environmental science is an interdisciplinary field that integrates physical, biological and information sciences including ecology, biology, physics, chemistry, zoology, mineralogy,oceanology, limnology, soil science, geology, atmospheric science, and geographyto the study of the environment and for the solution of environmental problems. It provides integrated and interdisciplinary approach to the study of environmental problems. Environmental Science is basically the study of conservation of energy, biodiversity, climate change, ground water and soil contamination and also the many technologies developed for treating air pollution, water pollution, sound pollution, industrial pollution, vehicular pollution and plastic menace. Environmental Science has emerged as a prospective career since people all over the globe have become more aware about keeping the environment clean and protected. The issue involving the protection and conservation of our environment spans to a great extent. A Master in Environmental Sciences through distance mode helps to quantify the impact and understanding the environment. There is the need for a specialized discipline like the environmental science in distance education to understand impacts of development on environment; to discover sustainable ways of living

and to utilize natural resources efficiently and to learn and create awareness about environmental problems at local, national and international levels.

(e) Instructional Design:

The first step of instructional design in distance mode is curriculum design. A growing number of students globally are enrolling in distance education programs and it is becoming important now, more than ever before, to design curriculum that reflects educational principles, represents elements of engagement and pedagogy and meets institutional and industry requirements. In doing so, it is vital to design contemporary curriculum that ensures these outcomes are attained. In order to effectively design curriculum, the role of the educator as a conductor, technician and choreographer. Finally, a triad has been proposed comprising of pedagogy, technology and an engaged community of learners as a basis for ensuring curriculum meets contemporary practices. For all these subjects the objective of this Open & Distance Learning (ODL) system of education is to develop capacity within and across the region to organize distance learning effectively in order to address the educational challenges and opportunities, particularly in higher education.

i) **Curriculum Design**: The curriculum is designed by a committee comprising experts from the parent department of the Vidyasagar University along with external expertkeeping in view the needs of the diverse groups of learners. Efforts have been made to adopt the syllabus at par with the regular courses in the university as far as practicable. The syllabus is prepared by the Subject Committee is placed in the Advisory Committee of Directorate of Distance Education for approval. Then the syllabus is uploaded in the website of the university.

ii) **Detailed Syllabus:**
Programme: M. Sc. in Environmental Science

Syllabus at a glance

<table>
<tr><td colspan="2">Semester – I (300 M)
24 Credits</td><td colspan="2">Semester-II (300 M)
24 Credits</td><td colspan="2">Total : 1200 marks
96 credits</td></tr>
<tr><td>Theory</td><td>Practical</td><td>Theory</td><td>Practical</td><td>Theory</td><td>Practical</td></tr>
<tr><td>200</td><td>100</td><td>200</td><td>100</td><td rowspan="3">800</td><td rowspan="3">400</td></tr>
<tr><td colspan="2">Semester –III(300 M)
24 Credits</td><td colspan="2">Semester –IV (300 M)
24 Credits</td></tr>
<tr><td>Theory</td><td>Practical</td><td>Theory</td><td>Dissertation</td></tr>
<tr><td>200</td><td>100</td><td>200</td><td>100</td><td></td><td></td></tr>
</table>

M.Sc. Semester-I

TYPE	PAPER	TOPIC	FULL MARKS	Credit
Theory	I	Fundamentals of Environmental Science	50	4
Theory	II	Human Ecology	50	4
Theory	III	Environmental Biology	50	4
Theory	IV	Biodiversity; Conservation Biology, Environmental Biotechnology	50	4
Practical	V	Methods and Techniques For Water Quality Analysis	50	4
Practical	VI	Methods and Techniques for Soil, Air & Noise Quality Analysis	50	4
Total			**300**	**24**

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M.Sc. Semester-II

TYPE	PAPER	TOPIC	FULL MARKS	Credit
Theory	VII	Environmental Issues & Problems	50	4
Theory	VIII	Environmental Management	50	4
Theory	IX	Environmental Chemistry	50	4
Theory	X	Environmental Geosciences	50	4
Practical	XI	Methods & Techniques of Environmental Geoscience	50	4
Practical	XII	Field Work	50	4
Total			**300**	**24**

M.Sc. Semester-III

TYPE	PAPER	TOPIC	FULL MARKS	Credit
Theory	XIII	Energy Resource Management-Conventional Energy	50	4
Theory	XIV	Energy Resource Management-Non Conventional energy	50	4
Theory	XV	Environmental Pollution	50	4
Theory	XVI	Environmental Toxicology and Statistical Applications in Environmental Science	50	4
Practical	XVII	Environmental Biology	50	4
Practical	XVIII	Field work	50	4
Total			**300**	**24**

M.Sc. Semester-IV

TYPE	PAPER	TOPIC	FULL MARKS	Credit
Theory	XIX	Environmental Laws and Policies	50	4
Theory	XX	Environmental Impact Assessment (EIA)	50	4
Theory	XXI	Environmental Planning, Environmental Audit and Environmental Management system	50	4
Theory	XXII	Biomonitoring, Industrial Ecology and Disaster Management	50	4
Practical	XXIII	Dissertation of project-Report preparation	50	4
Practical	XIV	Dissertation of project-Presentation and Viva	50	4
Total			**300**	**24**

iii) **Duration of the Program**: 4 (Four) Semesters, 2 (two) years.
However, the learners are given time to complete the course within 5 (five) years from the date of admission.

iv) **Instructional Delivery Mechanism**: The programme shall be delivered in two years. The learners shall be provided with the printed SLM which covers almost all the contents in the syllabus. Apart

from this the students will be provided with the SLM in electronic media depending on the choice of the learner. The PCP programmes are announced well ahead from the date of commencement. The examination programmes are also announced well before its commencement. The announcement for PCP or Examination is published in university website and leading newspaper of the state. We have a well-structured data base of the contacts of the learners and a system of delivering information to students using ICT. The students are also informed about those programmes by SMS. Counselling is also held in various affiliated study centres. The progress of the learners shall be evaluated by semester based examination. Examination rules are adopted as per the rules and regulation regular system of the university.

v) **Faculty**: Faculties of Vidyasagar University engaged in regular mode teaching, in addition counsellors from experienced Professors and Scientist of other universities and research institutes.UGC norms are followed for selecting the counsellors.

vi) **Media**: SLM will be provided in both Print Media, and e-media. The learners will be given choice to avail print media or e-media or both.

vii) **Student Support Service**: Existing facilities of central library, photo copying facilities, free internet and WIFI facility will be available to the students.The students are provided with facilities for canteen, food corners of the university during holding PCP even in holidays. Further, in order to successfully execute the programme, a wide range of support services are provided to the ODL learners.

Network of Study Centres: To assist its learners of Directorate of Distance Education of Vidyasagar University has established 36 study centres so that learner can choose a study center nearest to the residence.

(f) Procedure for admissions, Curriculum Transaction and evaluation:

Vidyasagar University has taken a concrete admission policy for all courses offered in distance mode. This policy includes notification, minimum eligibility criteria and fee structure. In every academic session the notifications are published in newspapers (National Level and local level) and also in the university website. For different subjects the minimum eligibility criteria for admission is different. There is a fixed fee structure for each subject.The learners are instructed to deposit the fee by cheque or draft. The learners are instructed to deposit the fee by cheque or draft.The system of on line admission is also in the pipe line.

Fee Structure:

Programme	Semester- I	Semester- II	Semester- III	Semester- IV
M.Sc. in Environmental Science	10,700.00	10,650.00	10,850.00	10,800.00

Curriculum Transaction incorporates effective planning for providing learning experiences for its learners, organization of planning, administration/implementation of the organized planning and evaluation of the implementations by the implementer and the experts in the relevant field. Curriculum Transaction or Curriculum management is the process of planning and organizing the curriculum in a particular subject area for different levels of education and continuously monitor it while being implemented. The main responsibility of the curriculum transaction lies on the teachers and trainers who may use different types of pedagogies to create a nice academic environment in the institution and students can be benefited in gaining knowledge and developing skills. Curriculum transaction is always done through Personal Contact Programmes (PCP). The PCP should aim to address not only the problems faced by the individual learners but also compensate the pedagogic limitations of the SLM. So it will not just bring together learners to solve their problems but will be an intervention for organizing activities to be carried out in teams, using multiple sources of information available in the university. The activities presently supposed to be carried out at the PCP such as clarification of doubts; laboratory

work and so on will be a part of the curriculum transaction process planned for the PCP. Efforts are being done to provide e-learning facility.

Evaluation: The evaluation of learners will be made by two modes – internal assessment/assignments and Semester based examination. For the evaluation of scripts there is a system of spot evaluation for expediting the publication of result, i.e., the examiners will come to Directorate of Distance Education and will examine the answer scripts and submit the marks on the spot. In some cases answer scripts are sent to the examiners and evaluated scripts are collected by messengers within a stipulated time. There is a system of re-examination of scripts after publication of results. The computerized system of database formation and preparation mark sheet and certificate will be employed for correct and speedy delivery of results to the learners.

(g) Requirement of Laboratory Support and Library resource:

Laboratory support is essential to the learner of distance education system in case of laboratory based subjects. Directorate of Distance Education, Vidyasagar University have established dedicated laboratory in the directorate of Distance Education for the laboratory based subjectsincluding Environmental Science, to give exposure of practical knowledge to the learners. Our laboratories are well equipped with sophisticated instruments:
Environmental Science Laboratory has all essential analytical instruments like Spectrophtometer, pH meter, Conductivity meter, Soil moisture meter, High volume air sampler, Hot air oven, Incubator, Cold Centrifuge, Light microscope, Lux meter, Sound meter, Soil thermometer, Digital balance, etc. along with plenty of chemicals and glass wares.
Practical classes of a particular subject are arranged group wise so that all the learners get sufficient attention and proper training from counsellors and laboratory instructors. Like theory classes, practical PCP schedule is announced by SMS and university website at least before 15 days. Apart from the dedicated laboratory of DDE, the students are also trained in regular departments of the university.

The students are provided with library facility in the central library of the University. They are used to get reading room as well as lending facilities. In addition to the adequate amount of printed books and journals the central library isalso equipped with a numbers of e-book and e-journals. The learners may also avail such facilities.

(h) Cost Estimate of the Programme and the Provisions:

The estimated cost of M. Sc in Environmental Science is given in the following table:

Programme	Development	Delivery	Maintenance	Total Amount
M. Sc. in Environmental Science	11 Lakhs	9 Lakhs	15 Lakhs	35 Lakhs

Provisions: As it is a continued programme the infrastructure is already in existence. The other expenses will be fulfilled from the fees collected from the students.

(i) Quality Assurance Mechanism and Expected Programme outcome:

Quality assurance (QA) for distance higher education is one of the main concerns among institutions and stakeholders today. Quality has always been an issue in distance education (DE) and distance learning (DL). Quality assurancein distance and higher education has gained serious attention by institutions, stakeholders, and scholars. In response to QA line of inquiry, institutions have begun to re-define and re-orient their institutional missions and strategic visions to incorporate and address quality issues. QA has now reached an important turning point and is influencing DE institution's management strategies and cultures. Learners are demanding better quality educational services and provisions. To fulfil these

demands, our Directorate of Distance Education must pay close attention to quality in terms of study material, quality of PCP counsellor, delivery systems and administrative facility to the learner.
The following major steps are taken for quality assurance:-

i) Establishment of Center for Internal Quality Assurance (CIQA)
ii) Revision of curriculum in 3 to 5 years interval
iii) Quality improvement of SLM
iv) Emphasize for online learning system
v) More emphasis of practical training of the learners in science subjects by improving the quality of laboratories with sophisticated instruments.
vi) More use of ICT for the management of DL of the university

The expected outcome of the programme is to develop the knowledge and skill of learners of the specific field. The learner may go for further higher education programmes, e.g., M. Phil, Ph. D,M. Tech and other professional programmes. After completion of the programme by distance mode the learner may prepare themselves for different job oriented entrance examinations, e.g. NET, GATE, College Service Entrance (CSC), School Service Entrance (SSC) etc., Thus they may be employed in Govt. and non-govt. sectors. Apart from this, their training may enable them for self employment. Environmental Science as a career offers immense job opportunities. The word 'Environmental Science' incorporates within it several activities for the protection of the environment. This in turn creates immense job opportunities for the Environmental scientists, Professors, environmental biologists, environmental modellers, environmental engineers and environmental journalists. A Master or Doctor degree holder in Environmental Science can get a good position/ job according to their knowledge and experience in various National and International organizations like Pollution Control Boards; Urban Planning; Water Resources and Agriculture; Public Institutions and Private Industries and Firms; Colleges and Universities; Ministry of Environment and Forests; Forest and Wildlife Management; Embassies and other Inter-national organization related to environment; Industries like distilleries, fertilizer plants, mines, refineries, textile mills etc.

Programme Project Report (PPR)

Programme: M.A. / M. Sc. in Geography

(ODL Monde with Semester system)

(a) Programme Mission and objective:

Geography by its nature is an integrative and synthesizing science. It is a spatial science that deals with both the physical and human environment. Geography provides rational and description and interpretation of different characteristics of the earth surface in relation to society-its need , desire ,location and sustainability. Now Geography is much concerned with quantitative techniques and mapping with the use remote sensing and GIS in applied field.

More over, teaching and learning of Geography through non conventional and non traditional modes have witnessed also impressive changes for better quality and sustainability of education in India.

In this context , **our proposed PG programme in Geography in ODL mode (with Semester system) focuses on** •Environmental Hazards & Disaster , •Planning for the backward areas ,• Land use/Cover Change and their environmental consequence,• Population Environment Development Debates ; •Globalization, Privatization, Liberization & the politics ;•Coastal Environmental concerns at the face of Global Climate Change, •Water, land & Energy Crisis Analysis • Synthesis of spatial Information with RS &GIS Advance quantitative techniques in exploring geo spatial Data and and• Modern survey techniques in mapping.

The proposed programme in Geography in open and distance mode for teaching and learning focuses on the following mission and objectives :

- to provide Quality Education for every one **through distance learning mode** ,need based academic programmes for livelihood and life long learning at post graduate level
- to set highest benchmark for quality and standards of Indian open distance learning strategy of this programme.

This PG programme may be helpful in terms of the following social aspects:

- To spread higher education especially in rural and socio economically backward community.
- To rid underprivileged society of social evils through proper education.
- Capacity building among the learners especially specially in **rural & tribal community** in the catchment of **Vidyasagar University.**
- To reach the unreached and provide education at the doorstep of the learners and according to their convenience.

Concept of open learning and distance education system focuses on open access education and training to make the learners free from the constraints of time and place, and offering flexible learning opportunities to individuals and groups of learners. Open and distance learning (ODL)is one of the most rapidly growing fields of education now a days and it has substantial impact on all education delivery systems. The new ODL system growing fast because of the development of Internet-based information technologies.. The concept of ODL education came from idea where the learners and the teachers can not be in a class room and they should be separated by some geographical distance or may be they cannot come close to each other to make the entire education system flexible.

Open and Distance Learning system has tremendous potential of inclusive growth of education because of its distinctive nature of being a user friendly system. ODL system is not only cost effective but it can also contribute in the sustainable development through learning processes that transcend distance, gender, regional, cultural and socio-economic barriers.

Higher education playing the role of leadership in the society education act as catalyst of social change and spread of education in a society is the foundation of success in countries that are latecomers for development. Distance education is playing an important role in providing higher education to those who are

unable to be the part of conventional system. The main objective of ODL is to reach the unreached and provide education at the doorstep of the learners and according to their convenience.
Formal system was unable to meet the demand of higher education and alternatively distance education was adopted as an alternative mode at the University stage

Most ODL learners have professional responsibilities (jobs), social responsibilities (families), are interested in part time studies, lack of access to on-campus based studies or are away from formal education and ODL becomes the readily available option for them to upgrade their qualifications.

Typical distance learners are regular students as we all know them, but also parents, physically challenged people, and working/business people who are looking for ways to enhance their skills next to their busy schedule.

The missions of the proposed Programme are in conformity with the missions of the institute. It aims to enable learners to learn and retain a broad base of knowledge in the various domains of the subject. The distance mode education has been started in the university with a mission to revitalize educational leadership, to set the standard for the production and dissemination of knowledge as well as to become an effective instrument of change in the society. Keeping priority with the view of "Education For All", PG ourses in Arts, Science and Commerce to be offered or being offered through ODL mode is very much relevant to the HEI's mission and goals as it aims to provide quality education to those aspiring candidates who are deprived of higher education due to the limited number of intake in the traditional mode of higher education in the Universities. Moreover, to keep the quality intact the curriculum and syllabus has been designed at par with the conventional mode keeping in mind the specific needs and acceptability of the learners in the distance mode and in keeping with the aims and objectives of the University. The proposal of the M.A. / M. Sc in Geography will fulfill **the above objectives** of the university as well as distance mode education.

A degree in geography from the University opens many new doors in terms of your career choices. The learner of geography, after getting the degree, may find avenues for getting jobs and further higher studies.

(b) Relevance of the programme with HEI Mission

Logo of Vidyasagar University reflects its the mission **"Education, Knowledge and Progress**" with special emphasis on a curriculum **relevant** to the ethnic, sociological and geographical needs in its catchment ,yet not ignoring the demands of mainstream education.
Its Relevance lies in -

i. improving the economic condition of the region and offer courses which should have the potential to garner employment.

ii. development of human resource with strong character and competence, having the strength to face the challenges of the changing realities both in global and local levels and to adapt to the fast evolving technologies.

iii. promoting an all round development of its students with a proper blending of knowledge and wisdom acquiring adequate skill in his own subject or trade or vocation through teaching learning process and human qualities like compassion, a sense of social responsibility and commitment and ethical sense (honesty), tolerance and empathy through various social, cultural, sports and ethical value addition programs.

iv.striving for the creation and dissemination of knowledge through continuous research and learning process as well as academic excellence

vii. stengthening learner support system to make it more cost effective and accessible so as to bring in equity in access to quality of education.

(C) Nature and target group of learners:

For the Proposed programme (M.A. / M. Sc in Geography) the following groups of learners have been targeted:

(1) Those are not selected for the admission in the regular mode due to limited intake capacity of HEIs

(2) Those employed in various organizations who desire to track higher education as a passion or as a means for movement up the promotional ladder.
(3) Drop outs primarily due to social, financial and economic compulsions as well as population related factors.
(5) Rural population those living in remote areas where higher education institutes are not easily accessible.
(4) Job seekers of particular field of geography and earth sciences
(5) People of any age can participate in higher education programmes as there is no age bar in ODL mode education.

(c) Appropriateness of the programme to be conducted in the ODL mode for acquiring specific skills and competence-

Vidyasagar University emphasized in innovative approach towards curriculum designing, while conforming to the basic or core requirements to create a common knowledge base for the state and the nation. Post graduate Programme in Arts, Commerce and Science to be offered through ODL mode will have certain learning outcomes. This programme will help the learners to spread higher education in all sectors of community.

- Capacity building among the s particularly from the rural population.
- To apply skills and knowledge in an internship experience.
- To develop skills on hand practical related to science subject and also hands on training in field exposure

The distance learning under Vidyasagar University offer programme in a expanded mode both in volume and the type of programmes: online, open and blended learning: PG degree endowed with credit system. As technology has been getting more affordable and widely available, the interest of both learners and institutions in this special kind of education is increased enormously.
Geography is a discipline which deals with the systematic study of landscape (Physical and cultural). This subject deals with determination of location and space, regionalization and explanation of man nature relationship. Recently Geography gives more attention to spatio temporal analysis of landforms , processes , land uses/land cover and different resources for the sustainable development. It explores interrelationship between changing phenomena in human society and environment. Today, Geography highlights environmental awareness and disaster management (flood, drought tectonic etc.) and changing /Cover. Moreover now extensive use of Remote sensing, GIS and GPS have made data collection and their integration more easier and lead to quick mapping, monitoring and inventorying of resources . Hence now geographical study provide multidisciplinary basic digital data base for planning in terms of economic, social, political and ecological development .In this context geography syllabus with relevant special paper has prepared for 2 years master degree course at DDE, Vidyasagar university.

(e) Instructional Design:

The first step of instructional design in distance mode is curriculum design. A growing number of students globally are enrolling in distance education programs and it is becoming important now, more than ever before, to design curriculum that reflects educational principles, represents elements of engagement and pedagogy and meets institutional and industry requirements. In doing so, it is vital to design contemporary curriculum that ensures these outcomes are attained. In order to effectively design curriculum, the role of the educator as a conductor, technician and choreographer. Finally, a triad has been proposed comprising of pedagogy, technology and an engaged community of learners as a basis for ensuring curriculum meets contemporary practices. For All these subjects the objective of this Distance Learning (DL) system of education is to develop capacity within and across the region to organize distance learning effectively in order to address the educational challenges and opportunities, particularly in higher education.

i) **Curriculum Design:** The curriculum is designed by a committee comprising experts from the parent department of the Vidyasagar University along with external expert keeping in view the needs of the diverse groups of learners. Efforts has been made to adopt the syllabus at par with the regular courses in the university as far as practicable. The syllabus is prepared by the Subject Committee is placed in the Advisory Committee of Directorate of Distance Education for approval. Then the syllabus is uploaded in the website of the university.

ii**) Detailed Syllabus**:

Syllabus of proposed PG programme in Geography at a glance

Division Of Marks

Semester	Theoretical	Practical	Total	Elective	Credit
I	200	100	300	-	24
II	150	100	250	50	24
III	150	100	250	50	24
IV	200	100	300	-	24
	700	**400**	**1100**	**100**	**96**

Structure of Syllabus

SEMESTER I (Duration July –December)

Type	Course/ Paper	Unit	Marks				Credit
			End-term Exam.	Internal Exam.	Unit Total	Paper Total	
THEORETICAL	GEO- 101: Earth's Surface Process	GEO 101.1: Geotectonics	20	5	25	50	4
		GEO 101.2: Geomorphology	20	5	25		
	GEO-102:Hydrospheric Science	GEO 102.1: Oceanography	20	5	25	50	4
		GEO 102.2: Hydrology	20	5	25		
	GEO-103: Climate, Soil and Agriculture	GEO103.1: Climatology	20	5	25	50	4
		GEO103.2: Soil and Agriculture	20	5	25		
	GEO-104: Environmental Geography	GEO104.1: Basics of Environment and Ecology	20	5	25	50	4
		GEO104.2: Landscape ecology and planning	20	5	25		
PRACTICAL	GEO-195: Hydrological Techniques and Sedimentological Analysis	GEO195.1: Hydrological Techniques	25	-	25	50	4
		GEO195.2: Sedimentological Analysis	25	-	25		
	GEO-196: Thematic Mapping	GEO196.1: Physical and Social Thematic Mapping	25	-	25	50	4
		GEO196.2: Environmental Mapping	25	-	25		

SEMESTER II(Duration January – June)

Type	Course/ Paper	Unit	Marks				Credit
			End-term Exam.	Internal Exam.	Unit Total	Paper Total	
THEORETICAL	GEO 201: Environmental Approaches & Application	GEO 201.1: Environmental Ethics and Regulation	20	5	25	50	4
		GEO 201.2: Environmental Engineering	20	5	25		
	GEO 202: Population and Development	GEO 202.1: Population Geography	20	5	25	50	4
		GEO 202.2: Population and Development	20	5	25		
	GEO 203: Regional Geomorphology and Resource Management	GEO 203.1: Regional Geomorphology of India and WB	20	5	25	50	4
		GEO203.2: Land water forest conflict and conservation	20	5	25		
	Elective Paper Theory C-GEO 204 : Resource Management and Earth System science	C-GEO 204.1: Resource and its Management	20	5	25	50	4
		C-GEO 204.2: Earth system science	20	5	25		
PRACTICAL	GEO-295: Statistical Techniques	GEO 295.1: Basic Statistics in Geography	25	-	25	50	4
		GEO 295.2: Advance Quantitative Method	25	-	25		
	GEO -296: Remote Sensing and Computer Application	GEO296.23: Principles of Remote Sensing and Aerial Photograph	25	-	25	50	4
		GEO296.24: Computer Basics and Application	25	-	25		

SEMESTER III(Duration July – December)

Type	Course /Paper	Unit	Marks				Credit
			End-term Exam.	Internal Exam.	Unit Total	Paper Total	
THEORETICAL	GEO 301: Approaches to Regional Development	GEO 301.1: Regional Approach in Geography	20	5	25	50	4
		GEO 301.2: Rural Development	20	5	25		
	GEO 302: Settlement and Transport Geography	GEO 302.1: Settlement Geography	20	5	25	50	4
		GEO 302.2: Transport Geography	20	5	25		
	Special Paper (Optional) GEO303	**303 Coastal Management**					
		GEO 303.1: Coastal Processes	20	5	25		
		GEO303.2: Coastal Environments: Focus on Indian Regions	20	5	25		
		303: Urban Geography & Regional Planning				50	4
		GEO 303.1: Foundation of Urban Geography	20	5	25		
		GEO 303.2: Contemporary Urban Issues	20	5	25		
	C-GEO 304 : Environmental Issues and Management (CBCS)	C-GEO 304.1: Emerging Issues and policies on Environment	20	5	25	50	4
		C-GEO304.2: Environmental Hazards and Disaster Management	20	5	25		
	GEO 395: GIS Application in Research GEO -396 special Paper based field work (Practicals)	GEO 395.1: Application of Remote Sensing and GIS	25	-	25	50	4
		GEO 395.2: Research Methodology	25	-	25		
		GEO 396B.1: Field work (Coastal Management)	25	-	25		
		GEO 396B.2: Field Report (Coastal Management)	25	-	25		
		GEO 396C.1: Field work (Urban)	25	-	25		
		GEO 396C.2: Field Report (Urban)	25	-	25		

SEMESTER IV(Duration January– June)

Type	Course	Unit	Marks				Credit
			End-term Exam.	Internal Exam.	Unit Total	Paper Total	
Theory	GEO 401: Geographical Philosophy	GEO 401.1: Schools in Geographical Thought	20	5	25	50	4
		GEO 401.2: Contemporary Discourses in Geography	20	5	25		
	GEO 402: Political Geography and Globalization	GEO 402.1: Political Geography	20	5	25	50	4
		GEO 402.2: Geography of Globalization	20	5	25		
	GEO 403: Society and Regional Planning	GEO 403.1: Social and Cultural Geography	20	5	25	50	4
		GEO 403.2: Regional Planning	20	5	25		
	Special Paper (Optional) GEO 404						
		404: Coastal Management				50	4
		GEO 404.1: Coastal Ecology and Hazards	20	5	25		
		GEO 404.2: Coastal Issues and Management	20	5	25		
		404: Urban Geography & Regional Planning				50	4
		GEO 404.1: Theoretical Bases of Regional Planning	20	5	25		
		GEO 404.2: Planning for Regional Development	20	5	25		
PRACTICAL	GEO 495: Spatial Analysis and Prototype Research	GEO 495.1: Spatial Analysis in Geography	25	-	25	50	4
		GEO 495.2: Research Exercise in Geography	25	-	25		
	GEO 496: Geodesy and GIS	GEO 496.1: Map Transformation and Geodesy	25	-	25	50	4
		GEO 496.2: Geographical Information System (GIS)	25	-	25		

Note : The details of the text of syllabus is given in the hard copy of the application

iii) Duration of the Program: 4 semesters i.e. Two years. However, the learners are given time to complete the course within 5 (five) years from the date of admission.

iv) **Instructional Delivery Mechanism**: The programme shall be delivered in two years. The learners shall be provided with the printed SLM which covers almost all the contents in the syllabus. Apart from this the students will be provided with the SLM in electronic media depending on the choice of the learner. The PCP programmes are announced well ahead from the date of commencement. The examination programmes are also announced well before its commencement. The announcement for PCP or Examination is published in university website. We have a well structured data base of the contacts of the learners and a system of delivering information to students using ICT. The students are also informed about those programmes by SMS. Counselling is also held in various affiliated study centres. The progress of the learners shall be evaluated by mid-term and end year examination. Examination rules are adopted as per the rules and regulation regular system of the university.

v) **Faculty**: Faculties are engaged from both regular and distance modes of Vidyasagar University teaching, in addition counsellors from experience teachers of colleges, other universities and research institutes. UGC norms are followed for selecting the counsellors.

vi) **Media**: SLM will be provided in both Print Media, and e-media. The learners will be given choice to avail print media or e-media or both.

vii) **Learner Support Service**: Existing facilities of central library, photo copying facilities , free internet and WIFI facility will be available to the students. The students are provided with facilities for canteen, food corners of the university during holding PCP even in holidays. Further, in order to successfully execute the programme, a wide range of support services are provided to the ODL learners.

Network of Study Centres: To assist its learners of Directorate of Distance Education of Vidyasagar University has established 36 study centres so that learner can choose a study center nearest to the residence.

(f) Procedure for admissions, Curriculum Transaction and evaluation:

Vidyasagar University has taken a concrete admission policy for all courses offered in distance mode. This policy includes notification, minimum eligibility criteria and fee structure. In every academic session the notifications are published in news papers (National Level and local level) and also in the university website. For different subjects the minimum eligibility criteria for admission is different. There is a fixed fee structure for each subject. The learners are instructed to deposit the fee by cheque or draft. The system of on line admission is also in the pipe line.

Fee structure :

Subject	***Semistar - I***	***Semistar - II***	***Semistar - III***	***Semistar - IV***
M.A/M.Sc **Geography**	**10,700.00**	**10,650.00**	**10,850.00**	**10,800.00**

Curriculum Transaction incorporates effective planning for providing learning experiences for its learners, organization of planning, administration/implementation of the organized planning and evaluation of the implementations by the implementer and the experts in the relevant field. Curriculum Transaction or Curriculum management is the process of planning and organizing the curriculum in a particular subject area for different levels of education and continuously monitor it while being implemented. The main responsibility of the curriculum transaction lies on the teachers and trainers who may use different types of pedagogies to create a nice academic environment in the institution and students can be benefited in gaining knowledge and developing skills. Curriculum transaction is always done through Personal Contact Programmes (PCP). The PCP should aim to address not only the problems faced by the individual learners but also compensate the pedagogic limitations of the SLM. So it will not just bring together learners to solve their problems but will be an intervention for organizing activities to be carried out in teams, using multiple sources of information available in the university. The activities presently supposed to be carried out at the PCP such as clarification of doubts; laboratory work and so on will be a part of the curriculum transaction process planned for the PCP. Efforts are being done to provide e-learning facility.

Evaluation: The evaluation of learners will be made by two modes – internal assessment/assignments and end-semester examination. For the evaluation of scripts there is a system of spot evaluation for expediting the publication of result, i.e., the examiners will come to Directorate of Distance Education and will examine the answer scripts and submit the marks on the spot. In some cases answer scripts are sent to the examiners and evaluated scripts are collected by messengers within a stipulated time. There is a system of re-examination of scripts after publication of results.

(g) Requirement of Laboratory Support and Library resource:

Laboratory support is essential to the learner of distance education system in case of laboratory based subjects. Directorate of Distance Education, Vidyasagar University have established dedicated laboratory in the directorate of Distance Education for the laboratory based subjects like, physics, chemistry, mathematics, environmental science, geography, Zoology and Nutrition and Dietetics to give exposure of practical knowledge to the learners. Our laboratories are well equipped with sophisticated instruments:

Geography Laboratory: It is equipped with Different scientific instruments, like, ground survey related instruments, soil testing kits ,GPS, mirror stereoscopes ,aerial photographs, toposheets ,GPS and image processing software as related to the remote sensing technique.

Practical PCP of a particular subject are arranged group wise so that all the learners get sufficient attention and proper training from counsellors and laboratory instructors. Like theory classes, practical PCP schedule is announced by news paper and university website at least before 15 days. Apart from the dedicated laboratory of DDE, the students are also trained in regular departments of the university.

The students are provided with library facility in the central library of the University. They are used to get reading room as well as lending facilities. The central library is equipped with a numbers of e-book and e-journals. The learners may also avail such facilities

(h) Cost Estimate of the Programme and the Provisions:

Estimated cost of Geography is given in a table below:

Subject	Development (Lakhs)	Delivery (Lakhs)	Maintenance (Lakhs)	Total (lakhs)
Geography	11	9	15	35

Provisions: As the proposed programme was offered for more than 11 years in recent past the infrastructure is already in existence. The other expenses will be met from the fees collected from the learners.

(i) Quality Assurance Mechanism and Expected Programme outcome:

Quality assurance (QA) for distance higher education is one of the main concerns among institutions and stakeholders today. Quality has always been an issue in distance education (DE) and distance learning (DL). Quality assurance in distance and higher education has gained serious attention by institutions, stakeholders, and scholars. In response to QA line of inquiry, institutions have begun to re-define and re-orient their institutional missions and strategic visions to incorporate and address quality issues. QA has now reached an important turning point and is influencing DE institution's management strategies and cultures. Learners are demanding better quality educational services and provisions. To fulfil these demands, our Directorate of Distance Education must pay close attention to quality in terms of study material, quality of PCP counsellor, delivery systems and administrative facility to the learner.

The following major steps would be taken for quality assurance:-

i) Establishment of quality assurance committee
ii) Revision of curriculum in 3 years interval
iii) Quality improvement of SLM
iv) Emphasize for online learning system
v) More emphasis of practical training of the learners in science subjects by improving the quality of laboratories with sophisticated instruments.
vi) More use of ICT for the management of DL of the university

The expected outcome of the programme is to develop the knowledge and skill of learners of the specific field. The learner may go for further higher education programmes, e.g., M. Phil, Ph. D. , M. Tech and other professional programmes. After completion of the programme by distance mode the learner may prepare themselves for different job oriented entrance examinations, e.g. NET, GATE, College service entrance (CSC), School Service Entrance (SSC) etc., Thus they may be employed in Govt. and non-govt. Sectors like academic institutions, mapping organisation , forest department ,Census based institute, development related offices at Block or Panchayet level and so on. Apart from this, their training may enable them for self employment

The candidates who hold M.A / M. Sc. in Geography can apply for various competitive exams conducted by different Central Government departments. UPSC and SSC are some of the central government exams that enable the aspirants to get placed in Telecom, Educational Sector, Military Service, etc. For becoming a Research Assistant or lecturer in government colleges or universities, one should qualify in the NET exam conducted by UGC. A few central government organizations that look for postgraduates in Geography are Oil & Natural Gas Corporation, National Council for Cement and Building Materials, Central Mine Planning & Design Institute Limited, Society of Integrated Coastal Management, etc.

The post graduate students in Geography can get placed in different departments under State Government through various exams organized by the Public Service. The learners passed M.A / M. Sc. in Geography through the distance mode will be eligible for the above said entrance test or job vacancy.

Programme Project Report (PPR)

Programme: M. Sc in Applied Mathematics

(a) Programme Mission and objective:

The skill set obtained during the Applied Mathematics MSc programme is highly transferable, which opens opportunities for a career in industry or for further advanced study in diverse areas ranging from engineering and physics to finance.
The breadth and depth of the taught modules and projects offered make this MSc programme unique. The solid training in applied mathematics provides the ecessary background for further postgraduate studies (PhD) and for an academic career. An MSc in Applied Mathematics also leads to many career opportunities in industry, for example in the aerospace, petroleum and financial industries.

The proposed programme has the mission and objectives in relation to the teaching and learning in open and distance mode. In order to afford Quality Education for every one through distance learning mode need based academic programmes for livelihood and lifelong learning at post graduate level has been adopted. In order to set highest benchmark for quality and standards of Indian open distance learning strategy introduction of this programme has enormously been spread.

The post graduate Programme in Arts, science and commerce to be offered through ODL mode will have certain learning outcomes. This programme will help the learners-

- To spread higher education especially among the rural people who are socio economically backward.
- To rid underprivileged society of social evils
- Capacity building among the rural population.

Concept of open learning and distance education system focuses on open access education and training to make the learners free from the constraints of time and place, and offering flexible learning opportunities to individuals and groups of learners. Open and distance learning (ODL)is one of the most rapidly growing fields of education now a days and it has substantial impact on all education delivery systems.The new ODL system growing fast because of the development of Internet-based information technologies.. The concept of ODL education came from idea where the learners and the teachers can not be in a class room and they should be separated by some geographical distance or maybe they cannot come close to each other to make the entire education system flexible.

Higher education playing the role of leadership in the society education act as catalyst of social change and spread of education in a society is the foundation of success in countries that are latecomers for development. Distance education is playing an important role in providing higher education to those who are unable to be the part of conventional system. The main objective of ODL is to reach the unreached and provide education at the doorstep of the learners and according to their convenience.

Formal system was unable to meet the demand of higher education and alternatively distance education was adopted as an alternative mode at the University stage

Most ODL learners have professional responsibilities (jobs), social responsibilities (families), are interested in part time studies, lack of access to on-campus based studies or are away from formal education and ODL becomes the readily available option for them to upgrade their qualifications.

Typical distance learners are regular students as we all know them, but also parents, physically challenged people, and working/business people who are looking for ways to enhance their skills next to their busy schedule.

The focus of this course is using mathematics to solve real world problems, such as in finance, energy, engineering or scientific research. The combination of the applied nature of the mathematics that is taught, with the masters level of this course, makes this qualification highly attractive to employers. Many of the topics taught are directly linked to the research that we do, so you will be learning at the cutting edge of applied mathematics.

The proposed programme aims to develop core skills in applied mathematics and allows students to specialise in industrial modelling or numerical analysis, in preparation for study towards a PhD or a career using mathematics within industry. An important element is the course regarding transferable skills which will link with academics and employers to deliver important skills for a successful transition to a research career or the industrial workplace.

(b) Relevance of the programme with HEI Mission

Mission of the Vidyasagar University is defined in its logo “Education, Knowledge and Progress” with special emphasis on a curriculum relevant to the ethnic, sociological and geographical needs on the catchment region ,yet not ignoring the demands of mainstream education.

The main missions of the university are-

i. To improve the economic condition of the region and offer courses which should have the potential to garner employment.

ii. To build human resource with strong character and competence, having the strength to face the challenges of the changing realities both in global and local levels and to adapt to the fast evolving technologies.

iii To promote an all round development of its students with a proper blending of knowledge and wisdom acquiring adequate skill in his own subject or trade or vocation through teaching learning process and human qualities like compassion, a sense of social responsibility and commitment and ethical sense (honesty), tolerance and empathy through various social, cultural, sports and ethical value addition programs.

iv. To strive for the creation and dissemination of knowledge through continuous research and learning process.

v. To strive for academic excellence

vii. To strengthen student support system

The missions of the proposed programme, M. Sc. in Applied Mathematics, are in conformity with the missions of the institute. It aims to enable learners to learn and retain a broad base of knowledge in the various domains of the subject. The distance mode education has been started in the university with a mission to revitalize educational leadership, to set the standard for the production and dissemination of knowledge as well as to become an effective instrument of change in the society. Keeping priority with

the view of "Education For All", PG courses in Arts, Science and Commerce to be offered or being offered through ODL mode is very much relevant to the HEI's mission and goals as it aims to provide quality education to those aspiring candidates who are deprived of higher education due to the limited number of intake in the traditional mode of higher education in the Universities. Moreover, to keep the quality intact the curriculum and syllabus has been designed at par with the conventional mode keeping in mind the specific needs and acceptability of the learners in the distance mode and in keeping with the aims and objectives of the University. The proposal of M. Sc. in Applied Mathematics will fulfil the above objectives of the university as well as distance mode education.

(C) Nature and target group of learners:

For the present subject the following groups of learners have been targeted:

(1) Those are distracted from the admission in the regular mode due to limited intake capacity of Vidyasagar University and other HEIs.

(2) Those employed in various organizations who desire to track higher education as a passion or as a means for movement up the promotional ladder.

(3) Drop outs primarily due to social, financial and economic compulsions as well as population related factors.

(5) Rural population those living in remote areas where higher education institutes are not easily accessible.

(4) Job seekers of particular field of Applied Mathematics

(5) People of any age can participate in higher education programmes as there is no age bar in ODL mode education.

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(d) Appropriateness of the programme to be conducted in the ODL mode for acquiring specific skills and competence:

Vidyasagar University emphasized in innovative approach towards curriculum designing, while conforming to the basic or core requirements to create a common knowledge base for the state and the nation. Post graduate Programme in Applied Mathematics to be offered through ODL mode will have certain learning outcomes. This programme will help the learners to spread higher education in all sectors of community.

- Capacity building among the students particularly from the rural population as well as backward areas of the districts

- To apply skills and knowledge in an internship experience.
- To develop skills on hand practical related to science subject and also hands on training in field exposure

The distance learning under Vidyasagar University offer programme in an expanded mode both in volume and the type of programmes. As technology has been getting more affordable and widely available, the interest of both learners and institutions in this special kind of education may be increased enormously.

In response to the exponentially growing demand for well trained post-graduates in Mathematics from Institutions with professional excellence, the Directorate of Distance Education,Vidyasagar University is providing a Two year M.Sc. **Applied Mathematics** Degree Programme The abilities to use logical thought, to make deduction from assumption, to use advanced concepts are all enhanced by a Mathematics degree course. It is for this reason that Mathematicians are increasingly in demand. With M.Sc. Mathematics degree, one should be able to turn his/her hand to Finance, Statistics, Engineering, Computers, Teaching or Accountancy with a success not possible to other post graduates.

(e) Instructional Design:

The first step of instructional design in distance mode is curriculum design. A growing number of students globally are enrolling in distance education programs and it is becoming important now, more than ever before, to design curriculum that reflects educational principles, represents elements of engagement and pedagogy and meets institutional and industry requirements. In doing so, it is vital to design contemporary curriculum that ensures these outcomes are attained. In order to effectively design curriculum, the role of the educator as a conductor, technician and choreographer. Finally, a triad has been proposed comprising of pedagogy, technology and an engaged community of learners as a basis for ensuring curriculum meets contemporary practices. For All these subjects the objective of this Open & Distance Learning (ODL) system of education is to develop capacity within and across the region to organize distance learning effectively in order to address the educational challenges and opportunities, particularly in higher education.

i). **Curriculum Design**: The curriculum of M.Sc. in Applied Mathematics is designed by a committee comprising experts from the parent department of the Vidyasagar University along with external expert keeping in view the needs of the diverse groups of learners. Efforts has been made to adopt the syllabus at par with the regular courses in the university as far as practicable. The syllabus is prepared by the Subject Committee is placed in the Advisory Committee of Directorate of Distance Education for approval. Then the syllabus id circulated among the learners and faculty members and it is also uploaded in the website of the university.

ii) **Detailed Syllabus**:

Syllabus at a glance

Syllabus of Mathematics (Semester wise)
SEM-I, II, III & IV)

Semester-I

Course No.	Topics	Marks	Credit Point
MTM101	Real Analysis	50	4
MTM102	Complex Analysis	50	4
MTM103	Ordinary Differential Equations and Special Functions	50	4
MTM104	Advanced Programming in C and MATLAB	50	4
MTM105	Classical Mechanics and Non – linear Dynamics	50	4
MTM106	Unit-1 Graph Theory	25	2
MTM106	Unit-2 Lab. 1: (Computational Methods: Using MATLAB)	25	2

Semester-II

Course No.	Topics	Marks	Credit Point
MTM201	Fluid Mechanics	50	4
MTM202	Numerical Analysis	50	4
MTM203	203.1 Abstract Algebra	25	2
MTM203	203.2 Linear Algebra	25	2
	(CBCS)		
MTM204	CMTM 204.A Statistical & Numerical Method	50	4
	CMTM 204.B HISTORY of MATHEMATICS		
MTM205	GENERAL THEORY OF CONTINUUM MECHANICS	50	4
MTM206	GENERAL TOPOLOGY	25	2
MTM 297	C PROGRAMMING WITH NUMERICAL AND STATISTICAL	25	2

SEMESTER-III

Course No.	Topics	Marks	Credit
MTM 301	PARTIAL DIFFERENTIAL EQUATIONS AND GENERALIZED FUNCTIONS	50	4
MTM 302	TRANSFORMS AND INTEGRAL EQUATIONS	50	4
MTM 303	MTM 303.1 DYNAMICAL OCEANOLOGY AND METEOROLOGY	25	2
	MTM 303.2 OPERATIONS RESEARCH	25	2

CBCS

C-MTM 304	DISCRETE MATHEMATICS	50	4

SPECIAL PAPER (A or B)

MTM 305	MTM 305A DYNAMICAL OCEANOLOGY	50	4
	MTM 305B ADVANCED OPTIMIZATION AND OPERATIONS RESEARCH		
MTM 306	MTM 306A DYNAMICAL METEOROLOGY-I	50	4
	MTM 306B OPERATIONAL RESEARCH MODELLING-I		

SEMESTER-IV

Course No.	Topics	Marks	Credit point
MTM 401	FUNCTIONAL ANALYSIS	50	4
MTM 402	MTM 402.1 FUZZY MATHEMATICS WITH APPLICATIONS	25	2
	MTM 402.2 SOFT COMPUTING	25	2
MTM 403	MTM 403.1 MAGNETO HYDRO-DYNAMICS	25	2
	MTM 403.2 STOCHASTIC PROCESS AND REGRESSION	25	2
	SPECIAL PAPER (A or B)		
MTM 404	MTM 404A:COMPUTATIONAL OCEANOLOGY	50	4
	MTM 404B NONLINEAR OPTIMIZATION		
MTM 405	MTM 405A DYNAMICAL METEOROLOGY - II	25	2
	MTM 405B OPERATIONAL RESEARCH MODELLING - II		
MTM 495	MTM 495A DYNAMICAL METEOROLOGY (practical)	25	2
	MTM 495B O.R. METHOD USING MATLAB AND LINGO (practical)		
MTM 406	DISSERTATION PROJECT WORK	50	6

Full Marks, 50 = END SEMESTER EXAMINATION (40) + INTERNAL ASSESSMENT (10) 25 = END SEMESTER EXAMINATION (20) + INTERNAL ASSESSMENT (5)

Note: Details text of syllabus is attached in the hard copy of the application

iii) **Duration of the Program**: 4 Semesters i.e 2 (two) years.

However, the learners are given time to complete the course within 5 (five) years from the date of admission.

iv) **Instructional Delivery Mechanism**: The programme shall be delivered in two years. The learners shall be provided with the printed SLM which covers almost all the contents in the syllabus. Apart from this the students will be provided with the SLM in electronic media depending on the choice of the learner. The PCP programmes are announced well ahead from the date of commencement. The examination programmes are also announced well before its commencement. The announcement for PCP or Examination is published in university website. We have a well structured data base of the contacts of the learners and a system of delivering information to students using ICT. The students are

also informed about those programmes by SMS. Counselling is

also held in various affiliated study centres. The progress of the learners shall be evaluated by mid-term and end year examination. Examination rules are adopted as per the rules and regulation regular mode of examination of the university.

v) **Faculty**: Faculties are engaged from both regular and distance mode of Vidyasagar University in teaching as PCP counsellors. In addition counsellors from experience teachers of colleges, other universities and research institutes are to be employed. UGC norms are followed for selecting the counsellors..

vi) **Media**: SLM will be provided in both Print Media, and e-media. The learners will be given choice to avail print media or e-media or both.

vii) **Student Support Service**: Existing facilities of central library, photo copying facilities, free internet and WIFI facility will be available to the students. The students are provided with facilities for canteen, food corners of the university during holding PCP even in holidays. Further, in order to successfully execute the programme, a wide range of support services are provided to the ODL learners.

Network of Study Centres: To assist its learners of Directorate of Distance Education of Vidyasagar University has established 36 study centres so that learner can choose a study canter nearest to the residence.

(f) Procedure for admissions, Curriculum Transaction and evaluation:

Vidyasagar University has taken a concrete admission policy for all courses offered in distance mode. This policy includes notification, minimum eligibility criteria and fee structure. In every academic session the notifications are published in news papers (National Level and local level) and also in the university website. For different subjects the minimum eligibility criteria for admission is different. There is a fixed fee structure for each subject. The learners are instructed to deposit the fee by cheque or draft. The system of on line admission is also in the pipe line.

Fee structure (Semester Wise):

Programme	Semester-I	Semester -II	Semester -III	Semester -IV
M. Sc. In Applied Mathematics	6900/-	6850/-	7850/-	7800/-

Curriculum Transaction incorporates effective planning for providing learning experiences for its learners, organization of planning, administration/implementation of the organized planning and evaluation of the implementations by the implementer and the experts in the relevant field. Curriculum Transaction or Curriculum management is the process of planning and organizing the curriculum in a particular subject area for different levels of education and continuously monitors it while being implemented. The main responsibility of the curriculum transaction lies on the teachers

and trainers who may use different types of pedagogies to create a nice academic environment in the institution and students can be benefited in gaining knowledge and developing skills. Curriculum transaction is always done through Personal Contact Programmes (PCP). The PCP should aim to address not only the problems faced by the individual learners but also compensate the pedagogic limitations of the SLM. So it will not just bring together learners to solve their problems but will be an intervention for organizing activities to be carried out in teams, using multiple sources of information available in the university. The activities presently supposed to be carried out at the PCP such as clarification of doubts; laboratory work and so on will be a part of the curriculum transaction process planned for the PCP. Efforts are being done to provide e-learning facility.

Evaluation: The evaluation of learners will be made by two modes – internal assessment/assignments and end-semester examination. For the evaluation of scripts there will be a system of **spot evaluation** for expediting the publication of result, i.e., the examiners will come to Directorate of Distance Education and will examine the answer scripts and submit the marks on the spot. In some cases answer scripts are sent to the examiners and evaluated scripts are collected by messengers within a stipulated time. Qualified examiners will be appointed for this purpose. There is a system of re-examination of scripts after publication of results. The computerized system of database formation and preparation mark sheet and certificate will be employed for correct and speedy delivery of results to the learners.

(g) Requirement of Laboratory Support and Library resource:

Laboratory support is essential to the learner of distance education system in case of laboratory based subjects. Directorate of Distance Education, Vidyasagar University have established dedicated laboratory in the directorate of Distance Education for the Applied Mathematics to give exposure of practical knowledge to the learners. Our laboratories are well equipped with sufficient computer facilities. Moreover, the students are also trained in the computer laboratories of the regular department.

Practical classes of a particular subject are arranged group wise so that all the learners get sufficient attention and proper training from counsellors and laboratory instructors. Like theoretical classes, practical PCP schedule is announced by news paper and university website at least before 15 days. Apart from the dedicated laboratory of DDE, the students are also trained in regular departments of the university.

The students are provided with library facility in the central library of the University. They are used to get reading room as well as lending facilities. The central library is equipped with a numbers of e-book and e-journals. The learners may also avail such facilities

(h) Cost Estimate of the Programme and the Provisions:

The estimated cost of the programme and the provisions are given below:

Programme	Development (Lakhs)	Delivery (Lakhs)	Maintenance (Lakhs)	Total (Lakhs)
M. Sc. in Applied Mathematics	11	9	15	35

Provisions: As it is a continued programme the infrastructure is already in existence. The other expenses will be fulfilled from the fees collected from the students.

(i) Quality Assurance Mechanism and Expected Programme outcome:

Quality assurance (QA) for distance higher education is one of the main concerns among institutions and stakeholders today. Quality has always been an issue in distance education (DE) and distance learning (DL). Quality assurance in distance and higher education has gained serious attention by institutions, stakeholders, and scholars. In response to QA line of inquiry, institutions have begun to re-define and re-orient their institutional missions and strategic visions to incorporate and address quality issues. QA has now reached an important turning point and is influencing DE institution's management strategies and cultures. Learners are demanding better quality educational services and provisions. To fulfil these demands, our Directorate of Distance Education must pay close attention to quality in terms of study material, quality of PCP counsellor, delivery systems and administrative facility to the learner.

The following major steps would be taken for quality assurance:-

i) Establishment of Center for Internal Quality Assurance
ii) Revision of curriculum in 3 – 5 years interval
iii) Quality improvement of SLM
iv) Emphasize for online learning system
v) More emphasis of practical training of the learners in science subjects by improving the quality of laboratories with sophisticated instruments.
vi) More use of ICT for the management of DL of the university

The expected outcome of the programme is to develop the knowledge and skill of learners of the specific field. The learner may go for further higher education programmes, e.g., M. Phil, Ph. D. , M. Tech and other professional programmes. After completion of the programme by distance mode the learner may prepare themselves for different job oriented entrance examinations, e.g. NET, GATE, College service entrance (CSC), School Service Entrance (SSC) etc., Thus they may be

employed in Govt. and non-govt. sectors. Apart from this, their training may enable them for self employment.

The skill set obtained during the Applied Mathematics M. Sc. programme is highly transferable, which opens opportunities for a career in industry or for further advanced study in diverse areas ranging from engineering and physics to finance. The breadth and depth of the taught modules and projects offered make this M. Sc. programme unique. The solid training in applied mathematics provides the necessary background for further postgraduate studies (PhD) and for an academic career.An M. Sc. in Applied Mathematics also leads to many career opportunities in industry, for example in the aerospace, petroleum and financial industries.

Programme Project Report (PPR)

Programme: M. Sc. in Physics

(a) Programme Mission and objective:

Masters Degrees in Physics focus on investigating and understanding the workings of the universe and of the physical matter and processes operating within it - on Earth and beyond. This involves understanding forces such as gravity, the behaviour of different atomic and sub-atomic particles and the fundamental properties of light and energy.

The proposed programme has the mission and objectives in relation to the teaching and learning in open and distance mode. In order to afford Quality Education for every one through distance learning mode need based academic programmes for livelihood and lifelong learning at post graduate level has been adopted. In order to set highest benchmark for quality and standards of Indian open distance learning strategy introduction of this programme has enormously been spread.

The post graduate Programme in Arts, science and commerce to be offered through ODL mode will have certain learning outcomes. This programme will help the learners-

To spread higher education especially among the rural people who are socio economically backward.

To rid underprivileged society of social evils through proper education

Capacity building among the students especially in rural population.

To reach the unreached and provide education at the doorstep of the learners and according to their convenience.

Concept of open learning and distance education system focuses on open access education and training to make the learners free from the constraints of time and place, and offering flexible learning opportunities to individuals and groups of learners. Open and distance learning (ODL)is one of the most rapidly growing fields of education now a days and it has substantial impact on all education delivery systems.The new ODL system growing fast because of the development of Internet-based information technologies.. The concept of ODL education came from idea where the learners and the teachers can not be in a class room and they should be separated by some geographical distance or may be they cannot come close to each other to make the entire education system flexible.

Open and Distance Learning system has tremendous potential of inclusive growth of education because of its distinctive nature of being a user friendly system. ODL system is not only cost effective but it can also contribute in the sustainable development through learning processes that transcend distance, gender, regional, cultural and socio-economic barriers.

Higher education playing the role of leadership in the society education act as catalyst of social change and spread of education in a society is the foundation of success in countries that are latecomers for development. Distance education is playing an important role in providing higher education to those who are unable to be the part of conventional system. The main objective of ODL is to reach the unreached and provide education at the doorstep of the learners and according to their convenience.

Formal system was unable to meet the demand of higher education and alternatively distance education was adopted as an alternative mode at the University stage

Most ODL learners have professional responsibilities (jobs), social responsibilities (families), are interested in part time studies, lack of access to on-campus based studies or are away from formal education and ODL becomes the readily available option for them to upgrade their qualifications.

Typical distance learners are regular students as we all know them, but also parents, physically challenged people, and working/business people who are looking for ways to enhance their skills next to their busy schedule.

Physics is widely regarded as a demanding degree to get and employers know that to get a good physics degree the learners should of good quality. A physicist looks to understand how things work: the reasons that things happen the way they do, which requires the ability to analyse problems. This is

a highly marketable skill which is applicable to a wide range of careers. A degree in Physics gives the learners an excellent grounding in many areas, what they make of it after graduation. One survey in The Times suggested that Physics was in fact the most employable of degrees.

(b) Relevance of the programme with HEI Mission

Mission of the Vidyasagar University is defined in its logo "Education, Knowledge and Progress" with special emphasis on a curriculum relevant to the ethnic, sociological and geographical needs on the catchment region ,yet not ignoring the demands of mainstream education. The main missions of the university are-

i. To improve the economic condition of the region and offer courses which should have the potential to garner employment.

ii. To build human resource with strong character and competence, having the strength to face the challenges of the changing realities both in global and local levels and to adapt to the fast evolving technologies.

iii. To promote an all round development of its students with a proper blending of knowledge and wisdom acquiring adequate skill in his own subject or trade or vocation through teaching learning process and human qualities like compassion, a sense of social responsibility and commitment and ethical sense (honesty), tolerance and empathy through various social, cultural, sports and ethical value addition programs.

iv. To strive for the creation and dissemination of knowledge through continuous research and learning process.

v. To strive for academic excellence

vii. To strengthen student support system

The missions of the proposed Programme, M. Sc. in Physics, are in conformity with the missions of the institute. It aims to enable learners to learn and retain a broad base of knowledge in the various domains of the subject. The distance mode education has been started in the university with a mission to revitalize educational leadership, to set the standard for the production and dissemination of knowledge as well as to become an effective instrument of change in the society. Keeping priority with the view of "Education For All", PG courses in Arts, Science and Commerce to be offered or being offered through ODL mode is very much relevant to the HEI's mission and goals as it aims to provide quality education to those aspiring candidates who are deprived of higher education due to the limited number of intake in the traditional mode of higher education in the Universities. Moreover, to keep the quality intact the curriculum and syllabus has been designed at par with the conventional mode keeping in mind the specific needs and acceptability of the learners in the distance mode and in keeping with the aims and objectives of the University. The proposal of the programme M. Sc. in Physics will fulfil the above objectives of the university as well as distance mode education.

(C) Nature and target group of learners:

For the present subject the following groups of learners have been targeted:

(1) Those are distracted from the admission in the regular mode due to limited intake capacity of Vidyasagar University and other HEIs

(2) Those employed in various organizations who desire to track higher education as a passion or as a means for movement up the promotional ladder.

(3) Drop outs primarily due to social, financial and economic compulsions as well as population related factors.

(5) Rural population those living in remote areas where higher education institutes are not easily accessible.

(4) Job seekers of particular field of Physics

(5) People of any age can participate in higher education programmes as there is no age bar in ODL mode education.

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(d) Appropriateness of the programme to be conducted in the ODL mode for acquiring specific skills and competence:

Vidyasagar University emphasized in innovative approach towards curriculum designing, while conforming to the basic or core requirements to create a common knowledge base for the state and the nation. Post graduate Programme in Arts, Commerce and Science to be offered through ODL mode will have certain learning outcomes. This programme will help the learners to spread higher education in all sectors of community.

- Capacity building among the students particularly from the rural population as well as backward areas of the districts
- To apply skills and knowledge in an internship experience.
- To develop skills on hand practical related to science subject and also hands on training in field exposure

The distance learning under Vidyasagar University offer programme in an expanded mode both in volume and the type of programmes. As technology has been getting more affordable and widely available, the interest of both learners and institutions in this special kind of education may be increased enormously.

More than 40% of pass out having PG Degree in **Physics** go on to study for a higher degree, leading to careers in universities or in industry or in research and development, technical consultancy, manufacturing and science education. Many others enter professions unrelated to Physics, such as finance and business, where the analytical and problem-solving skills they have developed are highly sought after.

Physics is one of the most applicable sciences in existence and can lead to careers in technology, sports and games, space science, sound engineering in music and television, and a lot more. A Master in Physics is an excellent choice for students seeking exciting and promising careers in a variety of settings.

(e) Instructional Design:

The first step of instructional design in distance mode is curriculum design. A growing number of students globally are enrolling in distance education programs and it is becoming important now, more than ever before, to design curriculum that reflects educational principles, represents elements of engagement and pedagogy and meets institutional and industry requirements. In doing so, it is vital to design contemporary curriculum that ensures these outcomes are attained. In order to effectively design curriculum, the role of the educator as a conductor, technician and choreographer. Finally, a triad has been proposed comprising of pedagogy, technology and an engaged community of learners as a basis for ensuring curriculum meets contemporary practices. For All these subjects the objective of this Open & Distance Learning (ODL) system of education is to develop capacity within and across the region to organize distance learning effectively in order to address the educational challenges and opportunities, particularly in higher education.

i) **Curriculum Design**: The curriculum of M. Sc. in Physics is designed by a committee comprising experts from the parent department of the Vidyasagar University along with external expert keeping in view the needs of the diverse groups of learners. Efforts has been made to adopt the syllabus at par with the regular courses in the university as far as practicable. The syllabus is prepared by the Subject Committee is placed in the Advisory Committee of Directorate of Distance Education for approval. Then the syllabus is uploaded in the website of the university.

ii) Detailed Syllabus: Programme : M. Sc. in Physics

COURSE STRUCTURE OF M.Sc. in PHYSICS

SEMESTER	COURSE NO.	COURSE TITLES		Full Marks	Credit
I	PHS 101	PHS 101.1	METHODS OF MATHEMATICAL PHYSICS -1	50	4
		PHS 101.2	CLASSICAL MECHANICS		
	PHS 102	PHS 102.1	QUANTUM MECHANICS -1	50	4
		PHS 102.2	SOLID STATE -1		
	PHS 103	PHS 103.1	ELECTRODYNAMICS	50	4
		PHS 103.2	MATERIALS: PREPARATION AND CHARACTERIZATION		
	PHS 104	PHS 104.1	ANALOG ELECTRONICS -1	50	4
		PHS 104.1	DIGITAL ELECTRONICS -1		
	PHS 195	ELECTRONICS PRACTICAL -I		50	4
	PHS 196	COMPUTER PRACTICAL		50	4
		TOTAL		300	24
II	PHS 201	PHS 201.1	QUANTUM MECHANICS - II	50	4
		PHS 201.2	METHODS OF MATHEMATICAL PHYSICS - II		
	PHS 202	PHS 202.1	SOLID STATE II	50	4
		PHS 202.2	SEMICONDUCTOR PHYSICS		
	PHS 203	PHS 203.1	ANALOG ELECTRONICS - II	50	4
		PHS 203.2	DIGITAL ELECTRONICS - II		
	C-PHS 204	CONCEPTS OF PHYSICS: INVENTIONS ANS APPLICA TION(CBCS)		50	4
	PHS 295	ELECTRONICS PRACTICAL - II		50	4
	PHS 296	ADVANCE PRACTICAL I		50	4
		TOTAL		300	24
III	PHS 301	PHS 301.1	QUANTUM MECHANICS - III	50	4
		PHS 301.2	STATISTICAL MECHANICS -1		
	PHS 302	PHS 302.1	MOLECULAR SPECTROSCOPY & LASER PHYSICS	50	4
		PHS 302.2	NUCLEAR PHYSICS -1		
		SPECIAL PAPER (any one)			
	PHS 303	PHS 303A	SOLID STATE PHYSICS-I	50	4
		PHS 303B	APPLIED EL ECTRONICS-I		
			PHS 303B.1 APPLIED ANALOG ELECTRONICS-I		
			PHS 303B.2 APPLIED DIGITAL ELECTRONICS-I		
	C-PHS 304	INTRODUCTORY ASTROPHYSICS (CBCS)		50	4
	PHS 395	ADVANCE PRACTICAL-II		50	4
		SPECIAL BASED PRACTICAL			
	PHS 396	PHS 396A	SOLID STATE PHYSICS-I (practical)	50	4
		PHS 396B	APPLIED ELECTRONICS-I (practical)		
		TOTAL		300	24
IV	PHS 401	PHS 401.1	PARTICLE PHYSICS	50	4
		PHS 401.2	STATISTICAL MECHANICS - II		
	PHS 402	PHS 402.2	NUCLEAR PHYSICS - II	50	4
		PHS 402.1	QUANTUM FIELD THEORY		
	PHS 403	PHS 403.1	SEMICONDUCTOR DEVICES	50	
		PHS 403.2	APPLIED OPTICS		
		SPECIAL PAPER (any one)			
	PHS 404	PHS 404A	SOLID STATE PHYSICS-II	50	4
		PHS 404B	APPLIED EL ECTRONICS-II		
			PHS 404B.1 APPLIED ANALOG ELECTRONICS-II		
			PHS 404B.2 APPLIED DIGITAL ELECTRONICS-II		
		SPECIAL BASED PRACTICAL			
	PHS 495	PHS 495A	SOLID STATE PHYSICS-II (practical)	50	4
		PHS 495B	APPLIED ELECTRONICS-II (practical)		
	PHS 496	PROJECT, SEMINAR AND GRAND VIVA		50	4
		TOTAL		300	24
ALL TOTAL				1200	96

Syllabus at a glance

Semister I: 300 marks 24 credits		**Semister II: 300 marks 24 credits**		**Semister III: 300 marks 24 credits**		**Semister IV: 300 marks 24 credits**		**Total: 1200 marks 96 credits**	
Theory	Practical	Theory	Practical	Theory	Practical	Theory	Practical	Theory	Practical
200	100	200	100	200	100	200	100	800	400

iii) **Duration of the Program**: 4 Semesters i.e., 2- years.
However, the learners are given time to complete the course within 5 (five) years from the date of admission.

iv) **Instructional Delivery Mechanism**: The programme shall be delivered in two years. The learners shall be provided with the printed SLM which covers almost all the contents in the syllabus. Apart from this the students will be provided with the SLM in electronic media depending on the choice of the learner. The PCP programmes are announced well ahead from the date of commencement. The examination programmes are also announced well before its commencement. The announcement for PCP or Examination is published in university website and leading news paper of the state. We have a well structured data base of the contacts of the learners and a system of delivering information to students using ICT. The students are also informed about those programmes by SMS. Counselling is also held in various affiliated study centres. The progress of the learners shall be evaluated by mid-term and end year examination. Examination rules are adopted as per the rules and regulation regular system of the university.

v) **Faculty**: Both regular and distance mode faculties of Vidyasagar University engaged in teaching, in addition counsellors from experience teachers of colleges, other universities and research institutes are to be employed. UGC norms are followed for selecting the counsellors.

vi) **Media:** SLM will be provided in both Print Media, and e-media. The learners will be given choice to avail print media or e-media or both.

vii) Student Support Service: Existing facilities of central library, photo copying facilities , free internet and WIFI facility will be available to the students. The students are provided with facilities for canteen, food corners of the university during holding PCP even in holidays. Further, in order to successfully execute the programme, a wide range of support services are provided to the ODL learners.

Network of Study Centres: To assist its learners of Directorate of Distance Education of Vidyasagar University has established 36 study centres so that learner can choose a study center nearest to the residence.

(f) Procedure for admissions, Curriculum Transaction and evaluation:

Vidyasagar University has taken a concrete admission policy for all courses offered in distance mode. This policy includes notification, minimum eligibility criteria and fee structure. In every academic session the notifications are published in news papers (National Level and local level) and also in the university website. For different subjects the minimum eligibility criteria for admission

is different. There is a fixed fee structure for each subject. The learners are instructed to deposit the fee by cheque or draft. The system of on line admission is also in the pipe line. Fee structure

Subject	*Semistar - I*	*Semistar - II*	*Semistar - III*	*Semistar - IV*
Physics	**10,400.00**	**10,350.00**	**10,750.00**	**10,750.00**

Curriculum Transaction incorporates effective planning for providing learning experiences for its learners, organization of planning, administration/implementation of the organized planning and evaluation of the implementations by the implementer and the experts in the relevant field. Curriculum Transaction or Curriculum management is the process of planning and organizing the curriculum in a particular subject area for different levels of education and continuously monitor it while being implemented. The main responsibility of the curriculum transaction lies on the teachers and trainers who may use different types of pedagogies to create a nice academic environment in the institution and students can be benefited in gaining knowledge and developing skills. Curriculum transaction is always done through Personal Contact Programmes (PCP). The PCP should aim to address not only the problems faced by the individual learners but also compensate the pedagogic limitations of the SLM. So it will not just bring together learners to solve their problems but will be an intervention for organizing activities to be carried out in teams, using multiple sources of information available in the university. The activities presently supposed to be carried out at the PCP such as clarification of doubts; laboratory work and so on will be a part of the curriculum transaction process planned for the PCP. Efforts are being done to provide e-learning facility.

Evaluation: The evaluation of learners will be made by two modes – internal assessment/assignments and end-year examination. For the evaluation of scripts there will be a system of **spot evaluation** for expediting the publication of result, i.e., the examiners will come to Directorate of Distance Education and will examine the answer scripts and submit the marks on the spot. In some cases answer scripts are sent to the examiners and evaluated scripts are collected by messengers within a stipulated time. Qualified examiners will be appointed for this purpose. There is a system of re-examination of scripts after publication of results. The computerized system of database formation and preparation mark sheet and certificate will be employed for correct and speedy delivery of results to the learners.

(g) Requirement of Laboratory Support and Library resource:

Laboratory support is essential to the learner of distance education system in case of laboratory based subjects like Physics. Directorate of Distance Education, Vidyasagar University have established dedicated laboratory in the directorate of Distance Education for the laboratory based subjects like, physics to give exposure of practical knowledge to the learners. Our laboratories are well equipped with instruments **related to Advance practical like** Electron temperature measurement by single probe setup, Electron temperature measurement by double probe setup.GM counter. X-ray diffractrometer.4-probe setup for bandgap measurement of a semiconductor.LED Experiment setup. LDR Experiment setup. **Instruments related to Electronics**
C.R.O,Function generator,Power supply,P.N Junction Experiment, Digital trainer kit, Analog trainer kit.
Beside these the students are also trained with other instruments available in the laboratories of the regular department
Practical classes of a particular subject are arranged group wise so that all the learners get sufficient attention and proper training from counsellors and laboratory instructors. Like theory classes, practical PCP schedule is announced by news paper and university website at least before 15 days. Apart from the dedicated laboratory of DDE, the students are also trained in regular departments of the university.

Library facility: The students are provided with library facility in the central library of the University. They are used to get reading room as well as lending facilities. The central library is equipped with a numbers of e-book and e-journals. The learners may also avail such facilities. The

faculty members are provided with 'remote user' facility by the central library of Vidyasagar University.

(h) Cost Estimate of the Programme and the Provisions:

Estimated cost of the programme and the provisions are given in a table below

Programme	Development (Lakh)	Delivery (Lakh)	Maintenance (Lakh)	Total (lakhs)
M. Sc. in Physics	11	9	15	35

Provisions: As it is a continued programme the infrastructure is already in existence. The other expenses will be fulfilled from the fees collected from the students.

(i) Quality Assurance Mechanism and Expected Programme outcome:

Quality assurance (QA) for distance higher education is one of the main concerns among institutions and stakeholders today. Quality has always been an issue in distance education (DE) and distance learning (DL). Quality assurance in distance and higher education has gained serious attention by institutions, stakeholders, and scholars. In response to QA line of inquiry, institutions have begun to re-define and re-orient their institutional missions and strategic visions to incorporate and address quality issues. QA has now reached an important turning point and is influencing DE institution's management strategies and cultures. Learners are demanding better quality educational services and provisions. To fulfil these demands, our Directorate of Distance Education must pay close attention to quality in terms of study material, quality of PCP counsellor, delivery systems and administrative facility to the learner.

The following major steps would be taken for quality assurance:-

i) Establishment of Center for Internal Quality Assurance
ii) Revision of curriculum in 3 years interval
iii) Quality improvement of SLM
iv) Emphasize for online learning system
v) More emphasis of practical training of the learners in science subjects by improving the quality of laboratories with sophisticated instruments.
vi) More use of ICT for the management of DL of the university

The expected outcome of the programme is to develop the knowledge and skill of learners of the specific field. The learner may go for further higher education programmes, e.g., M. Phil, Ph. D. , M. Tech and other professional programmes. After completion of the programme by distance mode the learner may prepare themselves for different job oriented entrance examinations, e.g. NET, GATE, College service entrance (CSC), School Service Entrance (SSC) etc., Thus they may be employed in Govt. and non-govt. sectors. Apart from this, their training may enable them for self employment.

A large proportion of physics graduates entering permanent jobs after graduation go into research, design and development. Although you can get a job as a trainee research scientist with a good first degree, for those wanting a long term career in research it may be advisable to study for a doctorate as promotion within research may be hindered without one. However, many junior research staff use research as a stepping stone to other functions within the company, such as marketing, patent work and production management, and for graduates with these ambitions a postgraduate degree would not be necessary. Many of these jobs are with electronics, telecommunications and defence companies and may be nearer engineering than pure physics. Areas of growth include nuclear and renewable energy, environmental jobs and defence.

Programme Project Report (PPR)

Programme: M. Sc. In Zoology

(a) Programme Mission and objective:

Zoology is the study of animals and their ecology, behaviour, structure, physiology, development, origin, and distributions. Study individual animals down to the molecular level, as well as their populations and communities and the ways they interact with plants and the physical environment. Master's degrees in Zoology study the classification and understanding of different animal species. They train students to appreciate the diversity of Earth's fauna, with opportunities to specialise in areas such as animal evolution, behaviour and ecology. Courses in this field may also incorporate elements of Ecology, Taxonomy and broader Animal Sciences. Entry requirements will usually include an undergraduate degree in Biology or another relevant science.

The proposed programme has the mission and objectives in relation to the teaching and learning in open and distance mode. In order to afford Quality Education for every one through distance learning mode, need based academic programmes for livelihood and lifelong learning at post graduate level has been adopted. In order to set highest benchmark for quality and standards of Indian open distance learning strategy, introduction of this programme has enormously been spread.

The post graduate Programme in Arts, science and commerce to be offered through ODL mode will have certain learning outcomes. This programme will help the learners-

- To spread higher education especially among the rural people who are socio economically backward.
- To rid underprivileged society of social evils
- To enable capacity building among the rural population.

Concept of open learning and distance education system focuses on open access education and training to make the learners free from the constraints of time and place, and offering flexible learning opportunities to individuals and groups of learners. Open and distance learning (ODL)is one of the most rapidly growing fields of education now a days and it has substantial impact on all education delivery systems. The new ODL system has been growing fast because of the development of Internet-based information technologies. The concept of ODL education came from idea where the learners and the teachers should not restrict themselves in a class room and they should be separated by some geographical distance or may be they cannot come close to each other to make the entire education system flexible.

Open and Distance Learning system has tremendous potential of inclusive growth of education because of its distinctive nature of being a user-friendly system. ODL system is not only cost effective but it can also contribute in the sustainable development through learning processes that transcend distance, gender, regional, cultural and socio-economic barriers.

Higher education playing the role of leadership in the society education act as catalyst of social change and spread of education in a society, is the foundation of success in countries that are latecomers for development. Distance education is playing an important role in providing higher education to those who are unable to be the part of conventional system. The main objective of ODL is to reach the unreached and provide education at the doorstep of the learners according to their convenience.

Formal system was unable to meet the demand of higher education and alternatively distance education was adopted as an alternative mode at the University level.

Most ODL learners having professional responsibilities (jobs) and social responsibilities (families), are interested in part time studies because of lack of access to on-campus based studies or are away from formal education. To fill up the gap, ODL has become the readily available option for them to upgrade their qualifications.

Typical distance learners are regular students as we all know them, but also parents, physically challenged people, and working/business people who are looking for ways to enhance their skills next to their busy schedule.
Masters-level courses in Zoological Science are well suited to Biological Science students seeking to pecialise further at postgraduate level. Some offer a general grounding in Zoology, but most a specific focus in the understanding and classification of specific species (and / or their environments). As a result, postgraduate Zoology is as diverse as the animal kingdom itself. Whatever your specific interest, it's probably reflected in one or more of the courses below. Employment opportunities and outcomes are equally varied. You'll be well equipped for PhD research, perhaps leading to an academic career. Alternatively, you could work for a range of organisations, from research centres to conservation groups. And yes, you could potentially end up working at a zoo.

(b) Relevance of the programme with HEI Mission

Mission of the Vidyasagar University is defined in its logo "Education, Knowledge and Progress" with special emphasis on a curriculum relevant to the ethnic, sociological and geographical needs on the catchment region, yet not ignoring the demands of mainstream education.
The main missions of the university are-

i. To improve the economic condition of the region and offer courses which should have the potential to garner employment.

ii. To build human resource with strong character and competence, having the strength to face the challenges of the changing realities both in global and local levels and to adapt to the fast-evolving technologies.

iii. To promote an all round development of its students with a proper blending of knowledge and wisdom acquiring adequate skill in his own subject or trade or vocation through teaching learning process and human qualities like compassion, a sense of social responsibility and commitment and ethical sense (honesty), tolerance and empathy through various social, cultural, sports and ethical value addition programs.
iv. To strive for the creation and dissemination of knowledge through continuous research and learning process.
v. To strive for academic excellence
vii. To strengthen student support system
The missions of the proposed Programme, M. Sc. In Zoology, are in conformity with the missions of the institute. It aims to enable learners to learn and retain a broad base of knowledge in the various domains of the subject. The distance mode education has been started in the university with a mission to revitalize educational leadership, to set the standard for the production and dissemination of knowledge as well as to become an effective instrument of change in the society. Keeping priority with the view of "Education For All", PG courses in Arts, Science and Commerce to be offered or being offered through ODL mode is very much relevant to the HEI's mission and goals as it aims to provide quality education to those aspiring candidates who are deprived of higher education due to the limited number of intake in the traditional mode of higher education in the Universities. Moreover, to keep the quality intact the curriculum and syllabus has been designed at par with the conventional mode keeping in mind the specific needs and acceptability of the learners in the distance mode and in keeping with the aims and objectives of the University. The proposal of the programme M. Sc. in Zoology will fulfil the above objectives of the university as well as distance mode education.

(c) Nature and target group of learners:

For the present subject the following groups of learners have been targeted:

(1) Those who are distracted from the admission in the regular mode due to limited intake capacity Vidyasagar University and other HEIs

(2) Those who are employed in various organizations but have desired to track higher education as a passion or as a means for movement up the promotional ladder.

(3) Drop primarily due to social, financial and economic compulsions as well as population related factors.

(5) Rural population who are living in remote areas where higher education institutes are not easily accessible.

(4) Job seekers of particular field related to zoology

(5) People of any age can participate in higher education programmes as there is no age bar in ODL mode education.

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(d) Appropriateness of the programme to be conducted in the ODL mode for acquiring specific skills and competence:

Vidyasagar University emphasized in innovative approach towards curriculum designing, while conforming to the basic or core requirements to create a common knowledge base for the state and the nation. Post graduate Programme in Arts, Commerce and Science to be offered through ODL mode will have certain learning outcomes. This programme will help the learners to spread higher education in all sectors of community.

- Capacity building among the students particularly from the rural population.
- To apply skills and knowledge in an internship experience.
- To develop skills on hand practical related to science subject and also hands on training in field exposure

The distance learning under Vidyasagar University offer programme in an expanded mode both in volume and the type of programmes. As technology has been getting more affordable and widely available, the interest of both learners and institutions in this special kind of education may be increased enormous.

The confluence of classical and modern types of technologies enables creation of new products and highly competitive processes in a large number of industrial and agricultural activities besides the health sector. The subject **Zoology** being a core subject of natural science in general and core of life science in particular which has under gone a considerable change during last 5 decades specially after the discovery of DNA. The syllabus has been prepared keeping in mind the classical zoology with modern one. The student after obtaining M.Sc degree will be able to possess knowledge on different aspects of the subject. So that they can be competent in handling the academic as well as applied aspects of. As well as working as a zoologist, the in-depth knowledge of animal sciences and lab and field work equips the learners for a career in the environmental, agricultural and pharmaceutical industries.

(e) Instructional Design:

The first step of instructional design in distance mode is curriculum design. A growing number of students globally are enrolling in distance education programs and it is becoming important now, more than ever before, to design curriculum that reflects educational principles, represents elements of engagement and pedagogy and meets institutional and industry requirements. In doing so, it is vital to design contemporary curriculum that ensures these outcomes are attained. In order to effectively design curriculum, the role of the educator as a conductor, technician and choreographer. Finally, a triad has been proposed comprising of pedagogy, technology and an engaged community of learners as a basis for ensuring curriculum meets contemporary practices. For All these subjects the objective of this Open & Distance Learning (ODL) system of education is to develop capacity within and across the region to organize distance learning effectively in order to address the educational challenges and opportunities, particularly in higher education.

i) **Curriculum Design**: The curriculum for M. Sc. in Zoology is designed by a committee comprising of experts from the parent department of the Vidyasagar University along with external experts keeping in view the needs of the diverse groups of learners. Efforts have been made to adopt the syllabus at par with the regular courses in the University as far as racticable. The syllabus after been prepared by the Subject Committee is placed in the

Advisory Committee of Directorate of Distance Education for approval. On getting the approval syllabus is circulated among the students and teachers then uploaded in the website of the University.

ii) Detailed Syllabus:

SEM-ESTER	PAPER CODE	CONTENT	Marks	Credit
I	ZOO 101	Non- Chordates& Chordates	50	4
	ZOO 102	Histochemistry& Animal Physiology	50	4
	ZOO 103	Immunology and Methods in Biology	50	4
	ZOO 104	Cell Biology &Cytogenetics	50	4
	ZOO 195	Non- Chordates, Chordates, Histochemistry& Animal Physiology (Practical)	50	4
	ZOO 196	Immunology, Methods in Biology,Cell Biology &Cytogenetics (Practical)	50	4
	TOTAL		**300**	**24**
II	ZOO-201	Biosystematics & Ecological principles	50	4
	ZOO-202	Biophysics &Biochemistry	50	4
	ZOO-203	Molecular Biology &Parasitology	50	4
	C-ZOO	***Wildlife & Eco-Management and Aqua informatics(CBCS)***	50	4
	ZOO-295	Ecological principles, Biochemistry & Field Study)	50	4
	ZOO-296	Biosystematics, Molecular Biology, Parasitology & Biophysics	50	4
	TOTAL		**300**	**24**
III	ZOO-301	Basic & applied Entomology and Ecotoxicology	50	4
	ZOO-302	Molecular Evolution and Microbiology	50	4
	SPECIAL PAPER (A: Fishery; B:Ecology)			
	ZOO-303A	Fish Taxonomy & Biology and Oceanography	50	4
	ZOO-303B	Biodiversity and Conservation Ecology & Aquatic Ecology		
	C-ZOO-304	***Genetics and Haematology(CBCS)***	50	4
	ZOO-395	Entomology, Ecotoxicology, Molecular Evolution and Microbiology	50	4
	SPECIAL PAPER BASED PRACTICAL			
	ZOO-396A	FISHERY PRACTICAL –I & Field trip	50	4
	ZOO-396B	ECOLOGY PRACTICAL –I & Field trip		
	TOTAL		**300**	**24**
IV	ZOO-401	Environmental pollution & management and Biostatistics	50	4
	ZOO-402	Developmental Biology and Neuro-endocrinology	50	4
	SPECIAL PAPER (A:Fishery; B:Ecology)			
	ZOO-403A	Aquaculture & Inland and Marine Fisheries	50	4
	ZOO-403B	Systems Ecology & Human Ecology		
	ZOO-494	Environmental Management, Bio statistics, Development Biology & Neuro Endocrinology	50	4
	SPECIAL PAPER (A:Fishery; B:Ecology)			
	ZOO-495A	FISHERY PRACTICAL –II	50	4
	ZOO-495B	ECOLOGY PRACTICAL –II		
	SPECIAL PAPER BASED PROJECT/DISSERTATION			
	ZOO 496A	FISHERY SPECIAL Pr.	50	4
	ZOO 496B	ECOLOGY SPECIAL Pr.		
	TOTAL		**300**	**24**
GRAND TOTAL			**1200**	**96**
Each paper of 50 marks = End semester examination (40) + internal assessment (10)				

- **Details text of syllabus is given in the hard copy of the application**

iii) **Duration of the Program**: 4 semesters in 2 years. However, the learners are given time to complete the course within 5 (five) years from the date of admission.

iv) **Instructional Delivery Mechanism**: The programme shall be delivered in two years. The learners shall be provided with the printed SLM which covers almost all the contents in the syllabus. Apart from this the students will be provided with the SLM in electronic media depending on the choice of the learner. The PCP programmes are announced well ahead from the date of commencement. The examination programmes are also announced well before its commencement. The announcement for PCP or Examination is published in the University website and leading news paper of the state. We have a well-structured data base of the contacts of the learners and a system of delivering information to students using ICT. The students are also informed about those programmes by SMS. Counselling is also held in various affiliated study centres. The progress of the learners shall be evaluated by mid-term and end year examination. Examination rules are adopted as per the rules and regulation regular system of the university.

v) **Faculty:** Faculties of Vidyasagar University engaged in regular mode teaching, in addition counsellors from experience teachers of colleges, other universities and research institutes. UGC norms are followed for selecting the counsellors.

vi) **Media**: SLM will be provided in both Print Media, and e-media. The learners will be given choice to avail print media or e-media or both.

vii) **Student Support Service**: Existing facilities of central library, photo copying facilities, free internet and WIFI facility will be available to the students. The students are provided with facilities for canteen, food corners of the university during holding PCP even in holidays.

Further, in order to successfully execute the programme, a wide range of support services are provided to the ODL learners.

Network of Study Centres: To assist its learners of Directorate of Distance Education of Vidyasagar University has established 49 study centres so that learner can choose a study center nearest to the residence.

(f) Procedure for admissions, Curriculum Transaction and evaluation:

Vidyasagar University has taken a concrete admission policy for all courses offered in distance mode. This policy includes notification, minimum eligibility criteria and fee structure. In every academic session the notifications are published in news papers (National Level and local level) and also in the university website. For different subjects the minimum eligibility criteria for admission is different. There is a fixed fee structure for each subject. The learners are instructed to deposit the fee by cheque or draft. The system of on line admission is also in the pipe line.

Fee structure:

Subject	Semistar - I	Semistar - II	Semistar - III	Semistar - IV
M.Sc. (Zoology)	10,700.00 13,700.00 #	10,650.00 13,650.00 #	10,850.00 13,850.00 #	10,800.00 13,800.00 #

Curriculum Transaction incorporates effective planning for providing learning experiences for its learners, organization of planning, administration/implementation of the organized planning and evaluation of the implementations by the implementer and the experts in the relevant field. Curriculum Transaction or Curriculum management is the process of planning and organizing the curriculum in a particular subject area for different levels of education and continuously monitor it while being implemented. The main responsibility of the curriculum transaction lies on the teachers and trainers who may use different types of pedagogies to create a nice academic environment in the institution and students can be benefited in gaining knowledge and developing skills. Curriculum transaction is always done through Personal Contact Programmes (PCP). The PCP should aim to address not only the problems faced by the individual learners but also compensate the pedagogic

limitations of the SLM. So it will not just bring together learners to solve their problems but will be an intervention for organizing activities to be carried out in teams, using multiple sources of information available in the university. The activities presently supposed to be carried out at the PCP such as clarification of doubts; laboratory work and so on will be a part of the curriculum transaction process planned for the PCP. Efforts are being done to provide e-learning facility.

Evaluation: The evaluation of learners will be made by two modes – internal assessment/assignments and end-year examination. For the evaluation of scripts there will be a system of **spot evaluation** for expediting the publication of result, i.e., the examiners will come to Directorate of Distance Education and will examine the answer scripts and submit the marks on the spot. In some cases, answer scripts are sent to the examiners and evaluated scripts are collected by messengers within a stipulated time. Qualified examiners will be appointed for this purpose. There is a system of re-examination of scripts after publication of results. The computerized system of database formation and preparation mark sheet and certificate will be employed for correct and speedy delivery of results to the learners.

(g) Requirement of Laboratory Support and Library resource:

Laboratory support is essential to the learner of distance education system in case of laboratory-based subjects like, Zoology. Directorate of Distance Education, Vidyasagar University have established dedicated laboratory in the directorate of Distance Education for M. Sc. in Zoology to give exposure of practical knowledge to the learners. Our laboratories are well equipped with sophisticated instruments:

Zoology Laboratory is equipped with the following instruments:

Hot-air-oven, Analytical Instruments (Balance, Digital etc), pH. Meter, Spectrophotometer, Water Bath, Deep Freezer, Flame Photometer, Remi centrifuge, Colorimeter, Soil thermometer, Lux meter, Sound meter etc. along with plenty of chemicals & glass wares.

Practical classes of a particular subject are arranged group wise so that all the learners get sufficient attention and proper training from counsellors and laboratory instructors. Like theory classes, practical PCP schedule is announced by news paper and university website at least before 15 days. Apart from the dedicated laboratory of DDE, the students are also trained in regular departments of the university.

Library facility: The students are provided with library facility in the central library of the University. They are used to get reading room as well as lending facilities. The central library is equipped with a number of e-book and e-journals. The learners may also avail such facilities. The faculty members are provided with 'remote user' facility by the central library of Vidyasagar University

(h) Cost Estimate of the Programme and the Provisions:

Estimated cost of the programme and the provisions are given in a table below

Subject	Development (Lakh)	Delivery (Lakh)	Maintenance (Lakh)	Total (lakhs)
M. Sc. in Zoology	11	9	19	35

Provisions: As it is a continued programme the infrastructure is already in existence. The other expenses will be fulfilled from the fees collected from the students.

(i) Quality Assurance Mechanism and Expected Programme outcome:

Quality assurance (QA) for distance higher education is one of the main concerns among institutions

and stakeholders today. Quality has always been an issue in distance education (DE) and distance learning (DL). Quality assurance in distance and higher education has gained serious attention by institutions, stakeholders, and scholars. In response to QA line of inquiry, institutions have begun to re-define and re-orient their institutional missions and strategic visions to incorporate and address quality issues. QA has now reached an important turning point and is influencing DE institution's

management strategies and cultures. Learners are demanding better quality educational services and provisions. To fulfil these demands, our Directorate of Distance Education must pay close attention to quality in terms of study material, quality of PCP counsellor, delivery systems and administrative facility to the learner.

The following major steps would be taken for quality assurance: -

i) Establishment of Center for Internal Quality Assurance
ii) Revision of curriculum in 3 years interval
iii) Quality improvement of SLM
iv) Emphasize for online learning system
v) More emphasis of practical training of the learners in science subjects by improving the quality of laboratories with sophisticated instruments.
vi) More use of ICT for the management of DL of the university

The expected outcome of the programme is to develop the knowledge and skill of learners of the specific field. The learner may go for further higher education programmes, e.g., M. Phil, Ph. D., M. Tech and other professional programmes. After completion of the programme by distance mode the learner may prepare themselves for different job-oriented entrance examinations, e.g. NET, GATE, College service entrance (CSC), School Service Entrance (SSC) etc., Thus they may be employed in Govt. and non-govt. sectors. Apart from this, their training may enable them for self employment.

The learners after getting Masters in Zoology may get jobs directly related to your degree include: Ecologist, Environmental consultant, Field trials officer, Marine scientist, Nature conservation officer, Physician associate, Research scientist (life sciences). Moreover,the degree is also useful in the following : Biomedical scientist, Environmental education officer, Environmental manager, Toxicologis.

INSTRUCTION OF UGC FOR THE WRITING OF SLM

(SLM = SELF LEARNING MANAGEMENT)

Course : BNG-101

- **শিরোনাম (Title of the Unit)**

১.১ ইন্দো-ইউরোপীয় ভাষাংশের পরিচয়

- **গঠন প্রণালী (Structure of the Content OR Unit Structure)**

১.১.১ প্রাসঙ্গিকতা ও উদ্দেশ্য (Relevance and Objectives of the Unit)

১.১.২ ভূমিকা (Introduction)

১.১.৩ অধ্যায় বিভাজন (Appropriate Section and Subsection Heading)

১.১.৪ বিষয়বস্তু (Subject Matter)

ক. ইন্দো-ইরানীয়

খ. বাল্‌তো-স্লাভিক

গ. আলবানীয়

ঘ. আর্মেনীয়

ঙ. গ্রিক

চ. ইতালিক

ছ. জার্মানিক

জ. কেলতিক

ঝ. তোখারীয়

ঞ. আনাতোলীয়

১.১.৫ সারসংক্ষেপ (Summary)

১.১.৬ অনুশীলনী (Questions)

১.১.৭ সহায়ক গ্রন্থ (References or Bibliography)

INSTRUCTION OF UGC FOR THE WRITING OF SLM

(SLM = SELF LEARNING MANAGEMENT)

Course : BNG-101

- **শিরোনাম (Title of the Unit)**

১.২ মধ্যভারতীয় আর্যভাষা (প্রাকৃতের সাধারণ পরিচয় ও পাঁচটি সাহিত্যিক প্রাকৃত)

- **গঠন প্রণালী (Structure of the Content OR Unit Structure)**

১.২.১ প্রাসঙ্গিকতা ও উদ্দেশ্য (Relevance and Objectives of the Unit)

১.২.২ ভূমিকা (Introduction)

১.২.৩ অধ্যায় বিভাজন (Appropriate Section and Subsection Heading)

১.২.৪ বিষয়বস্তু (Subject Matter)

ক. ভারতীয় আর্যভাষার কাল স্তর

খ. মধ্যভারতীয় আর্যভাষার মুখ্যভাষার প্রাকৃত ও তার বিভিন্ন স্তর

গ. মধ্যভারতীয় আর্যভাষার ভাষাতাত্ত্বিক বৈশিষ্ট্য

ঘ. আদি প্রাকৃত বা প্রত্নলিপির প্রাকৃত
(i) উত্তর-পশ্চিমা প্রাকৃত
(ii) দক্ষিণ-পশ্চিমা প্রাকৃত
(iii) প্রাচ্যামধ্য প্রাকৃত
(iv) প্রাচ্য প্রাকৃত

ঙ. সাহিত্যিক প্রাকৃত
(i) মহারাষ্ট্রী প্রাকৃত
(ii) শৌরসেনী প্রাকৃত
(iii) পৈশাচী প্রাকৃত
(iv) অর্ধমাগধী প্রাকৃত
(v) মাগধী প্রাকৃত

চ. মধ্যভারতীয় আর্যভাষার অন্ত্যস্তর

১.২.৫ সারসংক্ষেপ (Summary)

১.২.৬ অনুশীলনী (Questions)

১.২.৭ সহায়ক গ্রন্থ (References or Bibliography)

INSTRUCTION OF UGC FOR THE WRITING OF SLM

(SLM = SELF LEARNING MANAGEMENT)

Course : BNG-101

- **শিরোনাম (Title of the Unit)**

১.৩ বাংলা ভাষার উৎস ও বিবর্তন, বিভিন্ন স্তরের ভাষা পরিচয়

- **গঠন প্রণালী (Structure of the Content OR Unit Structure)**

১.৩.১ প্রাসঙ্গিকতা ও উদ্দেশ্য (Relevance and Objectives of the Unit)

১.৩.২ ভূমিকা (Introduction)

১.৩.৩ অধ্যায় বিভাজন (Appropriate Section and Subsection Heading)

১.৩.৪ বিষয়বস্তু (Subject Matter)

ক. বাংলা ভাষার উদ্ভব ও ক্রমবিকাশ

খ. প্রাচীন বাংলা ভাষার সময় নিদর্শন ও বৈশিষ্ট্য

গ. আদি-মধ্য বাংলা ভাষার সময়, নিদর্শন ও বৈশিষ্ট্য

ঘ. অন্ত্যমধ্য বাংলা ভাষার সময়, নিদর্শন ও বৈশিষ্ট্য

ঙ. আধুনিক বাংলা ভাষার সময়, নিদর্শন ও বৈশিষ্ট্য

১.৩.৫ সারসংক্ষেপ (Summary)

১.৩.৬ অনুশীলনী (Questions)

১.৩.৭ সহায়ক গ্রন্থ (References or Bibliography)

INSTRUCTION OF UGC FOR THE WRITING OF SLM

(SLM = SELF LEARNING MANAGEMENT)

Course : BNG-101

- **শিরোনাম (Title of the Unit)**

১.৪ বাংলা উপভাষা ও বিভাষা, লোকভাষা ও আদর্শ কথ্যভাষা

- **গঠন প্রণালী (Structure of the Content OR Unit Structure)**

১.৪.১ প্রাসঙ্গিকতা ও উদ্দেশ্য (Relevance and Objectives of the Unit)

১.৪.২ ভূমিকা (Introduction)

১.৪.৩ অধ্যায় বিভাজন (Appropriate Section and Subsection Heading)

১.৪.৪ বিষয়বস্তু (Subject Matter)

ক. ভাষা

খ. ভাষা ও উপভাষা

গ. বিভাষা

ঘ. নিভাষা

ঙ. বাংলা উপভাষা

চ. উপভাষা বিভাজন ও বিবর্তন

ছ. লোকভাষা

জ. আদর্শ কথ্যভাষা

১.৪.৫ সারসংক্ষেপ (Summary)

১.৪.৬ অনুশীলনী (Questions)

১.৪.৭ সহায়ক গ্রন্থ (References or Bibliography)

INSTRUCTION OF UGC FOR THE WRITING OF SLM

(SLM = SELF LEARNING MANAGEMENT)

Course : BNG-102

- **শিরোনাম (Title of the Unit)**

২.১ প্রাচীন ও মধ্যযুগের বাংলাদেশের ভৌগোলিক পরিচয়

- **গঠন প্রণালী (Structure of the Content OR Unit Structure)**

১.৪.১ প্রাসঙ্গিকতা ও উদ্দেশ্য (Relevance and Objectives of the Unit)

১.৪.২ ভূমিকা (Introduction)

১.৪.৩ অধ্যায় বিভাজন (Appropriate Section and Subsection Heading)

১.৪.৪ বিষয়বস্তু (Subject Matter)

ক. উত্তর পার্বত্য অঞ্চল

খ. পূর্বাঞ্চল

গ. পশ্চিমাঞ্চল

ঘ. দক্ষিণাঞ্চল

২.১.৫ সারসংক্ষেপ (Summary)

২.১.৬ অনুশীলনী (Questions)

২.১.৭ সহায়ক গ্রন্থ (References or Bibliography)

INSTRUCTION OF UGC FOR THE WRITING OF SLM

(SLM = SELF LEARNING MANAGEMENT)

Course : BNG-102

- **শিরোনাম (Title of the Unit)**

২.২ বাঙালি জাতি পরিচয়

- **গঠন প্রণালী (Structure of the Content OR Unit Structure)**

২.২.১ প্রাসঙ্গিকতা ও উদ্দেশ্য (Relevance and Objectives of the Unit)

২.২.২ ভূমিকা (Introduction)

২.২.৩ অধ্যায় বিভাজন (Appropriate Section and Subsection Heading)

২.২.৪ বিষয়বস্তু (Subject Matter)

ক. বাঙলার ইতিহাস
খ. বাঙলার নৃতাত্ত্বিক পরিচয়
গ. বাঙলা নামের উদ্ভব ও বিবর্তন
ঘ. বাঙলা নামকরণ
ঙ. বাঙলা ভূ-খণ্ডের সীমা নির্দেশ
চ. বাঙলার লোকপ্রকৃতি
ছ. বাঙালি সংস্কৃতি উৎস-সিন্ধু সভ্যতা
জ. বাঙলার নদ-নদী
ঝ. বাঙালির খাদ্যাভ্যাস
ঞ. বাঙালির খাদ্যাভ্যাস ও উপবাসে জ্যোতিষিক অনুশাসন
ট. বাঙালির পোশাক-পরিচ্ছেদ
ঠ. বাঙালির ধর্মীয় জীবন
ড. বাঙালির বর্ণবৈষম্য
ঢ. বাঙালির বিদ্যাচর্চা ও সাহিত্য সাধনা
ণ. বাঙালির সংস্কৃতির লৌকিক রূপ

২.২.৫ সারসংক্ষেপ (Summary)

২.২.৬ অনুশীলনী (Questions)

২.২.৭ সহায়ক গ্রন্থ (References or Bibliography)

INSTRUCTION OF UGC FOR THE WRITING OF SLM

(SLM = SELF LEARNING MANAGEMENT)

Course : BNG-102

- **শিরোনাম (Title of the Unit)**

২.৩ প্রাচীন ও মধ্যবাংলার ধর্ম পরিচয়

- **গঠন প্রণালী (Structure of the Content OR Unit Structure)**

২.৩.১ প্রাসঙ্গিকতা ও উদ্দেশ্য (Relevance and Objectives of the Unit)

২.৩.২ ভূমিকা (Introduction)

২.৩.৩ অধ্যায় বিভাজন (Appropriate Section and Subsection Heading)

২.৩.৪ বিষয়বস্তু (Subject Matter)

ক. বৈষ্ণব সহজিয়া ধর্ম পরিচয় – কৃষ্ণভক্তি / শ্রীকৃষ্ণকীর্তন

খ. মঙ্গলকাব্য

গ. নাথ সাহিত্য

ঘ. সুফী সাধনা

ঙ. বাউল গান

চ. শাক্ত সাধনা ও শাক্তধর্ম তত্ত্ব

২.৩.৫ সারসংক্ষেপ (Summary)

২.৩.৬ অনুশীলনী (Questions)

২.৩.৭ সহায়ক গ্রন্থ (References or Bibliography)

INSTRUCTION OF UGC FOR THE WRITING OF SLM

(SLM = SELF LEARNING MANAGEMENT)

Course : BNG-102

- **শিরোনাম (Title of the Unit)**

২.৪ বৈষ্ণব সাহিত্য ও জীবনী সাহিত্য ধারার পরিচয়

- **গঠন প্রণালী (Structure of the Content OR Unit Structure)**

২.৪ .১ প্রাসঙ্গিকতা ও উদ্দেশ্য (Relevance and Objectives of the Unit)

২.৪ .২ ভূমিকা (Introduction)

২.৪ .৩ অধ্যায় বিভাজন (Appropriate Section and Subsection Heading)

২.৪ .৪ বিষয়বস্তু (Subject Matter)

ক . বৈষ্ণব সাহিত্য ধারার পরিচয়

খ . জীবনী সাহিত্য ধারার পরিচয়

২.৪ .৫ সারসংক্ষেপ (Summary)

২.৪ .৬ অনুশীলনী (Questions)

২.৪ .৭ সহায়ক গ্রন্থ (References or Bibliography)

INSTRUCTION OF UGC FOR THE WRITING OF SLM

(SLM = SELF LEARNING MANAGEMENT)

Course : BNG-103

- **শিরোনাম (Title of the Unit)**

৩.১ মঙ্গলকাব্য ধারার পরিচয় (মনসামঙ্গল, চণ্ডীমঙ্গল, ধর্মমঙ্গল ও শিবায়ন কাব্য)

- **গঠন প্রণালী (Structure of the Content OR Unit Structure)**

৩.১.১ প্রাসঙ্গিকতা ও উদ্দেশ্য (Relevance and Objectives of the Unit)

৩.১.২ ভূমিকা (Introduction)

৩.১.৩ অধ্যায় বিভাজন (Appropriate Section and Subsection Heading)

৩.১.৪ বিষয়বস্তু (Subject Matter)

ক. সমকালীন সমাজজীবনের পরিচয়

খ. মঙ্গলকাব্য: কবি, বিষয় সংক্ষেপ

গ. মঙ্গলকাব্য: উৎস ও নামকরণ

ঘ. মনসামঙ্গল কাব্য পরিচয়

ঙ. চণ্ডীমঙ্গল কাব্য পরিচয়

চ. ধর্মমঙ্গল কাব্য পরিচয়

ছ. শিবায়ন কাব্য পরিচয়

৩.১.৫ সারসংক্ষেপ (Summary)

৩.১.৬ অনুশীলনী (Questions)

৩.১.৭ সহায়ক গ্রন্থ (References or Bibliography)

INSTRUCTION OF UGC FOR THE WRITING OF SLM

(SLM = SELF LEARNING MANAGEMENT)

Course : BNG-103

- **শিরোনাম (Title of the Unit)**

৩.২ অনুবাদ সাহিত্য (মালাধর বসু, কৃত্তিবাস ওঝা, সৈয়দ আলাওল ও দৌলত কাজী)

- **গঠন প্রণালী (Structure of the Content OR Unit Structure)**

৩.২.১ প্রাসঙ্গিকতা ও উদ্দেশ্য (Relevance and Objectives of the Unit)

৩.২.২ ভূমিকা (Introduction)

৩.২.৩ অধ্যায় বিভাজন (Appropriate Section and Subsection Heading)

৩.২.৪ বিষয়বস্তু (Subject Matter)

ক. মালাধর বসু

খ. কৃত্তিবাস ওঝা

গ. সৈয়দ আলাওল

ঘ. দৌলত কাজী

৩.২.৫ সারসংক্ষেপ (Summary)

৩.২.৬ অনুশীলনী (Questions)

৩.২.৭ সহায়ক গ্রন্থ (References or Bibliography)

INSTRUCTION OF UGC FOR THE WRITING OF SLM

(SLM = SELF LEARNING MANAGEMENT)

Course : BNG-103

- **শিরোনাম (Title of the Unit)**

৩.৩ শাক্তপদাবলী

- **গঠন প্রণালী (Structure of the Content OR Unit Structure)**

৩.৩.১ প্রাসঙ্গিকতা ও উদ্দেশ্য (Relevance and Objectives of the Unit)

৩.৩.২ ভূমিকা (Introduction)

৩.৩.৩ অধ্যায় বিভাজন (Appropriate Section and Subsection Heading)

৩.৩.৪ বিষয়বস্তু (Subject Matter)

ক. রামপ্রসাদ

খ. কমলাকান্ত

৩.৩.৫ সারসংক্ষেপ (Summary)

৩.৩.৬ অনুশীলনী (Questions)

৩.৩.৭ সহায়ক গ্রন্থ (References or Bibliography)

INSTRUCTION OF UGC FOR THE WRITING OF SLM

(SLM = SELF LEARNING MANAGEMENT)

Course : BNG-103

- **শিরোনাম (Title of the Unit)**

৩.৪ নাথ সাহিত্য, কবিগান ও বাউল সঙ্গীত

- **গঠন প্রণালী (Structure of the Content OR Unit Structure)**

৩.৪.১ প্রাসঙ্গিকতা ও উদ্দেশ্য (Relevance and Objectives of the Unit)

৩.৪.২ ভূমিকা (Introduction)

৩.৪.৩ অধ্যায় বিভাজন (Appropriate Section and Subsection Heading)

৩.৪.৪ বিষয়বস্তু (Subject Matter)

ক. নাথ সাহিত্য পরিচয়

খ. কবিগানের ধারাবাহিক বিকাশ

গ. বাউল সংগীত

৩.৪.৫ সারসংক্ষেপ (Summary)

৩.৪.৬ অনুশীলনী (Questions)

৩.৪.৭ সহায়ক গ্রন্থ (References or Bibliography)

INSTRUCTION OF UGC FOR THE WRITING OF SLM

(SLM = SELF LEARNING MANAGEMENT)

Course : BNG-104

- **শিরোনাম (Title of the Unit)**

৪.১ উনিশ শতকের প্রথমার্ধের গদ্য ও প্রবন্ধ সাহিত্যের ইতিহাস

- **গঠন প্রণালী (Structure of the Content OR Unit Structure)**

৪.১.১ প্রাসঙ্গিকতা ও উদ্দেশ্য (Relevance and Objectives of the Unit)

৪.১.২ ভূমিকা (Introduction)

৪.১.৩ অধ্যায় বিভাজন (Appropriate Section and Subsection Heading)

৪.১.৪ বিষয়বস্তু (Subject Matter)

ক. শ্রীরামপুর মিশন

খ. ফোর্ট উইলিয়াম কলেজ

গ. অপ্রধান লেখক গোষ্ঠী

৪.১.৫ সারসংক্ষেপ (Summary)

৪.১.৬ অনুশীলনী (Questions)

৪.১.৭ সহায়ক গ্রন্থ (References or Bibliography)

INSTRUCTION OF UGC FOR THE WRITING OF SLM

(SLM = SELF LEARNING MANAGEMENT)

Course : BNG-104

- **শিরোনাম (Title of the Unit)**

৪.২ উনিশ শতকের দ্বিতীয়ার্ধের আখ্যান ও প্রবন্ধ সাহিত্য

- **গঠন প্রণালী (Structure of the Content OR Unit Structure)**

৪.২.১ প্রাসঙ্গিকতা ও উদ্দেশ্য (Relevance and Objectives of the Unit)

৪.২.২ ভূমিকা (Introduction)

৪.২.৩ অধ্যায় বিভাজন (Appropriate Section and Subsection Heading)

৪.২.৪ বিষয়বস্তু (Subject Matter)

ক. বিদ্যাসাগর

খ. অক্ষয়কুমার দত্ত

গ. ভূদেব মুখোপাধ্যায়

ঘ. বঙ্কিমচন্দ্র চট্টোপাধ্যায়

ঙ. প্যারীচাঁদ মিত্র

৪.২.৫ সারসংক্ষেপ (Summary)

৪.২.৬ অনুশীলনী (Questions)

৪.২.৭ সহায়ক গ্রন্থ (References or Bibliography)

INSTRUCTION OF UGC FOR THE WRITING OF SLM

(SLM = SELF LEARNING MANAGEMENT)

Course : BNG-104

- **শিরোনাম (Title of the Unit)**

৪.৩ বিশ শতকের প্রথমার্ধের প্রবন্ধ সাহিত্য

- **গঠন প্রণালী (Structure of the Content OR Unit Structure)**

৪.৩.১ প্রাসঙ্গিকতা ও উদ্দেশ্য (Relevance and Objectives of the Unit)

৪.৩.২ ভূমিকা (Introduction)

৪.৩.৩ অধ্যায় বিভাজন (Appropriate Section and Subsection Heading)

৪.৩.৪ বিষয়বস্তু (Subject Matter)

ক. প্রমথ চৌধুরী

খ. শরৎচন্দ্র চট্টোপাধ্যায়

গ. সুধীন্দ্রনাথ দত্ত

ঘ. জীবনানন্দ দাশ

৪.৩.৫ সারসংক্ষেপ (Summary)

৪.৩.৬ অনুশীলনী (Questions)

৪.৩.৭ সহায়ক গ্রন্থ (References or Bibliography)

INSTRUCTION OF UGC FOR THE WRITING OF SLM

(SLM = SELF LEARNING MANAGEMENT)

Course : BNG-104

- **শিরোনাম (Title of the Unit)**

৪.৪ বিশ শতকের দ্বিতীয়ার্ধের প্রবন্ধ সাহিত্য

- **গঠন প্রণালী (Structure of the Content OR Unit Structure)**

৪.৪.১ প্রাসঙ্গিকতা ও উদ্দেশ্য (Relevance and Objectives of the Unit)

৪.৪.২ ভূমিকা (Introduction)

৪.৪.৩ অধ্যায় বিভাজন (Appropriate Section and Subsection Heading)

৪.৪.৪ বিষয়বস্তু (Subject Matter)

ক. অন্নদাশঙ্কর রায়

খ. বুদ্ধদেব বসু

গ. সুনীতিকুমার চট্টোপাধ্যায়

ঘ. শশিভূষণ দাশগুপ্ত

ঙ. অলোকরঞ্জন দাশগুপ্ত

চ. শঙ্খ ঘোষ

ছ. তপোব্রত ঘোষ

৪.৪.৫ সারসংক্ষেপ (Summary)

৪.৪.৬ অনুশীলনী (Questions)

৪.৪.৭ সহায়ক গ্রন্থ (References or Bibliography)

INSTRUCTION OF UGC FOR THE WRITING OF SLM

(SLM = SELF LEARNING MANAGEMENT)

Course : BNG-105

- **শিরোনাম (Title of the Unit)**

৫.১ উনিশ শতকের কবিতার ধারা

- **গঠন প্রণালী (Structure of the Content OR Unit Structure)**

৫.১.১ প্রাসঙ্গিকতা ও উদ্দেশ্য (Relevance and Objectives of the Unit)

৫.১.২ ভূমিকা (Introduction)

৫.১.৩ অধ্যায় বিভাজন (Appropriate Section and Subsection Heading)

৫.১.৪ বিষয়বস্তু (Subject Matter)

ক. ঈশ্বর গুপ্ত

খ. রঙ্গলাল বন্দ্যোপাধ্যায়

গ. মধুসূদন দত্ত

ঘ. হেমচন্দ্র বন্দ্যোপাধ্যায়

ঙ. নবীনচন্দ্র সেন

চ. বিহারীলাল চক্রবর্তী

৫.১.৫ সারসংক্ষেপ (Summary)

৫.১.৬ অনুশীলনী (Questions)

৫.১.৭ সহায়ক গ্রন্থ (References or Bibliography)

INSTRUCTION OF UGC FOR THE WRITING OF SLM

(SLM = SELF LEARNING MANAGEMENT)

Course : BNG-105

- **শিরোনাম (Title of the Unit)**

৫.২ বিশ শতকের প্রথমার্ধের কবিতার ধারা

- **গঠন প্রণালী (Structure of the Content OR Unit Structure)**

৫.২.১ প্রাসঙ্গিকতা ও উদ্দেশ্য (Relevance and Objectives of the Unit)

৫.২.২ ভূমিকা (Introduction)

৫.২.৩ অধ্যায় বিভাজন (Appropriate Section and Subsection Heading)

৫.২.৪ বিষয়বস্তু (Subject Matter)

ক. কালিদাস রায়

খ. নজরুল ইসলাম

গ. যতীন্দ্রনাথ সেনগুপ্ত

ঘ. অমিয় চক্রবর্তী

ঙ. জীবনানন্দ দাশ

চ. সুধীন্দ্রনাথ দত্ত

ছ. বিষ্ণু দে

৫.২.৫ সারসংক্ষেপ (Summary)

৫.২.৬ অনুশীলনী (Questions)

৫.২.৭ সহায়ক গ্রন্থ (References or Bibliography)

INSTRUCTION OF UGC FOR THE WRITING OF SLM

(SLM = SELF LEARNING MANAGEMENT)

Course : BNG-105

- **শিরোনাম (Title of the Unit)**

৫.৩ বিশ শতকের দ্বিতীয়ার্ধের কবিতার ধারা

- **গঠন প্রণালী (Structure of the Content OR Unit Structure)**

৫.৩.১ প্রাসঙ্গিকতা ও উদ্দেশ্য (Relevance and Objectives of the Unit)

৫.৩.২ ভূমিকা (Introduction)

৫.৩.৩ অধ্যায় বিভাজন (Appropriate Section and Subsection Heading)

৫.৩.৪ বিষয়বস্তু (Subject Matter)

ক. সুভাষ মুখোপাধ্যায়

খ. শক্তি চট্টোপাধ্যায়

গ. শঙ্খ ঘোষ

ঘ. সুনীল গঙ্গোপাধ্যায়

ঙ. বিনয় মজুমদার

চ. অলোকরঞ্জন দাশগুপ্ত

ছ. বীতশোক ভট্টাচার্য

৫.৩.৫ সারসংক্ষেপ (Summary)

৫.৩.৬ অনুশীলনী (Questions)

৫.৩.৭ সহায়ক গ্রন্থ (References or Bibliography)

INSTRUCTION OF UGC FOR THE WRITING OF SLM

(SLM = SELF LEARNING MANAGEMENT)

Course : BNG-201

- **শিরোনাম (Title of the Unit)**

৬.১ ভাষার ধ্বনি সংক্রান্ত আলোচনা

- **গঠন প্রণালী (Structure of the Content OR Unit Structure)**

৬.১.১ প্রাসঙ্গিকতা ও উদ্দেশ্য (Relevance and Objectives of the Unit)

৬.১.২ ভূমিকা (Introduction)

৬.১.৩ অধ্যায় বিভাজন (Appropriate Section and Subsection Heading)

৬.১.৪ বিষয়বস্তু (Subject Matter)

ক. ধ্বনি

খ. ধ্বনি - ধ্বনিকল্প - ধ্বনিবিকল্প

গ. ধ্বনিকল্পের উচ্চারণে বৈচিত্র্যের কারণ

ঘ. ধ্বনিকল্প ও ধ্বনিবিকল্প নির্ণয়ের নীতি

ঙ. ধ্বনিকল্প নির্ণয়ের সূত্র

চ. ধ্বনি বিকল্প নির্ণয়ের সূত্র

ছ. বাংলা ধ্বনি

জ. স্বরধ্বনি শ্রেণিবিভাগ

ঝ. ব্যঞ্জনধ্বনির শ্রেণিবিভাগ

ঞ. বাংলা অক্ষর

ট. বাংলা অক্ষরের গঠন কাঠামো

৬.১.৫ সারসংক্ষেপ (Summary)

৬.১.৬ অনুশীলনী (Questions)

৬.১.৭ সহায়ক গ্রন্থ (References or Bibliography)

INSTRUCTION OF UGC FOR THE WRITING OF SLM

(SLM = SELF LEARNING MANAGEMENT)

Course : BNG-201

- **শিরোনাম (Title of the Unit)**

৬.২ বাংলা ভাষার রূপতত্ত্ব সংক্রান্ত আলোচনা

- **গঠন প্রণালী (Structure of the Content OR Unit Structure)**

৬.২.১ প্রাসঙ্গিকতা ও উদ্দেশ্য (Relevance and Objectives of the Unit)

৬.২.২ ভূমিকা (Introduction)

৬.২.৩ অধ্যায় বিভাজন (Appropriate Section and Subsection Heading)

৬.২.৪ বিষয়বস্তু (Subject Matter)

ক. রূপ

খ. রূপিম

গ. রূপিম বৈশিষ্ট্য

ঘ. রূপিম ও শব্দ

ঙ. রূপিম ও অক্ষর

চ. অ্যালোমর্ফ

ছ. উপরূপের গণা বৈশিষ্ট্য

জ. রূপিম নির্ণয়ের নানা পদ্ধতি

ঝ. রূপিমের শ্রেণিবিভাগ

ঞ. বাংলা শব্দের গঠন ও গঠনগত

ট. রূপতত্ত্বগত বৈচিত্র্য

৬.২.৫ সারসংক্ষেপ (Summary)

৬.২.৬ অনুশীলনী (Questions)

৬.২.৭ সহায়ক গ্রন্থ (References or Bibliography)

INSTRUCTION OF UGC FOR THE WRITING OF SLM

(SLM = SELF LEARNING MANAGEMENT)

Course : BNG-201

- **শিরোনাম (Title of the Unit)**

৬.৩ বাংলা শব্দরূপ ও ক্রিয়ারূপের বৈচিত্র্য

- **গঠন প্রণালী (Structure of the Content OR Unit Structure)**

৬.৩.১ প্রাসঙ্গিকতা ও উদ্দেশ্য (Relevance and Objectives of the Unit)

৬.৩.২ ভূমিকা (Introduction)

৬.৩.৩ অধ্যায় বিভাজন (Appropriate Section and Subsection Heading)

৬.৩.৪ বিষয়বস্তু (Subject Matter)

ক. বাংলা শব্দরূপের বৈচিত্র্য

খ. বাংলা ক্রিয়াপদের বৈচিত্র্য

৬.৩.৫ সারসংক্ষেপ (Summary)

৬.৩.৬ অনুশীলনী (Questions)

৬.৩.৭ সহায়ক গ্রন্থ (References or Bibliography)

INSTRUCTION OF UGC FOR THE WRITING OF SLM

(SLM = SELF LEARNING MANAGEMENT)

Course : BNG-201

- **শিরোনাম (Title of the Unit)**

৬.৪ বাংলা ভাষার বাক্য সংক্রান্ত আলোচনা

- **গঠন প্রণালী (Structure of the Content OR Unit Structure)**

৬.৪.১ প্রাসঙ্গিকতা ও উদ্দেশ্য (Relevance and Objectives of the Unit)

৬.৪.২ ভূমিকা (Introduction)

৬.৪.৩ অধ্যায় বিভাজন (Appropriate Section and Subsection Heading)

৬.৪.৪ বিষয়বস্তু (Subject Matter)

ক. বাক্য

খ. অব্যবহিত উপাদান

গ. অব্যবহিত উপাদান এবং পদগুচ্ছ বিশ্লেষণ

ঘ. গঠনগত সমরূপতা

ঙ. সংগঠন আদর্শ এবং উপাদান শ্রেণী

চ. পদগুচ্ছ সংগঠন সূত্র

ছ. আধাগঠন ও অধিগঠন

জ. বাক্য ও শব্দার্থ

ঝ. বাংলা ভাষার রূপ ও পদ

ঞ. বাংলা পদগুচ্ছ

ট. সহায়ক ও অন্যান্য রূপ

ঠ. বাক্য উপাদানের ক্রম

ড. বাক্যের গঠনগত শ্রেণী

ঢ. বাক্যখণ্ড ও পদগুচ্ছ

৬.৪.৫ সারসংক্ষেপ (Summary)

৬.৪.৬ অনুশীলনী (Questions)

৬.৪.৭ সহায়ক গ্রন্থ (References or Bibliography)

INSTRUCTION OF UGC FOR THE WRITING OF SLM

(SLM = SELF LEARNING MANAGEMENT)

Course : BNG-202

- **শিরোনাম (Title of the Unit)**

৭.১ চর্যাপদ, পাঠ্যপদ:

১. কা আ তরুবর পঞ্চবি ডাল

২. উঁচা উঁচা পাবত

৩. টালত ঘর মোর

৪. নগর বাহিরি রে ডোম্বী।

৫. কাহারে ঘেনি

- **গঠন প্রণালী (Structure of the Content OR Unit Structure)**

৭.১.১ প্রাসঙ্গিকতা ও উদ্দেশ্য (Relevance and Objectives of the Unit)

৭.১.২ ভূমিকা (Introduction)

৭.১.৩ অধ্যায় বিভাজন (Appropriate Section and Subsection Heading)

৭.১.৪ বিষয়বস্তু (Subject Matter)

ক. আবিষ্কার ও প্রকাশ

খ. চর্যাপদের ভাষা

গ. নামকরণ

ঘ. রচনাকাল, চর্যাপদের সংখ্যা, কবিপরিচয়

ঙ. চর্যাপদে লোকায়ত জীবন

চ. সমাজচিত্র

ছ. বিষয়বস্তু / সাধনতত্ত্ব / রূপকার্য অন্বেষণ

জ. ছন্দ / অলংকার / কাব্যমূল্য

৭.১.৫ সারসংক্ষেপ (Summary)

৭.১.৬ অনুশীলনী (Questions)

৭.১.৭ সহায়ক গ্রন্থ (References or Bibliography)

INSTRUCTION OF UGC FOR THE WRITING OF SLM

(SLM = SELF LEARNING MANAGEMENT)

Course : BNG-202

- **শিরোনাম (Title of the Unit)**

৭.২ শ্রীকৃষ্ণকীর্তন (পাঠ্য - বংশী খণ্ড)

- **গঠন প্রণালী (Structure of the Content OR Unit Structure)**

৭.২.১ প্রাসঙ্গিকতা ও উদ্দেশ্য (Relevance and Objectives of the Unit)

৭.২.২ ভূমিকা (Introduction)

৭.২.৩ অধ্যায় বিভাজন (Appropriate Section and Subsection Heading)

৭.২.৪ বিষয়বস্তু (Subject Matter)

ক. আবিষ্কার ও প্রকাশ

খ. পুঁথির পরিচয় ও নামকরণ

গ. রচনাকাল, লিপিকাল ও কবি পরিচয়

ঘ. বাংলা সাহিত্যে গ্রন্থটির গুরুত্ব

ঙ. কাহিনী বিশ্লেষণ

চ. লোকনাট্য বা নাটগীতিমূলক কাব্য

ছ. চরিত্র - রাধা, কৃষ্ণ, বড়াই

জ. কাব্যটির শ্লীলতা, অশ্লীলতা

ঝ. কাব্যটিতে প্রবাদ প্রবচনের ব্যবহার

ঞ. হাস্যরস

ট. সাহিত্যমূল্য

ঠ. কথাশেষ

৭.২.৫ সারসংক্ষেপ (Summary)

৭.২.৬ অনুশীলনী (Questions)

৭.২.৭ সহায়ক গ্রন্থ (References or Bibliography)

INSTRUCTION OF UGC FOR THE WRITING OF SLM

(SLM = SELF LEARNING MANAGEMENT)

Course : BNG-202

- **শিরোনাম (Title of the Unit)**

৭.৩ বৈষ্ণব পদাবলী - পাঠ্যপদ:

১. চীরচন্দ উরে (বিদ্যাপতি)

২. বন্ধু সকলি আমার দোষ (চণ্ডীমঙ্গল)

৩. চাহ মুখ তুলি রাই (জ্ঞান দাস)

৪. মন্দির বাহির কঠিন কপাট (গোবিন্দদাস)

- **গঠন প্রণালী (Structure of the Content OR Unit Structure)**

৭.৩.১ প্রাসঙ্গিকতা ও উদ্দেশ্য (Relevance and Objectives of the Unit)

৭.৩.২ ভূমিকা (Introduction)

৭.৩.৩ অধ্যায় বিভাজন (Appropriate Section and Subsection Heading)

৭.৩.৪ বিষয়বস্তু (Subject Matter)

ক. চীরচন্দ উরে (বিদ্যাপতি)

খ. বন্ধু সকলি আমার দোষ (চণ্ডীমঙ্গল)

গ. চাহ মুখ তুলি রাই (জ্ঞান দাস)

ঘ. মন্দির বাহির কঠিন কপাট (গোবিন্দদাস)

৭.৩.৫ সারসংক্ষেপ (Summary)

৭.৩.৬ অনুশীলনী (Questions)

৭.৩.৭ সহায়ক গ্রন্থ (References or Bibliography)

INSTRUCTION OF UGC FOR THE WRITING OF SLM

(SLM = SELF LEARNING MANAGEMENT)

Course : BNG-202

- **শিরোনাম (Title of the Unit)**

৭.৪ শ্রী শ্রী চৈতন্যচরিতামৃত কাব্য (মধ্যলীলা ও অষ্টম পরিচ্ছেদ)

- **গঠন প্রণালী (Structure of the Content OR Unit Structure)**

৭.৪.১ প্রাসঙ্গিকতা ও উদ্দেশ্য (Relevance and Objectives of the Unit)

৭.৪.২ ভূমিকা (Introduction)

৭.৪.৩ অধ্যায় বিভাজন (Appropriate Section and Subsection Heading)

৭.৪.৪ বিষয়বস্তু (Subject Matter)

ক. সাধ্যসাধন বস্তু

খ. পঞ্চরস

গ. সখীসাধনা ও গোপীতত্ত্ব

ঘ. কৃষ্ণতত্ত্ব ও রাধাতত্ত্ব

ঙ. প্রেমবিলাস বিবর্ত

৭.৪.৫ সারসংক্ষেপ (Summary)

৭.৪.৬ অনুশীলনী (Questions)

৭.৪.৭ সহায়ক গ্রন্থ (References or Bibliography)

INSTRUCTION OF UGC FOR THE WRITING OF SLM

(SLM = SELF LEARNING MANAGEMENT)

Course : BNG-203

- **শিরোনাম (Title of the Unit)**

৮.১ মেঘনাদবধ কাব্য

- **গঠন প্রণালী (Structure of the Content OR Unit Structure)**

৮.১.১ প্রাসঙ্গিকতা ও উদ্দেশ্য (Relevance and Objectives of the Unit)

৮.১.২ ভূমিকা (Introduction)

৮.১.৩ অধ্যায় বিভাজন (Appropriate Section and Subsection Heading)

৮.১.৪ বিষয়বস্তু (Subject Matter)

ক. রসবিচার

খ. চরিত্র চিত্রণ

গ. ছন্দ ও অলংকার

৮.১.৫ সারসংক্ষেপ (Summary)

৮.১.৬ অনুশীলনী (Questions)

৮.১.৭ সহায়ক গ্রন্থ (References or Bibliography)

INSTRUCTION OF UGC FOR THE WRITING OF SLM

(SLM = SELF LEARNING MANAGEMENT)

Course : BNG-203

- **শিরোনাম (Title of the Unit)**

৮.২ সাধের আসন

- **গঠন প্রণালী (Structure of the Content OR Unit Structure)**

৮.২.১ প্রাসঙ্গিকতা ও উদ্দেশ্য (Relevance and Objectives of the Unit)

৮.২.২ ভূমিকা (Introduction)

৮.২.৩ অধ্যায় বিভাজন (Appropriate Section and Subsection Heading)

৮.২.৪ বিষয়বস্তু (Subject Matter)

ক. রোমান্টিসিজম্ ও মিস্টিসিজম্

খ. দার্শনিক কবিসত্তার অন্বেষা

গ. নিসর্গ বা প্রকৃতি চেতনা

ঘ. কাব্য ভাষা, ছন্দ ও চিত্রকল্প

৮.২.৫ সারসংক্ষেপ (Summary)

৮.২.৬ অনুশীলনী (Questions)

৮.২.৭ সহায়ক গ্রন্থ (References or Bibliography)

INSTRUCTION OF UGC FOR THE WRITING OF SLM

(SLM = SELF LEARNING MANAGEMENT)

Course : BNG-203

- **শিরোনাম (Title of the Unit)**

৮.৩ কবিতা পাঠ:

ক. অনামিকা : নজরুল ইসলাম

খ. বৃষ্টি (পারাপার) : অমিয় চক্রবর্তী

গ. ভালোবাসা দিতে পারি : বিনয় মজুমদার

ঘ. হৃদি ভেসে যায় অলকানন্দার জলে : জয় গোস্বামী

ঙ. মেঘের মাথুর : অলোকরঞ্জন দাশগুপ্ত

- **গঠন প্রণালী (Structure of the Content OR Unit Structure)**

৮.৩.১ প্রাসঙ্গিকতা ও উদ্দেশ্য (Relevance and Objectives of the Unit)

৮.৩.২ ভূমিকা (Introduction)

৮.৩.৩ অধ্যায় বিভাজন (Appropriate Section and Subsection Heading)

৮.৩.৪ বিষয়বস্তু (Subject Matter)

ক. অনামিকা : নজরুল ইসলাম

খ. বৃষ্টি (পারাপার) : অমিয় চক্রবর্তী

গ. ভালোবাসা দিতে পারি : বিনয় মজুমদার

ঘ. হৃদি ভেসে যায় অলকানন্দার জলে : জয় গোস্বামী

ঙ. মেঘের মাথুর : অলোকরঞ্জন দাশগুপ্ত

৮.৩.৫ সারসংক্ষেপ (Summary)

৮.৩.৬ অনুশীলনী (Questions)

৮.৩.৭ সহায়ক গ্রন্থ (References or Bibliography)

INSTRUCTION OF UGC FOR THE WRITING OF SLM

(SLM = SELF LEARNING MANAGEMENT)

Course : BNG-203

- **শিরোনাম (Title of the Unit)**

৮.৪ কবিতা পাঠ:

ক. কচি ডাব : যতীন্দ্রনাথ সেনগুপ্ত

খ. উটপাখি : সুধীন্দ্রনাথ দত্ত

গ. ক্যাম্পে : জীবনানন্দ দাশ

ঘ. কস্মৈ দেবায় : সঞ্জয় ভট্টাচার্য

ঙ. মেঘের মাথুর : অলোকরঞ্জন দাশগুপ্ত

- **গঠন প্রণালী (Structure of the Content OR Unit Structure)**

৮.৪.১ প্রাসঙ্গিকতা ও উদ্দেশ্য (Relevance and Objectives of the Unit)

৮.৪.২ ভূমিকা (Introduction)

৮.৪.৩ অধ্যায় বিভাজন (Appropriate Section and Subsection Heading)

৮.৪.৪ বিষয়বস্তু (Subject Matter)

ক. কচি ডাব : যতীন্দ্রনাথ সেনগুপ্ত

খ. উটপাখি : সুধীন্দ্রনাথ দত্ত

গ. ক্যাম্পে : জীবনানন্দ দাশ

ঘ. কস্মৈ দেবায় : সঞ্জয় ভট্টাচার্য

ঙ. মেঘের মাথুর : অলোকরঞ্জন দাশগুপ্ত

৮.৪.৫ সারসংক্ষেপ (Summary)

৮.৪.৬ অনুশীলনী (Questions)

৮.৪.৭ সহায়ক গ্রন্থ (References or Bibliography)

INSTRUCTION OF UGC FOR THE WRITING OF SLM

(SLM = SELF LEARNING MANAGEMENT)

Course : BNG-204

- **শিরোনাম (Title of the Unit)**

৯.১ উনিশ-বিশ শতকের বাংলা রম্যরচনার ধারা

- **গঠন প্রণালী (Structure of the Content OR Unit Structure)**

৯.১.১ প্রাসঙ্গিকতা ও উদ্দেশ্য (Relevance and Objectives of the Unit)

৯.১.২ ভূমিকা (Introduction)

৯.১.৩ অধ্যায় বিভাজন (Appropriate Section and Subsection Heading)

৯.১.৪ বিষয়বস্তু (Subject Matter)

ক. উনিশ শতেকর রচনাকার ও তাদের সৃষ্ট সাহিত্যের পরিচয়

খ. বিশ শতকের রম্যরচনাকারদের সৃষ্ট সাহিত্যের পরিচয়

৯.১.৫ সারসংক্ষেপ (Summary)

৯.১.৬ অনুশীলনী (Questions)

৯.১.৭ সহায়ক গ্রন্থ (References or Bibliography)

INSTRUCTION OF UGC FOR THE WRITING OF SLM

(SLM = SELF LEARNING MANAGEMENT)

Course : BNG-204

- **শিরোনাম (Title of the Unit)**

৯.২ শকুন্তলা - বিদ্যাসাগর

- **গঠন প্রণালী (Structure of the Content OR Unit Structure)**

৯.২.১ প্রাসঙ্গিকতা ও উদ্দেশ্য (Relevance and Objectives of the Unit)

৯.২.২ ভূমিকা (Introduction)

৯.২.৩ অধ্যায় বিভাজন (Appropriate Section and Subsection Heading)

৯.২.৪ বিষয়বস্তু (Subject Matter)

ক. চরিত্র বিচার

খ. অনুবাদ সাহিত্যের সার্থকতা

৯.২.৫ সারসংক্ষেপ (Summary)

৯.২.৬ অনুশীলনী (Questions)

৯.২.৭ সহায়ক গ্রন্থ (References or Bibliography)

INSTRUCTION OF UGC FOR THE WRITING OF SLM

(SLM = SELF LEARNING MANAGEMENT)

Course : BNG-204

- **শিরোনাম (Title of the Unit)**

৯.৩ কমলাকান্তের দপ্তর : বঙ্কিমচন্দ্র চট্টোপাধ্যায়

- **গঠন প্রণালী (Structure of the Content OR Unit Structure)**

৯.৩.১ প্রাসঙ্গিকতা ও উদ্দেশ্য (Relevance and Objectives of the Unit)

৯.৩.২ ভূমিকা (Introduction)

৯.৩.৩ অধ্যায় বিভাজন (Appropriate Section and Subsection Heading)

৯.৩.৪ বিষয়বস্তু (Subject Matter)

ক. চরিত্র বিচার

খ. কি বিষয়ক উপন্যাস

গ. হাস্যরস

৯.৩.৫ সারসংক্ষেপ (Summary)

৯.৩.৬ অনুশীলনী (Questions)

৯.৩.৭ সহায়ক গ্রন্থ (References or Bibliography)

INSTRUCTION OF UGC FOR THE WRITING OF SLM

(SLM = SELF LEARNING MANAGEMENT)

Course : BNG-204

- **শিরোনাম (Title of the Unit)**

৯.৪ প্রবন্ধ পাঠ:

ক. বিদ্যাসাগর : রামেন্দ্রসুন্দর ত্রিবেদী

খ. ভাববার কথা (নামাঙ্কিত প্রবন্ধ) : বিবেকানন্দ

গ. সুন্দর ও অসুন্দর : অবনীন্দ্রনাথ ঠাকুর

ঘ. ইন্টারভ্যু : সৈয়দ মুজতবা আলি

ঙ. সংস্কৃতির সংকট : অন্নদাশঙ্কর রায়

চ. স্মৃতিযাত্রায় রবীন্দ্রনাথ : তপোব্রত ঘোষ

- **গঠন প্রণালী (Structure of the Content OR Unit Structure)**

৯.৪.১ প্রাসঙ্গিকতা ও উদ্দেশ্য (Relevance and Objectives of the Unit)

৯.৪.২ ভূমিকা (Introduction)

৯.৪.৩ অধ্যায় বিভাজন (Appropriate Section and Subsection Heading)

৯.৪.৪ বিষয়বস্তু (Subject Matter)

ক. বিদ্যাসাগর : রামেন্দ্রসুন্দর ত্রিবেদী

খ. ভাববার কথা (নামাঙ্কিত প্রবন্ধ) : বিবেকানন্দ

গ. সুন্দর ও অসুন্দর : অবনীন্দ্রনাথ ঠাকুর

ঘ. ইন্টারভ্যু : সৈয়দ মুজতবা আলি

ঙ. সংস্কৃতির সংকট : অন্নদাশঙ্কর রায়

চ. স্মৃতিযাত্রায় রবীন্দ্রনাথ : তপোব্রত ঘোষ

৯.৪.৫ সারসংক্ষেপ (Summary)

৯.৪.৬ অনুশীলনী (Questions)

৯.৪.৭ সহায়ক গ্রন্থ (References or Bibliography)

INSTRUCTION OF UGC FOR THE WRITING OF SLM

(SLM = SELF LEARNING MANAGEMENT)

Course : BNG-205

- **শিরোনাম (Title of the Unit)**

১০.১ উনিশ শতকের বাংলা নাট্যসাহিত্যের ইতিহাস

- **গঠন প্রণালী (Structure of the Content OR Unit Structure)**

১০.১.১ প্রাসঙ্গিকতা ও উদ্দেশ্য (Relevance and Objectives of the Unit)

১০.১.২ ভূমিকা (Introduction)

১০.১.৩ অধ্যায় বিভাজন (Appropriate Section and Subsection Heading)

১০.১.৪ বিষয়বস্তু (Subject Matter)

ক. রামনারায়ণ তর্করত্ন

খ. দীনবন্ধু মিত্র

গ. জ্যোতিরিন্দ্রনাথ ঠাকুর

ঘ. গিরিশচন্দ্র ঘোষ

১০.১.৫ সারসংক্ষেপ (Summary)

১০.১.৬ অনুশীলনী (Questions)

১০.১.৭ সহায়ক গ্রন্থ (References or Bibliography)

INSTRUCTION OF UGC FOR THE WRITING OF SLM

(SLM = SELF LEARNING MANAGEMENT)

Course : BNG-205

- **শিরোনাম (Title of the Unit)**

১০.২ বিশ শতকের বাংলা নাট্যসাহিত্যের ইতিহাস

- **গঠন প্রণালী (Structure of the Content OR Unit Structure)**

১০.২.১ প্রাসঙ্গিকতা ও উদ্দেশ্য (Relevance and Objectives of the Unit)

১০.২.২ ভূমিকা (Introduction)

১০.২.৩ অধ্যায় বিভাজন (Appropriate Section and Subsection Heading)

১০.২.৪ বিষয়বস্তু (Subject Matter)

ক. রবীন্দ্রনাথ ঠাকুর

খ. ক্ষীরোদপ্রসাদ বিদ্যাবিনোদ

গ. দ্বিজেন্দ্রলাল রায়

ঘ. মন্মথ রায়

ঙ. শচীন্দ্রনাথ সেনগুপ্ত

চ. বিজন ভট্টাচার্য

ছ. তুলসী লাহিড়ি

জ. দিগিন্দ্রচন্দ্র বন্দ্যোপাধ্যায়

ঝ. বাদল সরকার

ঞ. শম্ভু মিত্র

ট. অন্যান্য অপ্রধান নাট্যকার

১০.২.৫ সারসংক্ষেপ (Summary)

১০.২.৬ অনুশীলনী (Questions)

১০.২.৭ সহায়ক গ্রন্থ (References or Bibliography)

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(SLM = SELF LEARNING MANAGEMENT)

Course : BNG-205

- **শিরোনাম (Title of the Unit)**

১০.৩ ক. বুড়ো শালিকের ঘাড়ে রোঁ

খ. শিককাবাব

- **গঠন প্রণালী (Structure of the Content OR Unit Structure)**

১০.৩.১ প্রাসঙ্গিকতা ও উদ্দেশ্য (Relevance and Objectives of the Unit)

১০.৩.২ ভূমিকা (Introduction)

১০.৩.৩ অধ্যায় বিভাজন (Appropriate Section and Subsection Heading)

১০.৩.৪ বিষয়বস্তু (Subject Matter)

ক. (i) বুড়ো শালিকের ঘাড়ে রোঁ-এর প্রধান বিষয়বস্তু

(ii) প্রহসন হিসেবে সার্থকতা

(iii) চরিত্র বিচার

খ. (i) শিককাবাবের রচনাশৈলী

(ii) চরিত্র বিচার

(iii) নামকরণের সার্থকতা

১০.৩.৫ সারসংক্ষেপ (Summary)

১০.৩.৬ অনুশীলনী (Questions)

১০.৩.৭ সহায়ক গ্রন্থ (References or Bibliography)

INSTRUCTION OF UGC FOR THE WRITING OF SLM

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Course : BNG-205

- **শিরোনাম (Title of the Unit)**

১০.৪ দেবীগর্জন

- **গঠন প্রণালী (Structure of the Content OR Unit Structure)**

১০.৪.১ প্রাসঙ্গিকতা ও উদ্দেশ্য (Relevance and Objectives of the Unit)

১০.৪.২ ভূমিকা (Introduction)

১০.৪.৩ অধ্যায় বিভাজন (Appropriate Section and Subsection Heading)

১০.৪.৪ বিষয়বস্তু (Subject Matter)

ক. কাহিনি বিশ্লেষণ

খ. চরিত্র পর্যালোচনা

গ. সংগীত

ঘ. ভাষা ও সংলাপ

ঙ. গঠনশৈলী

চ. নামকরণ

১০.৪.৫ সারসংক্ষেপ (Summary)

১০.৪.৬ অনুশীলনী (Questions)

১০.৪.৭ সহায়ক গ্রন্থ (References or Bibliography)

INSTRUCTION OF UGC FOR THE WRITING OF SLM

(SLM = SELF LEARNING MANAGEMENT)

Course : BNG-205

- **শিরোনাম (Title of the Unit)**

১০.৫ শকুন্তলা (বসুমতী সাহিত্য মন্দিরের অনুবাদ) : কালিদাস

- **গঠন প্রণালী (Structure of the Content OR Unit Structure)**

১০.৫.১ প্রাসঙ্গিকতা ও উদ্দেশ্য (Relevance and Objectives of the Unit)

১০.৫.২ ভূমিকা (Introduction)

১০.৫.৩ অধ্যায় বিভাজন (Appropriate Section and Subsection Heading)

১০.৫.৪ বিষয়বস্তু (Subject Matter)

ক. চরিত্র বিচার

খ. রস বিচার

গ. প্রকৃতি চিত্রায়ণ

১০.৫.৫ সারসংক্ষেপ (Summary)

১০.৫.৬ অনুশীলনী (Questions)

১০.৫.৭ সহায়ক গ্রন্থ (References or Bibliography)

INSTRUCTION OF UGC FOR THE WRITING OF SLM

(SLM = SELF LEARNING MANAGEMENT)

Course : BNG-301

- **শিরোনাম (Title of the Unit)**

১১.১ প্রাচীন ভাষাচর্চার ইতিহাস

- **গঠন প্রণালী (Structure of the Content OR Unit Structure)**

১১.১.১ প্রাসঙ্গিকতা ও উদ্দেশ্য (Relevance and Objectives of the Unit)

১১.১.২ ভূমিকা (Introduction)

১১.১.৩ অধ্যায় বিভাজন (Appropriate Section and Subsection Heading)

১১.১.৪ বিষয়বস্তু (Subject Matter)

ক. প্রাচীন গ্রিসের ভাষাচর্চার ইতিহাস

খ. প্রাচীন ভারতীয় ভাষাচর্চার ইতিহাস

১১.১.৫ সারসংক্ষেপ (Summary)

১১.১.৬ অনুশীলনী (Questions)

১১.১.৭ সহায়ক গ্রন্থ (References or Bibliography)

INSTRUCTION OF UGC FOR THE WRITING OF SLM

(SLM = SELF LEARNING MANAGEMENT)

Course : BNG-301

- **শিরোনাম (Title of the Unit)**

১১.২ আধুনিক ভাষাচর্চার ইতিহাস ও পদ্ধতি

- **গঠন প্রণালী (Structure of the Content OR Unit Structure)**

১১.২.১ প্রাসঙ্গিকতা ও উদ্দেশ্য (Relevance and Objectives of the Unit)

১১.২.২ ভূমিকা (Introduction)

১১.২.৩ অধ্যায় বিভাজন (Appropriate Section and Subsection Heading)

১১.২.৪ বিষয়বস্তু (Subject Matter)

ক. তুলনামূলক ও ঐতিহাসিক ভাষাচর্চা

খ. বর্ণনামূলক ভাষাচর্চা

১১.২.৫ সারসংক্ষেপ (Summary)

১১.২.৬ অনুশীলনী (Questions)

১১.২.৭ সহায়ক গ্রন্থ (References or Bibliography)

INSTRUCTION OF UGC FOR THE WRITING OF SLM

(SLM = SELF LEARNING MANAGEMENT)

Course : BNG-301

- **শিরোনাম (Title of the Unit)**

১১.৩ শব্দতত্ত্ব

- **গঠন প্রণালী (Structure of the Content OR Unit Structure)**

১১.৩.১ প্রাসঙ্গিকতা ও উদ্দেশ্য (Relevance and Objectives of the Unit)

১১.৩.২ ভূমিকা (Introduction)

১১.৩.৩ অধ্যায় বিভাজন (Appropriate Section and Subsection Heading)

১১.৩.৪ বিষয়বস্তু (Subject Matter)

ক. শব্দার্থতত্ত্বের সূত্রপাত

খ. শব্দে শব্দে সম্পর্কের ধরন ও অর্থনিরূপণ

গ. শব্দার্থের পরিবর্তনের কারণ

ঘ. শব্দার্থ পরিবর্তনের ধারা

১১.৩.৫ সারসংক্ষেপ (Summary)

১১.৩.৬ অনুশীলনী (Questions)

১১.৩.৭ সহায়ক গ্রন্থ (References or Bibliography)

INSTRUCTION OF UGC FOR THE WRITING OF SLM

(SLM = SELF LEARNING MANAGEMENT)

Course : BNG-301

- **শিরোনাম (Title of the Unit)**

১১.৪ প্রয়োগতত্ত্ব

- **গঠন প্রণালী (Structure of the Content OR Unit Structure)**

১১.৪.১ প্রাসঙ্গিকতা ও উদ্দেশ্য (Relevance and Objectives of the Unit)

১১.৪.২ ভূমিকা (Introduction)

১১.৪.৩ অধ্যায় বিভাজন (Appropriate Section and Subsection Heading)

১১.৪.৪ বিষয়বস্তু (Subject Matter)

ক. প্রয়োগতত্ত্বের প্রসঙ্গ

খ. প্রদর্শক

গ. বাচনক্রিয়াতত্ত্ব

ঘ. সৌজন্য

ঙ. নির্দেশ

চ. অবধারণ

ছ. পুনঃর্নির্দেশিকা

জ. পূর্বানুমিতি

ঝ. সমবায়ী বাক্যালাপ: কথোপকথন রীতি

১১.৪.৫ সারসংক্ষেপ (Summary)

১১.৪.৬ অনুশীলনী (Questions)

১১.৪.৭ সহায়ক গ্রন্থ (References or Bibliography)

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Course : BNG-301

- **শিরোনাম (Title of the Unit)**

১১.৫ সমাজ ভাষাবিজ্ঞান

- **গঠন প্রণালী (Structure of the Content OR Unit Structure)**

১১.৫.১ প্রাসঙ্গিকতা ও উদ্দেশ্য (Relevance and Objectives of the Unit)

১১.৫.২ ভূমিকা (Introduction)

১১.৫.৩ অধ্যায় বিভাজন (Appropriate Section and Subsection Heading)

১১.৫.৪ বিষয়বস্তু (Subject Matter)

ক. বর্ণনামূলক সমাজভাষাবিজ্ঞান

খ. গতিশীল সমাজভাষাবিজ্ঞান

গ. ব্যবহারিক সমাজভাষাবিজ্ঞান

১১.৫.৫ সারসংক্ষেপ (Summary)

১১.৫.৬ অনুশীলনী (Questions)

১১.৫.৭ সহায়ক গ্রন্থ (References or Bibliography)

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- **শিরোনাম (Title of the Unit)**

১২.১ উনিশ শতকে বাংলা উপন্যাসের ধারা

- **গঠন প্রণালী (Structure of the Content OR Unit Structure)**

১২.১.১ প্রাসঙ্গিকতা ও উদ্দেশ্য (Relevance and Objectives of the Unit)

১২.১.২ ভূমিকা (Introduction)

১২.১.৩ অধ্যায় বিভাজন (Appropriate Section and Subsection Heading)

১২.১.৪ বিষয়বস্তু (Subject Matter)

ক. বাংলা উপন্যাসের সূচনাপর্ব

খ. প্যারীচাঁদ : কালীপ্রসন্ন

গ. বঙ্কিমচন্দ্র চট্টোপাধ্যায়

ঘ. বঙ্কিম – সমকালীন ঔপন্যাসিকগণ

ঙ. রবীন্দ্রনাথ

১২.১.৫ সারসংক্ষেপ (Summary)

১২.১.৬ অনুশীলনী (Questions)

১২.১.৭ সহায়ক গ্রন্থ (References or Bibliography)

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- **শিরোনাম (Title of the Unit)**

১২.২ বিশ শতকে বাংলা উপন্যাসের ধারা

- **গঠন প্রণালী (Structure of the Content OR Unit Structure)**

১২.২.১ প্রাসঙ্গিকতা ও উদ্দেশ্য (Relevance and Objectives of the Unit)

১২.২.২ ভূমিকা (Introduction)

১২.২.৩ অধ্যায় বিভাজন (Appropriate Section and Subsection Heading)

১২.২.৪ বিষয়বস্তু (Subject Matter)

ক. রবীন্দ্রনাথ ঠাকুর

খ. শরৎচন্দ্র চট্টোপাধ্যায়

গ. কল্লোল কালের উপন্যাস

ঘ. বন্দ্যোপাধ্যায় ত্রয়ী: তারাশঙ্কর, মানিক, বিভূতিভূষণ

ঙ. জগদীশ গুপ্ত

চ. বনফুল

ছ. স্বাধীনতা উত্তর বাংলা উপন্যাস

জ. মহিলা ঔপন্যাসিক

ঝ. বাংলাদেশের উপন্যাস

১২.২.৫ সারসংক্ষেপ (Summary)

১২.২.৬ অনুশীলনী (Questions)

১২.২.৭ সহায়ক গ্রন্থ (References or Bibliography)

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- **শিরোনাম (Title of the Unit)**

১২.৩ উনিশ ও বিশ শতকে ছোটগল্পের ধারা

- **গঠন প্রণালী (Structure of the Content OR Unit Structure)**

১২.৩.১ প্রাসঙ্গিকতা ও উদ্দেশ্য (Relevance and Objectives of the Unit)

১২.৩.২ ভূমিকা (Introduction)

১২.৩.৩ অধ্যায় বিভাজন (Appropriate Section and Subsection Heading)

১২.৩.৪ বিষয়বস্তু (Subject Matter)

ক. উনিশ শতকের ছোটগল্পের ধারা

খ. বিশ শতকের ছোটগল্পের ধারা

১২.৩.৫ সারসংক্ষেপ (Summary)

১২.৩.৬ অনুশীলনী (Questions)

১২.৩.৭ সহায়ক গ্রন্থ (References or Bibliography)

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- **শিরোনাম (Title of the Unit)**

১২.৪ বিষবৃক্ষ : বঙ্কিমচন্দ্র চট্টোপাধ্যায়

- **গঠন প্রণালী (Structure of the Content OR Unit Structure)**

১২.৪.১ প্রাসঙ্গিকতা ও উদ্দেশ্য (Relevance and Objectives of the Unit)

১২.৪.২ ভূমিকা (Introduction)

১২.৪.৩ অধ্যায় বিভাজন (Appropriate Section and Subsection Heading)

১২.৪.৪ বিষয়বস্তু (Subject Matter)

ক. চরিত্র বিচার

খ. হাস্যরস

গ. গদ্যশৈলী ও বর্ণনারীতি

১২.৪.৫ সারসংক্ষেপ (Summary)

১২.৪.৬ অনুশীলনী (Questions)

১২.৪.৭ সহায়ক গ্রন্থ (References or Bibliography)

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- **শিরোনাম (Title of the Unit)**

১২.৫ ক. আদরিণী : প্রভাতকুমার মুখোপাধ্যায়

খ. বুধনী : সুবোধ ঘোষ

গ. হয়তো : প্রেমেন্দ্র মিত্র

- **গঠন প্রণালী (Structure of the Content OR Unit Structure)**

১২.৫.১ প্রাসঙ্গিকতা ও উদ্দেশ্য (Relevance and Objectives of the Unit)

১২.৫.২ ভূমিকা (Introduction)

১২.৫.৩ অধ্যায় বিভাজন (Appropriate Section and Subsection Heading)

১২.৫.৪ বিষয়বস্তু (Subject Matter)

ক. আদরিণী : প্রভাতকুমার মুখোপাধ্যায়

খ. বুধনী : সুবোধ ঘোষ

গ. হয়তো : প্রেমেন্দ্র মিত্র

১২.৫.৫ সারসংক্ষেপ (Summary)

১২.৫.৬ অনুশীলনী (Questions)

১২.৫.৭ সহায়ক গ্রন্থ (References or Bibliography)

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- **শিরোনাম (Title of the Unit)**

১৩.১ ক. অলংকারবাদ

খ. রীতিবাদ

গ. ঔচিত্যবাদ

ঘ. বক্রোক্তিবাদ

ঙ. ধ্বনিবাদ

- **গঠন প্রণালী (Structure of the Content OR Unit Structure)**

১৩.১.১ প্রাসঙ্গিকতা ও উদ্দেশ্য (Relevance and Objectives of the Unit)

১৩.১.২ ভূমিকা (Introduction)

১৩.১.৩ অধ্যায় বিভাজন (Appropriate Section and Subsection Heading)

১৩.১.৪ বিষয়বস্তু (Subject Matter)

ক. অলংকারবাদ

খ. রীতিবাদ

গ. ঔচিত্যবাদ

ঘ. বক্রোক্তিবাদ

ঙ. ধ্বনিবাদ

১৩.১.৫ সারসংক্ষেপ (Summary)

১৩.১.৬ অনুশীলনী (Questions)

১৩.১.৭ সহায়ক গ্রন্থ (References or Bibliography)

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- **শিরোনাম (Title of the Unit)**

১৩.২ সাহিত্য দর্পণ (তৃতীয় অধ্যায় – ভাব ও রস)

- **গঠন প্রণালী (Structure of the Content OR Unit Structure)**

১৩.২.১ প্রাসঙ্গিকতা ও উদ্দেশ্য (Relevance and Objectives of the Unit)

১৩.২.২ ভূমিকা (Introduction)

১৩.২.৩ অধ্যায় বিভাজন (Appropriate Section and Subsection Heading)

১৩.২.৪ বিষয়বস্তু (Subject Matter)

ক. ভাব সম্পর্কে আলোচনা

খ. রস সম্পর্কে আলোচনা

১৩.২.৫ সারসংক্ষেপ (Summary)

১৩.২.৬ অনুশীলনী (Questions)

১৩.২.৭ সহায়ক গ্রন্থ (References or Bibliography)

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- **শিরোনাম (Title of the Unit)**

১৩.৩ বাগেশ্বরী শিল্প প্রবন্ধাবলী

- **গঠন প্রণালী (Structure of the Content OR Unit Structure)**

১৩.৩.১ প্রাসঙ্গিকতা ও উদ্দেশ্য (Relevance and Objectives of the Unit)

১৩.৩.২ ভূমিকা (Introduction)

১৩.৩.৩ অধ্যায় বিভাজন (Appropriate Section and Subsection Heading)

১৩.৩.৪ বিষয়বস্তু (Subject Matter)

ক. লেখক পরিচিতি

খ. প্রত্যেকটি প্রবন্ধের বিষয়বস্তু

গ. প্রত্যেকটি প্রবন্ধের পর্যালোচনা ও সমালোচনা

ঘ. গদ্যশৈলী

১৩.৩.৫ সারসংক্ষেপ (Summary)

১৩.৩.৬ অনুশীলনী (Questions)

১৩.৩.৭ সহায়ক গ্রন্থ (References or Bibliography)

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- **শিরোনাম (Title of the Unit)**

১৪.১ রজনী : বঙ্কিমচন্দ্র (পাঠান্তর)

- **গঠন প্রণালী (Structure of the Content OR Unit Structure)**

১৪.১.১ প্রাসঙ্গিকতা ও উদ্দেশ্য (Relevance and Objectives of the Unit)

১৪.১.২ ভূমিকা (Introduction)

১৪.১.৩ অধ্যায় বিভাজন (Appropriate Section and Subsection Heading)

১৪.১.৪ বিষয়বস্তু (Subject Matter)

ক. রজনী উপন্যাসের চরিত্র বিচার

খ. রজনী উপন্যাসের অভিনবত্ব

গ. রজনী উপন্যাসের হাস্যরস

১৪.১.৫ সারসংক্ষেপ (Summary)

১৪.১.৬ অনুশীলনী (Questions)

১৪.১.৭ সহায়ক গ্রন্থ (References or Bibliography)

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- **শিরোনাম (Title of the Unit)**

১৪.২ মধুসূদন, রবীন্দ্রনাথ, জীবনানন্দের উপর প্রাচ্য ও পাশ্চাত্য প্রভাব

- **গঠন প্রণালী (Structure of the Content OR Unit Structure)**

১৪.২.১ প্রাসঙ্গিকতা ও উদ্দেশ্য (Relevance and Objectives of the Unit)

১৪.২.২ ভূমিকা (Introduction)

১৪.২.৩ অধ্যায় বিভাজন (Appropriate Section and Subsection Heading)

১৪.২.৪ বিষয়বস্তু (Subject Matter)

ক. মধুসূদনের সাহিত্যে প্রাচ্য ও পাশ্চাত্য প্রভাব

খ. রবীন্দ্রনাথের সাহিত্যে প্রাচ্য ও পাশ্চাত্য প্রভাব

গ. জীবনানন্দের সাহিত্যে প্রাচ্য ও পাশ্চাত্য প্রভাব

১৪.২.৫ সারসংক্ষেপ (Summary)

১৪.২.৬ অনুশীলনী (Questions)

১৪.২.৭ সহায়ক গ্রন্থ (References or Bibliography)

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- **শিরোনাম (Title of the Unit)**

১৪.৩ মেঘদূত (পূর্বমেঘ) : রাজশেখর বসুর অনুবাদ

- **গঠন প্রণালী (Structure of the Content OR Unit Structure)**

১৪.৩.১ প্রাসঙ্গিকতা ও উদ্দেশ্য (Relevance and Objectives of the Unit)

১৪.৩.২ ভূমিকা (Introduction)

১৪.৩.৩ অধ্যায় বিভাজন (Appropriate Section and Subsection Heading)

১৪.৩.৪ বিষয়বস্তু (Subject Matter)

ক. অনুবাদের সার্থকতা

খ. মেঘদূতের রসবিচার

১৪.৩.৫ সারসংক্ষেপ (Summary)

১৪.৩.৬ অনুশীলনী (Questions)

১৪.৩.৭ সহায়ক গ্রন্থ (References or Bibliography)

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- **শিরোনাম (Title of the Unit)**

১৫.১ রবীন্দ্রকাব্য ও নাট্যসাহিত্যের ইতিহাস

- **গঠন প্রণালী (Structure of the Content OR Unit Structure)**

১৫.১.১ প্রাসঙ্গিকতা ও উদ্দেশ্য (Relevance and Objectives of the Unit)

১৫.১.২ ভূমিকা (Introduction)

১৫.১.৩ অধ্যায় বিভাজন (Appropriate Section and Subsection Heading)

১৫.১.৪ বিষয়বস্তু (Subject Matter)

ক. রবীন্দ্রকাব্য সাহিত্যের ইতিহাস

খ. রবীন্দ্রনাট্য সাহিত্যের ইতিহাস

১৫.১.৫ সারসংক্ষেপ (Summary)

১৫.১.৬ অনুশীলনী (Questions)

১৫.১.৭ সহায়ক গ্রন্থ (References or Bibliography)

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- **শিরোনাম (Title of the Unit)**

১৫.২ রবীন্দ্র-উপন্যাস, ছোটগল্প ও প্রবন্ধ সাহিত্যের ইতিহাস

- **গঠন প্রণালী (Structure of the Content OR Unit Structure)**

১৫.২.১ প্রাসঙ্গিকতা ও উদ্দেশ্য (Relevance and Objectives of the Unit)

১৫.২.২ ভূমিকা (Introduction)

১৫.২.৩ অধ্যায় বিভাজন (Appropriate Section and Subsection Heading)

১৫.২.৪ বিষয়বস্তু (Subject Matter)

ক. রবীন্দ্র উপন্যাস সাহিত্যের ইতিহাস

খ. রবীন্দ্র ছোটগল্পের ইতিহাস

গ. রবীন্দ্র প্রবন্ধ সাহিত্যের ইতিহাস

১৫.২.৫ সারসংক্ষেপ (Summary)

১৫.২.৬ অনুশীলনী (Questions)

১৫.২.৭ সহায়ক গ্রন্থ (References or Bibliography)

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- **শিরোনাম (Title of the Unit)**

১৫.৩ রক্তকরবী

- **গঠন প্রণালী (Structure of the Content OR Unit Structure)**

১৫.৩.১ প্রাসঙ্গিকতা ও উদ্দেশ্য (Relevance and Objectives of the Unit)

১৫.৩.২ ভূমিকা (Introduction)

১৫.৩.৩ অধ্যায় বিভাজন (Appropriate Section and Subsection Heading)

১৫.৩.৪ বিষয়বস্তু (Subject Matter)

ক. রক্তকরবী নাটকের চরিত্র বিচার

খ. রক্তকরবী নাটকের সাংকেতিকতা

গ. রক্তকরবী নাটকের গান

১৫.৩.৫ সারসংক্ষেপ (Summary)

১৫.৩.৬ অনুশীলনী (Questions)

১৫.৩.৭ সহায়ক গ্রন্থ (References or Bibliography)

INSTRUCTION OF UGC FOR THE WRITING OF SLM

(SLM = SELF LEARNING MANAGEMENT)

Course : BNG-305

- **শিরোনাম (Title of the Unit)**

১৫.৪ চতুরঙ্গ

- **গঠন প্রণালী (Structure of the Content OR Unit Structure)**

১৫.৪.১ প্রাসঙ্গিকতা ও উদ্দেশ্য (Relevance and Objectives of the Unit)

১৫.৪.২ ভূমিকা (Introduction)

১৫.৪.৩ অধ্যায় বিভাজন (Appropriate Section and Subsection Heading)

১৫.৪.৪ বিষয়বস্তু (Subject Matter)

ক. চতুরঙ্গ উপন্যাসের চরিত্র বিচার

খ. চতুরঙ্গ উপন্যাসে স্বাদেশীকতা

গ. চতুরঙ্গ উপন্যাসে অভিনবত্ব

১৫.৪.৫ সারসংক্ষেপ (Summary)

১৫.৪.৬ অনুশীলনী (Questions)

১৫.৪.৭ সহায়ক গ্রন্থ (References or Bibliography)

INSTRUCTION OF UGC FOR THE WRITING OF SLM

(SLM = SELF LEARNING MANAGEMENT)

Course : BNG-305

- **শিরোনাম (Title of the Unit)**

১৫.৫ ছোটগল্প পাঠ : পোষ্টমাস্টার, স্ত্রীর পত্র, একরাত্রি

- **গঠন প্রণালী (Structure of the Content OR Unit Structure)**

১৫.৫.১ প্রাসঙ্গিকতা ও উদ্দেশ্য (Relevance and Objectives of the Unit)

১৫.৫.২ ভূমিকা (Introduction)

১৫.৫.৩ অধ্যায় বিভাজন (Appropriate Section and Subsection Heading)

১৫.৫.৪ বিষয়বস্তু (Subject Matter)

ক. পোষ্টমাস্টার

খ. স্ত্রীর পত্র

গ. একরাত্রি

১৫.৫.৫ সারসংক্ষেপ (Summary)

১৫.৫.৬ অনুশীলনী (Questions)

১৫.৫.৭ সহায়ক গ্রন্থ (References or Bibliography)

INSTRUCTION OF UGC FOR THE WRITING OF SLM

(SLM = SELF LEARNING MANAGEMENT)

Course : BNG-401

- **শিরোনাম (Title of the Unit)**

১৬.১ রোম্যান্টিসিজম, মডার্নিজিম, স্ট্রাকচারালিজম

- **গঠন প্রণালী (Structure of the Content OR Unit Structure)**

১৬.১.১ প্রাসঙ্গিকতা ও উদ্দেশ্য (Relevance and Objectives of the Unit)

১৬.১.২ ভূমিকা (Introduction)

১৬.১.৩ অধ্যায় বিভাজন (Appropriate Section and Subsection Heading)

১৬.১.৪ বিষয়বস্তু (Subject Matter)

ক. রোম্যান্টিসিজম

খ. মডার্নিজিম

গ. স্ট্রাকচারালিজম

১৬.১.৫ সারসংক্ষেপ (Summary)

১৬.১.৬ অনুশীলনী (Questions)

১৬.১.৭ সহায়ক গ্রন্থ (References or Bibliography)

INSTRUCTION OF UGC FOR THE WRITING OF SLM

(SLM = SELF LEARNING MANAGEMENT)

Course : BNG-401

- **শিরোনাম (Title of the Unit)**

১৬.২ হিস্টোরিক্যাল ক্রিটিসিজম, কম্পারেটিভ ক্রিটিসিজম, সাইকোঅ্যানালিটিক ক্রিটিসিজিম

- **গঠন প্রণালী (Structure of the Content OR Unit Structure)**

১৬.২.১ প্রাসঙ্গিকতা ও উদ্দেশ্য (Relevance and Objectives of the Unit)

১৬.২.২ ভূমিকা (Introduction)

১৬.২.৩ অধ্যায় বিভাজন (Appropriate Section and Subsection Heading)

১৬.২.৪ বিষয়বস্তু (Subject Matter)

ক. হিস্টোরিক্যাল ক্রিটিসিজম

খ. কম্পারেটিভ ক্রিটিসিজম

গ. সাইকোঅ্যানালিটিক ক্রিটিসিজিম

১৬.২.৫ সারসংক্ষেপ (Summary)

১৬.২.৬ অনুশীলনী (Questions)

১৬.২.৭ সহায়ক গ্রন্থ (References or Bibliography)

INSTRUCTION OF UGC FOR THE WRITING OF SLM

(SLM = SELF LEARNING MANAGEMENT)

Course : BNG-401

- **শিরোনাম (Title of the Unit)**

১৬.৩ পোয়েটিক্স

- **গঠন প্রণালী (Structure of the Content OR Unit Structure)**

১৬.৩.১ প্রাসঙ্গিকতা ও উদ্দেশ্য (Relevance and Objectives of the Unit)

১৬.৩.২ ভূমিকা (Introduction)

১৬.৩.৩ অধ্যায় বিভাজন (Appropriate Section and Subsection Heading)

১৬.৩.৪ বিষয়বস্তু (Subject Matter)

ক. পোয়েটিক্স গঠনতত্ত্ব

খ. পোয়েটিক্সের মূল বিষয়

১৬.৩.৫ সারসংক্ষেপ (Summary)

১৬.৩.৬ অনুশীলনী (Questions)

১৬.৩.৭ সহায়ক গ্রন্থ (References or Bibliography)

INSTRUCTION OF UGC FOR THE WRITING OF SLM

(SLM = SELF LEARNING MANAGEMENT)

Course : BNG-402

- **শিরোনাম (Title of the Unit)**

১৭.১ লোকসংস্কৃতি ও সাহিত্যের সংজ্ঞা, স্বরূপ ও বৈশিষ্ট্য

- **গঠন প্রণালী (Structure of the Content OR Unit Structure)**

১৭.১.১ প্রাসঙ্গিকতা ও উদ্দেশ্য (Relevance and Objectives of the Unit)

১৭.১.২ ভূমিকা (Introduction)

১৭.১.৩ অধ্যায় বিভাজন (Appropriate Section and Subsection Heading)

১৭.১.৪ বিষয়বস্তু (Subject Matter)

ক. লোকসংস্কৃতি ও সাহিত্যের সংজ্ঞা

খ. লোকসংস্কৃতি ও সাহিত্যের স্বরূপ

গ. লোকসংস্কৃতির শ্রেণীবিভাগ

ঘ. লোকসাহিত্যের শ্রেণীবিভাগ

১৭.১.৫ সারসংক্ষেপ (Summary)

১৭.১.৬ অনুশীলনী (Questions)

১৭.১.৭ সহায়ক গ্রন্থ (References or Bibliography)

INSTRUCTION OF UGC FOR THE WRITING OF SLM

(SLM = SELF LEARNING MANAGEMENT)

Course : BNG-402

- **শিরোনাম (Title of the Unit)**

১৭.২ বাংলা ছড়া, ধাঁধা ও প্রবাদ

- **গঠন প্রণালী (Structure of the Content OR Unit Structure)**

১৭.২.১ প্রাসঙ্গিকতা ও উদ্দেশ্য (Relevance and Objectives of the Unit)

১৭.২.২ ভূমিকা (Introduction)

১৭.২.৩ অধ্যায় বিভাজন (Appropriate Section and Subsection Heading)

১৭.২.৪ বিষয়বস্তু (Subject Matter)

ক. বাংলা ছড়ার সংজ্ঞা ও তার বৈশিষ্ট্য

খ. বাংলা ধাঁধার সংজ্ঞা ও তার বৈশিষ্ট্য

গ. প্রবাদের সংজ্ঞা ও তার বৈশিষ্ট্য

১৭.২.৫ সারসংক্ষেপ (Summary)

১৭.২.৬ অনুশীলনী (Questions)

১৭.২.৭ সহায়ক গ্রন্থ (References or Bibliography)

INSTRUCTION OF UGC FOR THE WRITING OF SLM

(SLM = SELF LEARNING MANAGEMENT)

Course : BNG-402

- **শিরোনাম (Title of the Unit)**

১৭.৩ গীতিকা, লোকগীতি ও লোকনাট্য

- **গঠন প্রণালী (Structure of the Content OR Unit Structure)**

১৭.৩.১ প্রাসঙ্গিকতা ও উদ্দেশ্য (Relevance and Objectives of the Unit)

১৭.৩.২ ভূমিকা (Introduction)

১৭.৩.৩ অধ্যায় বিভাজন (Appropriate Section and Subsection Heading)

১৭.৩.৪ বিষয়বস্তু (Subject Matter)

ক. গীতিকার সংজ্ঞা ও তার বৈশিষ্ট্য

খ. লোকগীতির সংজ্ঞা ও তার বৈশিষ্ট্য

গ. লোকনাট্যের সংজ্ঞা ও তার বৈশিষ্ট্য

১৭.৩.৫ সারসংক্ষেপ (Summary)

১৭.৩.৬ অনুশীলনী (Questions)

১৭.৩.৭ সহায়ক গ্রন্থ (References or Bibliography)

INSTRUCTION OF UGC FOR THE WRITING OF SLM

(SLM = SELF LEARNING MANAGEMENT)

Course : BNG-402

- **শিরোনাম (Title of the Unit)**

১৭.৪ লোককথা ও টাইপ, মোটিফ

- **গঠন প্রণালী (Structure of the Content OR Unit Structure)**

১৭.৪.১ প্রাসঙ্গিকতা ও উদ্দেশ্য (Relevance and Objectives of the Unit)

১৭.৪.২ ভূমিকা (Introduction)

১৭.৪.৩ অধ্যায় বিভাজন (Appropriate Section and Subsection Heading)

১৭.৪.৪ বিষয়বস্তু (Subject Matter)

ক. লোককথার বৈশিষ্ট্য

খ. লোককথার টাইপ ও মোটিফ

১৭.৪.৫ সারসংক্ষেপ (Summary)

১৭.৪.৬ অনুশীলনী (Questions)

১৭.৪.৭ সহায়ক গ্রন্থ (References or Bibliography)

INSTRUCTION OF UGC FOR THE WRITING OF SLM

(SLM = SELF LEARNING MANAGEMENT)

Course : BNG-403

বর্গ - ১

- **শিরোনাম (Title of the Unit)**

১৮.১ উপন্যাসের সংজ্ঞা ও বৈশিষ্ট্যসমূহ, উপন্যাসের শ্রেণীবিভাগ

- **গঠন প্রণালী (Structure of the Content OR Unit Structure)**

১৮.১.১ প্রাসঙ্গিকতা ও উদ্দেশ্য (Relevance and Objectives of the Unit)

১৮.১.২ ভূমিকা (Introduction)

১৮.১.৩ অধ্যায় বিভাজন (Appropriate Section and Subsection Heading)

১৮.১.৪ বিষয়বস্তু (Subject Matter)

ক. উপন্যাসের সংজ্ঞা ও বৈশিষ্ট্যসমূহ

খ. উপন্যাসের শ্রেণীবিভাগ

১৮.১.৫ সারসংক্ষেপ (Summary)

১৮.১.৬ অনুশীলনী (Questions)

১৮.১.৭ সহায়ক গ্রন্থ (References or Bibliography)

INSTRUCTION OF UGC FOR THE WRITING OF SLM

(SLM = SELF LEARNING MANAGEMENT)

Course : BNG-403

বর্গ - ১

- **শিরোনাম (Title of the Unit)**

১৮.২ ছোটগল্পের সংজ্ঞা, বৈশিষ্ট্য, ছোটগল্পের শ্রেণীবিভাগ

- **গঠন প্রণালী (Structure of the Content OR Unit Structure)**

১৮.২.১ প্রাসঙ্গিকতা ও উদ্দেশ্য (Relevance and Objectives of the Unit)

১৮.২.২ ভূমিকা (Introduction)

১৮.২.৩ অধ্যায় বিভাজন (Appropriate Section and Subsection Heading)

১৮.২.৪ বিষয়বস্তু (Subject Matter)

ক. ছোটগল্পের সংজ্ঞা ও স্বরূপ

খ. ছোটগল্পের শ্রেণীবিভাগ

১৮.২.৫ সারসংক্ষেপ (Summary)

১৮.২.৬ অনুশীলনী (Questions)

১৮.২.৭ সহায়ক গ্রন্থ (References or Bibliography)

INSTRUCTION OF UGC FOR THE WRITING OF SLM

(SLM = SELF LEARNING MANAGEMENT)

Course : BNG-403

বর্গ - ১

- **শিরোনাম (Title of the Unit)**

১৮.৩ পথের পাঁচালী

- **গঠন প্রণালী (Structure of the Content OR Unit Structure)**

১৮.৩.১ প্রাসঙ্গিকতা ও উদ্দেশ্য (Relevance and Objectives of the Unit)

১৮.৩.২ ভূমিকা (Introduction)

১৮.৩.৩ অধ্যায় বিভাজন (Appropriate Section and Subsection Heading)

১৮.৩.৪ বিষয়বস্তু (Subject Matter)

ক. পথের পাঁচালী - চরিত্র বিচার

খ. পথের পাঁচালী - গদ্যশৈলী ও বর্ণনারীতি

গ. পথের পাঁচালী - প্রাকৃতিক পরিবেশ

১৮.৩.৫ সারসংক্ষেপ (Summary)

১৮.৩.৬ অনুশীলনী (Questions)

১৮.৩.৭ সহায়ক গ্রন্থ (References or Bibliography)

INSTRUCTION OF UGC FOR THE WRITING OF SLM

(SLM = SELF LEARNING MANAGEMENT)

Course : BNG-403

বর্গ - ১

- **শিরোনাম (Title of the Unit)**

১৮.৪ কবি

- **গঠন প্রণালী (Structure of the Content OR Unit Structure)**

১৮.৪.১ প্রাসঙ্গিকতা ও উদ্দেশ্য (Relevance and Objectives of the Unit)

১৮.৪.২ ভূমিকা (Introduction)

১৮.৪.৩ অধ্যায় বিভাজন (Appropriate Section and Subsection Heading)

১৮.৪.৪ বিষয়বস্তু (Subject Matter)

ক. কবি উপন্যাসের চরিত্র পরিচয়

খ. কবি উপন্যাসের আঞ্চলিকতা

১৮.৪.৫ সারসংক্ষেপ (Summary)

১৮.৪.৬ অনুশীলনী (Questions)

১৮.৪.৭ সহায়ক গ্রন্থ (References or Bibliography)

INSTRUCTION OF UGC FOR THE WRITING OF SLM

(SLM = SELF LEARNING MANAGEMENT)

Course : BNG-403

বর্গ - ২

- **শিরোনাম (Title of the Unit)**

১৮.১ জীবনস্মৃতি

- **গঠন প্রণালী (Structure of the Content OR Unit Structure)**

১৮.১.১ প্রাসঙ্গিকতা ও উদ্দেশ্য (Relevance and Objectives of the Unit)

১৮.১.২ ভূমিকা (Introduction)

১৮.১.৩ অধ্যায় বিভাজন (Appropriate Section and Subsection Heading)

১৮.১.৪ বিষয়বস্তু (Subject Matter)

ক. জীবনস্মৃতি - শুধুমাত্র প্রবন্ধ নয়

খ. জীবনস্মৃতিতে রবীন্দ্রনাথের পৌরাণিক চেতনা

গ. জীবনস্মৃতিতে রবীন্দ্রচেতনার সামগ্রিক প্রকাশ

১৮.১.৫ সারসংক্ষেপ (Summary)

১৮.১.৬ অনুশীলনী (Questions)

১৮.১.৭ সহায়ক গ্রন্থ (References or Bibliography)

INSTRUCTION OF UGC FOR THE WRITING OF SLM

(SLM = SELF LEARNING MANAGEMENT)

Course : BNG-403

বর্গ - ২

- **শিরোনাম (Title of the Unit)**

১৮ .২ ব্রহ্মচর্যাশ্রম, বিশ্বভারতী ও শ্রীনিকেতন প্রতিষ্ঠার ইতিবৃত্ত

- **গঠন প্রণালী (Structure of the Content OR Unit Structure)**

১৮ .২.১ প্রাসঙ্গিকতা ও উদ্দেশ্য (Relevance and Objectives of the Unit)

১৮ .২.২ ভূমিকা (Introduction)

১৮ .২.৩ অধ্যায় বিভাজন (Appropriate Section and Subsection Heading)

১৮ .২.৪ বিষয়বস্তু (Subject Matter)

ক . ব্রহ্মচর্যাশ্রম

খ . বিশ্বভারতী

গ . শ্রীনিকেতন প্রতিষ্ঠার ইতিবৃত্ত

১৮ .২.৫ সারসংক্ষেপ (Summary)

১৮ .২.৬ অনুশীলনী (Questions)

১৮ .২.৭ সহায়ক গ্রন্থ (References or Bibliography)

INSTRUCTION OF UGC FOR THE WRITING OF SLM

(SLM = SELF LEARNING MANAGEMENT)

Course : BNG-402

বর্গ - ২

- **শিরোনাম (Title of the Unit)**

১৮ .৩ রবীন্দ্রনাথের শিশুশিক্ষা (সহজপাঠ, ইংরেজি সোপান, সংস্কৃত সোপান নির্ভর আলোচনা)

- **গঠন প্রণালী (Structure of the Content OR Unit Structure)**

১৮ .৩ .১ প্রাসঙ্গিকতা ও উদ্দেশ্য (Relevance and Objectives of the Unit)

১৮ .৩ .২ ভূমিকা (Introduction)

১৮ .৩ .৩ অধ্যায় বিভাজন (Appropriate Section and Subsection Heading)

১৮ .৩ .৪ বিষয়বস্তু (Subject Matter)

ক . রবীন্দ্রনাথের শিশুশিক্ষার অভিনবত্ব

খ . সহজপাঠ

গ . ইংরেজি সোপান

১৮ .৩ .৫ সারসংক্ষেপ (Summary)

১৮ .৩ .৬ অনুশীলনী (Questions)

১৮ .৩ .৭ সহায়ক গ্রন্থ (References or Bibliography)

INSTRUCTION OF UGC FOR THE WRITING OF SLM

(SLM = SELF LEARNING MANAGEMENT)

Course : BNG-403

বর্গ - ২

- **শিরোনাম (Title of the Unit)**

১৮.৪ প্রবন্ধ:

ক. কুমারসম্ভব ও শকুন্তলা

খ. শিক্ষার হেরফের

গ. সাহিত্যতত্ত্ব

- **গঠন প্রণালী (Structure of the Content OR Unit Structure)**

১৮.৪.১ প্রাসঙ্গিকতা ও উদ্দেশ্য (Relevance and Objectives of the Unit)

১৮.৪.২ ভূমিকা (Introduction)

১৮.৪.৩ অধ্যায় বিভাজন (Appropriate Section and Subsection Heading)

১৮.৪.৪ বিষয়বস্তু (Subject Matter)

ক. কুমারসম্ভব ও শকুন্তলা

খ. শিক্ষার হেরফের

গ. সাহিত্যতত্ত্ব

১৮.৪.৫ সারসংক্ষেপ (Summary)

১৮.৪.৬ অনুশীলনী (Questions)

১৮.৪.৭ সহায়ক গ্রন্থ (References or Bibliography)

INSTRUCTION OF UGC FOR THE WRITING OF SLM

(SLM = SELF LEARNING MANAGEMENT)

Course : BNG-403

বর্গ - ২

- **শিরোনাম (Title of the Unit)**

১৮ .৫ ছিন্নপত্রাবলী

- **গঠন প্রণালী (Structure of the Content OR Unit Structure)**

১৮ .৫ .১ প্রাসঙ্গিকতা ও উদ্দেশ্য (Relevance and Objectives of the Unit)

১৮ .৫ .২ ভূমিকা (Introduction)

১৮ .৫ .৩ অধ্যায় বিভাজন (Appropriate Section and Subsection Heading)

১৮ .৫ .৪ বিষয়বস্তু (Subject Matter)

ক . রবীন্দ্র চেতনে ছিন্নপত্রাবলী

১৮ .৫ .৫ সারসংক্ষেপ (Summary)

১৮ .৫ .৬ অনুশীলনী (Questions)

১৮ .৫ .৭ সহায়ক গ্রন্থ (References or Bibliography)

INSTRUCTION OF UGC FOR THE WRITING OF SLM

(SLM = SELF LEARNING MANAGEMENT)

Course : BNG-403

বর্গ - ৩

- **শিরোনাম (Title of the Unit)**

১৮.১ নাট্যতত্ত্ব – প্রাচ্য ও পাশ্চাত্য

ক. নাটকের সংজ্ঞা, বৈশিষ্ট্য ও বিভিন্ন উপাদান

খ. কমেডির সংজ্ঞা ও বৈশিষ্ট্য, ট্র্যাজিডির সংজ্ঞা, বৈশিষ্ট্য ও উপাদান

গ. কার্স, কমেডি ও প্রহসনের তুলনামূলক আলোচনা

- **গঠন প্রণালী (Structure of the Content OR Unit Structure)**

১৮.১.১ প্রাসঙ্গিকতা ও উদ্দেশ্য (Relevance and Objectives of the Unit)

১৮.১.২ ভূমিকা (Introduction)

১৮.১.৩ অধ্যায় বিভাজন (Appropriate Section and Subsection Heading)

১৮.১.৪ বিষয়বস্তু (Subject Matter)

ক. নাটকের সংজ্ঞা, বৈশিষ্ট্য ও বিভিন্ন উপাদান

খ. কমেডির সংজ্ঞা ও বৈশিষ্ট্য, ট্র্যাজিডির সংজ্ঞা, বৈশিষ্ট্য ও উপাদান

গ. কার্স, কমেডি ও প্রহসনের তুলনামূলক আলোচনা

১৮.১.৫ সারসংক্ষেপ (Summary)

১৮.১.৬ অনুশীলনী (Questions)

১৮.১.৭ সহায়ক গ্রন্থ (References or Bibliography)

INSTRUCTION OF UGC FOR THE WRITING OF SLM

(SLM = SELF LEARNING MANAGEMENT)

Course : BNG-403

বর্গ - ৩

- **শিরোনাম (Title of the Unit)**

১৮.২ নাটকের শ্রেণীভেদ:

ক. সংস্কৃত অলঙ্কার শাস্ত্র অনুসারে নাট্যের শ্রেণীবিভাগ সম্পর্কে আলোচনা

খ. ট্র্যাজিডির শ্রেণীবিভাগ

গ. কমেডির শ্রেণীবিভাগ

- **গঠন প্রণালী (Structure of the Content OR Unit Structure)**

১৮.২.১ প্রাসঙ্গিকতা ও উদ্দেশ্য (Relevance and Objectives of the Unit)

১৮.২.২ ভূমিকা (Introduction)

১৮.২.৩ অধ্যায় বিভাজন (Appropriate Section and Subsection Heading)

১৮.২.৪ বিষয়বস্তু (Subject Matter)

ক. সংস্কৃত অলঙ্কার শাস্ত্র অনুসারে নাট্যের শ্রেণীবিভাগ সম্পর্কে আলোচনা

খ. ট্র্যাজিডির শ্রেণীবিভাগ

গ. কমেডির শ্রেণীবিভাগ

১৮.২.৫ সারসংক্ষেপ (Summary)

১৮.২.৬ অনুশীলনী (Questions)

১৮.২.৭ সহায়ক গ্রন্থ (References or Bibliography)

INSTRUCTION OF UGC FOR THE WRITING OF SLM

(SLM = SELF LEARNING MANAGEMENT)

Course : BNG-403

বর্গ - ৩

- **শিরোনাম (Title of the Unit)**

১৮.৩ নূরজাহান

- **গঠন প্রণালী (Structure of the Content OR Unit Structure)**

১৮.৩.১ প্রাসঙ্গিকতা ও উদ্দেশ্য (Relevance and Objectives of the Unit)

১৮.৩.২ ভূমিকা (Introduction)

১৮.৩.৩ অধ্যায় বিভাজন (Appropriate Section and Subsection Heading)

১৮.৩.৪ বিষয়বস্তু (Subject Matter)

ক. নূরজাহানের চরিত্র চিত্রণ

খ. নূরজাহান কি বিষয়ক নাটক

১৮.৩.৫ সারসংক্ষেপ (Summary)

১৮.৩.৬ অনুশীলনী (Questions)

১৮.৩.৭ সহায়ক গ্রন্থ (References or Bibliography)

INSTRUCTION OF UGC FOR THE WRITING OF SLM

(SLM = SELF LEARNING MANAGEMENT)

Course : BNG-403

বর্গ - ৩

- **শিরোনাম (Title of the Unit)**

১৮ .৪ হ্যামলেট

- **গঠন প্রণালী (Structure of the Content OR Unit Structure)**

১৮ .৪ .১ প্রাসঙ্গিকতা ও উদ্দেশ্য (Relevance and Objectives of the Unit)

১৮ .৪ .২ ভূমিকা (Introduction)

১৮ .৩ .৩ অধ্যায় বিভাজন (Appropriate Section and Subsection Heading)

১৮ .৪ .৪ বিষয়বস্তু (Subject Matter)

ক . হ্যামলেট নাটকের বিষয়বস্তু

খ . হ্যামলেট নাটকের চরিত্র বিচার

১৮ .৪ .৫ সারসংক্ষেপ (Summary)

১৮ .৪ .৬ অনুশীলনী (Questions)

১৮ .৪ .৭ সহায়ক গ্রন্থ (References or Bibliography)

INSTRUCTION OF UGC FOR THE WRITING OF SLM

(SLM = SELF LEARNING MANAGEMENT)

Course : BNG-403

বর্গ - ৪

- **শিরোনাম (Title of the Unit)**

১৮.১ রসবাদ ও ধ্বনিবাদ

- **গঠন প্রণালী (Structure of the Content OR Unit Structure)**

১৮.১.১ প্রাসঙ্গিকতা ও উদ্দেশ্য (Relevance and Objectives of the Unit)

১৮.১.২ ভূমিকা (Introduction)

১৮.১.৩ অধ্যায় বিভাজন (Appropriate Section and Subsection Heading)

১৮.১.৪ বিষয়বস্তু (Subject Matter)

ক. রসবাদ

খ. ধ্বনিবাদ

১৮.১.৫ সারসংক্ষেপ (Summary)

১৮.১.৬ অনুশীলনী (Questions)

১৮.১.৭ সহায়ক গ্রন্থ (References or Bibliography)

INSTRUCTION OF UGC FOR THE WRITING OF SLM

(SLM = SELF LEARNING MANAGEMENT)

Course : BNG-403

বর্গ - ৪

- **শিরোনাম (Title of the Unit)**

১৮.২ সাহিত্য আন্দোলন

- **গঠন প্রণালী (Structure of the Content OR Unit Structure)**

১৮.২.১ প্রাসঙ্গিকতা ও উদ্দেশ্য (Relevance and Objectives of the Unit)

১৮.২.২ ভূমিকা (Introduction)

১৮.২.৩ অধ্যায় বিভাজন (Appropriate Section and Subsection Heading)

১৮.২.৪ বিষয়বস্তু (Subject Matter)

ক. পোস্ট মডার্নিজিম

খ. স্ট্রাকচারালিজিম

গ. পোস্ট স্ট্রাকচারালিজিম

ঘ. ফেমিনিজিম

১৮.২.৫ সারসংক্ষেপ (Summary)

১৮.২.৬ অনুশীলনী (Questions)

১৮.২.৭ সহায়ক গ্রন্থ (References or Bibliography)

INSTRUCTION OF UGC FOR THE WRITING OF SLM

(SLM = SELF LEARNING MANAGEMENT)

Course : BNG-403

বর্গ - ৪

- **শিরোনাম (Title of the Unit)**

১৮.৩ সাহিত্যদর্পণ

- **গঠন প্রণালী (Structure of the Content OR Unit Structure)**

১৮.৩.১ প্রাসঙ্গিকতা ও উদ্দেশ্য (Relevance and Objectives of the Unit)

১৮.৩.২ ভূমিকা (Introduction)

১৮.৩.৩ অধ্যায় বিভাজন (Appropriate Section and Subsection Heading)

১৮.৩.৪ বিষয়বস্তু (Subject Matter)

ক. সাহিত্যদর্পণের অষ্টম পরিচ্ছেদের প্রধান বিষয়

১৮.৩.৫ সারসংক্ষেপ (Summary)

১৮.৩.৬ অনুশীলনী (Questions)

১৮.৩.৭ সহায়ক গ্রন্থ (References or Bibliography)

INSTRUCTION OF UGC FOR THE WRITING OF SLM

(SLM = SELF LEARNING MANAGEMENT)

Course : BNG-403

বর্গ - ৪

- **শিরোনাম (Title of the Unit)**

১৮.৪ On the Sublime

- **গঠন প্রণালী (Structure of the Content OR Unit Structure)**

১৮.৪.১ প্রাসঙ্গিকতা ও উদ্দেশ্য (Relevance and Objectives of the Unit)

১৮.৪.২ ভূমিকা (Introduction)

১৮.৪.৩ অধ্যায় বিভাজন (Appropriate Section and Subsection Heading)

১৮.৪.৪ বিষয়বস্তু (Subject Matter)

ক. Theory of the Sublime

খ. The role of the creative imagination

১৮.৪.৫ সারসংক্ষেপ (Summary)

১৮.৪.৬ অনুশীলনী (Questions)

১৮.৪.৭ সহায়ক গ্রন্থ (References or Bibliography)

VIDYASAGAR UNIVERSITY
DIRECTORATE OF DISTANCE EDUCATION
Dietetics and Community Nutrition Management
M. Sc.
Semester – I

Paper ND01: Unit 01: ADVANCED HUMAN PHYSIOLOGY - I

SLM Unit No.1.1: Cellular Basis of Physiology

1. Objectives
2. Introduction
3. Structure and functions of Cell, organelles
    - 3.1 Principles of cell theory
    - 3.2 Plasma Membrane
        - 3.2.1 Common features of biological membranes
        - 3.2.2 Structures of bio-membrane
        - 3.2.3 Composition of bio-membrane

    3.2.3.1 Membrane lipids

        - 3.2.3.1.1 Phosphoglycerides
        - 3.2.3.1.2 Sphingolipid
        - 3.2.3.1.3 Glycolipid
        - 3.2.3.1.4 Cholesterol
        - 3.2.3.1.5 Importance of lipid bilayer

    3.2.3.2 Membrane Carbohydrates

    3.2.3.3 Membrane Proteins

        - 3.2.3.3.1 Integral Membrane Proteins
        - 3.2.3.3.2 Peripheral Membrane Proteins
        - 3.2.3.3.3 Lipid- Anchored Membrane Proteins

    3.2.3.4 Membrane lipids and membrane fluidity

    3.2.3.5 The asymmetry of membrane lipids

    3.2.3.6 Lipids and membrane proteins diffuse rapidly in the plane of the membrane

    3.2.3.7 Functions of bio-membrane

    - 3.3 Transport across the membrane
        - 3.3.1 Overview of Membrane Transport

    3.3.2 Types of membrane transport

    3.3.2.1 Active Transport and Passive Transport

    3.3.2.2 Passive diffusion vs. Carrier-assisted Transport

    3.3.2.3 Several features uniport

        - 3.3.2.3.1 GLUT1 as an uniports
        - 3.3.2.3.2 Transport of glucose through GLUT1

    3.3.2.4 Co-transport by symporters

    3.3.2.5 Co-transport by antiporters

3.3.2.6 ATP- powered pumps and the intracellular transport
3.3.2.7 Transport through channels
3.3.2.7.1 Water-channels (Aquaporins)
3.3.2.7.2 Different types of ion channels
3.3.2.7.2.1 Voltage gated ion channels
3.3.2.7.2.2 Mechanism of opening of voltage – gated channel
3.3.2.7.2.3 Ligand mediated and G protein mediated transport

3.4 Endoplasmic Reticulum
3.4.1 Structure of endoplasmic reticulum
3.4.2 Functions of rough endoplasmic reticulum (RER)
3.4.2.1 Protein synthesis on the RER
3.4.2.2 RER controls the processing of newly synthesized proteins
3.4.2.3 The RER synthesizes membranes
3.4.2.4 Synthesis of integral membrane proteins
3.4.2.5 Rough ER starts glycosylation
3.4.3 Functions of smooth endoplasmic
3.4.3.1 Relation to carbohydrate metabolism
3.4.3.2 Steroid Biosynthesis
3.4.3.3 Storage site for calcium
3.4.3.4 Site for detoxification

3.5 Golgi Complex
3.5.1 Electron microscope structure
3.5.2 Functions of Golgi Complex
3.5.2.1 Protein Secretion
3.5.2.2 Mechanism of vesicular traffic
3.5.2.3 Glycosylation process
3.5.2.4 Other functions

3.6 Mitochondria
3.6.1 Mitochondrial enzymes
3.6.2 Functions of Mitochondria

3.7 Lysosome
3.7.1 Lysosomal enzymes
3.7.1.1 Synthesis of lysosomal enzymes
3.7.2 Functions of lysosome
3.7.3 Abnormal lysosomes can cause fatal diseases
3.7.3.1 Lysosomal storage diseases
3.7.3.2 Standard classification of lysosomal storage diseases (LSD)
3.7.3.3 Signs and symptoms of LSDs
3.7.3.4 Diagnosis of LSDs
3.7.3.5 Treatment of LSDs

SLM Unit- 1.2: Blood

1. Objectives
2. Introduction
3. Blood

3.1 Functions of blood

3. 2 Composition of blood

3.2.1 Plasma

3.2.2 Serum

3.2.3 Plasma Proteins

3.2.4 Normal values

3.2.5 Properties of plasma proteins

3.2.6 Origin of plasma proteins

3.2.7 Functions of plasma proteins

3.3 Blood cells

3.3.1 Red blood cells

3.3.2 White blood cells

3.3.3 Platelets

3.3.4 Hematocrit Value

3.3.5 Haemopoiesis

3.4 Coagulation of Blood

3.4.1 Factors involved in blood clotting

3.4.2 Sequence of clotting mechanism

3.4.3 Blood clot

3.4.4 Anticoagulants

3.4.5 Heparin

3.4.6 Coumarin derivatives

3.4.7 Edta

3.4.8 Oxalate compounds

3.4.9 Citrates

3.4.10 Other substances which prevent blood clotting

3.5 Bleeding disorders

3.5.1 Hemophilia

3.5.2. Purpura

3.5 .3. Von Willebrand Disease

3.5.4 Thrombosis

3.6 Blood groups

3.6 .1 ABO blood groups

3.6.2 Blood group systems

3.6.3 ABO System

SLM Unit No.- 1.3: Cardiovascular System

4. Summary
5. Glossary
6. Self Assessment questions
7. Check your progress: Model Answers
8. Bibliography

Paper ND01: Unit 02: ADVANCED HUMAN PHYSIOLOGY - II

SLM Unit No. 2.1: Respiratory system

1. Objective
2. Introduction
3. Respiratory system
    a. Anatomy of respiratory tract
        i. Nose and Nasal Cavity
        ii. Oral cavity and pharynx
        iii. Larynx
        iv. Trachea
        v. Bronchi
        vi. Lungs
            1. Pulmonary alveolus
            2. Histological structure
            3. Pulmonary surfactant
    b. Lung compliance
        i. Static compliance
        ii. Dynamic compliance
        iii. Clinical significance (Alveolar size regulation)
    c. Lung volumes and capacities
    d. Muscle of Respiration
        i. Diaphragm
        ii. Intercostal muscles
        iii. Accessory muscles of respiration
        iv. Muscle of exhalation
    e. Innervations of lungs
    f. Mechanism of breathing
    g. Mechanism of breathing
        i. Mechanism of inspiration
        ii. Mechanism of expiration
    h. Pressure gradient for gaseous exchange
    i. Regulation of respiration
        i. Nervous regulation of respiration
        ii. Chemical regulation of respiration
        iii. Control systems
4. Summary
5. Glossary
6. Suggested questions
7. Sample questions and answers
8. Bibliography

SLM Unit No. 2.2: Endocrinology

SLM Unit No. 2.3: Reproductive System

Paper ND02: Unit 03: FOOD SCIENCE AND NUTRITION

SLM Unit No. 3.1: Carbohydrate

1. Objective
2. Introduction
3. Carbohydrates
    - 3.1. Classification of Carbohydrates
        - 3.1.1. Physiological classification of carbohydrates
        - 3.1.2. Chemical classification of carbohydrates
            - 3.1.2.1. Monosaccharide
            - 3.1.2.2. Oligosaccharides
            - 3.1.2.3. Polysachharide
    - 3.2. Sources of Carbohydrate
    - 3.3 Functions and utilization of carbohydrate
        - 3.3.1. Carbohydrates Supply Energy
        - 3.3.2. Carbohydrates Provide Fuel for the Central Nervous System
        - 3.3.3. Carbohydrates Provide Fuel for the Muscular System
        - 3.3.4 Carbohydrates Supposedly Spare Proteins
        - 3.3.5. Carbohydrates Supposedly Supply “Dietary Fiber” prevent diseases
        - 3.3.6. Helps to Sleep Better
        - 3.3.7. Prevents Blood
        - 3.3.8. Useful to Control Weight
        - 3.3.9. Improves the Digestive System
        - 3.3.10. Uplifts Mood
        - 3.3.11. Helps to Keep Memory Sharp
        - 3.3.12. Best Nutrient for Athletes
        - 3.3.13. Risk of cancer is reduced with carbohydrates
        - 3.3.14. Enjoy Healthier Skin
        - 3.3.15. Beneficial Uses of Carbohydrates
    - 3.4. Carbohydrates might cause side effects and common diseases
        - 3.4.1 Carbohydrates and Oxidative Damage
        - 3.4.2 Carbohydrates and Inflammation
        - 3.4.3 Carbohydrates and allergies
        - 3.4.4 Stroke and Obesity
        - 3.4.5 Increased Triglycerides
        - 3.4.6 Risk of Chronic Diseases
        - 3.4.7 Type 2 Diabetes
        - 3.4.8 Osteoporosis and intake of carbohydrates
    - 3.5. Storage of Carbohydrates in the Human Body
        - 3.5.1Glycogen Formation

SLM Unit No. 3.2: Dietary Fibers

SLM Unit No. 3.3: Proteins

SLM Unit No. 3.4: Lipids

SLM Unit No. 3.5: Energy Value of Foods

Paper ND02: Unit 04: VITAMINS AND MINERALS IN NUTRITION

SLM Unit No. 4.1: Fat Soluble Vitamins

SLM Unit No.-4.2: Water Soluble Vitamins

SLM Unit No. - 4.3: Macro Minerals

SLM Unit No. 4.4: Micro Minerals

1. Objectives
2. Introduction
3. Micro minerals

3.1 Iron
- 3.1.1 Major Sources
- 3.1.2 Functions
- 3.1.3 Mechanism of Action
- 3.1.4 RDA
- 3.1.5 Deficiency and toxicity

3.2 Zinc
- 3.2.1 Major Sources
- 3.2.2 Functions
- 3.2.3 Mechanism of Action
- 3.2.4 RDA
- 3.2.5 Deficiency and toxicity

3.3 Iodine
- 3.3.1 Major Sources
- 3.3.2 Functions
- 3.3.3 Mechanism of Action
- 3.3.4 RDA
- 3.3.5 Deficiency and toxicity

3.4 Selenium
- 3.4.1 Major Sources
- 3.4.2 Functions
- 3.4.3 Mechanism of Action
- 3.4.4 RDA
- 3.4.5 Deficiency and toxicity

3.5 Copper
- 3.5.1 Major Sources
- 3.5.2 Functions
- 3.5.3 Mechanism of Action
- 3.5.4 RDA
- 3.5.5 Deficiency and toxicity

3.6 Manganese
- 3.6.1 Major Sources
- 3.6.2 Functions
- 3.6.3 Mechanism of Action
- 3.6.4 RDA

SLM Unit No: 4.5: Ultra trace Minerals

Paper ND03: Unit 05: NUTRITIONAL BIOCHEMISTRY - I.

SLM Unit No-5.1: Enzymology

SLM Unit No-5.2: Metabolism of Carbohydrate

1. Objectives
2. Introduction
3. Metabolism of glucose, glycogen and their disorders
    - 3.1 Glycolysis and the oxidation of pyruvate
    - 3.2 TCA cycle
    - 3.3 Glycogen metabolism
    - 3.4 HMP shunt
    - 3.5 Gluconeogenesis
    - 3.6 Bioenergetics
    - 3.7 Disorders of carbohydrate metabolism
        - 3.7.1Galactosemia
        - 3.7.2 Glycogen storage disease
        - 3.7.3 Pentosuria
        - 3.7.4 Abnormal level in blood glucose
4. Summary
5. Glossary
6. Self-assessment questions
7. Check your Progress
8. Bibliography

SLM Unit no. 5.3: Metabolism of Lipid

1. Objective
2. Introduction
3. Metabolism of fatty acids, glycerides, triglycerides, phospholipids & cholesterol
   - 3.1 Biosynthesis of fattyacids
   - 3.2 Steps in Biosynthesis
   - 3.3 Fatty acid synthase complex
   - 3.4 Synthesis of Unsaturated fatty acids
   - 3.5 Oxidation of fatty acids
     - 3.5.1 Even no. Saturated fatty acids
     - 3.5.2 Odd nymber Saturated fatty acids
     - 3.5.3 Beta oxidation of Unsaturated fatty acids
     - 3.5.4 Eenergetics
   - 3.6 Glycerides
   - 3.7 Phospholipids
   - 3.8 Cholesterol
   - 3.9 Disorders of lipid metabolism
   - 3.10 Lipoprotein and their significance
4. Summary
5. Glossary
6. Self assessment questions
7. Bibliography

Paper ND03: Unit 06: NUTRITIONAL BIOCHEMISTRY - II

SLM Unit no 6.1: Protein and Amino acid Metabolism

SLM Unit no 6.2: Biological Oxidation

SLM UNIT-6.3: Integration and Regulation of Metabolism

SLM Unit No. 6.4.: Oxidative Stress and Antioxidants

Semester – II

Paper ND07: Unit 13: ADVANCED HUMAN PHYSIOLOGY – III

SLM Unit- 13.1: Digestive System

1. Objectives
2. Introduction
3. Digestive System
   - 3.1 Functional Organization of GI System:
     - 3.1.1 The Four Layers of The Digestive Tract
     - 3.1.2 Innervations of GI Tract
   - 3.2 Functions of the GI Tract:
     - 3.2.1neural and Hormonal Integration Of GI Functions
   - 3.3 Digestion And Absorption
     - 3.3.1 Digestion of Carbohydrates
     - 3.3.2 Absorption of Carbohydrates
     - 3.3.3 Digestion of Proteins
     - 3.3.4 Absorption of Amino Acids
     - 3.3.5digestion of Fats
     - 3.3.6absorption of Fats
   - 3.4 Secretory Functions of GI Tract
     - 3.4.1 Salivary Secretion
     - 3.4.2 Gastric Secretion
     - 3.4.3 Intestinal Secretion
     - 3.4.4 Pancreatic Secretion
   - 3.5 Gastrointestinal Hormones
   - 3.6 Movements of the Alimentary Canal
4. Summary
5. Glossary
6. Self Assesment Questions
7. Model Answer
8. Bibliography

SLM Unit No. 13.2: Excretory System

1. Objective
2. Introduction
3. Anatomical localization and structure of the Kidney
4. Functions of the kidney
5. Mechanism of urine formation and excretion
6. Compositions of urine
7. Role of Kidney in water, electrolyte and acid base balance
8. Summary
9. Glossary
10. Self Assessment Questions
11. Bibliography

SLM Unit No. 13.3: Excitable Tissue

1. Objectives
2. Introduction
3. Excitable tissue
    - 3.1. Nerve and Muscle
        - 3.1.1. Nerve
            - 3.1.1.1 Neurones & Glial cells
            - 3.1.1.2 Trophic factors
        - 3.1.2 Muscle, Types of muscle system and their importance
            - 3.1.2.1 Organization of skeletal muscle
            - 3.1.2.2. Skeletal muscle types
            - 3.1.2.3. Biophysical properties of skeletal muscle
            - 3.1.2.4. Basic organization of smooth muscle
            - 3.1.2.5. Types of smooth muscle
            - 3.1.2.6. Innervations of smooth muscle
            - 3.1.2.7. Structure of cardiac muscle
        - 3.1.3. Chemical, Electrical and molecular involvement in muscle contraction
            - 3.1.3.1. Control of skeletal muscle contraction
            - 3.1.3.2. Motor unit
            - 3.1.3.3. Energy sources in muscle contraction
            - 3.1.3.4. Control of smooth muscle activity and regulation of contraction
            - 3.1.3.5. Control of cardiac muscle activity
            - 3.1.3.6. Regulation of the force of contraction of cardiac muscle
        - 3.1.4 .Resting membrane potential & Action potential
            - 3.1.4.1. Electrical signals of nerve cell
            - 3.1.4.2. How ion movements produce electrical signals
            - 3.1.4.3. Forces that create Membrane potentials
            - 3.1.4.4. The ionic basis of resting membrane potential
            - 3.1.4.5. The ionic basis of Action potential
            - 3.1.4.6. Sequence of events during Action potential
        - 3.1.5. Nerve impulse propagation
            - 3.1.5.1. Factors affecting conductivity of nerve
            - 3.1.5.2. Classification of nerve fibres on the basis of conduction velocity
            - 3.1.5.3. Mechanism of conduction of nerve impulse
            - 3.1.5.4. Saltatory conduction in the myelinated nerve fibre
        - 3.1.6. Synaptic & Neuromuscular transmission

3.1.6.1. Structure and Properties of synapses
3.1.6.2. Properties of electrical synapses
3.1.6.3. Properties of chemical synapses
3.1.6.4. Properties of neurotransmitters
3.1.6.5. Quantal release of neurotransmitter
3.1.6.6. Role of Calcium in Transmitter Secretion
3.1.6.7. Ionotropic and metabotropic receptors
3.1.6.8. Mechanism of synaptic transmission
3.1.6.9. Anatomical structure of neuromuscular junction
3.1.6.10. Mechanism of neuromuscular transmission
3.1.6.11. Action of drugs on neuromuscular transmission

3.2. Function of hypothalamus-hunger, satiety and thirst

3.2.1Neuroendocrine regulation of hunger and satiety-Leptin , Ghrelin

3.2.1.1 Energy homeostasis
3.2.1.2 Regulation of body weight
3.2.1.3 The Leptin Protein
3.2.1.4 Leptin receptors(Ob-R)
3.2.1.5 Mechanism of Leptin action in brain
3.2.1.6 Leptin signalling pathways
3.2.1.7 Central Melanocortin system in the regulation of food intake
3.2.1.8 Effects on ghrelin on hypothalamus
3.2.1.9. Structure of ghrelin and functional receptor
3.2.1.10. Distribution and biological function of ghrelin
3.2.1.11. Ghrelin and control of appetite: Major effects and mechanism of action

3.2.2. Neural basis of behaviour and emotion

3.2.2.1. Physiological Changes Associated with Emotion
3.2.2.2. The integration of emotional behaviour
3.2.2.3. The Limbic system
3.2.2.4 .The Importance of the Amygdala
3.2.2.5. Emotion, Reason, and Social behaviour

3.3. Chemical sense-smell and taste

3.3.1. The organization of olfactory system
3.3.2. Olfactory perception in humans
3.3.3. Assessing Olfactory Function in the Laboratory
3.3.4. Olfactory epithelium and Olfactory receptor neurones
3.3.5. Odor transduction and odorant receptor proteins
3.3.6 Physiological mechanism of Odor Transduction
3.3.7. The Olfactory Bulb
3.3.8. The organization of the Taste System
3.3. 9.The taste Perception in Humans

SLM Unit No. 13.4: Immune System

Paper ND07: Unit 14: MOLECULAR BIOLOGY IN NUTRITION

SLM Unit no. 14.1: Metabolism of Nucleic Acids

SLM UNIT-14.2: Molecular Biology in Nutrition

SLM Unit No. 14.3: Genetic Engineering

Paper ND08: Unit 15: FOOD MICROBIOLOGY AND TOXICOLOGY

SLM Unit No. 15.1: Classification and Morphology of Microorganism

SLM Unit NO.-15.2: Microbiology of Food

SLM Unit No. – 15.3: Food Spoilage

SLM UNIT NO 15.4: Food Toxicology and Food Borne Illness

SLM Unit No 15.5: Food Safety, Assessment, Regulation and Standard

Paper ND08: Unit 16: FOOD BIOTECHNOLOGY

SLM Unit No. 16.1: Use of Biotechnology for Food Processing

SLM Unit No. 16.2: Genetically Modified Foods

1. Objective
2. Introduction: Concept of GM food
3. Genetically Modified food: Nutritional aspects and health concern:
   - 3.1 Need for Genetically Modified food
   - 3.2 Food challenges
     - 3.2.1 Potential Challenges
     - 3.2.2 Future Challenges to Food
   - 3.3 Potential benefits in agriculture
   - 3.4 Crop engineering
   - 3.5 Nutritional Improvement
   - 3.6 GM animal foods:
   - 3.7 Genomic analysis of GM food
     - 3.7.1 Genetics of GM food
     - 3.7.2 Genetic analysis and GMO Testing:
   - 3.8 Safety of G.M food
     - 3.8.1 Labeling of Genetically Modified Food
     - 3.8.2 Merits and demerits of GM foods
4. Summary
5. Self assessment question
6. References

SLM Unit No. 16.3: Technology for Production of Alcoholic Beverages

SLM Unit No. 16.4: Food Preservation

SLM Unit No. 16.5: Special Food Processing Technology

1. Objective
2. Introduction
3. Special Food Processing Technology
    - 3.1. Membrane technology
        - 3.1.1 Ultra filtration
        - 3.1.2 Reverse osmosis and)
        - 3.1.3 Agglomeration
        - 3.1.4 Agitation
        - 3.1.5 Extrusion
    - 3.2. Enzyme technology
        - 3.2.1 Production of enzymes – amylase, protease, lipase, lactase and pectinase
        - 3.2.2 Purification of enzymes
        - 3.2.3 Use of enzymes in food & beverage industry (e.g. cheese, fruit juice, wine, meat tenderizing & dairy)
4. Summary
5. Glossary
6. Self Assessment questions
7. Bibliography

Paper ND09: Unit 17: Food Hygiene and Sanitation

SLM Unit No – 17.1: General Principle of Food Hygiene

SLM Unit No – 17.2: Control of Insect, Pest and Microorganism in Food

SLM Unit No. 17.3: Sanitary Aspects of Water Supply

SLM Unit No. 17.4: Effective Detergency and Cleaning Practices

SLM Unit No: 17.5: Sanitary Aspects of Waste Disposal

Paper ND09: Unit 18: ASSESSMENT OF NUTRITIONAL STATUS

SLM Unit No.18.1: Nutrient Requirements

SLM No. Unit No.18.2: Indirect Methods for Nutritional Assessment

SLM Unit no-18.3: Direct Methods for Nutritional Assessment

SLM Unit No. -18.4: Direct Methods for Nutritional Assessment: Dietary and Clinical Assessments

1. Objectives
2. Introduction
3. Methods for Nutritional Assessment: Dietary and Clinical Assessments
    - 3.1 What is Nutritional Assessment, Nutritional Screening & Nutritional Status?
    - 3.2 Importance of Nutritional Assessment.
    - 3.3 Dietary Method - Different Dietary methods especially Dietary history, Dietary Intake Data (DID), 24hrs Recall Method, Food Frequency Method, Daily Food Record or Diary. Direct Measurement of Raw and Cooked Food, Nutrient Intake Analysis (NIA).
    - 3.4 Dietary Assessment in Special Population & Specific situation.
    - 3.5 Dietary Reference Intakes
    - 3.6Component of Clinical Assessment
    - 3.7 Association with Nutrient Deficiencies and Biochemical Status.
4. Summary
5. Glossary
6. Self Assessment Question (SAQ)
7. Bibliography

SLM Unit No -18.5: Assessing food and Nutrition Security

Paper ND10: Unit 19: NUTRITION THROUGH LIFE CYCLE - I

SLM Unit No. - 19.1: Growth and Development through the Life Cycle

SLM Unit No. - 19.2: Nutrition in Pregnancy

SLM Unit No.19.3: Nutrition in Lactation

SLM Unit No. – 19.4: Nutrition in Infancy

SLM Unit No. 19.5: Nutrition in Preschool Children

Paper ND10: Unit 20: **NUTRITION THROUGH LIFE CYCLE - II**

SLM Unit No. 20.1: Nutrition during School Age

SLM Unit No. 20.2: Nutrition during Adolescence

1. Objective
2. Introduction
3. Nutrition during Adolescence
    - 3.1 Growth in adolescence
        - 3.1.1 Physical growth in puberty
        - 3.1.2 Growth spurt
        - 3.1.3 Menarche
        - 3.1.4 Growth after puberty
        - 3.1.5 Internal changes
        - 3.1.6 Physiological change with special reference to hormonal change
        - 3.1.7 Emotional/social behavioural change
    - 3.2 Nutritional requirement in adolescene
        - 3.2.1 Special nutritional importance
        - 3.2.2 Nutrients need (Protein, carbohydrate, fat, minerals , vitamins)
        - 3.2.3 Balanced diet
    - 3.3 Factors influencing food habit
        - 3.3.1General
        - 3.3.2 Special
            - 3.3.2.1 Breakfast
            - 3.3.2.2 Ready to eat foods
            - 3.3.2.3 Alcohol and drinking
    - 3.4 Potential nutrition- related health problem
        - 3.4.1 Obesity
        - 3.4.2 Eating disorder
    - 3.5 Prevention of malnutrition among adolescents
        - 3.5.1General
        - 3.5.2 School lunch programme
4. Summary
5. Glossary
6. Self assessment questions
7. Bibliography

SLM Unit No. 20.3: Nutrition for Adults

SLM Unit No. 20.4: Nutrition for the Aged

1. Objective
2. Introduction

2.1 Global Situation

2.2 Effect of demographic transition

2.3 Aging process

3. Nutrition for elderly

3.1 Physiological changes related to age

3.1.1 Change in GI function

3.1.2 Loss of bone with age

3.1.3 Brain and neural change with age

3.1.4 Changes in C.V. system

3.1.5 Changes in renal function

3.2. Nutritional requirements of aged person

3.2.1 Macronutrients

3.2.2 Micronutrients

3.2.3 Fluid

3.2.4 Fibre

3.3 Factors affecting nutritional status

3.3.1 Financial capacity

3.3.2 Social problem

3.3.3 Emotional problem

3.3.4 Psychological problem

4. Nutrition- related health problem
5. Management of old age

5.1 A life span approach

5.2 Adoption of healthy life style

6. Prevention of disease in old age people

6.1 Primary prevention of disease in old age people

6.2 Secondary prevention

6.3 Tertiary prevention

7. Summary
8. Self Assessment Questions
9. Bibliography

SLM Unit no-20.5: Nutritional Requirements and Food Modification in Higher Altitude and Space Travels, Soldiers

1. Objective
2. Introduction
3. Physiological alteration in astronauts
    - 3.1 Weight reduction and Muscle wasting
    - 3.2 Body water
    - 3.3 Bone loss
    - 3.4 Effect on Blood and cardiovascular
    - 3.5 Alteration of Taste
4. Selection and types of space food
    - 4.1 Rehydratable Food
    - 4.2 Thermostabilized Food
    - 4.3 Intermediate Moisture Food
    - 4.4 Natural Form Food
    - 4.5 Irradiated Food
    - 4.6 Frozen Food
    - 4.7 Fresh Food
    - 4.8 Refrigerated Food
5. Nutritional requirements in space
    - 5.1 Energy
    - 5.2 Carbohydrates
    - 5.3 Protein and Fat
    - 5.4 Vitamin D
    - 5.5 Vitamin K
    - 5.6 Calcium
    - 5.7 Iron
6. Nutritional aspects in high altitude
    - 6.1 Introduction
    - 6.2 Energy expenditure at high altitude and related issues
    - 6.3 Altitude Related Illnesses

7. Nutritional issues and complaints at high altitude
    - 7.1 Weight Loss
    - 7.2 Insufficient Carbohydrate Intake
    - 7.3 Dehydration
    - 7.4 Gastrointestinal Complaints

8. Nutritional Guidelines for soldiers (Militants) at high altitude

Semester III

Paper ND 13: Unit 25: RESEARCH METHODOLOGY AND STATISTICS IN NUTRITION

SLM Unit No. -25.1: Research Methodology

1. Objectives
2. Introduction
3. Research Methodology
   - 3.1. Meaning, aim & objective of research
   - 3.2. Significance of Research
   - 3.3. Role of Research
   - 3.4. Types of Research, Research Process
   - 3.5. Research Problem
     - 3.5.1 Selecting the problem
     - 3.5.2 Technique involved in defining a problem
     - 3.5.3. Thrust areas in research in nutrition and dietetics
4. Summary
5. Glossary
6. Self Assessment Questions
7. Bibliography

SLM Unit No. -25.2: Sampling design & Data collection

1. Objectives
2. Introduction
3. Sampling design & Data collection

3.1.Sampling design

3.2.Census and sample survey

3.3.Steps in sampling design

3.4.Data collection

3.4.1. Collection of primary data through different methods (Questionnaire, observation, Interview, case study, sociometry, Anthropometry, Projective tests and other methods)

3.4.2. Collection of Secondary data

4. Summary
5. Glossary
6. Self Assessment Questions
7. Bibliography

SLM Unit No. -25.3: Descriptive Statistics

SLM Unit No. -25.4: Statistical Testing Inference

SLM Unit No. -25.5: Measures of association

Paper ND 13: Unit 26: BIOINFORMATICS AND COMPUTER APPLICATION IN NUTRITION

SLM Unit No. -26.1: Basic bioinformatics

SLM Unit No. -26.2: Basics of Computer

SLM Unit No. 26.3: Computer Software

SLM Unit No. 26.4: Word Processing and Data Management

SLM Unit No. 26.5: Concept of internet

Paper ND 14: Unit 27: FOOD AND NUTRITION SERVICES IN HOSPITAL AND OTHER ORGANIZATIONS

SLM Unit No. 27.1: Introduction to Food Service Organization

SLM Unit No. 27.2: Role of Nutrition Support Team

SLM Unit No. 27.3: Types of Services in Tertiary Health Care Setup

SLM Unit No. 27.4: Basic quality management in nutrition services

Basic quality management in nutrition services

SLM Unit No. 27.5: Patient Satisfaction

Paper ND 14: Unit 28: DRUG NUTRIENT INTERACTION AND NUTRIGENOMICS

SLM Unit No.28.1: Drugs and Pharmaceutical Compounds

SLM Unit No. 28.2: **Characteristics of Drugs Action**

SLM Unit No.28.3: Drug-Nutrient Interactions

SLM Unit No.28.4: Nutrient Effects on Drug Therapy

1. Objectives
2. Introduction
3. Nutrient Effects on Drug Therapy
    3.1. Effects of dietary composition
    3.2. Interactions between medication and milk, iron, fruit juices, antacids
4. Summary
5. Glossary
6. Self Assessment Questions (SAQ)
7. Bibliography

SLM Unit No.28.5: Nutrigenomics

Paper ND 15: Unit 29: DIET THERAPY- I

SLM Unit No.29.1: Basic principles of planning a normal diet

1. Objectives
2. Introduction
3. Basic principles of planning a normal diet
    - 3.1. characteristics of a normal diet
    - 3.2. meeting nutrient requirements of individuals and family
    - 3.3. Use of Dietary guidelines for Indians
    - 3.4. Objectives of diet therapy
        - 3.4.1. Regular diet and rationale for modifications in energy and other nutrients, texture, fluid, soft diets
4. Summary
5. Glossary
6. Self Assessment Questions
7. Bibliography

SLM Unit No.29.2: Diet in Febrile condition

SLM Unit No. 29.3: Diet in Energy Imbalance

SLM Unit No. 29.4: Diets in Cardio Vascular and Pulmonary Diseases

Paper ND 15: Unit 30: DIET THERAPY- II

SLM Unit No. 30.1: Diets in Diseases of the Gastro Intestinal System

1. Objectives
2. Introduction
3. Diets in Diseases of the Gastro Intestinal System
   - 3.1. Disorders, Etiology, Symptoms and dietary management of Acute Gastritis
   - 3.2. Disorders, Etiology, Symptoms and dietary management of Chronic Gastritis
   - 3.3. Disorders, Etiology, Symptoms and dietary management of Peptic Ulcer
   - 3.4. Duodenal & Gastric and Intestinal Disease
     - 3.4.1. Flatulence
     - 3.4.2. Diarrhoea and Dysentery
     - 3.4.3. Constipation
     - 3.4.4. Celiac disease
     - 3.4.5. Tropical sprue
     - 3.4.6. Irritable bowel syndrome
     - 3.4.7. Diverticular disease
     - 3.4.8. Colon cancer
     - 3.4.9. Ulcerative colitis
4. Summary
5. Glossary
6. Self Assessment Questions
7. Bibliography

SLM Unit No. 30.2: Diets in Liver and Kidney Diseases

1. Objectives
2. Introduction
3. Diets in Liver and Kidney Diseases

    3.1. Diets in Liver Diseases

        3.1.1. Dietary management of Hepatitis
        3.1.2. Dietary management of Cirrhosis
        3.1.3. Dietary management of Jaundice
        3.1.4. Dietary management of Fatty liver
        3.1.5. Dietary management of Cholecystits and Cholelithiasis
        3.1.6. Dietary management of Hepatic coma
        3.1.7. Dietary management of Pancreatitis

    3.2.. Diets in Kidney Diseases

        3.2.1. Etiology, Symptoms and Dietary modification of Nephritis
        3.2.2. Etiology, Symptoms and Dietary modification of Nephrosis
        3.2.3. Etiology, Symptoms and Dietary modification of Acute and chronic renal failure
        3.2.4. Etiology, Symptoms and Dietary modification of Nephrolilthiasis
        3.2.5. Transplantation and dialysis
        3.2.6. Dietary management, Diet in kidney stones
4. Summary
5. Glossary
6. Self Assessment Questions
7. Bibliography

SLM Unit No.30.3: Diabetes Mellitus

SEMESTER IV

Paper ND 19: Unit 37: ADVANCED DIET THERAPY

SLM Unit No.37.1: Diets in Neurological diseases and Rheumatic disorders

1. Objectives
2. Introduction
3. Diets in Neurological diseases and Rheumatic disorders
    - 3.1. Causes, effect of malnutrition, feeding problems, effect of nutrients in Stroke
    - 3.2. Causes, effect of malnutrition, feeding problems, effect of nutrients in Epilepsy
    - 3.3. Causes, effect of malnutrition, feeding problems, effect of nutrients in Migraine
    - 3.4. Causes, effect of malnutrition, feeding problems, effect of nutrients in Parkinson's neurotrauma myasthenia gravis
    - 3.5. Symptoms, causes, treatment, diet therapy in Osteoarthritis and Rheumatoid arthritis
    - 3.6. Symptoms, causes, treatment, diet therapy in Gout
4. Summary
5. Glossary
6. Self Assessment Questions
7. Bibliography

SLM Unit No.37.2: Diets in Cancer and HIV

SLM Unit No.37.3: Diet in Allergy

Paper ND 19: Unit 38: NUTRITION IN SPORTS AND FITNESS

SLM Unit No. 38.1 Approaches to the Management of Fitness and Health

SLM Unit No. 38.2: Nutritional requirements of exercise

SLM Unit No.38.3 Carbohydrate Requirements Before, During and After Sports, Exercise

SLM Unit No. 38.4: Requirements and Importance of Different Vitamins, Minerals and Water during Exercise

SLM Unit No. 38.5: Dietary Supplements and Ergogenic Aids

Paper ND 20: Unit 39: COMMUNITY NUTRITION

SLM Unit No. 39.1: Community Health Concept

1. Objectives
2. Introduction
3. Community Health Concept
    - 3.1. Definition and brief study of community, family, village and block
    - 3.2. Definition, dimension and determinant of health, positive health, health situation in India
    - 3.3. Relationship between health and nutrition
    - 3.4. Role of public nutritionist in health care delivery
    - 3.5. Health Indices: fertility indicator, vital statistics, mortality, morbidity and demographic indicator
    - 3.6. Human development Index
    - 3.7. Reproductive health index
    - 3.8. IMR, MMR, Birth Rate, Sex Ratio, Poverty Level
    - 3.9. Concept of disease, Causation (Agent, host, environmental factors)
    - 3.10. Concept and control & prevention modes of intervention
4. Summary
5. Glossary
6. Self Assessment Questions
7. Bibliography

SLM Unit No.39.2: Nutrition Programs

1. Objective
2. Introduction
3. Nutrition Programme
   - 3.1. National Anemia Prevention Programme (Nutritional Anemia) (NNACP)
   - 3.2. Night blindness (Nyctalopia) prevention programme (vitamin A deficiency) (NVADCP)
   - 3.3. Iodine prophylaxis programme (NIDDCP)
   - 3.4. The package programme of immunization
   - 3.5. Nutrition Education
   - 3.6. Feeding programme
   - 3.7. Malnutrition
     - 3.7.1. Causes of malnutrition
     - 3.7.2. Ecological factors
     - 3.7.3. Effects of malnutrition
   - 3.8. Demographic changes
   - 3.9. Vitamin deficiency, prevalence, programme to combat
     - 3.9.1. Thiamine (Vitamin B1)
     - 3.9.2. Riboflavin (Vitamin B2)
     - 3.9.3. Niacin
     - 3.9.4. Vitamin C
     - 3.9.5. Vitamin D
   - 3.10Protein deficiency,
     - 3.10.1. Prevalence,
     - 3.10.2. Programme to combat
   - 3.11. PEM
   - 3.12. Kwashirkor
4. Summary
5. Glossary
6. Self Assessment Questions (SAQ)
7. Bibliography

SLM Unit No.39.3: Nutrition and National Development

Paper ND 20: Unit 40: SPECIAL ASPECTS OF COMMUNITY NUTRITION

SLM Unit No.40.1: Nutrition Intervention Programmes

1. Objective
2. Introduction
3. Nutrition Intervention Programmes
    - 3.1. Objectives
    - 3.2. Operation of Feeding Programmes
        - 3.2.1. ICDS
        - 3.2.2. MDMP
        - 3.2.3. PDS
        - 3.2.4. FFW
        - 3.2.5. TINP
        - 3.2.6. NNMS/NNMB
        - 3.2.7. IRDP
        - 3.2.8. DWACRA
    - 3.3. National organizations and their role in nutrition programmes
        - 3.3.1. ICMR
        - 3.3.2. NIN
        - 3.3.3. CFTRI
        - 3.3.4. ICAR
        - 3.3.5. NIPCCD
    - 3.4. International organizations
        - 3.4.1. WHO
        - 3.4.2. UNICEF
        - 3.4.3. FAO
        - 3.4.4. UNESCO
        - 3.4.5. World Bank
4. Summary
5. Glossary
6. Self Assessment Questions
7. Bibliography

SLM Unit No.40.2: Nutrition Education

1. Objective
2. Introduction
3. Nutrition Education
    - 3.1. Meaning
    - 3.2. Nature and importance of nutrition education to the community
    - 3.3. Training of workers in nutrition education programme
    - 3.4. Principles of planning, executing and evaluation nutrition education programme
4. Summary
5. Glossary
6. Self Assessment Questions
7. Bibliography

SLM Unit No.40.3: Recent Trends in Nutrition Education

1. Objective
2. Introduction
3. Recent Trends in Nutrition Education
    - 3.1. Methods and Techniques of organizing nutrition programmes using audio, video aids and exhibition
    - 3.2. Problems of nutrition
    - 3.3. Health care delivery –
        - 3.3.1. PHC
        - 3.3.2 School Health services and their role in preventing communicable diseases
4. Summary
5. Glossary
6. Self Assessment Questions
7. Bibliography

Paper ND 21: Unit 41: NUTRITION IN EMERGENCIES

SLM Unit No.41.1: Natural / Manmade Disasters

1. Objective
2. Introduction
3. Natural / manmade disasters resulting in emergency situations
    - 3.1. Famine,
    - 3.2. Drought,
    - 3.3. Flood,
    - 3.4. Earthquake,
    - 3.5. Cyclone,
    - 3.6. War,
    - 3.7. Civil and Political Emergencies,
    - 3.8. Factors contributing to the rise and development of emergency situations (use illustrations from Indian case studies).
4. Summary
5. Glossary
6. Self Assessment Questions (SAQ)
7. Bibliography

SLM Unit No.41.2: Nutritional Problems and Communicable Diseases

SLM Unit No. 41.3: **Assessment and Surveillance of Nutritional Status**

SLM Unit No. 41.4: **Nutritional Relief and Rehabilitation**

SLM Unit No. 41.5: **Assessment of Food Needs in Emergency Situations**

Paper ND 21: Unit 42: NUTRITION COUNSELLING

SLM Unit No. 42.1: Nutrition Counseling

SLM Unit No. 42.2: **Factors for Counseling**

SLM Unit No. 42.3: **Assessment and Planning Component**

SLM Unit No. 42.4: **Implementation and Evaluation Component**

SLM Unit No. 42.5: Nutrition Advocacy

Paper ND 22: Unit 43: Nutraceuticals

SLM Unit No. 43.1: Nutraceuticals

SLM Unit No. 43.2: Prebiotics and Probiotics

SLM Unit No.43.3: Functional Foods

SLM Unit No.43.4: Development of Nutraceutical and Functional Foods

SLM Unit No.43.5: Other Food Components with Potential Health Benefits

Paper ND 22: Unit 44: Food Additives

SLM Unit No.44.1: Food additives

SLM Unit No.44.2: Categories of Food Additives

SLM Unit No.44.3: Sweetening agents & Natural and Synthetic colors

SLM Unit No.44.4: Food Flavors

SLM Unit No.44.5: Determination and Estimation of Food Additives

M.A. in HISTORY

SEM-I

Paper-HIS 101

History and Historiography: Western History Writing Approaches

Structure of Content –SLM-1. 1

- **Title of the Unit: What is History and Historiography?**
- **Objectives**
- **Introduction**

Divisions of the unit in unit sections and subsections (to be done by faculty slm wise)

- **Definitions of History**

– Its meaning and scope

– Events and interpretations

- **Philosophy of History**
- **Enlightenment historiography – the Berlin Revolution in Historiography – positivism – The Idealistic view of History**

- **Summary**
- **Glossary**
- **Self assessment questions or Check your Progress and activities**
- **References or Bibliography**

Structure of Content – SLM1.2

- **Title of the Unit**: **History writing and different versions of the Idea of Progress**
- **Objectives**
- **Introduction**
- **Divisions of the unit in unit sections and subsections (to be done by faculty slm wise)**
  - **Writings of T.B. Macaulay**
  - **Writings of Karl Marx**
  - **Writings of G.M. Trevelyan**
- **Summary**
- **Glossary**
- **Self assessment questions or Check your Progress and activities**
- **References or Bibliography**

Structure of Content – SLM1.3

Title of the Unit: **Development of Economic and Social history in the early twentieth century**

- **Objectives**
- **Introduction**
- **Divisions of the unit in unit sections and subsections (to be done by faculty slm wise)**
  - **Writings of Maurice Dobb**
  - **Writings of R. H. Tawney**
  - **Writings of G. Lefevbere**
- **Summary**
- **Glossary**
- **Self assessment questions or Check your Progress and activities**
- **References or Bibliography**

Structure of Content – SLM1.4

- **Title of the Unit: Emergence of new approaches in history writing**
- **Objectives**
- **Introduction**
- **Divisions of the unit in unit sections and subsections (to be done by faculty slm wise)**
  - **– Emergence of New social history**
  - **– Contributions of Christopher Hill in history writing**
    - **Contributions of E. P. Thompson in history writing**
    - **Contributions of Eric Hobsbawm in history writing**
- **Summary**
- **Glossary**
- **Self assessment questions or Check your Progress and activities**
- **References or Bibliography**

Structure of Content – SLM1.5

- **Title of the Unit: The Annales school in modern history thinking**
- **Objectives**
- **Introduction**
- **Divisions of the unit in unit sections and subsections (to be done by faculty slm wise)**
  - **– Foundation of the Annales school**
  - **Contribution of the Annales school**
- **Summary**
- **Glossary**
- **Self assessment questions or Check your Progress and activities**
- **References or Bibliography**

SEM-I

Paper-HIS 102

History and Historiography: Indian History Writing Approaches

Structure of Content – SLM1.6

- **Title of the Unit: History of history writing in nineteenth century India**
- **Objectives**
- **Introduction**
- **Divisions of the unit in unit sections and subsections (to be done by faculty slm wise)**
  - **– History of history writing in nineteenth century India**
  - **Ideas and variations**
- **Summary**
- **Glossary**
- **Self assessment questions or Check your Progress and activities**
- **References or Bibliography**

Structure of Content – SLM1.7

- **Title of the Unit**: **Indian National Movement and history writing**
- **Objectives**
- **Introduction**
- **Divisions of the unit in unit sections and subsections (to be done by faculty slm wise)**
  - **Indian National Movement and history writing practices**
  - **– different schools**
  - **Significance of these schools**
  - **Summary**
- **Glossary**
- **Self assessment questions or Check your Progress and activities**
- **References or Bibliography**

Structure of Content – SLM1.8

- **Title of the Unit**: **Modern Indian History with socio –economic perspective**
- **Objectives**
- **Introduction**
- **Divisions of the unit in unit sections and subsections (to be done by faculty slm wise)**
  - **Modern Indian History writing on peasantry and working classes**
  - **History writing on caste, tribe and gender**
  - **Summary**
- **Glossary**
- **Self assessment questions or Check your Progress and activities**
- **References or Bibliography**

Structure of Content – SLM1.9

- **Title of the Unit:** **Debates in Indian History I**
- **Objectives**
- **Introduction**
- **Divisions of the unit in unit sections and subsections (to be done by faculty slm wise)**

  – Feudalism in India

  -Eighteenth century crisis
- **Summary**
- **Glossary**
- **Self assessment questions or Check your Progress and activities**
- **References or Bibliography**

Structure of Content – SLM1.10

- **Title of the Unit: Debates in Indian History II**
- **Objectives**
- **Introduction**
- **Divisions of the unit in unit sections and subsections (to be done by faculty slm wise)**
    - **Revolt of 1857**
    - **Indian Awakening in nineteenth century**
- **Summary**
- **Glossary**
- **Self assessment questions or Check your Progress and activities**
- **References or Bibliography**

SEM-I
Paper-HIS 103

State and Economy in Colonial India I

Structure of Content – SLM1.11

- **Title of the Unit: The colonial state**
- **Objectives**
- **Introduction**
- **Divisions of the unit in unit sections and subsections (to be done by faculty slm wise)**

– Brief overview of British expansion in India

–British Parliament and the East India Company: Regulating Act of 1773 to Government of India Act of 1858

- **Summary**
- **Glossary**
- **Self assessment questions or Check your Progress and activities**
- **References or Bibliography**

Structure of Content – SLM1.12

- **Title of the Unit: Structure of colonial administration**
- **Objectives**
- **Introduction**
- **Divisions of the unit in unit sections and subsections (to be done by faculty slm wise)**

  –police

  - judiciary

  - bureaucracy

  - army
- **Summary**
- **Glossary**
- **Self assessment questions or Check your Progress and activities**
- **References or Bibliography**

Structure of Content – SLM1.13

- **Title of the Unit: The colonial ideology**
- **Objectives**
- **Introduction**
- **Divisions of the unit in unit sections and subsections (to be done by faculty slm wise)**
  - **– Orientalist and Utilitarian phases**
  - **- paternalist attitude**
  - **– White racism**
  - **– Divide and rule policy**
- **Summary**
- **Glossary**
- **Self assessment questions or Check your Progress and activities**
- **References or Bibliography**

Structure of Content – SLM1.14

- **Title of the Unit: Colonial social-cultural policies and their impact**
- **Objectives**
- **Introduction**
- **Divisions of the unit in unit sections and subsections (to be done by faculty slm wise)**

–Education

- Women

- **Summary**
- **Glossary**
- **Self assessment questions or Check your Progress and activities**
- **References or Bibliography**

Structure of Content – SLM1.15

- **Title of the Unit: Colonial social-cultural policies and their impact**
- **Objectives**
- **Introduction**
- **Divisions of the unit in unit sections and subsections (to be done by faculty slm wise)**
  - **– Caste**
  - **–Tribe**
- **Summary**
- **Glossary**
- **Self assessment questions or Check your Progress and activities**
- **References or Bibliography**
- **Objectives**
- **Introduction**

SEM-I
Paper-HIS 104

STATE AND ECONOMY IN COLONIAL INDIA 2

Structure of Content – SLM1.16

- **Title of the Unit: The colonial economy and its impact (1)**
- **Objectives**
- **Introduction**
- **Divisions of the unit in unit sections and subsections (to be done by faculty slm wise)**

Changing pattern of English trade

- **Summary**
- **Glossary**
- **Self assessment questions or Check your Progress and activities**
- **References or Bibliography**

Structure of Content – SLM1.17

- **Title of the Unit: The colonial economy and its impact (2)**
- **Objectives**
- **Introduction**
- **Divisions of the unit in unit sections and subsections (to be done by faculty slm wise)**

Land revenue settlements

Commercialisation of agriculture

- **Summary**
- **Glossary**
- **Self assessment questions or Check your Progress and activities**
- **References or Bibliography**

Structure of Content – SLM1.18

- **Title of the Unit: The colonial economy and its impact (3)**
- **Objectives**
- **Introduction**
- **Divisions of the unit in unit sections and subsections (to be done by faculty slm wise)**

Decline of traditional handicrafts – 'de-industrialization'?

- **Summary**
- **Glossary**
- **Self assessment questions or Check your Progress and activities**
- **References or Bibliography**

Structure of Content – SLM1.19

- **Title of the Unit: The colonial economy and its impact (4)**
- **Objectives**
- **Introduction**
- **Divisions of the unit in unit sections and subsections (to be done by faculty slm wise)**

-Emergence of modern industries

-Colonial industrial policy

- **Summary**
- **Glossary**
- **Self assessment questions or Check your Progress and activities**
- **References or Bibliography**

Structure of Content – SLM1.20

- **Title of the Unit: The colonial economy and its impact (5)**
- **Objectives**
- **Introduction**
- **Divisions of the unit in unit sections and subsections (to be done by faculty slm wise)**

-Banking and currency

-Railways

- **Summary**
- **Glossary**
- **Self assessment questions or Check your Progress and activities**
- **References or Bibliography**
- **Objectives**
- **Introduction**

SEM-II

Paper : HIS 201

Anti-Colonial Movements in India

Structure of Content- SLM 2.1

- **Title of the Unit:** Understanding Nation and Nationalism
- **Objectives**
- **Introduction**
- **Divisions of the unit in unit sections and subsections (to be done by faculty slm wise)**

  * Historiography

  * Traditional Resistance movements to 1857

  * Genesis of India National Congress

  *The moderate Phase
- **Summary**
- **Glossary**
- **Self assessment questions or Check your Progress and activities**
- **References or Bibliography**

Structure of Content- SLM2.2

- **Title of the Unit:** The Anti-colonial struggle in early twentieth century
- **Objectives**
- **Introduction**
- **Divisions of the unit in unit sections and subsections (to be done by faculty slm wise)**

  *The Extremists split

  *Partition and Swadeshi

  *The Rise of Gandhi
- **Summary**
- **Glossary**
- **Self assessment questions or Check your Progress and activities**
- **References or Bibliography**

Structure of Content- SLM2.3

- **Title of the Unit:** Anti-colonial movements in 30s and 40s
- **Objectives**
- **Introduction**
- **Divisions of the unit in unit sections and subsections (to be done by faculty slm wise)**

  *Civil disobedience movement

  *Quit India

  *Revolutionary Nationalism

  *Netaji and Azad Hind Fauz
- **Summary**
- **Glossary**
- **Self assessment questions or Check your Progress and activities**
- **References or Bibliography**

Structure of Content- SLM2.4

- **Title of the Unit:** Different Aspects of Anti-colonial movements
- **Objectives**
- **Introduction**
- **Divisions of the unit in unit sections and subsections (to be done by faculty slm wise)**

  *Peasants and workers

  *Caste and Gender
- **Summary**
- **Glossary**
- **Self assessment questions or Check your Progress and activities**
- **References or Bibliography**

Structure of Content- SLM2.5

- **Title of the Unit:** Communalism
- **Objectives**
- **Introduction**
- **Divisions of the unit in unit sections and subsections (to be done by faculty slm wise)**

  *The Two-nation Theory

  *Partition
- **Summary**
- **Glossary**
- **Self assessment questions or Check your Progress and activities**
- **References or Bibliography**

Paper: HIS 202

Post-Independence India

Structure of Content- SLM2.6

- **Title of the Unit:** India After Partition
- **Objectives**
- **Introduction**
- **Divisions of the unit in unit sections and subsections (to be done by faculty slm wise)**

  * Legacy

  *Integration of Princely States

  *Linguistic Reorganisation of the states
- **Summary**
- **Glossary**
- **Self assessment questions or Check your Progress and activities**
- **References or Bibliography**

Structure of Content- SLM2.7

- **Title of the Unit:** Consolidation of India as a Nation
- **Objectives**
- **Introduction**
- **Divisions of the unit in unit sections and subsections (to be done by faculty slm wise)**

  *Democracy

  *Women's Rights and laws
- **Summary**
- **Glossary**
- **Self assessment questions or Check your Progress and activities**
- **References or Bibliography**

Structure of Content- SLM2.8

- **Title of the Unit:** Predicaments and Problems of the new Nation
- **Objectives**
- **Introduction**
- **Divisions of the unit in unit sections and subsections (to be done by faculty slm wise)**

  *Emergency

  *Coalition Politics

  *Dalit and Protest Politics
- **Summary**
- **Glossary**
- **Self assessment questions or Check your Progress and activities**
- **References or Bibliography**

Structure of Content- SLM2.9

- **Title of the Unit:** Planning and Developments
- **Objectives**
- **Introduction**
- **Divisions of the unit in unit sections and subsections (to be done by faculty slm wise)**

  *Land Reforms

  * Planning

  *Environment and Protest Discourse
- **Summary**
- **Glossary**
- **Self assessment questions or Check your Progress and activities**
- **References or Bibliography**

Structure of Content- SLM2.10

- **Title of the Unit:** Foreign Policy
- **Objectives**
- **Introduction**
- **Divisions of the unit in unit sections and subsections (to be done by faculty slm wise)**

  *Nonalignment and Panchasheel

  *Nuclear Policy
- **Summary**
- **Glossary**
- **Self assessment questions or Check your Progress and activities**
- **References or Bibliography**

Paper- HIS 203

ANCIENT INDIA

Structure of Content – SLM2.11

- **Title of the Unit**:Political organization till the Vedic period
- **Objectives**
- **Introduction**
- **Divisions of the unit in unit sections and subsections (to be done by faculty slm wise)**
  - **– kingship in the ancient period**
  - **– post Vedic terms for the king**
- **Summary**
- **Glossary**
- **Self assessment questions or Check your Progress and activities**
- **References or Bibliography**

Structure of Content – SLM2.12

- **Title of the Unit**: Society in the early Vedic period
- **Objectives**
- **Introduction**
- **Divisions of the unit in unit sections and subsections (to be done by faculty slm wise)**
  - **Changes in the latter Vedic period**
  - **Janapadas and Mahajanapadas**
- **Summary**
- **Glossary**
- **Self assessment questions or Check your Progress and activities**
- **References or Bibliography**

Structure of Content – SLM2.13

- **Title of the Unit**: Local autonomy and imperial unity
- **Objectives**
- **Introduction**
- **Divisions of the unit in unit sections and subsections (to be done by faculty slm wise)**
  - **treasury and coercion in the state**
  - **regular collection of land revenue**
  - **advent of taxation and emergence of the state in the imperial form**
  - **Mauryas and successor states**
- **Summary**
- **Glossary**
- **Self assessment questions or Check your Progress and activities**
- **References or Bibliography**

Structure of Content – SLM2.14

- **Title of the Unit:** Structure of polity in early medieval India
- **Objectives**
- **Introduction**
- **Divisions of the unit in unit sections and subsections (to be done by faculty slm wise)**
  - **– Chieftaincies and feudatories**
  - **– political and economic changes and the bases of the early medieval state system**
- **Summary**
- **Glossary**
- **Self assessment questions or Check your Progress and activities**
- **References or Bibliography**

Structure of Content – SLM2.15

- **Title of the Unit:** State and Imperial ideology in south India
- **Objectives**
- **Introduction**
- **Divisions of the unit in unit sections and subsections (to be done by faculty slm wise)**
  - **– The Cholas and their successors**
  - **– Vijayanagara**
- **Summary**
- **Glossary**
- **Self assessment questions or Check your Progress and activities**
- **References or Bibliography**

Paper- HIS 204

MEDIEVAL INDIA

Structure of Content – SLM2.16

- **Title of the Unit:** State and economy in early modern India
- **Objectives**
- **Introduction**
- **Divisions of the unit in unit sections and subsections (to be done by faculty slm wise)**
  - **– the establishment of a centralized state under the Mughals**
  - **– emphasis on military and revenue administration**
- **Summary**
- **Glossary**
- **Self assessment questions or Check your Progress and activities**
- **References or Bibliography**

Structure of Content – SLM2.17

- **Title of the Unit: Conquest state and the extension of the Core Mughal model into other areas viz. Gujarat, Ahmadnagar, Bengal**
- **Objectives**
- **Introduction**
- **Divisions of the unit in unit sections and subsections (to be done by faculty slm wise)**
  - **– expansion and integration of the agrarian base during the Mughal period, Ahmadnagar, Bengal**
  - **– drive for revenue and the new agrarian frontiers**
- **Summary**
- **Glossary**
- **Self assessment questions or Check your Progress and activities**
- **References or Bibliography**

Structure of Content – SLM2.18

- **Title of the Unit**: Impact on agrarian society, especially in terms of the high revenue demand
- **Objectives**
- **Introduction**
- **Divisions of the unit in unit sections and subsections (to be done by faculty slm wise)**

  –relationship between the state and the landed elites viz. social and administrative
- **Summary**
- **Glossary**
- **Self assessment questions or Check your Progress and activities**
- **References or Bibliography**

Structure of Content – SLM2.19

- **Title of the Unit:** Indian economy and the Indian Ocean
- **Objectives**
- **Introduction**
- **Divisions of the unit in unit sections and subsections (to be done by faculty slm wise)**

  –Trade network and commerce: transformations since the 15th century

  – maritime merchants in the Indian Ocean region

  – Indian merchants and their participation in the Indian Ocean and hinterland or internal trade.
- **Summary**
- **Glossary**
- **Self assessment questions or**
- **References or Bibliography**

Structure of Content – SLM2.20

- **Title of the Unit:** Preparation of Content of SLM (semester wise)
- **Title of the Unit:** **Trade and the Indian Economy**
- **Objectives**
- **Introduction**
- **Divisions of the unit in unit sections and subsections (to be done by faculty slm wise)**

  – flow of precious metals and currency – the state and the need for monetization

  – the state and the need for monetization

  – mint administration towns

  – internal and overseas market
- **Summary**
- **Glossary**
- **Self assessment questions or Check your Progress and activities**
- **References or Bibliography**
- **Objectives**
- **Introduction**

SEM-III

Paper: HIS 301

Industrial Revolution: the Nature of the Industrial Revolution and the English Experience

Structure of Content – SLM3.1

- **Title of the Unit** : Defining the Industrial Revolution
- **Objectives**
- **Introduction**
- **Divisions of the unit in unit sections and subsections (to be done by faculty slm wise)**
  - Toynbee's characterization
  - Nef-Heaton's concept of 'evolution'
  - Concept of 'economic growth'
  - Why did it occur first in England
  - Chronology of the Industrial Revolution
- **Summary**
- **Glossary**
- **Self assessment questions or Check your Progress and activities**
- **References or Bibliography**

Structure of Content – SLM3.2

- **Title of the Unit** : Aspects of the Industrial Revolution
- **Objectives**
- **Introduction**
- **Divisions of the unit in unit sections and subsections (to be done by faculty slm wise)**
    - Agricultural Revolution
    - Proto-industrialization
- **Summary**
- **Glossary**
- **Self assessment questions or Check your Progress and activities**
- **References or Bibliography**

Structure of Content – SLM3.3

- **Title of the Unit** : Industrial Revolution in England (1)
- **Objectives**
- **Introduction**
- **Divisions of the unit in unit sections and subsections (to be done by faculty slm wise)**
    - Demographic Revolution
    - Commercial Revolution
    - Transport Revolution
- **Summary**
- **Glossary**
- **Self assessment questions or Check your Progress and activities**
- **References or Bibliography**

Structure of Content – SLM3.4

- **Title of the Unit:** Industrial Revolution (2)
- **Objectives**
- **Introduction**
- **Divisions of the unit in unit sections and subsections (to be done by faculty slm wise)**
    - Concept of 'leading sector'
    - Cotton Industry
    - Iron Industry
- **Summary**
- **Glossary**
- **Self assessment questions or Check your Progress and activities**
- **References or Bibliography**

Structure of Content – SLM3.5

- **Title of the Unit:** Industrial Revolution in England (3)
- **Objectives**
- **Introduction**
- **Divisions of the unit in unit sections and subsections (to be done by faculty slm wise)**
    - Role of the State
    - Factory Acts
    - Conditions of work
    - Labour organizations
    - Standard of Living
- **Summary**
- **Glossary**
- **Self assessment questions or Check your Progress and activities**
- **References or Bibliography**

Paper: HIS 302

Industrial Revolution-II: the Continental Experience

Structure of Content – SLM3.6

- **Title of the Unit:** Science in the Industrial Revolution
- **Objectives**
- **Introduction**
- **Divisions of the unit in unit sections and subsections (to be done by faculty slm wise)**
    - Technology
    - 'Latecomers' in the Industrial Revolution
- **Summary**
- **Glossary**
- **Self assessment questions or Check your Progress and activities**
- **References or Bibliography**

Structure of Content – SLM3.7

- **Title of the Unit:** 19th century industrial crises
- **Objectives**
- **Introduction**
- **Divisions of the unit in unit sections and subsections (to be done by faculty slm wise)**
    - Gerschenkron's concept of substitution process of the Industrial Revolution on the continent
    - 19th century of industrial crises
    - Explanations of Marx and Schumpeter
- **Summary**
- **Glossary**
- **Self assessment questions or Check your Progress and activities**
- **References or Bibliography**

Structure of Content – SLM3.8

- **Title of the Unit:** Industrialization in France
- **Objectives**
- **Introduction**
- **Divisions of the unit in unit sections and subsections (to be done by faculty slm wise)**
    - Conditions in the ancient regime
    - Prospects and problems in the revolutionary Napoleonic period
    - Restoration and the return Protectionism
    - Napoleon III and his 'booster' policies
    - Decline in the post 1870 period
- **Summary**
- **Glossary**
- **Self assessment questions or Check your Progress and activities**
- **References or Bibliography**

Structure of Content – SLM3.9

- **Title of the Unit:** Industrialization in Germany
- **Objectives**
- **Introduction**
- **Divisions of the unit in unit sections and subsections (to be done by faculty slm wise)**
    - Backwardness in the German states in 1815
    - Prussian imperatives: Zollverin and the railways
    - Growth in the period 1850-1870
    - Bismarck's policies
    - Situation up to 1914
- **Summary**
- **Glossary**
- **Self assessment questions or Check your Progress and activities**
- **References or Bibliography**

Structure of Content – SLM3.10

- **Title of the Unit:** Industrialization in Russia
- **Objectives**
- **Introduction**
- **Divisions of the unit in unit sections and subsections (to be done by faculty slm wise)**
    - Backwardness in the mid 19th century
    - Emancipation Edict and its effects
    - Trends in the period 1860s-1870s
    - Initiatives of Vishnegradsky and Witte
    - Stolypin reforms
    - Situation up to 1914
- **Summary**
- **Glossary**
- **Self assessment questions or Check your Progress and activities**
- **References or Bibliography**
- **Objectives**
- **Introduction**

Paper-HIS 303:

The Twentieth-Century World: Events between the Two World Wars

Structure of Content – SLM3.11

- **Title of the Unit**: Events of The First World War
- **Objectives**
- **Introduction**
- **Divisions of the unit in unit sections and subsections (to be done by faculty SLM wise)**

    - Historiography of the origins of the First World War
    - The impact of the War on the Old Order
    - Peace Settlement: Fourteen Points of Woodrow Wilson and Paris Peace Conference

- **Summary**
- **Glossary**
- **Self assessment questions or Check your Progress and activities**
- **References or Bibliography**

Structure of Content – SLM3.12

- **Title of the Unit**: The Post war Scenario
- **Objectives**
- **Introduction**
- **Divisions of the unit in unit sections and subsections (to be done by faculty SLM wise)**

    - The post-war world order: The League of Nations
    - Some issues arising out of the War: quest for security; problem of disarmament; problem of reparation
    - The Great Depression: causes and consequences

- **Summary**
- **Glossary**
- **Self assessment questions or Check your Progress and activities**
- **References or Bibliography**

Structure of Content – SLM3.13

- **Title of the Unit**: Russia between the Two World Wars
- **Objectives**
- **Introduction**
- **Divisions of the unit in unit sections and subsections (to be done by faculty SLM wise)**
    - Russia in revolution: Establishment of a Socialist State in Russia
    - Its economic and political aspects – responses and reactions in the West
    - Soviet Foreign Policy in the Inter-war years
- **Summary**
- **Glossary**
- **Self assessment questions or Check your Progress and activities**
- **References or Bibliography**

Structure of Content – SLM3.14

- **Title of the Unit:** Europe and America between the Two World Wars
- **Objectives**
- **Introduction**
- **Divisions of the unit in unit sections and subsections (to be done by faculty SLM wise)**

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  - The Western World between the Wars: Italy and Germany – domestic and foreign affairs – politics and ideologies of Fascism & Nazism
  - France and Great Britain between the Wars – the Policy of Appeasement
  - U. S. Foreign Policy between the two World Wars and the New Deal

- **Summary**
- **Glossary**
- **Self assessment questions or Check your Progress and activities**
- **References or Bibliography**

Structure of Content – SLM3.15

- **Title of the Unit:** West Asia between the Two World Wars
- **Objectives**
- **Introduction**
- **Divisions of the unit in unit sections and subsections (to be done by faculty SLM wise)**

    - Impact of the Peace Pact of 1919 on West Asia: Mandate system in Middle East
    - Rise of Mustafa Kamal Pasha & the modernisation of Turkey
    - Arab nationalism after World War I – role of Saudi Arab

- **Summary**
- **Glossary**
- **Self assessment questions or Check your Progress and activities**
- **References or Bibliography**

Paper-HIS 304:

The Twentieth-Century World: Various Aspects of Contemporary World

Structure of Content – SLM3.16

- **Title of the Unit:** Events leading to Second World War
- **Objectives**
- **Introduction**
- **Divisions of the unit in unit sections and subsections (to be done by faculty SLM wise)**

    - Road to Second World War: Rise of Japan as an imperialist power
    - Civil War in Spain
    - Historiography of the origins of the Second World War

- **Summary**
- **Glossary**
- **Self assessment questions or Check your Progress and activities**
- **References or Bibliography**

Structure of Content – SLM3.17

- **Title of the Unit:** Cold War
- **Objectives**
- **Introduction**
- **Divisions of the unit in unit sections and subsections (to be done by faculty SLM wise)**

    - The Cold War: Historiography – ideological and political basis of Cold War
    - Sovietisation of Eastern Europe and Americanisation of Western Europe
    - UNO and the concept of World Peace

- **Summary**
- **Glossary**
- **Self assessment questions or Check your Progress and activities**
- **References or Bibliography**

Structure of Content – SLM3.18

- **Title of the Unit:** Various Events of Cold War
- **Objectives**
- **Introduction**
- **Divisions of the unit in unit sections and subsections (to be done by faculty SLM wise)**

    - Internationalisation of Regional tensions: Korea, Vietnam, Cuba, Kashmir
    - The Middle East in World Politics: Birth of Israel and Arab-Israel conflict, Suez Crisis and Oil Diplomacy, Iraq-Kuwait conflict and Gulf War
    - Soviet intervention in Afghanistan – Talibanism and after

- **Summary**
- **Glossary**
- **Self assessment questions or Check your Progress and activities**
- **References or Bibliography**

Structure of Content – SLM3.19

- **Title of the Unit:** Third World and the Changing Dynamics of Sino-Soviet Relations
- **Objectives**
- **Introduction**
- **Divisions of the unit in unit sections and subsections (to be done by faculty SLM wise)**

  - Historical context of the emergence of the Third World
  - The impact of the rise of Communist China in world politics
  - Changing contours of Sino-Soviet(Russia) relations and Sino-U.S. relations

- **Summary**
- **Glossary**
- **Self assessment questions or Check your Progress and activities**
- **References or Bibliography**

Structure of Content – SLM3.20

- **Title of the Unit:** Dissolution of USSR and Thereafter
- **Objectives**
- **Introduction**
- **Divisions of the unit in unit sections and subsections (to be done by faculty SLM wise)**

  - Disintegration of the Soviet Union and its impact on international politics
  - The question of American Unipolarism
  - International terrorism
  - Globalisation: its economic and political impact

- **Summary**
- **Glossary**
- **Self assessment questions or Check your Progress and activities**
- **References or Bibliography**
- **Objectives**
- **Introduction**

SEM-IV

Paper-HIS 401

Social History of Science, Technology, and Environment in Colonial India

Structure of Content –SLM4.1

- **Title of the Unit:**Colonial and Nationalist Scientific Discourses
- **Objectives**
- **Introduction**
- **Divisions of the unit in unit sections and subsections (to be done by faculty slm wise)**
  - Role of Asiatic Society of Bengal
  - Relocating Ancient 'National' Scientific Tradition of India
  - British surveys in India as colonial forms of knowledge
  - Nationalist Science: a Counter Discourse to Colonial Science
- **Summary**
- **Glossary**
- **Self assessment questions or Check your Progress and activities**
- **References or Bibliography**

Structure of Content Unit :SLM4.2

- **Title of the Unit:** Technology and the Colonial Project
- **Objectives**
- **Introduction**
- **Divisions of the unit in unit sections and subsections (to be done by faculty slm wise)**
  - Colonial power underpinning scientific and technological initiatives of British India
  - Scientific and Technological Initiatives in British India
  - Evolution of Several Departments as a part of the Colonial Project: Irrigation, Agriculture, Public Works, Railways
  - Scientific Education and Technical Institutions
- **Summary**
- **Glossary**
- **Self assessment questions or Check your Progress and activities**
- **References or Bibliography**

Structure of Content Unit :SLM4.3

- **Title of the Unit:** Communities on the Margin
- **Objectives**
- **Introduction**
- **Divisions of the unit in unit sections and subsections (to be done by faculty slm wise)**
  - Indigenous Societies and their changing patterns of Livelihood
  - Forest Management
  - Forest Acts
  - Colonial Experience

- **Summary**
- **Glossary**
- **Self assessment questions or Check your Progress and activities**
- **References or Bibliography**

Structure of Content ;SLM4.4

- **Title of the Unit:** Environmental History
- **Objectives**
- **Introduction**
- **Divisions of the unit in unit sections and subsections (to be done by faculty slm wise)**
  - Historiography of the Emergence of Environmental History as a Discipline
  - Ecology: colonialism as a water shed
  - Nationalism and the Environmental Discourse
  - Technology and Ecological Change in Colonial Times

- **Summary**
- **Glossary**
- **Self assessment questions or Check your Progress and activities**
- **References or Bibliography**

Structure of Content :SLM4.5

- **Title of the Unit:** Climate change and its Impact on Environment
- **Objectives**
- **Introduction**
- **Divisions of the unit in unit sections and subsections (to be done by faculty slm wise)**
  - History of Climate Change
  - Drought, Flood & Earthquake
  - Dislocation and Migration
  - Impact on the Environment

- **Summary**
- **Glossary**
- **Self assessment questions or Check your Progress and activities**
- **References or Bibliography**

Paper-HIS 402:

Social History of Medicine in Colonial India

Structure of Content SLM4.6

- **Title of the Unit:**History of Medicine: an Overview
- **Objectives**
- **Introduction**
- **Divisions of the unit in unit sections and subsections (to be done by faculty slm wise)**
  - Evolution of History of Medicine from Ancient Times to the Modern Era: an Overview
  - Different Systems of Medical Knowledge in India
  - Historiography and Debates on Aspects of History of Medicine in India
  - Colonialism, Climate and Race
- **Summary**
- **Glossary**
- **Self assessment questions or Check your Progress and activities**
- **References or Bibliography**

Structure of Content SLM4.7

- **Title of the Unit: Medicine: Medicine:** East India Company & after 1858
- **Objectives**
- **Introduction**
- **Divisions of the unit in unit sections and subsections (to be done by faculty slm wise)**
  - East India Company era: establishment of Company's rule and training its surgeons; Company's medical experience in India
  - Orientalism and the renewed interest in Indian medicine; establishment of 'modern' western medicine and the end of Company's rule
  - Medicine in India after 1858
  - Formation of Indian Medical Societies
- **Summary**
- **Glossary**
- **Self assessment questions or Check your Progress and activities**
- **References or Bibliography**

Structure of Content :SLM4.8

Title of the Unit: History of Madness

- **Objectives**
- **Introduction**
- **Divisions of the unit in unit sections and subsections (to be done by faculty slm wise)**
  - Madness to Mental Health: changing terminology from the nineteenth to the twentieth century
  - Ayurveda and psychiatry: 'Unmada' in the Sanskrit Medical Literature; Insanity in Medieval Islamic Society
  - Psychiatry and its histories in the West; Debates in Psychiatry and Colonialism
  - Birth of Psychotropic Drugs and its Impact on India

- **Summary**
- **Glossary**
- **Self assessment questions or Check your Progress and activities**
- **References or Bibliography**

Structure of Content :SLM4.9

- **Title of the Unit:** Women: Doctors and Patients
- **Objectives**
- **Introduction**
- **Divisions of the unit in unit sections and subsections (to be done by faculty slm wise)**
  - Women, Health, and Medicine
  - Women in Medical Education
  - Women as Patients
  - Motherhood and Reproductive Health
- **Summary**
- **Glossary**
- **Self assessment questions or Check your Progress and activities**
- **References or Bibliography**

Structure of Content :SLM4.10

- **Title of the Unit:** Laboratory to Field
- **Objectives**
- **Introduction**
- **Divisions of the unit in unit sections and subsections (to be done by faculty slm wise)**
  - Advent of Hospitals & Laboratories
  - Role of Public Health and Sanitation
  - Prevention and Control of Diseases: Cholera, Small Pox & Tuberculosis
  - Medicine and Colonial Army

- **Summary**
- **Glossary**
- **Self assessment questions or Check your Progress and activities**
- **References or Bibliography**

Paper-HIS 403:

Social History of Colonial India 1

Structure of Content :SLM4.11

- **Title of the Unit:** What is Social History?
- **Objectives**
- **Introduction**
- **Divisions of the unit in unit sections and subsections (to be done by faculty slm wise)**
    - Orientalist, Utilitarian, and Nationalist perceptions of Indian society.
    - Debate over the 19th century 'Renaissance' in India
    - From social history to cultural history
    - The post-modern challenge
- **Summary**
- **Glossary**
- **Self assessment questions or Check your Progress and activities**
- **References or Bibliography**

Structure of Content :SLM4.12

- **Title of the Unit:** Reformers and Reforms
- **Objectives**
- **Introduction**
- **Divisions of the unit in unit sections and subsections (to be done by faculty slm wise)**
    - Rammohan Roy and BrahmoSamaj
    - Vidyasagar
    - Ramkrishna and Vivekananda
    - PrarthanaSamaj and Arya Samaj

- **Summary**
- **Glossary**
- **Self assessment questions or Check your Progress and activities**
- **References or Bibliography**

Structure of Content :SLM4.13

- **Title of the Unit:** Nationalism, modernity, and Muslim identity in India
- **Objectives**
- **Introduction**
- **Divisions of the unit in unit sections and subsections (to be done by faculty slm wise)**
    - Wahabi Movement
    - Deoband Movement
    - Islamic educational movements, faith, and revival movements
    - Syed Ahmed Khan and the Aligarh Movement

- **Summary**
- **Glossary**
- **Self assessment questions or Check your Progress and activities**
- **References or Bibliography**

Structure of Content :SLM4.14

- **Title of the Unit:** What is Women's history?
- **Objectives**
- **Introduction**
- **Divisions of the unit in unit sections and subsections (to be done by faculty slm wise)**
    - The 'Women's Question' in the 19th century
    - Reformers like RokeyaSakhawat Hossain and Sarala Devi, and movements for women's rights
    - Women in modern professions
    - Women in the national movement
    - Women labour
- **Summary**
- **Glossary**
- **Self assessment questions or Check your Progress and activities**
- **References or Bibliography**

Structure of Content :SLM4.15

- **Title of the Unit:** Caste: Varna and Jati
- **Objectives**
- **Introduction**
- **Divisions of the unit in unit sections and subsections (to be done by faculty slm wise)**
    - Features of traditional caste society
    - Caste protest movements in 19th century India
    - Colonial sociology and caste mobility and reform movements
    - Lower caste aspirations, politics, and the Indian national movement
- **Summary**
- **Glossary**
- **Self assessment questions or Check your Progress and activities**
- **References or Bibliography**

Paper-HIS 404

Social History of Colonial India 2

Structure of Content :SLM4.16

- **Title of the Unit:** Tribe
- **Objectives**
- **Introduction**
- **Divisions of the unit in unit sections and subsections (to be done by faculty slm wise)**
    - Validity of the concept and traditional features
    - Changing conditions during colonial rule and consequent confrontation
    - Tribes and the Indian national movement
    - Growth of a 'tribal' identity, reforms, and the increasing demand for a homeland
- **Summary**
- **Glossary**
- **Self assessment questions or Check your Progress and activities**
- **References or Bibliography**

Structure of Content :SLM4.17

- **Title of the Unit:** Labour
- **Objectives**
- **Introduction**
- **Divisions of the unit in unit sections and subsections (to be done by faculty slm wise)**
    - Consciousness and the making of a 'modern' working class in India
    - Capitalists, labourers, and conditions of work
    - Labour organisations and protest
    - Labour and the national movement; attitudes of various political parties towards labourers
- **Summary**
- **Glossary**
- **Self assessment questions or Check your Progress and activities**
- **References or Bibliography**

Structure of Content :SLM4.18

- **Title of the Unit:** Urbanization and Urbanism in Colonial India
- **Objectives**
- **Introduction**
- **Divisions of the unit in unit sections and subsections (to be done by faculty slm wise)**
    - Traditional Indian cities; trends and features of urbanization in the colonial period; metropolises and the mofussils
    - Emergence of a new middle class; other classes in the city
    - New sensibilities; Literature, theatre, cinema – popular culture in the cities; Press, new social attitudes, and the National Movement
    - Physical culture and Sports
- **Summary**
- **Glossary**
- **Self assessment questions or Check your Progress and activities**
- **References or Bibliography**

Structure of Content :SLM4.19

- **Title of the Unit:** South West Bengal: Western education and ideas
- **Objectives**
- **Introduction**
- **Divisions of the unit in unit sections and subsections (to be done by faculty slm wise)**
    - Growth of a new intelligentsia; Newspaper and Literature
    - Emergence of modern politics and the rise of a local leadership
    - Swadeshi Movement, Militant Nationalism
    - Non-Co-operation and Civil Disobedience Movements; Quit India Movement
- **Summary**
- **Glossary**
- **Self assessment questions or Check your Progress and activities**
- **References or Bibliography**

Structure of Content :SLM4.20

- **Title of the Unit:** South West Bengal: Emergence of Left-wing politics
- **Objectives**
- **Introduction**
- **Divisions of the unit in unit sections and subsections (to be done by faculty slm wise)**
    - Condition of workers, peasants and their mobilization
    - Students' response
    - Condition of women, tribes and castes
    - Ecology and environment, natural disasters, and their impact on local society
- **Summary**
- **Glossary**
- **Self assessment questions or Check your Progress and activities**
- **References or Bibliography**

***The Course contains 80 SLM**

Sub: Political Science (1st Semester)

Course- 101; Group- A; Unit- 1

Enlightenment: Meaning and Significance

Unit Structure:

Sub: Political Science (1st Semester)

Course- 101; Group- A; Unit- 2

Responses to Enlightenment – Rousseau and Kant

Unit Structure:

Sub: Political Science (1st Semester)

Course- 101; Group- A; Unit- 3

Hegel: Dialectical relationship between Family, Civil Society and the State

Unit Structure:

1. **Relevance of the Unit**
2. **Objectives of the Unit**
3. **Introduction**
4. **Hegel's Philosophy of history**
5. **Hegel's Idea of Freedom: Family, Civil Society, State**
6. **Critical estimate**
7. **Summary**
8. **Glossary**
9. **Self-Assessment Questions**
10. **References**

Sub: Political Science (1st Semester)

Course- 101; Group- A; Unit- 4

Nietzsche: An overview of his Political Philosophy

Unit Structure:

Sub: Political Science (1st Semester)

Course- 101; Group- B; Unit- 5

Western Marxism: Intellectual Background

Unit Structure:

1. **Relevance of the Unit**
2. **Objectives of the Unit**
3. **Introduction**
4. **Features of Western Marxism**
5. **Several Trends in Respect of Western Marxism**
6. **Contributions of Gramsci**
7. **Critical Assessment**
8. **Summary**
9. **Glossary**
10. **Self-Assessment Questions**
11. **References**

Sub: Political Science (1st Semester)

Course- 101; Group- B; Unit- 6

Critical theory Contributions of Horkheimer and Mercuse

Unit Structure:

1. **Relevance of the Unit**
2. **Objectives of the Unit**
3. **Introduction**
4. **Background of Critical Theory**
5. **Contributions of Harbert Mercuse**
6. **Contributions of Max Horkheimer**
7. **Critical Assessment**
8. **Summary**
9. **Glossary**
10. **Self-Assessment Questions**
11. **References**

Sub: Political Science (1st Semester)

Course- 101; Group- B; Unit- 7

Post-modernism: Background, Main Arguments and Contemporary Debates

Unit Structure:

1. **Relevance of the Unit**
2. **Objectives of the Unit**
3. **Introduction**
4. **Post Modernism as 'Critique' of Modernism**
4. **Modernity/Modernism**
5. **Basic Principles of Modernism**
6. **The 'Grand Narrative' of Modernity/Modernism**
7. **Modernity's Early Critiques**
8. **Post-War Criticism and Advent of Post Modernism**
9. **Influence of Structuralism in Different Disciplines**
10. **Beyond Structuralism: Derrida and Post Structuralism**
11. **Postmodernism: Main arguments**
12. **Comparison between Modernism and Post Modernism**
13. **Post Modernism: Contributions of Lyotard**
14. **Post Modernism: Contributions of Michel Foucault**
15. **Debate between Post-Modernism and Marxism**
16. **Summary**
17. **Glossary**
18. **Self Assessment Questions**
19. **References**

Sub: Political Science (1st Semester)

Course- 101; Group- B; Unit- 8

Post-Marxism: Laclau and Negri

Unit Structure:

1. **Relevance of the Unit**
2. **Objectives of the Unit**
3. **Introduction**
4. **Background of Post-Marxism**
5. **Contributions of Laclau**
6. **Contributions of Negri**
7. **Summary**
8. **Glossary**
9. **Self-Assessment Questions**
10. **References**

Sub: Political Science (1st Semester)

Course- 102; Group- A; Unit- 1

Bankim Chandra, Vivekananda and Tilak: Nationalist ideas

Unit Structure:

Sub: Political Science (1st Semester)

Course- 102; Group- A; Unit- 2

Savarkar and Golwalkar: Ideology of Hindu Nationalism

Unit Structure:

Sub: Political Science (1st Semester)

Course- 102; Group- A; Unit- 3

Jyotiba Phule and B. R. Ambedkar: Caste, Social Reform and Nationalism

Unit Structure

Sub: Political Science (1st Semester)

Course- 102; Group- A; Unit- 4

Gandhi: Critique of Modern Civilization - theory of Nonviolence and Satyagraha – concept of the State and Enlightened Anarchy - theory of Trusteeship

Unit Structure:

1. **Relevance of the Unit**
2. **Objectives of the Unit**
3. **Introduction**
4. **Critique of Modern Civilization**
5. **Ahimsa and Satyagraha**
6. **Concept of the State**
7. **Trusteeship**
8. **Conclusion**
9. **Summary**
10. **Self-Assessment Questions**
11. **References**

Sub: Political Science (1st Semester)

Course- 102; Group- B; Unit- 5

Tagore: Idea of *Atmashakti* – Critique of Nationalism and the notion of Cosmopolitanism

Unit Structure:

Sub: Political Science (1st Semester)

Course- 102; Group- B; Unit- 6

Jawaharlal Nehru: concepts of Socialism, Development and Planning

Unit Structure:

Sub: Political Science (1st Semester)

Course- 102; Group- B; Unit- 7

Subhaschandra Bose: his notion of Socialism, concepts of Planning and Reconstruction

Unit Structure:

1. **Relevance of the Unit**
2. **Objectives of the Unit**
3. **Introduction: Socialism – the Key features of the Concept**
4. **Socialist Ideas of Subhaschandra Bose: Concept of Samyavaa, Planning and Reconstruction**
5. **Summary**
6. **Glossary**
7. **Self-Assessment Questions**
8. **References**

Sub: Political Science (1st Semester)

Course- 102; Group- B; Unit- 8

Iqbal and Azad: Liberal and secular trends

Unit Structure:

Sub: Political Science (1st Semester)

Course- 103; Group- A; Unit- 1

Political Development in India: state, civil society and its institutions

Unit Structure:

1. **Relevance of the Unit**
2. **Objectives of the Unit**
3. **Introduction**
4. **The process of Political Development in India**
5. **Building up the Modern Democratic Nation-state**
6. **The Post-colonial State and its Institutions**
7. **The role of Civil Society**
8. **Summary**
9. **Glossary**
10. **Self-Assessment Questions**
11. **References**

Sub: Political Science (1st Semester)

Course- 103; Group- A; Unit- 2

Approaches to the Study of the Indian State

Unit Structure:

Sub: Political Science (1st Semester)

Course- 103; Group- A; Unit- 3

Indian Democracy at the Crossroads: Successes and Failures

Unit Structure:

1. **Relevance of the Unit**
2. **Objectives of the Unit**
3. **Introduction**
4. **Indian Democracy as the long-lasting democracy in the Third World**
5. **The Processes**
6. **The Impending Crisis**
7. **Crisis of 'Governability'**
8. **Summary**
9. **Glossary**
10. **Self-Assessment Questions**
11. **References**

Sub: Political Science (1st Semester)

Course- 103; Group- A; Unit- 4

Federal Process in India: Dynamics, Emergent Issues and Trends

Unit Structure:

1. **Relevance of the Unit**
2. **Objectives of the Unit**
3. **Introduction**
4. **The politics and economics of centralisation in India's federal polity**
5. **Coalition politics and Indian federation**
6. **Cooperative federation in the Indian context**
7. **Summary**
8. **Glossary**
9. **Self-Assessment Questions**
10. **References**

Sub: Political Science (1st Semester)

Course- 103; Group- B; Unit- 5

Party system in India: Changing nature – the politics of coalition

Unit Structure:

Sub: Political Science (1st Semester)

Course- 103; Group- B; Unit- 6

Political economy of development- agrarian and industrial strategies-politics of planning-political implications of economic liberalization

Unit Structure

1. **Relevance of the Unit**
2. **Objectives of the Unit**
3. **Introduction**
4. **Debates on Planning and Development Strategy**
5. **Changing Role of the Planning Commission**
6. **Economic Liberalization in India**
7. **Summary**
8. **Glossary**
9. **Self-Assessment Questions**
10. **References**

Sub: Political Science (1st Semester)

Course- 103; Group- B; Unit- 7

Media and politics in India

Unit Structure

1. **Relevance of the Unit**
2. **Objectives of the Unit**
3. **Introduction**
4. **Various types of media**
5. **Growth of Newspapers in India**
6. **The impact of electronic media**
7. **Social media and democracy: contemporary Indian scenario**
8. **Summary**
9. **Glossary**
10. **Self-Assessment Questions**
11. **References**

Sub: Political Science (1st Semester)

Course- 103; Group- B; Unit- 8

Politics of environment – the concept of alternative development

Unit Structure:

Sub: Political Science (1st Semester)

Course- 104; Group- A; Unit- 1

Religion in Indian politics: Communalism – meaning and nature; Theorising communalism: different perspectives; construction of a secular ideology in the Indian context: emerging issues

Unit Structure:

Sub: Political Science (1st Semester)

Course- 104; Group- A; Unit- 2

Identity politics in India: Caste, Tribe, Minority, Gender - the issue of Reservation

Unit Structure:

Sub: Political Science (1st Semester)

Course- 104; Group- A; Unit- 3

Language Question and Indian Politics: Key issues

Unit Structure:

Sub: Political Science (1st Semester)

Course- 104; Group- A; Unit- 4

Sustainable Rights in Indian Democracy: RTI, RTE

Unit Structure:

Sub: Political Science (1st Semester)

Course- 104; Group- B; Unit- 5

Politics of Regionalism: Conceptual issues – typologies – different perspectives – select case studies

Unit Structure:

Sub: Political Science (1st Semester)

Course- 104; Group- B; Unit- 6

State politics in India: emerging trends – State Politics in West Bengal: key issues

Unit Structure:

Sub: Political Science (1st Semester)

Course- 104; Group- B; Unit- 7

NGOs and Politics in India: Emerging Issues

Unit Structure:

Sub: Political Science (1st Semester)

Course- 104; Group- B; Unit- 8

'New Social Movements' in India: Select case studies

Unit Structure:

Sub: Political Science (1st Semester)

Course- 105; Group- A; Unit- 1

Development of Comparative Politics as an academic discipline- Comparative Government and Comparative Politics

Unit Structure:

1. **Relevance of the Unit**
2. **Objectives of the Unit**
3. **Introduction**
4. **Comparative Politics-Meaning and its Evolution**
5. **Comparative Government and Comparative Politics**
6. **Difference between Comparative Government and Comparative Politics**
7. **Summary**
8. **Glossary**
9. **Self-Assessment Questions**
10. **References**

Sub: Political Science (1st Semester)

Course- 105; Group- A; Unit- 2

Comparative Politics: Nature and Scope

Unit Structure:

1. **Relevance of the Unit**
2. **Objectives of the Unit**
3. **Introduction**
4. **Comparative Politics-Nature and Scope**
5. **Characteristics of Comparative Politics**
6. **Utility of Comparative Study of Politics**
7. **Summary**
8. **Glossary**
9. **Self-Assessment Questions**
10. **References**

Sub: Political Science (1st Semester)

Course- 105; Group- A; Unit- 3

Methods of Comparison

Unit Structure:

1. **Relevance of the Unit**
2. **Objectives of the Unit**
3. **Introduction**
4. **The Use of Comparative Analysis in Political Science**
5. **Advantages of Comparing Institutions and Political Processes**
6. **Methods of Comparative Analysis**
7. **Summary**
8. **Glossary**
9. **Self-Assessment Questions**
10. **References**

Sub: Political Science (1st Semester)

Course- 105; Group- A; Unit- 4

Approaches to the Study of Comparative Politics: Structural Functionalism, Systems Analysis and Institutionalism

Unit Structure:

1. **Relevance of the Unit**
2. **Objectives of the Unit**
3. **Introduction**
4. **Approaches to the Study of Comparative Politics**
5. **Structural Functionalism**
6. **Systems Analysis**
7. **Institutionalism**
8. **Summary**
9. **Glossary**
10. **Self-Assessment Questions**
11. **References**

Sub: Political Science (1st Semester)

Course- 105; Group- B; Unit- 5

Political Development and Political Modernisation

Unit Structure:

1. **Relevance of the Unit**
2. **Objectives of the Unit**
3. **Introduction**
4. **Political Development**
5. **Political Modernisation- Its Dimensions**
6. **Relationship between Political Development and Political Modernisation**
7. **Summary**
8. **Glossary**
9. **Self-Assessment Questions**
10. **References**

Sub: Political Science (1st Semester)

Course- 105; Group- B; Unit- 6

Comparing Organs of Government: Legislature, Executive and Judiciary

Unit Structure:

1. **Relevance of the Unit**
2. **Objectives of the Unit**
3. **Introduction**
4. **Relationship between three Organs of Government**
5. **Need for the Comparison**
6. **Summary**
7. **Glossary**
8. **Self-Assessment Questions**
9. **References**

Sub: Political Science (1st Semester)

Course- 105; Group- B; Unit- 7

Political Parties and Interest Group Politics

Unit Structure:

1. **Relevance of the Unit**
2. **Objectives of the Unit**
3. **Introduction**
4. **Difference between Political Parties and Interest Groups**
5. **Functions of Political Parties and their different types**
6. **Functions of Interest Groups and their different types**
7. **Summary**
8. **Glossary**
9. **Self-Assessment Questions**
10. **References**

Sub: Political Science (1st Semester)

Course- 105; Group- B; Unit- 8

Political Institutions and Legitimacy

Unit Structure:

1. **Relevance of the Unit**
2. **Objectives of the Unit**
3. **Introduction**
4. **Sources of Political Legitimacy**
5. **Legitimacy of Political Institutions**
6. **Challenges to Political Legitimacy**
7. **Political Cosmopolitanism**
8. **Summary**
9. **Glossary**
10. **Self-Assessment Questions**
11. **References**

Sub: Political Science (2nd Semester)

Course- 201; Group- A; Unit- 1

Development of International Relations as an academic discipline

Unit Structure:

1. **Relevance of the Unit**
2. **Objectives of the Unit**
2. **Introduction**
3. **Different phases in the development of the discipline**
4. **The League of Nation and its role**
5. **Development since World War-II: Role of the United Nations**
6. **Recent Trends**
7. **Summary**
8. **Glossary**
9. **Self-Assessment Questions**
10. **References**

Sub: Political Science (2nd Semester)

Course- 201; Group- A; Unit- 2

Theories and Approaches: Liberal Idealism to Neo-Liberalism; Realism to Neo-Realism; International Political Economy

Unit Structure:

Sub: Political Science (2nd Semester)

Course- 201; Group- A; Unit- 3

Methodological debates: Traditionalism vs. Behaviouralism

Unit Structure:

1. **Relevance of the Unit**
2. **Objectives of the Unit**
3. **Introduction**
4. **Main tenets of the Traditional Approach**
5. **Main tenets of the Behavioural Approach**
6. **Major points of the debate**
7. **Summary**
8. **Glossary**
9. **Self-Assessment Questions**
10. **References**

Sub: Political Science (2nd Semester)

Course- 201; Group- A; Unit- 4

Postmodernism and Constructivism

Unit Structure

1. **Relevance of the Unit**
2. **Objectives of the Unit**
3. **Introduction**
4. **Post-modernism**
5. **Constructivism**
6. **Summary**
7. **Glossary**
8. **Self Assessment Questions**
9. **References**

Sub: Political Science (2nd Semester)

Course- 201; Group- B; Unit- 5

Disarmament and World Peace-major Disarmament Efforts since World War II; Problems of Nuclear Proliferation

Unit Structure:

Sub: Political Science (2nd Semester)

Course- 201; Group- B; Unit- 6

Globalization: Concept and Debates

Unit Structure:

Sub: Political Science (2nd Semester)

Course- 201; Group- B; Unit- 7

Human Rights, Environment, Terrorism: Current Concerns

Unit Structure:

Sub: Political Science (2nd Semester)

Course- 201; Group- B; Unit- 8

Communications and Information Revolution and its Impact on International Relations and Institutions

Unit Structure:

Sub: Political Science (2nd Semester)

Course- 202; Group- A; Unit- 1

Changing role of the United Nations: Role of the Specialized Agencies

Unit Structure:

1. **Relevance of the Unit**
2. **Objectives of the Unit**
3. **Introduction**
4. **UNO Since 1945**
5. **UNO and the Peace Process**
6. **Political Activities**
7. **Economic Activities**
8. **Human Rights Activities**
9. **Other International Organisations: OECD, IMF, ILO, WHO**
10. **Harmony with the International Community**
11. **Changing Role**
12. **Summary**
13. **Glossary**
14. **Self – Assessment Questions**
15. **References**

Sub: Political Science (2nd Semester)

Course- 202; Group- A; Unit- 2

Multinational / Transnational Actors in World Politics- Role of IMF; World Bank; and WTO

Unit Structure:

1. **Relevance of the Unit**
2. **Objectives of the Unit**
3. **IMF (International Monetary Fund)**
4. **The World Bank**
5. **WTO (World Trade Organization)**
6. **Summary**
7. **Glossary**
8. **Self-Assessment Questions**
9. **References**

Sub: Political Science (2nd Semester)

Course- 202; Group- A; Unit- 3

Regional organizations: SAARC; ASEAN; and the (EU) European Union

Unit Structure:

Sub: Political Science (2nd Semester)

Course- 202; Group- A; Unit- 4

Regional Issues: (a) Middle East and the Palestine Question; (b) Central Asia and the 'great game'

Unit Structure:

Sub: Political Science (2nd Semester)

Course- 202; Group- B; Unit- 5

Foreign Policy of the Major Powers: USA, Russia and China

Unit Structure:

Sub: Political Science (2nd Semester)

Course- 202; Group- B; Unit- 6

BRICS and SCO in the New World Order

Unit Structure:

Sub: Political Science (2nd Semester)

Course- 202; Group- B; Unit- 7

India's Foreign Policy: Contemporary Debates

Unit Structure:

1. **Relevance of the Unit**
2. **Objectives of the Unit**
3. **Introduction**
4. **Cold War Years**
5. **Post Cold War Years**
6. **Contemporary Debates**
7. **Summary**
8. **Glossary**
9. **Self-Assessment Questions**
10. **References**

Sub: Political Science (2nd Semester)

Course- 202; Group- B; Unit- 8

India & Her Neighbours: Select States

Unit Structure:

1. **Relevance of the Unit**
2. **Objectives of the Unit**
3. **Introduction**
4. **India's Neighbourhood Policy**
5. **Challenges before India Today**
6. **Summary**
7. **Glossary**
8. **Self-Assessment Questions**
9. **References**

Sub: Political Science (2nd Semester)

Course- 203; Group- A; Unit- 1

Understanding Rural Society in India- Economic and Political life of Rural People: A Brief Profile

Unit Structure:

Sub: Political Science (2nd Semester)

Course- 203; Group- A; Unit- 2

Indian Villages: The Changing Pattern- Caste, Class Structure and Inequality

Unit Structure:

Sub: Political Science (2nd Semester)

Course- 203; Group- A; Unit- 3

Rural Society and Agrarian Change: Basic Issues- Land Reforms and Rural Development

Unit Structure:

Sub: Political Science (2nd Semester)

Course- 203; Group- A; Unit- 4

Rural Development in India: Approaches, Policies and Strategies

Unit Structure:

Sub: Political Science (2nd Semester)

Course- 203; Group- B; Unit- 5

District Administration in India: Colonial Legacies; Role, Functions and Challenges to District Administration

Unit Structure:

Sub: Political Science (2nd Semester)

Course- 203; Group- B; Unit- 6

District Planning and Plan Administration: Concept of Decentralized Planning; Evolution and Methodology

Unit Structure:

Sub: Political Science (2nd Semester)

Course- 203; Group- B; Unit- 7

Rural Development Administration in India: Origin and Growth, the Rural Development Bureaucracy and State – The role of ICT

Unit Structure:

Sub: Political Science (2nd Semester)

Course- 203; Group- B; Unit- 8

Panchayati Raj in India: Evolution, Institutional innovations for grassroots decentralization

Unit Structure:

Sub: Political Science (2nd Semester)

Course- 204; Group- A; Unit- 1

Making of the Indian Constitution: Role of the Constituent Assembly

Unit Structure:

1. **Relevance of the Unit**
2. **Objectives of the Unit**
3. **Introduction**
4. **The Importance of Constitution Making**
5. **The Process of Constitution Making**
6. **Deciding Whether a Constituent Assembly Should be Part of the Process**
7. **The Constituent Assembly: Structure and Composition**
8. **Powers and Functions of the Constituent Assembly**
9. **After the Constituent Assembly**
10. **Summary**
11. **Glossary**
12. **Self-Assessment Questions**
13. **References**

Sub: Political Science (2nd Semester)

Course- 204; Group- A; Unit- 2

The Preamble and its Significance

Unit Structure:

1. **Relevance of the Unit**
2. **Objectives of the Unit**
3. **Introduction**
4. **Preamble Reflects the Philosophy of the Constitution**
5. **Explains the Role of the Constitution**
6. **Explains the People of India**
7. **Helps in Interpretation the Constitution**
8. **Explain the Aim and Aspiration of the Constitution**
9. **Explains the Resolutions and Promises**
10. **Summary**
11. **Glossary**
12. **Self-Assessment Questions**
13. **References**

Sub: Political Science (2nd Semester)

Course- 204; Group- A; Unit- 3

Fundamental Rights and Duties

Unit Structure:

1. **Relevance of the Unit**
2. **Objectives of the Unit**
3. **Introduction**
4. **Meaning and Importance of Rights and Duties**
5. **Right to Equality**
6. **Right to Freedom**
7. **Right Against Exploitation**
8. **Right to Freedom of Religion**
9. **Cultural and Educational Rights**
10. **Right to Constitutional Remedies**
11. **Fundamental Duties**
12. **Summary**
13. **Glossary**
14. **Self-Assessment Questions**
15. **References**

Sub: Political Science (2nd Semester)

Course- 204; Group- A; Unit- 4

Directive Principles of the State Policy

Unit Structure:

1. **Relevance of the Unit**
2. **Objectives of the Unit**
3. **Introduction**
4. **Socialistic Principles**
5. **Gandhian Principles**
6. **Liberal Principles**
7. **New Directive Principles**
8. **Sanction Behind Directive Principles**
9. **Conflict between Fundamental Rights and DPSP**
10. **Summary**
11. **Glossary**
12. **Self-Assessment Questions**
13. **References**

Sub: Political Science (2nd Semester)

Course- 204; Group- B; Unit- 5

Executive: President and Prime Minister; Governor and Chief Minister – Power and Functions

Unit Structure:

1. **Relevance of the Unit**
2. **Objectives of the Unit**
3. **Introduction**
4. **The idea of Executive in India- Union and State**
5. **President of India- Powers and Functions**
6. **Prime Minister- Powers and Functions**
7. **Governor- Powers and Functions**
8. **Chief Minister- Powers and Functions**
9. **Summary**
10. **Glossary**
11. **Self-Assessment Questions**
12. **References**

Sub: Political Science (2nd Semester)

Course- 204; Group- B; Unit- 6

Legislature: Union Parliament and State Legislative Assemblies – Composition and Functions

Unit Structure:

1. **Relevance of the Unit**
2. **Objectives of the Unit**
3. **Introduction**
4. **Parliament in India- Composition**
3. **President of India**
4. **RajyaSabha**
5. **LokSabha**
6. **Powers and Functions of Parliament**
7. **Parliamentary Committees**
5. **Summary**
6. **Glossary**
7. **Self-Assessment Questions**
8. **References**

Sub: Political Science (2nd Semester)

Course- 204; Group- B; Unit- 7

Judiciary: Supreme Court and High Courts: Composition, Jurisdiction and Role

Unit Structure:

1. **Relevance of the Unit**
2. **Objectives of the Unit**
3. **Introduction**
4. **The Judiciary in India**
5. **Supreme Court- Composition and Functions**
6. **High Court-Composition and Functions**
7. **Subordinate Courts- The District Courts, Magistrate Courts and Junior Magistrate Courts**
8. **Judicial Review**
9. **Judicial Activism**
10. **Summary**
11. **Glossary**
12. **Self-Assessment Questions**
13. **References**

Sub: Political Science (2nd Semester)

Course- 204; Group- B; Unit- 8

Election Commission: Composition and Functions

Unit Structure:

1. **Objectives of the Unit**
2. **Relevance of the Unit**
3. **Introduction**
4. **Election Commission of India- Background and Structure**
5. **Election Commission of India- Composition and Functions**
6. **State Election Commission- Composition and Functions**
7. **Challenges before Election Commission of India**
8. **Summary**
9. **Glossary**
10. **Self-Assessment Questions**
11. **References**

Sub: Political Science (2nd Semester)

Course- 205; Group- A; Unit- 1

Globalisation and the Challenges to State Sovereignty: Economic, Political, Military and Cultural Dimensions

Unit Structure:

Sub: Political Science (2nd Semester)

Course- 205; Group- A; Unit- 2

Identities and the Challenges to Integrity of Nation-states: An Overview

Unit Structure:

Sub: Political Science (2nd Semester)

Course- 205; Group- A; Unit- 3

Development and Displacement: Key Issues

Unit Structure:

1. **Relevance of the Unit**
2. **Objectives of the Unit**
3. **Introduction**
4. **Causes of Displacement**
3. **Development-induced Displacement- Features**
4. **Problem of Resettlement**
5. **Policy and Mitigation of Development-induced Displacement- the Efforts**
7. **Summary**
8. **Glossary**
9. **Self – Assessment Questions**
10. **References**

Sub: Political Science (2nd Semester)

Course- 205; Group- A; Unit- 4

Internal Displacement: the UN General Principles on Internally Displaced Persons (IDPs)

Unit Structure:

Sub: Political Science (2nd Semester)

Course- 205; Group- B; Unit- 5

Refugees, Borders and Forced Migration

Unit Structure:

Sub: Political Science (2nd Semester)

Course- 205; Group- B; Unit- 6

The Refugee Regime after Second World War- UNHCR – Legal and Implementing Instruments

Unit Structure:

1. **Relevance of the Unit**
2. **Objectives of the Unit**
3. **Introduction**
4. **Persons of Concern to UNHCR- Refugees, Asylum-Seeker, IDPs, Stateless Person, Returnees, Migrants**
3. **Protecting Refugees: Issues and Obstacles**
4. **UNHCR and its role in monitoring the refugee Regime**
7. **Summary**
8. **Glossary**
9. **Self – Assessment Questions**
10. **References**

Sub: Political Science (2nd Semester)

Course- 205; Group- B; Unit- 7

State, Media and Democracy

Unit Structure:

Sub: Political Science (2nd Semester)

Course- 205; Group- B; Unit- 8

Climatic Displacements- Global Environmental Regimes

Unit Structure:

Sub: Political Science (3rd Semester)

Course- 301; Group- A; Unit- 1

Evolution of Public Administration as an academic discipline: Major Paradigms – Scientific Management, Human Relations Approach, Development Administration and its critique

Unit Structure:

Sub: Political Science (3rd Semester)

Course- 301; Group- A; Unit- 2

Weber and Post-Weberian concepts of Organization: Decision Making and Bounded Rationality (Herbert Simon); Chief Executive and Leadership (Chester Bernard)

Unit Structure:

Sub: Political Science (3rd Semester)

Course- 301; Group- A; Unit- 3

New Public Management (NPM) and Public Choice Approach: Entrepreneurial Government (EG) and Managerialism. The Governance discourse: Administrative Accountability and Transparency

Unit Structure:

Sub: Political Science (3rd Semester)

Course- 301; Group- A; Unit- 4

From Government to Governance: Structural, Behavioural and Procedural Changes. E-governance and Digitalization of Public System Management: Public Service Delivery; Role of NGOs; and the PPP model

Unit Structure:

Sub: Political Science (3rd Semester)

Course- 301; Group- B; Unit- 5

Constitutional Arrangements on Indian Administration – Towards Bureaucratic Reforms and Challenges of Development; Administrative Reforms: ARC-I (1966-70) &ARC-II (2005)

Unit Structure:

1. **Relevance of the Unit**
2. **Objectives of the Unit**
3. **Introduction**
4. **India at the time of independence: role of the state in development**
5. **ARC-I Report of the 1960s**
6. **ARC-II Report of 2005**
7. **Evaluating the changing scenario**
8. **Summary**
9. **Glossary**
10. **Self-Assessment Questions**
11. **References**

Sub: Political Science (3rd Semester)

Course- 301; Group- B; Unit- 6

Inclusive Governance and Empowerment: Women, SC, ST and the Recognition of Marginalized Groups in India

Unit Structure:

Sub: Political Science (3rd Semester)

Course- 301; Group- B; Unit- 7

Ministry-Administration Relations: Determining Factors. Political-Administrative Corruption and its corrective Mechanisms: CVC, CBI, NIC&RTI

Unit Structure:

1. **Relevance of the Unit**
2. **Objectives of the Unit**
3. **Introduction**
4. **Ministers in Parliamentary Democracy**
5. **Role of Bureaucrats**
6. **Checks and Balances: CVC, CBI, NIC & RTI**
7. **Summary**
8. **Glossary**
9. **Self-Assessment Questions**
10. **References**

Sub: Political Science (3rd Semester)

Course- 301; Group- B; Unit- 8

Impact of Globalization, Liberalization and Privatization on Indian Administration. Indian Administration and the 'Good Governance' agenda: Recommendations of the Conference of Chief Secretaries and Chief Ministers (1996-97); and of ARC II (2005)

Unit Structure:

1. **Relevance of the Unit**
2. **Objectives of the Unit**
3. **Introduction**
4. **Conceptualising LPG**
5. **Conceptualising Good Governance**
6. **The Indian context**
7. **States in decision-making process**
8. **Summary**
9. **Glossary**
10. **Self-Assessment Questions**
11. **References**

Sub: Political Science (3rd Semester)

Course- 302; Group- A; Unit- 1

Liberalism in the pre-modern and early modern period

Unit Structure:

1. **Relevance of the Unit**
2. **Objective of the Unit**
3. **Introduction**
4. **Different Variants of Liberalism**
5. **Classical Liberalism – Contributions of John Locke and others**
6. **Principles of Classical Liberalism**
7. **Key Features of Classical Liberalism**
8. **Classical Liberal Morality**
9. **Decline and Rebirth of Classical Liberalism**
10. **Summary**
11. **Glossary**
12. **Self-assessment Questions**
13. **References**

Sub: Political Science (3rd Semester)

Course- 302; Group- A; Unit- 2

Liberalism and the Enlightenment

Unit Structure:

1. **Relevance of the Unit**
2. **Objectives of the Unit**
3. **Introduction**
4. **Concept of Enlightenment**
5. **Equation between Liberalism and Enlightenment**
6. **Critical Assessment**
7. **Summary**
8. **Glossary**
9. **Self-assessment Questions**
10. **References**

Sub: Political Science (3rd Semester)

Course- 302; Group- A; Unit- 3

Liberalism in the Nineteenth century – Basic tenets of Classical Liberalism

Unit Structure:

1. **Relevance of the Unit**
2. **Objectives of the Unit**
3. **Introduction**
4. **Background of 19th Century Liberalism**
5. **Features of Classical Liberalism**
6. **Contributions of A J P Taylor**
7. **Critical Assessment**
8. **Summary**
9. **Glossary**
10. **Self-assessment Questions**
11. **References**

Sub: Political Science (3rd Semester)

Course- 302; Group- A; Unit- 4

Debates on Liberal Democracy –liberal democracy and the theory of welfare state: contributions of Amartya Sen

Unit Structure:

1. **Relevance of the Unit**
2. **Objectives of the Unit**
3. **Introduction**
4. **Concept of Welfare State**
5. **Equation between Liberal Democracy and the Welfare State**
6. **Contributions of Amartya Sen**
7. **Summary**
8. **Glossary**
9. **Self-assessment Questions**
10. **References**

Sub: Political Science (3rd Semester)

Course- 302; Group- B; Unit- 5

Post-liberal theories of Democracy: Contributions of C.B. Macpherson and Robert Dahl

Unit Structure:

Sub: Political Science (3rd Semester)

Course- 302; Group- B; Unit- 6

Contemporary Liberal and Neo-liberal theories: Contributions of John Rawls and Robert Nozick

Unit Structure:

Sub: Political Science (3rd Semester)

Course- 302; Group- B; Unit- 7

Liberal-Communitarian debate

Unit Structure:

Sub: Political Science (3rd Semester)

Course- 302; Group- B; Unit- 8

Liberalism: The Marxist Critique

Unit Structure:

1. **Relevance of the Unit**
2. **Objectives of the Unit**
3. **Introduction**
4. **Marx as a Critic of Liberalism**
5. **The Historical Materialist Approach**
6. **Attitudes to Liberalism**
7. **Marx on Rights and Justice**
8. **Relativism and the Justification of Values**
9. **Summary**
10. **Glossary**
12. **Self-Assessment Questions**
13. **References**

Sub: Political Science (3rd Semester)

Course- 303; Group- A; Unit- 1

Contextualising Marx: Socio-historical and intellectual roots; Philosophical issues: Dialectics as a method of understanding social reality- contentious legacies of Hegel and Feurbach; Marxist concepts of (i) ideology, (ii) alienation, and (iii) praxis

Unit Structure:

Sub: Political Science (3rd Semester)

Course- 303; Group- A; Unit- 2

Marxism after Marx – varieties of Marxism – an overview – contributions of Lenin and Trotsky

Unit Structure:

1. **Relevance of the Unit**
2. **Objectives of the Unit**
3. **Introduction**
4. **Varieties of Marxism**
5. **Lenin's Methodological Principles**
6. **Analysis of the Social Formation**
7. **Lenin's Idea on State and Revolution**
8. **Trotsky's Contribution to Historical Materialism**
9. **Trotsky and the Russian Revolution**
10. **Trotsky on Permanent Revolution**
11. **Summary**
12. **Glossary**
13. **Self-Assessment Questions**
14. **References**

Sub: Political Science (3rd Semester)

Course- 303; Group- A; Unit- 3

Marxism of Antonio Gramsci: Concept of Hegemony – Strategy of Revolution – Role of Intellectuals and the Party

Unit Structure:

Sub: Political Science (3rd Semester)

Course- 303; Group- A; Unit- 4

Marxism and Structuralism: Althusser's reading of Marx-the epistemological break – Althusser on superstructure, state and ideology

Unit Structure:

Sub: Political Science (3rd Semester)

Course- 303; Group- B; Unit- 5

Marxism and the Third World: Contributions of Mao Ze Dong and Che Guavara

Unit Structure:

Sub: Political Science (3rd Semester)

Course- 303; Group- B; Unit- 6

Post Colonial Political Theory: key issues; Meaning of Orientalism; Contributions and Critique of Edward Said

Unit Structure:

Sub: Political Science (3rd Semester)

Course- 303; Group- B; Unit- 7

Emerging Issues in Contemporary Radical Theories (i) Ecologism, and (ii) Multi-Culturalism

Unit Structure:

Sub: Political Science (3rd Semester)

Course- 303; Group- B; Unit- 8

Feminist Political Theory: Feminism: Problems of definition; basic issues, origin and development of feminist thought; current feminist viewpoints: an overview

Unit Structure:

Sub: Political Science (3rd Semester)

Course- 304; Group- A; Unit- 1

Human Rights: Concepts and Practices

Unit Structure:

Sub: Political Science (3rd Semester)

Course- 304; Group- A; Unit- 2

Green Politics: Ideas and Issues

Unit Structure:

Sub: Political Science (3rd Semester)

Course- 304; Group- A; Unit- 3

Gender and Politics: Major issues

Unit Structure:

Sub: Political Science (3rd Semester)

Course- 304; Group- A; Unit- 4

Terrorism: Different types and challenges

Unit Structure:

Sub: Political Science (3rd Semester)

Course- 304; Group- B; Unit- 5

The UNO: Objectives – major organs

Unit Structure:

1. **Relevance of the Unit**
2. **Objectives of the Unit**
3. **Introduction**
4. **Objectives and principles of the UNO**
5. **Major Organs of the UNO and their functions**
6. **Challenges facing the UNO**
7. **Summary**
8. **Glossary**
9. **Self-Assessment Questions**
10. **References**

Sub: Political Science (3rd Semester)

Course- 304; Group- B; Unit- 6

SAARC as a regional organization

Unit Structure:

1. **Relevance of the Unit**
2. **Objectives of the Unit**
3. **Introduction**
4. **SAARC and its functions**
5. **Evolution of SAARC- its Summits**
6. **Challenges facing the SAARC**
7. **Summary**
8. **Glossary**
9. **Self-Assessment Questions**
10. **References**

Sub: Political Science (3rd Semester)

Course- 304; Group- B; Unit- 7

Foreign policy: principles and objectives- with special reference to India

Unit Structure:

1. **Relevance of the Unit**
2. **Objectives of the Unit**
3. **Introduction**
4. **Principles of Indian Foreign Policy**
5. **Means of achievement of foreign policy objectives**
6. **Indian Foreign Policy at present**
7. **Summary**
8. **Glossary**
9. **Self-Assessment Questions**
10. **References**

Sub: Political Science (3rd Semester)

Course- 304; Group- B; Unit- 8

Globalization: Concept and salient features

Unit Structure:

1. **Relevance of the Unit**
2. **Objectives of the Unit**
3. **Introduction**
4. **Concept and background of Globalization**
5. **Features of Globalization**
6. **Globalization: Consequences and Implications**
7. **Summary**
8. **Glossary**
9. **Self-Assessment Questions**
10. **References**

Sub: Political Science (3rd Semester)

Course- 305; Group- A; Unit- 1

The nature of Scientific Research: Philosophical and Empirical Approaches

Unit Structure:

1. **Relevance of the Unit**
2. **Objectives of the Unit**
3. **Introduction**
4. **Salient Features of Scientific Knowledge**
5. **Empiricism: Its meaning and major premises**
6. **The Philosophical Approach: Its main tenets**
7. **Summary**
8. **Glossary**
9. **Self-Assessment Questions**
10. **References**

Sub: Political Science (3rd Semester)

Course- 305; Group- A; Unit- 2

Importance of Studying Research Methodology

Unit Structure:

1. **Relevance of the Unit**
2. **Objectives of the Unit**
3. **Introduction**
4. **Meaning of Methodology: Method and Methodology**
5. **Why study Research Methodology**
6. **Summary**
7. **Glossary**
8. **Self-Assessment Questions**
9. **References**

Sub: Political Science (3rd Semester)

Course- 305; Group- A; Unit- 3

Role of Theory in Social Science Research: Science, Theory and Fact – their interrelationships

Unit Structure:

1. **Relevance of the Unit**
2. **Objectives of the Unit**
3. **Introduction**
4. **Meaning of Theory**
5. **Meaning of Fact**
6. **Role of Theory**
7. **Science: Theory and Fact**
8. **Summary**
9. **Glossary**
10. **Self-Assessment Questions**
11. **References**

Sub: Political Science (3rd Semester)

Course- 305; Group- A; Unit- 4

Place of Values in Social Science Research

Unit Structure:

1. **Relevance of the Unit**
2. **Objectives of the Unit**
3. **Introduction**
4. **Meaning of 'Value'**
5. **Value and Social Science – 'Value-free' Research**
6. **Summary**
7. **Glossary**
8. **Self-Assessment Questions**
9. **References**

Sub: Political Science (3rd Semester)

Course- 305; Group- B; Unit- 5

Building Blocks of Theory: Concepts, Variables and Hypothesis

Unit Structure:

Sub: Political Science (3rd Semester)

Course- 305; Group- B; Unit- 6

Research Design: Meaning, Functions and Goals of Research Design-Characteristics of a good Research Design

Unit Structure:

Sub: Political Science (3rd Semester)

Course- 305; Group- B; Unit- 7

Participant Observation as a Method of Social Science Research

Unit Structure:

Sub: Political Science (3rd Semester)

Course- 305; Group- B; Unit- 8

Ethical Issues in Social Science Research

Unit Structure:

Sub: Political Science (4th Semester)

Course- 401; Group- A; Unit- 1

Tagore

Unit Structure:

1. **Objectives of the Unit**
2. **Relevance of the Unit**
3. **Introduction**
4. **Selective Texts of Rabindranath Tagore**

   4.1 ***Gora***

   4.2 ***Atmasakti***

   4.3 ***Nationalism***
5. **Summary**
6. **Glossary**
7. **Self-Assessment Questions**
8. **References**

Sub: Political Science (4th Semester)

Course- 401; Group- A; Unit- 2

Gandhi

Unit Structure:

1. **Objectives of the Unit**
2. **Relevance of the Unit**
3. **Introduction**
4. **Selective Texts of M.K. Gandhi**

   4.1 ***An Autobiography or the Story of My Experiments with Truth***

   4.2 ***The Essential Gandhi: An Anthology of His Writings on His Life, Work, and Ideas***

   4.3 Hind Swaraj
5. **Summary**
6. **Glossary**
7. **Self-Assessment Questions**
8. **References**

Sub: Political Science (4th Semester)

Course- 401; Group- A; Unit- 3

Rokeya

Unit Structure:

1. **Objectives of the Unit**
2. **Relevance of the Unit**
3. **Introduction**
4. **Selective Texts of Begum Rokeya**

   4.1 *Sultana's Dream*

   4.2 *Pipasa* (Thirst)

   4.3 *Mukti-phal* (The Fruit of Emancipation)

   4.4 *Abarodhbasini* (The Secluded Women)

5 Summary

6 Glossary

7 Self-Assessment Questions

8 References

Sub: Political Science (4th Semester)

Course- 401; Group- A; Unit- 4

Ambedkar

Unit Structure:

1. **Objectives**
2. **Relevance of the Unit**
3. **Introduction**
4. **Selective Texts of B. R. Ambedkar**

   4.1 ***Annihilation of Caste***

   4.2 ***Who Were the Shudras?***

   4.3 ***Riddles in Hinduism : The Annotated Critical Selection***

   4.4 ***What Congress and Gandhi Have Done To The Untouchables***

5. **Summary**
6. **Glossary**
7. **Self-Assessment Questions**
8. **References**

Sub: Political Science (4th Semester)

Course- 401; Group- B; Unit- 5

Rachel Carson

Unit Structure:

Sub: Political Science (4th Semester)

Course- 401; Group- B; Unit- 6

Michel Foucault

Unit Structure:

1. **Relevance of the Unit**
2. **Objectives of the Unit**
3. **Introduction**
4. **Selective Texts of Michel Foucault**

    4.1. Discipline and Punish

    4.2. College de France Lectures: "Society Must Be Defended"

5. **Summary**
6. **Glossary**
7. **Self-Assessment Questions**
8. **References**

Sub: Political Science (4th Semester)

Course- 401; Group- B; Unit- 7

Habermas

Unit Structure:

1. **Relevance of the Unit**
2. **Objectives of the Unit**
3. **Introduction**
4. **Selective Texts of Habermas**
   - ***4.1. The Theory of Communicative Action***
   - ***4.2. The Structural Transformation of the Public Sphere***
5. **Summary**
6. **Glossary**
7. **Self-Assessment Questions**
8. **References**

Sub: Political Science (4th Semester)

Course- 401; Group- B; Unit- 8

Charles Taylor

Unit Structure:

1. **Relevance of the Unit**
2. **Objectives of the Unit**
3. **Introduction**
4. **Selective Texts of Charles Taylor**
   - **4.1.** ***Sources of the Self: The Making of Modern Identity***
   - **4.3.** ***A Secular Age***
5. **Summary**
6. **Glossary**
7. **Self-Assessment Questions**
8. **References**

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Sub: Political Science (4th Semester)

Course- 403; Group- A; Unit- 1

South Asia as a Regional Entity – Geostrategic Significance

Unit Structure:

1. **Relevance of the Unit**
2. **Objectives of the Unit**
3. **Introduction**
4. **Definition of Region**
5. **Controversies surrounding South Asia as a Region**
6. **Geo-strategic significance of South Asia**
7. **Critical Assessment**
8. **Summary**
9. **Glossary**
10. **Self-assessment Questions**
11. **References**

Sub: Political Science (4th Semester)

Course- 403; Group- A; Unit- 2

Democracy, Nationalism and Process of Nation Building

Unit Structure:

1. **Relevance of the Unit**
2. **Objectives of the Unit**
3. **Introduction**
4. **Understanding the concept of Democracy**
5. **Defining the concept of Nation, Nationalism, and Nation Building**
6. **Nation Building in South Asia**
7. **Critical Assessment**
8. **Summary**
9. **Glossary**
10. **Self-assessment Questions**
11. **References**

Sub: Political Science (4th Semester)

Course- 403; Group- A; Unit- 3

Security in South Asia – Trends and Directions

Unit Structure:

1. **Relevance of the Unit**
2. **Objectives of the Unit**
3. **Introduction**
4. **Understanding the concept of Security**
5. **Distinction between traditional security and non-traditional security**
6. **Security in the South Asian context**
7. **Recent trends and directions of Security in South Asia**
8. **Critical Assessment**
9. **Summary**
10. **Glossary**
11. **Self-assessment Questions**
12. **References**

Sub: Political Science (4th Semester)

Course- 403; Group- A; Unit- 4

Islamic Extremism and its Challenges

Unit Structure:

1. **Relevance of the Unit**
2. **Objectives of the Unit**
3. **Introduction**
4. **Defining the concept of extremism**
5. **Nature of Islamic extremism in South Asia**
6. **Challenges emerging out of Islamic extremism in South Asia**
7. **Critical Assessment**
8. **Summary**
9. **Glossary**
10. **Self-assessment Questions**
11. **References**

Sub: Political Science (4th Semester)

Course- 403; Group- B; Unit- 5

Nuclear Issues in South Asia

Unit Structure:

1. **Relevance of the Unit**
2. **Objectives of the Unit**
3. **Introduction**
4. **Understanding the concept of Nuclear Proliferation**
5. **Nuclear issues as part of non-traditional security**
6. **Trends of Nuclearisation in South Asia**
7. **Emerging challenges**
8. **Critical Assessment**
9. **Summary**
10. **Glossary**
11. **Self-assessment Questions**
12. **References**

Sub: Political Science (4th Semester)

Course- 403; Group- B; Unit- 6

Environmental Issues in South Asia: Contemporary Trends

Unit Structure:

1. **Relevance of the Unit**
2. **Objectives of the Unit**
3. **Introduction**
4. **Understanding the environmental issue**
5. **Linkage between environment and development**
6. **Environmental issues in South Asia – Key features**
7. **Challenges of environmental sustainability in South Asia**
8. **Emerging debates in respect of environmental politics in South Asia**
9. **Critical Assessment**
10. **Summary**
11. **Glossary**
12. **Self-assessment Questions**
13. **References**

Sub: Political Science (4th Semester)

Course- 403; Group- B; Unit- 7

Refugees in South Asian Scenario

Unit Structure:

1. **Relevance of the Unit**
2. **Objectives of the Unit**
3. **Introduction**
4. **Defining the concept of refugee**
5. **Refugees and the rise of nation-state system**
6. **Refugee scenario in South Asia after the Second World War**
7. **Challenges emanating out of influx of refugees in South Asia**
8. **Critical Assessment**
9. **Summary**
10. **Glossary**
11. **Self-assessment Questions**
12. **References**

Sub: Political Science (4th Semester)

Course- 403; Group- B; Unit- 8

Cooperation and Conflict among the South Asian States: Major Issues

Unit Structure:

1. **Relevance of the Unit**
2. **Objectives of the Unit**
3. **Introduction**
4. **Cooperative framework in South Asia**
5. **Importance of Regional organisation in South Asia**
6. **Conflicting trends in South Asia**
7. **Relevance of SAARC in South Asia**
8. **Critical Assessment**
9. **Summary**
10. **Glossary**
11. **Self-assessment Questions**
12. **References**

Sub: Political Science (4th Semester)

Course- 404; Group- A; Unit- 1

Making Civil Society in South Asia – Civil Society and its Fragments

Unit Structure:

1. **Relevance of the Unit**
2. **Objectives of the Unit**
3. **Introduction**
4. **Civil Society: Origin & Development of the Concept**
5. **South Asia: A Geo-historical Survey**
6. **Civil Society and Political Institutions in South Asia: Mass Media, Political Parties, Social Movements and CSOs**
7. **Ethno-nationalism**
8. **Summary**
9. **Glossary**
10. **Self-assessment Questions**
11. **References**

Sub: Political Science (4th Semester)

Course- 404; Group- A; Unit- 2

Civil Society in India: An Overview of Contemporary Trends

Unit Structure:

1. **Relevance of the Unit**
2. **Objectives of the Unit**
3. **Introduction**
4. **Democracy in India: a Socio-historical Overview**
5. **Growth of Civil Society in India**
6. **Contemporary Trends**
7. **Summary**
8. **Glossary**
9. **Self-assessment Questions**
10. **References**

Sub: Political Science (4th Semester)

Course- 404; Group- A; Unit- 3

Youth and Political Engagement in Sri Lanka

Unit Structure:

1. **Relevance of the Unit**
2. **Objectives of the Unit**
3. **Introduction**
4. **Sri Lanka Since Independence: a Socio-historical Overview**
5. **Human Development Performances in Sri Lanka**
6. **Ethnic Strife in Sri Lanka**
7. **Youth in Sri Lanka: A profile**
8. **Summary**
9. **Glossary**
10. **Self-assessment Questions**
11. **References**

Sub: Political Science (4th Semester)

Course- 404; Group- A; Unit- 4

NGOs, Donors and the State of Bangladesh

Unit Structure:

1. **Relevance of the Unit**
2. **Objectives of the Unit**
3. **Introduction**
4. **Bangladesh: A Political History**
5. **Development Performances of Bangladesh**
6. **NGOs in Bangladesh**
   - **6.1. Growth of NGOs as Third Sector**
   - **6.2. State-NGO Relations; Range of NGO Activism in Bangladesh**
7. **Summary**
8. **Glossary**
9. **Self-assessment Questions**
10. **References**

Sub: Political Science (4th Semester)

Course- 404; Group- B; Unit- 5

Ethno – Nationalist Movements – its nature

Unit Structure:

1. **Relevance of the Unit**
2. **Objectives of the Unit**
3. **Introduction**
4. **South Asia, Ethnicity and Nationalism**
5. **Sub-nationalism**
6. **Ethno-nationalism**
7. **Summary**
8. **Glossary**
9. **Self-assessment Questions**
10. **References**

Sub: Political Science (4th Semester)

Course- 404; Group- B; Unit- 6

Civil Society and Hindu Nationalism – Select Case Studies

Unit Structure:

Sub: Political Science (4th Semester)

Course- 404; Group- B; Unit- 7

Civil Society, Transnational Connections and Ethnic Activism in Sri Lanka, Nepal and India

Unit Structure:

Sub: Political Science (4th Semester)

Course- 404; Group- B; Unit- 8

Civil Society and Dalit Activism –India and Nepal

Unit Structure:

Sub: Political Science (4th Semester)

Course- 405; Group- A; Unit- 1

Movement for Pakistan: Historico-political background. Democratic Movements: various phases

Unit Structure:

Sub: Political Science (4th Semester)

Course- 405; Group- A; Unit- 2

Nature of Society and Economy of East Pakistan: A brief background. Birth of Bangladesh and its Aftermath

Unit Structure:

Sub: Political Science (4th Semester)

Course- 405; Group- A; Unit- 3

Politics of Contemporary Nepal: the Post Monarchy phase

Unit Structure:

Sub: Political Science (4th Semester)

Course- 405; Group- A; Unit- 4

Democratic Movements in Bhutan – Nature of the Bhutanese Politics and Society

Unit Structure:

Sub: Political Science (4th Semester)

Course- 405; Group- B; Unit- 5

Society and Economy in Sri Lanka – Left Movement in Sri Lanka; JVP movement

Unit Structure:

Sub: Political Science (4th Semester)

Course- 405; Group- B; Unit- 6

Socio-Political Changes in Maldives

Unit Structure:

Sub: Political Science (4th Semester)

Course- 405; Group- B; Unit- 7

Re-structuring of Afghanistan: Role of International Agencies

Unit Structure:

Sub: Political Science (4th Semester)

Course- 405; Group- B; Unit- 8

Anti-Corruption Movements in India: An Overview

Unit Structure:

VIDYASAGAR UNIVERSITY

DIRECTORATE OF DISTANCE EDUCATION

Sanskrit, Semester - 1, PAPER: SAN-101,

SLM – **১**

এককটির নাম (Title of the Unit)**: অগ্নিসূক্ত (ঋগ্বেদ ১.১)**

গঠন (Unit Structure)

১.০ প্রাসঙ্গিকতা (Relevance of the Unit)

১.১ উদ্দেশ্য (Objectives)

১.২ প্রস্তাবনা (Introduction)

বিভাগ ও উপবিভাগের মাধ্যমে এককটির বিশ্লেষণ

(Divisions of the Unit in Unit sections and subsections)

১.৩ বিষয়বস্তু (Subject Matter)

১.৩.১ প্রথমমণ্ডলের অগ্নিসূক্তের বিষয়বস্তু

১.৪ সারসংক্ষেপ (Summary)

১.৫ গুরুত্বপূর্ণ শব্দাবলী (Glossary)

১.৬ পাঠের অগ্রগতির জ্ঞাপক প্রশ্নাবলী (Self assessment questions or Check your Progress)

১.৭ সহায়ক গ্রন্থাবলী (Bibliography)

এককটির নাম (Title of the Unit)**: অগ্নিসূক্ত (ঋগ্বেদ ১.১.৬)**

গঠন (Unit Structure)

১.১.০ প্রাসঙ্গিকতা (Relevance of the Unit)

১.১.১ উদ্দেশ্য (Objectives)

১.১.২ প্রস্তাবনা (Introduction)

বিভাগ ও উপবিভাগের মাধ্যমে এককটির বিশ্লেষণ

(Divisions of the Unit in Unit sections and subsections)

১.১.৩ বিষয়বস্তু (Subject Matter)

১.১.৩.০ প্রথমমণ্ডলের অগ্নিসূক্তের দ্বিতীয়সূক্তের বিষয়বস্তু

১.১.৪ সারসংক্ষেপ (Summary)

১.১.৫ গুরুত্বপূর্ণ শব্দাবলী (Glossary)

১.১.৬ পাঠের অগ্রগতির জ্ঞাপক প্রশ্নাবলী (Self assessment questions or Check your Progress)

১.১.৭ সহায়ক গ্রন্থাবলী (Bibliography)

এককটির নাম (Title of the Unit)**: বিশ্বামিত্রনদীসংবাদসূক্ত (৩.৩৩)**

গঠন (Unit Structure)

১.১.১.০ প্রাসঙ্গিকতা (Relevance of the Unit)

১.১.১.১ উদ্দেশ্য (Objectives)

১.১.১.২ প্রস্তাবনা (Introduction)

বিভাগ ও উপবিভাগের মাধ্যমে এককটির বিশ্লেষণ

(Divisions of the Unit in Unit sections and subsections)

১.১.১.৩ বিষয়বস্তু (Subject Matter)

১.১.১.৩.০ বিশ্বামিত্রনদীসংবাদের বিষয়বস্তু

১.১.১.৪ সারসংক্ষেপ (Summary)

১.১.১.৫ গুরুত্বপূর্ণ শব্দাবলী (Glossary)

১.১.১.৬ পাঠের অগ্রগতির জ্ঞাপক প্রশ্নাবলী (Self assessment questions or Check your Progress)

১.১.১.৭ সহায়ক গ্রন্থাবলী (Bibliography)

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এককটির নাম (Title of the Unit)**: নাসদীয়সূক্ত (ঋগ্বেদ ১০.১২৯**)

গঠন (Unit Structure)

২.০ প্রাসঙ্গিকতা (Relevance of the Unit)

২.১ উদ্দেশ্য (Objectives)

২.২ প্রস্তাবনা (Introduction)

বিভাগ ও উপবিভাগের মাধ্যমে এককটির বিশ্লেষণ

(Divisions of the Unit in Unit sections and subsections)

২.৩ বিষয়বস্তু (Subject Matter)

২.৩.১ নাসদীয়সূক্তের মন্ত্রাবলী

২.৪ সারসংক্ষেপ (Summary)

২.৫ গুরুত্বপূর্ণ শব্দাবলী (Glossary)

২.৬ পাঠের অগ্রগতির জ্ঞাপক প্রশ্নাবলী (Self assessment questions or Check your Progress)

২.৭ সহায়ক গ্রন্থাবলী (Bibliography)

এককটির নাম (Title of the Unit)**: পুরুষসূক্ত (ঋগ্বেদ, ১০.৯০ ১-১৬)**

গঠন (Unit Structure)

২.১.০ প্রাসঙ্গিকতা (Relevance of the Unit)

২.১.১ উদ্দেশ্য (Objectives)

২.১.২ প্রস্তাবনা (Introduction)

বিভাগ ও উপবিভাগের মাধ্যমে এককটির বিশ্লেষণ

(Divisions of the Unit in Unit sections and subsections)

২.১.৩ বিষয়বস্তু (Subject Matter)

২.১.৩.০ পুরুষসূক্তের বিষয়বস্তু

২.১.৪ সারসংক্ষেপ (Summary)

২.১.৫ গুরুত্বপূর্ণ শব্দাবলী (Glossary)

২.১.৬ পাঠের অগ্রগতির জ্ঞাপক প্রশ্নাবলী (Self assessment questions)

২.১.৭ সহায়ক গ্রন্থাবলী (Bibliography

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এককটির নাম(Title of the Unit)**: শিবসংকল্পসূক্ত (শুক্লযজুর্বেদ)**

৩.০ প্রাসঙ্গিকতা(Relevance of the Unit)

৩.১ উদ্দেশ্য(Objectives)

৩.২ প্রস্তাবনা(Introduction)

বিভাগ ও উপবিভাগের মাধ্যমে এককটির বিশ্লেষণ

(Divisions of the Unit in Unit sections and subsections)

৩.৩ বিষয়বস্তু (Subject Matter)

৩.৩.১ শিবসঙ্কল্পসূক্তের মন্ত্রাবলী

৩.৪ সারসংক্ষেপ (Summary)

৩.৫ গুরুত্বপূর্ণ শব্দাবলী(Glossary)

৩.৬ পাঠের অগ্রগতির জ্ঞাপক প্রশ্নাবলী(Self assessment questions or Check your Progress)

৩.৭ সহায়ক গ্রন্থাবলী(Bibliography)

এককটির নাম(Title of the Unit)**: পৃথিবীসূক্ত (অথর্ববেদ.১২/১/১-১০)**

গঠন (Unit Structure)

৩. ১.০ প্রাসঙ্গিকতা (Relevance of the Unit)

৩.১.১ উদ্দেশ্য (Objectives)

৩.১.২ প্রস্তাবনা (Introduction)

বিভাগ ও উপবিভাগের মাধ্যমে এককটির বিশ্লেষণ

(Divisions of the Unit in Unit sections and subsections)

৩.১.৩ বিষয়বস্তু (Subject Matters)

৩.১.৪ সারসংক্ষেপ (Summary)

৩.১.৫ গুরুত্বপূর্ণ শব্দাবলী (Glossary)

৩.১.৬ পাঠের অগ্রগতির জ্ঞাপক প্রশ্নাবলী (Self assessment questions or Check your Progress)

৩.১.৭ সহায়ক গ্রন্থাবলী (Bibliography

এককটির নাম(Title of the Unit)**: কালসূক্ত (অথর্ববেদ.১৯.৫৩)**

গঠন (Unit Structure)

৩.১. ১.০ প্রাসঙ্গিকতা (Relevance of the Unit)

৩.১.১.১ উদ্দেশ্য (Objectives)

৩.১.১.২ প্রস্তাবনা (Introduction)

বিভাগ ও উপবিভাগের মাধ্যমে এককটির বিশ্লেষণ

(Divisions of the Unit in Unit sections and subsections)

৩.১.১.৩ বিষয়বস্তু (Subject Matters)

৩.১.১.৩.০ কালসূক্তের বিষয়বস্তু

৩.১.১.৪ সারসংক্ষেপ (Summary)

৩.১.১.৫ গুরুত্বপূর্ণ শব্দাবলী (Glossary)

৩.১.১.৬ পাঠের অগ্রগতির জ্ঞাপক প্রশ্নাবলী (Self assessment questions or Check your Progress)

৩.১.১.৭ সহায়ক গ্রন্থাবলী (Bibliography)

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SLM – **৪**

এককটির নাম (Title of the Unit)**: শতপথব্রাহ্মণ (পঞ্চমহাযজ্ঞ)**

গঠন (Unit Structure)

৪.০ প্রাসঙ্গিকতা (Relevance of the Unit)

৪.১ উদ্দেশ্য (Objectives)

৪.২ প্রস্তাবনা (Introduction)

বিভাগ ও উপবিভাগের মাধ্যমে এককটির বিশ্লেষণ

(Divisions of the Unit in Unit sections and subsections)

৪.৩ বিষয়বস্তু (Subject Matter)

৪.৩.১ পঞ্চমহাযজ্ঞের নাম

৪.৩.২ ব্রহ্মযজ্ঞের স্বরূপ

৪.৪ সারসংক্ষেপ (Summary)

৪.৫ গুরুত্বপূর্ণ শব্দাবলী (Glossary)

৪.৬ পাঠের অগ্রগতির জ্ঞাপক প্রশ্নাবলী (Self assessment questions or Check your Progress)

৪.৭ সহায়ক গ্রন্থাবলী (Bibliography)

এককটির নাম (Title of the Unit)**: ঐতরেয় ব্রাহ্মণ –শুণঃশেপের উপাখ্যান (তেত্রিশসংখ্যক অধ্যায়ের তৃতীয় খণ্ড)**

গঠন (Unit Structure)

৪.১.০ প্রাসঙ্গিকতা (Relevance of the Unit)

৪.১.১ উদ্দেশ্য (Objectives)

৪.১.২ প্রস্তাবনা (Introduction)

বিভাগ ও উপবিভাগের মাধ্যমে এককটির বিশ্লেষণ

(Divisions of the Unit in Unit sections and subsections)

৪.১.৩ বিষয়বস্তু (Subject Matter)

৪.১.৩.০ রোহিতের অরণ্য গমনের পর রাজা হরিশ্চন্দ্রের বৃত্তান্ত।

৪.১.৩.২ ইন্দ্ররোহিতসংবাদ

৪.১.৪ সারসংক্ষেপ (Summary)

৪.১.৫ গুরুত্বপূর্ণ শব্দাবলী (Glossary)

৪.১.৬ পাঠের অগ্রগতির জ্ঞাপক প্রশ্নাবলী (Self assessment questions or Check your Progress)

৪.১.৭ সহায়ক গ্রন্থাবলী (Bibliography)

SLM – **৫**

এককটির নাম (Title of the Unit)**: কঠোপনিষত্ (প্রথম অধ্যায়: প্রথম বল্লী)**

গঠন (Unit Structure)

৫.০ প্রাসঙ্গিকতা(Relevance of the Unit)

৫.১ উদ্দেশ্য(Objectives)

৫.২ প্রস্তাবনা(Introduction)

বিভাগ ও উপবিভাগের মাধ্যমে এককটির বিশ্লেষণ

(Divisions of the Unit in Unit sections and subsections)

৫.৩ বিষয়বস্তু(Subject Matter)

- ৫.৩.১ বাজশ্রবসের দক্ষিণাপ্রদান এবং নচিকেতার চিন্তা
- ৫.৩.২ পিতাকে আশ্বস্ত করে নচিকেতার যমগৃহে গমন
- ৫.৩.৩ যমের তিনটি বরপ্রদানের প্রতিজ্ঞা এবং নচিকেতার বর প্রার্থনা
  - ৫.৩.৩.১ নচিকেতার প্রার্থিত প্রথম বর – পিতৃসন্তোষ
  - ৫.৩.৩.২ নচিকেতার প্রার্থিত দ্বিতীয় বর – স্বর্গসাধক অগ্নিবিদ্যা
  - ৫.৩.৩.৩ সন্তুষ্ট যমের দ্বারা নচিকেতাকে তিনটি বরের অতিরিক্ত বরপ্রদান
  - ৫.৩.৩.৪ নচিকেতার প্রার্থিত তৃতীয় বর – আত্মতত্ত্বের উপদেশলাভ
- ৫.৩.৪ নচিকেতার যোগ্যতা পরীক্ষা না করে যমের আত্মতত্ত্ব উপদেশে অনিচ্ছা
- ৫.৩.৫ যমের দ্বারা আত্মতত্ত্বের উপদেশের পরিবর্তে লৌকিক এবং অলৌকিক সুখের প্রলোভন
- ৫.৩.৬ নচিকেতার দৃঢ়তা এবং বৈরাগ্যপ্রদর্শন

৫.৪ সারসংক্ষেপ(Summary)

৫.৫ গুরুত্বপূর্ণ শব্দাবলী(Glossary)

৫.৬ পাঠের অগ্রগতির জ্ঞাপক প্রশ্নাবলী(Self assessment questions or Check your Progress)

৫.৭ সহায়ক গ্রন্থাবলী(Bibliography)

SLM – **৬**

এককটির নাম (Title of the Unit)**: কঠোপনিষত্ (প্রথম অধ্যায় : দ্বিতীয় বল্লী)**

গঠন (Unit Structure)

SLM – **৭**

এককটির নাম (Title of the Unit)**: কেনোপনিষত্ (প্রথমখণ্ড)**

গঠন (Unit Structure)

৭.০ প্রাসঙ্গিকতা(Relevance of the Unit)

৭.১ উদ্দেশ্য(Objectives)

৭.২ প্রস্তাবনা(Introduction)

বিভাগ ও উপবিভাগের মাধ্যমে এককটির বিশ্লেষণ

(Divisions of the Unit in Unit sections and subsections)

৭.৩ বিষয়বস্তু(Subject Matter)

৭.৩.১ প্রথমমন্ত্রে শিষ্য কর্তৃক গুরুর প্রতি জডদেহের কার্যশীলতার কারন জিজ্ঞাসা

৭.৩.২ দ্বিতীয়মন্ত্রে উক্ত প্রশ্নের উত্তর প্রদান

৭.৩.৩ তৃতীয়মন্ত্রে শুদ্ধচৈতন্যের স্বরূপ বর্ণনা

৭.৩.৪ ৪-৯ সংখ্যক মন্ত্রে জীব ও শুদ্ধচৈতন্যের স্বরূপ বর্ণনা

৭.৩.৫ ব্রহ্মের স্বরূপ নিরূপণ

৭.৪ সারসংক্ষেপ(Summary)

৭.৫ গুরুত্বপূর্ণ শব্দাবলী(Glossary)

৭.৬ পাঠের অগ্রগতির জ্ঞাপক প্রশ্নাবলী(Self assessment questions or Check your Progress)

৭.৭ সহায়ক গ্রন্থাবলী(Bibliography)

SLM – **৮**

এককটির নাম (Title of the Unit)**: কেনোপনিষত্ (দ্বিতীয়খণ্ড)**

গঠন (Unit Structure)

৮.০ প্রাসঙ্গিকতা(Relevance of the Unit)

৮.১ উদ্দেশ্য(Objectives)

৮.২ প্রস্তাবনা(Introduction)

বিভাগ ও উপবিভাগের মাধ্যমে এককটির বিশ্লেষণ

(Divisions of the Unit in Unit sections and subsections)

৮.৩ বিষয়বস্তু(Subject Matter)

৮.৩.১ ব্রহ্ম যে অবাঙমনসগোচর তা ব্যক্ত করা

৮.৩.২ ব্রহ্ম যে জ্ঞানের বিষয়াতীত তা ব্যক্ত করা

৮.৩.৩ ব্রহ্মানুভূতির উপায়

৮.৩.৪ ব্রহ্মানুভূতির ফল

৮.৪ সারসংক্ষেপ(Summary)

৮.৫ গুরুত্বপূর্ণ শব্দাবলী(Glossary)

৮.৬ পাঠের অগ্রগতির জ্ঞাপক প্রশ্নাবলী(Self assessment questions or Check your Progress)

৮.৭ সহায়ক গ্রন্থাবলী(Bibliography)

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SLM – **৯**

এককটির নাম (Title of the Unit)**: সিদ্ধান্তকৌমুদী (সংজ্ঞাপ্রকরণ)**

গঠন (Unit Structure)

SLM- ১০

এককটির নাম (Title of the Unit)**: সিদ্ধান্তকৌমুদী (পরিভাষাপ্রকরণ)**

গঠন (Unit Structure)

১০.০ প্রাসঙ্গিকতা (Relevance of the Unit)

১০.১ উদ্দেশ্য (Objectives)

১০.২ প্রস্তাবনা (Introduction)

বিভাগ ও উপবিভাগের মাধ্যমে এককটির বিশ্লেষণ

(Divisions of the Unit in Unit sections and subsections)

১০.৩ বিষয়বস্তু (Subject Matter)

১০.৩.১ পাণিনিপ্রণীত পরিভাষা সূত্রসমূহঃ মূলপাঠ, অনুবাদ ও উদাহরণসহ ব্যাখ্যা।

১০.৪ সারসংক্ষেপ (Summary)

১০.৫ গুরুত্বপূর্ণ শব্দাবলী (Glossary)

১০.৬ পাঠের অগ্রগতির জ্ঞাপক প্রশ্নাবলী (Self assessment questions or Check your Progress)

১০.৭ সহায়ক গ্রন্থাবলী (Bibliography)

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SLM – **১১**

এককটির নাম (Title of the Unit)**: উত্তররামচরিত**

গঠন (Unit Structure)

SLM – **১২**

এককটির নাম (Title of the Unit)**: উত্তররামচরিত**

গঠন (Unit Structure)

SLM – **১৩**

এককটির নাম (Title of the Unit)**: নাট্যশাস্ত্র** (**প্রথমাধ্যায়**)

গঠন (Unit Structure)

SLM - ১৪

এককটির নাম (Title of the Unit)**: নাট্যশাস্ত্র (দ্বিতীয় অধ্যায়)**

গঠন (Unit Structure)

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SLM- **১৫**:

এককটির নাম(Title of the unit**)- তুলনামূলক ভাষাতত্ত্ব এবং প্রাচীন ভারতীয় আর্যের ঐতিহাসিক বিবর্তন।) (**Comparative linguistic and historical development of OIA**)**

গঠন (Unit Structure)-

১৫.০ -প্রাসঙ্গিকতা (Relevance of the Unit)-

১৫.১- উদ্দেশ্য (Objectives)

১৫.২- প্রস্তাবনা (Introduction)

বিভাগ ও উপবিভাগের মাধ্যমে এককটির বিশ্লেষণ (Divisions of the Unit in Unit sections and subsections)

১৫.৩- বিষয়বস্তু (Subject Matter)

১৫.৩.১-তুলনামূলক ভাষাতত্ত্ব

১৫.৩.২-প্রাচীন ভারতীয় আর্যভাষার ঐতিহাসিক বিবর্তন

১৫.৪- সারসংক্ষেপ (Summary**)**

১৫.৫ – গুরুত্বপূর্ণ শব্দাবলী(Glossary)

১৫.৬-পাঠের অগ্রগতির জ্ঞাপক প্রশ্নাবলী (Self Assessment Question)

১৫.৭- সহায়ক গ্রন্থাবলী (Bibliography)

SLM- **১৬**

এককটির নাম (Title of the Unit**)- ইন্দো-ইউরোপীয় ভাষা (বংশের) শ্রেণীবিভাগ, ধ্বনিসূত্র এবং ধ্বনিপরিবর্তনের ধারা (**Classification of Indo-European, Phonetic Laws and tendencies**)**

গঠন-(Unit Structure**)**

১৬.০ -প্রাসঙ্গিকতা (Relevance of the Unit)-

১৬.১- উদ্দেশ্য (Objectives)

১৬.২- প্রস্তাবনা (Introduction)

বিভাগ ও উপবিভাগের মাধ্যমে এককটির বিশ্লেষণ (Divisions of the Unit in Unit sections and subsections)

১৬.৩- বিষয়বস্তু (Subject Matter)

১৬.৩.১- ইন্দো ইউরোপীয় ভাষা-পরিবার

১৬.৩.২- ইন্দো ইউরোপীয় ভাষার শ্রেণীবিভাগ।

১৬.৩.৩- ধ্বনিতাত্ত্বিক সূত্র।

১৬.৩.৪- ধ্বনি পরিবর্তনের ধারা।

১৬.৪- সারসংক্ষেপ (Summary)

১৬.৫ – গুরুত্বপূর্ণ শব্দাবলী(Glossary)

১৬.৬- পাঠের অগ্রগতির জ্ঞাপক প্রশ্নাবলী (Self Assessment Question)

১৬.৭- সহায়ক গ্রন্থাবলী (Bibliography)

SLM – **১৭**

এককটির নাম(Title of the Unit) **: Elementary knowledge of Manuscriptology**

গঠন (Unit Structure)

১৭.০ প্রাসঙ্গিকতা (Relevance of the Unit)

১৭.১ উদ্দেশ্য (Objectives)

১৭.২ প্রস্তাবনা (Introduction)

বিভাগ ও উপবিভাগের মাধ্যমে এককটির বিশ্লেষণ

(Divisions of the Unit in Unit sections and subsections)

১৭.৩ বিষয়বস্তু (Subject Matter)

১৭.৩.১ Manuscript

১৭.৩.২ Manuscriptology

১৭.৩.৩ Archetype

১৭.৩.৪ Colophone

১৭.৩.৫ Critical Apparatus

১৭.৩.৬ Recension

১৭.৩.৭ Catalogus Catalogorum

১৭.৩.৮ New Catalogus Catalogorum

১৭.৩.৯ Descriptive Catalogue

১৭.৩.১০ Gilgit Manuscript

১৭.৩.১১ Bower Manuscript

১৭.৩.১২ Causes of Variant readings

১৭.৪ সারসংক্ষেপ (Summary)

১৭.৫ গুরুত্বপূর্ণ শব্দাবলী (Glossary)

১৭.৬ পাঠের অগ্রগতির জ্ঞাপক প্রশ্নাবলী (Self assessment questions or Check your Progress)

১৭.৭ সহায়ক গ্রন্থাবলী (Bibliography)

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SLM – **১৮**

এককটির নাম(Title of the Unit) **:ঋগ্বেদভাষ্যভূমিকা (প্রথমার্ধ)**

গঠন (Unit Structure)

১৮.০ প্রাসঙ্গিকতা (Relevance of the Unit)

১৮.১ উদ্দেশ্য (Objectives)

১৮.২ প্রস্তাবনা (Introduction)

বিভাগ ও উপবিভাগের মাধ্যমে এককটির বিশ্লেষণ

(Divisions of the Unit in Unit sections and subsections)

১৮.৩ বিষয়বস্তু (Subject Matter)

১৮.৩.১ বেদব্যাখ্যায় যজুর্বেদের প্রাথম্য

১৮.৩.২ বেদের লক্ষণ ও প্রামাণ্য বিচার

১৮.৩.৩ বেদের মন্ত্রভাগের প্রামাণ্য

১৮.৩.৪ বেদের ব্রাহ্মণভাগে বিধিসমূহের প্রামাণ্য

১৮.৩.৫ ব্রাহ্মণভাগে অর্থবাদের প্রামাণ্যবিচার

১৮.৩.৬ মন্ত্র বিবক্ষিতার্থ অথবা অবিবক্ষিতার্থ

১৮.৩.৭ বেদের পৌরুষেয়ত্ব ও অপৌরুষেয়ত্ববিচার

১৮.৪ সারসংক্ষেপ (Summary)

১৮.৫ গুরুত্বপূর্ণ শব্দাবলী (Glossary)

১৮.৬ পাঠের অগ্রগতির জ্ঞাপক প্রশ্নাবলী (Self assessment questions or Check your Progress)

১৮.৭ সহায়ক গ্রন্থাবলী (Bibliography)

SLM – **১৯**

এককটির নাম(Title of the Unit) **:ঋগ্বেদভাষ্যভূমিকা (দ্বিতীয়ার্ধ)**

গঠন (Unit Structure)

১৯.০ প্রাসঙ্গিকতা (Relevance of the Unit)

১৯.১ উদ্দেশ্য (Objectives)

১৯.২ প্রস্তাবনা (Introduction)

বিভাগ ও উপবিভাগের মাধ্যমে এককটির বিশ্লেষণ

(Divisions of the Unit in Unit sections and subsections)

১৯.৩ বিষয়বস্তু (Subject Matter)

১৯.৩.১ মন্ত্র ও ব্রাহ্মণের স্বরূপ নির্ণয়

১৯.৩.২ বেদাধ্যয়নের দৃষ্টপ্রয়োজন

১৯.৩.৩ বেদাঙ্গনিরূপণ

১৯.৪ সারসংক্ষেপ (Summary)

১৯.৫ গুরুত্বপূর্ণ শব্দাবলী (Glossary)

১৯.৬ পাঠের অগ্রগতির জ্ঞাপক প্রশ্নাবলী(Self assessment questions or Check your Progress)

১৯.৭ সহায়ক গ্রন্থাবলী (Bibliography)

SLM – ২০

এককটির নাম (Title of the Unit)**: নিরুক্ত (প্রথম অধ্যায়)**

গঠন (Unit Structure)

২০.০ প্রাসঙ্গিকতা(Relevance of the Unit)

২০.১ উদ্দেশ্য(Objectives)

২০.২ প্রস্তাবনা(Introduction)

বিভাগ ও উপবিভাগের মাধ্যমে এককটির বিশ্লেষণ

(Divisions of the Unit in Unit sections and subsections)

২০.৩ বিষয়বস্তু(Subject Matter)

২০.৩.১ পদবিভাজন

২০.৩.২ পদের নিত্যানিত্য বিচার

২০.৩.৩ নাম ও আখ্যাতের স্বরূপবিচার

২০.৩.৪ উপসর্গের অর্থ এবং স্বরূপ

২০.৩.৫ নিপাতের স্বরূপ এবং শ্রেণীবিভাগ

২০.৩.৬ ষড়ভাববিকার

২০.৪ সারসংক্ষেপ(Summary)

২০.৫ গুরুত্বপূর্ণ শব্দাবলী(Glossary)

২০.৬ পাঠের অগ্রগতির জ্ঞাপক প্রশ্নাবলী(Self assessment questions or Check your Progress)

২০.৭ সহায়ক গ্রন্থাবলী(Bibliography)

SLM – ২১

এককটির নাম (Title of the Unit)**: নিরুক্ত (দ্বিতীয় অধ্যায়)**

গঠন (Unit Structure)

২১.০ প্রাসঙ্গিকতা(Relevance of the Unit)

২১.১ উদ্দেশ্য(Objectives)

২১.২ প্রস্তাবনা(Introduction)

বিভাগ ও উপবিভাগের মাধ্যমে এককটির বিশ্লেষণ

(Divisions of the Unit in Unit sections and subsections**)**

২১.৩ বিষয়বস্তু

২১.৩.১ নিম্নোক্ত শব্দগুলির নির্বচন – আচার্য, বীর, হ্রদ, গো , সমুদ্র, বৃত্র, আদিত্য, উষস্, মেঘ, বাক্, উদক, নদী, অশ্ব, জাতবেদস্, বৈশ্বানর, নিঘন্টু।

২১.৪ সারসংক্ষেপ (Summary)

২১.৫ গুরুত্বপূর্ণ শব্দাবলী (Glossary)

২১.৬ পাঠের অগ্রগতির জ্ঞাপক প্রশ্নাবলী (Self assessment questions or Check your Progress)

২১.৭ সহায়ক গ্রন্থাবলী (Bibliography)

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SLM- ২২

এককটির নাম (Title of the Unit)- **বৈয়াকরণসিদ্ধান্তকৌমুদী** (**অচ্ সন্ধি**)

গঠন-(Unit Structure**)**

২২.০ -প্রাসঙ্গিকতা (Relevance of the Unit)-

২২.১- উদ্দেশ্য (Objectives)

২২.২- প্রস্তাবনা (Introduction)

বিভাগ ও উপবিভাগের মাধ্যমে এককটির বিশ্লেষণ (Divisions of the Unit in Unit sections and subsections)

২২.৩- বিষয়বস্তু (Subject Matter)

২২.৩.১ যণ্-সন্ধি

২২.৩.২ বর্ণদ্বিত্ব বিষয়ক নিয়ম

২২.৩.৩ পূর্বস্বরবিকার

২২.৩.৪ উভয়বিকারে গুণসন্ধি

২২.৩.৫ উভয়বিকারে বৃদ্ধিসন্ধি

২২.৩.৬ উভয়বিকারে পররূপবিধান

২২.৩.৭ উভয়বিকারে সবর্ণদীর্ঘ

২২.৩.৮ উভয়বিকারে পূর্বরূপবিধান

২২.৩.৯ কিছু শব্দের সসূত্র সন্ধিরূপ

২২.৩.১০ কিছু দীক্ষিতবচনের ব্যাখ্যা

২২.৪- সারসংক্ষেপ (Summary**)**

২২.৫ – গুরুত্বপূর্ণ শব্দাবলী(Glossary)

২২.৬-পাঠের অগ্রগতির জ্ঞাপক প্রশ্নাবলী (Self Assessment Question)

২২.৭- সহায়ক গ্রন্থাবলী (Bibliography)

SLM- ২৩

এককটির নাম (Title of the Unit)- **বৈয়াকরণসিদ্ধান্তকৌমুদী** (**প্রকৃতিভাবপ্রকরণ**)

গঠন-(Unit Structure**)**

২৩.০ -প্রাসঙ্গিকতা (Relevance of the Unit)-

২৩.১- উদ্দেশ্য (Objectives)

২৩.২- প্রস্তাবনা (Introduction)

বিভাগ ও উপবিভাগের মাধ্যমে এককটির বিশ্লেষণ (Divisions of the Unit in Unit sections and subsections)

২৩.৩- বিষয়বস্তু (Subject Matter)

২৩.৩.১ প্রকৃতিভাব

২৩.৩.২ প্লুত

২৩.৩.৩ প্লুত অপ্লুতের মত

২৩.৩.৪ প্রগৃহ্য

২৩.৩.৫ অন্যান্য

২৩.৪ সারসংক্ষেপ (Summary)

২৩.৫ – গুরুত্বপূর্ণ শব্দাবলী(Glossary)

২৩.৬-পাঠের অগ্রগতির জ্ঞাপক প্রশ্নাবলী (Self Assessment Question)

২৩.৭- সহায়ক গ্রন্থাবলী (Bibliography)

SLM- ২৪

এককটির নাম(Title of the Unit) **:সিদ্ধান্তকৌমুদী (অজন্ত পুংলিঙ্গ প্রকরণ)**

গঠন (Unit Structure)

২৪.০ প্রাসঙ্গিকতা (Relevance of the Unit)

২৪.১ উদ্দেশ্য (Objectives)

২৪.২ প্রস্তাবনা (Introduction)

বিভাগ ও উপবিভাগের মাধ্যমে এককটির বিশ্লেষণ

(Divisions of the Unit in Unit sections and subsections)

২৪.৩ বিষয়বস্তু(Subject Matter)

২৪.৩.১ সবৃত্তি পাণিনীয় সূত্রগলির অর্থনির্ধারণ।

২৪.৩.২ রামঃ প্রভৃতি শব্দরূপের সসূত্র সাধনপ্রক্রিয়া।

২৪.৩.৩ কিছু বিশেষ সূত্রের ব্যাখ্যা।

২৪.৩.৪ বিশেষ বিশেষ দীক্ষিত বচনের ব্যাখ্যা।

২৪.৪ সারসংক্ষেপ(Summary)

২৪.৫ গুরুত্বপূর্ণ শব্দাবলী(Glossary)

২৪.৬ পাঠের অগ্রগতির জ্ঞাপক প্রশ্নাবলী(Self assessment questions or Check your Progress)

২৪.৭ সহায়ক গ্রন্থাবলী (Bibliography)

SLM- ২৫

এককটির নাম(Title of the Unit) **:সিদ্ধান্তকৌমুদী : অজন্ত পুংলিঙ্গ প্রকরণ (শেষার্দ্ধ)**

গঠন (Unit Structure)

২৫.০ প্রাসঙ্গিকতা (Relevance of the Unit)

২৫.১ উদ্দেশ্য (Objectives)

২৫.২ প্রস্তাবনা (Introduction)

বিভাগ ও উপবিভাগের মাধ্যমে এককটির বিশ্লেষণ

(Divisions of the Unit in Unit sections and subsections)

২৫.৩ বিষয়বস্তু(Subject Matter)

২৫.৩.১ সবৃত্তি পাণিনীয় সূত্রগলির অর্থনির্ধারণ।

২৫.৩.২ বিশ্বপা-প্রভৃতি শব্দরূপের সসূত্র সাধনপ্রক্রিয়া ।

২৫.৩.৩ কিছু বিশেষ সূত্রের ব্যাখ্যা।

২৫.৪. ৪ বিশেষ বিশেষ দীক্ষিত বচনের ব্যাখ্যা।

২৫.৪ সারসংক্ষেপ(Summary)

২৫.৫ গুরুত্বপূর্ণ শব্দাবলী(Glossary)

২৫.৬ পাঠের অগ্রগতির জ্ঞাপক প্রশ্নাবলী(Self assessment questions or Check your Progress)

২৫.৭ সহায়ক গ্রন্থাবলী (Bibliography)

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SLM – **২৬**

এককটির নাম (Title of the Unit)**: নৈষধচরিত (প্রথম সর্গ প্রথম ভাগ)**

গঠন (Unit Structure)

SLM – **২৭**

এককটির নাম (Title of the Unit)**: নৈষধচরিত (প্রথম সর্গ দ্বিতীয় ভাগ)**

গঠন (Unit Structure)

SLM – **২৮**

এককটির নাম (Title of the Unit) **মেঘদূত (পূর্বমেঘ)**

গঠন (Unit Structure)

SLM- ২৯

এককটির নাম(Title of the Unit)**: মেঘদূতম্ (উত্তরমেঘ)**

গঠন (Unit Structure)

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SLM- **৩০**

এককটির নাম(Title of the Unit)**: সংস্কৃতসাহিত্যের ইতিহাস (**History of Sanskrit Literature)

৩০.০ প্রাসঙ্গিকতা (Relevance of the Unit)

৩০.১ উদ্দেশ্য (Objectives)

৩০.২ প্রস্তাবনা (Introduction)

বিভাগ ও উপবিভাগের মাধ্যমে এককটির বিশ্লেষণ

(Divisions of the Unit in Unit sections and subsections)

৩০.৩ বিষয়বস্তু (Subject Matter)

বৈদিক সাহিত্য

৩০.৩.১ বেদের কাল

৩০.৩.২ ঋগ্বেদ সংহিতা

৩০.৩.৩ ঋগ্বেদের ধর্মনিরপেক্ষ সূক্ত

৩০.৩.৪ ঋগ্বেদের সংবাদ সূক্ত

৩০.৩.৫ ঋগ্বেদের দার্শনিক সূক্ত

৩০.৩ ৬ সামবেদ সংহিতা

৩০.৩.৭ যজুর্বেদ সংহিতা

৩০.৩.৮ অথর্ববেদসংহিতা

৩০.৩.৯ ব্রাহ্মণসাহিত্য

৩০.৩.৯ আরণ্যক

৩০.৩.১০ উপনিষদ্

৩০.৩.১১ বেদাঙ্গ

৩০.৩.১২ সূত্রসাহিত্য

৩০.৩.১৩ রামায়ণ

৩০.৩.১৪ রামায়ণের প্রক্ষিপ্ত অংশ

৩০.৩.১৫ রামায়ণের রচনাকাল

৩০.৩.১৬ রামায়ণ ও মহাভারতের পৌর্বাপর্য

৩০.৩.১৭ রামায়ণের প্রভাব

৩০.৩.১৮ মহাভারত

৩০.৩.১৯ মহাভারতের রচনাকাল

৩০.৩.২০ শ্রীমদ্ভাগবদ্গীতা

৩০.৩.২১ মহাভারতের প্রভাব

৩০.৩.২২ পুরাণসাহিত্য

৩০.৪ সারসংক্ষেপ (Summary)

৩০.৫ গুরুত্বপূর্ণ শব্দাবলী(Glossary)

৩০.৬ পাঠের অগ্রগতির জ্ঞাপক প্রশ্নাবলী(Self assessment questions or Check your Progress)

৩০.৭ সহায়ক গ্রন্থাবলী(Bibliography)

SLM- **৩১**

এককটির নাম(Title of the Unit)**: সংস্কৃতসাহিত্যের ইতিহাস (**History of Sanskrit Literature)

৩১.০ প্রাসঙ্গিকতা (Relevance of the Unit)

৩১.১ উদ্দেশ্য (Objectives)

৩১.২ প্রস্তাবনা (Introduction)

বিভাগ ও উপবিভাগের মাধ্যমে এককটির বিশ্লেষণ

(Divisions of the Unit in Unit sections and subsections)

৩১.৩ বিষয়বস্তু (Subject Matter)

মহাকাব্য ও দৃশ্যকাব্য

৩১.৩.১ অশ্বঘোষ

৩১.৩.২ কালিদাস

৩১.৩.৩ ভারবি

৩১.৩.৪ মাঘ

৩১.৩.৫ শ্রীহর্ষ

ব্যাকরণ

৩১.৩.৬ পাণিনি সম্প্রদায়

৩১.৩.৭ কাত্যায়ন

৩১.৩.৮ পতঞ্জলি

৩১.৩.৯ ভর্তৃহরি

৩১.৩.১০ অন্যান্য বৈয়াকরণ সম্প্রদায়

ফলিত জ্যোতিষ, জ্যোতির্বিজ্ঞান

৩১.৩.১১ জ্যোতিষশাস্ত্র

৩১.৩.১২ বৃহত্সংহিতা

৩১.৩.১৩ জ্যোতির্বিজ্ঞান

৩১.৩.১৪ আর্যভট্ট

৩১.৩.১৫ বরাহমিহির

৩১.৩.১৬অন্যান্য জ্যোতির্বিজ্ঞান

আয়ুর্বেদ বা চিকিত্সাশাস্ত্র

৩১.৩.১৭ আয়ুর্বেদশাস্ত্র

৩১.৩.১৮ চরকসংহিতা

৩১.৩.১৯ সুশ্রুতসংহিতা

৩১.৩.২০ অন্যান্য আয়ুর্বেদ শাস্ত্রের পরিচয়

৩১.৪ সারসংক্ষেপ (Summary)

SLM- **৩২**

এককটির নাম(Title of the Unit)**: ব্যাকরণ**

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SLM- ৩৩

এককটির নাম (Title of the Unit**)-বেদান্তসার (মঙ্গলাচরণ-অজ্ঞান**)

গঠন-(Unit Structure**)**

৩৩.০ -প্রাসঙ্গিকতা (Relevance of the Unit)-

৩৩.১- উদ্দেশ্য (Objectives)

৩৩.২- প্রস্তাবনা (Introduction)

বিভাগ ও উপবিভাগের মাধ্যমে এককটির বিশ্লেষণ (Divisions of the Unit in Unit sections and subsections)

৩৩.৩- বিষয়বস্তু (Subject Matter)

৩৩.৩.১.মঙ্গলাচরণ

৩৩.৩.২.**বেদান্ত**

৩৩.৩.৩.অনুবন্ধ চতুষ্টয়

৩৩.৩.৪. সাধন চতুষ্টয়

৩৩.৩.৫. অধ্যারোপ

৩৩.৩.৬. অজ্ঞান

৩৩.৪- সারসংক্ষেপ (Summary**)**

৩৩.৫ – গুরুত্বপূর্ণ শব্দাবলী(Glossary)

৩৩.৬-পাঠের অগ্রগতির জ্ঞাপক প্রশ্নাবলী (Self Assessment Question)

৩৩.৭- সহায়ক গ্রন্থাবলী (Bibliography)

SLM- ৩৪

এককটির নাম (Title of the Unit**)- বেদান্তসারঃ(অজ্ঞান বিভাগ-আত্মবাদ**)

গঠন-(Unit Structure**)**

৩৪.০ -প্রাসঙ্গিকতা (Relevance of the Unit)-

৩৪.১- উদ্দেশ্য (Objectives)

৩৪.২- প্রস্তাবনা (Introduction)

বিভাগ ও উপবিভাগের মাধ্যমে এককটির বিশ্লেষণ (Divisions of the Unit in Unit sections and subsections)

৩৪.৩- বিষয়বস্তু (Subject Matter)

৩৪.৩.১.অজ্ঞান বিভাগ

৩৪.৩.২.**ঈশ্বর নিরূপণ**

৩৪.৩.৩. প্রাজ্ঞ নির্ণয়

৩৪.৩.৪. তুরীয় চৈতন্য

৩৪.৩.৫.ঈশ্বরের জগত্কারণতা

৩৪.৩.৬. স্থূল ও সূক্ষভূতোত্পত্তি

৩৪.৩.৭. পঞ্চকোশ

৩৪.৩.৮. পঞ্চবায়ু

৩৪.৩.৯. পঞ্চীকরণ

৩৪.৩.১০.বিশ্ব ও বৈশ্বানরের সম্বন্ধ

৩৪.৩.১১.আত্মবাদ

৩৪.৪- সারসংক্ষেপ (Summary**)**

৩৪.৫ – গুরুত্বপূর্ণ শব্দাবলী(Glossary)

৩৪.৬-পাঠের অগ্রগতির জ্ঞাপক প্রশ্নাবলী (Self Assessment Question)

৩৪.৭- সহায়ক গ্রন্থাবলী (Bibliography)

SLM- **৩৫**

এককটির নাম (Title of the Unit)-**বেদান্তসার (অপবাদ-বিদেহমুক্তি)**

গঠন-(Unit Structure**)**

৩৫.০ -প্রাসঙ্গিকতা (Relevance of the Unit)-

৩৫.১- উদ্দেশ্য (Objectives)

৩৫.২- প্রস্তাবনা (Introduction)

বিভাগ ও উপবিভাগের মাধ্যমে এককটির বিশ্লেষণ (Divisions of the Unit in Unit sections and subsections)

৩৫.৩- বিষয়বস্তু (Subject Matter)

৩৫.৩.১.অপবাদ

৩৫.৩.২.**মহাবাক্য বিচার**

৩৫.৩.৩.ভাগলক্ষণার স্বরূপ

৩৫.৩.৪. আত্মসাক্ষাত্কারের সাধন

৩৫.৩.৫. সমাধি

৩৫.৩.৬. জীবন্মুক্তি

৩৫.৩.৭.বিদেহমুক্তি

৩৫.৪- সারসংক্ষেপ (Summary**)**

৩৫.৫ – গুরুত্বপূর্ণ শব্দাবলী(Glossary)

৩৫.৬-পাঠের অগ্রগতির জ্ঞাপক প্রশ্নাবলী (Self Assessment Question)

৩৫.৭- সহায়ক গ্রন্থাবলী (Bibliography)

SLM-৩৬

এককটির নাম (Title of the Unit**) মহাভাষ্য**

গঠন-(Unit Structure**)**

৩৬.০ -প্রাসঙ্গিকতা (Relevance of the Unit)-

৩৬.১- উদ্দেশ্য (Objectives)

৩৬.২- প্রস্তাবনা (Introduction)

বিভাগ ও উপবিভাগের মাধ্যমে এককটির বিশ্লেষণ (Divisions of the Unit in Unit sections and subsections)

৩৬.৩- বিষয়বস্তু (Subject Matter)

৩৬.৩.১. শব্দের স্বরূপ

৩৬.৩.২. **ব্যাকরণ অধ্যয়ণের মুখ্য প্রয়োজন**

৩৬.৩.৩. ব্যাকরণ অধ্যয়ণের গৌণ প্রয়োজন

৩৬.৩.৪. শব্দোপদেশের প্রক্রিয়া

৩৬.৪- সারসংক্ষেপ (Summary**)**

৩৬.৫ – গুরুত্বপূর্ণ শব্দাবলী(Glossary)

৩৬.৬-পাঠের অগ্রগতির জ্ঞাপক প্রশ্নাবলী (Self Assessment Question)

৩৬.৭- সহায়ক গ্রন্থাবলী (Bibliography)

SLM-৩৭

এককটির নাম (Title of the Unit**) মহাভাষ্য**

গঠন-(Unit Structure**)**

৩৭.০ -প্রাসঙ্গিকতা (Relevance of the Unit)-

৩৭.১- উদ্দেশ্য (Objectives)

৩৭.২- প্রস্তাবনা (Introduction)

বিভাগ ও উপবিভাগের মাধ্যমে এককটির বিশ্লেষণ (Divisions of the Unit in Unit sections and subsections)

৩৭.৩- বিষয়বস্তু (Subject Matter)

৩৭.৩.১. পদের অর্থ

৩৭.৩.২. শব্দের নিত্যতা ও অনিত্যতা

৩৭.৩.৩. শব্দার্থসম্বন্ধের নিত্যতা

৩৭.৩.৪. জাতি ও ব্যক্তির পদার্থত্ব

৩৭.৪.৫. অনাদিব্যবহারের দ্বারা শব্দার্থসম্বন্ধনিত্যতা

৩৭.৪- সারসংক্ষেপ (Summary**)**

৩৭.৫ – গুরুত্বপূর্ণ শব্দাবলী(Glossary)

৩৭.৬-পাঠের অগ্রগতির জ্ঞাপক প্রশ্নাবলী (Self Assessment Question)

৩৭.৭- সহায়ক গ্রন্থাবলী (Bibliography)

SLM-৩৮

এককটির নাম (Title of the Unit**) মহাভাষ্য**

গঠন-(Unit Structure**)**

৩৮.০ -প্রাসঙ্গিকতা (Relevance of the Unit)-

৩৮.১- উদ্দেশ্য (Objectives)

৩৮.২- প্রস্তাবনা (Introduction)

বিভাগ ও উপবিভাগের মাধ্যমে এককটির বিশ্লেষণ (Divisions of the Unit in Unit sections and subsections)

৩৮.৩- বিষয়বস্তু (Subject Matter)

৩৮.৩.১. ব্যাকরণশাস্ত্রে ধর্মনিয়ম

৩৮.৩.২. শব্দের অপ্রযুক্তত্বের আক্ষেপ ও সমাধান

৩৮.৩.৩. শব্দের জ্ঞান ও প্রয়োগের ধর্মজনকতা

৩৮.৩.৪. ব্যাকরণ শব্দের অর্থ

৩৮.৪.৫. বর্ণোপদেশের প্রয়োজন

৩৮.৪- সারসংক্ষেপ (Summary**)**

৩৮.৫ – গুরুত্বপূর্ণ শব্দাবলী(Glossary)

৩৮.৬-পাঠের অগ্রগতির জ্ঞাপক প্রশ্নাবলী (Self Assessment Question)

৩৮.৭- সহায়ক গ্রন্থাবলী (Bibliography)

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SLM- ৩৯

এককটির নাম (Title of the Unit**)** : **বৈয়াকরণসিদ্ধান্তকৌমুদী (ধাতু - ভূ)**

গঠন (Unit Structure**) -**

৩৯.০ -প্রাসঙ্গিকতা (Relevance of the Unit)-

৩৯.১- উদ্দেশ্য (Objectives)

৩৯.২- প্রস্তাবনা (Introduction)

বিভাগ ও উপবিভাগের মাধ্যমে এককটির বিশ্লেষণ (Divisions of the Unit in Unit sections and subsections)

৩৯.৩- বিষয়বস্তু (Subject Matter)

৩৯.৩.১-ধাতুসমূহের রূপসাধনের ক্ষেত্রে সাধারণ নিয়ম-

১- সূত্র, বৃত্তি ও অনুবাদ

২-বিশেষ কিছু সূত্রের ব্যাখ্যা

৩৯.৩.২- লট্ লকার বিষয়ক সূত্র, বৃত্তি,ও অনুবাদ

১-বিশেষ কিছু সূত্রের ব্যাখ্যা

৩৯.৩.৩- লট্ লকারের রূপ সাধন-

১- ভবতি, ২- ভবতঃ, ৩- ভবন্তি, ৪- ভবামি

৩৯.৩.৪- লিট্ লকার বিষয়ক সূত্র, বৃত্তি ও অনুবাদ

১-বিশেষ কিছু সূত্রের ব্যাখ্যা

৩৯.৩.৫- লিট্ লকারের রূপ সাধন

১-বভূব, ২-বভূবতুঃ, ৩-বভূবিথ

৩৯.৩.৬- লুট্ লকার বিষয়ক সূত্র, বৃত্তিও অনুবাদ

১-বিশেষ কিছু সূত্রের ব্যাখ্যা

৩৯.৩.৭- লুট্ লকারের রূপ সাধন-

১- ভবিতা, ২- ভবিতারৌ, ৩- ভবিতারঃ

৩৯.৩.৮- লৃট্ ও লোট্ লকার বিষয়ক সূত্র, বৃত্তি ও অনুবাদ

১-বিশেষ কিছু সূত্রের ব্যাখ্যা

৩৯.৩.৯- লৃট্ লকারের রূপ সাধন-

১- ভবিষ্যতি, ২- ভবিষ্যন্তি, ৩- ভবিষ্যামি

৩৯.৩.১০- লোট্ লকারের রূপ সাধন-

১-ভবতু/ভবতাৎ, ২-ভবতাম্, ৩-ভব/ ভবতাৎ, ৪-ভবানি

৩৯.৩.১১- লঙ্ লকারবিষয়ক সূত্র, বৃত্তি ও অনুবাদ

১-বিশেষ কিছু সূত্রের ব্যাখ্যা

৩৯.৩.১২- লঙ্ লকারের রূপসাধন

১- অভবৎ, ২-অভবতাম্, ৩-অভবন্

৩৯.৩.১৩- লিঙ্ লকারবিষয়ক আলোচনা

১-বিধিলিঙ্ লকারবিষয়ক সূত্র, বৃত্তি ও অনুবাদ, ২-বিধিলিঙের কিছু সূত্র ব্যাখ্যা

৩-বিধিলিঙের রূপসাধন, ৪.-আশীর্লিঙ্ লকারবিষয়ক সূত্র, বৃত্তি ও অনুবাদ,

৫-আশীর্লিঙের কিছু সূত্র ব্যাখ্যা, ৬-আশীর্লিঙের রূপসাধন

৩৯.৩.১৪- লুঙ্ লকারের সূত্র,বৃত্তি ও অনুবাদ

১-কিছু বিশেষ সূত্রের ব্যাখ্যা

২-লুঙ্ লকারের রূপসাধন- ১.অভূৎ, ২-অভূতাম্, ৩-অভূবন্

৩৯.৩.১৫- লৃঙ্ লকারের সূত্র, বৃত্তি, অনুবাদ ও ব্যাখ্যা

১.লৃঙ্ লকারের রূপসাধন- ১-অভবিষ্যৎ, ২-অভবিষ্যতাম্, ৩-অভবিষ্যন্

৩৯.৩.১৬- কিছু দীক্ষিতবচনের আলোচনা

৩৯.৪- সারসংক্ষেপ (Summary)

৩৯.৫- গুরুত্বপূর্ণ শব্দাবলী (Glossary)

৩৯.৬- পাঠের অগ্রগতির জ্ঞাপক প্রশ্নাবলী (Self assessment questions)

৩৯.৭- সহায়ক গ্রন্থাবলী (Bibliography)

SLM- ৪০

এককটির নাম (Title of the Unit)- **বৈয়াকরণসিদ্ধান্তকৌমুদী (ধাতু - এধ্)**

গঠন-(Unit Structure**)**

৪০.০ -প্রাসঙ্গিকতা (Relevance of the Unit)-

৪০.১- উদ্দেশ্য (Objectives)

৪০.২- প্রস্তাবনা (Introduction)

বিভাগ ও উপবিভাগের মাধ্যমে এককটির বিশ্লেষণ (Divisions of the Unit in Unit sections and subsections)

৪০.৩- বিষয়বস্তু (Subject Matter)

৪০.৩.১ - লট্-লকারবিষয়ক আলোচনা

৪০.৩.২ - লিট্-লকারবিষয়ক আলোচনা

৪০.৩.৩ -লুট্-লকারবিষয়ক আলোচনা

৪০.৩.৪ - লৃট্ লকারবিষয়ক আলোচনা

৪০.৩.৫ - লোট্-লকারবিষয়ক আলোচনা

৮.৩.৬ -লঙ্-লকারবিষয়ক আলেচনা

৪০.৩.৭-বিধিলিঙ্-বিষয়ক আলোচনা

৪০.৩. ৮-আশীর্লিঙ্-বিষয়কআলোচনা

৪০.৩.৯ -লুঙ্-লকারবিষয়কআলোচনা

৪০.৩.১০ -লৃঙ্-লকারবিষয়ক আলোচনা

৪০.৩.১১ -বিশেষ বিশেষ কিছু সূত্রের ব্যাখ্যা

৪০.৪- সারসংক্ষেপ (Summary)

৪০.৫ – গুরুত্বপূর্ণ শব্দাবলী(Glossary)

৪০.৬-পাঠের অগ্রগতির জ্ঞাপক প্রশ্নাবলী (Self Assessment Question)

৪০.৭- সহায়ক গ্রন্থাবলী (Bibliography)

SLM- ৪১

এককটির নাম (Title of the Unit)- **বৈয়াকরণসিদ্ধান্তকৌমুদী** : স্ত্রীপ্রত্যয় (স্ত্রিয়াম্ থেকে দীর্ঘাদাচার্যানাম্ সূত্র পর্যন্ত)

গঠন-(Unit Structure**)**

৪১.০ -প্রাসঙ্গিকতা (Relevance of the Unit)-

৪১.১- উদ্দেশ্য (Objectives)

৪১.২- প্রস্তাবনা (Introduction)

বিভাগ ও উপবিভাগের মাধ্যমে এককটির বিশ্লেষণ (Divisions of the Unit in Unit sections and subsections)

৪১.৩- বিষয়বস্তু (Subject Matter)

৪১.৩.১ মূল – সূত্র, বৃত্তি, অনুবাদ

৪১.৩.২ কিছু বিশেষ সূত্রের ব্যাখ্যা

৪১.৩.৩ কিছু দীক্ষিত বচনের ব্যাখ্যা

৪১.৩.৩ পদসাধন

৪১.৪- সারসংক্ষেপ (Summary)

৪১.৫ – গুরুত্বপূর্ণ শব্দাবলী(Glossary)

৪১.৬-পাঠের অগ্রগতির জ্ঞাপক প্রশ্নাবলী (Self Assessment Question)

৪১.৭- সহায়ক গ্রন্থাবলী (Bibliography)

SLM- ৪২

এককটির নাম (Title of the Unit)- **বৈয়াকরণসিদ্ধান্তকৌমুদী** : স্ত্রীপ্রত্যয় (অনুপসর্জনাদ্ সূত্র থেকে অবশিষ্ট)

গঠন-(Unit Structure**)**

৪২.০ -প্রাসঙ্গিকতা (Relevance of the Unit)-

৪২.১- উদ্দেশ্য (Objectives)

৪২.২- প্রস্তাবনা (Introduction)

বিভাগ ও উপবিভাগের মাধ্যমে এককটির বিশ্লেষণ (Divisions of the Unit in Unit sections and subsections)

৪২.৩- বিষয়বস্তু (Subject Matter)

৪২.৩.১ মূল – সূত্র, বৃত্তি, অনুবাদ

৪২.৩.২ কিছু বিশেষ সূত্রের ব্যাখ্যা

৪২.৩.৩ কিছু দীক্ষিত বচনের ব্যাখ্যা

৪২.৩.৩ পদসাধন

৪২.৪- সারসংক্ষেপ (Summary)

৪২.৫ – গুরুত্বপূর্ণ শব্দাবলী(Glossary)

৪২.৬-পাঠের অগ্রগতির জ্ঞাপক প্রশ্নাবলী (Self Assessment Question)

৪২.৭- সহায়ক গ্রন্থাবলী (Bibliography)

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SLM- ৪৩

এককটির নাম (Title of the Unit)**: কাব্যপ্রকাশ (প্রথমোল্লাস)**

গঠন (Unit Structure)

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এককটির নাম (Title of the Unit)**: কাব্যপ্রকাশ (দ্বিতীয়োল্লাস)**

গঠন (Unit Structure)

৪৪.০ প্রাসঙ্গিকতা (Relevance of the Unit)

৪৪.১ উদ্দেশ্য (Objectives)

৪৪.২ প্রস্তাবনা (Introduction)

বিভাগ ও উপবিভাগের মাধ্যমে এককটির বিশ্লেষণ

(Divisions of the Unit in Unit sections and subsections)

৪৪.৩ বিষয়বস্তু (Subject Matter)

৪৪.৩.১ শব্দ ও অর্থের স্বরূপঃ মূলপাঠ, অনুবাদ ও আলোচনা

৪৪.৩.২ অর্থেরব্যঞ্জকত্বঃ মূলপাঠ, অনুবাদ ও আলোচনা

৪৪.৩.৩ বাচক, লাক্ষণিক ও ব্যঞ্জক শব্দের লক্ষণঃ মূলপাঠ, অনুবাদ ও আলোচনা

৪৪.৩.৪ সঙ্কেতিত অর্থের বিভাগঃ মূলপাঠ, অনুবাদ ও আলোচনা

৪৪.৩.৫ অভিধার স্বরূপঃ মূলপাঠ ও অনুবাদ

৪৪.৩.৬ লক্ষণার সংজ্ঞাঃ মূলপাঠ, অনুবাদ ও আলোচনা

৪৪.৩.৭ লক্ষণার ভেদঃ মূলপাঠ, অনুবাদ ও আলোচনা

৪৪.৩.৮ সারোপা লক্ষণা ও সাধ্যবসানা লক্ষণাঃ মূলপাঠ, অনুবাদ ও আলোচনা

৪৪.৩.৯ গৌণীওশুদ্ধা লক্ষণাঃমূলপাঠ, অনুবাদ ও আলোচনা

৪৪.৩.১০ ব্যঞ্জনাকৃত লক্ষণার ভেদঃ মূলপাঠ, অনুবাদ ও আলোচনা

৪৪.৩.১১ লাক্ষণিক শব্দে ব্যঞ্জনাত্মক ব্যাপারঃ মূলপাঠ, অনুবাদ ও আলোচনা

৪৪.৩.১২ লাক্ষণিক শব্দে ব্যঞ্জনাত্মক ব্যাপারের যথার্থতাঃ মূলপাঠ, অনুবাদ ও আলোচনা

৪৪.৩.১৩ অভিধামূলা ব্যঞ্জনাঃ মূলপাঠ, অনুবাদ ও আলোচনা।

৪৪.৩.১৪ ব্যঞ্জকশব্দঃমূলপাঠ, অনুবাদ ও আলোচনা।

৪৪.৩.১৫ **সারসংক্ষেপ**(Summary)

৪৪.৫ গুরুত্বপূর্ণ শব্দাবলী(Glossary)

৪৪.৬ পাঠের অগ্রগতির জ্ঞাপক প্রশ্নাবলী(Self assessment questions or Check your Progress)

৪৪.৭ সহায়ক গ্রন্থাবলী(Bibliography)

SLM – **৪৫**

এককটির নাম (Title of the Unit)**: কাব্যপ্রকাশ (নবমোল্লাস)**

গঠন (Unit Structure)

৪৫.০ প্রাসঙ্গিকতা(Relevance of the Unit)

৪৫.১ উদ্দেশ্য(Objectives)

৪৫.২ প্রস্তাবনা(Introduction)

বিভাগ ও উপবিভাগের মাধ্যমে এককটির বিশ্লেষণ

(Divisions of the Unit in Unit sections and subsections)

৪৫.৩ বিষয়বস্তু(Subject Matter)

৪৫.৩.১ বক্রোক্তি অলংকার

৪৫.৩.২ অনুপ্রাস অলঙ্কার

৪৫.৩.৩ যমক অলংকার

৪৫.৩.৪ শ্লেষালঙ্কার

৪৫.৪ সারসংক্ষেপ(Summary)

৪৫.৫ গুরুত্বপূর্ণ শব্দাবলী(Glossary)

৪৫.৬ পাঠের অগ্রগতির জ্ঞাপক প্রশ্নাবলী(Self assessment questions)

৪৫.৭ সহায়ক গ্রন্থাবলী(Bibliography)

SLM- ৪৬

এককটির নাম (Title of the Unit) **কাব্যপ্রকাশ (দশমোল্লাস)**

গঠন (Unit Structure)

৪৬.০ প্রাসঙ্গিকতা (Relevance of the Unit)

৪৬.১ উদ্দেশ্য (Objectives)

৪৬.২ প্রস্তাবনা (Introduction)

বিভাগ ও উপবিভাগের মাধ্যমে এককটির বিশ্লেষণ

(Divisions of the Unit in Unit sections and subsections)

৪৬.৩ বিষয়বস্তু (Subject Matter)

- ৪৬.৩.১ উপমা
- ৪৬.৩.২ অনন্বয়
- ৪৬.৩.৩ উপমেয়োপমা
- ৪৬.৩.৪ উত্প্রেক্ষা
- ৪৬.৩.৫ সসন্দেহ
- ৪৬.৩.৬ রূপক
- ৪৬.৩.৭ অপহ্নুতি
- ৪৬.৩.৮ শ্লেষ
- ৪৬.৩.৯ সমাসোক্তি
- ৪৬.৩.১০ নিদর্শনা
- ৪৬.৩.১১ অতিশয়োক্তি
- ৪৬.৩.১২ প্রতিবস্তূপমা
- ৪৬.৩.১৩ দৃষ্টান্ত
- ৪৬.৩.১৪ দীপক
- ৪৬.৩.১৫ তুল্যযোগিতা
- ৪৬.৩.১৬ ব্যতিরেক
- ৪৬.৩.১৭ বিভাবনা
- ৪৬.৩.১৮ বিশেষোক্তি
- ৪৬.৩.১৯ অর্থান্তরন্যাস

৪৬.৪ সারসংক্ষেপ (Summary)

৪৬.৫ গুরুত্বপূর্ণ শব্দাবলী (Glossary)

৪৬.৬ পাঠের অগ্রগতির জ্ঞাপক প্রশ্নাবলী (Self assessment questions or Check your Progress)

৪৬.৭ সহায়ক গ্রন্থাবলী (Bibliography)

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SLM – **৪৭**

এককটির নাম (Title of the Unit) **দশরূপক (প্রথম প্রকাশ)**

গঠন (Unit Structure)

৪৭.০ প্রাসঙ্গিকতা (Relevance of the Unit)

৪৭.১ উদ্দেশ্য (Objectives)

৪৭.২ প্রস্তাবনা (Introduction)

বিভাগ ও উপবিভাগের মাধ্যমে এককটির বিশ্লেষণ

(Divisions of the Unit in Unit sections and subsections)

৪৭.৩ বিষয়বস্তু (Subject Matter)

৪৭.৩.১ নাটকের উত্স ও ইতিবৃত্ত – সংক্ষিপ্ত পরিচয়

৪৭.৩.২ দশরূপক – গ্রন্থপরিচিতি ও লেখকপরিচিতি

৪৭.৩.৩ মঙ্গলাচরণ ও অনুবন্ধনিরূপণ

৪৭.৩.৪ নাট্যের লক্ষণ ও বিভাগ

৪৭.৩.৫ নাট্য, নৃত্য ও নৃত্ত – এদের ভেদ কথন

৪৭.৩.৬ রূপকের ভেদ ও ভেদের কারণ

৪৭.৩.৭ নাট্যবস্তু বিভাগ

৪৭.৩.৮ অর্থপ্রকৃতি

৪৭.৩.৯ কার্যাবস্থা

৪৭.৩.১০ সন্ধি, সন্ধ্যঙ্গসমূহ ও সন্ধ্যঙ্গসমূহের প্রয়োজন নিরূপণ

৪৭.৩.১১ অর্থোপক্ষেপক

৪৭.৩.১২ বিষ্কম্ভক

৪৭.৩.১৩ প্রবেশক

৪৭.৩.১৪ চূলিকা

৪৭.৩.১৫ অঙ্কাস্য

৪৭.৩.১৬ অঙ্কাবতার

৪৭.৩.১৭ প্রকাশ, স্বগত, জনান্তিক ও অপবারিত

৪৭.৩.১৮ আকাশভাষিত

৪৭.৪ সারসংক্ষেপ (Summary)

৪৭.৫ গুরুত্বপূর্ণ শব্দাবলী (Glossary)

৪৭.৬ পাঠের অগ্রগতির জ্ঞাপক প্রশ্নাবলী (Self assessment questions or Check your Progress)

৪৭.৭ সহায়ক গ্রন্থাবলী (Bibliography)

SLM – **৪৮**

এককটির নাম (Title of the Unit) **দশরূপক (তৃতীয় প্রকাশ)**

গঠন (Unit Structure)

৪৮.০ প্রাসঙ্গিকতা (Relevance of the Unit)

৪৮.১ উদ্দেশ্য (Objectives)

৪৮.২ প্রস্তাবনা (Introduction)

বিভাগ ও উপবিভাগের মাধ্যমে এককটির বিশ্লেষণ

(Divisions of the Unit in Unit sections and subsections)

৪৮.৩ বিষয়বস্তু (Subject Matter)

- ৪৮.৩.১ ভারতী বৃত্তি ও তার ভেদসমূহ
- ৪৮.৩.২ নাটক
- ৪৮.৩.৩ প্রকরণ
- ৪৮.৩.৪ নাটিকা
- ৪৮.৩.৫ ভাণ
- ৪৮.৩.৬ প্রহসন
- ৪৮.৩.৭ ডিম
- ৪৮.৩.৮ ব্যায়োগ
- ৪৮.৩.৯ সমবকার
- ৪৮.৩.১০ অঙ্ক
- ৪৮.৩.১১ ঈহামৃগ

৪৮.৪ সারসংক্ষেপ (Summary)

৪৮.৫ গুরুত্বপূর্ণ শব্দাবলী (Glossary)

৪৮.৬ পাঠের অগ্রগতির জ্ঞাপক প্রশ্নাবলী (Self assessment questions or Check your Progress)

৪৮.৭ সহায়ক গ্রন্থাবলী (Bibliography)

SLM – **৪৯**

এককটির নাম(Title of the Unit) :ध्वन्यालोकः (प्रथमोद्द्योतः)

গঠন (Unit Structure)

৪৯.০ প্রাসঙ্গিকতা (Relevance of the Unit)

৪৯.১ উদ্দেশ্য (Objectives)

৪৯.২ প্রস্তাবনা (Introduction)

বিভাগ ও উপবিভাগের মাধ্যমে এককটির বিশ্লেষণ

(Divisions of the Unit in Unit sections and subsections)

৪৯.৩ বিষয়বস্তু(Subject Matter)

- **ধ্বনিবিরুদ্ধসম্প্রদায়ের মতবাদ**

  ৪৯.৩.১. অভাববাদ

  ৪৯.৩.২. ভাক্তবাদ

  ৪৯.৩.৩. অনির্বচনীয়তাবাদ

৪৯.৩.৪ কাব্যাত্মভূত অর্থের ভেদদ্বয়: বাচ্য ও প্রতীয়মান অর্থ

৪৯.৩.৫ ধ্বনিবাদের সিদ্ধান্তস্থাপন

৪৯.৪ সারসংক্ষেপ(Summary)

৪৯.৫ গুরুত্বপূর্ণ শব্দাবলী(Glossary)

৪৯.৬ পাঠের অগ্রগতির জ্ঞাপক প্রশ্নাবলী(Self assessment questions or Check your Progress)

৪৯.৭ সহায়ক গ্রন্থাবলী (Bibliography)

SLM — ৫০

এককটির নাম(Title of the Unit) :ध्वन्यालोकः (प्रथमोद्द्योतः १६-१९ कारिका)

গঠন (Unit Structure)

৫০.০ প্রাসঙ্গিকতা (Relevance of the Unit)

৫০.১ উদ্দেশ্য (Objectives)

৫০.২ প্রস্তাবনা (Introduction)

বিভাগ ও উপবিভাগের মাধ্যমে এককটির বিশ্লেষণ

(Divisions of the Unit in Unit sections and subsections)

৫০.৩ বিষয়বস্তু(Subject Matter)

৫০.৩.১ ধ্বনির স্বরূপ

৫০.৩.২ বৈয়াকরণমতে ধ্বনির স্বরূপ

৫০.৩.৩ ভাক্তবাদখণ্ডন

৫০.৩.৪ অনির্বচনীয়তাবাদখণ্ডন

৫০.৪ সারসংক্ষেপ(Summary)

৫০.৫ গুরুত্বপূর্ণ শব্দাবলী(Glossary)

৫০.৬ পাঠের অগ্রগতির জ্ঞাপক প্রশ্নাবলী(Self assessment questions or Check your Progress)

৫০.৭ সহায়ক গ্রন্থাবলী (Bibliography)

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SLM — ৫১

এককটির নাম(Title of the Unit) **:** অভিজ্ঞানশকুন্তলা (প্রথম ও দ্বিতীয় অঙ্ক)

গঠন (Unit Structure)

৫১.০ প্রাসঙ্গিকতা (Relevance of the Unit)

৫১.১ উদ্দেশ্য (Objectives)

৫১.২ প্রস্তাবনা (Introduction)

বিভাগ ও উপবিভাগের মাধ্যমে এককটির বিশ্লেষণ

(Divisions of the Unit in Unit sections and subsections)

৫১.৩ বিষয়বস্তু(Subject Matter)

৫১.৩.১ প্রথমাঙ্কের বিষয়বস্তু

৫১.৩.২ দ্বিতীয়াঙ্কের বিষয়বস্তু

৫১.৩.৩ কিছু বিশেষ শ্লোকের ব্যাখ্যা

৫১.৪ সারসংক্ষেপ(Summary)

৫১.৫ গুরুত্বপূর্ণ শব্দাবলী(Glossary)

৫১.৬ পাঠের অগ্রগতির জ্ঞাপক প্রশ্নাবলী(Self assessment questions or Check your Progress)

৫১.৭ সহায়ক গ্রন্থাবলী (Bibliography)

SLM — ৫২

এককটির নাম(Title of the Unit) **:** অভিজ্ঞানশকুন্তলা (তৃতীয় ও চতুর্থ অঙ্ক)

গঠন (Unit Structure)

৫২.০ প্রাসঙ্গিকতা (Relevance of the Unit)

৫২.১ উদ্দেশ্য (Objectives)

৫২.২ প্রস্তাবনা (Introduction)

বিভাগ ও উপবিভাগের মাধ্যমে এককটির বিশ্লেষণ

(Divisions of the Unit in Unit sections and subsections)

৫২.৩ বিষয়বস্তু(Subject Matter)

৫২.৩.১ তৃতীয়াঙ্কের বিষয়বস্তু

৫২.৩.২ চতুর্থাঙ্কের বিষয়বস্তু

৫২.৩.৩ কিছু বিশেষ চরিত্রের মূল্যায়ন

৫২.৩.৪ কিছু বিশেষ শ্লোকের ব্যাখ্যা

৫২.৪ সারসংক্ষেপ(Summary)

৫২.৫ গুরুত্বপূর্ণ শব্দাবলী(Glossary)

৫২.৬ পাঠের অগ্রগতির জ্ঞাপক প্রশ্নাবলী(Self assessment questions or Check your Progress)

৫২.৭ সহায়ক গ্রন্থাবলী (Bibliography)

SLM- ৫৩

এককটির নাম(Title of the Unit) : অপরাজিতা

গঠন (Unit Structure)

৫৩.০ প্রাসঙ্গিকতা (Relevance of the Unit)

৫৩.১ উদ্দেশ্য (Objectives)

৫৩.২ প্রস্তাবনা (Introduction)

বিভাগ ও উপবিভাগের মাধ্যমে এককটির বিশ্লেষণ

(Divisions of the Unit in Unit sections and subsections)

৫৩.৩ বিষয়বস্তু(Subject Matter)

৫৩.৩.১ অপরাজিতা নামকরণের তাত্পর্য

৫৩.৩.২ অপরাজিতা : মূলানুবাদ ও আলোচনা

৫৩.৩.৩ অপরাজিতা : কিছু বিশেষ কুশীলবদের চরিত্রচিত্রণ

৫৩.৩.৪ কুলীনা নামকরণের তাত্পর্য

৫৩.৩.৫ কুলীনা : মূলানুবাদ ও আলোচনা

৫৩.৩.৬ কুলীনা : কিছু বিশেষ কুশীলবদের চরিত্রচিত্রণ

৫৩.৩.৭ শঙ্খনাদ নামকরণের তাত্পর্য

৫৩.৩.৮ শঙ্খনাদ : মূলানুবাদ ও আলোচনা

৫৩.৩.৯ শঙ্খনাদ : কিছু বিশেষ কুশীলবদের চরিত্রচিত্রণ

৫৩.৪ সারসংক্ষেপ(Summary)

৫৩.৫ গুরুত্বপূর্ণ শব্দাবলী(Glossary)

৫৩.৬ পাঠের অগ্রগতির জ্ঞাপক প্রশ্নাবলী(Self assessment questions or Check your Progress)

৫৩.৭ সহায়ক গ্রন্থাবলী (Bibliography)

SLM- ৫৪

এককটির নাম(Title of the Unit) **:** অপরাজিতা

গঠন (Unit Structure)

৫৪.০ প্রাসঙ্গিকতা (Relevance of the Unit)

৫৪.১ উদ্দেশ্য (Objectives)

৫৪.২ প্রস্তাবনা (Introduction)

বিভাগ ও উপবিভাগের মাধ্যমে এককটির বিশ্লেষণ

(Divisions of the Unit in Unit sections and subsections)

৫৪.৩ বিষয়বস্তু(Subject Matter)

৫৪.৩.১ অনুগৃহীতা নামকরণের তাত্পর্য

৫৪.৩.২ অনুগৃহীতা : মূলানুবাদ ও আলোচনা

৫৪.৩.৩ অনুগৃহীতা : কিছু বিশেষ কুশীলবদের চরিত্রচিত্রণ

৫৪.৩.৪ জাগরিত নামকরণের তাত্পর্য

৫৪.৩.৫ জাগরিত : মূলানুবাদ ও আলোচনা

৫৪.৩.৬ জাগরিত : কিছু বিশেষ কুশীলবদের চরিত্রচিত্রণ

৫৪.৩.৭ একোঽন্যঃ শিবি নামকরণের তাত্পর্য

৫৪.৩.৮ একোঽন্যঃ শিবি: মূলানুবাদ ও আলোচনা

৫৪.৩.৯ একোঽন্যঃ শিবি : কিছু বিশেষ কুশীলবদের চরিত্রচিত্রণ

৫৪.৩.১০ বাতায়ন নামকরণের তাত্পর্য

৫৪.৩.১১ বাতায়ন : মূলানুবাদ ও আলোচনা

৫৪.৩. ১২ বাতায়ন : কিছু বিশেষ কুশীলবদের চরিত্রচিত্রণ

৫৪.৪ সারসংক্ষেপ(Summary)

৫৪.৫ গুরুত্বপূর্ণ শব্দাবলী(Glossary)

৫৪.৬ পাঠের অগ্রগতির জ্ঞাপক প্রশ্নাবলী(Self assessment questions or Check your Progress)

৫৪.৭ সহায়ক গ্রন্থাবলী (Bibliography)

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এককটির নাম(Title of the Unit) **:** তর্কভাষা : প্রমাণপ্রকরণ (প্রত্যক্ষপ্রমাণ পর্যন্ত)

গঠন (Unit Structure)

৫৫.০ প্রাসঙ্গিকতা (Relevance of the Unit)

৫৫.১ উদ্দেশ্য (Objectives)

৫৫.২ প্রস্তাবনা (Introduction)

বিভাগ ও উপবিভাগের মাধ্যমে এককটির বিশ্লেষণ

(Divisions of the Unit in Unit sections and subsections)

৫৫.৩ বিষয়বস্তু(Subject Matter)

৫৫.৩.০ অনুবন্ধ চতুষ্টয়ের আলোচনা

৫৫. ৩.১. ন্যায়শাস্ত্রের প্রবৃত্তিবিষয়ক আলোচনা

৫৫. ৩.২. প্রমাণের লক্ষণনিরূপণ

৫৫. ৩.৩. প্রমাণের লক্ষণবিচার প্রসঙ্গে প্রমার লক্ষণনিরূপণ

৫৫. ৩.৪. করণের লক্ষণনিরূপণ

৫৫. ৩.৫. কারণের স্বরূপও বিভাগ

৫৫. ৩.৬. প্রত্যক্ষপ্রমাণের স্বরূপ ও বিভাগ

৫৫. ৩.৭. লৌকিক ও অলৌকিক সন্নিকর্ষ

৫৫.৪ সারসংক্ষেপ(Summary)

৫৫.৫ গুরুত্বপূর্ণ শব্দাবলী(Glossary)

৫৫.৬ পাঠের অগ্রগতির জ্ঞাপক প্রশ্নাবলী(Self assessment questions or Check your Progress)

৫৫.৭ সহায়ক গ্রন্থাবলী (Bibliography)

SLM- ৫৬

এককটির নাম(Title of the Unit) **:** তর্কভাষা : প্রমাণপ্রকরণ (অনুমানাদিপ্রমাণ)

গঠন (Unit Structure)

৫৬.০ প্রাসঙ্গিকতা (Relevance of the Unit)

৫৬.১ উদ্দেশ্য (Objectives)

৫৬.২ প্রস্তাবনা (Introduction)

বিভাগ ও উপবিভাগের মাধ্যমে এককটির বিশ্লেষণ

(Divisions of the Unit in Unit sections and subsections)

৫৬.৩ বিষয়বস্তু(Subject Matter)

৫৬.৩.০. অনুমানপ্রমাণনিরূপণ

৫৬. ৩.১. উপমানপ্রমাণনিরূপণ

৫৬. ৩.২. অর্থাপত্তিপ্রমাণ খণ্ডণ

৫৬. ৩.৩. অভাবপ্রমাণ খণ্ডণ

৫৬. ৩.৪ সম্ভব, ঐতিহ্য ও চেষ্টা নামক প্রমাণ খণ্ডণ

৫৬. ৩.৫. প্রমাণ্যবাদ

৫৬.৪ সারসংক্ষেপ(Summary)

৫৬.৫ গুরুত্বপূর্ণ শব্দাবলী(Glossary)

৫৬.৬ পাঠের অগ্রগতির জ্ঞাপক প্রশ্নাবলী(Self assessment questions or Check your Progress)

৫৬.৭ সহায়ক গ্রন্থাবলী (Bibliography)

SLM- ৫৭

এককটির নাম(Title of the Unit) **:** তর্কভাষা : প্রমেয়নিরূপণ প্রকরণ

গঠন (Unit Structure)

৫৭.০ প্রাসঙ্গিকতা (Relevance of the Unit)

৫৭.১ উদ্দেশ্য (Objectives)

৫৭.২ প্রস্তাবনা (Introduction)

বিভাগ ও উপবিভাগের মাধ্যমে এককটির বিশ্লেষণ

(Divisions of the Unit in Unit sections and subsections)

৫৭.৩ বিষয়বস্তু(Subject Matter)

৫৭.৩.০. প্রমেয়সামান্যলক্ষণ ও আত্মাদি দ্বাদশ প্রমেয়ের উদ্দেশ

৫৭. ৩.১. আত্মানামকপ্রমেয়নিরূপণ

৫৭. ৩.২. শরীর ও ইন্দ্রিয় নামক প্রমেয়নিরূপণ

৫৭. ৩.৩. অর্থ প্রমেয়নিরূপণ

৫৭. ৩.৪. বুদ্ধ্যাদি প্রমেয়নিরূপণ

৫৭. ৩.৫. সংশয়াদি পদার্থনিরূপণ

৫৭.৪ সারসংক্ষেপ(Summary)

৫৭.৫ গুরুত্বপূর্ণ শব্দাবলী(Glossary)

৫৭.৬ পাঠের অগ্রগতির জ্ঞাপক প্রশ্নাবলী(Self assessment questions or Check your Progress)

৫৭.৭ সহায়ক গ্রন্থাবলী (Bibliography)

SLM- ৫৮

এককটির নাম(Title of the Unit) **ব্যাপ্তির প্রথম লক্ষণ**

গঠন (Unit Structure)

৫৮.০ প্রাসঙ্গিকতা (Relevance of the Unit)

৫৮.১ উদ্দেশ্য (Objectives)

৫৮.২ প্রস্তাবনা (Introduction)

বিভাগ ও উপবিভাগের মাধ্যমে এককটির বিশ্লেষণ

(Divisions of the Unit in Unit sections and subsections)

৫৮.৩ বিষয়বস্তু(Subject Matter)

৫৮.৩.১. ব্যাপ্তির প্রথমলক্ষণ বাক্যের অর্থ

৫৮.৩.২. ব্যাপ্তির প্রথমলক্ষণের সদ্ধেতুস্থলে সঙ্গতিপ্রদর্শন

৫৮.৩.৩. ব্যাপ্তির প্রথমলক্ষণের অসদ্ধেতুস্থলে অসঙ্গতিপ্রদর্শন

৫৮.৩.৪. লক্ষণে সাধ্যতাবচ্ছেদকসম্বন্ধগ্রহণের প্রয়োজনীয়তা

৫৮.৩.৫. লক্ষণে সাধ্যবদন্যপদেরদ্বারা সাধ্যবত্ত্বাবচ্ছিন্নপ্রতিযোগিতাকভেদবান্ এই অর্থগ্রহণের প্রয়োজনীয়তা

৫৮.৩.৬. লক্ষণে হেতুতাবচ্ছেদকসম্বন্ধগ্রহণের প্রয়োজনীয়তা

৫৮.৩.৭. সাধ্যবদন্যাবৃত্তিত্বপদেরদ্বারা সাধ্যবদন্যবৃত্তিত্বত্বাবচ্ছিন্নপ্রতিযোগিতাকভাব এই অর্থগ্রহণের প্রয়োজনীতা

৫৮.৩.৮. লক্ষণে হেতুতাবচ্ছেদকাবচ্ছিন্নহেতুর অবৃত্তিত্ব বলার প্রয়োজনীয়তা

৫৮.৩.৯. ব্যাপ্তির প্রথমলক্ষণপরিত্যাগে হেতুপ্রদর্শন

৫৮.৪ সারসংক্ষেপ(Summary)

৫৮.৫ গুরুত্বপূর্ণ শব্দাবলী(Glossary)

৫৮.৬ পাঠের অগ্রগতির জ্ঞাপক প্রশ্নাবলী(Self assessment questions or Check your Progress)

৫৮.৭ সহায়ক গ্রন্থাবলী (Bibliography)

SLM- ৫৯

এককটির নাম(Title of the Unit) **ব্যাপ্তির সিদ্ধান্ত লক্ষণ**

গঠন (Unit Structure)

৫৯.০ প্রাসঙ্গিকতা (Relevance of the Unit)

৫৯.১ উদ্দেশ্য (Objectives)

৫৯.২ প্রস্তাবনা (Introduction)

বিভাগ ও উপবিভাগের মাধ্যমে এককটির বিশ্লেষণ

(Divisions of the Unit in Unit sections and subsections)

৫৯.৩ বিষয়বস্তু(Subject Matter)

৫৯.৩.১. ব্যাপ্তির সিদ্ধান্তলক্ষণবাক্যের অর্থনিরূপণ

৫৯.৩.২. ব্যাপ্তির সিদ্ধান্তলক্ষণের সদ্ধেতুস্থলে সঙ্গতিপ্রদর্শন

৫৯.৩.৩. ব্যাপ্তির সিদ্ধান্তলক্ষণের অসদ্ধেতুস্থলে অসঙ্গতিপ্রদর্শন

৫৯.৩.৪. লক্ষণে উভয়াভাব-বিশিষ্টাভাব-মহানসীয়বহ্ন্যাদ্যভাববারণ

৫৯.৩.৫. রূপত্বব্যাপ্যজাতিমত্ত্বান্ পৃথিবীত্বাত্ এখানে অব্যাপ্তির পরিহারপ্রদর্শন

৫৯.৩.৬. সাধ্যাদিভেদে ব্যাপ্তির ভেদ

৫৯.৩.৭. হেত্বধিকরণবিচার

অ. হেত্বধিকরণের হেতুতাবচ্ছেদকবিশিষ্টাধিকরণত্ববিচার

আ. হেতুতাবচ্ছেদকসম্বন্ধে হেত্বধিকরণের বিচার

৫৯.৩.৮. প্রতিযোগিব্যধিকরণত্ববিচার

৫৯.৩.৯. প্রতিযোগিব্যধিকরণনিষ্কর্ষ

৫৯.৩.১০. প্রতিযোগ্যনিধকরণত্বে তিনটি কল্পের উপস্থাপন ও তার দূষণ

৫৯.৩.১১. তৃতীয়কল্পানুসারে সমাধান

৫৯.৩.১২. কালো ঘটবান্ কালপরিমাণাত্ এখানে অব্যাপ্তিপ্রদর্শন

৫৯.৩.১৩. অন্য পণ্ডিতদের মতে অব্যাপ্তির পরিহার

৫৯.৩.১৪. উভয়াভাবঘটিত-পরিষ্কার

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SLM – ৬০

এককটির নাম (Title of the Unit)**: সর্বদর্শনসংগ্রহ : চার্বাকদর্শন**

গঠন (Unit Structure)

৬০.০ প্রাসঙ্গিকতা (Relevance of the Unit)

৬০.১ উদ্দেশ্য (Objectives)

৬০.২ প্রস্তাবনা (Introduction)

বিভাগ ও উপবিভাগের মাধ্যমে এককটির বিশ্লেষণ

(Divisions of the Unit in Unit sections and subsections)

৬০.৩ বিষয়বস্তু (Subject Matter)

- **৬০.৩.০ মঙ্গলাচরণ**
- **৬০.৩.১ চার্বাকদর্শনের লোকায়ত্ব প্রতিপাদন**
- **৬০.৩.২ চতুর্ভূতত্ব বা ভূতচতুষ্টয়বাদ**
- **৬০.৩.৩ দেহাত্মবাদ**
- **৬০.৩.৪ প্রত্যক্ষমাত্রের প্রামাণ্য ও অনুমানাদির অপ্রামাণ্য**
- **৬০.৩.৫ চার্বাকমতে পুরুষার্থ**
- **৬০.৩.৬ অনুমানপ্রমাণ অস্বীকারে জীবনযাত্রা ব্যাহত**
- **৬০.৩.৭ ব্যাপ্তিজ্ঞানের অসম্ভাব্যতা**
- **৬০.৩.৮ ব্যাপ্তিপ্রতিষ্ঠায় অনুমানোপমানাদির অসামর্থ্য**
- **৬০.৩.৯ উপাধি**
- **৬০.৩.১০ ব্যাপ্তি ও উপাধির অন্যোন্যাশ্রয়ত্ব**
- **৬০.৩.১১ রত্নধারণ ও ব্রত উদযাপনের নিষ্ফলত্ব প্রতিপাদন**

৬০.৪ সারসংক্ষেপ (Summary)

৬০.৫ গুরুত্বপূর্ণ শব্দাবলী (Glossary)

৬০.৬ পাঠের অগ্রগতির জ্ঞাপক প্রশ্নাবলী (Self assessment questions or Check your Progress)

৬০.৭ সহায়ক গ্রন্থাবলী (Bibliography)

SLM – ৬১

এককটির নাম (Title of the Unit): **সর্বদর্শনসংগ্রহ : বৌদ্ধদর্শন (যোগাচারমত পর্যন্ত)**

গঠন (Unit Structure)

৬১.০ প্রাসঙ্গিকতা (Relevance of the Unit)

৬১.১ উদ্দেশ্য (Objectives)

৬১.২ প্রস্তাবনা (Introduction)

বিভাগ ও উপবিভাগের মাধ্যমে এককটির বিশ্লেষণ

(Divisions of the Unit in Unit sections and subsections)

৬১.৩ বিষয়বস্তু (Subject Matter)

- **৬১.৩.১ ব্যাপ্তিস্থাপনা**
- **৬১.৩.২ অনুমানপ্রামান্যপ্রতিষ্ঠা**
- **৬১.৩.৩ ক্ষণিকত্ববাদ**
- **৬১.৩.৪ সামান্যপদার্থখণ্ডন**
- **৬১.৩.৫ মাধ্যমিকের শূন্যবাদ**
- **৬১.৩.৬ যোগাচারের বিজ্ঞানবাদ**

৬১.৪ সারসংক্ষেপ (Summary)

৬১.৫ গুরুত্বপূর্ণ শব্দাবলী (Glossary)

৬১.৬ পাঠের অগ্রগতির জ্ঞাপক প্রশ্নাবলী (Self assessment questions or Check your Progress)

৬১.৭ সহায়ক গ্রন্থাবলী (Bibliography)

SLM – ৬২

এককটির নাম (Title of the Unit): **সর্বদর্শনসংগ্রহ : বৌদ্ধদর্শন (সৌত্রান্তিক ও বৈভাষিক মত)**

গঠন (Unit Structure)

SLM – **৬৩**

এককটির নাম (Title of the Unit): **সর্বদর্শনসংগ্রহঃ (অর্হত্ দর্শনম্)**

গঠন (Unit Structure)

৬৩.০ প্রাসঙ্গিকতা (Relevance of the Unit)

৬৩.১ উদ্দেশ্য (Objectives)

৬৩.২ প্রস্তাবনা (Introduction)

বিভাগ ও উপবিভাগের মাধ্যমে এককটির বিশ্লেষণ

(Divisions of the Unit in Unit sections and subsections)

৬৩.৩ বিষয়বস্তু (Subject Matter)

৬৩.৩.০ ক্ষণিকত্ববাদ খণ্ডন

৬৩.৩.১ ক্ষণিকত্ববাদস্থাপনে বৌদ্ধদের যুক্তি

৬৩.৩.২ জৈনদের দ্বারা সযৌক্তিক মত খণ্ডন

৬৩.৩.৩ ক্ষণিকত্ববাদস্থাপনে গ্রাহ্যগ্রাহকভাবের অনুপপত্তি

৬৩.৩.৪ জ্ঞানের সাকারত্ব খণ্ডন

৬৩.৩.৫ অহর্ত্ স্বরূপ ও সিদ্ধিতে বিরুদ্ধবাদীদের শঙ্কা

৬৩.৩.৫.০ মীমাংসকদের শঙ্কা

৬৩.৩.৫.১ নৈয়ায়িকদের শঙ্কা

৬৩.৩.৫.২ সাবয়বপক্ষে পঞ্চবিকল্প ও তার খণ্ডন

৬৩.৩.৫.৩ জগতের কর্তারূপে ঈশ্বরের অস্তিত্ব খণ্ডন

৬৩.৩.৬ অর্হন্মুনির সর্বজ্ঞত্বস্থাপন

৬৩.৩.৭ রত্নত্রয়

৬৩.৩.৭.০. সম্যক্ দর্শন

৬৩.৩.৭.১. সম্যক্ জ্ঞান

৬৩.৩.৭.২. সম্যক্ চারিত্র

৬৩.৪ সারসংক্ষেপ (Summary)

৬৩.৫ গুরুত্বপূর্ণ শব্দাবলী (Glossary)

৬৩.৬ পাঠের অগ্রগতির জ্ঞাপক প্রশ্নাবলী (Self assessment questions or Check your Progress)

৬৩.৭ সহায়ক গ্রন্থাবলী (Bibliography)

SLM – **৬৪**

এককটির নাম (Title of the Unit): **সর্বদর্শনসংগ্রহঃ (অর্হত্ দর্শনম্)**

গঠন (Unit Structure)

৬৪.০ প্রাসঙ্গিকতা (Relevance of the Unit)

৬৪.১ উদ্দেশ্য (Objectives)

৬৪.২ প্রস্তাবনা (Introduction)

বিভাগ ও উপবিভাগের মাধ্যমে এককটির বিশ্লেষণ

(Divisions of the Unit in Unit sections and subsections)

৬৪.৩ বিষয়বস্তু (Subject Matter)

- **৬৪.৩.০ জৈননয়ে তত্ত্ব**
- **৬৪.৩.১ দ্বিবিধ তত্ত্ব**
- **৬৪.৩.২ পঞ্চবিধ তত্ত্ব**
- **৬৪.৩.৩ সপ্তবিধ তত্ত্ব**
- **৬৪.৩.৪ নববিধ তত্ত্ব**
- **৬৪.৩.৫ সপ্তভঙ্গিনয়**

৬৪.৪ সারসংক্ষেপ (Summary)

৬৪.৫ গুরুত্বপূর্ণ শব্দাবলী (Glossary)

৬৪.৬ পাঠের অগ্রগতির জ্ঞাপক প্রশ্নাবলী (Self assessment questions or Check your Progress)

৬৪.৭ সহায়ক গ্রন্থাবলী (Bibliography)

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SLM – **৬৫**

এককটির নাম (Title of the Unit)**: সাংখ্যকারিকা**

গঠন (Unit Structure)

৬৫.০ প্রাসঙ্গিকতা (Relevance of the Unit)

৬৫.১ উদ্দেশ্য (Objectives)

৬৫.২ প্রস্তাবনা (Introduction)

বিভাগ ও উপবিভাগের মাধ্যমে এককটির বিশ্লেষণ

(Divisions of the Unit in Unit sections and subsections)

৬৫.৩ বিষয়বস্তু (Subject Matter)

৬৫.৩.১ দুঃখত্রয়ের স্বরূপ ও দুঃখবিনাশে দৃষ্ট উপায়

৬৫.৩.২ দুঃখবিনাশে অদৃষ্ট উপায় ও বিষয়সমূহ

৬৫.৩.৩ প্রমাণের স্বরূপ ও বিভাগ

৬৫.৩.৪ প্রত্যক্ষের ও প্রকৃতি প্রত্যক্ষের ক্ষেত্রে প্রতিবন্ধকতা

৬৫.৩.৫ সত্কার্যবাদ

৬৫.৩.৬ ব্যক্ত ও অব্যক্ত বৈধর্ম্য ও সাধর্ম্য

৬৫.৩.৭ গুণত্রয় ও গুণত্রয়ের প্রয়োজন

৬৫.৩.৮ অব্যক্তসিদ্ধি ও তার প্রবৃত্তিভেদ

৬৫.৩.৯ সৃষ্টিবৈচিত্র্য স্থাপন

৬৫.৩.১০ পুরুষের অস্তিত্ব সিদ্ধি ও পুরুষের বহুত্বসিদ্ধি

৬৫.৩.১১ পুরুষের স্বরূপ ও প্রকৃতি পুরুষের সম্বন্ধ এবং তাদের সংযোগের ফল

৬৫.৩.১২ সৃষ্টিক্রম, বিকাশ, বুদ্ধি ও অহঙ্কার

৬৫.৩.১৩ একাদশেন্দ্রিয়ের বর্ণনা ও জ্ঞানেন্দ্রিয়, কর্মেন্দ্রিয় পঞ্চক

৬৫.৩.১৪ একাদশেন্দ্রিয়, জ্ঞানেন্দ্রিয় ও কর্মেন্দ্রিয়ের বৃত্তি

৬৫.৩.১৫ অন্তঃকরণের বৃত্তি ও বৃত্তিক্রম

৬৫.৩.১৬ ত্রয়োদশ করণের পারস্পরিক সম্বন্ধ ও বৃত্তি

৬৫.৩.১৭ অন্তঃ ও বাহ্যকরণের ভেদ, বিষয় ও বৃত্তি

৬৫.৩.১৮ পুরুষের প্রয়োজন সিদ্ধি ও প্রধানকরণ বুদ্ধি

৬৫.৩.১৯ তন্মাত্র ও সূক্ষ্মশরীরবিশেষ

৬৫.৩.২০ লিঙ্গশরীরের আশ্রয়, লিঙ্গশরীর অবিশেষ এবং লিঙ্গশরীর উদ্দেশ্য

৬৫.৪ সারসংক্ষেপ (Summary)

৬৫.৫ গুরুত্বপূর্ণ শব্দাবলী (Glossary)

৬৫.৬ পাঠের অগ্রগতির জ্ঞাপক প্রশ্নাবলী (Self assessment questions or Check your Progress)

৬৫.৭ সহায়ক গ্রন্থাবলী (Bibliography)

SLM – ৬৬

এককটির নাম (Title of the Unit)**: সাংখ্যকারিকা**

গঠন (Unit Structure)

SLM – **৬৭**

এককটির নাম (Title of the Unit)**: পাতঞ্জল যোগদর্শন : সমাধিপাদ (সূত্র ১-২৯)**

গঠন (Unit Structure)

SLM – **৬৮**

এককটির নাম (Title of the Unit)**: পাতঞ্জল যোগদর্শন : সমাধিপাদ (সূত্র ৩০-৫১)**

গঠন (Unit Structure)

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SLM – **৬৯**

এককটির নাম (Title of the Unit)**: ন্যায়সূত্র**

গঠন (Unit Structure)

৬৯.০ প্রাসঙ্গিকতা (Relevance of the Unit)

৬৯.১ উদ্দেশ্য (Objectives)

৬৯.২ প্রস্তাবনা (Introduction)

বিভাগ ও উপবিভাগের মাধ্যমে এককটির বিশ্লেষণ

(Divisions of the Unit in Unit sections and subsections)

৬৯.৩ বিষয়বস্তু (Subject Matter)

৬৯.৩.১- 'অর্থবত্ব' হেতুর দ্বারা প্রমাণের প্রামাণ্যসাধন।

৬৯.৩.২- প্রমাতা, প্রমাণ, প্রমেয়, ও প্রমিতির স্বরূপ।

৬৯.৩.৩- তত্ত্বের স্বরূপ

৬৯.৩.৪- প্রমাণের দ্বারা অভাব পদার্থের জ্ঞান কীভাবে হয়?

৬৯.৩.৫- প্রথম সূত্র

৬৯.৩.৬- হেয়, হান, উপায় ও অধিগন্তব্য এই চারটি পদের ব্যাখ্যা

৬৯.৩. ৭- আন্বীক্ষিকীবিদ্যার আসাধারণ প্রতিপাদ্য সংশয়াদি পদার্থ।

৬৯.৩. ৮- সংশয়াদি পদার্থের পৃথক উল্লেখের কারণ।

৬৯.৩. ৯- দ্বিতীয়সূত্রের মাধ্যমে মুক্তির ক্রমবর্ণনা

৬৯. ৩. ১০- আত্মা থেকে মোক্ষ পর্যন্ত প্রমেয় পদার্থগুলির মিথ্যাজ্ঞানের নানাপ্রকার।

৬৯. ৩. ১১- ঐ মিথ্যাজ্ঞানের বিপরীত তত্ত্বের জ্ঞানগুলির বর্ণনা।

৬৯.৩. ১২- ন্যায়শাস্ত্রের উদ্দেশ্য, লক্ষণ ও পরীক্ষার স্বরূপ।

৬৯.৪ সারসংক্ষেপ (Summary)

৬৯.৫ গুরুত্বপূর্ণ শব্দাবলী (Glossary)

৬৯.৬ পাঠের অগ্রগতির জ্ঞাপক প্রশ্নাবলী (Self assessment questions or Check your Progress)

৬৯.৭ সহায়ক গ্রন্থাবলী (Bibliography)

SLM – ৭০

এককটির নাম (Title of the Unit**)- ন্যায়সূত্র**

গঠন-(Unit Structure**)**

৭০.০ -প্রাসঙ্গিকতা (Relevance of the Unit)-

৭০.১- উদ্দেশ্য (Objectives)

৭০.২- প্রস্তাবনা (Introduction)

বিভাগ ও উপবিভাগের মাধ্যমে এককটির বিশ্লেষণ (Divisions of the Unit in Unit sections and subsections)

৭০.৩- বিষয়বস্তু (Subject Matter)

৭০.৩.১ প্রত্যক্ষপ্রমাণের লক্ষণ

৭০.৩.২ অনুমানপ্রমাণের লক্ষণ

৭০.৩.৩ উপমানপ্রমাণের লক্ষণ

৭০.৩.৪ শব্দপ্রমাণের লক্ষণ

৭০.৪- সারসংক্ষেপ (Summary**)**

৭০.৫ – গুরুত্বপূর্ণ শব্দাবলী(Glossary)

৭০.৬-পাঠের অগ্রগতির জ্ঞাপক প্রশ্নাবলী (Self Assessment Question)

৭০.৭- সহায়ক গ্রন্থাবলী (Bibliography)

SLM – ৭১

এককটির নাম (Title of the Unit)- **ন্যায়সূত্র**

গঠন-(Unit Structure**)**

৭১.০ -প্রাসঙ্গিকতা (Relevance of the Unit)-

৭১.১- উদ্দেশ্য (Objectives)

৭১.২- প্রস্তাবনা (Introduction)

বিভাগ ও উপবিভাগের মাধ্যমে এককটির বিশ্লেষণ (Divisions of the Unit in Unit sections and subsections)

৭১.৩- বিষয়বস্তু (Subject Matter)

৭১.৩.১ প্রমেয়গুলির বিভাগ (নবম সূত্র)

৭১.৩.২ আত্মার লক্ষণ (দশম সূত্র)

৭১.৩.৩ শরীরের লক্ষণ (একাদশ সূত্র)

৭১.৩.৪ ইন্দ্রিয়ের লক্ষণ (দ্বাদশ সূত্র)

৭১.৩.৫ ভূতবর্গের নাম (ত্রয়োদশ সূত্র)

৭১.৩.৬ ইন্দ্রিয়গুলির বিষয় (চতুর্দশ সূত্র)

৭১.৩.৭ পঞ্চদশ সূত্র

৭১.৩.৮ মনের লক্ষণ (ষোডশ সূত্র)

৭১.৩.৯ সপ্তদশ সূত্র

৭১.৩.১০ দোষের লক্ষণ (অষ্টাদশ সূত্র)

৭১.৩.১১ প্রেত্যভাবের লক্ষণ (ঊনবিংশতি সূত্র)

৭১.৩.১২ ফলের লক্ষণ (বিংশতি সূত্র)

৭১.৩.১৩ দুঃখের লক্ষণ (একবিংশতি সূত্র)

৭১.৩.১৪ অপবর্গের লক্ষণ (দ্বাবিংশতি সূত্র)

৭১.৪- সারসংক্ষেপ (Summary**)**

৭১.৫ – গুরুত্বপূর্ণ শব্দাবলী(Glossary)

৭১.৬-পাঠের অগ্রগতির জ্ঞাপক প্রশ্নাবলী (Self Assessment Question)

৭১.৭- সহায়ক গ্রন্থাবলী (Bibliography)

SLM – ৭২

এককটির নাম (Title of the Unit): **প্রশস্তপাদভাষ্য (পৃথিবী,জল,তেজ,বায়ু)**

গঠন (Unit Structure)

SLM – ৭৩

এককটির নাম (Title of the Unit): **প্রশস্তপাদভাষ্য (আকাশ,কাল,দিগ,আত্মা,মন)**

গঠন (Unit Structure)

SLM – ৭৪

এককটির নাম (Title of the Unit): **অর্থসংগ্রহঃ ()**

গঠন (Unit Structure)

৭৪.০ প্রাসঙ্গিকতা (Relevance of the Unit)

৭৪.১ উদ্দেশ্য (Objectives)

৭৪.২ প্রস্তাবনা (Introduction)

বিভাগ ও উপবিভাগের মাধ্যমে এককটির বিশ্লেষণ

(Divisions of the Unit in Unit sections and subsections)

৭৪.৩ বিষয়বস্তু (Subject Matter)

৭৪.৩.০ ধর্মলক্ষণ

৭৪.৩.১ ভাবনাবিচার

৭৪.৩.২ বেদলক্ষণ

৭৪.৩.৩ বিধির সংজ্ঞা, বিধির প্রকারভেদ ও তাদের নাম

৭৪.৩.৪ প্রত্যেকবিধির সংজ্ঞা, উদাহরণ

৭৪.৩.৫ বিধির শ্রুতি প্রভৃতি ছয় প্রকার প্রমাণ

৭৪.৩.৬ প্রসঙ্গক্রমে আগত আরাদুপকারক, সন্নিপত্যোপকারক, সংদংশলক্ষণ আলোচনা

৭৪.৩.৭ প্রয়োগক্ষেত্রে ক্রম শাস্ত্র ও জ্ঞাতব্য

৭৪.৪ সারসংক্ষেপ (Summary)

৭৪.৫ গুরুত্বপূর্ণ শব্দাবলী (Glossary)

৭৪.৬ পাঠের অগ্রগতির জ্ঞাপক প্রশ্নাবলী (Self assessment questions or Check your Progress)

৭৪.৭ সহায়ক গ্রন্থাবলী (Bibliography)

SLM – ৭৫

এককটির নাম (Title of the Unit): **অর্থসংগ্রহঃ ()**

গঠন (Unit Structure)

৭৫.০ প্রাসঙ্গিকতা (Relevance of the Unit)

৭৫.১ উদ্দেশ্য (Objectives)

৭৫.২ প্রস্তাবনা (Introduction)

বিভাগ ও উপবিভাগের মাধ্যমে এককটির বিশ্লেষণ

(Divisions of the Unit in Unit sections and subsections)

৭৫.৩ বিষয়বস্তু (Subject Matter)

৭৫.৩.০ প্রয়োগবিধিলক্ষণ

৭৫.৩.১ ক্রমস্বরূপ : শ্রুতি, অর্থ, পাঠ, স্থান, মুখ্য ও সমাখ্যা

৭৫.৩.২ অধিকারবিধিলক্ষণ

৭৫.৪ সারসংক্ষেপ (Summary)

৭৫.৫ গুরুত্বপূর্ণ শব্দাবলী (Glossary)

৭৫.৬ পাঠের অগ্রগতির জ্ঞাপক প্রশ্নাবলী (Self assessment questions or Check your Progress)

৭৫.৭ সহায়ক গ্রন্থাবলী (Bibliography)

SLM- **৭৬**

এককটির নাম (Title of the Unit**)**- ব্রহ্মসূত্র শাঙ্করভাষ্য (অথাতো ব্রহ্মজিজ্ঞাসা)

গঠন-(Unit Structure**)**

৭৬.০ -প্রাসঙ্গিকতা (Relevance of the Unit)-

৭৬.১- উদ্দেশ্য (Objectives)

৭৬.২- প্রস্তাবনা (Introduction)

বিভাগ ও উপবিভাগের মাধ্যমে এককটির বিশ্লেষণ (Divisions of the Unit in Unit sections and subsections)

৭৬.৩- বিষয়বস্তু (Subject Matter)

৭৬.৩.১. অধ্যাসভাষ্য

৭৬.৩.২. **প্রতিজ্ঞা**

৭৬.৩.৩. শারীরকমীমাংসাভাষ্য

৭৬.৩.৪. অধ্যাসভাষ্য সংক্ষিপ্ত অনুবাদ

৭৬.৩.৫. অথাতো ব্রহ্মজিজ্ঞাসা সূত্র

৭৬.৩.৫.১. অথ পদের অর্থ নিরুপণ

৭৬.৩.৫.২. অতঃ পদের অর্থ নিরুপণ

৭৬.৩.৫.৩. ব্রহ্মজিজ্ঞাসা পদের ব্যুত্পiত্তি ও অর্থ নিরুপণ

৭৬.৩.৫.৪. বিভিন্ন দর্শন মতে আত্মস্বরূপ

৭৬.৪- সারসংক্ষেপ (Summary**)**

৭৬.৫ – গুরুত্বপূর্ণ শব্দাবলী(Glossary)

৭৬.৬-পাঠের অগ্রগতির জ্ঞাপক প্রশ্নাবলী (Self Assessment Question)

৭৬.৭- সহায়ক গ্রন্থাবলী (Bibliography)

SLM- **৭৭**

এককটির নাম (Title of the Unit**)**- ব্রহ্মসূত্র শাঙ্করভাষ্য (জন্মাদ্যস্য যতঃ, শাস্ত্রযোনিত্বাৎ)

গঠন-(Unit Structure**)**

৭৭.০ -প্রাসঙ্গিকতা (Relevance of the Unit)-

৭৭.১- উদ্দেশ্য (Objectives)

৭৭.২- প্রস্তাবনা (Introduction)

বিভাগ ও উপবিভাগের মাধ্যমে এককটির বিশ্লেষণ (Divisions of the Unit in Unit sections and subsections)

৭৭.৩- বিষয়বস্তু (Subject Matter)

৭৭.৩.১.ব্রহ্মের লক্ষণ

৭৭.৩.২. ব্রহ্মের প্রমাণ

৭৭.৩.৩. জন্মাদ্যস্য যতঃ

৭৭.৩.৪. শাস্ত্রযোনিত্বাৎ

৭৭.৪- সারসংক্ষেপ (Summary**)**

৭৭.৫ – গুরুত্বপূর্ণ শব্দাবলী(Glossary)

৭৭.৬-পাঠের অগ্রগতির জ্ঞাপক প্রশ্নাবলী (Self Assessment Question)

৭৭.৭- সহায়ক গ্রন্থাবলী (Bibliography)

SLM- **৭৮**

এককটির নাম (Title of the Unit)- ব্রহ্মসূত্র শাঙ্করভাষ্য (তত্তুসমন্বয়াৎ)

গঠন-(Unit Structure)

৭৮.০ -প্রাসঙ্গিকতা (Relevance of the Unit)-

৭৮.১- উদ্দেশ্য (Objectives)

৭৮.২- প্রস্তাবনা (Introduction)

বিভাগ ও উপবিভাগের মাধ্যমে এককটির বিশ্লেষণ (Divisions of the Unit in Unit sections and subsections)

৭৮.৩- বিষয়বস্তু (Subject Matter)

৭৮.৩.১. পূর্বপক্ষীর আশঙ্কা উপস্থাপন

৭৮.৩.২. তত্তুসমন্বয়াৎ

৭৮.৪- সারসংক্ষেপ (Summary)

৭৮.৫ – গুরুত্বপূর্ণ শব্দাবলী(Glossary)

৭৮.৬-পাঠের অগ্রগতির জ্ঞাপক প্রশ্নাবলী (Self Assessment Question)

৭৮.৭- সহায়ক গ্রন্থাবলী (Bibliography)

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SLM- **৭৯**

এককটির নাম (Title of the Unit**)**- বাক্যপদীয় (১-৫০)

গঠন-(Unit Structure**)**

৭৯.০ -প্রাসঙ্গিকতা (Relevance of the Unit)-

৭৯.১- উদ্দেশ্য (Objectives)

৭৯.২- প্রস্তাবনা (Introduction)

বিভাগ ও উপবিভাগের মাধ্যমে এককটির বিশ্লেষণ (Divisions of the Unit in Unit sections and subsections)

৭৯.৩- বিষয়বস্তু (Subject Matter)

৭৯.৩.১ শব্দব্রহ্মের স্বরূপ ও প্রাপ্তির উপায় (কারিকা ১-১০)

৭৯.৩.২ বাক্যপদীয় উক্ত ব্যাকরণ পাঠের প্রয়োজন (কারিকা ১১-২২)

৭৯.৩.৩ শব্দের অর্থ ও শব্দার্থসম্বন্ধের নিত্যতা স্থাপন (কারিকা ২৩-২৯)

৭৯.৩.৪ বাক্যপদীয়ে প্রমাণসমূহ (কারিকা ৩০-৪৩)

৭৯.৩.৫ উপাদান শব্দের প্রকারভেদ – তাদের স্বরূপ ও সম্বন্ধ (কারিকা ৪৪-৪৬)

৭৯.৩.৬স্ফোটের স্বরূপ (কারিকা ৪৭-৫০)

৭৯.৪- সারসংক্ষেপ (Summary**)**

৭৯.৫ – গুরুত্বপূর্ণ শব্দাবলী(Glossary)

৭৯.৬-পাঠের অগ্রগতির জ্ঞাপক প্রশ্নাবলী (Self Assessment Question)

৭৯.৭- সহায়ক গ্রন্থাবলী (Bibliography)

SLM- **৮০**

এককটির নাম (Title of the Unit**)**- বাক্যপদীয় (৫৫-৯৩)

গঠন-(Unit Structure**)**

৮০.০ -প্রাসঙ্গিকতা (Relevance of the Unit)-

৮০.১- উদ্দেশ্য (Objectives)

৮০.২- প্রস্তাবনা (Introduction)

বিভাগ ও উপবিভাগের মাধ্যমে এককটির বিশ্লেষণ (Divisions of the Unit in Unit sections and subsections)

৮০.৩- বিষয়বস্তু (Subject Matter)

৮০.৩.১ স্ফোটাত্মকশব্দের দ্বিবিধ শক্তি (কারিকা ৫৫-৭৫)

৮০.৩.২ ধ্বনির প্রকারভেদ ও প্রকৃতি (কারিকা ৭৬-৮১)

৮০.৩.৩ স্ফোট অভিব্যক্তির ক্ষেত্রে ধ্বনির ভূমিকা (কারিকা ৮২ – ৮৫)

৮০.৩.৪ বর্ণ পদ ও বাক্যে ব্যঞ্জকধ্বনিভেদে প্রত্যেকের ভেদ (কারিকা ৮৮-৯৩)

৮০.৪- সারসংক্ষেপ (Summary**)**

৮০.৫ – গুরুত্বপূর্ণ শব্দাবলী(Glossary)

৮০.৬-পাঠের অগ্রগতির জ্ঞাপক প্রশ্নাবলী (Self Assessment Question)

৮০.৭- সহায়ক গ্রন্থাবলী (Bibliography)

SLM- **৮১**

এককটির নাম (Title of the Unit**)**- বাক্যপদীয় ব্রহ্মকাণ্ডের বিশেষ বিশেষ কারিকার বিস্তারিত অর্থ ও অনুশীলনী

গঠন-(Unit Structure**)**

৮১.০ -প্রাসঙ্গিকতা (Relevance of the Unit)-

৮১.১- উদ্দেশ্য (Objectives)

৮১.২- প্রস্তাবনা (Introduction)

বিভাগ ও উপবিভাগের মাধ্যমে এককটির বিশ্লেষণ (Divisions of the Unit in Unit sections and subsections)

৮১.৩- বিষয়বস্তু (Subject Matter)

৮১.৩.১ অনাদিনিধননং ব্রহ্ম.....| |(কারিকা – ১)
৮১.৩.২ অধ্যাহিতকলাং যস্য.....| |(কারিকা – ৩)
৮১.৩.৩ প্রাপ্ত্যুপায়োঽনুকারশ্চ.....| |(কারিকা – ৫)
৮১.৩.৪ অর্থপ্রবৃত্তিতত্ত্বানাং শব্দা....| |(কারিকা – ১৩)
৮১.৩.৫ তদ্দারমপবর্গস্য বাঙ্মলানাং....| |(কারিকা – ১৪)
৮১.৩.৬ নাদস্য ক্রমজন্মত্বাত্....| |(কারিকা – ৪৮)
৮১.৩.৬ পদে ন বর্ণা বিদ্যন্তে.....| |(কারিকা – ৭৬)

৮১.৪- সারসংক্ষেপ (Summary**)**

৮১.৫ – গুরুত্বপূর্ণ শব্দাবলী(Glossary)

৮১.৬-পাঠের অগ্রগতির জ্ঞাপক প্রশ্নাবলী (Self Assessment Question)

৮১.৭- সহায়ক গ্রন্থাবলী (Bibliography)

SLM- ৮২

এককটির নাম (Title of the Unit**) পরমলঘুমঞ্জূষা : কারক (কর্তা, কর্ম, করণ)**

গঠন-(Unit Structure**)**

৮২.০ -প্রাসঙ্গিকতা (Relevance of the Unit)-

৮২.১- উদ্দেশ্য (Objectives)

৮২.২- প্রস্তাবনা (Introduction)

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৮২.৩.২ কর্তৃকারকের লক্ষণ

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এককটির নাম (Title of the Unit**) পরমলঘুমঞ্জূষা : কারক (সম্প্রদান, অপাদান, অধিকরণ)**

গঠন-(Unit Structure**)**

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SUBJECT: SECURITY ANALYSIS AND PORTFOLIO MANAGEMENT

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- The Profit-Maximizing Monopolist
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- Cournot model with cost of Production
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Self-assessment Questions

References

Semester-IV

Subject: Corporate Indirect Taxes

Paper Code: DCOM 403

SLM- 90

Objective

90.1 Procedures of Importation,

90.2 Procedures of Exportation

90.3 Demand of Customs Duty

90.4 Recovery and Refunds in Customs

90.5 Duty Drawback

Summary

Glossary

Self-assessment Questions

References

Semester-IV

Subject: Financial Statement Analysis

Paper Code: DCOM 404A

SLM- 91

Structure

91.0: Learning Objectives

91.1 Introduction

91.2 Concept of Financial Statements

91.3 Nature of Financial Statements

91.4 Objectives of Financial statements

91.5 Limitations of Financial Statements

91.6 Overview of Financial statements Analysis

91.7 Tools of Financial statement Analysis

91.8 Summary

91.9 Key Words

91.10 Self assessment Questions

91.11 References

Semester-IV

Subject: Financial Statement Analysis

Paper Code: DCOM 404A

SLM- 92

Structure

Semester-IV

Subject: Financial Statement Analysis

Paper Code: DCOM 404A

SLM- 93

Structure

93.2: Meaning of Cash Flow Analysis

93.3: Purpose of Cash Flow Analysis

93.4: Fund Flow Vs. Cash Flow

93.5: Items of Cash Inflow and Cash Outflow

93.6: Problems and Solution

93.7: Meaning and Nature of Receivables or Debtors Management

93.8: Objectives of Debtors Management

93.9: Cost of maintaining debtors

93.10: Collection Policies

93.11: Evaluating of Credit Applicant

93.12: Summary

93.13: Glossary

93.14: Self assessment Questions

93.15: References

Semester-IV

Subject: Financial Statement Analysis

Paper Code: DCOM 404A

SLM- 94

Structure

94.0: Learning Objectives

94.1: Introduction

94.2: Accounting and Financial Reporting Standard

94.3: Scope of Accounting Standard

94.4: Standard Setting Procedure

94.5: Accounting Standard at a Glance

94.6: Summary

94.7: Glossary

94.8: Self assessment Questions

94.9: References

Semester-IV

Subject: Financial Statement Analysis

Paper Code: DCOM 404A

SLM- 95

Structure

95.0: Learning Objectives

95.1: Introduction

95.2: Corporate Segment reporting

95.3: Corporate social and Environment Reporting

95.4: Emerging tools for Performance Measurement

95.5: Economic Value Added

95.6: Market Value Added

95.7: Balance Score Card

95.8: Summary

95.8: Glossary

95.9: Self assessment Questions

95.10: References

Semester-IV

Subject: Advanced Cost Accounting

Paper Code: DCOM 405A

SLM- 96

Structure

Semester-IV

Subject: Advanced Cost Accounting

Paper Code: DCOM 405A

SLM- 97

Structure

Semester-IV

Subject: Advanced Cost Accounting

Paper Code: DCOM 405A

SLM- 98

Structure

98.6 Managerial Decision using Marginal Costing

98.7 Activity Based Costing-Definition, Concept and Approaches

98.8 Developing the system of ABC& Advantages of ABC

98.9 Target Costing- Concept

98.10 Basis of Product Pricing

98.11 Steps in developing the target cost and target price.

Glossary

Summary

Questions to check your progress

References

Semester-IV

Subject: Advanced Cost Accounting

Paper Code: DCOM 405A

SLM- 99

Structure

Objective

99.0 Objectives

99.1 Introduction

99.2 Meaning of Budget & Budgetary Control

99.3 Objectives of Budgetary Control

99.4 Types of Budget

99.5 Preparation of Functional Budgets

99.6 Master Budget

99.7 Flexible Budgeting

99.8 Zero base Budgeting

99.9 Performance Budgeting

Summary

Glossary

Questions to check your progress

References

Semester-IV

Subject: Advanced Cost Accounting

Paper Code: DCOM 405A

SLM- 100

Structure

SEMESTER I

PAPER: BOT 101

Microbiology (SLM 1 -4)

SLM 1

Relevance of the unit

Objectives

Introduction

1 Six kingdom hypothesis (Woese et al, 1977) & Three – Domains concept (Woese et al, 1990).

1.1 Six Kingdom Hypothesis

1.2 Three-Domains concept

1.3 Scopes and areas of Microbiology.

1.3.1 Scopes of Microbiology

1.3.2 Areas of Microbiology

2 Principle characteristics used in the classification and identification of microbes.

2.1 Bergey's manual of determinative bacteriology: Phenetic and phylogenetic classification

2.1.1 Phenetic Classification

2.1.2 Phylogenetic Classification

3 Morphology of bacterial cell

3.1 Ultrastructure & Chemical nature of capsule

3.1.1 Cell wall: Types of cell wall, composition of cell wall, function of outer membrane

3.1.2 Flagella: structure of flagella, types of flagella, function

3.1.3 Pili

3.1.4 Genome

3.1.5 Cytoskelital elements of bacterial cell.

3.2 Principle of Gram Staining: Reagents used in gram staining, procedure of gram staining, examples of gram positive and gram negative bacteria

3.3 Reserve substances

3.4 Endospore: structure of endospore, stages of sporulation

- Summary:
- Glossary:
- Self Assessment questions
- References

SLM 2

- Relevance of the unit
- Objectives
- Introduction

4. Methods of sterilization

4.1. Dry and moist heat

4.2. Mode of Action/Principle of Moist Heat sterilization

4.3. Advantages and disadvantages of steam sterilization method
4.4. Principle of Dry heat sterilization using Hot Air Oven
4.5. Advantages and disadvantages of dry heat sterilization
4.6. UV and X-ray
4.7. Food Sterilization

5 Growth curve

5.1.1 Stages of bacterial growth curve
5.1.2 Mathematical nature and expression of growth
5.1.3 Exponential and arithmetic growth
5.1.4 Generation time
5.1.5 Growth curve parameters-yield
5.1.6 Synchronous culture
5.1.7 Batch culture and continuous growth.

- Summary:
- Glossary:
- Self Assessment questions
- References

SLM 3

- Relevance of the unit
- Objectives
- Introduction

5 Nutrition of microbes

5.1 Nutritional requirements

- Principles behind formulation of media
- Liquid and solid medium
- Enrichment culture technique

5.2 Anaerobic culture principles.

5.3 Microbial Metabolism

5.3.1 Respiration and Fermentation

5.3.2 Fermentation Pathway (ED Pathway)

5.3.3 Nitrification: chemical process of nitrification, Sulfur oxidation, Nitrogen Fixation.

5.4 Organization and replication of genetic material in bacteria

5.5 Plasmids :function and types of plasmid, application of plasmids

5.5.1 Genetic recombination

5.5.1.1 Conjugation
5.5.1.2 Transformation
5.5.1.3 Transduction.

6 Viruses

6.1 Structural organization and chemistry of viruses

6.2 Classification of viruses

6.3 Cultivation of viruses

6.3.1 Virus purification; assay of viruses (hemagglutination and plaque assay)

6.3.2 Lytic and Lysogenic cycle

6.3.3 Virus related agents-Viroids and Prions

6.3.4 Virus induced cancer:Human papilloma viruses (HPVs), Epstein-Barr virus (EBV), Hepatitis B virus (HBV) and hepatitis C virus (HCV), Human herpes virus 8 (HHV-8), Human T-lymphotrophic virus-1 (HTLV-1), Simian virus 40 (SV40);oncogenesis; antiviral drugs; HIV and its importance.

- Summary:
- Glossary:
- Self Assessment questions
- References

SLM 4

- Relevance of the unit
- Objectives
- Introduction

7 Applied microbiology

7.1 Biological nitrogen fixation-

7.1.1 Free living nitrogen fixing bacteria, symbiotic nitrogen fixing bacteria

7.1.2 Nitrogenase enzyme

7.2 Microbiological analysis of water; presumptive and confirmatory tests, water borne human diseases: sources of water borne infections, cholera,Legionellosis (Legionnaires' Disease), typhoid fever

7.3 Production of alcohol, wine, beer, penicillin, SUFU

7.4 Immunology

8 Cells and organs of the immune system

8.1 Lymphocytes

8.2 Antigens, antibodies

8.3 Immunoglobulin classes, structure of immunoglobulin G

8.4 Vaccine, Agglutination, Immunodiffusion, ELISA

- Summary:
- Glossary:
- Self Assessment questions
- References

PAPER: BOT 102

UNIT I: PHYCOLOGY (SLM 5 & 6)

- Relevance of the unit
- Objectives
- Introduction

1 Parameters used to classify algae: biochemical parameters, storage products, ultrastructural features, features of mitotic division, molecular parameters

1.1 Concept of Streptophyta

1.2 Range in thallus organization;

1.3 ultra-structure of algal cell

1.4 Algal origin of land plant: Endosymbiotic Theory of Origin of Chloroplast

1.5 Physiology and biochemistry of algal cell

1.6 Salient features of algal taxa:

1.6.1 Salient features of Cyanobacteria,

1.6.2 Salient features of Rhodophyta

1.6.3 Salient features of Heterokontophyta

1.6.4 Salient features of Cholophyta

2 Economic Importance; Introduction

2.1 Phycocoloids - Agar-agar, Alginic acid, Carageeenan;

2.2 Reclamation of soil by algae

2.3 Algae as Single Cell Protein (SCP)

2.4 Algae in pisciculture

2.5 Source of hydrocarbon from algae

2.6 Pheromone in algae

2.7 Pathogenic algae

- Summary:
- Glossary:
- Self Assessment questions
- References

UNIT II: BRYOLOGY (SLM 7 & 8)

Relevance of the unit
Objectives
Introduction

1 General Characteristics of Bryophytes:

2 Outline of recent classification of bryophytes

2.1 Outline of recent classification of Marchantiophyta (Liverworts)

2.2 Outline of recent classification of Bryophyta (Mosses)

2.3 Outline of recent classification of Antherophyta (Hornworts)

3 Characteristics, affinities and systematic position of Calobryales, Takakiales and Sphagnales

3.1 Characteristics, affinities and systematic position of Calobryales

3.2 Characteristics, affinities and systematic position of Takakiales

3.3 Characteristics, affinities and systematic position of Sphagnales

4 Cytogenetics of bryophytes

5 Ecology of bryophytes

5.1 Ecological Roles

6 Economic importance of bryophytes

6.1 Role of bryophytes in plant succession

6.2 Pollution monitoring by bryophytes

6.3 Bryophytes as site indicators

6.4 Bryomonitoring

6.5 Culturing of bryophytes

7 Biotechnology of Bryophytes

7.1 Biotechnology

7.2 Genetic Engineering

- Summary:
- Glossary:
- Self Assessment questions
- References

PAPER: BOT 103

UNIT I: MYCOLOGY (SLM 9 & 10)

- Relevance of the unit
- Objectives
- Introduction

1. Unique features of fungi

2. Classification of Fungi (Hibbett et al, 2007)

2.1 Kingdom PROTOZOA

2.2 Kingdom STRAMINOPILA

2.3 Kingdom FUNGI

2.4 Summary

3 Homothallism and Heterothallism

3.1 Physiological and molecular basis of mating systems

3.1.1 Mating in Zygomycota

3.1.2 Mating in Ascomycota

3.1.3 Mating in Basidiomycota

- Tetrapolar mating system
- Bipolar mating system

3.2 Summary

4 Ascomycota

5 Basidiomycota

6 Modern systamatics of zygomycotina and Deuteromycotina

7 Applied mycology

7.1 Antibiotic production

7.2 Organic acid production

7.3 Food production

7.4 Role of fungi in agriculture and forestry

8 Mycotoxins

8.1 Aflatoxins

8.2 Phytoalexins

- Summary:
- Glossary:
- Self Assessment questions
- Reference

UNIT II: PLANT PATHOLOGY (SLM 11 & 12)

- Relevance of the unit
- Objectives
- Introduction

1 Unique features of fungi

2 Classification of plant disease

2.1 Diagnosis, modern methods

2.2 Knowledge on the agents of infectious and non-infectious diseases

2.3 Role of environment in disease development

3 Production, liberation and dispersal of inocula, inoculum potential

4 Host pathogen interaction

4.1 Mechanism of penetration

4.2 Role of growth regulators

5 Defense mechanism of host

5.1 Introduction

5.2 Pathogenesis and Host Response

5.3 Defense Mechanisms: Pre-existing or Passive

5.4 Defense mechanism: Induced or active

6 Selected plant diseases

6.1 Downy mildew

6.2 Powdery mildew of cucurbits

6.3 Loose smut of wheat

6.4 Blast of rice

6.5 Wilt of pigeon pea

6.6 Anthracnose of Jute

7 Control of plant diseases

7.1 Introduction

7.2 Control measures

7.3 Epidemiology

7.4 Disease forecasting

- Summary:
- Glossary:
- Self Assessment questions
- Reference

PAPER: BOT 104

UNIT I: PTERIDOPHYTES (SLM 13 & 14)

- Relevance of the unit
- Objectives
- Introduction

1.1 Origin of vascular plants may be monophyletic or polyphyletic

1.2 Instances of early vascular plants

2 Rhyniopsida

2.1 Characteristic features

2.2 Important representatives

2.3 Gametophytic structures.

3 Zosterophyllopsida

3.1 Characteristic features

3.2 Representative taxa

3.3 Potentiality of the group as a progenitor of lycopsida.

4 Trimerophytopsida

4.1 Characteristic features

4.2 Representative taxa

5 Filicopsida

5.1 Characters of filicopsida:

5.2 Phyletic slide:

5.3 Evolution of soral structure in filicalian fern:

5.3.1 Evolution of sori from a tassel

5.3.2 Position of sorus

5.3.3 Mode of sorus maturation

6 Apogamy and Apospory

6.1 Apogamy

6.1.1 Factors inducing Apogamy

6.1.2 Significance

6.2 Apospory

6.2.1 Natural apospory & Induced Apospory

6.2.2 Factors influencing apospory

6.2.3 Significance

7 Progymnosperms

7.1 Concept

7.2 Characterization

7.3 Classification

7.4 Comparison between the different members of the order Aneurophytales:

7.5 The origin and evolution of progymnosperms

- Summary:
- Glossary:
- Self Assessment questions
- Reference

UNIT II: GYMNOSPERMS (SLM 15 & 16)

- Relevance of the unit
- Objectives
- Introduction

1 General characters of Gymnosperms

2 Classification

3 Origin and evolution of seed habit

3.1 Preovular concept

3.2 Concept of Pre-pollen

4 General features, geologic range and phylogeny.

4.1 Pteridospermales

4.2 Glossopteridales

4.2.1 Habit and habitat

4.2.2 Phylogenetic relationship

4.3 Pentoxylales

4.3.1 General features

4.3.2 Affinity of the group

4.4 Caytoniales

4.5 Cycadales

4.5.1 General features

4.5.2 Fossil cycads

4.5.3 Extant cycads with their distribution

4.5.4 Variation in cycad megasporophylls and their course of evolution

4.6 Coniferales:

4.6.1 General Characters of Coniferales:

4.6.2 Distribution pattern of Coniferales:

4.6.3 Origin of seed-cone complex among Coniferales:

4.7 Gnetales:

4.7.1 General Characteristic Features of Gnetales:

4.7.2 Relationship of Gnetales with angiosperms:

4.7.3 Relation of the Three Genera:

4.7.4 Relationship of Gnetales with Other Gymnosperms:

4.7.5 Phylogenetic Status; Gametophyte and molecular systematics:

5 Economic Importance of Gymnosperms:

5.1 Source of Resins:

5.2 Source of Essential oil:

5.3 Source of Tannins:

5.4 Source of Food Supplements:

5.5 Source of Pharmaceuticals:

- Summary:
- Glossary:
- Self Assessment questions
- Reference

SEMESTER II

PAPER: BOT 201

UNIT I: ANGIOSPERM TAXONOMY (SLM 17 - 18)

- Relevance of the unit
- Objectives
- Introduction

1. Introduction:
  1.1 Definition of terms:
    1.1.1 Systematics,
    1.1.2 Taxonomy,
    1.1.3 Classification,
    1.1.4 Nomenclature,
    1.1.5 Identification

2. Classification Concept:
  2.1 History of classification
  2.2 Takhtajan's System of Classifications
  2.3 , Cronquist and Thorne system of classification
3. APG system of plant classification, c
4. Concepts of palaeoherbs
5. Systematics: Taxonomy and phylogeny of the important groups like Eudicots, Commelinids and Asterids
  5.1 Taxonomy and Phylogeny of Eudicots
  5.2 Taxonomy and Phylogeny of Commelinids
  5.3 Taxonomy and Phylogeny of Asterids

6. Herbarium
  6.1 Traditional and digital herbarium
  6.2 Methods of herbarium preparation
  6.3 Local, regional, national and international herbaria
  6.4 Utilities of herbarium
  6.5 Major herbaria of the world and of India with their acronyms

7. Botanical gardens:
  7.1 Major Botanical gardens of the world and of India,
  7.2 Role of Botanic gardens in conservation of endangered plants

- Summary:
- Glossary:
- Self Assessment questions
- Reference

UNIT II: BIOSYSTEMATICS (SLM 19 - 20)

- Relevance of the unit
- Objectives
- Introduction

1. ICN

1.2 Principles of ICBN, ICN,

1.3 Rejection of names,

1.4 Effective and valid publications,

1.5 Typification,

1.6 Types of Key,

1.7 Author's citation

2. Taxonomy synthetic subjects:

2.2 Taxonomic supportive evidences: palynology and phytochemistry

2.2.1 Palynology in relation to taxonomy

2.2.2 Phytochemistry in relation to taxonomy

3. Numerical taxonomy

3.2 Aspects of Numerical taxonomy

3.3 Principles of Numerical taxonomy

3.4 Phenetics

3.5 Cladistics

3.6 Determination of Phenogram

4. Biosystematics

4.2 Chemotaxonomy

4.3 Serotaxonomy

4.4 Taxonomic tools

5. Molecular Taxonomy

5.2 DNA Bar-Coding

6. Role of Anatomy, Palynology and Embryology to assess systematic of plants

7. Origin of angiosperms

- Summary:
- Glossary:
- Self Assessment questions
- Reference

PAPER: BOT 202

UNIT I: PALAEOBOTANY (SLM 21 - 22)

- Relevance of the unit
- Objectives
- Introduction

1. **General idea of fossil & their study**
   - **1.1.** Fossils: Definition, types, nomenclature,
   - **1.2.** Modes of preservation (Schopf 1975),
   - **1.3.** Fossilization process-factors,
   - **1.4.** Techniques of fossil study; Ground thin section; peel technique; peat analysis
2. **Earliest life form and Precambrian biota**
   - **2.1.** Early life forms recovered from Precambrian strata and Archaean life;
   - **2.2.** Proterozoic life-Prokaryotes;
   - **2.3.** Neoproterozoic life-Eukaryotes
3. **Indian Gondwana system**
   - **3.1.** Indian Gondwana sequence,
   - **3.2.** Classification and megafloristics assemblages in Gondwana sequence
4. **Continental drift hypothesis and plate tectonics**
   - **4.1.** Concept of Continental drift hypothesis
   - **4.2.** Evidences in support of Continental drift hypothesis
   - **4.3.** Validation of continental drift hypothesis
   - **4.4.** Concept of Plate Tectonics
5. **Dating of geological age**
   - **5.1.** Dating: Relative and absolute dating
   - **5.2.** Geological time scale
   - **5.3.** basic principles of radiometric dating
     - **5.3.1.** Radiocarbon
     - **5.3.2.** Uranium-Thorium
     - **5.3.3.** Potassium-Argon dating

- Summary:
- Glossary:
- Self Assessment questions
- Reference

UNIT II: PALYNOLOGY & PLANT REPRODUCTIVE BIOLOGY (SLM 23 - 24)

Relevance of the unit
Objectives
Introduction

1. Microspore tetrads and polarity of spores and pollen grains
   - **1.1.** Microspore tetrads
   - **1.2.** Polarity
2. Spore-pollen morphology
   - **2.1.** Symmetry, Shape; Size
   - **2.2.** Aperture pattern; Position of aperture
   - **2.3.** NPC system of Pollen / spore classification
   - **2.4.** Exine stratification
   - **2.5.** LO analysis
3. Sporopollenin
   - **3.1.** Physical and chemical nature of sporopollenin
   - **3.2.** Function
4. Aeropalynology: Basic concept
   - **4.1.** Introduction
   - **4.2.** Trapping
   - **4.3.** Characters and identification of the trapped pollen grains
   - **4.4.** Pollen calendar
   - **4.5.** Importance
5. Melissopaynology:
   - **5.1.** Definition:
   - **5.2.** Indian species of honeybees:
   - **5.3.** Bee-bread:
   - **5.4.** Pollen collecting mechanism of honeybees:
   - **5.5.** Objectives of Melissopalynology:
   - **5.6.** Important bee plants of West Bengal:
6. Palaeopalynology:
   - **6.1.** Introductory idea:
   - **6.2.** Significance of Palaeopalynology:
7. Pollination biology
   - **7.1.** Introduction Pollination biology:
   - **7.2.** Pollen: dispersal units
   - **7.3.** Pollination Types:
   - **7.4.** Contrivances for self and cross–pollination:
   - **7.5.** Contrivances for Cross-Pollination:
   - **7.6.** Pollen Vectors:
   - **7.7.** Pollination modes and floral organization:
   - **7.8.** Evolutionary trends in pollination modes:
8. Breeding systems
   - **8.1.** Self-incompatibility and compatibility control
   - **8.2.** Pollen-pistil interactions

- Summary:
- Glossary:
- Self Assessment questions
- Reference

PAPER: BOT 203

UNIT 1: PLANT ANATOMY (SLM 25 - 26)

Relevance of the unit
Objectives
Introduction

1. Totipotency
   - **1.1.** Introduction, types of Totipotency, Regulation of Totipotency, Differentiation
   - **1.2.** Significance of totipotency
2. Cell Wall
   - **2.1.** Introduction, Chemistry of Cell wall, Structure of the cell wall, Ultrastructure of the Cell wall
   - **2.2.** Biosynthesis of the Cell wall, Growth of the cell wall
   - **2.3.** Thickening pattern of cell wall and Phylogeny
3. Secretory Tissues in Plant
   - **3.1.** Introduction
   - **3.2.** External secretory structures
   - **3.3.** Internalsecretory structure
4. Laticifers
   - **4.1.** Introduction
   - **4.2.** Types, Cytology and Cell wall of the laticifers, Distribution of laticiers, Development of laticifer structure
   - **4.3.** Economic importance of latex
5. Xylem
   - **5.1.** Ultrastructure, lignification pattern
   - **5.2.** Ontogeny, and phylogeny
6. Phloem
   - **6.1.** Structure, Ultrastructure
   - **6.2.** p-Protein, Transcellular strands
   - **6.3.** Phylogeny
7. Nodal anatomy
   - **7.1.** Nodal Types and structural diversity
   - **7.2.** Evolutionary trends in nodal structure.
8. Stomata:
   - **8.1.** Types (Metchalfe and Chalk) and Ontogeny.
9. **Wood**
   - **9.1.** Physical and mechanical properties
   - **9.2.** Chemical Composition
10. **Plant fibres**
    - **10.1.** Types of plant fibers and their properties
    - **10.2.** Distribution, Structure and Commercial importance of Coir, Jute, and Cotton

Summary:
Glossary:
Self Assessment questions
Reference

UNIT II: PHARMACOGNOSY (SLM 27 - 28)

Relevance of the unit
Objectives
Introduction

1. Pharmacognosy
   - **1.1.** Introduction
   - **1.2.** Scope of pharmacognosy
2. Organoleptic, micromorphological and chemical characteristics of crude plant drugs-
   - **2.1.** *Cinchona,*
   - **2.2.** *Digitalis,*
   - **2.3.** *Strychnos,*
   - **2.4.** *Rauvolfia*
   - **2.5.** *Adhatoda*.
3. Secondary Metabolites
   - **3.1.** Secondary metabolites of plants and their significance
4. Alkaloids: Introduction, properties, test for alkaloids, classification
   - **4.1.** Alkaloids obtained from *Stramonium*, Belladonna, Ergot, *Rauvolfia, Catharanthus, Cinchona*, Tea, *Holarrhena* and their uses.
5. Glycosides
   - **5.1.** Introduction, Physical properties, Classification,
   - **5.2.** Glycosides obtained from Senna and their uses,
   - **5.3.** Sources and types of cardioactive glycosides and their uses.
6. Crude Drugs
   - **6.1.** Concept
   - **6.2.** Difference between Crude drug and Medicine
   - **6.3.** Importance of Herbal drugs
7. Drug Adulteration
   - **7.1.** Introduction
   - **7.2.** Conditions of Drug Adulteration
   - **7.3.** Types of Drug Adulteration

Summary:
Glossary:
Self Assessment questions
Reference

PAPER: C-BOT 204 (CBCS)

PLANTS AND SOCIETY (Part - I)

UNIT I: GENERAL CONCEPT ON PLANT KINGDOM (SLM C1 – C2)

Relevance of the unit
Objectives
Introduction

1. **Concept of living world and its Classification**
   - **1.1** Haeckel's Three-kingdom Concept
   - **1.2** Whittaker's Five Kingdom Concept
   - **1.3** Three-domain Concept of Carl Woese
2. **Definitions and Concepts of Diversity**
   - **3.1** Microbes
   - **3.2** Fungi
   - **3.3** Algae
   - **3.4** Bryophytes;
   - **3.5** Seedless Vascular Plants
   - **3.6** Seed Plants
3. **BACTERIA**
   - **3.1** General characteristics and classification (on the basis of morphology).
   - **3.2** Classification of Bacteria According to Bergey's Manual
     - **3.2.1** Classification of Bacteria
     - **3.2.2** The Proteobacteria
     - **3.2.3** Bergey's Classification of Determinative Bacteriology
     - **3.2.4** The Salient Features of Various Bacteria According to Bergey's Manual of Determinative
   - **3.3** Fine structure of bacterial cell.
   - **3.4** Gram positive and Gram negative bacteria.
   - **3.5** Mode of nutrition and reproduction vegetative.
   - **3.6** Asexual and recombination (Conjugation, transformation and transduction).
   - **3.7** Economic importance.
   - **3.8** Microbial Biotechnology Fermentation technology; Biofertilizers.
4. **VIRUSES:**
   - **4.1** General characteristics, types of viruses
   - **4.2** Nomenclature and Classification of viruses
   - **4.3** Structure of Bacteriophages.
   - **4.4** Multiplication of viruses (General account).
   - **4.5** Lytic and Lysogenic cycle.
   - **4.6** General account of Viroids, Virusoids, Prions, and Cyanophages.
   - **4.7** Economic importance
   - **4.8** Mycorrhiza-Types and Significance.

6. FUNGI

- **6.1** Modern System of Classification of Fungi
- **6.2** Classification of Fungi
- **6.3** Characteristics of Fungi
  - **6.3.1** Habitat
  - **6.3.2** Nutrition
- **6.4** Structure of Fungi
- **6.5** Reproduction in Fungi
- **6.6** Economic importance of Fungi

7. ALGAE

- **7.1** General characters
- **7.2** Classification of Algae
- **7.3** **Thallus Organisation in Algae**
- **7.4** Cellular organelles; Chloroplast and ER
- **7.5** Pigmentation and storage products
  - **7.5.1** Gaidukov phenomenon
- **7.6** Reproduction and Life Cycle Patterns in Algae
  - **7.6.1** Reproduction in Algae;
  - **7.6.2** Life Cycle Patterns in Algae
- **7.7** Classification, Systematic position, occurrence, structure and life cycle
  - **7.7.1** Cyanophyceae *Nostoc, Gloeocaspsa*
  - **7.7.2** Chlorophyceae *Volvox,, Oedogonium, Chara*,
  - **7.7.3** Xanthophyceae *Vaucheria,*
  - **7.7.4** Phaeophyceae, *Ectocarpus,*
  - **7.7.5** Rhodophyceae, *Polysiphonia*
- **7.8** Economic importance

8. LICHENS

- **8.1** General account.
- **8.2** Types.
- **8.3** Structure.
- **8.4** Nutrition.
- **8.5** Reproduction.
- **8.6** Economic importance

9. BRYOPHYTES

- **9.1** Introduction
- **9.2** Characteristics
- **9.3** Classification of Bryophytes
- **9.4** General features.
- **9.5** Classification.
- **9.6** Life cycle patterns.
- ***9.7*** *Marchantia*
- ***9.8*** *Anthoceros*
- ***9.9*** *Funaria*
- **9.10** Evolutionary significance.
- **9.11** Economic importance of bryophytes.

10. PALAEOBOTANY.

10.1 Concept of palaeobotany
10.2 Process of fossilization
10.3 Fossil types:
10.3.1 *Rhynia,*
10.3.2 *Psilophyton,*
10.3.3 *Lyginopteris,*
10.3.4 *Williamsonia,*
10.3.5 *Pentoxylon.*

11. PTERIDOPHYTES

11.1 General features
11.2 Classification of Pteridophytes.
11.3 Stelar System in Pteridophytes.
11.4 Heterospory and evolutionary significance.
11.5 General Characteristics and Life Cycle Patterns:
11.5.1 Psilopsida
11.5.1.1 Class Psilophytopsida;
11.5.1.2 Class Psilotopsida
11.5.2 Lycophyta
11.5.2.1 Class Eligulospsida;
11.5.2.2 Class Ligulopsida
11.5.3 Sphenophyta
11.5.3.1 Class Sphenophyllopsida;
11.5.3.2 Class Calamopsida
11.5.4 Filicophyta Or Pteropside
11.5.4.1 Class Primofilicopsida;
11.5.4.2 Class Eusporangioposida
11.5.4.3 Class Leptosporangiopsida (Leptosporangiate Ferns)
11.5.5 Study of Fossils in Pteridophytes (Sphenophyllum, Lepidodendron)
11.6 Economic importance of Pteridophytes

12. GYMNOSPERMS

12.1 General Characteristics of Gymnosperms
12.2 Classification of Gymnosperms
12.3 Economic Importance of Gymnosperms
12.4 General Characteristics of Cycadales
12.5 General Characteristics of Ginkgoales
12.6 General Characteristics of Coniferales
12.7 General Characteristics of Gnetales
12.8 Fossil Gymnosperms
12.9 Phylogeny and affinity, distribution of Gymnosperms in India

13. ANGIOSPERMS:

13.1 Origin and phylogeny of Angiosperms.
13.2 Concept of Plant Systematics and taxonomic hierarchy.
13.3 Binomial nomenclature.
13.4 Systems of classification.
13.5 Alternative view of Primitive Angiosperms Flower.

13.6 Fossil Record
13.7 Interrelationships of Angiosperms and Animals.
13.8 Pollination.
13.9 Seed Dispersal, Co-evolution, Classification of the Angiosperms.

14. PLANT CELL AND ORGANELLES

14.1 Chemistry, structure and function of Plant cell wall.
14.2 Overview of membrane function.
14.2.1 Chemical composition of membranes.
14.2.2 Membrane transport – Passive, active and facilitated transport.
14.2.3 Endocytosis and Exocytosis.
14.3 Nucleus: Structure-nuclear envelope, nuclear pore complex, nuclear lamina, molecular organization of chromatin; nucleolus.
14.4 Cytoskeleton: Role and structure of microtubules, microfilaments and intermediary filament.
14.5 Chloroplast, mitochondria and peroxisomes: Structural organization; Function;
14.6 Endomembrane system: Endoplasmic Reticulum – Structure, Smooth ER and lipid synthesis, Golgi Apparatus – organization; Lysosomes.

15. PLANT TISSUE:

15.1 Plant Tissue Definition.
15.2 Types of Tissue in Plants.
15.3 Other way to classify Plant Tissue.
15.4 Functions of plant tissues

16. PLANT ORGANS:

16.1 Plant Organ Definition.
16.2 Types of Organs in Plant.
16.2.1 Root,
16.2.2 Stem
16.2.3 Leaves,
16.2.4 Fruit,
16.2.5 Flower.
16.3 Function of Plant Organs.
16.3.1 Root,
16.3.2 Stem
16.3.3 Leaves,
16.3.4 Fruit,
16.3.5 Flower.

Summary:
Glossary:
Self Assessment questions
Reference

PAPER: C-BOT 204 (CBCS)

PLANTS AND SOCIETY (Part - I)

UNIT II: SOCIO-ECONOMIC ASPECTS OF PLANTS (SLM C3 – C4)

Relevance of the unit
Objectives
Introduction

1. **Concept of economic botany**
   1.1. Plant of traditional use; Historical account
   1.2. Plant used in different purpose ; an overview
2. **Cereals yielding plants**
   2.1.1. Origin, Morphology, Processing & Uses
   2.1.1.1. Wheat
   2.1.1.2. Rice
   2.1.1.3. Maize
   2.1.1.4. Millets.
3. **Fiber yielding plants**
   3.1.1. Classification of fibers
   3.1.2. Origin of fibers.
   3.1.3. Morphology, Extraction and Uses of Cotton, Coir and Jute
4. **Sugar yielding plants**
5. **Medicinal plants**
   5.1. Concept of traditional medicine
   5.2. Some medicinal plants and their uses
6. **Dye yielding plants**
   6.1.1. *Bixa orellena,*
   6.1.2. *Butea monosperma,*
   6.1.3. *Crocus sativus,*
   6.1.4. *Indigofera tinctoria,*
   6.1.5. *Lawsonia inermis.*
7. **Narcotics plants**
   7.1.1. *Canabis sativus,*
   7.1.2. *Papaver somniferum*
8. **Oil yielding plants**
   8.1.1. Edible oil yielding Plants and their uses
   8.1.1.1. Mustard
   8.1.1.2. Sunflower
   8.1.1.3. Saffola,
   8.1.1.4. Rice bran

8.1.2. Essential Oils:

8.1.2.1. General account

8.1.2.2. Extraction methods,

8.1.2.3. Comparison with fatty oils & their uses of ***Citronella*** **and** ***Eucalyptus***

9. Pulses

9.1.1. Origin, Morphology and uses; Lentil, Mung, Gram, Pea.

10. Species and condiments yielding Plants

10.1.1. Origin, Morphology and uses; Coriander, Foeniculum, Nigella, Carum, Black pepper, Chilli, Turmeric, Ginger,

11. Beverages yielding Plants

11.1.1. Morphology, Processing & Uses of Tea, Coffee.

12. Commercial uses of fossil plant

12.1. Coal,

12.2. Petroleum,

12.3. Amber,

12.4. Diatomites)

13. Plants of special uses

13.1. Cork,

13.2. Mat grass, *Saccharum officinarum*,

13.3. Babui grass (*Eulolpsis binata*),

13.4. Vetiver grass (*Vetiveria zizanioides*).

Summary:

Glossary:

Self Assessment questions

Reference

SEMESTER III

PAPER: BOT 301

CELL BIOLOGY, GENETICS & BIOTECHNOLOGY

UNIT I: CELL BIOLOGY & GENETICS (SLM 29 - 30)

Relevance of the unit
Objectives
Introduction

1. Gene Interaction and Modified Mendelian Ratios
   - **1.1.** Multiple Factors and Polygenic Inheritance
   - **1.2.** Linkage, Crossing Over and Chromosome Mapping
2. Ultrastructure of Cellular components
   - **2.1.** Nucleus and Nucleoulous
   - **2.2.** Endoplasmic Reticulum
   - **2.3.** Golgi Apparatus
3. Cell Cycle
   - **3.1.** Biochemical and Molecular Events Associated with Cell Cycle
   - **3.2.** Molecular Mechanism of Cell Cycle Regulation.
4. Molecular Organization of Chromosome –
   - **4.1.** DNA packaging in chromatin and chromosome
   - **4.2.** Regulation of chromatin structure by histone n- terminal tails
   - **4.3.** Ultrastructure of Special Chromosomes, Centromere and Telomere
5. Chromosome Banding –
   - **5.1.** Principles
   - **5.2.** G Banding, Fluorescent Banding, R Banding, C Banding
6. Genetic Code –
   - **6.1.** Properties of Genetic Code
   - **6.2.** Genetic Code – Deciphering of Genetic Code
   - **6.3.** Transposable Elements – Definition, Transposon and Retroposon
   - **6.4.** Characteristic Features of IS Elements, Ac/Ds Elements and Copia Element
7. DNA replication
   - **7.1.** Characteristics of DNA replications
   - **7.2.** Origin and regulations, Enzymes, Factors and their roles
8. Sex determination: basic types,
   - **8.1.** Lyon hypothesis and dosage compensation - types, Barr body,
   - **8.2.** Sex linked inheritance, Sex influenced, sex linked and sex limited characters.
9. Extranuclear inheritance:
   - **9.1.** Definition
   - **9.2.** Types Skin pigmentation of larvae of *Ephestia kuehniella*, Shell coiling of *Limnaea peregra*, Variegated leaves of *Mirablis* and maize, Kappa particle of *Paramoecium*, CO_2 sensitivity and sex ratio of *Drosophila*.
10. Population Genetics
    - **10.1.** Hardy-Weinberg Hypothesis,
    - **10.2.** Mathematical expression.
    - **10.3.** Factors affecting allelic frequency in population.

Summary:
Glossary:
Self Assessment questions
Reference

UNIT II: BIOTECHNOLOGY (SLM 31 - 32)

Relevance of the unit
Objectives
Introduction

1. Recombinant DNA Technology

1.1. Vectors; Plasmid, Cosmid, Phagemid, Bacterial Artificial Chromosome (BAC), Yeast Artificial Chromosome (YAC)

1.2. Restriction Enzymes

1.3. Agrobacterium mediated Gene-transfer

1.3.1. Organization of Ti plasmid

1.3.2. Crown Gall Disease and Ti Plasmid

1.3.3. T-DNA transfer and integration

2. Cloning Strategies and screening of Recombinant clone Introduction

2.1. Essential Steps in the Molecular Cloning Process

2.2. Choice of starting material

2.3. Choice of host

2.4. Synthesis of cDNA

2.5. Cloning cDNA in plasmid vectors

2.6. Genomic libraries

2.7. Preparation of DNA fragments for cloning

2.8. Selection, screening and analysis of recombinants

2.8.1. Blue white Colony Selection:

2.9. Purification of Recombinant plasmid DNA

2.9.1. Preparation of plasmid DNA

3 Applications of rDNA technology in Agricuture & Medicine

3.1 Food and Agriculture.

3.2 Health and Diseases.

3.3 Gene Therapy

3.4 Production of Antibodies and Their Derivatives.

3.5 Phytoremediation and Plant Resistance Development.

4 Gene Library

4.1 Gene library

4.2 Construction of cDNA library

4.3 Genomic library

5 DNA sequencing

5.1 DNA sequencing methods.

5.2 Sanger's Method or Chain Termination Method –

5.3 Maxam and Gilbert Method or Chemical degradation method

5.4 Hybridization Method

5.5 Pal Nyren's Method or Pyrosequencing method

5.6 Automatic DNA Sequencer

6 Polymerase Chain Reactions (PCR);

6.1 Principles of Polymerase Chain Reactions (PCR)

6.1.1 Components of Polymerase Chain Reactions (PCR):

6.1.2 Programming PCRs

6.1.3 PCR Stages

6.2 Types of PCR

6.3 Procedure of PCR

6.3.1 Preparation of PCR mixture:

6.3.2 The PCR reactions:

6.3.3 Parameters that affect PCR

6.4 Applications of Polymerase Chain Reactions (PCR):

7 Blotting Techniques, RAPD, AFLP, DNA fingerprinting

7.1 Blotting Techniques,

7.1.1 Southern Blot

7.1.2 Northern Blot

7.1.3 Western Blot

7.1.4 Eastern blotting

7.2 Molecular marker:RAPD, AFLP, DNA fingerprinting

7.3 Randomly Amplified Polymorphic DNA (RAPD)

7.4 Amplified Fragment Length Polymorphism (AFLP):

7.5 DNA fingerprinting

8 Plant Tissue Culture;

8.1 Basic Requisites

8.1.1 Laboratory Organisation

8.1.2 General Laboratory Practice

PAPER: BOT 302

UNIT I: PLANT PHYSIOLOGY (SLM 33 - 34)

Relevance of the unit
Objectives
Introduction

Chapter 1. Plant Water Relations: Introduction

1.1 Role of Water in Plant:
1.2 Physical process involved in water transport:
1.2.1 Diffusion
1.2.2 Facilitated Diffusion
1.2.3 Comparison of Diffusion and Facilitated diffusion
1.2.4 Water potential and its role in water transport
1.2.5 Physical processes that drives the overall water transport
1.3 The Pathway of Water Transport
1.3.1 Absorption of water
1.3.2 Radial pathway of water transport
1.3.3 Membrane transport of water
1.3.3.1 Aquaporins and facilitated water transport
1.3.4 Water transport through water conducting cells:
1.4 Transpiration and Recent concept in Stomata physiology
1.4.1 Mechanism of Stomatal Opening and Closing:
1.4.1.1 Starch-sugar hypothesis:
1.4.1.2 Concentration of CO_2 hypothesis by Bonner and Galston:
1.4.1.3 Active Potassium (K^+) Theory:
1.4.1.4 Role of blue ligh in stomatal physiology:
1.4.2 Factors Affecting Stomatal Movement:

Chapter 2. Solute Transport in Plant: Introduction

2.1 Diffusion and other physical processes:
2.2 Chemical Potential Measurement and Nernst equation and its utility
2.3 Mechanism of solute transport
2.3.1 The movement of ions into the soil solution by exchange adsorption
2.3.2 Solute Transport across Membranes in Plant
2.3.2.1 Ion-Channels:
2.3.2.2. Carriers:
2.3.2.3. Pumps:
2.3.3 Secondary Active Transport—Symport and Antiport:

Chapter 3: Photochemistry and Photosynthesis

- 3.1 Photosynthetic pigments
- 3.2 Absorption and transformation of radiant energy
- 3.3 Light harvesting complexes
- 3.4 ETS
- 3.5 Photoinhibition, O2 and H20 evolution
- 3.6 RUBISCO activity
- 3.7 Photorespiration
- 3.8 CAM and C4 pathway

Chapter 4: Respiration

- 4.1 Overview of plant respiration
- 4.2 EMP pathway
- 4.3 TCA cycle
- 4.4 PPP Glyoxylate cycle
- 4.5 Mitochondrial ETS
- 4.6 Cyanide resistant pathway
- 4.7 Gluconeogenesis
- 4.8 ATP synthesis

Chapter 5: Photoperidism

- 5.1 Photoperiodic classes
- 5.2 Photoperiodic induction- importance of light and dark period
- 5.3 Mechanism of induction and role of phytochrome

Chapter 6: Plant growth regulators

- 6.1 Auxin
- 6.2 Gibberellin
- 6.3 Cytokinins
- 6.4 ABA
- 6.5 Ethylene
- 6.6 Introductions of other hormones

Chapter 7: Seed Germination, Flowering and Fruit ripening

- 7.1 Metabolic changes during seed germination

Chapter 8: Senescence aging and Abscission

- 8.1 Senescence and Aging;
- 8.1.1 Types of Senescence:
- 8.1.2 Senescence syndrome; Symptoms of Senescence:

UNIT II: BIOCHEMISTRY (SLM 35 - 36)

Relevance of the unit

Objectives

Introduction

1. Enzymology
   - **1.1** General classification
   - **1.2** Isozymes
   - **1.3** Factors affecting enzyme activity
   - **1.4** Enzyme kinetics
     - **1.4.1** Michaelis-Menten Equation
   - **1.5** enzyme inhibition
     - **1.5.1** Competitive inhibition
     - **1.5.2** Uncompetitive inhibition
     - **1.5.3** Noncompetitive inhibition
     - **1.5.4** Allosteric inhibition
2. Carbohydrates
   - **2.1** General classification
   - **2.2** Synthesis and breakdown of carbohydrates(Starch, Glycogen, Pectin, Glucose)
3. Amino acids & Proteins
   - **3.1** General classification of amino acids & proteins
   - **3.2** Structure, synthesis and properties of amino acids
   - **3.3** Protein structure
     - **3.3.1** Primary structure
     - **3.3.2** Secondary structure
     - **3.3.3** Tertiary structure
     - **3.3.4** Quaternary structure
     - **3.3.5** Ramchandran Plot
4. Nitrogen Metabolism
   - **4.1** Nitrogen Uptake
   - **4.2** NOD Factor
   - **4.3** Root Nodulation and nitrogen fixation
5. Secondary Metabolites
   - **5.1** General classification of Major Pathways
   - **5.2** Phenolics
   - **5.3** Flavonoids
   - **5.4** Terpenoids
   - **5.5** Alkaloids
6. Lipid Metabolism
   - **6.1** General Classification
   - **6.2** Beta oxidation

Summary:

Glossary

Self assessment Questions

References

PAPER: BOT 303

UNIT I: ECOLOGY (SLM 37 - 38)

Relevance of the unit

Objectives

Introduction

Chapter 1: Significance And Scope of Ecology: Concept in Ecology-Deep Ecology and Shallow Ecology

1.1 What is Ecology ?

1.2 Significance and Scope of Ecology

1.3 Concept in Ecology – Deep Ecology and Shallow Ecology

1.3.1 What is Deep Ecology?

1.3.2 What is Shallow Ecology?

Chapter 2: Habitat and Niche concept. Fundamental and Realised niche

2.1 Habitat and niche – concept and differences

2.1.1 Habitat

2.1.2 Ecological niche

2.1.2.1 Fundamental and realised niche

2.1.2.2 Niche construction and niche differention

Chapter 3: Ecosystem organization: structure and functions, ecological pyramids, food chains and food webs, ecological energetics, energy flow via grazing and detritus claims.

3.1 Structure and function of ecosystems

3.1.1 Structure of ecosystem

3.1.2 Function of ecosystem

3.2 Food chain and food web

3.3 Ecological pyramids

3.4 Ecological energetic

3.5 Energy flow via grazing and detritus chain

Chapter 4: Community ecology: concept of community and continuum; mechanisms of econological succession and climax concept, changes in ecosystems properties during succession.

4.1 Community ecology: concept of community and continuum

4.2 Mechanism of ecological succession and climax concept

UNIT II: ENVIRONMENTAL BIOLOGY (SLM 39 - 40)

Relevance of the unit

Objectives

Introduction

Chapter 1: Introduction to environment

1.0 Introduction, definition

1.1 Importance of environment.

1.2 Components of environment; structure of earth - different spheres of earth

1.2.1 Atmosphere,

1.2.2 Hydrosphere,

1.2.3 Lithosphere,

1.2.4 Biosphere

Chapter 2: Biodiversity

2.1 Concept of biodiversity

2.2 Types of biodiversity

2.2.1 Alpha diversity,

2.2.2 Beta diversity

2.2.3 Gamma diversity

2.3 Use and importance of biodiversity

2.4 Causes for loss of biodiversity

2.5 Measurement of biodiversity

2.6 Mega diversity countries.

Chapter 3: Conservation of biodiversity.

3.1 Concept, aims for conservation

3.2 Types of species to be conserved

3.3 *in-situ, ex-situ* and in vivo conservation

3.4 cbd and ramsar sites-concept

Chapter 4: Impact of human activities

4.1 Green house effect and global warming

4.2 Ozone depletion

4.3 Acid rain

PAPER: C-BOT 304 (CBCS)

PLANTS AND SOCIETY- II

UNIT – I: PLANT AND ENVIRONMENT MARKS (SLM C5 – C6)

Relevance of the unit

Objectives

Introduction

1. **Ecosystem – terrestrial, aquatic (fresh water and marine), hill, mangrove.**
   - 1.1. Components of Ecosystem
     - **1.1.1. Terrestrial**
     - **1.1.2. Aquatic Ecosystem**
     - **1.1.3. Fresh water**
     - **1.1.4. Marine**
     - **1.1.5. Hill**
     - 1.1.6. **Mangrove**
2. **Plant and ecological balance, Biomonitoring,**
   - 2.1. Trophic organization.
   - 2.2. Food chains.
   - 2.3. Food webs.
   - 2.4. Ecological pyramids.
   - 2.5. **Biomonitoring**
3. **Phytoremediation-Types and application**
   - 3.1. Definition of Phytoremediation.
   - 3.2. Types of Phytoremediation.
   - 3.3. Types of application,
   - 3.4. Field Demonstrations of Phytoremediation of Lead-Contaminated Soils,
   - 3.5. Phytoremediation by Constructed Wetlands.
4. **Biodiversity, conservation and sustainable development**
   - 4.1. What is Biodiversity.
   - 4.2. Why should we conserve it.
   - 4.3. Elements of Biodiversity –
     - 4.3.1. Ecosystem Diversity,
     - 4.3.2. Genetic Diversity,
     - 4.3.3. Species Abundance & Diversity.
     - 4.3.4. Patterns of Species Diversity.
   - 4.4. Overexploitation threatening living species.
   - 4.5. International Trade.
   - 4.6. Animals threatened by International trade.
   - 4.7. Concept, approaches (economic, ecological and socio-cultural).
5. **Social ecology (Community movements and environmental laws).**
   - 5.1. Social Ecologies and Their Contribution to Resilience.
   - 5.2. Causal Pathways and Social Ecology

Summary:

Glossary

Self assessment Questions

References

UNIT – II: BIOTECHNOLOGY AND HUMAN WELFARE (SLM C7 – C8)

Relevance of the unit
Objectives
Introduction

1. **Microbial biotechnology: Cheese, Sausage, Pudding, Wine and oriental fermented food.**
   - **1.1.** Milk as a growth medium of bacteria.
   - **1.2.** Normal micro flora of milk.
   - **1.3.** Undesirable microorganisms in milk and normal micro flora of meat, poultry, eggs, fruits and vegetables.
   - **1.4.** Microbial spoilage of food- Fresh food, fresh milk, canned food and stored grains.
   - **1.5.** Microbiological examination of food.
   - **1.6.** Microscopic examination and culture, phosphatase test of Pasteurized milk.
2. **Preservation of food-**
   - **2.1.** High temperature (boiling, pasteurization, appertization),
   - **2.2.** Low temperature (freezing),
   - **2.3.** Other process; Dehydration, osmotic pressure, chemical preservations, radiation.
3. **Microbiologically fermented food**-
   - **3.1.** Curd, cheese, idli, yogurt, acidophilic milk, microorganisms as food SCP
   - **3.2.** Food borne diseases.
4. **Plant biotechnology:**
   - **4.1. Plant tissue culture, GM (transgenic) plants.**
     - **4.1.1.** Histological developments in Plant Tissue Culture.
     - **4.1.2.** Laboratory design and development.
     - **4.1.3.** Instrumentation used in Plant Tissue Culture.
     - **4.1.4.** Plant Tissue Culture media.
     - **4.1.5.** Sterilization Technique.
     - **4.1.6.** Application of Plant Tissue Culture.
     - **4.1.7.** Techniques used to detect Transgenic Plant.
   - **4.2.** Molecular Markers
     - **4.2.1.** DNA based detection.
     - **4.2.2.** Protein based detection.
   - **4.3.** Method Validation and Standardisation.
   - **4.4.** Selected characters of Transgenic Plants and their application in Plant production.
   - **4.5.** Tansgenic plant in Breeding and Crop Production.
5. **Petrocrops and biodiesel:**
   - **5.1.** Biofuels and biodiesel; prospects and Applications
   - **5.2.** Biofules from Petrocrops and Biomass productions

Summary:
Glossary
Self-assessment Questions
References

SEMESTER IV

PAPER: BOT 401

SILVICULTURE, MENSURATION,

SILVICULTURE SYSTEM AND FOREST MANAGEMENT

UNIT I: SILVICULTURE & MENSURATION (SLM 41 - 42)

Relevance of the unit

Objectives

Introduction

Chapter 1: Silviculture

1.1 Definition, scope & objective

1.2 Classification of Forests, Farm Forestry, Social Forestry & Agro Forestry

1.3 Factors of locality: climatic (light, temperature and frost)

1.4 Topographic: affect of altitude, aspect and exposure

1.5 Edaphic: general, parental rock influence on vegetation, pan formation

1.6 Biotic: influence of plants, insects, wild animals, man, and his animals

1.7 Concept of regeneration of forest

Chapter 2: Forest Mensuration

2.1 Definition objective and scope.

2.2 Measurement of diameter and girth.

2.3 Breast height- Rules of diameter measurement, diameter and girth class.

2.4 Measurement of height of tree

2.5 Principles of height measurement (similar triangle, trigonometric).

2.6 Volume: Measurement of volume of standing and felled trees, volume table

Summary:

Glossary

Self assessment Questions

References

UNIT II: SILVICULTURE SYSTEM & FOREST MANAGEMENT (SLM 43 - 44)

Relevance of the unit
Objectives
Introduction

Chapter 1: Silviculture, Mensuration and Management:
- 1.1 Classification and objective
- 1.2 Clear felling system: clear strip and alternate strip system
  - 1.2.1Variations in clear felling system
  - 1.2.2 Regeneration by Taungya and /or departmental plantation
    - 1.2.2.1 Methods of obtaining regeneration
    - 1.2.2.2 Method of artificial regeneration
    - 3.2.2.3 Method of natural regeneration
- 1.3 Uniform system
  - 1.3.1 Shelter wood system- kinds and pattern of felling
    - 1.3.1.1 Variations of Shelterwood System
    - 1.3.1.2 Uniform Shelterwood System
    - 1.3.1.3 Strip Shelterwood System
    - 1.3.1.4 Group Shelterwood System
      - 3.3.1.4.1 Variations on the simple group shelterwood
      - 3.3.1.4.2 Irregular Shelterwood System
      - 3.3.1.4.3 Natural Shelterwood System
      - 3.3.1.4.4 Nurse-tree Shelterwood System
  - 1.3.2 Periodic Block
  - 1.3.3 Indian Irregular shelter wood system
- 1.4 Selection system
- 1.5 Coppice System
  - 1.5.1 Simple, Coppice with Standard

Chapter 2: Silviculture System & Forest Management:
- 2.1 Principles and objective of Forest Conservation and Management
- 2.2 Forest Policy 1988
- 2.3 Reserve, Protected and unclassed Forest
- 2.4 Management Classification: Working plan, working circle, Felling
- 2.5 Sustained yield and progressive yield
- 2.6 Joint Forest Management

Summary:
Glossary
Self assessment Questions
References

PAPER: BOT 402 A

(SPECIAL PAPER)

MICROBIOLOGY- BASIC (SLM 45A – 48A)

Relevance of the unit
Objectives
Introduction

1. Microscopy (Phase contrast; SEM, TEM, AFM).
1.1. 1Microscopy
1.2. Types of microscope- Phase contrast, SEM, TEM, AFM

2. Staining methods (Gram, Acid fast, Endospore).
2.1.1. Stains- Staining types (Negative staining, simple staining, differential staining)
2.1.2. Staining methods- Gram stain, Acid fast stain, Endospore stain

3. General account of Actinomycetes, Spirochetes, Rickettsials and Mycoplasmas.
3.1.1. Actinomycetes
3.1.2. Spirochetes
3.1.3. Rickettsials
3.1.4. Mycoplasmas

4. Measurements of bacterial growth
4.1.1. Bacterial culture medium,
4.1.2. Characteristics of medium,
4.1.3. Types of media
4.1.4. Enrichment culture
4.1.5. Isolation of pure cultures
4.1.6. Batch culture
4.1.7. Continuous culture.
4.2. Bacterial growth
4.3. Measurements of bacterial growth, Generation time
4.4. Mathematical expression of growth
4.5. Synchronized growth and Diauxic growth
4.6. Environmental factors influencing growth
4.7. Biofilm formation

5. Quorum sensing-
5.1. prokaryotic cell to cell signalling quorum sensing,
5.2. mechanisms of quorum sensing.

6. Metabolic classes of microorganisms (autotroph, phototroph, chemotroph, heterotroph)
6.1. Photosynthesis, Photosynthetic microorganisms, classification of photosynthetic bacteria, photosynthetic pigments, photosynthetic electron transport system- purple bacteria, green bacteria, heliobacteria, Dark reaction
6.2. Chemosynthesis (sulfur oxidation, iron oxidation, hydrogen oxidation and nitrification)
6.3. Methanotrophy Anaerobic Respiration –
6.4. Nitrate respiration (denitrification),
6.5. Sulfate reduction, methanogenes

7. Biological nitrogen fixation by root nodulating symbiotic bacteria,
- **7.1.** Leghaemoglobin,
- **7.2.** Metabolism and genetics of nitrogen fixtation
- **7.3.** Nitrogenase- structure and function, alternative nitrogenase, control and regulation.

8. Chemistry and mode of action of antibiotics (Penicillin, Streptomycin, Viricidin),
- **8.1.** Microbial assay
- **8.2.** Mechanism of drug resistance.

9. Mobile Genetic Elements
- **9.1.** General properties of plasmids
- **9.2.** Application of plasmid in cloning technology
- **9.3.** cosmids.

10. Genetic engineering-
- **10.1.** Strategies,
- **10.2.** Formation of DNA fragments
- **10.3.** Restriction enzymes, topoisomerase, gyrase, methylase
- **10.4.** Genomic library, c-DNA library
- **10.5.** Application of recombinant DNA technology
- **10.6.** Esthetical issues of genetic engineering

11. Molecular biology of the bacteriophage lambda, M13 and P1.

12.

13. Plant-microbe relationship,
- **13.1.** Microbe as pathological agents in plants, animals and human system

14. Toxins-
- **14.1.** Classification of toxins,
- **14.2.** Membrane transducing toxins,
- **14.3.** Intracellular toxins.

15. Enzyme kinetics,
- **15.1.** Effect of temperature and pH on enzyme action,
- **15.2.** Regulation of enzyme activity,
- **15.3.** Mode of action of amylases and proteases.

16. Oncogenes-
- **16.1.** Cellular and viral oncogenes,
- **16.2.** Oncogenes families,
- **16.3.** Oncogenes proteins
- **16.4.** Cancer- causes of cancers.

17. Virus-
- **17.1.** General concept,
- **17.2.** Occurrence,
- **17.3.** Morphology, shape, size, structure
- **17.4.** Classification
- **17.5.** Cultivation, isolation and purification of viruses
- **17.6.** Prions- spread of prions, artificial prions
- **17.7.** Viroids- host range, genome and origin of viroids.

Summary:
Glossary
Self assessment Questions
References

PAPER: BOT 402 B

(SPECIAL PAPER)

PLANT PHYSIOLOGY (SLM 45B – 48B)

Relevance of the unit
Objectives
Introduction

1. Organization of photosynthetic apparatus and light absorbing antenna system. Genes and polypeptide components of photosynthetic complexes. Rubisco and Rubisco genes.

- **1.1.** General Concepts and overview of photosynthesis
- **1.2.** Photosynthetic Pigments and Photosynthetic apparatus
- **1.3.** Organization of Photosynthetic Apparatus into Photosystems
  - **1.3.1.** Light absorbing antenna system
  - **1.3.2.** Photochemical Reaction Centers
  - **1.3.3.** Photosystem I
  - **1.3.4.** Photosystem II
  - **1.3.5.** Cytochrome b6f (Plastoquinol-Plastocyanin Oxidoreductase)
  - **1.3.6.** Mobile Electron Carriers
  - **1.3.7.** Water Splitting Complex
- **1.4.** Rubisco enzyme
  - **1.4.1.** Structural Components
  - **1.4.2.** The Folding and Assembly of Rubisco
  - **1.4.3.** The Catalytic Mechanism of Rubisco
- **1.5.** Genes and polypeptide components of photosynthetic complexes

2. ATP generation mechanisms in chloroplast and mitochondria.

- **2.1.** Basic Energetic Principles
- **2.2.** Energy Coupled Reactions
- **2.3.** Structure of ATP
  - **2.3.1.** ATP as High-Energy Molecule and Energy Currency of the Cell
- **2.4.** ATP Generation in Light Reactions of Photosynthesis
- **2.5.** ATP Generation respirations

3. Nitrate assimilation in plants. Structure function and regulation of nitrate assimilating enzymes. *Nif* gene, nod gene – structure, function and regulation.

- **3.1.** Nitrate assimilation in plants
- **3.2.** Biological Nitrogen fixation
  - **3.2.1.** Overview of the process
  - **3.2.2.** Enzymes involved in the process
  - **3.2.3.** Molecular aspects of Nitrogen fixation
    - **3.2.3.1.** Nif Genes
    - **3.2.3.2.** Nod factors
  - **3.2.4.** Regulation of nitrogen fixations

4. Chloroplast structure, function and genetic engineering
   - **4.1.** Chloroplast structure
     - **4.1.1.** Membrane structure
     - **4.1.2.** Internal organizations
   - **4.2.** Different forms of plastids
   - **4.3.** Plastid genomics
     - **4.3.1.** Sequenced plastomes
     - **4.3.2.** Promiscuous DNA
     - **4.3.3.** Plastid genome organization
     - **4.3.4.** Plastid gene expression, and regulation
   - **4.4.** Systems biology approach in understanding chloroplast development
   - **4.5.** Chloroplast genetic engineering

5. Pumps, carriers and Channels – Structure and function, energetics of active transport, isophore and ionophore; vacuoles – structure and function.
   - **5.1.** Membrane Transport
   - **5.2.** Pumps, channels, and cotransporters
   - **5.3.** H+ pumps and K+ channels
   - **5.4.** Transport rates vary across different transporter types
   - **5.5.** Isophore and Ionophore
   - **5.6.** Vacuole membrane and transporters
   - **5.7.** Vacuolar transport

6. PGRs - biosynthesis, transport, mechanism of action, bioassay.
   - **6.1.** Concepts of Plant hormone and PGR
   - **6.2.** Understding the role of PGR
   - **6.3.** Mutant of PGR Functions
   - **6.4.** Types and diversity of PGR
   - **6.5.** Biosynthesis, transport, mechanism of action and bioassay
     - **6.5.1.** Auxins
     - **6.5.2.** Cytokinins
     - **6.5.3.** Gibberellins
     - **6.5.4.** Abscissic Acid (ABA)
     - **6.5.5.** Ethylene
     - **6.5.6.** Brassinosteroids
     - **6.5.7.** Jasmonic Acid
   - **6.6.** Recently Discovered Plant Growth Regulators; Salicylic Acid, NO, Strigolactones

7. Floral induction and development
   - **7.1.** Flowering
     - **7.1.1.** Flower Induction
       - **7.1.1.1.** Photoperiodism: Critical Day Length
       - **7.1.1.2.** Photoinductive Cycle
       - **7.1.1.3.** Photoreceptors (Phytochrome and Cryptochrome)
       - **7.1.1.4.** Photoperiodic Signal and Florigen
     - **7.1.2.** Flower Development
       - **7.1.2.1.** Concept of genetic regulations of flower development
       - **7.1.2.2.** ABC to ABCDE Model
       - **7.1.2.3.** Role of other factors in flowering

8. Senescence and programmed cell death (PCD) – Senescence and its regulations, hormonal and environmental control of senescence. Molecular Biology of PCD; fruit ripening.

8.1. Senescence

8.1.1. Patterns of Senescence

8.1.2. Types of Senescence:

8.1.3. Structural and Physiobiochemical changes-Cell morphotypes:

8.1.4. Regulation of Senescence Process in Plants:

8.1.5. Significance of Senescence

8.2. Programmed cell death (PCD)

8.2.1. Types of Programmed Cell Death

8.2.2. PCD in vegetative plant tissues

8.2.3. PCD during reproductive period:

8.2.4. PCD in senescence

8.2.5. PCD in response to biotic stress & abiotic stress

8.2.6. Mechanism of Molecular regulations of PCD

8.3. Fruit Ripening

8.3.1. Types; Climacteric and Non-climacteric Fruit Ripening

8.3.2. Fruit Ripening Stages

8.3.3. Physiological Changes During Fruit Ripening

8.3.4. Role of Phytohormones

8.3.5. Genetic Regulation of fruit ripening

9. Physiology and molecular biology of stress – abiotic stress, biotic stress, heavy metals, reactive oxygen species and their protection mechanism.

9.1. Plant–environment interactions

9.2. General principles of Stress

9.3. Stress avoidance and tolerance and other molecular responses

9.4. Biotic stress

9.4.1. Interactions with Pathogens

9.4.2. Hypersensitive Response

9.4.3. Plant Defense Mechanisms to biotic stress

9.4.4. Effector-Triggered Responses

9.4.5. Signal Transduction SER and other

9.4.6. Phytohormones in Plant Defense

9.5. Abiotic Stress

9.5.1. Plant Responses to Abiotic Stress

9.5.2. Physiological aspects and Resistance Mechanisms

9.5.3. Molecular Aspects and genetic basis

9.5.4. Abiotic Stress-Induced Signal Transduction

9.6. Oxidative Stress

9.6.1. Cellular Antioxidative Defense System

9.7. Salt Stress

9.7.1. Salt Stress Tolerance Mechanisms

9.7.2. Physiological adjustment

9.7.3. Salt Stress-induced Signal Transduction

Summary:

Glossary

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References

PAPER: BOT 403 A

(SPECIAL PAPER)

MICROBIOLOGY- ADVANCE (SLM 49A – 52A)

Relevance of the unit
Objectives
Introduction

1. Bacterial fermentation process
- **1.1.** Role of microorganisms in the production of fermented dairy products
  - **1.1.1.** Youghurt, kefir, koumiss, butter milk, butter cheese
- **1.2.** Meat and fishery products,
- **1.3.** Plant products,
- **1.4.** Breads
- **1.5.** Applications of microbial enzymes in dairy industry.

2. Probiotics
- **2.1.** Concept of Probiotics
- **2.2.** Application of Probiotics.

3. Microbial metabolites
- **3.1.** Primary and secondary microbial metabolites
- **3.2.** Properties of industrial microorganisms.

4. Fermentation technology,
- **4.1.** Fermentor and its application,
- **4.2.** Fermentation scale up
- **4.3.** Industrial production of alcohol, organic acids, amino acids, antibiotics, enzymes.

5. Biopesticides,
- **5.1.** Concept
- **5.2.** Application of biopesticides,
- **5.3.** *Bacillus thuringiensis* as bacterial insecticide

6. Biopolymers (bacterial plastics),
- **6.1.** Application of biopolymers

7. Air microbiology
- **7.1.** Introduction
- **7.2.** Occurrence of aeromicroorganisms in indoor and outdoor environments

8. Water microbiology,
- **8.1.** Marine and fresh water microorganisms,
- **8.2.** microbial analysis of water, purification of water

9. Soil microbiology
- **9.1.** Soil microbes,
- **9.2.** Rhizosphere and rhizoplane microorganisms

10. Control of pollution by microbes

10.1. Bioremediation

11. Use and Applications of Microbes

11.1. Wastewater treatments

11.1.1. Sewage treatment,

11.1.2. Sewage microorganisms,

11.1.3. Generalised plan of a sewage treatment,

11.1.4. Small scale sewage treatment,

11.1.5. Large scale sewage treatment- primary and secondary treatment

11.2. Biodegradation of petroleum

11.3. Biodegradation of xenobiotics

11.4. Biofertilizers-

11.5. Concepts of biofertilizers

11.6. Steps for preparing biofertilizer,

11.7. Green manuring, Algae and other biofertilizer

11.8. Biogas production.

11.9. Microbial leaching of metal, copper leaching

12. Medical microbiology:

12.1. Principles of epidemiology

12.2. Air borne diseases

12.3. Transmission of food and water borne diseases

12.4. Immunological and serological methods in common medical practices.

13. Immunology

13.1. Immunoglobulin classes- IgG, IgA, IgM, IgE and IgD

13.2. Humoral and cell mediated immunity

13.3. Immunological memory

13.4. Mechanism of antibody diversity

13.5. Monoclonal antibody

13.6. Vaccine.

14. Basic concept on Bioinformatics

Summary:

Glossary

Self assessment Questions

References

PAPER: BOT 403 B

(SPECIAL PAPER)

BIOCHEMISTRY & MOLECULAR BIOLOGY (SLM 49B – 52B)

Relevance of the unit
Objectives
Introduction

1. Biosynthesis of carotenoids, amino acids, biological significance of carotenoids.
- **1.1.** Biosynthesis of carotenoid in plants
- **1.2.** Scheme of the Isoprenoid Biosynthetic Pathways in Plants
- **1.3.** Gene activation and Regulation of the carotenogenic pathway
- **1.4.** Significance of carotenoids

2. Proteins and Amino acids.
- **2.1.** Amino acids
  - **2.1.1.** Chemistry of Amino Acids
  - **2.1.2.** Classification of Amino Acids
  - **2.1.3.** Properties of Amino Acids
  - **2.1.4.** Essential Amino Acids
- **2.2.** Peptides
- **2.3.** Biologically active peptides
- **2.4.** Proteins
  - **2.4.1.** Classification of Proteins
  - **2.4.2.** Conformation of Proteins
  - **2.4.3.** Structural hierarchy of proteins
    - **2.4.3.1.** Secondary Structures
    - **2.4.3.2.** Tertiary Sturucture
    - **2.4.3.3.** Protein Domain and Motifs

3. Protein purification, characterization, methods for the determination of amino acids sequences in protein.

- **3.1.** Principles of protein purification
- **3.2.** Extracting proteins from biological samples
- **3.3.** Protein separations
  - **3.3.1.** Electrophoresis
  - **3.3.2.** Dialysis
  - **3.3.3.** Gel filtration chromatography
  - **3.3.4.** High-performance liquid chromatography
- **3.4.** Protein digestion
- **3.5.** Protein sequencing and peptide synthesis
  - **3.5.1.** Amino acid composition analysis
  - **3.5.2.** Edman Degradation
  - **3.5.3.** Sequencing strategy
  - **3.5.4.** Protein fingerprinting
  - **3.5.5.** Mass spectrometry muldi-ms- maldi-tof
- **3.6.** Information derived from protein sequences

4. Post translational modification of protein, protein targeting, protein transport, chaperon and protein folding.
- **4.1.** Post translational modification of protein
- **4.2.** Protein targeting
- **4.3.** Protein transport
- **4.4.** Protein folding

5. Signal Molecules, signal perception and transduction in plants.
- **5.1.** Signal Perception and Transduction
- **5.2.** Routes of Signal Perception, Transduction, and Response in Plants
- **5.3.** Spatial and Temporal Aspects of Signal Transduction
- **5.4.** Signal Perception
  - **5.4.1.** Signal Perception at the Plasma Membrane
  - **5.4.2.** Receptor Kinases
  - **5.4.3.** G-Protein-Coupled Receptors (GPCRs)
  - **5.4.4.** Ion Channel-Linked Receptors
- **5.5.** Signal Transduction
  - **5.5.1.** Secondary Messengers
    - **5.5.1.1.** Calcium inos (Ca+)
    - **5.5.1.2.** Cyclic nucleotides
    - **5.5.1.3.** MAP kinases
    - **5.5.1.4.** Lipid-signaling molecules
  - **5.5.2.** Significance of Secondary Messengers

6. Proteomics applied to functional genomics.
- **6.1.** Proteomics and Recombinant DNA technology
- **6.2.** Functional genomics
- **6.3.** Protein Database
- **6.4.** Reverse Genetics

Summary:

Glossary

Self-assessment Questions

References

SEM-I

CEM-101 - PHYSICAL CHEMISTRY-I

MATHEMETICAL PRELIMINARIES & QUANTUM MECHANICS-I: SLM No-1

SLM-1:Unit-1

1.1.1. Statements of Objectives

1.1.2. Introduction

1.1.3.1 Element of Calculus
- 1.1.3.1.1 Limit of a function
- 1.1.3.1.2 Worked examples of Limit of a function
- 1.1.3.1.3 Continuity
- 1.1.3.1.4 Examples of Continuity
- 1.1.3.1.5 Differential Coefficient (or derivative)
- 1.1.3.1.6 Examples of Differential Coefficient (or derivative)

1.1.3.2 Extremum Principle and Constrained Optimization
- 1.1.3.2.1 Maxima and Minima:Extreme values
- 1.1.3.2.2 Example
- 1.1.3.2.3 Sufficient conditions for the existence of extreme values
- 1.1.3.2.4 Extrema with two variables
- 1.1.3.2.5 Necessary conditions for Maximum and Minimum of extrema with two variables
- 1.1.3.2.6 Determination ofMaxima and Minima of extrema with two variables
- 1.1.3.2.7 Worked Examples
- 1.1.3.2.8 Lagrange's method of undetermined multipliers
- 1.1.3.2.9 Worked Examples

1.1.3.3 Power Series
- 1.1.3.3.1 Definition of a Power Series
- 1.1.3.3.2 Definition of radius of convergence and its determination
- 1.1.3.3.3 Properties of a power series
- 1.1.3.3.4 Examples of a power series

1.1.3.4 Fourier Transformation
- 1.1.3.4.1 Fourier Transform: Exponential Fourier Transform
- 1.1.3.4.2 Explanation of Fourier Transform
- 1.1.3.4.3 Examples of Fourier Transform
- 1.1.3.4.4 Some Elementary Properties on Fourier Transform
- 1.1.3.4.5 Fourier Transformation of Derivatives

1.1.3.4.6 Inverse Fourier Transform
1.1.3.4.7 Fourier Sine Transform
1.1.3.4.8 Fourier Cosine Transform
1.1.3.4.9 Examples of Fourier Sine Transform and Fourier Cosine Transform

1.1.3.5 Vectors
1.1.3.5.1 Collinear and Coplanar vectors
1.1.3.5.2 Examples
1.1.3.5.3 Scalar product of two vectors
1.1.3.5.4 Scalar product in terms of co-ordinates
1.1.3.5.5 Vector product of two vectors
1.1.3.5.6 Distributive law
1.1.3.5.7 Vector product in terms of co-ordinates
1.1.3.5.8 Scalar triple product
1.1.3.5.9 Volume of a tetrahedron
1.1.3.5.10 Vector triple product
1.1.3.5.11 Scalar product of four vectors
1.1.3.5.12 Vector product of four vectors:
1.1.3.5.13 Reciprocal system of vectors
1.1.3.5.14 Worked examples
1.1.3.5.15 Vector equation of a straight line
1.1.3.5.16 Condition of intersection of two straight lines
1.1.3.5.17 Shortest distance between two skew lines
1.1.3.5.18 Worked examples

1.1.3.6 Vector Space
1.1.3.6.1 External composition and its example
1.1.3.6.2 Vector space over a Field
1.1.3.6.3 Real vector space
1.1.3.6.4 Examples of vector space
1.1.3.6.5 Subspace
1.1.3.6.6 Theorem
1.1.3.6.7 Examples of Subspace
1.1.3.6.8 Linear combination and its example
1.1.3.6.9 Linear span and its example
1.1.3.6.10 Linear dependence and Linear independence
1.1.3.6.11 Examples of linearly dependent and linearly independent set of vectors
1.1.3.6.12 Dimension of a vector space
1.1.3.6.13 Basis. .
1.1.3.6.14 Example of basis

1.1.4. Unit Summery

1.1.5. Self Assessment Questions

1.1.6. Suggested Further Readings

SLM-1: Unit-2

1.2.1. Objectives

1.2.2. Introduction

1.2.3. Keywords

1.2.4. Materials

1.2.4.1 Postulates of Quantum Mechanics

1.2.4.2 Properties of Operators and Commutators

1.2.4.3 Angular momentum Operator

1.2.4.4 Stationary Stat

1.2.4.5 Equation of Motion

1.2.4.6 Ehrenfest's Theorems

1.2.4.7 Barrier Problems

1.2.5. Summary

1.2.6. Self Assesment Questions

1.2.7. References

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-I

CEM-101 - PHYSICAL CHEMISTRY-I

THERMODYNAMICS: SLM No-2

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-I

CEM-101 - PHYSICAL CHEMISTRY-I

STATISTICAL MACHANICS - I: SLM No-3

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-I

CEM-101 - PHYSICAL CHEMISTRY-I

FUNDAMENTALS OF NANOSCIENCE AND TECHNOLOGY: SLM No-4

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-I

CEM-101 - PHYSICAL CHEMISTRY-I

PRINCIPLE OF MOLECULAR SPECTROSCOPY-I: SLM No-5

5.1. Objectives

5.2. Introduction

5.3. Key Words

5.4. Study Material

- 5.4.1 Rotational Spectroscopy
  - 5.4.1.1 Mechanism of interaction between radiation and the rotating molecule.
  - 5.4.1.2 Rotational angular momentum and the classification of molecules.
  - 5.4.1.3 Diatomic molecule (Rigid rotator model).
  - 5.4.1.4 Effect of isotopic substitution.
  - 5.4.1.5 Frequency of rotation of rigid rotation with its rotational quantum number 'J'.
  - 5.4.1.6 Degeneracy of the rotational levels.
  - 5.4.1.7 Relative population of various rotational levels.
  - 5.4.1.8 Calculation of J_{max}
  - 5.4.1.9 Non-rigid rotator
- 5.4.2 Vibrational or Infrared spectra.
  - 5.4.2.1 Simple Harmonic Oscillator.
  - 5.4.2.2 Necessary Conditions for a molecule to be IR active.
  - 5.4.2.3 An harmonic Oscillator.
  - 5.4.2.4 A critical analysis of vibrational spectra.

5.5. Summary

5.6. Model Question

5.7. Self Assessment Question

5.8. Reference

SEM-I

CEM-102 - ORGANIC CHEMISTRY-I

PERICYCLIC REACTION I: SLM No-6

6.1. Relevance

6.2. Objectives

6.3. Introduction

6.4. Keywords

6.5. Pericyclic Reaction

- 6.5.1 Classifications
  - 6.5.1.1 Electrocyclic Reaction
    - 6.5.1.1.1 Conservation of orbital symmetry
    - 6.5.1.1.2 MO of different polyenes and Wood Word Hofmann symmetry rules
  - 6.5.1.2 Sigmatropic rearrangements
  - 6.5.1.3 Cycloaddition reaction
  - 6.5.1.4 Cheletropic Reaction
  - 6.5.1.5 Ene Reactions
  - 6.5.1.6 Dyotropic Rearrangements
- 6.5.2 Correlation Diagrams
- 6.5.3 General Formulation
- 6.5.4 Equivalence of other theoretical models

6.6. Summary

6.7. Model Question and Answer

6.8. Self Assessment Question

6.9. References

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-I

CEM-102 - ORGANIC CHEMISTRY-I

ORGANIC TRANSFORMATIONS/ REAGENT CHEMISTRY/SYNTHESIS-I: SLM No-7

7.1. Objective

7.2. Introduction

7.3. Keywords

7.4. Subject discussion

7.4.1 Cation olefin cyclization reaction

7.4.2 Fragmentation reaction

7.4.3 Remote functionalization

7.4.4 Biomimetic reaction/template effect, examples

7.4.5 Functional group interconversion

7.4.6 Multicomponent reactions

7.4.7 Olefinmetathesis reaction

7.4.8 Phase transfer catalysis

7.5. Summary

7.6. Model question and answer

7.7. Self assessment question

7.8. References

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-I

CEM-102 - ORGANIC CHEMISTRY-I

NATURAL PRODUCTS-TERPENOIDS: SLM No-8

8.1. Objectives

8.2. Introduction

8.3. Keywords

8.4. Materials

8.4.1.1 Isoprene rule
8.4.1.2 Special isoprene rule

8.4.2 Classification of terpenoids

8.4.3 Isolation of mono and sesquiterpenoids

8.4.4 General properties of terpenoids

8.4.5 General method for the structure elucidation

8.4.6 Structure elucidation of some selected terpenoids

8.4.6.1 Citral
8.4.6.2 Geraniol
8.4.6.3 Nerol
8.4.6.4 Linalool

8.4.7 Cyclisation reaction of monoterpenoids

8.4.8 Monocyclic monoterpenoids

8.4.8.1 α-Terpineol
8.4.8.2 β-Terpineol
8.4.8.3 γ-Terpineol
8.4.8.4 1, 8- Terpin, Terpin or 1, 8- Menthanediol
8.4.8.5 Menthol and Menthone

8.4.9 Bicyclic monoterpenoids

8.4.9.1 Camphor

8.4.10 Sesquiterpenoids

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

8.4.10.1 Farnesol
8.4.10.2 Bisabolene
8.4.10.3 Zingiberene
8.4.10.4 Cadinene

8.4.11 Tricyclic Sesquiterpenoids

8.4.12 Diterpenoids

8.4.12.1 Phytol
8.4.12.2 Abietic acid

8.4.13 Triterpenoids

8.4.13.1 Squalene

8.4.14 Tetraterpenoids

8.4.14.1 Phytoene

8.4.15 Biosynthetic pathway of terpenoids

8.4.15.1 Mevalonic acid pathway
8.4.15.2 MEP/DOXP pathway
8.4.15.3 Reactions involved in MEP/DOXP pathway

8.4.16 Biosynthesis of subclasses

8.4.17 Biosynthesis of Monoterpene

8.4.18 Biosynthesis of Squalene

8.4.19 Biosynthesis of carotene

8.4.20 Biosynthesis of Phytol & α-Tocopherol

8.5. Summary

8.6. Model questions & Answers

8.7. Self Assessment Questions

8.8. References

SEM-I

CEM-102 - ORGANIC CHEMISTRY-I

NATURAL PRODUCTS - ALKALOIDS: SLM No-9

9.1. Objectives

9.2. Introduction

9.3. Key words

9.4.1 General Properties of Alkaloids

9.4.1.1 Occurrences

9.4.1.2 Functions of alkaloids in the plant

9.4.1.3 Nomenclature

9.4.1.4 Classification

9.4.1.5 Isolation

9.4.1.6 Properties

9.4.2Determination of molecular structure of alkaloids

9.4.3 Structure elucidation of some selected alkaloids

9.4.3.1 Phenylethylamine alkaloids

9.4.3.1.1 Ephedrine

9.4.3.1.2 Benzedrine (amphetamine)

9.4.3.1.3 Adrenaline

9.4.3.1.4 Noradrenaline

9.4.3.2 Pyridine-Pyrolidine alkaloids

9.4.3.2.1 Nicotine (*Tobacco alkaloids*)

9.4.3.2.2 Quinine

9.4.4 Peptides

9.4.4.1 The Peptide Bonds

9.4.4.2 The Primary Structures of Peptides

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-I

CEM-102 - ORGANIC CHEMISTRY-I

RETROSYNTHETIC ANALYSIS-I: SLM No-10

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-I

CEM-103 - INORGANIC CHEMISTRY-I

SYMMETRY AND GROUP THEORY-I: SLM No-11

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-I

CEM-103 - INORGANIC CHEMISTRY-I

SOLID STATE CHEMISTRY AND CRYSTALLOGRAPHY: SLM No-12

12.1. Objective

12.2. Introduction

12.3. Keywords

12.4. Materials

12.4.1 Defects in solids

12.4.2 Line and plane defects

12.4.3 Deterination of equilibrium concentration of Schottky and Frenkel defects

12.4.4 Stoichimetric imbalance in crystals and non-stoichiometric phases

12.4.5 Color centres in ionic crystals

12.4.6 Band theory, band gap

12.4.7 Metals, insulators, semiconductors (intrinsic and extrinsic)

12.4.8 Hopping semiconductors

12.4.9 Rectifiers and transistors

12.4.10 Bonding in metal crystals

12.4.10.1 Free electron theory
12.4.10.2 Electronic specific heat
12.4.10.3 Hall effect
12.4.10.4 Electrical and thermal conductivity of metals
12.4.10.5 Superconductivity
12.4.10.6 Meissner effect
12.4.10.7 Basic concepts of BCS (Bardeen-Copper-Schriffer) theory

12.4.11 Crystalline solid

12.4.11.1 Single crystal and polycrystal (twinning problem) lattice
12.4.11.2 Unit cell-primitive and non-primitive unit cells
12.4.11.3 Unit cell parameters and crystal systems

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

12.4.12 Space group-Hermann–Mauguin notations

12.4.13 Space group in triclinic and monoclinic system

12.4.14 Indexing of lattice planes

12.4.15 Miller indices

12.4.16 Bragg‟s equation

12.4.17 Reciprocal lattice and its relation to direct lattice

12.4.18 Bragg‟s reflection in terms of reciprocal lattice-sphere of reflection and limiting sphere

12.4.19 Relation between d_{hkl} and lattice parameters

12.5. Summary

12.6. Model Question

12.7. Self Assessment Question

12.8. References

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-I

CEM-103 - INORGANIC CHEMISTRY-I

BIOINORGANIC CHEMISTRY-I: SLM No-13

13.1. Objectives

13.2. Introduction

13.3. Key words

13.4.1 Essential elements in Biology

13.4.2 Beneficial and Toxic Role of Some metal Ions

13.4.3 Bioenergetic principle and role of ATP

13.4.4 O_2-uptake proteins

13.4.4.1 Haemoglobin (Hb) and Myoglobin (Mb)
13.4.4.1.1 Oxygen binding
13.4.4.1.2 Bohr effect
13.4.4.1.3 Model systems: Synthetic Oxygen Carrier
13.4.4.2 Hemerythrin
13.4.4.3Hemocyanin

13.4.5 Electron Transport Proteins

13.4.5.1 Rubredoxin
13.4.5.2 Ferredoxins
13.4.5.2.1 [2Fe-2S] Ferredoxins
13.4.5.2.2 [4Fe-4S] Ferredoxins
13.4.5.2.3 [8Fe-8S] Ferredoxins

13.4.6 Metal Ions Transport and Storage Proteins
13.4.6.1 Transport and Storage of Iron
13.4.6.1.1 Transferrin
13.4.6.1.2 Ferritin
13.4.6.2 Transport and Storage of Copper
13.4.6.2.1 Ceruloplasmin

13.4.7 Transport Across biological Membrane

13.4.7.1 Na+-K+-ATPase: Na+ ion pump

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-I

CEM-104 - INDUSTRIAL CHEMISTRY-I

FLUID DYNAMICS: SLM No-14A

SEM-I

CEM-104 - INDUSTRIAL CHEMISTRY-I

HEAT TRANSFER OPERATION: SLM No-15A

15A.1. Objectives

15A.2. Introduction

15A.3. Key Words

15A.4. Materials

- 15A.4.1 BasicMechanism of Heat Transfer
  - 15A.4. 1.1 Conduction
  - 15A.4.1.2 Convection
  - 15A.4.1.3 Radiation
- 15A.4.2 Steady and unstedy State of Heat Transformation
- 15A.4.3 Fourier Law of Heat Conduction
  - 15A.4.3.1 Conduction through a flat slab or wall
  - 15A.4.3.2 Conduction through a hollow cylinder
  - 15A.4.3.3 Conduction through a hollow sphere
- 15A.4.4 Conduction through solid in series
- 15A.4.5 Unsteady – steady heat conduction equation
- 15A.4.6 Natural and Forced Convection
  - 15A.4.6.1 Convection heat transfer coefficient
  - 15A.4.6.2 Combined convection and conduction and overall coefficient
  - 15A.4.6.3 Log mean temperature difference and varying temperature drop
- 15A.4.7 Heat Exchange
  - 15A.4.7.1 Double pipe heat exchanger
  - 15A.4.7.2 Shell andTube Exchanger
  - 15A.4.7.3 Cross flow Exchanger
- 15A.4.8 Radiation Heat Transfer
  - 15A.4.8.1 Nature of radient heat Transfer
  - 15A.4.8.2 Absorptivity and Mack-body
  - 15A.4.8.3 Radiation from a body and emissivity
  - 15A.4.8.5 Radiation to a small object from surrounding
  - 15A.4.8.6 Radiation Spectrum

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

15A.4.8.6.1 Radiation Spectrum and thermal radiation
15A.4.8.6.2 Planck's law and Emissive Power
15A.4.8.6.3 Stefan-Boltzman law
15A.4.8.6.4 Emissivity and Kirchhoff's law
15A.4.8.6.5 Concept of Gray-Body

15A.5. Summary

15A.6. Model Questionand Answer

15A.7. Self Assessment Question

15A.8. References

SEM-I

CEM-104 - INDUSTRIAL CHEMISTRY-I

UNIT PROCESSES: SLM No-16A

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-I

CEM-104 - INDUSTRIAL CHEMISTRY-I

STOICHIOMETRY: SLM No-17A

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-I

CEM-104 - FOOD PROCESSING AND PRESERVATION

CONSTITUENTS OF FOOD: SLM No-14B

14B.1. Objective

14B.2. Introduction

14B.3. Keywords

14B.4. Material

- 14B.4.1 Water
  - 14B.4.1.1 Water in foods and its properties
- 14B.4.2 Carbohydrates
  - 14B.4.2.1 Sources and physico-chemical and functional properties
- 14B.4.3 Proteins
  - 14B.4.3.1 Sources and physico-chemical and functional properties
  - 14B.4.3.2 Purification of proteins
  - 14B.4.3.3 Common food proteins
- 14B.4.4 Lipids
  - 14B.4.4.1 Sources and physico chemical and functional properties
  - 14B.4.4.2 PUFA (Polyunsaturated Fatty Acids)
  - 14B.4.4.3 Lipids of biological importance like cholesterol and phospholipids
  - 14B.4.4.4 Hydrogenation and rancidity of lipids
  - 14B.4.4.5 Saponification number
  - 14B.4.4.6 iodine value of lipids,
- 14B.4.5 Vitamins and Minerals
  - 14B.4.5.1 Sources, classification and structures of minerals & vitamins
  - 14B.4.5.2 Effect of processing and storage of vitamins
  - 14B.4.5.3 Pro vitamins A & D
  - 14B.4.5.4 Vitamins as antioxidants
- 14B.4.6 Food Pigments & Flavouring Agents
  - 14B.4.6.1 Importance, types and sources of pigments
  - 14B.4.6.2 Changes during processing and storages

14B.5. Summary

14B.6. Model Question

14B.7. Self Assessment Question

14B.8. References

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-I

CEM-104 - FOOD PROCESSING AND PRESERVATION

INTRODUCTION TO FOOD MICROBIOLOGY: SLM No-15B

15B.1. Objective

15B.2. Introduction

15B.3. Keywords

15B.4. Materials

- 15B.4.1 Definition
- 15B.4.2 Historical development and significance
- 15B.4.3 Factors influencing the growth and survival of microorganisms in foods
- 15B.4.4 Role of microbes in fermented foods and genetically modified foods
- 15B.4.5 Food spoilage
- 15B.4.6 Types and causes of food spoilage
- 15B.4.7 Microbiology of milk & milk products like cheese, butter, ice-cream
- 15B.4.8 Microbiology of meat, fish, poultry & egg and their products
- 15B.4.9 Microbiology of cereal and cereal products like bread, confectionary etc

15B.5. Summary

15B.6. Model Question

15B.7. Self Assessment Question

15B.8. References

SEM-I

CEM-104 - FOOD PROCESSING AND PRESERVATION

FOOD PRESERVATION: PRINCIPLES AND METHODS: SLM No-16B

16B.1. Objective

16B.2. Introduction

16B.3. Keywords

16B.4. Materials

- 16B.4.1 Canning
  - 16B.4.1.1 Preservation principle of canning of food items
  - 16B.4.1.2 Thermal process time calculations for canned foods
  - 16B.4.1.3 Spoilage in canned foods
- 16B.4.2 Dehydration and drying of food items
  - 16B.4.2.1 Water activity of food and its significance in food preservation
  - 16B.4.2.2 IMF
- 16B.4.3 Low temperature preservation
  - 16B.4.3.1 Freezing and cold storage
  - 16B.4.3.2 Cold chain
- 16B.4.4 Preservation by fermentation
  - 16B.4.4.1 Curing and pickling
- 16B.4.5 Use of preservative in foods
  - 16B.4.5.1 Chemical preservative, biopreservatives, antibiotics, lactic acid bacteria
- 16B.4.6 Hurdle technology

16B.5. Summary

16B.6. Model Question

16B.7. Self Assessment Question

16B.8. References

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-I

CEM-104 - COMPUTER BASICS

COMPUTER BASICS-I: SLM No-18

18.1. Objective

18.2. Introduction

18.3. Keywords

18.4. Materials

- 18.4.1 Block diagram of a computer, Functions of the Different Units
- 18.4.2 Input unit, Output unit, Memory unit, CPU (ALU+CU)
- 18.4.3 Input Devices
- 18.4.4 Output Devices
- 18.4.5 Memories
- 18.4.6 Software
- 18.4.7 Data storage
- 18.4.8 Conversion from one number system to another number system, Codes, ASCII, BCD
- 18.4.9 Arithmetic Operation for Binary Numbers
- 18.4.10 Representation of numbers in 1's and 2's Complement method
- 18.4.11 Subtraction using 1's and 2's Complement method

18.5. Summary

18.6. Model Question

18.7. Self Assessment Question

18.8. References

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-I

CEM-104 - COMPUTER BASICS

COMPUTER BASICS – II: DATA MANIPULATION: SLM No-19

SEM-II

CEM-201 - PHYSICAL CHEMISTRY-II

QUANTUM MECHANICS-II: SLM No-20

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-II

CEM-201 - PHYSICAL CHEMISTRY-II

CHEMICAL KINETICS-I: SLM No-21

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-II

CEM-201 - PHYSICAL CHEMISTRY-II

ELECTROCHEMISTRY: SLM No-22

22.1. Objectives

22.2. Introduction

22.3. Keywords

22.4. Materials

- 22.4.1 Debye – Huckel Theory of Strong Electrolytes
  - 22.4.1.1 Assuptions
  - 22.4.1.2 Activity and Activity Coefficients of Electrolytes
  - 22.4.1.3 Ionic Strength
- 22.4.2 Debye –Huckel Theory of Strong Electrolytes – A Quantitative Treatment : Derivation of Limiting Law or Expression For Activity Coefficient
  - 22.4.2.1 Assumptions
  - 22.4.2.2 Details of the derivation
    - Ionic atmosphere
    - Poisson equation
    - Linearisation of Boltzmann equation
    - Linearised Poisson – Boltzmann equation
    - Solution of linearised P – B equation
    - Thickness of the Ionic atmosphere
    - Activity coefficient and Interionic attraction
    - Effect of finite size of the ion on the activity coefficient
    - Mean activity coefficient of the electrolytic
    - Mean activity coefficient related to ionic strength
- 22.4.3 Verification of the Debye–Huckel equation
- 22.4.4 Modifications of the Debye – Huckel limiting law
  - 22.4.4.1 Correction for ion size
  - 22.4.4.2 Correction for linearization of the P-B equation
  - 22.4.4.3 Correction for ion – association
  - 22.4.4.4 Correction for solvation of ions
- 22.4.5 Transport Properties of Electrolytes and Electrolytic Conductance Theory and derivation of the Limiting Laws Concerned
  - 22.4.5.1 Transport Properties
  - 22.4.5.2 Diffusion
  - 22.4.5.3 Migration Conduction
  - 22.4.5.4 Hydrodynamic Flow

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-II

CEM-201 - PHYSICAL CHEMISTRY-II

MOLECULAR SPECTROSCOPY-II: SLM No-23

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-II

CEM-201 - PHYSICAL CHEMISTRY-II

SURFACE CHEMISTRY: SLM No-24

24.1. Relevance of the Unit

24.2. Objectives`

24.3. Introduction

24.4. Keyword

24.5. Material

- 24.5.1 Pressure drop across a curved surface Young-Laplace equation.
- 24.5.2Vapour pressure of a droplet: Kelvin equation
- 24.5.3 Surface Concentration: Gibbs Adsorption equation.
- 24.5.4Surface films: Two-dimensional perfect gas law.
- 24.5.5 Adsorption by solids
  - 24.5.5.1 Langmuir Adsorption equation
  - 24.5.5.2 BET Adsorption equation
- 24.5.6 Surfactants, micelles, reverse micelles and Emulsions and their applications.

24.6. Summary

24.7. Model Question Answer

24.8. Self Assessment Questions

24.9. Reference

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-II

CEM-202 - ORGANIC CHEMISTRY-II

PERICYCLIC REACTION II: SLM No-25

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-II

CEM-202 - ORGANIC CHEMISTRY-II

ORGANIC TRANSFORMATIONS/REAGENT CHEMISTRY/SYNTHESIS-II

: SLM No-26

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-II

CEM-202 - ORGANIC CHEMISTRY-II

RETRO SYNTHETIC ANALYSIS-II: SLM No-27

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-II

CEM-202 - ORGANIC CHEMISTRY-II

STEREOCHEMISTRY I: SLM No-28

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-II

CEM-202 - ORGANIC CHEMISTRY-II

STEREOCHEMISTRY II: SLM No-29

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-II

CEM-203 - INORGANIC CHEMISTRY-II

ORGANOMETALLIC CHEMISTRY –I: SLM No-30

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-II

CEM-203 - INORGANIC CHEMISTRY-II

GROUP THEORY-II: SLM No-31

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-II

CEM-203 - INORGANIC CHEMISTRY-II

CHEMISTRY OF *p* AND *d*-BLOCK ELEMENTS: SLM No-32

SLM-32: Unit-1

32.1.1. Objectives

32.1.2. Introduction: Cluster

32.1.3. Key words

32.1.4. Materials

- 32.1.4.1 Boranes (Boron hydrides)
  - 32.1.4.1.1 Structure of B_2H_6
  - 32.1.4.1.2 Redistribution reactions of diborane
  - 32.1.4.1.3 Bonding and topology of boranes
  - 32.1.4.1.4 Different types of orbitals used in the formation of bonds in boranes
  - 32.1.4.1.5 The molecular orbital energy diagram of diborane molecule
  - 32.1.4.1.6 Interrelationship among boranes and Wade's rules
  - 32.1.4.1.7 Tabular summary of Wade's rules: Classification and electron count of boron hydrides
  - 32.1.4.1.8 Examples in understanding Wade's rules
  - 32.1.4.1.9 Different types of bonds in boron hydrides
  - 32.1.4.1.10 Elucidation of structure of boron hydrides
- 32.1.4.2 Carboranes
  - 32.1.4.2.1 Structure of some carboranes derived from the structure of boranes
- 32.1.4.3 Metallacarboranes
- 32.1.4.4 Boron-10 neutron capture therapy (BNCT)
- 32.1.4.5 Biomedical application of polyhedral boranes
- 32.1.4.6 Fullerenes
- 32.1.4.7 Graphite Intercalation Compound
- 32.1.4.8 Carbon nanotubes
  - 32.1.4.8.1 Synthesis of carbon nanotubes
  - 32.1.4.8.2 Applications of carbon nanotubes

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

32.1.4.9 Graphene

32.1.4.9.1 Applications of graphene

32.1.4.9.1.1 Graphene in batteries

32.1.4.9.1.2 Graphene electrodes for touch screens

32.1.4.9.1.3 Integrated circuits with graphene transistors

32.1.4.9.1.4 Biomedical applications

32.1.5. Summary

32.1.6. Self Assessment Questions

32.1.7. References

SLM-32:Unit-2

32.2.1. Objectives

32.2.2. Introduction

32.2.3. Keywords

32.2.4.1 Oxidation states, coordination number and redox behavior

32.2.4.2 Iso and hetero polyoxometalates

32.2.4.2.1 Synthesis of polyoxometalates

32.2.4.2.2 Reaction of polyoxometalates

32.2.4.2.3 Structure of polyoxometalates

32.2.4.2.4 Uses of polyoxometalates

32.2.4.3 Metal-dinitrogen and metal-dioxygen complexes

32.2.4.3.1 Binding modes

32.2.4.3.2 Metal-dinitrogen complexes

32.2.4.3.2.1 Synthesis of Metal-dinitrogen complexes

32.2.4.3.2.2 Reactivity of Metal-dinitrogen complexes

32.2.4.3.2.3 Nitrogen fixation and nitrogenase

32.2.4.3.3 Metal-dioxygen complexes

32.2.4.3.3.1 Hemoglobin and myoglobin

32.2.4.3.3.2 Vaska's complex

32.2.4.3.3.3 Hemocyanin

32.2.4.3.3.4 Synthesis of metal-dioxygen complexes

32.2.4.4 Octachlorodirhenateion

32.2.4.5 Molybdenum blue

32.2.4.6 Tungsten blue

32.2.4.7 Ruthenium red

32.2.4.8 Creutz-Taube complex

32.2.4.8.1 Synthesis of Creutz-Taube complex

32.2.4.8.2 Properties of Creutz-Taube complex

32.2.4.9 Vaska's complex

32.2.4.9.1 Synthesis of Vaska's complex

32.2.4.9.2 Properties of Vaska's complex

32.2.4.10 Niobium and Tantalum halide clusters

32.2.4.11 Uncommon oxidation state of transition metals by complex formation

32.2.5. Summary

32.2.6. Self Assessment Questions

32.2.7. References

SEM-II

CEM-204 - POLYMER CHEMISTRY-I

HIGH POLYMER SYSTEM: SLM No: 33A

33A.1. Objective

33A.2. Introduction

33A.3. Keywords

33A.4. Materials

- 33A.4.1 Basic principles
- 33A.4.2 Definition
- 33A.4.3 Origin and classification of polymers
- 33A.4.4 Structure-property Relationship
- 33A.4.5 Rubber, plastic and fibres

33A.5. Summary

33A.6. Model Question

33A.7. Self Assessment Question

33A.8. References

SEM-II

CEM-204 - POLYMER CHEMISTRY-I

IMPORTANTS OF SOME FUNDAMENTAL QUANTITES: SLM No: 34A

34A.1. Objective

34A.2. Introduction

34A.3. Keywords

34A.4. Materials

- 34A.4.1 Polymer characterization
- 34A.4.2 End groups
- 34A.4.3 Head to tail structure
- 34A.4.4 Molecular weight and molecular weight distribution
- 34A.4.5 Number average, weight average and viscosity average molecular weight of polymers
- 34A.4.6 Polydispersity index

34A.5. Summary

34A.6. Model Question

34A.7. Self Assessment Question

34A.8. References

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-II

CEM-204 - POLYMER CHEMISTRY-I

STEP GROWTH AND CONDENSATION POLYMERIZATION: SLM No: 35A

35A.1. Objective

35A.2. Introduction

35A.3. Keywords

35A.4. Materials

- 35A.4.1 Functionality principles
- 35A.4.2 Kinetics and mechanism of step growth polymerization
- 35A.4.3 Molecular weight control in linear stepwise polymerization
- 35A.4.4 Molecular weight distribution in condensation polymers
- 35A.4.5 Carothers equation and flory equation
- 35A.4.6 Prediction of gel point

35A.5. Summary

35A.6. Model Question

35A.7. Self Assessment Question

35A.8. References

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-II

CEM-204 - POLYMER CHEMISTRY-I

CHAIN GROWTH OR ADDITIONAL POLYMERIZATION: SLM No: 36A

36A.1. Objective

36A.2. Introduction

36A.3. Keywords

36A.4. Materials

- 36A.4.1 Free radical and ionic (cationic and anionic) poloymerization
- 36A.4.2 Kinetics and mechanism
- 36A.4.3 Degree of polymerization and its control
- 36A.4.4 Chain transfer

36A.5. Summary

36A.6. Model Question

36A.7. Self Assessment Question

36A.8. References

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-II

CEM-204 - POLYMER CHEMISTRY-I

ADDITIONAL ASPECTS OF POLYMERISATION: SLM No: 37A

37A.1. Objective

37A.2. Introduction

37A.3. Keywords

37A.4. Materials

- 37A.4.1 Copolymerzation
- 37A.4.2 Stereo regular polymerization
- 37A.4.3 Techniques of polymerization
- 37A.4.4 Mass, solution suspension, and emulsion polymerization

37A.5. Summary

37A.6. Model Question

37A.7. Self Assessment Question

37A.8. References

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-II

CEM-204 - NANOTECHNOLOGY: PRINCIPLES AND PRACTICES (CBCS)

INTRODUCTION: SLM No: 33B

33B.1. Objective

33B.2. Introduction

33B.3. Keywords

33B.4. Materials

- 33B.4.1 Bulk vs. Nano
- 33B.4.2 Geometric structure
- 33B.4.3 Magic numbers
- 33B.4.4 Co-ordination number of small clusters

33B.5. Summary

33B.6. Model Question

33B.7. Self Assessment Question

33B.8. References

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-II

CEM-204 - NANOTECHNOLOGY: PRINCIPLES AND PRACTICES (CBCS)

SYNTHESIS AND PROPERTIES OF NANOMATERIALS: SLM No: 34B

34B.1. Objective

34B.2. Introduction

34B.3. Keywords

34B.4. Materials

34B.4.1 Synthesis of nanomaterials

34B.4.1.1 Physical methods
34B.4.1.2 Chemical methods
34B.4.1.3 Biological methods

34B.4.2 Properties of Nanomaterials

34B.4.2.1 Mechanical properties
34B.4.2.2 Structural properties
34B.4.2.3 Melting of nanoparticles
34B.4.2.4 Electrical conductivity
34B.4.2.5 Optical properties
34B.4.2.6 magnetic properties

34B.5. Summary

34B.6. Model Question

34B.7. Self Assessment Question

34B.8. References

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-II

CEM-204 - NANOTECHNOLOGY: PRINCIPLES AND PRACTICES (CBCS)

ANALYSIS TECHNIQUES: SLM No: 35B

35B.1. Objective

35B.2. Introduction

35B.3. Keywords

35B.4. Materials

35B.4.1 Microscopes

35B.4.1.1 Optical microscopes
35B.4.1.2 Electron microscopes
35B.4.1.3 Scanning electron microscope
35B.4.1.4 Transmission electron microscope
35B.4.1.5 Scanning probe microscope
35B.4.1.6 Scanning tunneling microscope
35B.4.1.7 Atomic force microscope

35B.4.2 XRD

35B.4.3 Spectroscopies

35B.4.3.1 UV-VIS-NIR
35B.4.3.2 Infrared (FTIR)
35B.4.3.3 Photo luminescence
35B.4.3.4 XPS (X-ray photo electron spectroscopy)
35B.4.3.5 Anger electron spectroscopy

35B.5. Summary

35B.6. Model Question

35B.7. Self Assessment Question

35B.8. References

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-II

CEM-204 - NANOTECHNOLOGY: PRINCIPLES AND PRACTICES (CBCS)

APPLICATION OF NANOTECHNOLOGY: SLM No: 36B

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-III

CEM-301 - ADVANCED SPECTROSCOPY-I

PHOTOPHYSICAL PROCESSES: SLM No: 38

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-III

CEM-301 - ADVANCED SPECTROSCOPY-I

LASER AND ITS APPLICATIONS: SLM No: 39

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-III

CEM-301 - ADVANCED SPECTROSCOPY-I

EPR SPECTROSCOPY: SLM No: 40

40.1. Objective

40.2. Introduction

40.3. Keywords

40.4. Materials

- 40.4.1 Principle
- 40.4.2 Spin Hamiltonian (comparison to NMR spectra)
- 40.4.3 Energy of spinning electron in a magnetic field
- 40.4.4 EPR-instrumentation
- 40.4.5 Representation of EPR spectrum
- 40.4.6 X-band and Q-band spectra
- 40.4.7 Line width
- 40.4.8 Hyperfine splitting
- 40.4.9 Magnetically equivalent and nonequivalent sets of nuclei
- 40.4.10 *g*-anisotropy
- 40.4.11 Spectra of simple organic free radicals
  - 40.4.11.1 expected number of lines, intensities
- 40.4.12 Spectra of transition metal complexes
- 40.4.13 Metal hyperfine anisotropic spectra
- 40.4.14 Zero-field splitting
- 40.4.15 Application: determination of oxidation state of metal ion in samples

40.5. Summary

40.6. Model Question

40.7. Self Assessment Question

40.8. References

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-III

CEM-301 - ADVANCED SPECTROSCOPY-I

PES AND NQR SPECTROSCOPY: SLM No: 41

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-III

CEM-302 - ADVANCED PHYSICAL CHEMISTRY-I

MATRIX MECHANICS : SLM No: 42-P

42-P.1. Objective

42-P.2. Introduction

42-P.3. Key Words

42-P.4. Study Materials

42-P.4.1 Basis and representations,

42-P.4.2 Elementary matrix properties,

42-P.4.3 Unitary and similarity transformation in quantum mechanics,

42-P.4.4 Energy representations, angular momentum matrices, the pauli spin matrices.

42-P.4.5 Matrix eigen value problem. Linear variational principle and matrix.

42-P.5. Summery

42-P.6. Model Questions

42-P.7. Self Assessment Questions

42-P.8. References

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-III

CEM-302 - ADVANCED PHYSICAL CHEMISTRY-I

STATIONARY PERTURBATION THEORY: SLM No: 43-P

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-III

CEM-302 - ADVANCED PHYSICAL CHEMISTRY-I

SEMICLASICAL TREATMENT OF RADIATION-MATTER INTERACTION:

SLM No: 44-P

SEM-III

CEM-302 - ADVANCED PHYSICAL CHEMISTRY-I

SEMIEMPIRICAL METHODS OF QUANTUM CHEMISTRY: SLM No: 45-P

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-III

CEM-302 - ADVANCED PHYSICAL CHEMISTRY-I

GROUP THEORY AND QUANTUM MECHANICS: SLM No: 46-P

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-III

CEM-303 - ADVANCED PHYSICAL CHEMISTRY-II

SOLID STATE CHEMISTRY- I: SLM No: 47-P

47-P.1. Objective

47-P.2. Introduction

47-P.3. Key Words

47-P.4. Study Materials

- 47-P.4.1 Electrical conductivity of metals
- 47-P.4.2 Free electron theory of metals (classical and quantum theory)
- 47-P.4.3 X-ray diffraction, Laue's diffraction, atomic scattering factor and geometrical structure factor
- 47-P.4.4 Hall effect, Lattice vibration: phonon and exciton, superconductors.

47-P.5. Summery

47-P.6. Model Questions

47-P.7. Self Assessment Questions

47-P.8. References

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-III

CEM-303 - ADVANCED PHYSICAL CHEMISTRY-II

SOLID STATE CHEMISTRY- II: SLM No: 48-P

48-P.1. Objective

48-P.2. Introduction

48-P.3. Key Words

48-P.4. Study Materials

48-P.4.1 Defects in solids: Point, line and plane defects

48-P.4.2 Determination of equilibrium concentration of schottky defect and Frenkel defects

48-P.4.3 Stoichiometric imbalance in crystals

48-P.4.4 Band theory: band gap, metal, insulators, semiconductors (intrinsic and extrinsic), hopping semiconductors; rectifiers and transistors.

48-P.5. Summery

48-P.6. Model Questions

48-P.7. Self Assessment Questions

48-P.8. References

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-III

CEM-303 - ADVANCED PHYSICAL CHEMISTRY-II

STATISTICAL MECHANICS-II: SLM No: 49-P

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-III

CEM-303 - ADVANCED PHYSICAL CHEMISTRY-II

STATISTICAL MECHANICS-III: SLM No: 50-P

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-III

CEM-303 - ADVANCED PHYSICAL CHEMISTRY-II

NON-EQUILIBRIUM THERMODYNAMICS: SLM No: 51-P

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-III

CEM-302 - ADVANCED ORGANIC CHEMISTRY-I

PERICYCLIC REACTION III: SLM No: 42-O

42-O.1. Objective

42-O.2. Introduction

42-O.3. Keywords

42-O.4. Materials

- 42-O.4.1 Electrocyclic reactions
- 42-O.4.2 Sigmatropic rearrangement
- 42-O.4.3 Cycloaddition reactions
- 42-O.4.4 Cycloreversion reactions
- 42-O.4.5 Cheletropic reactions
- 42-O.4.6 Ene reaction
- 42-O.4.7 Frontier Molecular Orbital theory
- 42-O.4.8 Concept of aromaticity of Transition States
- 42-O.4.9 Orbital correlation diagrams
- 42-O.4.10 Huckel MO theory
  - 42-O.4.10.1 MO's of chains and rings alternants and nonalternants

42-O.5. Summary

42-O.6. Model Questions

42-O.7. Self Assessment Question

42-O.8. References

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-III

CEM-302 - ADVANCED ORGANIC CHEMISTRY-I

LINEAR FREE ENERGY RELATIONSHIP-I: SLM No: 43-O

SEM-III

CEM-302 - ADVANCED ORGANIC CHEMISTRY-I

LINEAR FREE ENERGY RELATIONSHIP-II: SLM No: 44-O

SEM-III

CEM-302 - ADVANCED ORGANIC CHEMISTRY-I

ORGANOMETALLIC CHEMISTRY: SLM No: 45-O

SEM-III

CEM-303 - ADVANCED ORGANIC CHEMISTRY-II

BIOORGANIC AND SUPRAMOLECULAR CHEMISTRY-I: SLM No: 46-O

46-O.1. Objective

46-O.2. Introduction

46-O.3. Keywords

46-O.4. Materials

- 46-O.4.1 Crown ethers
  - 46-O.4.1.1 Discovery
  - 46-O.4.1.2 Nomenclature
  - 46-O.4.1.3 Synthesis
  - 46-O.4.1.4 Properties
  - 46-O.4.1.5 Applications
- 46-O.4.2 Cryptands
  - 46-O.4.2.1 Structures
  - 46-O.4.2.2 Applications
- 46-O.4.3 Molecular Recognition
  - 46-O.4.3.1 Definition
  - 46-O.4.3.2 Examples of molecular recognition
    - 46-O.4.3.2.1 Utilizing H-bonding interaction
    - 46-O.4.3.2.2 Utilizing electrostatic interaction
    - 46-O.4.3.2.3 Utilizing solvophobic interaction
    - 46-O.4.3.2.4 Utilizing pi-pi interaction
  - 46-O.4.3.3 Application of molecular recognition
- 46-O.4.4 H-bonding in molecular organization
- 46-O.4.5 Chiral recognition
- 46-O.4.6 Introduction to molecular mechanics calculation and its use in the design of molecular receptors

46-O.5. Summary

46-O.6. Model Questions

46-O.7. Self Assessment Question

46-O.8. References

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-III

CEM-303 - ADVANCED ORGANIC CHEMISTRY-II

BIOORGANIC AND SUPRAMOLECULAR CHEMISTRY-II: SLM No: 47-O

SEM-III

CEM-303 - ADVANCED ORGANIC CHEMISTRY-II

BIOORGANIC AND SUPRAMOLECULAR CHEMISTRY-III: SLM No: 48-O

48-O.1. Objective

48-O.2. Introduction

48-O.3. Keywords

48-O.4. Materials

- 48-O.4.1 Self-assembling systems
  - 48-O.4.1.1 Micelles and Reverse micelles
  - 48-O.4.1.2 Vesicles
  - 48-O.4.1.3 Fibers and Tubules
  - 48-O.4.1.4 Amphiphiles and Bola-amphiphiles
- 48-O.4.2 Self replication
- 48-O.4.3 Gels
  - 48-O.4.3.1 Definition, Classification, Examples
  - 48-O.4.3.2 Study of the morphology and rheology of gels
  - 48-O.4.3.3 applications
- 48-O.4.4 Chemical sensors
- 48-O.4.5 Photo-responsive systems
- 48-O.4.6 Dye sensitized solar cell
- 48-O.4.7 Liquid Crystals
- 48-O.4.8 Molecular Electronic devices
- 48-O.4.9 Organic conductors

48-O.5. Summary

48-O.6. Model Questions

48-O.7. Self Assessment Question

48-O.8. References

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-III

CEM-303 - ADVANCED ORGANIC CHEMISTRY-II

PEPTIDES AND NUCLEIC ACIDS: SLM No: 49-O

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-III

CEM-303 - ADVANCED ORGANIC CHEMISTRY-II

GREEN CHEMISTRY: SLM No: 50-O

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-III

CEM-304 - POLYMER CHEMISTRY-II

PLASTIC TECHNOLOGY: SLM No: 52A

52A.1. Objective

52A.2. Introduction

52A.3. Keywords

52A.4. Materials

- 52A.4.1 Synthesis
- 52A.4.2 Properties
- 52A.4.3 Uses and application of
  - 52A.4.3.1 Polyethylene
  - 52A.4.3.2 Polypropylene
  - 52A.4.3.3 Ethylene copolymers
  - 52A.4.3.4 Polystyrene
  - 52A.4.3.5 Polyvinyl chloride
  - 52A.4.3.6 Acrylics
  - 52A.4.3.7 Acetal resins
  - 52A.4.3.8 Cellulosics
  - 52A.4.3.9 Polycarbonates

52A.5. Summary

52A.6. Model Questions

52A.7. Self Assessment Question

52A.8. References

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-III

CEM-304 - POLYMER CHEMISTRY-II

RESINS: SLM No: 53A

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-III

CEM-304 - POLYMER CHEMISTRY-II

PROCESSING TECHNOLOGY: SLM No: 54A

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-III

CEM-304 - POLYMER CHEMISTRY-II

RUBBER TECHNOLOGY: SLM No: 55A

SEM-III

CEM-304 - POLYMER CHEMISTRY-II

SUBSTITUTED POLYMER AND RUBBER: SLM No: 56A

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-III

CEM-304 - PHARMACEUTICAL CHEMISTRY

INTRODUCTION OF PHARMACEUTICAL CHEMISTRY: SLM No-52B

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-III

CEM-304 - PHARMACEUTICAL CHEMISTRY

CLASSIFICATION AND NOMENCLATURES OF DRUGS: SLM No-53B

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-III

CEM-304 - PHARMACEUTICAL CHEMISTRY

THEORY OF DRUG ACTION AND FACTORS AFFECTING THE DRUGS:

SLM No-54B

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-III

CEM-304 - PHARMACEUTICAL CHEMISTRY

TYPES OF DRUGS: SLM No-55B

55B.1. Objective

55B.2. Introduction

55B.3. Keywords

55B.4. Materials

55B.4.1.1 Hyponotics and sedative drugs
55B.4.1.2 Anticonvulsivant and analgesic drugs
55B.4.1.3 General anaesthetics and local anaesthetics
55B.4.1.4 Expectorant
55B.4.1.5 Psychoactive and nervous system stimulant drugs
55B.4.1.6 Antiperkinson
55B.4.1.7 Antihistamine
55B.4.1.8 Anti-inflammatory and antipyretic drugs

55B.4.2.1 Antiamoebic
55B.4.2.2 Antifungal and antiviral drugs
55B.4.2.3 Antineoplastic agents
55B.4.2.4 Disinfectant and Antiseptic
55B.4.2.6 Thyroid hormones and Antithyroid drugs
55B.4.2.7 Vitamins
55B.4.2.8 Sulfonamides and antibiotics

55B.5. Summary

55B.6. Model Questions

55B.7. Self Assessment Question

55B.8. References

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-III

CEM-304 - PHARMACEUTICAL CHEMISTRY

ANTIMALARIAL DRUGS: SLM No-56B

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-IV

CEM-401 - ADVANCED SPECTROSCOPY-II

NMR SPECTROSCOPY-I: SLM No: 57

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-IV

CEM-401 - ADVANCED SPECTROSCOPY-II

NMR SPECTROSCOPY-II: SLM No: 58

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-IV

CEM-401 - ADVANCED SPECTROSCOPY-II

MASS SPECTROSCOPY: SLM No: 59

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-IV

CEM-401 - ADVANCED SPECTROSCOPY-II

COMBINED APPLICATION OF SPECTROSCOPIC TECHNIQUES: SLM No: 60

60.1. Objective

60.2. Introduction

60.3. Keywords

60.4. Materials

60.4.1 Combined application of spectroscopic techniques (UV, IR, NMR, MS) in elucidation of structure and study of reactions of organic compounds

60.5. Summary

60.6. Model Questions

60.7. Self Assessment Question

60.8. References

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-IV

CEM-401 - ADVANCED SPECTROSCOPY-II

CD ORD AND MOSSBAUER SPECTROSCOPY: SLM No: 61

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-IV

CEM-402 - ADVANCED PHYSICAL CHEMISTRY-III

QUANTUM MECHANICS OF MANY ELECTRON SYSTEMS-I: SLM No: 62-P

62-P.1. Objective

62-P.2. Introduction

62-P.3. Key Words

62-P.4. Study Materials

- 62-P.4.1 Identical particle and Pauli's Antisymmetry principle
- 62-P.4.2 Slater determinant for system with more than two electrons
- 62-P.4.3 Eigen functions of many electron spin operator:- Pure spin states, Energy expectation value of pure spin states
- 62-P.4.4 Orbitals in many electron atoms: The Hartree-Fock Theory, Koopman's theorem, The Hatree-Fock-Roothaan method for closed cell systems, Roothaan equation, Brillouin's theorem.

62-P.5. Summary

62-P.6. Model Ouestions

62-P.7. Self Assessment Questions

62-P.8. References

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-IV

CEM-402 - ADVANCED PHYSICAL CHEMISTRY-III

ATOMIC SPECTROSCOPY: SLM No: 63-P

63-P.1. Objective

63-P.2. Introduction

63-P.3. Key Words

63-P.4. Study Materials

- 63-P.4.1 Ground state electronic configuration of elements
- 63-P.4.2 Spectroscopic term symbol: LS coupling scheme, j-j coupling scheme
- 63-P.4.3 Electronic spectrum of many electron atoms
- 63-P.4.4 Zeeman Effect in many electron atoms
- 63-P.4.5 Electron correlation and method of configuration interaction.

63-P.5. Summary

63-P.6. Model Question

63-P.7. Self Assessment Question

63-P.8. References

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-IV

CEM-402 - ADVANCED PHYSICAL CHEMISTRY-III

QUANTUM MECHANICS OF DIATOMIC MOLECULES: SLM No: 64-P

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-IV

CEM-402 - ADVANCED PHYSICAL CHEMISTRY-III

QUANTUM MECHANICS OF MANY ELECTRON SYSTEM-II: SLM No: 65-P

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-IV

CEM-402 - ADVANCED PHYSICAL CHEMISTRY-III

APPLICATIONS OF PERTURBATION THEORY: SLM No: 66-P

66-P.1. Objective

66-P.2. Introduction

66-P.3. Keywords

66-P.4. Study Materials

- 66-P.4.1 The Hellmann-Feynman theorem
- 66-P.4.2 Electrical responsive properties
- 66-P.4.3 Perturbation treatment to NMR spectroscopy: A-X, A2 Spin system, more than two spin system
- 66-P.4.4 ESR spectroscopy: total magnetic Hamiltonian of an electron, magnetic interaction in atoms
- 66-P.4.5 Application of perturbation theory on the splitting of ESR lines on some model system

66-P.5. Summary

66-P.6. Model Question

66-P.7. Self Assessment Questiom

66-P.8. References

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-IV

CEM-403 - ADVANCED PHYSICAL CHEMISTRY-IV

CHEMICALS KINETICS-II: SLM No: 67-P

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-IV

CEM-403 - ADVANCED PHYSICAL CHEMISTRY-IV

CHEMICALS KINETICS-III: SLM No: 68-P

68-P.1. Objective

68-P.2. Introduction

68-P.3. Keywords

68-P.4. Study Materials

- 68-P.4.1 Rate processes and some physical phenomena
- 68-P.4.2 Statistical approach to rate theory: Hinshelwood, RRK and RRKM theories
- 68-P.4.3 Reaction in molecular beams and shockwaves. Application of absolute reaction rate theory in viscosity
- 68-P.4.4 Diffusion controlled reaction (full and partial microscopic diffusion controlled). Bimolecular surface reaction of different types
- 68-P.4.5 Inhibition, exchange reactions.
- 68-P.4.6 TST of surface reaction.

68-P.5. Summery

68-P.6. Model Question

68-P.7. Self Assessment Question

68-P.8. References

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-IV

CEM-403 - ADVANCED PHYSICAL CHEMISTRY-IV

MACROMOLECULES: SLM No: 69-P

69-P.1. Objective

69-P.2. Introduction

69-P.3. Keywords

69-P.4. Study Materials

- 69-P.4.1 Classification of polymers
- 69-P.4.2 Kinetics of polymerization
- 69-P.4.3 Molecular weight of polymers, molecular weight determination by viscosity, osmometry, light scattering, diffusion and ultracentrifugation methods
- 69-P.4.4 Thermodynamics of polymer solutions
- 69-P.4.5 Polymer conformation.

69-P.5. Summery

69-P.6. Model Question

69-P.7. Self Assessment Question

69-P.8. References

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-IV

CEM-403 - ADVANCED PHYSICAL CHEMISTRY-IV

BIOPOLYMERS: SLM No: 70-P

70-P.1. Objective

70-P.2. Introduction

70-P.3. Keywords

70-P.4. Study Materials

- 70-P.4.1 Structure of biomolecules
  - 70-P.4.1.1 Protein-building, peptide bonds, primary, secondary, tertiary, quaternary structure. Phi-Psi map
  - 70-P.4.1.2 Nucleic acids- A,B,Z conformations, t-RNA conformation, carbohydrates and lipids biomembranes.
- 70-P.4.2 SDS-PAGE (for proteins), agarose gel method (for nucleic acids)
- 70-P.4.3 Techniques to study biomolecules: CD, ORD, Flurescence, IR and Raman spectroscopy

70-P.5. Summery

70-P.6. Model Question

70-P.7. Self Assessment Question

70-P.8. References

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-IV

CEM-403 - ADVANCED PHYSICAL CHEMISTRY-IV

ADVANCED ELECTROCHEMISTRY: SLM No: 71-P

71-P.1. Objective

71-P.2. Introduction

71-P.3. Keywords

71-P.4. Study Materials

- 71-P.4.1 Overvoltage
- 71-P.4.2 Polarography
- 71-P.4.3 Amperometric titration
- 71-P.4.4 Basic principles of cyclic voltammetry and coulometry, polyelectrolyte
- 71-P.4.5 Mechanism of multi-step electrochemical reactions
- 71-P.4.6 Hydrogen overvoltage
- 71-P.4.7 Thermodynamics of ideally polarized electrodes
- 71-P.4.8 Structures of metal and semiconductor-electrolyte junctions
- 71-P.4.9 Fuel cell and photoelectrochemical cells.

71-P.5. Summery

71-P.6. Model Question

71-P.7. Self Assessment Question

71-P.8. References

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-IV

CEM-404 - CHEMISTRY IN TECHNOLOGY

BIOPHYSICAL CHEMISTRY: SLM No: 72-P

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-IV

CEM-404 - CHEMISTRY IN TECHNOLOGY

INSTRUMENTAL ANALYSIS: THEORY AND PRACTICES: SLM No: 73-P

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-IV

CEM-404 - CHEMISTRY IN TECHNOLOGY

CHEMICAL TOXICOLOGY: SLM No: 74-P

74-P.1. Objective

74-P.2. Introduction

74-P.3. Keywords

74-P.4. Materials

- 74-P.4.1 Toxic Chemicals in the environment
- 74-P.4.2 Impact of toxic chemicals on enzymes
- 74-P.4.3 Biochemical effects of arsenic, cadmium, sulphur dioxide, ozone and PAN, Cyanide, pesticides, Carcinogens

74-P.5. Summary

74-P.6. Model Questions

74-P.7. Self Assessment Question

74-P.8. References

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-IV

CEM-404 - CHEMISTRY IN TECHNOLOGY

CORROSION TECHNOLOGY: SLM No: 75-P

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-IV

CEM-402 - ADVANCED ORGANIC CHEMISTRY-III

ORGANIC PHOTOCHEMISTRY-I: SLM No: 62-O

SEM-IV

CEM-402 - ADVANCED ORGANIC CHEMISTRY-III

ORGANIC PHOTOCHEMISTRY-II: SLM No: 63-O

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-IV

CEM-402 - ADVANCED ORGANIC CHEMISTRY-III

BIOLOGICAL ACTIVE MOLECULES: SLM No: 64-O

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-IV

CEM-402 - ADVANCED ORGANIC CHEMISTRY-III

VITAMINS AND CO-ENZYMES: SLM No: 65-O

65-O.1. Objective

65-O.2. Introduction

65-O.3. Keywords

65-O.4. Materials

65-O.4.1 Vitamins A1, B1, C, K coenzymes

65-O.4.2 NAD, FAD and reactivity of different Vitamin in biological reactions

65-O.4.3 Chemistry of nucleosides nucleotides and ATP

65-O.4.4 Elementary structure and role of DNA and various types of RNA's in protein biosynthesis

65-O.5. Summary

65-O.6. Model Questions

65-O.7. Self Assessment Question

65-O.8. References

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-IV

CEM-402 - ADVANCED ORGANIC CHEMISTRY-III

HETERCYCLES: SLM No: 66-O

66-O.1. Objective

66-O.2. Introduction

66-O.3. Keywords

66-O.4. Materials

66-O.4.1 Synthesis and Reactions

66-O.4.2 Generalized approach to the synthesis of heterocycles possessing 5-,6-, and 7-membered rings with one or two heteroatoms per ring

66-O.4.3 Reactions of heterocycles:

66-O.4.3.1 Oxidation and Reduction

66-O.4.3.2 Reactions with electrophiles

66-O.4.3.3 Reaction with nucleophiles

66-O.4.3.4 Reaction with other reactive intermediates with typical monocyclic and fused ring systems as examples

66-O.5. Summary

66-O.6. Model Questions

66-O.7. Self Assessment Question

66-O.8. References

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-IV

CEM-403 - ADVANCED ORGANIC CHEMISTRY-IV

STEREOCHEMISTRY-III: SLM No: 67-O

67-O.1. Objective

67-O.2. Introduction

67-O.3. Keywords

67-O.4. Materials

- 67-O.4.1 Conformation and Chemical Reactivity
  - 67-O.4.1.1 Curtin-Hammett principle
  - 67-O.4.1.2 Its derivation under different conditions and applications
- 67-O.4.2 Quantitative treatement of mobile systems
- 67-O.4.3 Winstein Holress equation
- 67-O.4.4 Eliel equation
- 67-O.4.5 Applications of Winstein Holress equation and Eliel equation
- 67-O.4.6 Allylic 1,2 - and 1, 3-strain (in pseudoallylic systems also)
- 67-O.4.7 Applications

67-O.5. Summary

67-O.6. Model Questions

67-O.7. Self Assessment Question

67-O.8. References

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-IV

CEM-403 - ADVANCED ORGANIC CHEMISTRY-IV

STEREOCHEMISTRY-IV: SLM No: 68-O

68-O.1. Objective

68-O.2. Introduction

68-O.3. Keywords

68-O.4. Materials

- 68-O.4.1 Fused ring systems
- 68-O.4.2 *trans* and *cis* decalins
- 68-O.4.3 Conformation
- 68-O.4.4 Steroid and nonsteroid conformation
- 68-O.4.5 Symmetry
- 68-O.4.6 Torsion angle
- 68-O.4.7 Enthalphy
- 68-O.4.8 Entropy
- 68-O.4.9 Free energy
- 68-O.4.10 Substituted decalins, q- methyldecalins and 9,10 dimethyldecalins
- 68-O.4.11 Decalones
- 68-O.4.12 Conformation of cis-octalins and trans-octalins

68-O.5. Summary

68-O.6. Model Questions

68-O.7. Self Assessment Question

68-O.8. References

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-IV

CEM-403 - ADVANCED ORGANIC CHEMISTRY-IV

STEREOCHEMISTRY-V: SLM No: 69-O

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-IV

CEM-403 - ADVANCED ORGANIC CHEMISTRY-IV

STEREOCHEMISTRY-VI: SLM No: 70-O

70-O.1. Objective

70-O.2. Introduction

70-O.3. Keywords

70-O.4. Materials

70-O.4.1 Modern concepts of nucleophilic addition to carbonyl compounds

70-O.4.2 Felkin model (torsional strain)

70-O.4.3 Burzi Dunitz trajectory

70-O.4.4 Cieplak model

70-O.4.5 Examples

70-O.5. Summary

70-O.6. Model Questions

70-O.7. Self Assessment Question

70-O.8. References

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-IV

CEM-403 - ADVANCED ORGANIC CHEMISTRY-IV

STEREOCHEMISTRY-VII: SLM No: 71-O

71-O.1. Objective

71-O.2. Introduction

71-O.3. Keywords

71-O.4. Materials

- 71-O.4.1 Optical rotation, specific and molecular rotations-their units
- 71-O.4.2 Brewster rule
- 71-O.4.3 Lowe's rule
- 71-O.4.4 Origin of optical rotation
- 71-O.4.5 Circular birefringence
- 71-O.4.6 Optical rotatory dispersion (ORD)
- 71-O.4.7 Octane rule
- 71-O.4.8 Axial haloketone rule-application (Octant projection diagrams)
- 71-O.4.9 Circular dichroism (CD) differential dichronic absorption
- 71-O.4.10 Specific ellipticity and molar ellipticity
- 71-O.4.11 Applications of CD-helicity rule
- 71-O.4.12 Exciton chirality (dibenzoate chirality rule)
- 71-O.4.13 Davydor splitting-applications with different steroidal glycols

71-O.5. Summary

71-O.6. Model Questions

71-O.7. Self Assessment Question

71-O.8. References

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-IV

CEM-404 - INDUSTRIAL CHEMISTRY-II

FILTRATION & FLOW MEASURING INSTRUMENT: SLM No: 72-OA

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-IV

CEM-404 - INDUSTRIAL CHEMISTRY-II

PRINCIPAL OF DIFFUSION AND MASS TRANSFER: SLM No: 73-OA

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-IV

CEM-404 - INDUSTRIAL CHEMISTRY-II

ORE PROCESSING /BENEFICATION: SLM No: 74-OA

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-IV

CEM-404 - INDUSTRIAL CHEMISTRY-II

FUEL: SLM No: 75-OA

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-IV

CEM-404 - INDUSTRIAL CHEMISTRY-II

REFRACTORY: SLM No: 76-OA

76-OA.1. Objectives

76-OA.2. Introduction

- What is a refractory?
- Role of refractories
- Purposes of refractories
- Melting point of some pure components used to manufacture refractories

76-OA.3. Keywords

76-OA.4. Materials

- 76-OA.4.1 Properties of characterization for refractories
- 76-OA.4.2 Classifications of refractory material
  - 76-OA.4.2.1 Based on chemical composition
    - Acidic
    - Basic
    - Neutral
  - 76-OA.4.2.2 Based on physical form
    - Brick
    - Monolithic
- 76-OA.4.3 Nomenclature of fireclay refractories
- 76-OA.4.4 Insulating refractory materials
- 76-OA.4.5 Manufacture of refractory materials
- 76-OA.4.6 Manufacturing process description
  - Emission & control
- 76-OA.4.7 Refractory Cement
- 76-OA.4.8 Uses of Refractories

76-OA.5. Summary

76-OA.6. Glossary

76-OA.7. Model Questions

76-OA.8. Self Assessment Questions

76-OA.9. References

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-IV

CEM-404 - CHEMICAL PRINCIPLES IN FOOD SCIENCE AND TECHNOLOGY

STORAGE AND HANDLING OF FRESH FRUITS AND VEGETABLES:

SLM No: 72-OB

72-OB.1. Objective

72-OB.2. Introduction

72-OB.3. Keywords

72-OB.4. Materials

- 72-OB.4.1 Pre and post harvest changes
- 72-OB.4.2 Thermal and osmotic dehydration of fruits and vegetables
- 72-OB.4.3 Canning and bottling
- 72-OB.4.4 CAP and MAP storage
- 72-OB.4.5 Juice extraction and preparation of drinks
  - 72-OB.4.5.1 Syrups, Squashes, Cordials, Nectars, Jam, Jelly, Marmalade, Ketchup, Pickles, Chutneys, Sauces
- 72-OB.4.6 Fruits juice concentrates and powders
- 72-OB.4.7 Fermented fruit and Vegetable products

72-OB.5. Summary

72-OB.6. Model Questions

72-OB.7. Self Assessment Question

72-OB.8. References

SEM-IV

CEM-404 - CHEMICAL PRINCIPLES IN FOOD SCIENCE AND TECHNOLOGY

SCIENCE AND TECHNOLOGY OF DAIRY PROCESSING: SLM No: 73-OB

73-OB.1. Objective

73-OB.2. Introduction

73-OB.3. Keywords

73-OB.4. Materials

- 73-OB.4.1 Definition
- 73-OB.4.2 Composition of milk
- 73-OB.4.3 Quality standards for milk
- 73-OB.4.4 Pasteurization of milk
- 73-OB.4.5 Standardization
- 73-OB.4.6 Toning
- 73-OB.4.7 Homogenization and cream separation
- 73-OB.4.8 Technology of dried whole milk, butter, ghee, margarine, condensed milk, fermented milk products, UHT milk, ice-cream, cheese (cheddar, cottage)

73-OB.5. Summary

73-OB.6. Model Questions

73-OB.7. Self Assessment Question

73-OB.8. References

SEM-IV

CEM-404 - CHEMICAL PRINCIPLES IN FOOD SCIENCE AND TECHNOLOGY

SCIENCE AND TECHNOLOGY OF CEREAL PROCESSING: SLM No: 74-OB

74-OB.1. Objective

74-OB.2. Introduction

74-OB.3. Keywords

74-OB.4. Materials

- 74-OB.4.1 Production of milled rice
- 74-OB.4.2 Parboiling and parboiled rice
- 74-OB.4.3 Wheat processing
  - 74-OB.4.3.1 Classification of wheat
  - 74-OB.4.3.2 Milling of wheat
  - 74-OB.4.3.3 Dough mixing
  - 74-OB.4.3.4 Types of dough and its rheology testing
  - 74-OB.4.3.5 Production of wheat products such as bread, biscuits and cakes

74-OB.5. Summary

74-OB.6. Model Questions

74-OB.7. Self Assessment Question

74-OB.8. References

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-IV

CEM-404 - CHEMICAL PRINCIPLES IN FOOD SCIENCE AND TECHNOLOGY

SCIENCE AND TECHNOLOGY OF FATS AND OILS PROCESSING: SLM No: 75-OB

75-OB.1. Objective

75-OB.2. Introduction

75-OB.3. Keywords

75-OB.4. Materials

- 75-OB.4.1 Chemical composition
- 75-OB.4.2 Nutritional importance of dietary oils and fats
- 75-OB.4.3 Effect of processing and storage on fats and oils (oxidative and hydrolytic rancidity)
- 75-OB.4.4 Fat micelles
- 75-OB.4.5 Soap and detergency
- 75-OB.4.6 Essential fatty acids
- 75-OB.4.7 Extraction
- 75-OB.4.8 Physical and chemical refining of oils from oil seed such as mustard including winterization, bleaching and deodorization
- 75-OB.4.9 Hydrogenation and catalysis
- 75-OB.4.10 Margarine
- 75-OB.4.11 Analytical techniques for fat and oil analysis

75-OB.5. Summary

75-OB.6. Model Questions

75-OB.7. Self Assessment Question

75-OB.8. References

Note: P Stands for Physical, O Stands for Organic,
Students are requested to choice either A or B.

SEM-IV

CEM-404 - CHEMICAL PRINCIPLES IN FOOD SCIENCE AND TECHNOLOGY

QUALITY CONTROL AND FOOD SAFETY: SLM No: 76-OB

76-OB.1. Objective

76-OB.2. Introduction

76-OB.3. Keywords

76-OB.4. Materials

76-OB.4.1 Quality definition of different food products according to food laws: especially FSSAI, PFA, FPO, Essential Commodities Act, 1955, BIS, AGMARK

76-OB.4.2 Classifications and functions and safety limits of food additives such as preservatives, antioxidants, colors, emulsifiers, sweeteners, buffering salts

76-OB.4.3 Voluntary quality standards and certification - GMP, HACCP, GAP, ISO 9000, ISO 14000, ISO 22000

76-OB.4.4 Misbranding

76-OB.4.5 Adulteration in oil, dairy items and spices

76-OB.5. Summary

76-OB.6. Model Questions

76-OB.7. Self Assessment Question

76-OB.8. References

VIDYASAGAR UNIVERSITY

DIRECTORATE OF DISTANCE
EDUCATION
MIDNAPORE-721102

Structure of SLMs for
M.Sc. In COMPUTER SCIENCE

SEMESTER 1

COS-101: Data Structure and Algorithm

SLM 01: Introduction to Data Structure and Arrays

Relevance of the Unit
Objective
1.1 Introduction to Data Structure
1.1.1 Definition of Data Structure
1.1.2 Types of Data Structure

- Linear Vs Non-Linear Data Structure
- The Difference between Data Structure and Storage Structure

1.1.3 Abstract Data Types (ADT)
1.1.4Basic Concept of Algorithm

- Algorithm and its Characteristics
- Complexity of an algorithm
- Time Complexity:
- Space Complexity:
- Time Space Trade-off
- Growth Rate
- Best, Worst and Average Case Analysis of an Algorithm
- Asymptotic Notation
- Big-O notation
- Big-Ω notation
- Big-Θnotation
- Small-o notation
- Small- ω notation

1.2Array

1.2.1 Basic Concept of Array
1.2.2 Representation of Single dimensional array

- Length and size of a one dimensional array
- Address calculation of single dimensional array

1.2.3 Representation of Two dimensional array

- Memory Representation of 2D Array:
- Row Major Order Memory Representation*:*
- Column Major Order Memory Representation:
- Length and size of a two dimensional array
- Address calculation of two dimensional arrays

1.2.4 Representation of multidimensional array

- Length and size of a multidimensional array
- Address calculation of multidimensional array

1.2.5 Application of arrays.
1.3Character and String in C

- What is character?

- What is string?
- How strings are used as a parameter?

1.4 Sparse matrix

1.4.1 What is sparse matrix

1.4.2 Representation of sparse matrix in memory

1.4.3 Different types of sparse matrix

- Tri diagonal matrix

Address Calculation (When non zero element of a tridiagonal matrix are placed in a linear array):

- Lower triangular matrix

Address Calculation (When non zero element of a lower triangular matrix are placed in a linear array B):

- Upper triangular matrix

Address Calculation (When nonzero element of a upper triangular matrix are placed in a linear array B):

1.5 Vectors

Summary

Glossary

Self-Assessment Questions

References

SLM 02: Stack and Queues

Relevance of the Unit

Objective

2.1 Stack

2.1.1 Definition and Brief description

- Stack is a LIFO (Last In First Out) or FILO (First In Last Out) structure.

2.1.2 Operations of Stack

- PUSH operation : Algorithm and explanation
- POP operation: Algorithm and explanation

2.1.3 Linked Representation of stack

- PUSH operation using linked representation
- POP operation using linked representation

2.1.4 Application of stack

2.1.5 Recursion

2.1.6 Tower of Hanoi Problem

2.1.7 Expression Representation

- [i] Conversion of Infix to Postfix
- [ii] Conversion of Infix to Pre-fix:
- [iii] Conversion of Postfix to Infix
- [iv] Conversion of Prefix to Infix
- [v] Evaluation of Postfix Expression

2.2 Queue

2.2.1 Definition and Brief description

2.2.2 Operations of Queue

- INSERTION Algorithm: array representation
- DELETION Algorithm: Array representation

2.2.3 Linked representation of Queue

- INSERTION Algorithm: Linked Representation
- DELETION Algorithm: Linked Representation

2.2.4 Circular Queue

2.2.5 Representation of Circular Queue

- Insertion Function on Circular Queue
- Deletion Function on Circular Queue

2.2.6 Deque (D- Queue)

- Function of Insertion of an element at the front end of the queue
- Function of Deletion of an element from the rear end of the queue

2.2.7 Priority Queue

2.3 Application of Queue

Summary

Glossary

Self-Assessment Questions

References

SLM 03: Linked list and Trees

Relevance of the Unit

Objective

3.1 Linked list

- Introduction
- Types of Linked List:

3.1.1 Singly linked list

- Representation: Data Structure
- Creation of a singly linked list
- Different operations on a linked list
- Insertion of a node at the beginning
- Insertion of a node at the end of a linked list
- Insertion of a node at any position of a linked list
- Deletion of the first node from a linked list
- Deletion of the last node from a linked list
- Deletion of any intermediate node from a linked list
- Searching an element in a linked list

3.1.2 Doubly linked list

- Necessity of Doubly Linked List
- Basic Operations of Doubly Linked list
- Creation of a doubly linked list for n nodes.

- Insert a node before first node of a doubly linked list.
- Insert a node after the last node of a doubly linked list.
- Insert a node at intermediate position of a doubly linked list.
- To delete first node from a doubly linked list.
- To delete last node from a doubly linked list.
- To delete a node fromintermediate positionof a doubly linked list.

3.1.3 Circular Linked list

- Singly Circular Linked List
- Doubly Circular Linked List
- What are the differences between Linked list and array?
- Application of Linked List

3.1.4 Garbage Collection and Compaction

- Garbage Collection (GC)
- Compaction

3.1.5 Generalised linked list

3.1.6 Polynomial Representation using Linked list

- Representation
- Polynomial Addition

3.2 Tree

3.2.1 Basic terminology

3.2.2 Binary tree

- Different Types of Binary Tree
- Complete Binary Tree
- Full Binary Tree
- Strictly binary tree
- Skew tree
- Representation of Binary tree
- Array representation
- Linked representation

3.2.3 Algorithm: Traversing of Binary Tree

- Preorder Traversal (Parent-Left-Right)
- Inorder Traversal (Left-Parent-Right)
- Postorder Traversal (Left-Right-Parent)

3.2.4 Binary Search Tree (BST)

- Creation of Binary Search Tree
- Searching a node with key in a Binary Search Tree
- Insertion of a node in a Binary Search Tree
- Deletion of a node from Binary Search Tree

3.2.5 Extended Binary tree

3.2.6 Threaded Binary Tree

3.2.7 Huffman code

- Huffman Algorithm

3.2.8 AVL tree

- Different Rotations in AVL tree
  (i) Left rotation
  (ii) Right rotation
  (iii) Left Right rotation
  (iv) Right Left rotation

3.2.9 B tree
3.2.10 Representation of Algebraic expression using Tree
3.2.11 Complexity of Search Algorithm
Summary
Glossary
Self-Assessment Questions
References

SLM 04: Searching, Hashing and Sorting

Relevance of the Unit
Objective

4.1 Searching
  4.1.1 Sequential Search
  4.1.2 Binary Search
4.2 Hashing
  4.2.1 Hash Functions
  4.2.1.1 The Division Method
  4.2.1.2 The Midsquare Method
  4.2.1.3 The Folding Method
  4.2.1.4 Digit Analysis
  4.2.1.5 The Length depend Method
  4.2.1.6 Algebraic Coding
  4.2.1.7 Multiplicative Hashing
  4.2.2 Collision Resolution Techniques
4.3 Sorting
  4.3.1 Selection Sort
  4.3.2 Bubble Sort
  4.3.3 Quick Sort
  4.3.4 Two-way Merge Sort
  4.3.5 Heap Sort

Summary
Glossary
Self-Assessment Questions
References

SLM 05: Graph and File Structures

Relevance of the Unit
Objective

5.1 Graphs
- 5.1.1 Terminology and Representation
  - 5.1.1.1 Graph Representation
- 5.1.2 Graph Traversal
- 5.1.3 Spanning Tree
- 5.1.4 Minimum Cost Spanning Tree
  - 5.1.4.1 Kruskal's Algorithm
  - 5.1.4.2 Prim's Algorithm

5.2 File Organization
- 5.2.1. Introduction
- 5.2.2. Types of Files
  - 5.2.2.1 Files of Unordered Records
  - 5.2.2.2 Files of Ordered records
  - 5.2.2.3 Indexing Structure for Files
- 5.2.3. Types of Single level ordered Indices
  - 5.2.3.1 Primary Indices
  - 5.2.3.2 Cluster Indices
  - 5.2.3.3 Secondary Indices
  - 5.2.3.4 Multilevel Indices
- 5.2.4. Dynamic Multilevel Indices
  - 5.2.4.1 B-tree
  - 5.2.4.2 B^+-tree

Summary
Glossary
Self-Assessment Questions
References

COS-102: Advanced Computer Architecture

SLM 06: Introduction

Relevance of the Unit
Objective
6.1 Introduction
6.2 Instruction Set Architecture (ISA)
- 6.2.1 Instruction format
- 6.2.2 CPU Organization
- 6.2.3 Instruction Length
- 6.2.4 Data ordering and memory addressing standards
- 6.2.5 Addressing mode
- 6.2.6 Instruction operations
- 6.2.7 Type and size of operands

6.3 Arithmetic and Logic Unit (ALU)
- 6.3.1 Arithmetic unit
- 6.3.2 Logic unit
- 6.3.3 Shifter unit

SLM 07: Pipelining

7.6.1 Super pipelined Design
7.6.2 Super scalar Design
7.6.3 Very long instruction word (VLIW) processor
Summary
Glossary
Self-Assessment Questions
References

SLM 08: Memory Systems

Relevance of the Unit
Objective
8.1 Introduction
8.2 Hierarchical memory
8.2.1 Memory hierarchy
8.2.2 Memory hierarchy properties
8.2.3 Memory capacity planning
8.3 Cache memory
8.3.1 Cache memory performance
8.3.2 Cache Mapping
8.4. Virtual memory
8.4.1 Memory Management Unit (MMU)
8.4.2 Paging technique
8.4.3 Segmentation
Summary
Glossary
Self-Assessment Questions
References

SLM 09: Multiprocessor Architecture & Interconnection Network

Relevance of the Unit
Objective
9.1 Introduction
9.2 Centralized shared-memory architecture
9.2.1 Flynn's Taxonomy
9.2.2 Centralized shared-memory system
9.2.2.1 UMA systems
9.2.2.2 Cache coherence
9.3 Synchronization
9.3.1 Basic Hardware Primitives
9.3.2 Components of a Synchronization Event
9.3.3 Implementing Locks Using Coherence
9.4 Memory Consistency
9.5 Interconnection networks
9.6 Distributed shared-memory systems
9.7 Cluster Computing

Summary
Glossary
Self-Assessment Questions
References

SLM 10: Data Flow Architecture & Programming Environment

Relevance of the Unit
Objective
10.1 Introduction
10.2 Sequential execution model
10.3 Data flow Architecture
  10.3.1 Data flow graph
  10.3.2 Petri nets
  10.3.3. Static Data flow
  10.3.4 Dynamic Data flow
10.4 Programming Environment
  10.4.1 Different Parameters
  10.4.2 Message Passing
10.5 Case studies
  10.5.1 Current Architectural trends
  10.5.2 DSP processor
  10.5.3 Dual core technology
Summary
Glossary
Self-Assessment Questions
References

COS-103: Data Communication and Computer Network

SLM 11: Overview of data communication and Networking

Relevance of the Unit
Objective
11.1 Introduction
11.2 Data Communication and its Components
11.3 Data Representation
11.4 Direction of Data Flow
11.5 Network and its Properties and Categories
11.6 Network Topology
11.7 Internet and Services
11.8 Protocols and Standards
11.9 Reference Models

11.10 OSI Model
11.11 TCP/IP Model
11.12 Comparative Study of OSI & TCP/IP Models
Summary
Glossary
Self-Assessment Questions
References

SLM 12: Physical level

Relevance of the Unit
Objective
12.1 Introduction
12.2 Analog and Digital Data and Signal
12.3 Data Rate Limits
12.4 Transmission Impairments
12.5 Digital Transmission
12.6 Analog Transmission
12.7 Multiplexing
12.8 FDM, WDM and TDM
12.9 Switching Techniques
12.10 Telephone Network
Summary
Glossary
Self-Assessment Questions
References

SLM 13: Data link layer and Medium access sub layer

Relevance of the Unit
Objective
13.1 Introduction
13.2 Types of errors
13.3 Framing
- 13.3.1 Character Stuffing
- 13.3.2 Bit Stuffing

13.4 Error Detection and Correction Methods
- 13.4.1 Simple Parity check
- 13.4.2 Two-dimensional Parity check
- 13.4.3 Checksum
- 13.4.4 Cyclic redundancy check
- 13.4.5 Hamming code for error detection and correction

13.5 Flow Control

13.5.1 Stop and Wait protocol
13.5.2 Sliding Window protocol
13.6 Error Control
13.6.1 Stop and Wait ARQ
13.6.2 Go-Back-N ARQ
13.6.3 Selective Repeat ARQ
13.7 HDLC
13.8 Point to Point Protocol
13.9 LCP
13.10 NCP
13.11 FDDI
13.12 Token Bus
13.13 Token Ring
13.14 Multiple Access Protocols
13.14.1 Pure ALOHA
13.14.2 Slotted ALOHA
13.14.3 CSMA
13.14.4 CSMA/CD
13.14.5 FDMA
13.14.6 TDMA
13.14.7 CDMA
13.14.8 Traditional Ethernet
13.14.9 Fast Ethernet
Summary
Glossary
Self-Assessment Questions
References

SLM 14: Network layer

Relevance of the Unit
Objective
14.1 Introduction
14.2 Connecting devices
14.2.1 Repeaters
14.2.2 Hub
14.2.3 Bridge
14.2.4 Switch
14.2.5 Router
14.2.6 Gateway
14.3 Addressing
14.3.1 IPv4 ADDRESSES
14.3.2 Classful Addressing
14.3.3 Classes and Blocks
14.3.4 Netid and Hostid
14.3.5 Subnetting

SLM 15: Transport layer and Application layer

15.3.1 Leaky bucket algorithm
15.3.2 Token bucket algorithm
15.3.3 Choke packets
15.4 Quality of service
15.4.1 Techniques to improve QoS
15.5 DNS
15.5 SMTP
15.6 SNMP
15.7 FTP
15.8 HTTP
15.9 WWW
15.10 Security
15.10.1 Cryptography
15.10.2 User authentication
15.10.3 Security protocols in internet
15.10.4 Firewalls.
Summary
Glossary
Self-Assessment Questions
References

COS-104: Software Engineering and Project Management

SLM 16: The Product

Relevance of the Unit
Objective
16.1 Introduction.
16.2 Software.
16.2.1 Characteristics of Software
16.3 Software Myths.
16.3.1 Management Myths.
16.3.2 Customer Myths.
16.3.3 Practitioner's Myths.
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SLM 22: Relational Databases

SLM 23: Object-oriented Databases & Multimedia Database

SLM 24: Parallel and Distributed Databases

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SLM 39: Java Programming Fundamentals

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COS-301: Advanced Operating System

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SLM 52: Introduction to computer graphics & graphics systems

SLM 53: Scan conversion

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SLM 54: 2D and 3D transformation & viewing

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COS-302 M-II: Image Processing

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SLM 59: Images Enhancement and Color Image Processing

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COS-303: Elective – I: Mobile Computing

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SLM E2: Medium Access Control

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SLM E8: Unsupervised learning

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SLM E9: Recurrent Neural Network

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SLM E10: Genetic Algorithm (GA)

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COS-303: Elective – I: Machine Learning

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SLM E12: Decision tree learning algorithms

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SLM E13: Artificial Neural Network

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SLM E14: Machine learning concepts and limitations

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SLM E15: Support Vector Machine (SVM)

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COS-304: IoT

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SLM 62: IOT Architecture

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SLM 64: Developing IOTs

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SLM 65: Case Study & Advanced IOT Application

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COS-401: Artificial Intelligence

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SLM 67: Randomized Search

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SLM 68: Finding Optimal Paths

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68.7 Problem Decomposition
    68.7.1 Goal Trees
    68.7.2 AO*
    68.7.3 Rule Based Systems
    68.7.4 Rete Net
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SLM 69: Game Playing

Relevance of the Unit
Objective
69.1 Adversarial Search
    69.1.1. Game playing: overview
    69.1.2. Minimax search procedure
    69.1.3. alpha-beta cutoff
    69.1.4. Additional Refinement
    69.1.5. Iterative deeping
    69.1.6. Case studies
69.2 Planning
    69.2.1. Overview
    69.2.2. Components of planning system
    69.2.3. Goal stack planning
    69.2.4. Nonlinear Planning
    69.2.5. Hierarchical Planning
69.3 Understanding
    69.3.1. Overview
    69.3.2. Constraint Satisfaction in understanding
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SLM 70: Logic and Inferences

Relevance of the Unit
Objective
70.1 Introduction
70.2 Propositional logic and its resolution
70.3 Predicate logic & its resolution
70.4 Unification algorithm
70.5 Forward chaining backward chaining and conflict resolution
70.6 Structured knowledge Representation
    70.6.1 Semantic Nets, Slots

70.6.2 Frames
70.6.3 CD and Conceptual graphs
70.6.4 Scripts
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COS-402: Elective – II: Cryptography and Steganography

SLM E16: Introduction

Relevance of the Unit
Objective
16.1 Introduction
16.2 Introduction to security attacks, services and mechanism
16.2 Introduction to cryptography
16.3 Conventional Encryption
16.3.1 Conventional encryption model
16.3.2 Classical encryption techniques
16.3.3 Substitution ciphers and transposition ciphers
16.4 Cryptanalysis
16.5 Stereography
16.6 Stream and block ciphers
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SLM E17: Modern Block Ciphers

Relevance of the Unit
Objective
17.1 Introduction
17.2 Modern Block Ciphers
17.2.1 Block ciphers principals,
17.3 Shannon's theory of confusion and diffusion
17.4 Fiestal structure
17.5 Data encryption standard (DES)
17.5.1 Strength of DES
17.5.2 Differential and linear crypt analysis of DES
17.5.3 Block cipher modes of operations
17.5.4 Triple DES
17.6 IDEA encryption and decryption
17.6.1 Strength of IDEA
17.7 Confidentiality using conventional encryption
17.8 Traffic confidentiality
17.9 Key distribution
17.10 Random number generation
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SLM E18: Introduction to Information Hiding

SLM E19: A Survey of Steganographic Techniques

SLM E20: Watermarking and Copyright Protection

20.1 Introduction
20.2 Watermarking and Copyright Protection
    20.2.1 Basic Watermarking
    20.2.2 Watermarking Applications
20.3 Requirements and Algorithmic Design Issues
20.4 Evaluation and Benchmarking of Watermarking system
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COS-402: Elective – II: Web Technology

SLM E21: Internet

Relevance of the Unit
Objective
21.1 Introduction
21.2 Evolution of the Internet and the growth of the World Wide Web
21.3 Client Server Model
21.4 Architecture of the Intranet/ Internet/ Extranet
21.5 Access Methods
    21.5.1 Dial up
    21.5.2 ISDN
    21.5.3 ADSL/2+
    21.5.4 Cable
    21.5.5 LAN
    21.5.6 Wi-Fi
    21.5.7 Mobile and Satellite
21.6 Application areas
    21.6.1 E-Commerce
    21.6.2 Education Entertainment
    21.6.3 Web Portals
    21.6.4 Discussion forums
    21.6.5 Weblogs
    21.6.6 Podcasting
    21.6.7 RSS/ATOM
    21.6.8 Wiki
    21.6.9 VoIP
    21.6.10 Video on Demand
    21.6.11 Search Engines
    21.6.12 Webbots
    21.6.13 Integrity of information
    21.6.14 Databases online
21.7 URL
21.8 TCP/IP fixed and dynamic IP addressing
21.9 Role of DNS
21.10 Email
    21.10.1 Email clients
    21.10.2 Server and gateways

SLM E22: Style Sheets

SLM E23: Host Objects

SLM E24: Representing Web Data

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SLM E25: Web Services

Relevance of the Unit
Objective
25.1 JAX and RPC
- 25.1.1 Introduction
- 25.1.2 Java API for XML
- 25.1.3 RPC: Remote procedure call
- 25.1.4 Java API for XML-based Remote Procedure Call

25.2 Web service
- 25.2.1Overview
- 25.2.2 Types of web services
- 25.2.3 Writing Web service server
- 25.2.4 Writing web service client
- 25.2.5 WSDL: Web Service Description Language
- 25.2.6 Representing Data types using XML
- 25.2.7 SOAP web services
- 25.2.8 SOAP Web Service WSDL and Configs
- 25.2.9 Storing Java Objects in Files
- 25.2.10 Java Servlet

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COS-402: Elective – II: Parallel Computing

SLM E26: Introduction to High Performance Computing

Relevance of the Unit
Objective
26.1 Introduction
26.2 Applications
26.3 High-Performance Computing architectures
- 26.3.1 Major classes of HPC

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SLM E27: Parallel programming models and performance analysis

Relevance of the Unit
Objective
27.1 Introduction
27.2 Parameterisation
27.3 Modeling
27.4 Performance analysis

27.5 Amdahl’s law
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SLM E28: Programming parallel computers

Relevance of the Unit
Objective
28.1 Introduction
28.2 Parallel languages
28.3 Parallel programming
28.4 Parallelizing compilers
28.5 Message passing
28.6 Data parallel programming models
28.7 MPI
28.8 OpenMP
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SLM E29: Multi-Thread Models

Relevance of the Unit
Objective
29.1 Introduction
29.2 Memory architecture
29.3 Multi-Process Execution Model
29.4 Loop Transformations
29.5 Data Transformations
29.6 Dependence Analysis
29.7 Compiler Strategies
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SLM E30: Parallel Algorithms

Relevance of the Unit
Objective
30.1 Introduction
30.2 Cyclic Reduction
30.3 Iterative Algorithms
    30.3.1 Jacobi
    30.3.2 GaussSeidel
    30.3.3 RedBlackOrderings
30.4 Divide-and-Conquer Algorithms,

30.5 Adaptive Quadrature
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COS-402: Elective – III: Multimedia

SLM E31: Introduction Multimedia

Relevance of the Unit
Objective
31.1 Introduction
31.2 Applications
31.3 Different Media
31.4 Hypertext and Hypermedia
31.5 Issues in Multimedia System
31.6 Component of a Multimedia System
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SLM E32: Overview of Text and Graphics

Relevance of the Unit
Objective
32.1 Introduction
32.2 Types of Text Data
    32.2.1 Plain
    32.2.2 Formatted
    32.2.3 Hypertext
32.3 Unicode Scheme
32.4 Concept of Font,
32.5 File Formats
32.6 Vector and Raster Graphics
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SLM E33: Image

Relevance of the Unit
Objective
33.1 Introduction
33.2 Image Digitization
33.3 Digital Image
33.4 Types of Image
33.5 Colour Models

33.6 File Formats
33.7 Contrast Intensification
33.8 Noise removal
33.9 Edge detection and Segmentation
33.10 Image Descriptors
33.11 Loss-less and Lossy Image Compression
33.12 Content Based Image Retrieval System
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SLM E34: Audio & Video

Relevance of the Unit
Objective
34.1 Audio
- 34.1.1 Introduction
- 34.1.2 Audio Digitization
- 34.1.3 File Formats
- 34.1.4 Time Domain Descriptors
- 34.1.5 Frequency Domain Descriptors
- 34.1.6 Perception based Descriptors
- 34.1.7 Audio Compression
- 34.1.8 Audio Classification/Retrieval System

34.2 Video
- 34.2.1 Introduction
- 34.2.2 Structure of Video Data
- 34.2.3 File Formats
- 34.2.4 Video Compression
- 34.2.5 Motion Estimation
- 34.2.6 Structural Segmentation of Video Data
- 34.2.7 Video Summarization
- 34.2.8 Browsing and Retrieval System

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SLM E35: Animation

Relevance of the Unit
Objective
35.1 Introduction
35.2 Keyframes & tweening
35.3 cel & path animation
35.4 Principles and techniques of animation
35.5 Web animation
35.6 3D animation principles
35.7 Transformations and editing

35.8 Rendering algorithms
35.9 Features of animation software
35.10 File formats
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COS-402: Elective – III: Cloud Computing

SLM E36: Introduction

Relevance of the Unit
Objective
36.1 Introduction
36.2 Cloud and Virtualization
36.3 Cloud Services Requirements
36.4 Cloud and Dynamic Infrastructure
36.5 Cloud Computing Characteristics
36.6 Cloud Adoption
36.7 Cloud Models
36.8 Cloud Infrastructure Self Service
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SLM E37: Cloud as a Service & Solution

Relevance of the Unit
Objective
37.1 Introduction
37.2 Principal Technologies
37.3 Cloud Strategy
37.4 Cloud Design
37.5 Implementation using SOA
37.6 Conceptual Cloud Model
37.7 Cloud Service
37.8 Cloud Ecosystem
37.9 Cloud Business Process Management
37.10 Cloud Service Management
37.11 Cloud Stack
37.12 Computing on Demand (CoD)
37.13 Cloud sourcing
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SLM E38: Cloud Offerings & Management

SLM E39: Cloud Virtualization Technology

SLM E40: Cloud and SOA

40.6 Cloud Infrastructure Benchmarking
- 40.6.1 OLTP Benchmark
- 40.6.2 Business Intelligence Benchmark
- 40.6.3 eBusiness Benchmark
- 40.6.4 ISV Benchmarks

40.7 Data Collection and Performance Monitoring Commands
40.8 Benchmark Tools
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COS-402: Elective – III: Bioinformatics

SLM E41: Introduction to molecular biology

Relevance of the Unit
Objective
41.1 Introduction
41.2 The Central Dogma of Molecular Biology
- 41.2.1 General transfers of biological sequential information
  - 41.2.1.1 DNA replications
  - 41.2.1.2 Transcription
  - 41.2.1.3 Translation
- 41.2.2 Special transfers of biological sequential information
  - 41.2.2.1 Reverse transcription
  - 41.2.2.2 RNA replication
  - 41.2.2.3 Direct translation from DNA to protein

41.3 Physical mapping
- 41.3.1 Low-resolution mapping
- 41.3.2 High-resolution mapping
- 41.3.3 Restriction site mapping
  - 41.3.3.1 Double digestion
  - 41.3.3.2 Partial digestion
- 41.3.4 Sequencing by clones
- 41.3.5 Application

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SLM E42: Protein sequence data bank

Relevance of the Unit
Objective
42.1 Introduction
42.2 Protein sequence data bank
42.3 NBFR-PIR
42.4 SWISSPROT,
42.5 GenBank

42.6 EMBL nucleotide sequence data bank
42.7 Protein Data Bank (PDB)
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SLM E43: Motif finding in DNA and proteins

Relevance of the Unit
Objective
43.1 Introduction
43.2 Motif finding in DNA and proteins
43.3 Sequence alignment for DNA and protein sequences
43.4 Concepts
    43.4.1 Homology
    43.4.2 Sequence similarity and sequence alignment
    43.4.3 Dynamic programming algorithms
    43.4.4 Pairwise alignment
43.5 Global and local alignment using dynamic programming
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SLM E44: Alignment methods

Relevance of the Unit
Objective
44.1 Introduction
44.2 Heuristic alignment methods
    44.2.1 BLAST/FASTA and the statistics of local alignments
44.3 Multiple sequence alignment
    44.3.1 Definition
    44.3.2 Scoring
    44.3.3 Techniques
44.4 Aligners for proteins sequences
44.5 Spliced alignment
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SLM E45: Gene ontology, Annotation and Metadata

Relevance of the Unit
Objective
45.1 Introduction
45.2 Gene ontology
45.3 Annotation and Metadata

VIDYASAGAR UNIVERSITY
DIRECTORATE OF DISTANCE EDUCATION
Dietetics and Community Nutrition Management
M. Sc.
Semester – I

Paper ND01: Unit 01: ADVANCED HUMAN PHYSIOLOGY - I

SLM Unit No.1.1: Cellular Basis of Physiology

1. Objectives
2. Introduction
3. Structure and functions of Cell, organelles
    - 3.1 Principles of cell theory
    - 3.2 Plasma Membrane
        - 3.2.1 Common features of biological membranes
        - 3.2.2 Structures of bio-membrane
        - 3.2.3 Composition of bio-membrane

    3.2.3.1 Membrane lipids

        - 3.2.3.1.1 Phosphoglycerides
        - 3.2.3.1.2 Sphingolipid
        - 3.2.3.1.3 Glycolipid
        - 3.2.3.1.4 Cholesterol
        - 3.2.3.1.5 Importance of lipid bilayer

    3.2.3.2 Membrane Carbohydrates

    3.2.3.3 Membrane Proteins

        - 3.2.3.3.1 Integral Membrane Proteins
        - 3.2.3.3.2 Peripheral Membrane Proteins
        - 3.2.3.3.3 Lipid- Anchored Membrane Proteins

    3.2.3.4 Membrane lipids and membrane fluidity

    3.2.3.5 The asymmetry of membrane lipids

    3.2.3.6 Lipids and membrane proteins diffuse rapidly in the plane of the membrane

    3.2.3.7 Functions of bio-membrane

    - 3.3 Transport across the membrane
        - 3.3.1 Overview of Membrane Transport

    3.3.2 Types of membrane transport

    3.3.2.1 Active Transport and Passive Transport

    3.3.2.2 Passive diffusion vs. Carrier-assisted Transport

    3.3.2.3 Several features uniport

        - 3.3.2.3.1 GLUT1 as an uniports
        - 3.3.2.3.2 Transport of glucose through GLUT1

    3.3.2.4 Co-transport by symporters

    3.3.2.5 Co-transport by antiporters

3.3.2.6 ATP- powered pumps and the intracellular transport
3.3.2.7 Transport through channels
3.3.2.7.1 Water-channels (Aquaporins)
3.3.2.7.2 Different types of ion channels
3.3.2.7.2.1 Voltage gated ion channels
3.3.2.7.2.2 Mechanism of opening of voltage – gated channel
3.3.2.7.2.3 Ligand mediated and G protein mediated transport

3.4 Endoplasmic Reticulum
3.4.1 Structure of endoplasmic reticulum
3.4.2 Functions of rough endoplasmic reticulum (RER)
3.4.2.1 Protein synthesis on the RER
3.4.2.2 RER controls the processing of newly synthesized proteins
3.4.2.3 The RER synthesizes membranes
3.4.2.4 Synthesis of integral membrane proteins
3.4.2.5 Rough ER starts glycosylation
3.4.3 Functions of smooth endoplasmic
3.4.3.1 Relation to carbohydrate metabolism
3.4.3.2 Steroid Biosynthesis
3.4.3.3 Storage site for calcium
3.4.3.4 Site for detoxification

3.5 Golgi Complex
3.5.1 Electron microscope structure
3.5.2 Functions of Golgi Complex
3.5.2.1 Protein Secretion
3.5.2.2 Mechanism of vesicular traffic
3.5.2.3 Glycosylation process
3.5.2.4 Other functions

3.6 Mitochondria
3.6.1 Mitochondrial enzymes
3.6.2 Functions of Mitochondria

3.7 Lysosome
3.7.1 Lysosomal enzymes
3.7.1.1 Synthesis of lysosomal enzymes
3.7.2 Functions of lysosome
3.7.3 Abnormal lysosomes can cause fatal diseases
3.7.3.1 Lysosomal storage diseases
3.7.3.2 Standard classification of lysosomal storage diseases (LSD)
3.7.3.3 Signs and symptoms of LSDs
3.7.3.4 Diagnosis of LSDs
3.7.3.5 Treatment of LSDs

SLM Unit- 1.2: Blood

1. Objectives
2. Introduction
3. Blood

3.1 Functions of blood

3. 2 Composition of blood

3.2.1 Plasma

3.2.2 Serum

3.2.3 Plasma Proteins

3.2.4 Normal values

3.2.5 Properties of plasma proteins

3.2.6 Origin of plasma proteins

3.2.7 Functions of plasma proteins

3.3 Blood cells

3.3.1 Red blood cells

3.3.2 White blood cells

3.3.3 Platelets

3.3.4 Hematocrit Value

3.3.5 Haemopoiesis

3.4 Coagulation of Blood

3.4.1 Factors involved in blood clotting

3.4.2 Sequence of clotting mechanism

3.4.3 Blood clot

3.4.4 Anticoagulants

3.4.5 Heparin

3.4.6 Coumarin derivatives

3.4.7 Edta

3.4.8 Oxalate compounds

3.4.9 Citrates

3.4.10 Other substances which prevent blood clotting

3.5 Bleeding disorders

3.5.1 Hemophilia

3.5.2. Purpura

3.5 .3. Von Willebrand Disease

3.5.4 Thrombosis

3.6 Blood groups

3.6 .1 ABO blood groups

3.6.2 Blood group systems

3.6.3 ABO System

SLM Unit No.- 1.3: Cardiovascular System

4. Summary
5. Glossary
6. Self Assessment questions
7. Check your progress: Model Answers
8. Bibliography

Paper ND01: Unit 02: ADVANCED HUMAN PHYSIOLOGY - II

SLM Unit No. 2.1: Respiratory system

1. Objective
2. Introduction
3. Respiratory system
    a. Anatomy of respiratory tract
        i. Nose and Nasal Cavity
        ii. Oral cavity and pharynx
        iii. Larynx
        iv. Trachea
        v. Bronchi
        vi. Lungs
            1. Pulmonary alveolus
            2. Histological structure
            3. Pulmonary surfactant
    b. Lung compliance
        i. Static compliance
        ii. Dynamic compliance
        iii. Clinical significance (Alveolar size regulation)
    c. Lung volumes and capacities
    d. Muscle of Respiration
        i. Diaphragm
        ii. Intercostal muscles
        iii. Accessory muscles of respiration
        iv. Muscle of exhalation
    e. Innervations of lungs
    f. Mechanism of breathing
    g. Mechanism of breathing
        i. Mechanism of inspiration
        ii. Mechanism of expiration
    h. Pressure gradient for gaseous exchange
    i. Regulation of respiration
        i. Nervous regulation of respiration
        ii. Chemical regulation of respiration
        iii. Control systems
4. Summary
5. Glossary
6. Suggested questions
7. Sample questions and answers
8. Bibliography

SLM Unit No. 2.2: Endocrinology

SLM Unit No. 2.3: Reproductive System

Paper ND02: Unit 03: FOOD SCIENCE AND NUTRITION

SLM Unit No. 3.1: Carbohydrate

1. Objective
2. Introduction
3. Carbohydrates
    - 3.1. Classification of Carbohydrates
        - 3.1.1. Physiological classification of carbohydrates
        - 3.1.2. Chemical classification of carbohydrates
            - 3.1.2.1. Monosaccharide
            - 3.1.2.2. Oligosaccharides
            - 3.1.2.3. Polysachharide
    - 3.2. Sources of Carbohydrate
    - 3.3 Functions and utilization of carbohydrate
        - 3.3.1. Carbohydrates Supply Energy
        - 3.3.2. Carbohydrates Provide Fuel for the Central Nervous System
        - 3.3.3. Carbohydrates Provide Fuel for the Muscular System
        - 3.3.4 Carbohydrates Supposedly Spare Proteins
        - 3.3.5. Carbohydrates Supposedly Supply “Dietary Fiber” prevent diseases
        - 3.3.6. Helps to Sleep Better
        - 3.3.7. Prevents Blood
        - 3.3.8. Useful to Control Weight
        - 3.3.9. Improves the Digestive System
        - 3.3.10. Uplifts Mood
        - 3.3.11. Helps to Keep Memory Sharp
        - 3.3.12. Best Nutrient for Athletes
        - 3.3.13. Risk of cancer is reduced with carbohydrates
        - 3.3.14. Enjoy Healthier Skin
        - 3.3.15. Beneficial Uses of Carbohydrates
    - 3.4. Carbohydrates might cause side effects and common diseases
        - 3.4.1 Carbohydrates and Oxidative Damage
        - 3.4.2 Carbohydrates and Inflammation
        - 3.4.3 Carbohydrates and allergies
        - 3.4.4 Stroke and Obesity
        - 3.4.5 Increased Triglycerides
        - 3.4.6 Risk of Chronic Diseases
        - 3.4.7 Type 2 Diabetes
        - 3.4.8 Osteoporosis and intake of carbohydrates
    - 3.5. Storage of Carbohydrates in the Human Body
        - 3.5.1Glycogen Formation

SLM Unit No. 3.2: Dietary Fibers

SLM Unit No. 3.3: Proteins

SLM Unit No. 3.4: Lipids

SLM Unit No. 3.5: Energy Value of Foods

Paper ND02: Unit 04: VITAMINS AND MINERALS IN NUTRITION

SLM Unit No. 4.1: Fat Soluble Vitamins

SLM Unit No.-4.2: Water Soluble Vitamins

SLM Unit No. - 4.3: Macro Minerals

SLM Unit No. 4.4: Micro Minerals

1. Objectives
2. Introduction
3. Micro minerals

3.1 Iron
- 3.1.1 Major Sources
- 3.1.2 Functions
- 3.1.3 Mechanism of Action
- 3.1.4 RDA
- 3.1.5 Deficiency and toxicity

3.2 Zinc
- 3.2.1 Major Sources
- 3.2.2 Functions
- 3.2.3 Mechanism of Action
- 3.2.4 RDA
- 3.2.5 Deficiency and toxicity

3.3 Iodine
- 3.3.1 Major Sources
- 3.3.2 Functions
- 3.3.3 Mechanism of Action
- 3.3.4 RDA
- 3.3.5 Deficiency and toxicity

3.4 Selenium
- 3.4.1 Major Sources
- 3.4.2 Functions
- 3.4.3 Mechanism of Action
- 3.4.4 RDA
- 3.4.5 Deficiency and toxicity

3.5 Copper
- 3.5.1 Major Sources
- 3.5.2 Functions
- 3.5.3 Mechanism of Action
- 3.5.4 RDA
- 3.5.5 Deficiency and toxicity

3.6 Manganese
- 3.6.1 Major Sources
- 3.6.2 Functions
- 3.6.3 Mechanism of Action
- 3.6.4 RDA

SLM Unit No: 4.5: Ultra trace Minerals

Paper ND03: Unit 05: NUTRITIONAL BIOCHEMISTRY - I.

SLM Unit No-5.1: Enzymology

SLM Unit No-5.2: Metabolism of Carbohydrate

1. Objectives
2. Introduction
3. Metabolism of glucose, glycogen and their disorders
    - 3.1 Glycolysis and the oxidation of pyruvate
    - 3.2 TCA cycle
    - 3.3 Glycogen metabolism
    - 3.4 HMP shunt
    - 3.5 Gluconeogenesis
    - 3.6 Bioenergetics
    - 3.7 Disorders of carbohydrate metabolism
        - 3.7.1Galactosemia
        - 3.7.2 Glycogen storage disease
        - 3.7.3 Pentosuria
        - 3.7.4 Abnormal level in blood glucose
4. Summary
5. Glossary
6. Self-assessment questions
7. Check your Progress
8. Bibliography

SLM Unit no. 5.3: Metabolism of Lipid

1. Objective
2. Introduction
3. Metabolism of fatty acids, glycerides, triglycerides, phospholipids & cholesterol
   - 3.1 Biosynthesis of fattyacids
   - 3.2 Steps in Biosynthesis
   - 3.3 Fatty acid synthase complex
   - 3.4 Synthesis of Unsaturated fatty acids
   - 3.5 Oxidation of fatty acids
     - 3.5.1 Even no. Saturated fatty acids
     - 3.5.2 Odd nymber Saturated fatty acids
     - 3.5.3 Beta oxidation of Unsaturated fatty acids
     - 3.5.4 Eenergetics
   - 3.6 Glycerides
   - 3.7 Phospholipids
   - 3.8 Cholesterol
   - 3.9 Disorders of lipid metabolism
   - 3.10 Lipoprotein and their significance
4. Summary
5. Glossary
6. Self assessment questions
7. Bibliography

Paper ND03: Unit 06: NUTRITIONAL BIOCHEMISTRY - II

SLM Unit no 6.1: Protein and Amino acid Metabolism

SLM Unit no 6.2: Biological Oxidation

SLM UNIT-6.3: Integration and Regulation of Metabolism

SLM Unit No. 6.4.: Oxidative Stress and Antioxidants

Semester – II

Paper ND07: Unit 13: ADVANCED HUMAN PHYSIOLOGY – III

SLM Unit- 13.1: Digestive System

1. Objectives
2. Introduction
3. Digestive System
   - 3.1 Functional Organization of GI System:
     - 3.1.1 The Four Layers of The Digestive Tract
     - 3.1.2 Innervations of GI Tract
   - 3.2 Functions of the GI Tract:
     - 3.2.1neural and Hormonal Integration Of GI Functions
   - 3.3 Digestion And Absorption
     - 3.3.1 Digestion of Carbohydrates
     - 3.3.2 Absorption of Carbohydrates
     - 3.3.3 Digestion of Proteins
     - 3.3.4 Absorption of Amino Acids
     - 3.3.5digestion of Fats
     - 3.3.6absorption of Fats
   - 3.4 Secretory Functions of GI Tract
     - 3.4.1 Salivary Secretion
     - 3.4.2 Gastric Secretion
     - 3.4.3 Intestinal Secretion
     - 3.4.4 Pancreatic Secretion
   - 3.5 Gastrointestinal Hormones
   - 3.6 Movements of the Alimentary Canal
4. Summary
5. Glossary
6. Self Assesment Questions
7. Model Answer
8. Bibliography

SLM Unit No. 13.2: Excretory System

1. Objective
2. Introduction
3. Anatomical localization and structure of the Kidney
4. Functions of the kidney
5. Mechanism of urine formation and excretion
6. Compositions of urine
7. Role of Kidney in water, electrolyte and acid base balance
8. Summary
9. Glossary
10. Self Assessment Questions
11. Bibliography

SLM Unit No. 13.3: Excitable Tissue

1. Objectives
2. Introduction
3. Excitable tissue
    - 3.1. Nerve and Muscle
        - 3.1.1. Nerve
            - 3.1.1.1 Neurones & Glial cells
            - 3.1.1.2 Trophic factors
        - 3.1.2 Muscle, Types of muscle system and their importance
            - 3.1.2.1 Organization of skeletal muscle
            - 3.1.2.2. Skeletal muscle types
            - 3.1.2.3. Biophysical properties of skeletal muscle
            - 3.1.2.4. Basic organization of smooth muscle
            - 3.1.2.5. Types of smooth muscle
            - 3.1.2.6. Innervations of smooth muscle
            - 3.1.2.7. Structure of cardiac muscle
        - 3.1.3. Chemical, Electrical and molecular involvement in muscle contraction
            - 3.1.3.1. Control of skeletal muscle contraction
            - 3.1.3.2. Motor unit
            - 3.1.3.3. Energy sources in muscle contraction
            - 3.1.3.4. Control of smooth muscle activity and regulation of contraction
            - 3.1.3.5. Control of cardiac muscle activity
            - 3.1.3.6. Regulation of the force of contraction of cardiac muscle
        - 3.1.4 .Resting membrane potential & Action potential
            - 3.1.4.1. Electrical signals of nerve cell
            - 3.1.4.2. How ion movements produce electrical signals
            - 3.1.4.3. Forces that create Membrane potentials
            - 3.1.4.4. The ionic basis of resting membrane potential
            - 3.1.4.5. The ionic basis of Action potential
            - 3.1.4.6. Sequence of events during Action potential
        - 3.1.5. Nerve impulse propagation
            - 3.1.5.1. Factors affecting conductivity of nerve
            - 3.1.5.2. Classification of nerve fibres on the basis of conduction velocity
            - 3.1.5.3. Mechanism of conduction of nerve impulse
            - 3.1.5.4. Saltatory conduction in the myelinated nerve fibre
        - 3.1.6. Synaptic & Neuromuscular transmission

3.1.6.1. Structure and Properties of synapses
3.1.6.2. Properties of electrical synapses
3.1.6.3. Properties of chemical synapses
3.1.6.4. Properties of neurotransmitters
3.1.6.5. Quantal release of neurotransmitter
3.1.6.6. Role of Calcium in Transmitter Secretion
3.1.6.7. Ionotropic and metabotropic receptors
3.1.6.8. Mechanism of synaptic transmission
3.1.6.9. Anatomical structure of neuromuscular junction
3.1.6.10. Mechanism of neuromuscular transmission
3.1.6.11. Action of drugs on neuromuscular transmission

3.2. Function of hypothalamus-hunger, satiety and thirst

3.2.1Neuroendocrine regulation of hunger and satiety-Leptin , Ghrelin

3.2.1.1 Energy homeostasis
3.2.1.2 Regulation of body weight
3.2.1.3 The Leptin Protein
3.2.1.4 Leptin receptors(Ob-R)
3.2.1.5 Mechanism of Leptin action in brain
3.2.1.6 Leptin signalling pathways
3.2.1.7 Central Melanocortin system in the regulation of food intake
3.2.1.8 Effects on ghrelin on hypothalamus
3.2.1.9. Structure of ghrelin and functional receptor
3.2.1.10. Distribution and biological function of ghrelin
3.2.1.11. Ghrelin and control of appetite: Major effects and mechanism of action

3.2.2. Neural basis of behaviour and emotion

3.2.2.1. Physiological Changes Associated with Emotion
3.2.2.2. The integration of emotional behaviour
3.2.2.3. The Limbic system
3.2.2.4 .The Importance of the Amygdala
3.2.2.5. Emotion, Reason, and Social behaviour

3.3. Chemical sense-smell and taste

3.3.1. The organization of olfactory system
3.3.2. Olfactory perception in humans
3.3.3. Assessing Olfactory Function in the Laboratory
3.3.4. Olfactory epithelium and Olfactory receptor neurones
3.3.5. Odor transduction and odorant receptor proteins
3.3.6 Physiological mechanism of Odor Transduction
3.3.7. The Olfactory Bulb
3.3.8. The organization of the Taste System
3.3. 9.The taste Perception in Humans

SLM Unit No. 13.4: Immune System

Paper ND07: Unit 14: MOLECULAR BIOLOGY IN NUTRITION

SLM Unit no. 14.1: Metabolism of Nucleic Acids

SLM UNIT-14.2: Molecular Biology in Nutrition

SLM Unit No. 14.3: Genetic Engineering

Paper ND08: Unit 15: FOOD MICROBIOLOGY AND TOXICOLOGY

SLM Unit No. 15.1: Classification and Morphology of Microorganism

SLM Unit NO.-15.2: Microbiology of Food

SLM Unit No. – 15.3: Food Spoilage

SLM UNIT NO 15.4: Food Toxicology and Food Borne Illness

SLM Unit No 15.5: Food Safety, Assessment, Regulation and Standard

Paper ND08: Unit 16: FOOD BIOTECHNOLOGY

SLM Unit No. 16.1: Use of Biotechnology for Food Processing

SLM Unit No. 16.2: Genetically Modified Foods

1. Objective
2. Introduction: Concept of GM food
3. Genetically Modified food: Nutritional aspects and health concern:
   - 3.1 Need for Genetically Modified food
   - 3.2 Food challenges
     - 3.2.1 Potential Challenges
     - 3.2.2 Future Challenges to Food
   - 3.3 Potential benefits in agriculture
   - 3.4 Crop engineering
   - 3.5 Nutritional Improvement
   - 3.6 GM animal foods:
   - 3.7 Genomic analysis of GM food
     - 3.7.1 Genetics of GM food
     - 3.7.2 Genetic analysis and GMO Testing:
   - 3.8 Safety of G.M food
     - 3.8.1 Labeling of Genetically Modified Food
     - 3.8.2 Merits and demerits of GM foods
4. Summary
5. Self assessment question
6. References

SLM Unit No. 16.3: Technology for Production of Alcoholic Beverages

SLM Unit No. 16.4: Food Preservation

SLM Unit No. 16.5: Special Food Processing Technology

1. Objective
2. Introduction
3. Special Food Processing Technology
    - 3.1. Membrane technology
        - 3.1.1 Ultra filtration
        - 3.1.2 Reverse osmosis and)
        - 3.1.3 Agglomeration
        - 3.1.4 Agitation
        - 3.1.5 Extrusion
    - 3.2. Enzyme technology
        - 3.2.1 Production of enzymes – amylase, protease, lipase, lactase and pectinase
        - 3.2.2 Purification of enzymes
        - 3.2.3 Use of enzymes in food & beverage industry (e.g. cheese, fruit juice, wine, meat tenderizing & dairy)
4. Summary
5. Glossary
6. Self Assessment questions
7. Bibliography

Paper ND09: Unit 17: Food Hygiene and Sanitation

SLM Unit No – 17.1: General Principle of Food Hygiene

SLM Unit No – 17.2: Control of Insect, Pest and Microorganism in Food

SLM Unit No. 17.3: Sanitary Aspects of Water Supply

SLM Unit No. 17.4: Effective Detergency and Cleaning Practices

SLM Unit No: 17.5: Sanitary Aspects of Waste Disposal

Paper ND09: Unit 18: ASSESSMENT OF NUTRITIONAL STATUS

SLM Unit No.18.1: Nutrient Requirements

SLM No. Unit No.18.2: Indirect Methods for Nutritional Assessment

SLM Unit no-18.3: Direct Methods for Nutritional Assessment

SLM Unit No. -18.4: Direct Methods for Nutritional Assessment: Dietary and Clinical Assessments

1. Objectives
2. Introduction
3. Methods for Nutritional Assessment: Dietary and Clinical Assessments
    - 3.1 What is Nutritional Assessment, Nutritional Screening & Nutritional Status?
    - 3.2 Importance of Nutritional Assessment.
    - 3.3 Dietary Method - Different Dietary methods especially Dietary history, Dietary Intake Data (DID), 24hrs Recall Method, Food Frequency Method, Daily Food Record or Diary. Direct Measurement of Raw and Cooked Food, Nutrient Intake Analysis (NIA).
    - 3.4 Dietary Assessment in Special Population & Specific situation.
    - 3.5 Dietary Reference Intakes
    - 3.6Component of Clinical Assessment
    - 3.7 Association with Nutrient Deficiencies and Biochemical Status.
4. Summary
5. Glossary
6. Self Assessment Question (SAQ)
7. Bibliography

SLM Unit No -18.5: Assessing food and Nutrition Security

Paper ND10: Unit 19: NUTRITION THROUGH LIFE CYCLE - I

SLM Unit No. - 19.1: Growth and Development through the Life Cycle

SLM Unit No. - 19.2: Nutrition in Pregnancy

SLM Unit No.19.3: Nutrition in Lactation

SLM Unit No. – 19.4: Nutrition in Infancy

SLM Unit No. 19.5: Nutrition in Preschool Children

Paper ND10: Unit 20: **NUTRITION THROUGH LIFE CYCLE - II**

SLM Unit No. 20.1: Nutrition during School Age

SLM Unit No. 20.2: Nutrition during Adolescence

1. Objective
2. Introduction
3. Nutrition during Adolescence
    - 3.1 Growth in adolescence
        - 3.1.1 Physical growth in puberty
        - 3.1.2 Growth spurt
        - 3.1.3 Menarche
        - 3.1.4 Growth after puberty
        - 3.1.5 Internal changes
        - 3.1.6 Physiological change with special reference to hormonal change
        - 3.1.7 Emotional/social behavioural change
    - 3.2 Nutritional requirement in adolescene
        - 3.2.1 Special nutritional importance
        - 3.2.2 Nutrients need (Protein, carbohydrate, fat, minerals , vitamins)
        - 3.2.3 Balanced diet
    - 3.3 Factors influencing food habit
        - 3.3.1General
        - 3.3.2 Special
            - 3.3.2.1 Breakfast
            - 3.3.2.2 Ready to eat foods
            - 3.3.2.3 Alcohol and drinking
    - 3.4 Potential nutrition- related health problem
        - 3.4.1 Obesity
        - 3.4.2 Eating disorder
    - 3.5 Prevention of malnutrition among adolescents
        - 3.5.1General
        - 3.5.2 School lunch programme
4. Summary
5. Glossary
6. Self assessment questions
7. Bibliography

SLM Unit No. 20.3: Nutrition for Adults

SLM Unit No. 20.4: Nutrition for the Aged

1. Objective
2. Introduction

2.1 Global Situation

2.2 Effect of demographic transition

2.3 Aging process

3. Nutrition for elderly

3.1 Physiological changes related to age

3.1.1 Change in GI function

3.1.2 Loss of bone with age

3.1.3 Brain and neural change with age

3.1.4 Changes in C.V. system

3.1.5 Changes in renal function

3.2. Nutritional requirements of aged person

3.2.1 Macronutrients

3.2.2 Micronutrients

3.2.3 Fluid

3.2.4 Fibre

3.3 Factors affecting nutritional status

3.3.1 Financial capacity

3.3.2 Social problem

3.3.3 Emotional problem

3.3.4 Psychological problem

4. Nutrition- related health problem
5. Management of old age

5.1 A life span approach

5.2 Adoption of healthy life style

6. Prevention of disease in old age people

6.1 Primary prevention of disease in old age people

6.2 Secondary prevention

6.3 Tertiary prevention

7. Summary
8. Self Assessment Questions
9. Bibliography

SLM Unit no-20.5: Nutritional Requirements and Food Modification in Higher Altitude and Space Travels, Soldiers

1. Objective
2. Introduction
3. Physiological alteration in astronauts
    - 3.1 Weight reduction and Muscle wasting
    - 3.2 Body water
    - 3.3 Bone loss
    - 3.4 Effect on Blood and cardiovascular
    - 3.5 Alteration of Taste
4. Selection and types of space food
    - 4.1 Rehydratable Food
    - 4.2 Thermostabilized Food
    - 4.3 Intermediate Moisture Food
    - 4.4 Natural Form Food
    - 4.5 Irradiated Food
    - 4.6 Frozen Food
    - 4.7 Fresh Food
    - 4.8 Refrigerated Food
5. Nutritional requirements in space
    - 5.1 Energy
    - 5.2 Carbohydrates
    - 5.3 Protein and Fat
    - 5.4 Vitamin D
    - 5.5 Vitamin K
    - 5.6 Calcium
    - 5.7 Iron
6. Nutritional aspects in high altitude
    - 6.1 Introduction
    - 6.2 Energy expenditure at high altitude and related issues
    - 6.3 Altitude Related Illnesses

7. Nutritional issues and complaints at high altitude
    - 7.1 Weight Loss
    - 7.2 Insufficient Carbohydrate Intake
    - 7.3 Dehydration
    - 7.4 Gastrointestinal Complaints

8. Nutritional Guidelines for soldiers (Militants) at high altitude

Semester III

Paper ND 13: Unit 25: RESEARCH METHODOLOGY AND STATISTICS IN NUTRITION

SLM Unit No. -25.1: Research Methodology

1. Objectives
2. Introduction
3. Research Methodology
   - 3.1. Meaning, aim & objective of research
   - 3.2. Significance of Research
   - 3.3. Role of Research
   - 3.4. Types of Research, Research Process
   - 3.5. Research Problem
     - 3.5.1 Selecting the problem
     - 3.5.2 Technique involved in defining a problem
     - 3.5.3. Thrust areas in research in nutrition and dietetics
4. Summary
5. Glossary
6. Self Assessment Questions
7. Bibliography

SLM Unit No. -25.2: Sampling design & Data collection

1. Objectives
2. Introduction
3. Sampling design & Data collection

3.1.Sampling design

3.2.Census and sample survey

3.3.Steps in sampling design

3.4.Data collection

3.4.1. Collection of primary data through different methods (Questionnaire, observation, Interview, case study, sociometry, Anthropometry, Projective tests and other methods)

3.4.2. Collection of Secondary data

4. Summary
5. Glossary
6. Self Assessment Questions
7. Bibliography

SLM Unit No. -25.3: Descriptive Statistics

SLM Unit No. -25.4: Statistical Testing Inference

SLM Unit No. -25.5: Measures of association

Paper ND 13: Unit 26: BIOINFORMATICS AND COMPUTER APPLICATION IN NUTRITION

SLM Unit No. -26.1: Basic bioinformatics

SLM Unit No. -26.2: Basics of Computer

SLM Unit No. 26.3: Computer Software

SLM Unit No. 26.4: Word Processing and Data Management

SLM Unit No. 26.5: Concept of internet

Paper ND 14: Unit 27: FOOD AND NUTRITION SERVICES IN HOSPITAL AND OTHER ORGANIZATIONS

SLM Unit No. 27.1: Introduction to Food Service Organization

SLM Unit No. 27.2: Role of Nutrition Support Team

SLM Unit No. 27.3: Types of Services in Tertiary Health Care Setup

SLM Unit No. 27.4: Basic quality management in nutrition services

Basic quality management in nutrition services

SLM Unit No. 27.5: Patient Satisfaction

Paper ND 14: Unit 28: DRUG NUTRIENT INTERACTION AND NUTRIGENOMICS

SLM Unit No.28.1: Drugs and Pharmaceutical Compounds

SLM Unit No. 28.2: **Characteristics of Drugs Action**

SLM Unit No.28.3: Drug-Nutrient Interactions

SLM Unit No.28.4: Nutrient Effects on Drug Therapy

1. Objectives
2. Introduction
3. Nutrient Effects on Drug Therapy
    3.1. Effects of dietary composition
    3.2. Interactions between medication and milk, iron, fruit juices, antacids
4. Summary
5. Glossary
6. Self Assessment Questions (SAQ)
7. Bibliography

SLM Unit No.28.5: Nutrigenomics

Paper ND 15: Unit 29: DIET THERAPY- I

SLM Unit No.29.1: Basic principles of planning a normal diet

1. Objectives
2. Introduction
3. Basic principles of planning a normal diet
    - 3.1. characteristics of a normal diet
    - 3.2. meeting nutrient requirements of individuals and family
    - 3.3. Use of Dietary guidelines for Indians
    - 3.4. Objectives of diet therapy
        - 3.4.1. Regular diet and rationale for modifications in energy and other nutrients, texture, fluid, soft diets
4. Summary
5. Glossary
6. Self Assessment Questions
7. Bibliography

SLM Unit No.29.2: Diet in Febrile condition

SLM Unit No. 29.3: Diet in Energy Imbalance

SLM Unit No. 29.4: Diets in Cardio Vascular and Pulmonary Diseases

Paper ND 15: Unit 30: DIET THERAPY- II

SLM Unit No. 30.1: Diets in Diseases of the Gastro Intestinal System

1. Objectives
2. Introduction
3. Diets in Diseases of the Gastro Intestinal System
   - 3.1. Disorders, Etiology, Symptoms and dietary management of Acute Gastritis
   - 3.2. Disorders, Etiology, Symptoms and dietary management of Chronic Gastritis
   - 3.3. Disorders, Etiology, Symptoms and dietary management of Peptic Ulcer
   - 3.4. Duodenal & Gastric and Intestinal Disease
     - 3.4.1. Flatulence
     - 3.4.2. Diarrhoea and Dysentery
     - 3.4.3. Constipation
     - 3.4.4. Celiac disease
     - 3.4.5. Tropical sprue
     - 3.4.6. Irritable bowel syndrome
     - 3.4.7. Diverticular disease
     - 3.4.8. Colon cancer
     - 3.4.9. Ulcerative colitis
4. Summary
5. Glossary
6. Self Assessment Questions
7. Bibliography

SLM Unit No. 30.2: Diets in Liver and Kidney Diseases

1. Objectives
2. Introduction
3. Diets in Liver and Kidney Diseases

    3.1. Diets in Liver Diseases

        3.1.1. Dietary management of Hepatitis
        3.1.2. Dietary management of Cirrhosis
        3.1.3. Dietary management of Jaundice
        3.1.4. Dietary management of Fatty liver
        3.1.5. Dietary management of Cholecystits and Cholelithiasis
        3.1.6. Dietary management of Hepatic coma
        3.1.7. Dietary management of Pancreatitis

    3.2.. Diets in Kidney Diseases

        3.2.1. Etiology, Symptoms and Dietary modification of Nephritis
        3.2.2. Etiology, Symptoms and Dietary modification of Nephrosis
        3.2.3. Etiology, Symptoms and Dietary modification of Acute and chronic renal failure
        3.2.4. Etiology, Symptoms and Dietary modification of Nephrolilthiasis
        3.2.5. Transplantation and dialysis
        3.2.6. Dietary management, Diet in kidney stones
4. Summary
5. Glossary
6. Self Assessment Questions
7. Bibliography

SLM Unit No.30.3: Diabetes Mellitus

SEMESTER IV

Paper ND 19: Unit 37: ADVANCED DIET THERAPY

SLM Unit No.37.1: Diets in Neurological diseases and Rheumatic disorders

1. Objectives
2. Introduction
3. Diets in Neurological diseases and Rheumatic disorders
    - 3.1. Causes, effect of malnutrition, feeding problems, effect of nutrients in Stroke
    - 3.2. Causes, effect of malnutrition, feeding problems, effect of nutrients in Epilepsy
    - 3.3. Causes, effect of malnutrition, feeding problems, effect of nutrients in Migraine
    - 3.4. Causes, effect of malnutrition, feeding problems, effect of nutrients in Parkinson's neurotrauma myasthenia gravis
    - 3.5. Symptoms, causes, treatment, diet therapy in Osteoarthritis and Rheumatoid arthritis
    - 3.6. Symptoms, causes, treatment, diet therapy in Gout
4. Summary
5. Glossary
6. Self Assessment Questions
7. Bibliography

SLM Unit No.37.2: Diets in Cancer and HIV

SLM Unit No.37.3: Diet in Allergy

Paper ND 19: Unit 38: NUTRITION IN SPORTS AND FITNESS

SLM Unit No. 38.1 Approaches to the Management of Fitness and Health

SLM Unit No. 38.2: Nutritional requirements of exercise

SLM Unit No.38.3 Carbohydrate Requirements Before, During and After Sports, Exercise

SLM Unit No. 38.4: Requirements and Importance of Different Vitamins, Minerals and Water during Exercise

SLM Unit No. 38.5: Dietary Supplements and Ergogenic Aids

Paper ND 20: Unit 39: COMMUNITY NUTRITION

SLM Unit No. 39.1: Community Health Concept

1. Objectives
2. Introduction
3. Community Health Concept
    - 3.1. Definition and brief study of community, family, village and block
    - 3.2. Definition, dimension and determinant of health, positive health, health situation in India
    - 3.3. Relationship between health and nutrition
    - 3.4. Role of public nutritionist in health care delivery
    - 3.5. Health Indices: fertility indicator, vital statistics, mortality, morbidity and demographic indicator
    - 3.6. Human development Index
    - 3.7. Reproductive health index
    - 3.8. IMR, MMR, Birth Rate, Sex Ratio, Poverty Level
    - 3.9. Concept of disease, Causation (Agent, host, environmental factors)
    - 3.10. Concept and control & prevention modes of intervention
4. Summary
5. Glossary
6. Self Assessment Questions
7. Bibliography

SLM Unit No.39.2: Nutrition Programs

1. Objective
2. Introduction
3. Nutrition Programme
   - 3.1. National Anemia Prevention Programme (Nutritional Anemia) (NNACP)
   - 3.2. Night blindness (Nyctalopia) prevention programme (vitamin A deficiency) (NVADCP)
   - 3.3. Iodine prophylaxis programme (NIDDCP)
   - 3.4. The package programme of immunization
   - 3.5. Nutrition Education
   - 3.6. Feeding programme
   - 3.7. Malnutrition
     - 3.7.1. Causes of malnutrition
     - 3.7.2. Ecological factors
     - 3.7.3. Effects of malnutrition
   - 3.8. Demographic changes
   - 3.9. Vitamin deficiency, prevalence, programme to combat
     - 3.9.1. Thiamine (Vitamin B1)
     - 3.9.2. Riboflavin (Vitamin B2)
     - 3.9.3. Niacin
     - 3.9.4. Vitamin C
     - 3.9.5. Vitamin D
   - 3.10Protein deficiency,
     - 3.10.1. Prevalence,
     - 3.10.2. Programme to combat
   - 3.11. PEM
   - 3.12. Kwashirkor
4. Summary
5. Glossary
6. Self Assessment Questions (SAQ)
7. Bibliography

SLM Unit No.39.3: Nutrition and National Development

Paper ND 20: Unit 40: SPECIAL ASPECTS OF COMMUNITY NUTRITION

SLM Unit No.40.1: Nutrition Intervention Programmes

1. Objective
2. Introduction
3. Nutrition Intervention Programmes
    - 3.1. Objectives
    - 3.2. Operation of Feeding Programmes
        - 3.2.1. ICDS
        - 3.2.2. MDMP
        - 3.2.3. PDS
        - 3.2.4. FFW
        - 3.2.5. TINP
        - 3.2.6. NNMS/NNMB
        - 3.2.7. IRDP
        - 3.2.8. DWACRA
    - 3.3. National organizations and their role in nutrition programmes
        - 3.3.1. ICMR
        - 3.3.2. NIN
        - 3.3.3. CFTRI
        - 3.3.4. ICAR
        - 3.3.5. NIPCCD
    - 3.4. International organizations
        - 3.4.1. WHO
        - 3.4.2. UNICEF
        - 3.4.3. FAO
        - 3.4.4. UNESCO
        - 3.4.5. World Bank
4. Summary
5. Glossary
6. Self Assessment Questions
7. Bibliography

SLM Unit No.40.2: Nutrition Education

1. Objective
2. Introduction
3. Nutrition Education
    - 3.1. Meaning
    - 3.2. Nature and importance of nutrition education to the community
    - 3.3. Training of workers in nutrition education programme
    - 3.4. Principles of planning, executing and evaluation nutrition education programme
4. Summary
5. Glossary
6. Self Assessment Questions
7. Bibliography

SLM Unit No.40.3: Recent Trends in Nutrition Education

1. Objective
2. Introduction
3. Recent Trends in Nutrition Education
    - 3.1. Methods and Techniques of organizing nutrition programmes using audio, video aids and exhibition
    - 3.2. Problems of nutrition
    - 3.3. Health care delivery –
        - 3.3.1. PHC
        - 3.3.2 School Health services and their role in preventing communicable diseases
4. Summary
5. Glossary
6. Self Assessment Questions
7. Bibliography

Paper ND 21: Unit 41: NUTRITION IN EMERGENCIES

SLM Unit No.41.1: Natural / Manmade Disasters

1. Objective
2. Introduction
3. Natural / manmade disasters resulting in emergency situations
    - 3.1. Famine,
    - 3.2. Drought,
    - 3.3. Flood,
    - 3.4. Earthquake,
    - 3.5. Cyclone,
    - 3.6. War,
    - 3.7. Civil and Political Emergencies,
    - 3.8. Factors contributing to the rise and development of emergency situations (use illustrations from Indian case studies).
4. Summary
5. Glossary
6. Self Assessment Questions (SAQ)
7. Bibliography

SLM Unit No.41.2: Nutritional Problems and Communicable Diseases

SLM Unit No. 41.3: **Assessment and Surveillance of Nutritional Status**

SLM Unit No. 41.4: **Nutritional Relief and Rehabilitation**

SLM Unit No. 41.5: **Assessment of Food Needs in Emergency Situations**

Paper ND 21: Unit 42: NUTRITION COUNSELLING

SLM Unit No. 42.1: Nutrition Counseling

SLM Unit No. 42.2: **Factors for Counseling**

SLM Unit No. 42.3: **Assessment and Planning Component**

SLM Unit No. 42.4: **Implementation and Evaluation Component**

SLM Unit No. 42.5: Nutrition Advocacy

Paper ND 22: Unit 43: Nutraceuticals

SLM Unit No. 43.1: Nutraceuticals

SLM Unit No. 43.2: Prebiotics and Probiotics

SLM Unit No.43.3: Functional Foods

SLM Unit No.43.4: Development of Nutraceutical and Functional Foods

SLM Unit No.43.5: Other Food Components with Potential Health Benefits

Paper ND 22: Unit 44: Food Additives

SLM Unit No.44.1: Food additives

SLM Unit No.44.2: Categories of Food Additives

SLM Unit No.44.3: Sweetening agents & Natural and Synthetic colors

SLM Unit No.44.4: Food Flavors

SLM Unit No.44.5: Determination and Estimation of Food Additives

Semester-I

Paper - I

FUNDAMENTALS OF ENVIRONMENTAL SCIENCE

UNIT – I.

Basic Aspects of Environmental Science

TABLE OF CONTENTS

Learning Objectives

At the end of this unit, you will be able to:

- You will be able to understand the meaning of Environmental Science and its interdisciplinary nature.
- Know about the basic components of earth as their interrelatedness
- Learn about the fundamentals of ecology and ecosystem
- Get a preliminary idea about the environmental resources and the problem associated with the utilization and sustainable management
- Finally you will have a brief idea about climates and climatic zones of the earth in general and India in particular from an ecological perspective.

UNIT II.

Global Environment and Its Segments

TABLE OF CONTENTS

Objectives

The following components and issues of environmental science are defined and described in the Unit -2

i. Definition of ecosystem,
ii. Explanation of the ecosystem concept,
iii. Physico-chemical factors of environment,

Biological factors of environment, v. Stability of ecosystem.

Unit III.

FUNDAMENTALS OF ECOLOGY

Table of Contents

Learning Outcomes

Reading this module you will be able to

- Learn about the fundamental concept of ecology and ecosystems
- Learn about energy flow, trophic levels, and ecological pyramids
- Learn about ecotone, edge effects, ecological riche, succession

UNIT IV.

ENVIRONMENTAL RESOURCES

Learning Outcome:

At the end of this unit, you will be able to:

- Understand the Abiotic resources like Air, Water, Soil, Minerals.
- Learn about the Forests and Energy resources;
- Concept of reserve and resources;
- Learn about the problems with the exploitation of resources and sustainable management;
- Population Growth – Biological Growth Curves and Carrying capacity

Unit – V

Weather and Climate

Table of Contents

Learning outcomes

After studying this module you will be able to

- Differentiate weather and climate
- Understand the different variables affecting weather
- Learn about the heat balance of the earth-atmosphere system
- Identify the origin of climatic zones
- Evaluate the importance of climatic zones
- Understand the effects of climatic extremes

Paper-II

Human Ecology

Unit – I

Human Ecology

Table of Contents

Learning Outcomes

After reading this module you will be able to

- Understand the relationship between man and environment
- Identify different aspects of human ecology
- Differentiate between various ecosystem types
- Evaluate the importance of ecosystems

Unit – II

Human Adaptability

Table of Contents

Learning Outcomes

After reading this unit you will be able to

- Learn about human adaptation
- Understand different modes of adaptation
- Differentiate different environmental conditions and human adaptations

Unit – III

Human Defense system and Environment.

Contents

Learning outcome

After studying this module you will be able to

- Understand the different cells
- Learn about the antigen presenting cells
- Understand the immune system
- Learn about the complementary systems
- Evaluate the human defense system

Unit –IV

Environmental Risk and Hazards.

TABLE OF CONTENTS

Learning Outcome

This unit is likely to help

a) understanding and differentiate between Hazards, risk and disaster.

b) identification of various features for assessment of intensity of hazards and risk

c) estimate the disasters, whether man made or natural

d) causes of hazards and precautionary measures

e) risk assessment and arrangement to mitigate as and where required

f) prior estimation of environmental disasters by statistical analysis of earlier records and estimating probability of occurrence

g) identification of various categories and making people aware of the consequences to minimize both hazards and associated risks

Unit – V

Epidemiological issues

Table of Contents

5.8.5 Signs and symptoms
5.8.6 Life cycle of Plasmodium Sp.
5.8.7 Pathogenesis of malaria
5.8.9 Diagnosis
5.8.10 Prevention/control of malaria
5.8.11 Malaria eradication
5.8.12 Resurgence of malaria
5.8.13 Revised strategy
5.9 Environmental, Biological, Chemical and Biotechnological control of mosquitoes, flies and other domestic pets.
5.9.1 Improvement of environment and upgrading santitation
5.9.2 Personal protection
5.9.3 Physical barriers
5.9.4 Other methods
5.10 Dengue
5.10.1 Viriology
5.10.2 Epidemiology
5.10.3 Symptoms
5.10.4 Prevention
5.11 Swine flue
5.11.1 Symptoms
5.11.2 Structure
5.11.3 Classification
5.11.4 Influenza C
5.11.5 Influenza A
5.11.6.Diagnosis
5.11.7 Vaccination
5.12Immuno pathology of AIDS
5.12.1 Retroviruses
5.12.2 Structure of HIV
5.12.3 Life cycle of the HIV
5.12.4 Acquired Immunodeficiency syndrome (AIDS)
5.12.4.1 First phase of HIV infection
5.12.4.2 Second phase of HIV infection
5.12.4.3 Third phase of HIV : Full blown AIDS
5.12.4.4 Mechanism of immune suppression in HIV infection
5.12.4.5 Indirect effects on T cells
5.12.4.6 Detection of defects in the immune system of HIV infected patients
5.12.4.7 Macrophages
5.12.4.8 Dendritic cells
5.12.4.9 Follicular dendritic cells (FDC)
5.12.9.1 How HIV evades immune mechanisms
5.12.9.2 Vaccination
5.13 Vaccines and vaccination
5.13.1 Active and passive immunity
5.13.1.1 Active immunization
5.13.1.2 Passive immunization
5.13.1.3 Herd immunity
5.13.2 Types of vaccines
5.13.2.1 Killed vaccine

Learning Outcome

In the present module epidemiological aspects of some diseases have been discussed. These diseases are environment related and cause epidemic in our country and abroad. The causes of the disease and their health hazards have been pointed out. The followings are the main goals of this module:

1. To understand the epidemiological issues of HIV.
2. To know about the different epidemiological aspects of malaria
3. To acquire knowledge about different epidemiological aspects of goiter
4. To understand the epidemiological issues of fluorosis
5. To know about the epidemiology of arsenic
6. To know the structure and epidemiology of Dengue and Swine flu.
7. To understand the types of vaccine and produce of vaccination.

Paper - III

Environmental Biology & Biotechnology

Unit –I:

Diversities of life forms.

TABLE OF CONTENTS

Learning Outcome

After studying this module you will be able to understand the origin and evolution of life on earth

Unit –II

Microbial Diversity

2.1 Concept of Diversity

2.2 Microbial diversity

a. bacteria
b. fungi
c. actinomycetes

2.3 Microbial diversity in man-made ecosystems

2.4 Microbial diversity in natural ecosystems

2.5 Importance of microbes in nutrient cycling.

a. Nitrogen cycle
b. Sulfur cycle
c. Phosphorus cycle

Objectives: After studying the unit you will be able understand the microbial diversity on earth, Importance of Microbes in nutrient cycling.

Unit –III

Plant diversity

Structure of the Contents :

Objectives : The prime objectives of this chapter / unit are as following –

- Understanding plant identification, classification & nomenclature
- Overall phytogeographical distribution of plants in India and their present endangered states.
- Botanical gardens their role in plant exploration and conservation.

Unit –IV:

Animal Diversity.

Table of Contents

Objectives : The prime objectives of this chapter / unit are as following –

To understand the animal diversity

Causes of biodiversity loss

Endangered Species and Hotspots

Unit – V

Environmental Biotechnology.

Table of Content

Learning Objectives: The prime objectives of this chapter / unit are as following

Concept of Environmental Biotechnology

Basic techniques in Genetic Engineering

GM crop and concept of GMO

Paper-IV

Biodiversity; Conservation Biology

Unit –I

Biodiversity and Wildlife

1.1 Biodiversity - definition
1.2 Categories of Biodiversity
    a. Levels:
1.3 Ecosystem Diversity
1.4 Genetic Diversity
1.5 Species Diversity
    a. Types:
1.6 Alpha diversity
1.7 Beta diversity
1.8 Gamma diversity
1.9 Wildlife – definition
1.10 Values of wildlife conservation
1.11 IUCN Red List
1.12 Basic Measurement methods of Species Diversity:
    a. Species richness
    b. Species diversity
1.13 How to Measure Species Diversity?
1.14 Species richness indices:
        i. Menhinick's Index
        ii. Margalef's index
1.15 Species abundance models:
        i. Species evenness
1.16 Species proportional abundance based indices
        i. Simpson's Index
        ii. Pielou's Evenness index
        iii. Shannon Diversity Index
1.17 Summary and Exercises
1.18 Conservation of Biodiversity
    a. Wildlife Management
1.19 Threats to Biodiversity- Causes of loss:
1.20 Need for Biodiversity Conservation
1.21 Methods of Biodiversity Conservation
1.22 *In-situ* Conservation
        i. National park
        ii. Wildlife Sanctuary
        iii. Biosphere reserves
        iv. Nature reserves

v. Preservation plots

1.23 *Ex-situ* Conservation

i. Seed Banks
ii. Botanical garden
iii. Zoos
iv. Aquaria
v. Homestead Garden
vi. Herbarium

1.24 Summary and Sample Questions

Learning Objectives:

- You should know the importance of Wildlife & Biodiversity and it's categories.
- You should gather knowledge on the needs of conservation and methods of conservation.
- You must be able to quantify species diversity
- You should be able to propose how ecological theories could be applied by conservation biologists to species richness in a national park, for example.

Unit –II
Global Biodiversity conservation strategies

Contents:

2.1. Man and the Biosphere Programme (MAB)
   a. General objective of MAB
   b. Organization
   c. Project Areas
   d. Biosphere Reserves

2.2 IUCN
2.3 2.1.Functions:
2.4 2.2. The IUCN Categories
2.5 Role of Indigenous Knowledge System (IKS)
   a. Sources of Traditional Knowledge
   b. Indigenous intellectual property

2.6 Intellectual property rights – TRIPS4.1. Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS)
2.7 4.2. The Convention on Biological Diversity (CBD)
2.8 4.3. IPR Policy of India
2.9 Biopiracy
   a. Regulation of Access to Biological Resources at the International Level
      i. Convention on Biological Diversity (CBD)
      ii. International Treaty on Plant Genetic Resources on Food and Agriculture (PGRFA)
      iii. Farmers' Rights
      iv. The International Undertaking (IU)

Objectives:

After studying this unit you will be able to:

Gather knowledge regarding the function and organization of MAB and IUCN

Role of Indigenous Knowledge System

Concept of TRIPS

Biopiracy and right of farmers

CBD

Unit –III:

Forest Ecology.

Structure of the Contents :

Objectives : The unit focus the following aspect –

- Forest types, composition and functions
- Ecological value of forest
- Status of forests in India

Unit –IV

Conservation of forest

Objectives:

The learner's will be able to

1. define the forest conservation
2. understand the importance of forest conservation
3. know the methods of forest conservation
4. understand the role of people in forest management
5. understand forest conservation strategies in India
6. illustrate the role of celebration of important days for forest and environment conservation
7. understand the use of forest biotechnology and bioprocess

Unit –V
Aquatic Ecology

Objectives:

The learner's will be able to

- Learn about the Aquatic flora, fauna and microbes
- Diversities of aquatic ecosystem;Degradation of aquatic ecosystem;
- Food chain and function in aquatic eco-system
- Eutrophication and their conservation; Wetland – status and conservation priorities in India

Semester-II

Paper VII
Environmental Issues and Problems

Unit – I:

Environmental Education and Awareness.

Table of Contents:

LEARNING OUTCOMES

Learners will be able to

- Define & explain Traditional Knowledge
- Define & explain principles of environment
- Explain functions of environmental NGOs
- Define and find trends in green movements in India

Unit – II

Environmental Ethics and Global Imperatives.

Table of Contents

Learning Outcome

Learners will be able to
- Definition, History & Explanation of Environmental Ethics
- Development and Types of Environmental Ethics
- Issues on Environmental Ethics and Political aspects

Unit – III

Global Environmental Problems.

Table of Contents:-

Learning Outcomes:-

After going through the module the student will be able to-

- Understand greenhouse effect.
- Learn about global warming.
- Understand the impact of climate change.
- Evaluate the effect of biodiversity loss.

Unit IV

National and Regional Environmental Issues

Table of Contents:

Learning Outcomes:

After completing this unit you will be able to:

- Understand the concept of Ecological Refugee
- Understand the concept of Resources
- Can differentiate between renewable and non-renewable resources
- Management and mitigation of resources
- Learn about major Environmental issues
- Sustainable management and mitigation of resources

Unit – V

Environmental Movements in India

Table of Contents:

Learning Outcomes:

After going through the unit you will be able to

- Understand the important environmental movement in India.
- Learn the goals of such movements.
- Learn about the leadership and participation.
- Evaluate the emergency of such movement.

Paper-VIII

Environmental Management

Unit – I:

Environmental Management.

Content

1.1 Environmental Management

1.2 Concept of Environmental Management

1.3 Scope of Environmental Management

1.4 Environmental Management; Systems and approaches;

1.5 Standards –international and national;

1.6 Ecomark;

1.7 Environmental accounts and auditing;

1.8 Green funding and taxes;

1.9 Trade and Environmental management.

1.10 Summary.

1.11 Glossary.

1.12 Self assessment question.

1.13 Bibliography.

Learning Outcomes:

After completing this unit you will be able to:

- Understand the Concept, Scope and Application of Environmental Management
- Learn about the various National and International Standards
- Concept of Ecomark
- Learn about the environmental accounts and auditing; Green funding and taxes;
- Trade and Environmental management.

Unit – II

Ecosystem Management.

Content

Learning Outcomes:

After completing this unit you will be able to:

- Understand the Ecosystem analysis Modelling, Monitoring and Planning
- Concept of Ecotourism
- Learn about the Environmental management of water, forest and biological resource.

Unit – III:

Reclamation and Management of Ecosystem.

Table of Contents (Part-A):

Learning Outcomes:
The main objectives of this module are as follows:

- Types of soil erosion
- Factors affecting soil erosion
- Effects of soil erosion and its prevention

Table of Contents (Part-B)

Learning Outcome
After going through this unit you will able to learn about user, alkaline and saline soil in the following perspectives:

- Nature and characteristics of user, alkaline and saline soil

- Formation of these types of soil
- Detrimental effects and
- Reclamation strategies

Table of Contents (Part-C):

Learning Outcome

In this module learners will be able to learn the need of watershed, its characteristics, and to promote watershed management with sustainable approach.

Table of Contents (Part-D):

Learning Outcome

In this module learners will be able to learn the cause and effect of desertification with some mitigation strategies.

Unit – IV

Aspects of Bio-fertilizer and Bio-pesticides

4.1 Introduction
4.2 Necessity of Bio fertilizers
4.3 Different types of Bio fertizers
4.4 Rhizobium
4.5 Azotobactor
4.6 Azospirillum
4.7 Cyanobacteria
4.8 Azolla
4.9 Phosphatesolubilising microorganisms (PSM)
4.10 A M tungi
4.11 Silicatesolubilising bacteria (SSR)
4.12 Plant growth promoting Rhizobacteria (PGPR)
4.13 Liquid biofertilizers
4.14 Definition
4.15 Basic characteristics of liquid Bio fertilizers
4.16 Benefit
4.17 Liquid Bio fertilizers application methodology
4.18 Mass production of bacterial Bio fertilizers
4.19 Culturing microorganism
4.20 Inoculums preparation
4.21 Processing of carrier materials
4.22 Preparation of carrier materials
4.23 Mixing the carrier and the broth culture and packaging
4.24 Packaging of inoculates
4.25 Specification of the polytheme bags
4.26 Storage of Bio fertilizers packet
4.27 Mass production of Mycorrhizal Bio fertilizer
4.28 Application
4.29 Mass production and field application of cyanobacteria
4.30 Multiplication in Trays
4.31 Multiplicationunderfield condition
4.32 Procedure
4.33 Method of inoculation of BGA in rice field
4.34 Mass production and field application of Azolla
4.35 Mass application of Azolla under field conditions.
4.36 Materials
4.37 Procedure
4.38 Method of inoculation of Azolla to rice crop
4.39 Application of Bio fertilizers
4.40 Seed treatment
4.41 Seedling roof tip
4.42 Main field application
4.43 Constraints in Bio fertilizers technology
4.44 Technological constraints
4.45 Infrastructural constraints
4.46 Financial constraints

Learning Outcome

After going through this chapter one should know about

i. Biofertlizers and types of biofertilizers available
ii. The methods of production and application of Biofertlizers
iii. Merits and demerits of biofertlizers
iv. Composts and vermicomposts including method of production and use
v. About various types of pests and pesticides
vi. Application and controlling mechanisms of bio-pesticides

Table of Contents (Part-B)

Unit – V

Management of Freshwater

Table of Contents

Learning Outcome:

Learners will be able to

- Define & explain Hydrological cycle and water resources
- Understand the ecological backgroundof water availability in hydrological context
- Use of remote sensing in hydro geomorphological studies
- Understand the Indian Fresh water scenario
- Artificial recharge and rainwater harvesting: hydro geological, geomorphological & technological considerations

Paper - IX

Environmental Chemistry

Unit –I:

Chemical Thermodynamics.

1.1 Laws of Thermodynamics

1.2 Introduction

a. Energy and Units of Energy
b. Equivalence of work and heat
c. Specific heats: Constant pressure and Constant volume
d. Work done in expansion
e. The mechanical equivalence of heat

1.3 **The first law of thermodynamics**

a. Law of conservation of energy: First law of thermodynamics
b. Application of the first law: Energy of a system
c. Energy, work and heat exchanges
d. Heat content
e. Heat capacity
f. Ideal gases

1.4 Thermodynamics of an Ideal Gas

a. Boyle's Law and Gay-Lussac's Law
b. Equation of State for an Ideal Gas
c. The Gas constant
d. Difference in heat Capacities
e. Reversible processes
f. Reversible Isothermal expansion of Ideal Gas
g. Adiabatic changes

1.5 Thermochemistry

a. Heat exchanges in chemical reactions
b. Heat exchanges at constant pressure and constant volume
c. Heat of formation
d. Heat of combustion
e. Heat of hydrogenation
f. Thermochemical laws
g. Experimental methods: Types of calorimeters
h. The adiabatic calorimeter
i. Measurement of temperature
j. Types of reaction
k. Kirchhoff's equation: Influence of temperature on Heat of reaction

1.6 The second law of thermodynamics

a. Spontaneous processes
b. The second law of thermodynamics

c. Perpetual motion of the second kind
d. Reversible and irreversible processes

1.7 Carnot cycle

a. Cycles or cyclic processes
b. Carnot's theorem
c. Carnot's cycle
d. Entropy
e. Entropy of an ideal gasentropy changes at constant volume or constant pressure
f. Entropy changes in irreversible processes

1.8 Thermodynamic functions

a. Free energy and work functions
b. The Gibbs-Helmholtz equation
c. Work function and free energy in isothermal changes
d. Conditions of equilibrium in closed systems
e. Heat capacities at constant pressure and constant volume
f. Thermodynamic equations of state
g. Partial molar quantities
h. The chemical potential
i. Partial molar volume
j. Determination of partial molar quantities
k. Thermal properties of homogeneous mixtures

1.9 Chemical kinetics

a. Introduction
b. Order and molecularity of a reaction
c. Basic kinetic laws-first, second and third order reactions
d. Reaction of the first order
e. First order gas reactions
f. Flow method
g. Decomposition of Definite fraction of reactant
h. First order reactions in solution
i. Pseudo-unimolecular reactions
j. Inversion of sucrose
k. Hydrolysis of an ester
l. Decomposition of hydrogen peroxide
m. Seconds order reactions
n. Gas reactions of the second order
o. Pseudo-bimolecular reactions
p. Bimolecular reactions of fractional order
q. Autocatalytic reactions
r. Third order reactions
s. Third order gas reactions
t. Determination of order of reaction
u. Free radical and chain reactions

v. Determination of rate constant
w. Theory of reaction rates
x. The temperature coefficient
y. The Arrhenius equation
z. Molecular activation
aa. Free energy of activation
bb. Steady state concept
cc. The collision theory of unimolecular reactions

1.10 Enzyme Kinetics

a. Simple enzyme kinetics
b. Steady-state rate equations
c. Reactions of two substrates
d. Inhibition of enzyme activity
e. pH dependence

1.11 Biological regulation of enzymes

1.12 Summary.

1.13 Glossary.

1.14 Self Assessment Questions.

1.15 Bibliography.

Learning Objective: To learn about the concept of chemical thermodynamics, chemical kinetics

Unit –II:

Photochemistry

2.1 Laws of photochemistry

a. The Grotthuss-Draper Law
b. The Einstein law of photochemical equivalence

2.2 Fluorescence and Phosphorescence phenomena

a. Consequence of light absorption by atoms
b. Consequence of light absorption by molecules

2.3 Chemical, photochemical and photosensitized reactions in the atmosphere

a. Photochemical kinetics
b. Experimental study of photochemical reactions
c. Photochemical gas reactions
d. Photosensitization
e. Photosensitized gas reactions
f. Photochemical equilibrium

2.4 Fluorescence Molecular Sensors

a. Chemiluminescence
b. Luminescent polymers
c. Nanomaterials for optical sensing
d. Polymer-based sensing materials
e. Fluorescent sensors for the detection of heavy metal Ions

2.5 Summary.

2.6 Glossary.

2.7 Self Assessment Questions.

2.8 Bibliography.

Learning Objective: To learn about the concept of photochemistry

Unit –III:

Analytical Methods in Environmental Quality Assessment.

3.1 Principles of titrimetry

3.2 Principles of Gravimetry

3.3 Principles of Colorimetry

3.4 Principles of Spectrophotometry

3.5 Principles of Spectrofluorimetry

3.6 Principles of Flame photometry

3.7 AAS principle and applications

3.8 Chromatographic techniques

3.9 Gel electrophoresis

3.10 X-ray diffraction techniques

3.11 Summary.

3.12 Glossary.

3.13 Self Assessment Questions.

3.14 Bibliography.

Learning Objective: To learn about the operating mechanism, principles and applications of different instrumentation in environmental science

Unit –IV:

4.1Bioinorganic Chemistry.

Learning Objective: To learn about the concept of Bioinorganic chemistry.

Paper-X

Environmental Geosciences

Unit –I:

Geological Time Scale.

CONTENTS

Learning Objectives

After learning this unit students will understand geological time scale, palaeoecology reconstruction of paleogeography. They also understand common rocks and minerals,major categories, their mode of origin and different weathering processes.

Unit –II:

Geomorphological process and Forms

2.1 Introduction

2.2 Process and forms (Fluvial, eolian, glacial, coastal and Karst);

2.3 Fundamentals of structural geology and tectonics

2.4 Coastal systems – Definitions, Energy and classification with an emphasis on broad scale geological and tectonic controls

2.5 The impact of human activity in tidal coastal systems

2.6 Mountain environment – landslides and mass wasting;

2.7 Glacial processing; Periglacial process; Fluvial environment – Drainage system, Establishment of drainage system, drainage patterns, process of erosion and transportation by rivers

2.8 Erosional and depositional landforms;

2.9 River basin concept and its application in regional management;

2.10 Fluvial cycle of erosion; interruption of cycle of erosion

2.11 Summary.

2.12 Glossary.

2.13 Self Assessment Questions.

2.14 Bibliography

Learning Objective: To learn about the concept various geomorphological processes and landforms

Unit –III:

Hydrological cycles and groundwater issues.

3.1 Introduction

3.2 Aquifers,

3.3 Aquitards,

3.4 Darcy's law and hydraulic conductivity;

3.5 Groundwater quality and contamination with reference to arsenic fluoride and nitrate

3.6 Summary.

3.7 Glossary.

3.8 Self Assessment Questions.

3.9 Bibliography

Learning Objective: To learn about the concept of Hydrological cycles and issues of ground water depletion.

Unit – IV

Natural hazards and its management.

4.1 Introduction

4.2 Problems and prospects related to the management of Drought, Flood, Earth quake and Landslide

4.3 Human consequences of flood and bank erosion;

4.4 Application of GIS in Environmental management.

4.5 Summary.

4.6 Glossary.

4.7 Self Assessment Questions.

4.8 Bibliography

Learning Objective: To learn about the Natural hazards and its management

Unit – V:

Environmental issues related to mining and construction.

5.1 Introduction

5.2 Problems and prospects of Coal, mineral and metal Mining.

5.3 Geological consideration of engineering constructions– Dam, Road & Rail link, Landslide area

5.4 Summary.

5.5 Glossary.

5.6 Self Assessment Questions.

5.7 Bibliography.

Learning Objective: To learn about the issues related to mining and construction and their management techniques

Semester-III

Paper-XIII

Energy Resource Management-Conventional energy

Unit-I:

Energy fundamentals

Table of Contents

Learning Outcome

OBJECTIVES / LEARNING OUTCOME

After studying this unit you will be able

To know fundamental modes of heat transfer Concept of the thermodynamic system Hydrological cycle

Water use, availability and stress

Biogeochemical cycle

Unit – II

Sources of energy and their classification.

Content

2.1. Energy

2.2. Energy forms and transformation;

2.3. Sun as source of energy – Source of sun's energy,

2.3.1. Solar Radiation and its Properties

2.3.2. Solar spectrum,

2.4. Solar radiation

2.4.1. Absorption

2.4.2. Reflection

2.4.3.Scattering

2.4.4.Diffusion

2.4.5.Albedo

2.5.Global energy balance.

Objectives:

After Learning this Unit you will be able to able to:

- Understand the Energy and its various Forms
- Sun as a Source of Energy and Properties of Solar Energy
- Learn about the Global Energy balance

Unit –III:

Energy use pattern.

3.1 Human energy requirement;

3.2 Energy use pattern in different parts of the world

3.3 Impact on the environment

3.4 Energy use pattern in India

3.5 Summary.

3.6 Glossary.

3.7 Self Assessment Questions.

3.8 Bibliography

Learning Objective: To learn about the energy use pattern in the world

Unit – IV:

Fossil Fuels.

CONTENTS

Learning Objectives

After learning this unit students will understand how the different types of fossil fuels originated, how they are harvested, and how they are used? For one thing, it is important simply because these substances still play such a pivotal role in our daily lives. Fossil fuels are a great source of energy because they originate from living things. The chapter also gives you the details about characteristic features of Fossil Fuels and its different forms. The Exploration and Production (E&P) Process as well as its environmental effect will also be learnt from this project.

Unit – V:

Nuclear energy.

Unit Structure:

Objectives

"*There is no more sensible alternative than Nuclear Energy if we really want to sustain our civilization*". James Lovelock.

Nuclear power can generate electricity without greenhouse gas emissions and produce vastly expanded supplies of clean electricity on a global scale. So the main object is to enhance the knowledge and understanding the sources of nuclear energy and its production to mitigate the future need of electricity.

Paper-XIV

Energy Resource Management-Non Conventional energy

Unit – I:

Solar Energy.

Unit Structure:

1.1: Introduction

1.2 Solar pond

1.2.1 USES

1.2.2 Benefits and Limitations

1.3 Photo voltaic cell

1.3.1 Efficiency of photovoltaic cells

1.3.1 Characteristics of a Solar Cell and Parameters of a Solar Cell

1.3.2 Efficiency of Solar Cell

1.4 Solar Cooker

1.4.1 Solar Collectors

1.4.2.Concentrators

1.5 Sun Tracking Solar Power Systems

1.6 Electricity Generating Systems

1.7 Potential of solar energy in India

Objectives

Student will acquire a good understanding of solar energy systems and its components. He/she will also able to perform an initial design of a solar energy system.

Unit – II:

Wind energy.

Unit Structure:

Objectives

Aim of this course is to increase knowledge and understanding of wind energy systems and its components. They will also able to perform an initial design of a small wind energy system for home application for the use of green energy.

Unit -III:

Hydroelectricity.

Objectives

Aim of this course is to increase knowledge and understanding about principles of generation of hydroelectric power and hazard related to hydropower generation and distribution.

Unit – IV:

Geothermal energy.

Objectives

Aim of this course is to increase knowledge and understanding of Geothermal energy and application of green energy.

Unit – V:

Hydrothermal energy.

Objectives

Aim of this course is to increase knowledge and understanding of hydro energy. They will also able understand the concept of green energy.

Unit – VI:

Bio-energy.

Definition of Biomass

1.1 Composition of Biomass

1.2 Types of biomass-derived energy

1.2.1 Wood and Agricultural Biomass

1.2.2 Solid Waste

1.2.3 Landfill Gas & Bio-gas

1.2.4 Alcohol Fuels

1.3 Use of Biomass and the Environment

1.4. Conversion of Biomass to energy

1.5 Thermal conversionConversion Technologies

1.6 Chemical conversion

1.7 Biochemical conversion

1.8 Electrochemical conversion

1.9Torrefaction

1.10Torrefaction Process

1.11. Benefits of Torrefaction

1.12 Material Balance and Energy Value of Biomass DuringTorrefaction

1.12.1 Charcoal Production

1.12.2 Earth kilns as the simplest method for charcoal production

1.12.3 Brick kilns as an effective method of charcoal production

1.12.4 Modern methods of charcoal production

1.12.5 Types of Pyrolysis

1.12.5.1.Slow Pyrolysis

1.12.5.2.Flash Pyrolysis

1.12.5.3.Fast Pyrolysis

1.12.5.4.Microwave Pyrolysis

1.12.5.5.Pyrolysis reactors

1.12.5.6.Advantages of Pyrolysis

1.12.5.7 Applications

1.12.5.8Gasification of Biomass

1.12.5.9. Liquefaction

1.13. Biochemical Conversion

1.13.1 Anaerobic Digestion:

1.13.2 Principle of Anaerobic digestion

1.13.3 Optimum Parameters for Anaerobic Digestion

1.13.4 Applications of Anaerobic digestion

1.13.5 Environmental Constraints in Biogas production

1.13.6 Energy from Solid wastes

1.13.7 Solid wastes – source and types of wastes

1.13.8 Energy Generation Technologies

1. 13.9.Energy Plantation

Learning outcomes:

After completing the portion the students will learn :

- Definition of biomass, its composition, types of biomass.
  - Introduction, concept of biomass- derived energy, their usefulness & applications.
  - Bio-conversion processes – their utilities, advantages/disadvantages and applications.
  - Bio-mass conversion technologies –their advantages , disadvantages etc.
- Solid waste management – including municipal solid wastes.
- Energy Plantation- their need and practice in India.
- Environmental effects of the said topics in the contemporary society.

Paper-XV

Environmental Pollution

Unit – I:

Air Pollution

Table of contents

Learning Outcome

Learning Outcome

After studying of the unit the learner will be able to know about:

- The earth's atmosphere and atmospheric reactions
- Different types and nature of air pollutants
- Acid rain and photochemical smog
- Air quality standard
- Vehicular pollution etc.

Table of contents (Management of Air Pollution)

Learning Outcome

After studying of this unit you will be able to know about

- Effects of air pollutants (like SO_1, NO_1, CO_1, SPM) on plants, animals, materials and on climate.
- Monitoring methods of air pollution
- Engineered systems for air pollution control

Unit – II

Water Pollution

Table of Contents

Learning Outcome

The following aspects of water pollution can be meet with

1. Highlight water availability and distribution pattern in the world in view of water pollution.
2. Draw the relationships in between water pollution and pollution cycle in the environment.
3. Discuss the normal state of functioning of any water body or water ecosystems
4. Identify the signs and hazards due to water pollution

Discuss different types of water pollution, highlighting their effects on environment

Unit – III

Soil Pollution

Table of Contents

Unit- V (B)

Table of Contents

1.1.2 Dairy Plants

1.1.3 Steel Plants

1.1.4 Pulp and Paper industries

1.1.5 Petrochemical industries

1.2 Undesirable waste streams from industries

1.3 Hazardous Wastes

1.3.1 Identification

1.3.2.Listed hazardous wastes (Priority chemicals)

1.3.3 Characteristics of hazardous wastes

1.3.4 Classification

1.4 Types of heavy metals and its industrial source

1.5 Interaction with soil

1.5.1 Lead

1.5.2chromium'

1.5.3 Arsenic

1.5.4 Zinc

1.5.5 Cadmium

1.5.6 Copper

1.5.7 Mercury

1.5.8 Nickel

1.6 Summary

1.7 Glossary

1.8Self Assessment questions

1.9.Bibliography

Learning Outcomes

Learners will be able to

- Know the importance of soil sampling
- Learn sampling procedure for physical, chemical and bacteriological analysis
- Know soil pollution control procedure

Unit – IV

Noise pollution.

Table of Contents

Learning Outcome

In the present situation knowledge of the noise is necessary to reduce the problems of noise pollution. To do this one should know the characteristics of noise and its adverse effects on the man and his society. In the present module topics related to those points have been taken into accounts. The aims of this module are-

To discuss about the sources of noise.

To explain the procedure for the measurement of noise

To describe the principles of management of noise.

Unit – V:

Marine pollution.

Table to Contents

LEARNING OBJECTIVES

This paper will help the students to learn Marine Pollution and its types and sources. The students can get the lesson about the impact of marine pollution over the ecosystems . The important measures to reduce marine pollution also become the lesson for the students.

Unit – VI:
Impact of Pollutants on human health

Table of Contents

Learning Outcome

Different pollutants create a number of health hazards in humans and animals. The effects of polluting agents may be of different extents in living systems. The aims of the module are:

to let you have some idea about the origin and health problems of air pollution

to give you some information about the harmful diseases caused by water pollution

to know about the effects of acute and chronic exposure of heavy metal on human health

to understand the health effects of humans due to exposure of noise

to know about the harmful effects of pesticides

to let you learn about different health hazards of ionizing radiation

to let you have a brief idea regarding the thermal pollution and its health effects

Paper-XVI

Environmental Toxicology and Statistical applications

Unit.-I

Fundamentals of Environmental Toxicology

Environmental Toxicology

Air Born Microbes and Allergic Disorders

Ecological Toxicology

Forensic Toxicology

Dose Response Relationship

LD10's

Potency Versus Toxicity

Summary

Self assessment question

Glossary

Bibliography

Learning Outcome

To study the Environmental toxicity and Air borne microbes and allergic disorders

Unit-II :

Environment Toxicants:

Introduction

Environmental toxicants

Definition of a Heavy Metal

Toxic Heavy Metals

Exposure of heavy metals

Arsenic

Acute poisoning

Chronic poisoning

Cadmium

Acute Toxicity

Chronic Toxicity

Cadmium and Cancer

Lead

Sources

Hazards

Occupational exposure

Absorption

Pharmacotoxic effects

Signs and Symptoms

Mercury

Absorption

Transport, distribution and excretion

Acute poisoning

Chronic poisoning

Chromium

Health effects

The most important disasters with heavy metals

Summary

Self assessment question

Glossary

Bibliography

Unit –III:

Basic Elements and Tools of Statistical Analysis.

1. Introduction
2. Basic Tools of Statistics

1.2.1 Population and Sample

1.2.2 Variables

1.2.3 Sampling

1.2.4 Degrees of Freedom

1.2.1 Level of Significance

1.2.6 Data Collection

1.2.7 Dispersion

1.2.8 Sample Variance

1.2.9 Standard Deviation

1.2.10 Standard error of mean

1.2.11 Coefficient of Variance

1.3 Hypothesis Testing

1.3.1 Decision Errors

1.3.2 Decision Errors

1.3.3 Decision Errors

1.3.4 Decision Errors

1.3.1 Minimum Z required rejecting H0

1.4 Chi – Square Test

1.4.1 Chi Square Goodness of Fit

1.4.2 Chi Square Goodness of Fit

1.4.3Skewness and Kurtosis

1.5 Poisson Distribution

1.6 Binomial distribution

Learning Outcome: To understand different Basic Elements and Tools of Statistical Analysis

Unit – IV:

Introduction to Environmental System Analysis.

Approaches to development of models.

Validationand forecasting.

Models of population growth and interactions –

Lotka- Volterra model.

Leslie's matrix model,

Point source stream pollution model,

Box model,

Gaussian plume model.

Summary

Self assessment question

Glossary

Bibliography

Learning Outcome: To understand different Models of Environmental system analysis

Semester-IV

Paper-XIX

Environmental Laws and Policies

Unit – I

International Environmental Laws.

Table of Contents

After completing this lesson you will be able to

- Appreciate the need for protection of environment
- Know the various laws relating to the protection and promotion of environment
- Identify the factors responsible for environmental pollution
- Find out the various issues related to environmental laws
- Evaluate the need for formulation of different environmental laws

Unit –II:

Global Environmental Issues and International laws.

1. Global warming

1.1 Global warming

1.2. Greenhouse gases and global warming

2. The Ozone Layer

2.1. Formation of Ozone Layer in Stratosphere

2.2. Ozone Depletion Mechanisms

2.3. Conventions for protecting the Ozone Layer

3. Acid Rain

4. Hazardous waste

4.1. Resource Conservation and Recovery Act (RCRA)

4.2. Comprehensive Environmental Response, Compensation, and Liability Act

4.3. Household Hazardous Waste

4.4. Final disposal of hazardous waste

4.4.1. Role of UN authorities in protection of Global Environment:

4.1. Women and Environment

4.1.1. Environmental change and women

4.1.2. Women environmentalists

4.1.3. Ecological movements initiated by women

Objectives:

After studying this unit you will be able to:

- Understand the concept of Global Warming
- Ozone depletion Mechanisms
- Acid Rain
- Hazardous wastes and its disposal
- Role of UN authorities in protection of Global Environment
- Women and environment

Unit – III:

Environmental laws in India.

Table of Contents

Learning Outcome

After completing the lesson you will be able to

- Understand the legal, administrative and constitutional provisions of Indian Environmental Law
- Know the statutory provisions for the protection of human environment
- Appreciate the need for legislative measures against pollution
- Evaluate the various legal steps taken to control pollution

Unit – IV:

Sanction and Enforcement Bodies of Environmental Laws in India.

Table of Contents

Learning outcome

After going through this module the students will be able to

- Understand the role of Supreme Court for protection of environment
- Know the activities of Breen Bench
- Understand the activities of NGO in environmental protection
- Know the process of public interest litigation

Evaluate the public awareness on environmental protection

Unit – V:

Environmental management of industrial pollution.

Introduction

Management of pollution

Management of Pollution due to chemical, mining and manufacturing industries

Management of Pollution from Petroleum Industry,

Management of Pollution from coal Industry,

Management of Pollution from cement Industry,

Management of Pollution frompaper industry

Management of Pollution fromfertilizer industry

Summary

Glossary

Suggested Questions

Bibliography

Learning outcome
After going through this module the students will be able to understand theEnvironmental management of industrial pollution

Unit – VI:

Management of Solid Wastes.

Introduction

Different types of solid wastes

Methods of disposal and management of Municipal

Methods of disposal and management of Thermal power plant generated solid wastes;

Methods of disposal and management of Bio-medical wastes

Methods of disposal and management of Hazardous wastes;

Recycling of wastes

Power generation and waste minimization techniques.

Summary

Glossary

Suggested Questions

Bibliography

Learning outcome
To understand the Types and management of solid waste

Paper-XX

Environmental Impact Assessment (EIA)

Unit – I:

Basics of EIA

- purpose and aims of EIA
- EIA administration and practice
- concept of associated assessment processes
- key elements of the EIA process
- undertaking an EIA
- role of public participation;
- stages that follow EIA;
- the costs and benefits of undertaking EIA and
- understanding of the strengths and limitations of EIA.

OBJECTIVES

:

- appreciate the purpose and role of EIA in the decision-making process
- understand the strengths of EIA in regard to environmental management;
- understand the technical and social/political limitations of EIA;

Unit – II:
Framework of Environmental Assessment.

Table of Contents

LearningOutcomesofthisUnit

On successful completion of this Section, you will be able to:

- Understand the purpose, scope and content of EIA policy and legislation
- Understand the EIA requirements of International Organizationsand relevant International Environmental Agreements

Unit – III:
Impact Assessment Methodologies.

Table of Contents:

Learningoutcomesofthisunit

Onsuccessfulcompletionofthisunit,youwillbeableto:

- Understand and explain why screening is necessary in EIA,
- Know how to undertake screening, including knowledge of procedures,

Unit –IV:
Socioeconomic Impact Analysis (SIA):

Table of Contents:

Learning outcome

Governmental or private programs policies and projects can cause potentially significant changes in many features of socioeconomic environment. In some cases the changes may be beneficial or detrimental otherwise. According EIA must systematically identify the impact insocial sector and plan for proper impact mitigation.

Paper-XXI

Environmental Planning, Auditing and Environmental Management

Unit – I:

Environmental Planning and Management

Table to Content

Objective / Learing Outcomes:

By and large all learners will be able to define and explain the process and concept of Ecological monitoring viz Biomonitoring, Bioremediation, Phytoremediation, Ecorestoration, Ecoremediation, Ecorehabilitation of various environmental components (should waste sewage water, industrial effluents oil spillage, heavy metals and radioactive substance) with proper examples.

Unit-II:

Coastal Zone Management

TABLE OF CONTENTS

LEARNING OUTCOME

This paper will help the students to learn specifically the aspects of Coastal Zone Management. Coastal issues are nowadays an important topic to focus. This topic will help you to learn Salient features of coastal management. Today coastal zone is the area of most important geographical habitats for the floral and faunal communities. These habitats are now getting rapidly degraded due to natural factors and human factors. The techniques of ICZM for sustainability of coastal resource management and coastal ecosystem management are important lessons for the students .

Unit- III:

Environmental Audit

Objective : To learn about the concept of EA

Unit-IV:

Environmental Management System-ISO, OSHA

Objective: To learn about the Environmental Management System-ISO, OSHA

Unit-V:

Sustainable Development

Content :

Objectives :

In this unit the following aspect will be discussed at length – What is to be sustained? For how long ? And what is to developed

Paper-XXII

Biomonitoring, Industrial Ecology and Disaster Management

Unit-I:

Bio-monitoring of Environmental Quality of Air and Soil

Objective : The study objective of biomonitoring issues are unique for environmental quality assessment and considered as new field of research.

Unit-II:

Bio-monitoring of Environmental Quality of Water

Table to content

Objective : The study objective of biomonitoring issues are unique for environmental quality assessment and considered as new field of research.

Unit-III:

Industrial Ecology

ObjectiveTo study the concept of industrial ecology

Unit-IV:

Fundamentals of Disaster Management and Industrial accidents

Learning Objectives

At the end of this unit, you will be able to:

Understand the concept of disaster Management

Learn about the types of disaster

Industrial accidents and Occupational health and safety

Unit V:

Disaster Management for Earth quake, Flood and Cyclone.

Learning Objectives

At the end of this unit, you will be able to:

- Understand the Concept and Management of Disaster
- Mitigation of earthquake
- Mitigation of Flood
- Mitigation of Cyclone

SEMESTER WISE GEOGRAPHY SLM CONTENT

SEMESTER-I

Paper/Course101:Earth's Surface Process

Unit GEO101.1 GEOTECTONICS

GEO101.1 GEOTECTONICS: Origin & Evolution of Solar System

SLM -1a.

Relevance
Objective
1.1Introduction
1.1.1 Origin and evolution of Universe with special reference to Stellar evolution
1.1.2 Dynamic Constraints
1 .1.3 Compositional Constraints
1.1.4 Age Constraints
1.1.5The Solar Nebula Hypothesis
1.1.6 Cold Accretion model
1.1.7 Hot Accretion Model
1.1.8Black Hole Theory
Summary
Glossary
Self Assessment Questions
References

101.1 GEOTECTONICS: Relative & Absolute Dating & Origin of magmatic field

SLM-1b.

Relevance
Objective
1.2Introduction
1.2.1 Relative and Absolute Dating

- What is Relative Dating?
- What is Absolute Dating?
- Principles of Relative and Absolute Dating
- Relative Dating vs. Absolute Dating

1.3 Origin of Earth's Magnetic Field
Generation of the Earth's magnetic field
Summary
Glossary
Self Assessment Questions
References

101.1 GEOTECTONIS: MECHANISM OF PLATE DYNAMICS AND NEO TECTONICS

SLM-1c

Relevance
Objective
1.4.Introduction
1.4.1 Plate Tectonics and Neo-Tectonics
1.4.1.1 Indicators of Neo-tectonic Movements
1.4.1.2 Historical Instances
1.4.1.3 Rising and Subsiding Grounds
1.4.1.4 Movements along the Faults
1.4.1.5 Movements along Thrust Planes
1.4.1.6 Recurrent Seismicity
1.4.2 Plate Tectonics and Earthquakes:
1.4.2.1Collision Sites:
1.4.2.2 Continental-Ocean Collision with Subduction
1.4.2.3 Simple Subduction (Andes type)
1.4.2.4 Island-arc Subduction
1.4.2.5 Continent-Ocean Collision with Obduction
1.4.2.6 Continent-Continent Collisions (Himalayan types
1.4.2.7 Ocean-Ocean Collision
1.4.2.8 Arc-Arc Collision
1.5. Plate Tectonics and Volcanisms
1.5.1 Volcanoes and Magma
1.5.2 Plate Tectonics and Orogeny
Summary
Glossary
Self Assessment Questions
Reference

Unit GEO101.2 Geomorphology

101.2 GEOMORPHIC CONCEPTS, WEATHERING AND MASS WASTING

SLM-2a.

Relevance
Objective
2.1Introduction
2.1.1 KEY CONCEPTS IN GEOMORPHOLOGY:

- Principles after Schumm (1977)
- Principles after Anderson and Anderson (2010)
- Principles after Bierman and Montgomery (2014)

2.1.2 HISTORICAL AND FUNCTIONAL APPROACHES
2.1.3 SYSTEM CONCEPT

- Types of System Applied to Fluvial Environment
- Morphological System
- Cascading System
- Stochastic approach

2.1.4 UNFORMITARIANISM AND CATASTROPHISM
2.1.5 BASE LEVEL
2.1.6 GRADE
2.1.7 CONCEPT OF EQUILIBRIUM
2.2 WEATHERING

- Definition
- Factors of Weathering
- Climate:
- Topography:
- Parent Materials:
- Biotic Factor:
- Factors of chemical weathering:
- Landforms Developed by Weathering:

Landform by Constant volume weathering
Landform developed by weathering with expansion
Landforms due to differential weathering
2.2.1 MASS WASTING

- Definition:
- Processes:

Factors responsible for decrease in Shear Strength

- Weathering:
- Seepage Erosion:
- Liquefaction
- Remoulding
- Fluidization

Factors responsible for increase in Shear Stress

- Increase in the gradient and height
- Unloading
- Loading
- Shocks and vibration
- Removal of underlying support
- Landforms Developed by Mass Wasting:

Dislodgement of debris:
Transportation of dislodged materials on slope:
Deposition of transported materials at foothill:
Summary
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Self Assessment Question
Reference

GEO101.2 SLOPE EVOLUTION PROCESS

SLM-2b

Relevance
Objective
2.3Introduction
2.3.1 Nomenclature of Slopes
2.3.2 Processes of Slope Development
2.3.3 Theories of Slope Evolution

- Slope decline theory of W.M. Davis
- Slope decline theory of W. Penck
- Parallel retreat theory of L.C. King
- Theory of A. Wood
- Theory of A.N. Strahler
- Theory of R.A. Savigear

2.3.3 Dynamic Metastability in Slope Evolution

- Standpoint of the rise of the Non-cyclic concept
- The rise of Non-cyclic concept
- The concept of dynamic equilibrium
- Illustrations of the Dynamic Equilibrium Theory
- Major points of observation on the concept of dynamic equilibrium

Summary
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Self assessment questions
References

GEO 101.2 FLUVIAL FORMS AND PROCESSES-

SLM-2c

Relevance
Objective
2.4Introduction
2.4.1 Entrainment

- Critical Shear Stress

2.4.2 Channel Forms

- Channel Forms
- Pools And Riffles

2.4.3 Channel Patterns

- Straight Channel
- Braided Channel
- Anabranching Channel
- Meandering Channel

2.4.4 Flood Plain

- Flood Plain Formation

2.4.5 Alluvial Fan

- Location Of Fans
- Fan Development
- Fan Morphology

2.4.6 River Terraces

- Development Of A Terrace
- Types Of Terraces

Leopold, Wolman And Miller (1964)

- Geomorphic Importance Of A River Terrace

2.4.7 Delta

- Conditions Of Growth
- Classification Of Delta
- Mechanism Of Delta Formation
- Morphology Of Delta

Summary
Glossary
Self assessment questions
References

GEO101.2 APPLIED GEOMORPHOLOGY

SLM 2d

Relevance
Objective
2.5Introduction
2.5.1Application to Hydrology

- Hydrological Problems In Karst Region
- Ground Water Potential Zone
- Regional Hydrology

2.5.2Regional Development and Spatial Planning
2.5.3 Application to Economic Geology

- Surface Expression of Ore Bodies
- Weathering Residues
- Study of Unconformity
- Placer Deposits

2.5.4 Application To Engineering

- Construction of Roads
- Sand And Gravel Quarry
- Constructions of Dam

2.5.5 Contribution To Environmental Issues
2.5.6 Application For The Mitigation of Environmental Hazard

- Approaches
- Techniques And Roles of Geomorhologists

2.5.7Geomorphology In Flood And Flood-Plain Management

- Flood Through System Approach
- Impact of Flood Floodplains
- Factors Guiding the Intensity of Impacts
- Contribution of Geomorphologists in Flood Management

2.5.8Geomorphology In Landslide Management

- Technique
- Management Processes

2.5.9Geomorphology In Landscape Ecology

- Techniques Followed
- Role of Geomorphology

2.5.10Geomorphology in EIA

- Procedure of EIA:
- Scope of Geomorphology in EIA:

Summary
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Reference

Course/PaperGEO102: Hydrospheric science
Unit GEO102.1 OCEANOGRAPHY

102.1 MARINE ENVIRONMENT AND PROCESSES

SLM 3a.

Relevance
Objectives
3.1Introduction
3.1.1 Marine Environment and Processes
3.1.1.1. Components of Marine Environment
3.1.1.1.1. Physical Components
3.1.1.1.2. Biological Components
3.1.1.1.3. Anthropogenic Components
3.1.1.1.4 Subdivisions of Marine Environment
3.1.1.2.5. Coastal Environments
3.1.1.2.6. Open Oceans
3.1.1.2.7. Sea Floor
3.1.1.3.8 Wind and Ocean Circulations
3.1.1.3.9 Atmosphere-Sea Interactions
3.1.1.3.10. Ocean Circulations
3.1.1.3.11. Surface Water Currents
3.1.1.3.12 Deep Water Currents
3.1.1.4. Waves in the Ocean
3.1.1.4.1. Wave Generation
3.1.1.4.2. Types of Waves
3.1.1. 4.3. Wind Waves Approaching Shore

3.1.1.5. Tides

3.1.1.5.1. Types of Tides

3.1.1.5.2. Origin of Tides

3.1.1.5.3. Tidal Bores

3.2.2. Physical and Chemical Structure of Oceans

3.2.2.1. Physical Properties of Ocean Water

3.2.2.2. Chemical Properties of Ocean Water

3.2.2.3. Water Masses

3.2.2.3.1. T-S Diagram

3.2.2.3.2. Sources and Properties of Water

3.2.2.3.3. Types of Water Masses

3.2.2.4. Sediments in the Sea

2.2.2.4.1. Origin

3.2.2.4.2. Classification and Distribution

Summery

Glossary

Self Assessment Questions

References

GEO 102.1COASTAL HABITATS

SLM-3b.

Relevance

Objectives

3.3Introduction

3.3.1.Coastal Habitats

3.3.1.1 Estuaries

3 .3.1.2. Origin

3. .3.1.3. Circulation, Sedimentation & Classification

3. 3.1.4. Estuarine Biology

3.3.1.5. Lagoons

3.3.1.6 Salt Marshes

3.3.1.5. Ecological Zones and Biology

.3.3.1.6 Evolution, Ecological Succession and Sediment Trapping

3.3.1. 7Mangrove Swamps

3.3.1. 8Coral Reefs

3 .3.1.9. Conditions for growth

3 .3.1.10. Origin

3.3.1.11. Ecology

Summery

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References

GEO102.1THE DYNAMIC SHORELINE & OCEAN RESOURCES SLM-10

SLM-3c.

Unit GEO102.2HYDROLOGY

GEO 102.2 Hydrological System & Precipitation Estimate

SLM-4a

102.2 HYDROLOGY :Infiltration and evapotranspiration

SLM-4b.

GEO102.2 HYDROLOGY – Hydrograph rating curve

SLM-4c

Relevance
Objectives
4.5Introduction
4.5.1 Hydrograph and rating curve
4.5.2 Time dimension of hydrographs
4.5.3 Concept of Unit hydrograph
4.5.4 Rating Curve and their significance
Summary
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Reference

Course/Paper GEO103: CLIMATE, SOIL & AGRICULTURE

Unit GEO103.1 CLIMATOLOGY

GEO 103.1Nature and scope of climatology and General Circulation

SLM-5a.

Relevance
Objective
5.1Introduction
5.1.1Nature and scope of climatology
And its relationship with meteorology
Climatological system operating in different
Space and timescale.
5.1.2Thunder storms
5.1.3 Tropical cyclone
5.1.4 Jet stream
5.1.5 Planetary wind
5.2General circulation
5.2.1GCM
5.2.2Tropical circulation
5.2.2.1Mechanism of Indian Monsoon
5.2.2.2Walker Circulation & Enso phenomena
5.2.2.3 Temperate Circulation
Summary
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References

GEO103.1 CLIMATOLOGY:Climatic zones and Maritime Influence

SLM-5b.

GEO103.1 CLIMATOLOGY:Climatic Changes

SLM-5c.

Relevance

Objectives

5.5Introduction

5.5.1 Climate change through geological periods

- Tertiary period
- Pleistocene period
- Holocene period

5.5.2 Evidences of climate change

5.5.3 Possible causes

- Solar variability
- Orbital changes
- Plate tectonics
- Volcanic eruptions
- Atmospheric composition
- Aerosols
- Runoff of fresh water
- Surface land cover

5.5.4 Global warming

5.5.4.1 Causes of global warming

- Natural causes
- Anthropogenic causes
- Consequences of global warming

Summary

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Reference

UNIT GEO103.2 SOIL AND AGRICULTURE

GEO103.2 Variation in physical chemical properties of soil

SLM-6a.

103.2 Soil Geomorphology

SLM-6b.

GEO103.2 AGRICULTURAL GEOGRAPHY

GEO 103. 2Approaches in Agricultural Geography

SLM-6c.

Relevance
Objective
6.6Introduction
6.6.1 Agricultural Geography
6.6.2 Nature and Scope of Agricultural Geography
6.6.3 Approaches to Agricultural Geography
6.6.4 Agricultural Systems
6.6.5 Ecological System
6.6.6Non-ecological System
6.6.7 Jonnasons's theory on Agricultural Land Use
Summary
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GEO103.2 Determinants of agricultural pattern and Issues and Policies

SLM-6d.

Relevance
Objective
6.4Introduction
6.4.1 Determinants of Agricultural Patterns
6.4.2 Physical Determinants
6.4.3Institutional Determinants
6.4.4 Methods of Agriculture
6.4.5 Intensive Method
6.4.6 Extensive Method
6.4.7Commercial Method
6.4.8 Crop Combination
6.4.9 Rice-Jute-Potato
6.4.9 Techniques in Agriculture
6.4.10 Diversification
6.4.11 Diffusion
6.4. 12Measurement Techniques
6.4.1 3Agricultural Productivity
6.4.14 Efficiency
6.4.15 Intensity
6.4.16Precision
6.5 .Modern Technology in Agriculture
6.5.1 Issues in Modern Agriculture

6.5.2 Policies in Modern Agriculture
6.5.3 Implication of Agricultural Policies
6.5.4 Green Revolution
6.5.5Impact of Green Revolution
6.5.6 Genetically Modified Crops
6.5.7 Food Security
6.5.8 Agricultural Policies and Their Implication
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Reference

Course/Paper GEO104: ENVIRONMENTAL GEOGRAPHY
104.1BASICS OF ENVIRONMENT AND ECOLOGY
104.1 ENVIRONMENTAL BASICS, SLM-22

SLM-7a.

Relevance
Objectives
7.1 Introduction
7.1.1 Environment
7.1.2 Meaning and Definition
7.1.3 Classification of Environment
7.1.4 Major Elements of Environment
7.1.5 Functioning of Environmental System
7.1.6 Role of Abiotic and Biotic Elements

7.2. Ecosystem: Structure, Function and Processes
7.2.1 Concept of Ecosystem
7.2.2 Meaning and Definition
7.2.3 Structure of Ecosystem
7.2.4 Types of Ecosystem
7.2.5 Function of Ecosystem
7.2.6 Energy Flow in Ecosystem

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104.2 BIOGEOCHEMICAL CYCLES AND TERRESTRIAL ECOSYSTEMS

SLM-7b.

104.2 Terrestrial Ecosystem & Biodiversity

SLM-7c.

Unit 104.2 LANDSCAPE ECOLOGY AND PLANNING

104.2 LANDSCAPE ECOLOGY

SLM-8a.

Relevance
Objectives
8.1Introduction
8.1. Landscape
8.1.2Definition, concept, nature and role,
8.1.3Ecological description of landscape.
8.2.4 Structure of Landscape
8.2.5 Patches (shape, size, nature and boundary),
8.2.6 Corridors (type, network, matrix) and
8.2.7 Mosaics, Habi tat arrangement measuring metrices
(Shanon Diversity Index and Simpson Diversity Index).
Summary
Glossary
Self testing questions
References

104.2 LANDSCAPE ECOLOGY

SLM-8b

Relevance
Objectives
8.3Introduction
8.3. 1Landscape Dynamics
8.3.2Energy flow,
8.3.3Species movement,
8.3.4Nutrient movement.
8.4. 5Anthropogenic Modification:
8.4.6Agricultural intensification,
8.4.7Deforestation and development.
Summary
Glossary
Self testing questions
References

104.2 LANDSCAPE MANAGEMENT & PLANNING

SLM-8c

Relevance
Objectives
8.5Introduction
8.5.1 Landscape management and planning
8.5.2 Role of keystone species, conservation of fragmented habitats,
8.5.3 Sustainable landscape, and
8.5.4 Role of Traditional Ecological Knowledge (TEK) in conserving landscape.
8.5.5 Role of GIS in landscape planning.
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Course/Paper GEO195: HYDROLOGICAL TECHNIQUES AND SEDIMENTOLOGICAL ANALYSIS

Unit GEO195.1 HYDROLOGICAL TECHNIQUES-

GEO 195.1 HYDROLOGICALTECNIQUES:Point rainfall Analysis

SLM-9a

Relevance
Objective
9.1Introduction
9.1.1 Point Rainfall Analysis
9.1.2 Depth Area Duration (DAD) Curve
9.1.3 Mean Areal Depth of Precipitation
Self Assessment Questions
References

GEO195.1HYDROLOGICAL TECHNIQUES: Infiltration & Evaporation Estimation

SLM-9b

Relevance
Objective
9.2Introduction
9.2.1 Concept and Components of Infiltration
9.2.2 Types of Infiltrometer
9.2.3 Horton's Infiltration Model
9.2.4 Infiltration curve
9.3.1 Concept and factors
9.3.2 Description of Evaporation Pan
9.3.3 Empirical Methods
Self Assessment Questions
References

GEO195.1 HYDROLOGICAL TECHNIQUES: Runoff and Hydrograph

SLM-9c

Relevance
Objective
9.4Introduction
9.4.1 Runoff Analysis
9.4.2 Runoff Coefficient Based on Annual or Seasonal Rainfall
9.4.3 Techniques for Channel Flow Measurement
9.5.1 Unit Hydrograph
9.5.2 Rating Curve
9.5.3 Uncertainty of stage-discharge relationships
Self Assessment Questions
References

UNIT GEO195.2SEDIMENTOLOGICAL ANALYSIS

GEO195.2SEDIMENTOLOGICAL ANALYSIS:Phi Scale,Form and Shape analysis Megascopic examination of sediment

SLM-10a

Relevance
Objective
10.1Introduction
10.1.1 Phi scale of grain size distribution, texture analysis of sediment samples using standard techniques, statistical representation:
10.1.2. Grain Size Classification
10.1.2.1 Size grades
10.1.2.2. Phi (ϕ)-scale notion
10.1.2.3. Grain-Size (Texture) analysis and Techniques
10.1.3.1. Sand
10.1.3.2. Silt plus Clay
10.1.3.3. Gravel
10.1.3.4. Statistical Representation
10.1.3.5. Size Distributions
10.2. Form and shape analysis of pebble grade sediments.
10.2.1. Grain Morphology
10.2.1.1. Form and Shape
10.3. Megascopic and Microscopic Examinations of Sediment:
10.3.1 Megascopic Examinations
10.3.2. Microscopic Examinations
Self Assessment Questions
References

GEO195.2 SEDIMENTOLOGICAL ANALYSIS:
Identification of Sedimentary and Bioturbation structure
SLM-10b

Relevance
Objective
Introduction
10.4. Identification of Sedimentary and Bioturbation structures:
10.4.1. Structures:
10.4.1.1. Depositional Structures:
10.4.1.2. Internal Structures:
10.4.2. Bioturbation and Ichno fabric:
10.4.2.1. Trace fossils
10.4.2.2. Rootlet beds:
10.5. Sedimentary environmental facies analysis:
10.5.1 Facies:
10.5.2. Graphic Log:
10.5.3. Paleocurrents and dip:
10.5.4. The Compass Clinometer:
10.5.5. Field Equipment:
10.5.6. What to do in the Field?
Self Assessment Questions
References

Course/Paper GEO196: THEMATIC MAPPING
GEO 196.1: ENVIRONMENTAL MAPPING: Estimation of Soil & Water properties
SLM-11a

Relevance
Objective
Introduction
11.1. Estimation and mapping of soil properties: texture, structure, moisture, colour, pH, organic matter, NPK, soil profile mapping.
11.2. Estimation of Water Properties: BOD, COD, Dissolved Oxygen, pH, suspended solid, turbidity and electric conductivity.
Self Assessment Questions
References

GEO 196.1: ENVIRONMENTAL MAPPING: Micro Zonation & Vegetation

SLM-11b

Relevance
Objective
Introduction
11.3. Ecological Micro- zonation Mapping.
11.4. Vegetation density mapping
11.5. Association between soil parameters, vegetation types and density.

Self Assessment Questions
References

UNIT GEO196.1PHYSICAL THEMATIC MAPPING & SOCIAL THEMATIC MAPPING

GEO196.1PHYSICAL THEMATIC MAPPING

SLM-12a

Relevance
Objective
12.1Introduction
12.1.1 Procedure

- Linear Parameters
  Stream Order (U)
- Stream Length (Lu)
- Bifurcation Ratio (Rb)
- Mean Stream Length (Lsm)
- Stream Length Ratio (RI)
- Relief Parameters
- Basin Relief (Bh)
- Relief Ratio (Rh)
- Ruggedness Number (Rn):
- Areal Parameters
- Stream Frequency (Fs)
- Drainage Density
- Texture Ratio (Rt)
- Form factor (Ff)
- Circulatory Ratio (Rc)
- Elongation Ratio (Re)
- Length of overland Flow (Lof)
- Sinuosity Index

12.1.2 Hypsometric Curve
Self Assessment Questions
References

GEO196.1 SOCIAL THEMATIC MAPPING

GEO196.1MAPPING OF FARMING PRACTICES:CROP-COMBINATION, DIVERSIFICATION AND CROPPING INTENSITY

SLM-12b

GEO196.THEMATIC MAPPIN ON SOCIAL INDEX

SLM-12c

SEMESTER-II

Course/Paper GEO 201: Environmental Approaches & Application

UNIT GEO201.1 ENVIRONMENTAL ETHICS & REGULATION

GEO201.1 ENVIRONMENTAL ETHICS

SLM-13a

Relevance
Objective
13.1Introduction
13.1.2 Environmental ethics and education; Concept, development of environmental philosophy, Ecocentrism and Anthropocentrism, the land ethic (Aldo Leopold), Gaia concept, Eco- feminism. Formal and non-formal environmental education, Tbilisi conference, environmental awareness.
13.2 Approaches to conservation of environment: Landscape ecology and ethno-ecology, environmental stewardship.
Summary
Glossary
Self Assessment Questions
References

GEO201.1 ENVIRONMENTAL REGULATION

SLM-13b

Relevance
Objective
13.3Introduction
13.3.1 Environmental Impact Assessment (EIA), Environmental Management Planning (EMP), Environmental Performance Assessment (EPA).
13.4 Global Environmental Issues: Stockholm Conference, the Earth Summits, Inter-Governmental Panel for Climate Change (IPCC).
13.5 Environmental Laws in India: Wild life Act, Forest Acts
Environmental Protection Act, National Environmental Tribunal Act.
Summary
Glossary
Self Assessment Questions
References

UNIT GEO201.2 ENVIRONMENTAL ENGINEERING

GEO201.2 ENVIRONMENTAL ENGINEERING :

Concept, Sludge Treatment and Air Pollution

SLM-14a

GEO201.2 ENVIRONMENTAL ENGINEERING – Noise and Arsenic and Fluoride Pollution

SLM-14b

COURSE/PAPER GEO202: POPULATION AND DEVELOPMENT
UNIT: GEO201.1 POPULATION GEOGRAPHY:
Scope, Development and Population Composition

SLM-15a

GEO201.1 POPULATION GEOGRAPHY:
Demographic Transition and Population Projection

SLM-15b

Relevance
Objectives
15.3 Introduction
15.3.1 Demographic Transition Theory
15.3.2 Impacts of Demographic Transition
15.3.3 Demographic Transition throughout the world- Critical Appraisal
15.4 Population Projection
Summery
Glossary
Self Assessment Questions

GEO201.1 POPULATION GEOGRAPHY: Population - Resource Relationship

SLM-15c

Relevance
Objectives
15.5 Introduction
15.5.1 Population-Resource Relationship
15.5.2 Resource: Definition and Types
15.5.3 Population-Resource Relationship: Concepts
a) Optimum Population
b) Overpopulation
c) Under-population
15.5.4.1 Population Resource Regions
a) Technology-source areas of low population-potential/resources ratio or the United States type
b)Technology-source areas of high population-potential/resources ratio or the European type
c)Technology-deficient areas of low population-potential/resources ratio or the Brazilian type
d)Technology-deficient areas of high population-potential/resources ratio or the China or Egyptian type
e)Technology-deficient areas of having a few food producing resources or the Arctic-Desert type
15.5.4.2 Population Resource Regions in India
a) Dynamic Population-resource region
b) Prospective Population-resource region
c) Problematic Population-resource region
15.5.5 Carrying Capacity: Concept and Change over Time

15.5.6 Population Policies
Summery
Glossary
Self Assessment Question
Reference

UNIT:GEO202.2: POPULATION AND DEVELOPMENT

GEO202.2.2 Millennium Development Goals (MDGS) and Population Growth

SLM-16a

Relevance
Objectives
16.1 Introduction
16.1.1 The Fate of Millennium Development Goals (MDGs)
16.1.2 Human Development Index (HDI)
16.1.3Gender Development Index (GDI)
16.1.4 Gender Empowerment Measure (GEM)
16.2.1 Population Growth: Link to Economic Development
16.2.2 Population Growth and Resource Scarcity
16.2.3 Population and its association with Sustainable Development
16.2.4 Concept of Logistic and Exponential Growth
Summery
Glossary
Self Assessment Questions
References

GEO 202.2 POPULATION AND DEVELOPMENT :
Integration with Reference to India, Theory,
Approaches of Population Growth and Migration

SLM-16b

Relevance
Objectives
16.3 Introduction
16.3.1 Population Growth and Processes of Population Change
16.3.2 Characteristics of the Population of India
16.3.3 Population and Development Integration in India
16.4 Population: Theory 1. The Malthusian Theory of Population
16.4.1 Population: Theory 2:- The Optimum Theory of Population:
16.4.2 Population: Theory 3:-The Theory of Demographic Transition
16.4.3 Population Regulation or Limiting Factors
16.5 Migration: Concept
16.5.1 Types of Migration
16.5.2 Patterns of Migration (With Indian Perspective)
16.5.3 Theories and Models of Migration

- *Ravenstein's Law*
- *Lee's Theory of Migration*
- *Lewis's Model of Rural-Urban Migration*

16.5.4 Consequences of or Impact of Migration on Society
Summery
Glossary
Self Assessment Questions
References

COURSE/PAPER:GEO203:REGIONAL GEOMORPHOLOGY AND RESOURCE MANAGEMENT
UNIT:GEO203.1 REGIONAL GEOMORPHOLOGY OF INDIA AND WEST BENGAL
Geomorphology of Darjeeling Himalaya

SLM- 17a

Relevance
Objectives
17.1 Introduction
17.1.1 Tectonic Character Of The Darjeeling Himalayan Region

- Geographical Connotation Of Landslide
- Causes Of Landslides

17.1.2 Land Slides In Darjeeling Hill Areas

- Environmental Set Up Of The Darjeeling Hill Area
- Possible Causes Of Landslide Hazards In The Darjeeling Hill Tract

17.1.3 Alluvial Fans In Terai Region Of North Bengal

- `Geographical Environmental Condition For The Development Of Alluvial Fans

GEO203.1 REGIONAL GEOMORPHOLOGY

Western Ghat (Deccan Trap)

SLM :17b

Relevance
Objectives
17.2 Introduction
17.2.1 Geology And Tectonics Of Western Ghats With Special Reference To Deccan Trap
17.2.2 Geomorphological Characteristics Of Deccan Trap And The Western Ghats
17.2.3 Characteristics Of Drainage System In The Deccan Trap Region
17.2.4 Geomorphology And Soil-Landform Assemblages Of Chhotanagpur Plateau And Its Adjacent Areas Of West Bengal
17.3.1 Geomorphology And Soil-Landforms Of The Chhotanagpur Plateau
Region And Its Adjacent Areas
17.3.2 Geomorphology Of Rajasthan Desert With Special Reference To Marusthali
17.3.3 General Profile Of The Landscape
17.3.4 Geomorphology Of The Marusthali Region
17.3.5 The Sub-Regions
17.3.6 Geomorphic Evolution Of The Marusthali Region
Summery
Glossary
Self Assessment Questions
References

GEO203.1 REGIONAL GEOMORPHOLOGY

Form, Process and Evolution of Ganga

SLM-17c

Relevance
Objectives
17.4 Introduction
17.4.1 The Ganga Delta –its shape, composition,

- Geology as well as Geomorphological and Biotic environments; Evolution of Bengal Basin within the Ganga-Brahmaputra delta region; Present threats of sea-level rise to the active delta region (the Sundarban area.
- The Subarnarekha Delta – Stages of development through the geological history. The Godavari Delta – Formation and topographic characteristics)

17.5 Tectonics and Geomorphology of the Islands of Bay of Bengal – Andaman

and Nicobar Islands; Islands of Arabian Sea – Lakshadeep)
Summery
Glossary
Self Assessment Questions
References

UNIT:GEO203.2: LAND WATER FOREST CONFLICT AND COSERVATION

SLM-18

Relevance
Objectives
18.1Introduction
18.1.1 Land class systems, land use capability classes.
18.2 Land degradation, land conservation and land improvement.
18.3 Water assessment:
18.3.1Water quality,
18.3.2Water availability and scarcity of water,
18.3.3Saline ground water in coastal areas, functions of wetlands
18.4 Characterization diversity of rainforests and mangrove forests
18.5 Degradation and management of forest, social forestry and agro-forestry.
Summery
Glossary
Self Assessment Questions
References

COURSE/PAPER C-GEO204: RESOURCE MANAGEMENT AND EARTH SYSTEM SCIENCE

UNIT C-GEO204.1: Resource and Its Management

SLM-19

Relevance
Objectives
19.1 Introduction
19.1.1 Geography as a science of synthesis; social relevance of geography
19.2 Resource assessments, management and mapping
19.3 Human resource development in backward region.
19.4 Indicators of livelihood security.
19.5 Microlevel resource planning in watershed scale.

Summery
Glossary
Self Assessment Questions
References

UNIT:C-GEO204.2: EARTH SYSTEM SCIENCE

SLM-20

Relevance
Objectives
20.1 Introduction
20.1.1 Earth surface processes and Geo-tectonics
20.2 Composition of atmosphere and atmospheric processes
20.3 Bottom relief of major oceans; temperature and salinity distribution
20.4 Principles of mapping and applications
20.5 Regional geomorphology of West Bengal.
Summery
Glossary
Self Assessment Questions
References

COURSE/PAPERGEO295:STATISTICAL TECHNIQUES
UNIT:GEO295.1BASIC STATISTIC IN GEOGRAPHY
GEO295.1 Basic Statistics Measurement in Geography and Concept of Covariance, correlation

SLM-21a

Relevance
Objective
21.1 Introduction
21.1.1 Measurement Scales: Traditional Classification
21.1.2 Nominal Scales
21.1.3 Ordinal Scales
21.1.4 Interval Scales
21.1.5 Ratio Scales
21.1.6 Measurement Scales: Other Views
21.1.7 Continuous and Discrete Variables
21.1.8 Bounded Variables
21.1.9 Categorical versus Categorized Variables
21.1.10 A Group is not a Group is not a Group
21.2.1 Covariance and correlation
21.2.2 Covariance
21.3 Correlation
21. 3.1 Regression: Simple Linear Regression

21.3.2 Residuals
21.3.3 Residual Mapping
21.3.4 Pearson product moment correlation-coefficient
21.3.5 Spearman correlation-coefficient
Summery
Glossary
Self Assessment Questions
References

GEO295.1 Basic Statistics Probability Distribution

SLM-21b

Relevance
Objective
21.3Introduction
21.3.1 Sample Spaces and Probability
21.3.2 The Addition Rules for Probability
21.3.3 The Multiplication Rules and Conditional Probability
21.3.4 Conditional Probability
21.3.5 Binomial probability distribution
21.3.6 Properties of normal distribution
Self Assessment Questions
References

GEO295.1BASIC STATISTICS

SLM-21c

Relevance
Objective
21.4 Introduction
21.4.1 Hypothesis Testing
21.4.2 t-distribution
21.4.3Type I and Type II error
21.4.4Degrees of freedom
21.4.5Chi-squared distribution
21.4.6 T-test and Chi-squared test
21.4.6.1 t-test
21.4.6.2 Chi-squared test
21.4.7 One tailed and two tailed test

21.4.8 Deciding the sample size
21.5.1 Sampling procedure in Geographical study
21.5.2 Probability sampling:
21.5.3 Non-probability sampling
Self Assessment Questions
References

GEO295.2:ADVANCE QUANTITATIVE METHOD

SLM - 22

Relevance
Objective
22.1Introduction
22.1.1 Analysis of Variance: Objectives; One-way and Two-way ANOVA.
22.1.2 Fitting Second Degree Polynomial curves to bivariate geographical data and testing by
ANOVA.
22.1.3 Multiple Regression: Linear multiple regression equation, Multiple and partial correlation coefficient.
22.1.4 Elementary multiple regression modeling techniques: Stepwise variable entry method, Path Analysis.
22.1.5 Model building techniques
Self Assessment Questions
References

COURSE/PAPER:GEO296:REMOTE SENSING AND COMPUTER APPLICATION
UNIT:GEO296.1:PRINCIPLE OF REMOTE SENSING AND AERIAL PHOTOGRAPHS
GEO296.1 PRINCIPAL OF REMOTE SENSING –
Principles of RS and Satellite System

SLM-23a

Relevance
Objective
23.1Introduction
23.1.1 .Physics of Remote Sensing: Electro Magnetic Radiation (EMR), Radiation laws (wavelength-frequency-energy relationship of EMRnumerical problems).

23.1.2. Electromagnetic Energy:
23.1.3. Radiation Laws:
23.1.4. Atmospheric window:
23.2. Satellite System: Keplers's Laws, Major-Semi-major axis, eccentricity, velocity (Numerical problems).
23.2.1. Keplers's Laws:
23.2.2. The Ellipse
23.2.3 Semi-major and semi-minor axis
23.2.4. Eccentricity
Self Assessment Questions
References

GEO296.1 PRINCIPAL OF REMOTE SENSING AND AERIAL PHOTOGRAPHY

SLM-23b

Relevance
Objective
23.3Introduction
23.3. Satellite Sensors
23.3.1. Concept:
23.3.2. Instantaneous Field of View (IFOV):
23.3.3. Pixels:
23.3.4 Trade Off:
23.3.5. Photographic film resolution:
23.3.6. Swath:
23.4. Basics of Aerial Photograph
23.4.1. Definition:
23.4.2. Geometry of an Aerial Photograph:
23.4.3. The resulting geometries of central perspective projections are:
23.4.4. Determination of scale:
23.4.5. Different Methods:
23.4.6. Distortions:
23.4.7. Parallax:
23.4.8. Computing height using stereoscopic parallax:
23.4.9. Relief Displacement:
23.4.10: Displacement Methods:
23.4.11. Shadow Height Method:
23.5. Stereoscopy and Aerial Photo Interpretation
23.5.1. Stereoscopy:
23.5.2. Depth Perception:
23.5.3. Mirror Stereoscope:
23.5.3.1. Proper Use of Stereoscopes:
23.5.3.2. Problems/Issues Involved in Viewing Stereo:
23.5.4. Pseudoscopy:
23.5.5. Photographic Mosaic:
23.5.6. Edge Information:

23.5.7. Airphoto Interpretation Keys:
23.5.8. Land use/Land cover mapping:
Self Assessment Questions
References

UNIT:GEO296.2 COMPUTER BASICS AND APPLICATION

Computer Components and Representation Data

SLM-24a

Relevance
Objective
24.1Introduction

24.1.1 Computer Fundamentals

24.1.2 What is Computer?
24.1.3 The History of a Computer
24.1.4 The Generations of Computer
24.1.5 Classification of Computer
24.1.6 Working Procedure of a Computer (IPO System)
24.1.7 Components of Computer
24.1.8 Computer Hardware
24.1.9 Computer Software
24.1.10 Computer Programming Languages

24.2 Data Re presentation and Number System

24.2.1 Data Representation
24.2.2 Number System
24.2.3 Unit of Binary Number System
24.2.4 Number System Conversion
24.2.5 Binary Arithmetic
24.2.6 Basic Logic Gates
24.2.7 Boolean Rules and Reduction Techniques
Self Assessment Questions
References

GEO296.2 COMPUTER BASICS AND APPLICATION

SLM-24b

Relevance
Objective
24.3 Introduction
24.3.1 SPREADSHEET
24.3.2 Introduction

SEMESTER-III

COURSE/PAPER GEO 301: APPROACHES TO REGIONAL DEVELOPMENT

UNIT: GEO 301.1 REGIONAL APPROACHES IN GEOGRAPHY

SLM-25a

Glossary
Self Assessment Questions
References

GEO 301.1REGIONAL APPROACHES IN GEOGRAPHY
Contribution of Ratzel and others Regarding regional Concepts
SLM-25b

Relevance
Objective
25.2 Introduction
25.2.1 Contribution of Ratzel, Hartshorne, Schaefer and Vidal de la Blache to the development of regional concept.

- Frederick Ratzel
- Richard Hartshorne
- Fred K. Schaefer
- Vidal de la Blache

25.2.2 The character of regional geography, Space: the fundamental stuff of geography (Geography in history or historical geography)
25.2.2.1Space: the fundamental stuff of geography
25.2.2.2 Historical Geography
Summery
Glossary
Self Assessment Questions
References

GEO 301.1 REGIONAL APPROACHES IN GEOGRAPHY
Planning Regions in India
SLM-25c

Relevance
Objectives
25.3 Introduction
25.3.1 Planning regions
25.3.2 Planning regions in India
25.3.3 Tribal Areas:
25.3.4 Drought Prone Areas
25.3.5 Flood Prone Area
25.3.6 National Water Policy
Summery
Glossary
Self Assessment Questions
References

UNIT:301.2:RURAL DEVELOPMENT

Concept and Approach to Rural Development and Rural Economics

SLM-26a

301.2:RURAL DEVELOPMENT

Rural Micro-finance, Industries and Development Programme

SLM-26b

Self Assessment Questions
Reference

COURSE/PAPERS:GEO 302: SETTLEMENT AND TRANSPORT GEOGRAPHY
UNIT: GEO 302: SETTLEMENT GEOGRAPHY
302.1 Concepts of Shelter, Census and Site

SLM-27a

Relevance
Objective
27.1Introduction
27.1 Concept of Shelter
27.1.1 The Settlement
27.1.2 Concept of Shelter
27.1.3 Definition
27.1.4 Components and types
27.1.5 Basic difference between shelter and settlement
27.1.6 Dwelling place as a cultural expression
27.1.7 Defining and concept of dwelling place
27.1.8 Typical dwelling-places
27.1.9 Cultural expressions in dwelling-places
27.2 Census categories of Settlement
27.2.1 Introduction
27.2.2 Census categories of settlement
27.2.3 Settlement Hierarchy
27.2.4 Types of Rural Settlements
27.2.5 Urban Settlements
27.2 6 Building Materials
27.2.6.1 Materials
27.2.6.2 Relation between building materials and architectural design of rural houses
27.2.6.3 Morphology of rural dwellings
27.3 Factors of settlement growth: Site and Situation
27.3.1 Introduction
27.3.2 Factors affecting location and siting of rural settlements
27.3.3 Site
27.3.3.1 Concept and definition
27.3.3.2 Typical example of sites
27.4 Situation
27. 4.1 Definition
27. 4.2 Characteristics
27. 4.3 Example of Situation
27.4.4 Size of the settlements

302.1 CONCEPTS IN SETTLEMENT GEOGRAPHY

Components of Rural and Urban Morphology

SLM – 27b

302.1 CONEPTS IN SETTLEMENT GEOGRAPHY

Socio Economic Segregation

SLM-27c

Relevance
Objective
27.5 Introduction
27.5.1 Characteristics of Rural Society
27.5.2.Factors Contributing to the Unity within the Indian Society
27.5.3.Structure of the Indian Society
27.5.4. Social inequality
27.5.5.Segregation
27.5.5.1Contextual approach to Socio-economic segregation .
27.5.5.2Conceptualizing socio-economic segregation

- Income inequality
- Globalization and economic restructuring
- Welfare regime
- Housing regime
- History, local institutions and space
- Religious and Social Discrimination
- Caste system

27.5.5.3 Measuring the socio-economic segregation

- Index of Dissimilarity (D)
- Neighborhood Sorting Index (NSI)
- The Gini Segregation Coefficient
- The Entropy Index of Segregation
- The Exposure Index

27.5.5.4 Policy Implications
27.5.6. Concept of Multiculturism and Cities as melting pot of Culture
27.5.6.1 Characteristics of a Multicultural Organization
Summary
Glossary
Self Assessment Questions
References

UNIT: 302.2 TRANSPORT GEOGRAPHY

302.2 CONEPTS IN TRANSPORT GEOGRAPHY : Distance, Cost and others

SLM-28a

Relevance
Objective
28.1Introduction
28.1.1 Concept of distance, Transportation and space, space-time relation through transportation
28.1.2 Concept of Distance

28.1.3 Transportation and Space
28.1.4 Space/time relationships
28.1.5 Transport Network Analysis
28.1.6 Transport Models
28.2 Transport cost, Principles of transport cost fixation, comparative cost advantage.
28.2.1 Principles of transport cost fixation
28.2.3 Comparative cost advantage
Summary
Glossary
Self Assessment Questions
Reference

302.2 CONEPTS IN TRANSPORTATION GEOGRAPHY
Planning for Public Transport
SLM-28b

Relevance
Objective
28.3 Introduction
28.3.1 Planning for Public Transport
28.3.2 Desired Characteristics
28.3.3 Modes and Optimal Pricing
28.3.4: Services, Ownership and Regulation
Glossary
Self Assessment Questions
References

302.2 CONEPTS IN TRANSPORT GEOGRAPHY
Transport Policy and Communication Technology
SLM-28c

Relevance
Objective
28.4 Introduction
28.4.1 Transport Policy
28.4.1.1 Problem oriented planning, and objective-led approach.
28.4.1.2 Infrastructure
28.4.1.3 Management and Information
28.4.1.4: Pricing and Land-use Components
28.4.1.5 National Transport Policy
28.4.1.6 Road Transport in India

28.4.1.7 Railways
28.4.1.8 Inland Navigation
28.5 Communication Technology-Roles in Reducing Transport Demand
Glossary
Self Assessment Questions
References

COURSE/PAPER:GEO303: SPECIAL PAPER (Optional)
Special Paper Option 1-GEO 303: COASTAL MANAGEMENT
UNIT: GEO 303:1COASTAL PROCESS
Coastal Zone and Wave Hydrodynamic

SLM-29a

Relevance
Objective
29.1Introduction
29.1.1 Definition of coastal zone
29.1.2 Relevance of coastal study
29.1.3 Classification of coast - Beach stage model.
29.2 Wave hydrodynamics
29.2.1 Wave modification near coast with special reference to attenuation, breaker types
29.2.2 Energy dissipation during breaking wave
Summary
Glossary
Self Assessment Questions
References

GEO 303.1 COASTAL PROCESSES
Tide Coastal Current and Macro Landforms

SLM- 29b

Relevance
Objective
29.3 Introduction
29.3.1 concept of Tide
29.3.2 Diurnal and semi-diurnal
29.3.3 Rotating and progressive tide, concept of live storage, tidal environment with special reference to estuary.
29.4 Coastal current; types and concepts
29.4.1 Intensity of long shore component and its implications, cell circulation.
29.5 Macro land forms with special reference to beaches and dunes
29.5.1 Micro and biogenic forms
Summary
Glossary
Self Assessment Questions
References

Special Paper Option 2- GEO 303 URBAN GEOGRAPHY AND REGIONAL PLANNING

UNIT :GEO303.1 FOUNDATION OF URBAN GEOGRAPHY: Development, Concept, Today's Cities

SLM – 29c

Relevance
Objective
29.1 Introduction
29.1.1 Development of urban geography as a systematic discipline
29.1.2 Sope, content and recent trends.
29.2 Concept and definitions of urban system
29.2.1 Urban, urbanization, urbanism and urban ecology
29.2.2 National urban system and global economy
29.2.3 Nature of urban system, global economy and global shift
29.3 Today's cities and suburbs
29.3.1 Suburban sprawl, smart growth, exurbs, the new cities and gated communities
Summary
Glossary
Self Assessment Questions
Reference

GEO303.1 FOUNDATION OF URBAN GEOGRAPHY

Urban Living and Urban Planning

SLM-29d

Relevance
Objective
29.4 Introduction
29.4.1 Origin and growth of urban living
29.4.2 Bases and processes of urbanization
29.4.3 Historical perspectives on world urbanization
29.5 Urban planning, policies and regeneration
29.5.1Architectural vision, European, Anglo American tradition
29.5.2 Planning the social city, the new towns movement
29.5.3 Towards planning for sustainable urban development.
Summary
Glossary
Self Assessment Questions
References

UNIT:GEO 303.2 :COASTAL ENVIRONMENT :FOCUS ON INDIAN REGION

Tidal Environment and Morphodynamic Systems

SLM – 30a

GEO303.2 : COASTAL ENVIRONMENTS FOCUS ON INDIAN REGIONS

Carbonate Platform, Coastal Erosion and Techniques

SLM-30b

UNIT: GEO 303.2 CONTEMPORARY URBAN ISSUES

Changing Scenario

SLM-30c

GEO303.2 CONTEMPORARY URBAN ISSUES

Social Environment, Urban Problems

SLM-30d

COURSE/PAPERS C- GEO304: ENVIRONMENTAL ISSUES AND MANAGEMENT
UNIT C-GEO 304.1;EMERGING ISSUES AND POLICIES ON ENVIRONMENT

SLM-31

Relevance
Objective
31.1 Introduction

31.1.1 Global climate change, water scarcity and politics of water
31.1.2 Environmental degradation and pollution
31.1.3 Environment and development: Debate and Issues
31.1.4 Social and Cultural Hazards
31.1.5 Globalization and Environment
Summary
Glossary
Self Assessment Questions
References

UNITC-GEO 304.2 ENVIRONMENTAL HAZARDS AND DISASTER MANAGEMENT

SLM-32

Relevance
Objective
32.2 Introduction
32.2.1 Concepts and techniques for analysis of risk, hazard, disaster, vulnerabilities and resilience.
32.2.2 Cyclone and storm surges, thunderstorms and lighting, earthquake, tsunami wave and landslide hazards.
32.2.3 Natural hazard and disaster management in India, Agricultural drought hazard and the national experience
32.2.4 International Disaster Response Laws Rules (IDRL)
32.2.5 National policy and appraisal of hazard
Summary
Glossary
Self Assessment Questions
References

COURSE/PAPERS GEO 395:GIS APPLICATION IN RESEARCH
UNIT GEO 395.1APPLICATION OF REMOTE SENSING AND GIS
GEO 395.1 APPLICATION OF REMOTE SENSING
Geo Referencing, FCC and Classification Techniques

SLM- 33a

GEO 395.1 APPLICATION OF GIS and MAP Layers

SLM-33b

UNIT GEO395.2 RESEARCH METHODOLOGY

SLM-34

Relevance

Objective

Introduction

34.1 Research ethics and paradigm shift of research methodology in Geography

34.2 Need for research, basic research types

34.3 Identification of research problems, development of theoretical background- literature review, research gap and research question and specification of the objectives of study; hypothesis building, Framework of research writing.

34.4 Methods of data collection- primary and secondary; Preparation of questionnaire and survey schedule and their differences, research ethics.

34.5 Methods of writing notes, style of referencing, bibliography and appendices, abstract and synopsis writing.

Self Assessment Questions

References

COURSE/PAPER GEO-396 SPECIAL PAPER BASED FIELD WORK
OPTION 1
UNIT:GEO-396.1 & .2FIELD WORK (COASTAL MANAGEMENT)

SLM-35a

Relevance

Objective

Introduction

Field works in Deltaic/ Non-deltaic or Rocky Coastal Environments

35.1 Studies on the shore profile forms and channel cross sections using echo-sounder and current meter. Littoral environment observation with special reference hydrological parameters: Waves, tides, winds and currents.

35.2 Coastal sediment budget analysis.

35.3 Analysis of population pressure on the coastal zones.

35.4 Analysis of coastal ecosystem diversity using remote sensing.

35.5 Hazard mapping and community vulnerability mapping Mapping CRZ violation areas using GPS handset, Nearshore geomorphological mapping with conventional surveying equipments or with Total Station. Mapping of the forms of coastline changes.

Self Assessment Questions

References

OPTION 2

GEO-396.1&.2 FIELD WORK & REPORT (URBAN Geography)

SLM-35b

Relevance

Objective

Introduction

Field works on focused urban issue(s) in an urban area e.g. Small town/ Big city/ Few wards of a Big City

35.1 Wardwise landuse /land cover survey using high resolution Remote Sensing data.
Wardwise distribution of population and its change over time.

35.2 **Survey of** spatial distribution of urban facilities (Bank, School, College, Offices, Hospitals etc.), urban transport: Nodes, Network and flow: Collection of database (Primary and Secondary), Water supply system: waste collection and disposal system

35.3 Study of Urban sprawling, renewal, economics, environmental problems etc.: Collection of database (Primary and Secondary)

35.4 Income/Social grouping, Ethnic groups Education; Occupation; Age-sex Composition etc.

35.5 Enquiries on future prospects and planning strategies

Self Assessment Questions

References

SEMESTER IV

COURSE/PAPERS : GEO 401: GEOGRAPHICAL PHYLOSOPHY
UNIT:GEO 401.1 SCHOOLS IN GEOGRAPHICAL THOUGHT
Field of Geography

SLM-37a

Relevance

Objectives

37.1 Introduction

37.1.1 The Field of Geography, Place of Geography in classification of knowledge and other disciplines

37.1.2 Geography as a social science

37.1.3 Approaches of Geographical thoughts

37.1.4 Physical and Human Geography

37.1.5 Linkages among the sub-disciplines of physical and human geography.

37.1.6 Typology of models and uses: structure component and characters

Summery

Glossary

Self Assessment Questions

Reference

GEO 401.1 SCHOOLS IN GEOGRAPHICAL THOUGHT

Development of Geography, Conceptual and Methodological Development

SLM-37b

GEO 401.1 SCHOOLS IN GEOGRAPHICAL THOUGHT

Methological Development and Typology

SLM-37c

GEO 401.2: CONTEMPORARY DISCOURSES IN GEOGRAPHY

SLM-38

COURSE/PAPERGEO 402: POLITICAL GEOGRAPHY AND GLOBALIZATION

GEO 402.1 POLITICAL GEOGRAPHY

Politics and Geography and Geo Political Significance

SLM-39a

GEO 402.1POLITICAL GEOGRAPHY

SLM-39b

Relevance
Objectives
39.3 Introduction
39.3.1 Geography and federalism; union, democratic, republic and federal state
39.3.2 Reorganization of Indian states since independence 15.8.3 Partition of India and its consequences
39.4 International and interstate water disputes in India.
39.4.1 Interstate; Ravi & Beas, Narmada, Cauveri, Krishna, Periyar and Godavari
39.4.2 International; Indus, Brahmaputra and Tista
39.5 Political and economic blocs; ASEAN, APEC,
BRICS,EU,NAFTA,CIS,SAARC,COMESA, IOR-ARC
39.5.1 Geopolitics in the context of globalization; de-territorialisation
39.5.2 colonialism and post colonialism
Summery
Glossary
Self Assessment Questions
References

GEO 401.2GEOGRAPHY OF GLOBALIZATION

SLM-40a

Relevance
Objectives
Introduction
40.1 Transformed Geography
40.1.1 Concept of Liberalization, Privatization and Globalization (LPG)
40.1.2 Rise of the globalization, conflicts of globalization,
40.1.3 Concept of glocalilisation.
40.2 Economic geography in the era of Globalization
40.2.1 Changes and recent trends
40.2.2 Impact of globalization on agriculture, industry and trade.
Summery
Glossary
Self Assessment Questions
References

GEO 401.2 GEOGRAPHY OF GLOBALIZATION

SLM-40b

Relevance
Objectives
40.3Introduction
40.3.1 World economic order: Economic booms and crisis
40.4.1 Globalization and cultural changes
40.4.2 Globalization and cultural transformations
Summery
Glossary
Self Assessment Questions
Reference

GEO401.2 GEOGRAPHY OF GLOBALIZATION

SLM-40c

Relevance
Objectives
40.5 Introduction
40.5.1 Assessing the future of globalization and global challenges
40.5.1.1Inequality and globalization
40.5.1.2 development and globalization
40.5.2 Environment, sustainability and globalization.
Summery
Glossary
Self Assessment Questions
References

COURSE/PAPER 403SOCIETY AND REGIONAL PLANNING
UNIT:403.1 SOCIAL & CULTURAL GEOGRAPHY
403.1 SOCIAL GEOGRAPHY
Nature and Scope, Social Structure and Others

SLM-41a

Relevance
Objectives
41.1Introduction
41.1.1 Nature, scope and content of social Geography
41.1.2 Ethnicity, tribe, dialect, language, caste and religion.
41.2 Social structure and processes
41.2.1 Social exclusion
41.2.2 Geographies of social well-being with special reference to India.
Summery
Glossary
Self Assessment Questions
References

GEO 403.1 CULTURAL GEOGRAPHY

SLM-41b

Relevance
Objectives
41.3Introduction
41.3.1 Cultural Geography: Definition, scope and nature.
41.3.2 Race ,religion, language as cultural attributes with special reference to India,
41.3.3 North-South social -cultural divide.
41.3.4Cultural processes
41.3.5 Diffusion; types and characteristics of different diffusions
41.3.6 Concept of acculturation, assimilation and cultural pluralism.
41.4 World cultural realms
41.5 Cultural Processes
Summery
Glossary
Self Assessment Questions
References

UNIT GEO 403.2 REGIONAL PLANNING

SLM-42a

Relevance
Objectives
42.1Introduction
42.1.1 Concept of planning
42.1.2 Levels of planning
42.1.3 Types of planning and regional disparities.
42.2 Basic principles and methodology of regional planning
42.2.1 Regional development strategies: Centralized, decentralized and multilevel planning for rural and urban areas
42.2.2 People's participation in planning- Panchayati Raj Institution.
Summery
Glossary
Self Assessment Questions
References

GEO 403.2 REGIONAL PLANNING STRATEGIES

SLM - 42b

Relevance
Objectives
42.3 Introduction
42.3.1 Planning regions in India
42.3.2 Purpose and methods of delineating planning region.
42.3.3 Demographic, social and economic disparities in India.
42.3.4 Concept and approach to rural development
42.3.5 Rural development programmes in India in different planning period
42.4 Regional disparities
42.5 Planning of problems religion
Summery
Glossary
Self Assessment Questions
Reference

GEO404: SPECIAL PAPER
COURSE/PAPER OPTION 1 :COASTAL MANAGEMENT
UNIT: 404.1 COASTAL ECOLOGY AND HAZARDS
GEO 404.1 COASTAL ECOLOGY

SLM- 43a –Coastal

Relevance
Objective
43.1 Introduction
43.1.1 Study and management of- Sea weeds
43.1.2 Seaweed ecosystem
43.1.3 Artificial seaweeds.
43.2 Dune vegetation
43.2.1 Dune initiating and dune building types
43.2.2 Adaptation and reproduction
43.2.3 Plant-animal interaction in sand dune.
43.2.4 Mangroves: physical environment and ecology.
Summary
Glossary
Self Assessment Questions
References

404 SPECIAL PAPER

COURSE/PAPER OPTION II URBAN GEOGRAPHY AND REGIONAL PLANNING

UNIT:GEO 404 .1 THEORETICAL BASES OF REGIONAL PLANNING

SLM – 43a - Urban

Relevance
Objective
43.1 Introduction
43.1.1 History of regional planning in India; pre and post independence
43.1.2 Theories of regional planning
43.1.3 Growth pole theory
43.1.4 Stages of Economic Growth
43.1.5 Core-perifery theory
43.1.6 Cumulative causation theory
43.1.7 Tickle-down effect
43.1.8 Concept of balanced and unbalanced growth
Summary
Glossary
Self Assessment Questions
References

GEO 404 .1 THEORETICAL BASES OF REGIONAL PLANNING

Development Perspectives Growth Pole Agropolitan Development

SLM- 43b - Urban

Relevance
Objective
43.2 Introduction
43.2.1 Regional development perspectives
43.2.2 Colonial period (Dependency theories- Friedman, Andre Gander Frank, David Slater)
43.3.1 Growth Pole theories and the developing world by
43.3.1.1 Perroux
43.3.1.2 Myrdal
43.3.1.3 Hirschman,
43.3.1.4 Boudiville
43.4 Agropolitan Development
43.4.1Basic need approach
43.4.2 E.A.J Johnson
43.4.3 Dennis Rondinelli-USAID
Summary
Glossary
Self Assessment Questions
References

GEO 404.1 COASTAL HAZARDS

SLM-43b - Coastal

Relevance
Objective
43.3 Introduction
43.3.1 concept of Coastal hazards and their management
43.3.1 Sea level change- long and short term changes
43.3.2 Regional and global effects on shore
43.3.3 Coastal erosion- causes and effects
43.3.4 Storm hazard- role in sediment transfer, effects on open and estuarine coast, management of storm hazard.
43.4 Techniques of monitoring coastal processes and land forms
43.5 Coastal studies in India: Monitoring and research
Summary
Glossary
Self Assessment Questions
References

UNIT: 404B.2 COASTAL ISSUES AND MANAGEMENT

404.2 COASTAL ISSUES

SLM-44a

Relevance
Objective
44.1Introduction
44.1.1 Concept of Coral bleaching
44.1.2 Impact of Global warming,
44.1.3 Coastal eutrophication
44.1.4 Habitat conservation of Coastal lagoons
44.1.5 Habitat conservation of other coastal wetlands
44.2 Coastal tourism and environment conflicts
44.2.1 Beaches and barrier coasts
44.2.2 Mangrove dominated coast
44.2.3Coral coasts
44.2.4 Environmental regulations
44.3 Application of remote sensing and GIS techniques in coastal management
44.3.1 Geomorphological mapping
44.3.2 Coastal cell circulation systems
44.3.3 Environmental zoning approach
44.3.4 Identification and diversity of coastal habitats
Summary
Glossary
Self Assessment Questions
References

404.2 COASTAL MANAGEMENT

SLM-44b

Relevance
Objective
44.4 Introduction
44.4.1 Managing coastal change
44.4.2 Assessment of coastal vulnerability
44.4.3 Ecosystem valuation of coast
44.4.4 Integrated coastal zone management
44.5 coastal regulations; CRZ
44.5.1 Coastal engineering: Developments in hard structure designs, developments in soft structure designs, new dredging techniques and procedures.
44.5.2 Coastal urbanization and population pressures
44.5.3 Coastal resource management
Summary
Glossary
Self Assessment Questions
References

UNIT: GEO 404 .2PLANNING FOR URBAN DEVELOPMENT

SLM-44c

Relevance
Objective
44.1 Introduction
44.1.1 Concept of developed and under development economy
44.2 Urban infrastructure planning
44.3 Urban traffic and transportation planning
44.4 Planning for urban Housing
44.5 Application of remote sensing
Summary
Glossary
Self Assessment Question
Reference

COURSE/PAPER GEO-496: GEODESY AND GIS
UNIT: GEO496. 1: MAP TRANSFORMATION AND GEODESY
GEO496. 1: MAP TRANSFORMATION

SLM- 45a

Relevance
Objective
Introduction
45.1 Map transformation: Scale factor; distortion types; systems of map projections; principles of choosing map projection; importance of map projection in GIS.
45.2 Principle, construction, properties and uses of following map projections:
a) Conformal Projections- Mercator's Projection; Transverse Mercator Projection and Lambert's Conformal Conic (LCC) Projection.
45.3 Principle, construction, properties and uses of following map projections b) Equal Area Projection- Mollweide's Projection.
c) Conical Projection- Simple Conical Projection with Two Standard Parallels
Self Assessment Questions
Reference

GEO496. 1: GEODESY

SLM- 45b

Relevance
Objective
Introduction
45.4 Geodesy: Scope and application; concept of Geoid, reference ellipsoid and spheroid WGS 84, Everest Spheroid.
45.5 Coordinate Systems: Cartesian, Rectangular, Spherical, Curvilinear, Spherical, UTM Grid System.
Self Assessment Questions
Reference

UNIT GEO 495. 2: GEOGRAPHIC INFORMATION SYSTEM

SLM-46

46.1 Basic Concepts and components in GIS: An overview of the development of the GIS fields, Data Sources; Data acquisition methods

46.2 Data structure: Vector and Raster data structures, data storage.

46.3 Modern trends in GIS: 3D GIS and Web GIS, Real time GIS, Mobile GIS and application of GIS

46.4 Basics of GPS Surveying: Conceptual Framework, Space Segment, Ground Segment, Control Segment, Satellite Triangulation, Pseudo Random Code. DGPS and GNSS

46.5 GPS-aided traversing; Manual and Computer plotting for preparation of maps.

COURSE/PAPER: **GEO 495: SPATIAL ANALYSIS AND PROTOTYPE RESEARCH**

UNIT GEO495. 1: SPATIAL ANALYSIS IN GEOGRAPHY

SLM- 47a

Relevance
Objective
Introduction
47.1 Transport network analysis: Centrality Indices, Shortest path analysis(Transport and allocation problems), Detour and spread.
47.2 Distance Matrix (Aggregate Travel Distance).
47.3 Point spatial distribution analysis: Uniformity, randomness and compactness.
47.4 Analysis of Directional Data; Rose diagram, Dominant Direction, Mean direction.
47.5 Analysis of Shape: Measures based on axial ratios, perimeters to areas, areas to axial length.
Self Assessment Questions
Reference

UNIT- GEO 495. 2: RESEARCH EXERCISE IN GEOGRAPHY

SLM-47b

Relevance
Objective
Introduction
Field work on a specific environmental issue and generation of report (within about 50 A4 size pages including 15-20 maps/diagrams/field photographs).
Self Assessment Questions
Reference

SEM-I

MTM 101 **Real Analysis (50)**
(6SLM)

1. Introduction

2. Objectives

3. Keywords

4. Study Materials

- **4.1 Metric spaces**
- **4.2 Complete Metric spaces**
- **4.3 Compactness**
- **4.4 Connectedness**
- **4.5 Heine-Borel Theorem**
- **4.6 Separable and non-separable metric spaces**
- **4.7 Functions of bounded variation**
- **4.8 R-S Integral**
- **4.9 Measurable sets**
- **4.10 Concept of Lebesgue function**
- **4.11 Inner, outer measure and their properties**
- **4.12 Set of measure zero**
- **4.13 Cantor set, Borel set and their measurability**
- **4.14 Nonmeasurable sets**
- **4.15 Measurable function: Definition and it's simple properties**
- **4.16 Borel measurable functions**
- **4.17 Sequence of measurable functions**
- **4.18 Statement of Lusin's theorem**
- **4.19 Egoroff's theorem**
- **4.20 Simple functions and it's properties**
- **4.21 Lebesgue integral on a measurable set: Definition, Basic simple properties.**
- **4.22 Lebesgue integral of a bounded function over a set of finite measure**
- **4.23 Integral of nonnegative measurable functions**
- **4.24 General Lebesgue integral**
- **4.25 Bounded convergence theorem for a sequence of Lebesgue integrable function**
- **4.26 Fatou's lemma**
- **4.27 Classical Lebesgue dominated convergence theorem**
- **4.28 Monotone convergence theorem**
- **4.29 Relation between Lebesgue integral and Riemann integral**

5. Summary

6. Model Question Answers

7. Self Assessment Questions

8. References

MTM 102 **Complex Analysis (50)**
(6SLM)

1. Introduction

2. Objectives

3. Keywords

4. Study Materials

- **4.1 Analytic function**
- **4.2 Cauchy- Riemann differential equation**
- **4.3 Construction of analytic function**
- **4.4 Jardan arc, Contour, Rectifiable arcs**
- **4.5 Cauchy's theorem**
- **4.6 Cauchy's integral formula**
- **4.7 Morera's theorem**
- **4.8 Liouville's theorem**
- **4.9 Taylor's and Laurent's series**
- **4.10 Maximum modulus principle**
- **4.11 Residues and Poles**
- **4.12 Isolated Singular Points**
- **4.13 Cauchy's Residue Theorem**
- **4.14 Residue at Infinity**
- **4.15 Types of Isolated Singular Points**
- **4.16 Residues at Poles**
- **4.17 Zeros of Analytic Functions**
- **4.18 Zeros and Poles**
- **4.19 Behaviour of Functions Near Isolated Singularity**
- **4.20 Application of Residues**
- **4.21 Evaluation of Improper Integrals**
- **4.22 Improper Integrals from Fourier Analysis**
- **4.23 Jordan's Lemma**
- **4.24 Indented Paths**
- **4.25 An Indentation Around a Branch Point**
- **4.26 Integration Along a Branch Cut**
- **4.27 Definite Integrals Involving Sines and Cosines**
- **4.28 Argument Principle**
- **4.29 Rouch´e's Theorem**
- **4.30 Inverse Laplace Transforms**
- **4.31 Mapping by Elementary Functions**
- **4.32 Riemann Surfaces Conformal Mapping**
- **4.33 Harmonic Conjugates**
- **4.34 Transformations of Harmonic Functions**
- **4.35 Transformations of Boundary Conditions**
- **4.36 Mapping the Real Axis Onto a Polygon**
- **4.37 Schwarz–Christoffel Transformation**

5. Summary

6. Model Question Answers

7. Self Assessment Questions

8. References

MTM 103 Ordinary Differential Equations and Special Functions (50) (6SLM)

1. Introduction

2. Objectives

3. Keywords

4. Study Materials

4.1 Second Order Linear Differential Equations
4.2 Power Series Method
4.3 Singularity at Infinity
4.4 Frobenius Method
4.5 Hypergeometric Equation
4.6 Some properties of Hypergeometric Function
4.7 Integral Representation
4.8 Analytic Continuation of F(a,b,c; z)
4.9 Confluent Hypergeometric Equation
4.10 Solution of Confluent Hypergeometric Equation
4.11 Integral Representation of Confluent Hypergeometric Function
4.12 Legendre Differential Equation
4.13 Solution of Legendre Equation at z=0
4.14 General expression of $P_n(z)$
4.15 Rodrigues Formula
4.16 Orthogonality
4.17 Expansion of Functions: Legendre Series
4.18 Generating Function
4.19 Special Values
4.20 Bounds of $P_n(\cos\theta)$
4.21 Recurrence Relations
4.22 Integral Representation
4.23 Laplace's Equation
4.24 Bessel's Differential Equation and it's solution
4.25 Generating Function
4.26 Recurrence Relation of $J_a(z)$
4.27 Bessel Differential Equation from Recurrence Relations
4.28 Representation Bessel Function as Continued Fraction
4.29 Hankel Functions
4.30 Definition and Properties of Green's Function
4.31 Theorem on Green's Function
4.32 Theorem of Green's Function on Non-homogeneous Differential Equations
4.33 Sturm-Liouville Problem
4.34 Orthogonality of Characteristic Functions
4.35 System of Linear Differential Equations
4.36 Types of Linear Systems
4.37 Definitions and theorems on Linear Systems
4.38 Solution procedure of Homogeneous Linear Systems
4.39 Solution procedure of Non-Homogeneous Linear Systems

5. Summary

6. Model Question Answers

7. Self Assessment Questions

8. References

MTM 104 Advanced Programming in C and MATLAB (50) (6SLM)

1. Introduction

2. Objectives

3. Keywords

4. Study Materials

4.1 Programming in C

- **4.1.1 Review of basic concepts of C programming**
- **4.1.2 Arrays**
- **4.1.3 Structure and union**
- **4.1.4 Enum**
- **4.1.5 Pointers: pointers and functions, pointers and arrays, array of pointers, pointers and**
- **4.1.6 Structures**
- **4.1.7 strings and string handling functions**
- **4.1.8 Dynamic memory allocation: using of malloc(), reallc(), calloc() and free()**
- **4.1.9 File handling functions: use of fopen, fclose, fputc, fgets, fputs, fscanf, fprintf, fseek, putc, getc, putw, getw, append**
- **4.1.10 Low level programming**
- **4.1.11 C pre-processor: Directive, #define, Macro Substitution, conditional compilation, #if, #ifdef, #ifndef, #else, #endif**

4.2 Programming in MATLAB

- **4.2.1 The Matlab workspace**
- **4.2.2 Data types**
- **4.2.3 Variables**
- **4.2.4 Assignment statements**
- **4.2.5 Arrays**
- **4.2.6 Sets**
- **4.2.7 Matrices**
- **4.2.8 String**
- **4.2.9 Time, date**
- **4.2.10 Cell arrays and structures**
- **4.2.11 Introduction to M – file scripts**
- **4.2.12 Input and output functions**
- **4.2.13 Conditional control statements**
- **4.2.14 Loop control statements**
- **4.2.15 Break**
- **4.2.16 Continue**
- **4.2.17 Return statements**

5. Summary

6. Model Question Answers

7. Self Assessment Questions

8. References

MTM 105 Classical Mechanics and Non-linear Dynamics (50) (6SLM)

1. Introduction

2. Objectives

3. Keywords

4. Study Materials

4.1	**Motion of a system of particles**
4.2	**Generalized coordinates**
4.3	**Holonomic and nonholonomic system**
4.4	**Principle of virtual work**
4.5	**D'Alembart's Principle**
4.6	**Lagrange's equations**
4.7	**Plane pendulum and spherical pendulum**
4.8	**Cyclic co-ordinates**
4.9	**Coriolis force**
4.10	**Motion relative to rotating earth**
4.11	**Principle of stationary action**
4.12	**Hamilton's principle**
4.13	**Deduction of Lagrange from Hamilton's Principle**
4.14	**Brachitochrone problem**
4.15	**Lagrange's equations from Hamilton's principle**
4.16	**Invariance transformations**
4.17	**Conservation laws**
4.18	**Infinitesimal transformations**
4.19	**Space-time transformations**
4.20	**Hamilton's equations**
4.21	**Poisson bracket**
4.22	**Canonical transformations**
4.23	**Liouville's theorem**
4.24	**Small oscillation about equilibrium**
4.25	**Lagrange's method**
4.26	**Normal co-ordinates**
4.27	**Oscillations under constraint**
4.28	**Stationary character of a normal mode**
4.29	**Small oscillation about the state of steady motion**
4.30	**Normal coordinates Orientation and displacement of a rigid body**
4.31	**Eulerian angles**
4.32	**Principal axis transformation**
4.33	**Euler equations of motion**
4.34	**Motion of a free body about a fixed point**
4.35	**Special theory of relativity in Classical Mechanics**
4.36	**Lorentz transformation**

MTM 105 **Graph Theory (25)**
(3SLM)

1. Introduction

2. Objectives

3. Keywords

4. Study Materials

- **4.1 Basic graph theoretical concepts**
- **4.2 paths and cycles**
- **4.3 connectivity**
- **4.4 trees**
- **4.5 spanning sub graphs**
- **4.6 bipartite graphs**
- **4.7 Hamiltonian and Euler cycles**
- **4.8 Distance and centre**
- **4.9 Cut sets and cut vertices**
- **4.10 Colouring and matching**
- **4.11 Four colour theorem**
- **4.12 Planar graphs**
- **4.13 Dual graph**
- **4.14 Directed graphs**
- **4.15 Weighted graphs**
- **4.16 Matrix representation of graphs**
- **4.17 Algorithms for shortest path and spanning trees**
- **4.18 Intersection graph**
- **4.19 Applications of graphs in operations research.**

5. Summary

6. Model Question Answers

7. Self Assessment Questions

8. References

MTM 197 Lab.1:(Computational Methods: Using MATLAB) (25)

1. Introduction

2. Objectives

3. Keywords

4. Study Materials

4.1 Working with matrix

- **4.1.1 Generating matrix**
- **4.1.2 Concatenation**
- **4.1.3 Deleting rows and columns.**
- **4.1.4 Symmetric matrix**
- **4.1.5 Matrix multiplication**
- **4.1.6 Test the matrix for singularity**
- **4.1.7 Magic matrix.**
- **4.1.8 Matrix analysis using function: norm, normest, rank, det, trace, null, orth, rref, subspace, inv, expm, logm, sqrtm, funm.**

4.2 Array

- **4.2.1 Addition, Subtraction,**
- **4.2.2 Element-by-element multiplication**
- **4.2.3 Element-by-element division**
- **4.2.4 Element-by-element left division**
- **4.2.5 Element-by-element power**
- **4.2.6 Multidimensional Arrays**
- **4.2.7 Cell Arrays**
- **4.2.8 Characters and Text in array.**

4.3 Graph Plotting

- **4.3.1 Plotting Process**
- **4.3.2 Creating a Graph**
- **4.3.3 Graph Components,**
- **4.3.4 Figure Tools,**
- **4.3.5 Arranging Graphs Within a Figure**
- **4.3.6 Choosing a Type of Graph to Plot**
- **4.3.7 Editing Plots, Plotting**
- **4.3.8 Two Variables with Plotting Tools**
- **4.3.9 Changing the Appearance of Lines and Markers**
- **4.3.10 Adding more Data to the Graph**
- **4.3.11 Changing the Type of Graph**
- **4.3.12 Modifying the Graph Data Source,**
- **4.3.13 Annotating Graphs for Presentation**
- **4.3.14 Exporting the Graph.**

4.4 Using Basic Plotting Functions

- **4.4.1 Creating a Plot**
- **4.4.2 Plotting Multiple Data Sets in One Graph**
- **4.4.3 Specifying Line Styles and Colors**
- **4.4.4 Plotting Lines and Markers**
- **4.4.5 Graphing Imaginary and Complex Data**
- **4.4.6 Adding Plots to an Existing Graph**
- **4.4.7 Figure Windows**

SEM-II

MTM 201 **Fluid Mechanics (50)**
(6SLM)

1. Introduction

2. Objectives

3. Keywords

4. Study Materials

4.1 Viscous Flow
4.2 Real and Ideal Fluids
4.3 Types of fluid Flow: Real/Ideal Fluid Flow
4.4 Compressible/Incompressible flow, Newtonian/Non-Newtonian fluids, Rotational/irrotational
4.5 flows, Steady/Unsteady Flow, Uniform/Non uniform Flow, One, Two or Three Dimensional flow, Laminar or Turbulent Flow
4.6 Preliminaries for the derivation of governing equation: Coordinate systems: Lagrangian description and Eulerian description
4.7 Models of the flow: Finite Control Volume and Infinitesimal Fluid Element), Substantial Derivative, Source of Forces
4.8 Derivation of Governing Equations: Derivation of Continuity Equation, Derivation of Momentum Equation
4.9 Special case : Incompressible Newtonian Fluid
4.10 Physical interpretation
4.11 Derivation of Energy Equation
4.12 Boundary Layer Theory:Prandtl's Concept of Boundary Layer
4.13 Boundary Layer Flow along a Flat Plate
4.14 Governing Equations
4.15 Boundary Conditions
4.16 Exact Solution of the Boundary-Layer Equations for Plane Flows (Similarity Solution, Vorticity, Stress)
4.17 Exact/Analytical Solution of Navier-Stokes Equation
4.18 Reynolds number
4.19 Non-dimensionalization
4.20 Importance of Reynolds number to Navier-Stokes Equation
4.21 Exact Solution of Navier-Stokes Equation (Couette-Poisseuille flow, Flow of a Viscous Fluid with Free Surface on an Inclined Plate)

4.22 Incompressible Viscous Flows via Finite Difference Methods: Variable arrangement (Cell center / Collocated arrangement or Staggered Gird)

4.23 One-Dimensional Computations by Finite Difference Methods
4.24 Space discresiation (Simple and general methods based on Taylor's series for first, second, and fourth order accuracy, and hence Accuracy of the Discretisation Process)

4.25 Time discretization (Explicit Algorithm, Implicit Algorithm and Semi-implicit Algorithm)
4.26 Solution of Couette flow using FTCS and Crank-Nicolson methods

5. Summary

6. Model Question Answers

7. Self Assessment Questions

8. References

MTM 202 Numerical Analysis (50) (6SLM)

1. Introduction

2. Objectives

3. Keywords

4. Study Materials

- **4.1 Cubic spline interpolation**
- **4.2 Lagrange's bivariate interpolation**
- **4.3 Approximation of function**
- **4.4 Chebyshev polynomial**
- **4.5 Minimax property**
- **4.6 Curve fitting by least square method**
- **4.7 Use of orthogonal polynomials**
- **4.8 Economization of power series**
- **4.9 Numerical integration**
- **4.10 Newton-Cotes formulae-open type**
- **4.11 Gaussian quadrature**
- **4.12 Gauss-Legendre**
- **4.13 Gauss-Chebyshev**
- **4.14 Integration by Monte Carlo method**
- **4.15 Roots of polynomial equation**
- **4.16 Bairstow method**
- **4.17 Solution of a system of non-linear equations**
- **4.18 by fixed point method**
- **4.19 Newton-Raphson methods**
- **4.20 Convergence and rate of convergence**
- **4.21 Solution of a system of linear equations**
- **4.22 Matrix inverse**
- **4.23 LU decomposition method**
- **4.24 Solution of tri-diagonal system of equations**
- **4.25 Ill-conditioned linear systems**
- **4.26 Relaxation method**
- **4.27 Eigenvalue problem**
- **4.28 Power method**
- **4.29 Jacobi's method**
- **4.30 Solution of ordinary differential equation**
- **4.31 Runge-Kutta method to solve a system of equations and second order IVP**
- **4.32 Predictor-corrector method**
- **4.33 Milne's method**

4.34 Solution of second order boundary value problem by finite difference and finite element methods
4.35 Partial differential equation
4.36 Finite difference scheme
4.37 Parabolic equation
4.38 Crank-Nicolson method
4.39 Iteration method to solve Elliptic and hyperbolic equations

5. Summary

6. Model Question Answers

7. Self Assessment Questions

8. References

MTM 203 Unit-1: Abstract Algebra (25) (3SLM)

1. Introduction

2. Objectives

3. Keywords

4. Study Materials

4.1 Groups
4.2 Morphism of groups
4.3 Quotient groups
4.4 Fundamental theorem on homomorphism of groups
4.5 Isomorphism theorems
4.6 Automorphism
4.7 Solvable groups and theorems on them
4.8 Direct product
4.9 Conjugacy
4.10 Conjugate classes
4.11 Class equation
4.12 Theorems on finite groups
4.13 Cauchy's theorem
4.14 Sylow's theorem
4.15 Application of Sylow's theorem
4.16 Simple groups
4.17 Permutation groups
4.18 Cayley theorem
4.19 Group actions
4.20 Rings
4.21 Integral domain
4.22 Quotient rings
4.23 Morphism of rings
4.24 Isomorphism theorem
4.25 Ideals (Prime and maximal)
4.26 Euclidean domain
4.27 Principal ideal domain
4.28 Unique factorization domain
4.29 Polynomial rings

4.30 Skew fields
4.31 Fields
4.32 Field extensions
4.33 Finite, algebraic and finitely generated field extensions
4.34 Classical ruler and compass constructions
4.35 Splitting fields and normal extensions, algebraic closures
4.36 Finite fields
4.37 Cyclotomic fields
4.38 Separable and inseparable extensions

5. Summary

6. Model Question Answers

7. Self Assessment Questions

8. References

MTM 203 Unit-2: Linear Algebra (25) (3SLM)

1. Introduction

2. Objectives

3. Keywords

4. Study Materials

4.1 Review of Linear transformations
4.2 Matrix representation of Linear transformation
4.3 Linear operators
4.4 Isomorphism, Isomorphism theorems
4.5 Invertibility and change of coordinate matrix
4.6 Dual space
4.7 Minimal polynomial
4.8 Diagonlization
4.9 Canonical Forms
4.10 Triangular canonical form
4.11 Nilpotent transformations
4.12 Jordan canonical form
4.13 Rational canonical form
4.14 Inner product spaces
4.15 Hermitian transformations
4.16 Unitary transformations
4.17 Normal transformations
4.18 Spectral theorem
4.19 Bilinear forms
4.20 Symmetric and Skew-symmetric bilinear forms
4.21 Sylvester's law of inertia

5. Summary

6. Model Question Answers

7. Self Assessment Questions

8. References

C-MTM-204A Statistical and Numerical Methods (50) (6SLM)

1. Introduction

2. Objectives

3. Keywords

4. Study Materials

4.1 Statistical Methods

- **4.1.1 Mean, median, mode**
- **4.1.2 Bi-variate correlation and regression**
- **4.1.3 Properties and Significance**
- **4.1.4 Time series analysis**
- **4.1.5 Hypothesis testing: chi-square test, t-test and F-test**
- **4.1.6 ANOVA**

4.2 Numerical methods

- **4.2.1 Sources and causes of errors**
- **4.2.2 Types of errors**
- **4.2.3 Lagrange's and Newton's interpolation (deduction is not required)**
- **4.2.4 Roots of algebraic and transcendental equations**
- **4.2.5 Bisection Method**
- **4.2.6 Newton-Rapshon methods**
- **4.2.7 Rate of convergence**
- **4.2.8 Solution of system of linear equations, Cramer's rule**
- **4.2.9 Gauss-elimination method**
- **4.2.10 Integration by trapezoidal method**
- **4.2.11 Integration by Simpson 1/3 methods**
- **4.2.12 Solution of ordinary differential equation by Euler's method, Runge-Kutta method**

5. Summary

6. Model Question Answers

7. Self Assessment Questions

8. References

C-MTM-204B

History of Mathematics (50)
(6SLM)

C-MTM-205 General Theory of Continuum Mechanics (50) (6SLM)

1. Introduction

2. Objectives

3. Keywords

4. Study Materials

4.1 Stress: Body force
4.2 Surface forces
4.3 Cauchy's stress principle
4.4 Stress vector
4.5 State of stress at a point
4.6 Stress tensor
4.7 The stress vector –stress tensor relationship
4.8 Force and moment equilibrium
4.9 Stress tensor symmetry stress quadric of Cauchy
4.10 Stress transformation laws
4.11 Principal stress
4.12 Stress invariant
4.13 Stress ellipsoid
4.14 Strain
4.15 Deformation Gradients
4.16 Displacement Gradient Deformation tensor
4.17 Finite strain tensors
4.18 Small deformation theory-infinitesimal strain tensor
4.19 Linear rotation tensor
4.20 Interpretation of the linear strain tensors
4.21 Strength ratio
4.22 Finite strain interpretation
4.23 Principal strains
4.24 Strain invariant
4.25 Cubical dilatation
4.26 Compatibility equation for linear strain
4.27 Strain energy function
4.28 Hook's law
4.29 Saint –Venant's principal
4.30 Airy's strain function
4.31 Isotropic media
4.32 Elastic constrains
4.33 Moduli of elasticity of isotropic bodies and their relation
4.34 Displacement equation of motion
4.35 Waves in isotropic elastic media
4.36 Perfect fluid: Kinematics of fluid
4.37 Lagrangian method
4.38 Eulerian method
4.39 Equation of continuity
4.40 Stream lines and path lines
4.41 Irrotational motion and its physical interpretation
4.42 Velocity potential
4.43 Euler's equation of motion of an in viscid fluid
4.44 Cauchy's integral
4.45 Bernoulli's equation

C-MTM-206 General Topology (25) (3SLM)

MTM-297 Lab. 2: Language: C- Programming with Numerical Methods (25) (3SLM)

1. Introduction

2. Objectives

3. Keywords

4. Study Materials

4.1 On Searching and Sorting Problems

- **4.1.1 Linear and binary search**
- **4.1.2 Bubble sort**
- **4.1.3 Insertion**
- **4.1.4 Selection techniques**

4.2 String manipulation

- **4.2.1 No of occurrence of a letter in a given string**
- **4.2.2 Palindrome nature of string**
- **4.2.3 Rewrite the name with surname first**
- **4.2.4 Print a string in a reverse order**
- **4.2.5 String searching**
- **4.2.6 Sorting of names in alphabetic order**
- **4.2.7 Find and replace a given letter or word in a given string**
- **4.2.8 Combinations of letters of a word**
- **4.2.9 Conversion of name into abbreviation form**
- **4.2.10 Pattern matching**

4.3 On Numerical Problems

- **4.3.1 Evaluation of determinant by Gauss elimination method, using partial pivoting**
- **4.3.2 Matrix inverse by partial pivoting**
- **4.3.3 Roots of Polynomial equation**
- **4.3.4 Solution of system of linear equations by Gauss Seidal iteration method Matrix inversion method, LU decomposition method, Gauss elimination method**
- **4.3.5 Solution of Tri-diagonal equations**
- **4.3.6 Interpolation: Difference table, Lagrange, Newton forward and backward interpolation, Cubic spline interpolation**
- **4.3.7 Integration: Gauss quadrature rule, Integration by Monte Carlo method, Double integration**
- **4.3.8 Solution of ODE: Euler and Modified Euler, Runge-Kuta, Predictor and Corrector method: Milne method**
- **4.3.9 Solution of PDE by Finite difference method**
- **4.3.10 Eigen value of a matrix: Power method, Jacobi method**

4.4 Statistical Problems

- **4.4.1 On bivariate distribution: Correlation coefficient, Regression lines, Curve fitting**
- **4.4.2 Multiple regressions**
- **4.4.3 Simple hypothesis testing**

SEM-III

MTM 301 PARTIAL DIFFERENTIAL EQUATIONS AND GENERALIZED FUNCTIONS (50)

(6SLM)

MTM 302 TRANSFORMS AND INTEGRAL EQUATIONS (6SLM)

1. **Introduction**

2. **Objectives**

3. **Keywords**

4. **Study Materials**

   4.1 Fourier Transform
   4.2 Properties of Fourier transform
   4.3 Inversion formula, Convolution, arseval's relation, Multiple Fourier transform,
   4.4 Bessel's inequality,
   4.5 Application of transform to Heat, Wave and Laplace equations (Partial differential equations).
   4.6 Laplace Transform:Laplace Transform,
   4.7 Properties of Laplace transform,
   4.8 Inversion formula of Laplace transform (Bromwich formula),
   4.9 Convolution theorem,
   4.10 Application to ordinary and partial differential equations.
   4.11 Wavelet Transform:Time-frequency analysis,
   4.12 Multi-resolution analysis,
   4.13 Spline wavelets,
   4.14 Sealing function,
   4.15 Short-time Fourier transforms,
   4.16 Wavelet series,
   4.17 Orthogonal wavelets,
   4.18 Applications to signal and image processing.
   4.19 Integral Equation:Formulation of integral equations,
   4.20 Integral equations of Fredholm and Volterra type,
   4.21 Solution by successive substitutions and successive approximations,
   4.22 Resolvent Kernel Method,
   4.23 Integral equations with degenerate kernels,
   4.24 Abel's integral equation,
   4.25 Integral Equations of convolution type and their solutions by Laplace transform,
   4.26 Fredholm's theorems,
   4.27 Integral equations with symmetric kernel,
   4.28 Eigen value and Eigen function of integral equation and their simple properties,
   4.29 Fredholm alternative.

5. **Summary**

6. **Model Question Answers**

7. **Self Assessment Questions**

8. **References**

MTM 303 **Unit-1: Dynamical Oceanology and Meteorology (25)**
(3 SLM)

1. **Introduction**

2. **Objectives**

3. **Keywords**

4. **Study Materials**

   4.1 Dynamical Oceanology
   4.2 Properties of Sea Water relevant to Physical Oceanography
   4.3 Measurement of density, temperature and salinity
   4.4 Relative density
   4.5 sigma-t and specific volume
   4.6 Density and specific volume as functions of temperature, salinity and pressure
   4.7 The Basic Physical Laws used in Oceanography and Classifications of Forces and Motions in the Sea
   4.8 The Equation of Continuity of Volume
   4.9 The Equation of Motion
   4.10 The derivation of the terms in the equation of motion
   4.11 The pressure term
   4.12 Transforming from axes fixed in space to axes fixed in the rotating earth, Gravitation and gravity
   4.13 The Coriolis terms
   4.14 Dynamical Meteorology
   4.15 Composition of Atmosphere
   4.16 Basic Thermodynamics of the atmosphere
   4.17 Poisson's Equation
   4.18 Potential temperature
   4.19 Equation of state of dry air
   4.20 Hydrostatic equation
   4.21 Variation of pressure with altitude
   4.22 Hypsometric equation
   4.23 Dry adiabatic lapse rate
   4.24 Equation of moist air
   4.25 Virtual temperature
   4.26 Mixing ratio
   4.27 Specific humidity, absolute humidity and relative humidity
   4.28 Fundamental atmospheric forces
   4.29 Derivation of momentum equation of an air parcel in vector and Cartesian form
   4.30 Geostrophic wind and Gradient wind

5. **Summary**

6. **Model Question Answers**

7. **Self Assessment Questions**

8. **References**

MTM 303 **Unit-2: Operations Research (25)**

(3 SLM)

1. **Introduction**
2. **Objectives**
3. **Keywords**
4. **Study Materials**

   4.1 Inventory control: Deterministic Inventory control including price breaks and Multi-item with constraints.
   4.2 Queuing Theory: Basic Structures of queuing models
   4.3 Poisson queues –M/M/1, M/M/C for finite and infinite queue length
   4.4 Non-Poisson queue -M/G/1
   4.5 Machine-Maintenance (steady state)
   4.6 Classical optimization techniques: Single variable optimization, multivariate optimization (with no constraint, with equality constraints and with inequality constraints).

5. **Summary**
6. **Model Question Answers**
7. **Self Assessment Questions**
8. **References**

MTM 304 **Discrete Mathematics (50)**
(6 SLM)

1. **Introduction**

2. **Objectives**

3. **Keywords**

4. **Study Materials**

    - **4.1 Boolean algebra**
    - **4.2 Duality**
    - **4.3 Basic Theorems**
    - **4.4 lattice**
    - **4.5 Representation Theorem**
    - **4.6 Sum-of-product form for sets**
    - **4.7 Sum-of-products forms for Boolean Algebra**
    - **4.8 Proposional Logic**
    - **4.9 Tautology Sets**
    - **4.10 Cardinality**
    - **4.11 Mathematical Induction**
    - **4.12 Principle of Inclusion and exclusion.**
    - **4.13 Computability and Formal Languages**
    - **4.14 Ordered Sets.**
    - **4.15 Languages.**
    - **4.16 Phrase Structure Grammars.**
    - **4.17 Types of Grammars and Languages.**
    - **4.18 Finite State Machines: Equivalent Machines.**
    - **4.19 Finite State Machines as Language Recognizers.**
    - **4.20 Partial Order Relations and Lattices**
    - **4.21 Chains and Antichains**
    - **4.22 Graph Theory**
    - **4.23 Walks**
    - **4.24 Paths**
    - **4.25 connected graphs**
    - **4.26 regular and bipartite graphs**
    - **4.27 cycles and circuits.**
    - **4.28 Tree and rooted tree.**
    - **4.29 Spanning trees.**
    - **4.30 Eccentricity of a vertex radius and diameter of a graph.**
    - **4.31 Centre(s) of a tree.**
    - **4.32 Hamiltonian and Eulerian graphs**
    - **4.33 Planar graphs**
    - **4.34 Analysis of Algorithms: Time Complexity. Complexity of Problems.**
    - **4.35 Discrete Numeric Functions and Generating Functions.**

5. **Summary**

6. **Model Question Answers**

7. **Self Assessment Questions**

8. **References**

MTM 305A **Special Paper-OM: Dynamical Oceanology (50)**
(6 SLM)

1. **Introduction**

2. **Objectives**

3. **Keywords**

4. **Study Materials**

   4.1 The Role of the Non-linear Terms and the Magnitudes of Terms in the Equations of Motion
   4.2 The non-linear terms in the equation of motion,
   4.3 Reynolds Number, Reynolds stresses
   4.4 Equations for the mean or average flow
   4.5 eddy viscosity
   4.6 Scaling the equations of motion
   4.7 Rossby number
   4.8 Ekman number
   4.9 Currents without Friction (Geostrophic Flow):Hydrostatic equilibrium
   4.10 Inertial motion
   4.11 Geopotential surfaces
   4.12 Isobaric surfaces
   4.13 The geostrophic equation
   4.14 Deriving absolute velocities,
   4.15 Relations between isobaric and level surfaces
   4.16 Relations between isobaric and isopycnal surfaces and currents
   4.17 The beta spiral
   4.18 Currents with Friction (Wind-driven Circulation)
   4.19 The equation of motion with friction: included, Ekman's solution to the equation of motion with friction present
   4.20 Sverdrup's solution for the wind-driven circulation Vorticity and Circulation:Vorticity
   4.21 Kelvin’s theorem for barotropic fluid
   4.22 Vortex line and Vortex tube
   4.23 Helmholtz’s theorem
   4.24 Vorticity equation
   4.25 Physical Interpretation
   4.26 Baroclinicvorticity equation
   4.27 Vortex Motion:Circular Vortex, the circulation of circular vortex, Rectilinear Vortex, Vortex Pair, Vortex Doublet, Infinite Row of Parallel Rectilinear Vortices (Single Infi nite Row, Two rows of vortices)
   4.28 Karman Vortex

5. **Summary**

6. **Model Question Answers**

7. **Self Assessment Questions**

8. **References**

MTM 306A **Special Paper-OM: Dynamical Meteorology (50)**
(6 SLM)

1. Introduction

2. Objectives

3. Keywords

4. Study Materials

4.1 Thermodynamics of the atmosphere
4.2 Adiabatic lapse rate for moist unsaturated air
4.3 The effect of Ascent and descent on lapse rare and stability
4.4 The Clausius – Clapeyron equation
4.5 The saturated adiabatic lapse rate and stability
4.6 Saturation by Isobaric cooling
4.7 Dew point changes in adiabatic motion
4.8 Saturation by adiabatic ascent
4.9 Pseudoadiabatic change
4.10 Wet-bulb temperature
4.11 Potential temperature
4.12 Wet – bulb potential temperature
4.13 Vertical stability by Parcel method
4.14 Slice method of stability analysis
4.15 Horizontal mixing of air masses
4.16 Vertical mixing of air masses
4.17 Purpose and use of Aerological diagrams
4.18 Area Equivalence
4.19 Properties of Tephigram
4.20 Clapeyron diagram
4.21 Emagram Dynamics in Atmosphere
4.22 Equation of momentum of an air parcel in spherical coordinates, natural coordinates and isobaric coordinates.
4.23 Vertical shear of Geostrophic wind
4.24 Thermal wind equation
4.25 Vertical variation of pressure system
4.26 Atmospheric energy equation
4.27 Circulation and vorticity in the atmosphere
4.28 Equation of vorticity
4.29 Rate of change of circulation.

5. Summary

6. Model Question Answers

7. Self Assessment Questions

8.References

MTM 305 B Special Paper-OR: Advanced Optimization and Operations Research (50)
(6 SLM)

1. **Introduction**

2. **Objectives**

3. **Keywords**

4. **Study Materials**

   - **4.1 Revised simplex method(with and without artificial variable).**
   - **4.2 Modified dual simplex**
   - **4.3 Large Scale Linear Programming: Decomposition Principle of Dantzig and Wolf**
   - **4.4 Parametric and post-optimal analysis: Change in the objective function**
   - **4.5 Change in the requirement vector**
   - **4.6 Addition of a variable, Addition of a constraint**
   - **4.7 Parametric analysis of cost and requirement vector**
   - **4.8 Search Methods: Fibonacci and golden section method**
   - **4.9 Gradient Method: Method of conjugate directions for quadratic function**
   - **4.10 Steepest descent and Davodon-Fletcher-Powell method**
   - **4.11 Methods of feasible direction and cutting**
   - **4.12 hyper-plane method**
   - **4.13 Integer Programming: Gomory's cutting plane algorithm**
   - **4.14 Gomory's mixed integer problem algorithm**
   - **4.15 A branch and bound algorithm**
   - **4.16 Concept of Goal Programming**
   - **4.17 Difference between LP and GP approach**
   - **4.18 Graphical solution-method of Goal Programming**
   - **4.19 Modified simplex method of Goal Programming**
   - **4.20 Optimization for Several Variables: Algebraic approach**
   - **4.21 Algebraic geometrical approach**
   - **4.22 cost–different approach**
   - **4.23 Inequality approach**

5. **Summary**

6. **Model Question Answers**

7. **Self Assessment Questions**

8. **References**

MTM 306 B Special Paper-OR: Special Paper-OR: Operational Research Modeling -I (50) (6 SLM)

1. **Introduction**

2. **Objectives**

3. **Keywords**

4. **Study Materials**

   - **4.1 Dynamic Programming**
   - **4.2 Nature of dynamic programming**
   - **4.3 Deterministic processes**
   - **4.4 Non-Sequential discrete optimization**
   - **4.5 Allocation problems**
   - **4.6 Assortment problems**
   - **4.7 Sequential discrete optimization**
   - **4.8 Long-term planning problem**
   - **4.9 Multi-stage decision process**
   - **4.10 Application of Dynamic Programming in production scheduling and routing problems**
   - **4.11 Inventory control: Probabilistic inventory control(with and without lead time)**
   - **4.12 Dynamic inventory models. Basic concept of supply –chain management and two echelon supply chain model**
   - **4.13 Network:PERT and CPM:Basic difference between PERT and CPM, Steps of PERT/CPM Techniques, PERT/CPM Network components and precedence relationships**
   - **4.14 Critical path analysis**
   - **4.15 Probability in PERT analysis, Project Time-Cost, Trade-off, Updating of the project**
   - **4.16 Resource allocation —resource smoothing and resource leveling**
   - **4.17 Replacement and Maintenance Models: Introduction, Failure Mechanism of items**
   - **4.18 Replacement of items deteriorates with time**
   - **4.19 Replacement policy for equipments when value of money changes with constant rate during the period**
   - **4.20 Replacement of items that fail completely—individual replacement policy and group replacement policy**
   - **4.21 Other replacement problems —staffing problem, equipment renewal problem**
   - **4.22 Simulation: Introduction, Steps of simulation process, Advantages and disadvantages of simulation,Stochastic simulation and random numbers—Monte Carlo simulation, Random number, Generation, Simulation of Inventory Problems, Simulation of Queuing problems, Role of computers in Simulation, Applications of Simulations.**

5. **Summary**

6. **Model Question Answers**

7. **Self Assessment Questions**

8. **References**

SEM-IV

MTM 401 **Functional Analysis (50)**
(6SLM)

1. Introduction

2. Objectives

3. Keywords

4. Study Materials

- **4.1 Normed spaces**
- **4.2 Continuity of linear maps**
- **4.3 Bounded linear transformation**
- **4.4 Banach space**
- **4.5 Quotioent of normed linear spaces**
- **4.6 Hahn-Banach Extension theorem and Its applications**
- **4.7 Conjugate spaces, Reflexive spaces**
- **4.8 Uniform Boundedness Principle and its applications**
- **4.9 Closed Graph Theorem, Open Mapping Theorem and their applications**
- **4.10 Inner product spaces**
- **4.11 Hilbert spaces**
- **4.12 Orthonormal basis, Complete Orthonormal basis**
- **4.13 Cauchy-Schwarz inequality**
- **4.14 Parallelogram law**
- **4.15 Projection theorem**
- **4.16 Relation between IPS and NLS**
- **4.17 Bessel's inequality**
- **4.18 Parseval's identity.**
- **4.19 Strong and Weak convergence of sequence of operators**
- **4.20 Reflexivity of Hilbert space**
- **4.21 Riesz Representation theorem for bounded linear functional on a Hilbert space.**
- **4.22 Self-adjoint operator**
- **4.23 Normal, Unitary and Positive operators**
- **4.24 Related theorems**

5. Summary

6. Model Question Answers

7. Self Assessment Questions

8. References

MTM 402 **Unit-1: Fuzzy Mathematics with Applications (25)**
(3 SLM)

1. **Introduction**
2. **Objectives**
3. **Keywords**
4. **Study Materials**

    4.1 Basic concept and definition of fuzzy sets
    4.2 Standard fuzzy sets operations and its properties
    4.3 Basic terminologies
    4.4 Fuzzy relations
    4.5 Properties of α-Cut
    4.6 Zadeh's extension principle
    4.7 Interval arithmetic
    4.8 Fuzzy numbers and their representation
    4.9 Arithmetic of fuzzy numbers
    4.10 Basic concept of fuzzy matrices
    4.11 Basic concepts of fuzzy differential equations
    4.12 Linear Programming Problems with fuzzy resources
    4.13 Vendegay's approach
    4.14 Werner's approach
    4.15 L.P.P. with fuzzy resources and objective: Zimmermann's approach.
    4.16 L.P.P. with fuzzy parameters in the objective function
    4.17 Fuzzy multiobjective linear programming problems

5. **Summary**
6. **Model Question Answers**
7. **Self Assessment Question**
8. **References**

MTM 402

Unit-2: Soft Computing (25)
(3 SLM)

1. **Introduction**
2. **Objectives**
3. **Keywords**
4. **Study Materials**

    - **4.1 Introduction of soft computing**
    - **4.2 fuzzy logic**
    - **4.3 Genetic Algorithm**
    - **4.4 Neural networks**
    - **4.5 Application of fuzzy logic concepts in scientific problems**
    - **4.6 Solution of optimization problems using Genetic Algorithm**
    - **4.7 Neural Network approaches in scientific analysis**
    - **4.8 Design and diagnostic problems**

5. **Summary**
6. **Model Question Answers**
7. **Self Assessment Questions**
8. **References**

MTM 403 Unit-1: Magneto Hydro-Dynamics (25)
(3 SLM)

1. **Introduction**
2. **Objectives**
3. **Keywords**
4. **Study Materials**

    4.1 Maxwell's electromagnetic field equations when medium in motion
    4.2 Lorentz's force
    4.3 The equations of motion of a conducting fluid
    4.4 Basic equations
    4.5 Simplification of the electromagnetic field equation
    4.6 Magnetic Reynolds number
    4.7 Alfven theorem
    4.8 Magnetic body force
    4.9 Ferraro's law of isorotation
    4.10 Laminar Flow of a viscous conducting liquid between parallel walls in transverse magnetic fields
    4.11 M.H.D. Flow Past a porous flat plate without induced magnetic field
    4.12 MHD Couelte Flow under different boundary conditions
    4.13 Magneto hydro dynamics waves
    4.14 Hall currents
    4.15 MHD flow past a porous flat plate without induced magnetic field

5. **Summary**
6. **Model Question Answers**
7. **Self Assessment Questions**
8. **References**

MTM 403 Unit-2: Stochastic Process and Regression (25) (3 SLM)

1. **Introduction**
2. **Objectives**
3. **Keywords**
4. **Study Materials**

    4.1 Stochastic Process
    4.2 Markov chains with finite and countable state space
    4.3 Classification of states
    4.4 Limiting behaviour of n state transition probabilities
    4.5 Stationary distribution
    4.6 Branching process
    4.7 Random walk
    4.8 Gambler's ruin problem
    4.9 Markov processes in continuous time
    4.10 Poisson's process Partial correlation
    4.11 Multiple correlations
    4.12 Advanced theory of linear estimation.

5. **Summary**
6. **Model Question Answers**
7. **Self Assessment Questions**
8. **References**

MTM 404A Special Paper-OM: Computational Oceanology (50)
(6 SLM)

1. **Introduction**
2. **Objectives**
3. **Keywords**
4. **Study Materials**

    4.1 **Shallow water theory**
    4.2 **Quasi-Homogeneous Ocean**
    4.3 **Derivation of depth-averaged continuity equation**
    4.4 **Momentum equation and vorticity equation**
    4.5 **Potential Vorticity**
    4.6 **Derivation of potential vorticity equation**
    4.7 **Analytical Approaches: Linear waves in the absence of rotation**
    4.8 **Geostrophic adjustment**
    4.9 **Sverdrup waves**
    4.10 **Inertial waves and Poincare waves**
    4.11 **Kelvin waves at a straight coast**
    4.12 **Planetary Rossby waves**
    4.13 **Computational Approaches: One-dimensional gravity waves with centred space differencing**
    4.14 **Two-dimensional gravity waves with centred space differencing**
    4.15 **The shallow-water equations with explicit-Euler Scheme**
    4.16 **Implicit-Euler scheme**
    4.17 **Leap-frog schemes**
    4.18 **Boundary conditions (Closed boundary conditions, Open boundary conditions Cyclic boundary conditions)**
    4.19 **Finite Volume Method:Equations with First order Derivatives Only, with second order Derivatives**
    4.20 **The Finite Volume Method for Shallow Water Equations (one and two- dimensional situation)**
    4.21 **First Order Upwind (FOU) and Lax-Friedrichs Schemes for the Shallow Water Equations**
    4.22 **The Finite Volume Method for Diffusion Problems (Steady One dimensional Condition with The Upwind Scheme, Unsteady One-Dimensional Condition, Two-And Three-Dimensional Situations)**
    4.23 **Convection and Diffusion Problems (one and two dimensional situation).**

5. **Summary**
6. **Model Question Answers**
7. **Self Assessment Questions**
8. **References**

MTM 405A Special Paper-OM: Dynamical Meteorology –II (25)
(3 SLM)

1. **Introduction**
2. **Objectives**
3. **Keywords**
4. **Study Materials**

    4.1 Surface of discontinuity
    4.2 Slope of frontal surface
    4.3 Pressure distribution near fronts
    4.4 Pressure tendency below frontal surface
    4.5 Condition for frontogenesis and frontolysis in a deformation field
    4.6 Geostrophic front
    4.7 Global Circulation
    4.8 Meridionaltemperature gradient
    4.9 Jet stream
    4.10 Rossby waves
    4.11 Perturbation method
    4.12 Gravity waves
    4.13 Hurricane
    4.14 Storm Surge
    4.15 Numerical Weather Prediction
    4.16 Grid points
    4.17 Finite difference equations
    4.18 Forecasting of potential temperature

5. **Summary**
6. **Model Question Answers**
7. **Self Assessment Questions**
8. **References**

MTM 495A Special Paper-OM: Lab. Dynamical Meteorology (25) (3 SLM)

1. **Introduction**
2. **Objectives**
3. **Keywords**
4. **Study Materials**

4.1 Problems on Meteorology:

4.1.1 Surface temperature, pressure, humidity, Wind speed and direction measurements.

4.1.2 Rainfall and rain measurements.

4.1.3 TD charts-analysis.

4.1.4 T- diagram :

4.1.4.1 Geopotential height by isotherm / adiabatic method.

4.1.4.2 To find dry bulb and wet bulb temperature, potential, virtual, equivalent potential, dew point temperatures and mixing ratio.

4.1.5 Numerical method and computer techniques related to Meterological problems, Handling and analysis of Meteorological data.

4.2 Field work (5-marks) (compulsory): Students should go to one of the University/Institute/Organization laboratory to understand experimental set-ups in advance meteorology (such as Annular experiment for existence of general circulation and Rossby wave, experiment for demonstrating Helmholtz instability, Aerosol measurements, Facsimile recorder for receiving weather charts etc.)

5.Summary

6.Model Question Answers

7.Self Assessment Questions

8.References

MTM 404B Special Paper-OR: Nonlinear Optimization (50) (6SLM)

1. **Introduction**
2. **Objectives**
3. **Keywords**
4. **Study Materials**

    4.1 Optimization: The nature of optimization and scope of the theory
    4.2 The optimality criterion of Linear programming
    4.3 An application of Farka's theorem
    4.4 Existence theorem for linear systems
    4.5 Theorems of the alternatives
    4.6 Slater's theorem of alternatives
    4.7 Motzkin theorem of alternatives
    4.8 Optimality in the absence of differentiability and constraint qualification
    4.9 Karlin's qualification
    4.10 Kuhn-Tucker's saddle point necessary optimality theorem
    4.11 Fritz-John saddle point optimality theorem
    4.12 Optimality criterion with differentiability and Convexity
    4.13 Kuhn-Tucker's sufficient optimality theorem
    4.14 Fritz-John stationary point optimality theorem
    4.15 Duality in non-linear programming
    4.16 Weak duality theorem
    4.17 Wolfe's duality theorem
    4.18 Duality for quadratic programming
    4.19 Quadratic Programming: Wolfe's modified simplex method
    4.20 Beale's method
    4.21 Convex programming.
    4.22 Stochastic Programming: Chance constraint programming technique
    4.23 Geometric programming (both unconstrained and constrained) with positive and negative degree of difficulty
    4.24 Games: Preliminary concept of continuous game
    4.25 Bi-matrix games
    4.26 Nash equilibrium
    4.27 Solution of bi-matrix games through quadratic programming (relation with nonlinear programming)
    4.28 Multi-objective Non-linear Programming: Introductory concept and solution procedure

9. **Summary**
10. **Model Question Answers**
11. **Self Assessment Questions**
12. **References**

MTM 405B Special Paper- OR: Operational Research Modelling-II (25) (3 SLM)

1. **Introduction**
2. **Objectives**
3. **Keywords**
4. **Study Materials**

    - **4.1 Optimal Control, Performance indices**
    - **4.2 Methods of calculus of variations**
        - **4.2.1 Transversally Conditions**
        - **4.2.2 Simple optimal problems of mechanics**
        - **4.2.3 Pontryagin's principle (with proof assuming smooth condition)**
        - **4.2.4 Bang–bang Controls**
    - **4.3 Reliability: Concept**
    - **4.4 Reliability: System Reliability, System Failure rate, Reliability of the Systems connected in Series or / and parallel**
    - **4.5 MTBF, MTTF, optimization using reliability**
    - **4.6 reliability and quality control comparison**
    - **4.7 reduction of life cycle with reliability**
    - **4.8 maintainability, availability**
    - **4.9 Effect of age, stress, and mission time on reliability**
    - **4.10 Information Theory: Introduction**
    - **4.11 Communication Processes— memory less channel, the channel matrix**
    - **4.12 Probability relation in a channel, noiseless channel.**
    - **4.13 A Measure of information**
    - **4.14 Properties of Entropy function**
    - **4.15 Measure of information quantities: marginal, joint entropies, conditional entropies, expected mutual information**
    - **4.16 Axiom for an Entropy function**
    - **4.17 properties of Entropy function**
    - **4.18 Channel capacity**
    - **4.19 Efficiency and redundancy**
    - **4.20 Objectives of Encoding**
    - **4.21 Shannon-Fano Encoding Procedure**
    - **4.22 Necessary and sufficient Condition for Noiseless Encoding**

5. **Summary**
6. **Model Question Answers**
7. **Self Assessment Questions**
8. **References**

MTM 495B Special Paper-OR: Lab. (OR methods using MATLAB and LINGO) (25) (3SLM)

1. **Introduction**
2. **Objectives**
3. **Keywords**
4. **Study Materials**

4.1 Problems on Advanced Optimization and Operations Research are to be solved by using MATLAB and LINGO

- **4.1.1 Problems on LPP by Simplex Method**
- **4.1.2 Problems on LPP by Revised Simplex Method**
- **4.1.3 Problems on Stochastic Programming**
- **4.1.4 Problems on Geometric Programming**
- **4.1.5 Problems on Bi-matrix Games**
- **4.1.6 Problems on Queuing Theory**
- **4.1.7 Problems on QPP by Wolfe's Modified Method**
- **4.1.8 Problems on IPP by Gomory's Cutting Plane Method**
- **4.1.9 Problems on Inventory**
- **4.1.10 Problems on Monte Carlo Simulation Technique**
- **4.1.11 Problems on Dynamic Programming**
- **4.1.12 Problems on Reliability**

4.2 Field Work

Application for Optimization problems in real-life problem by visiting any Industry/University/Reputed Institution to understand the practical use of the optimization and making Lab Note Book on the experience gathered during the visit.

9. **Summary**
10. **Model Question Answers**
11. **Self Assessment Questions**
12. **References**

MTM 406 Dissertation Project Work (50)

1. **Introduction**
2. **Objectives**
3. **Keywords**
4. **Study Materials**

   4.1 Dissertation Project

5. **Summary**

6. **Self Assessment Questions**

7. **References**

VIDYASAGAR UNIVERSITY

DIRECTORATE OF DISTANCE
EDUCATION
MIDNAPORE-721102

Structure of SLMs for
M.Sc. in Physics

SEMESTER-I

Course No: PHS 101.1: Methods of Mathematical Physics

SLM: 1

1. Relevance of the Unit
2. Objectives
3. Introduction
4. Vector Space
5. Vector Subspace
6. Linear Span of a Set
6.1 Linear Dependence and Independence
7. Basis and Dimension
8. Inner Product Space
9. Orthogonal and Orthonormal Set of Vectors
9.1 Gram-Schmidt Process of Orthogonalisation
10. Hermitian and Unitary Matrices
11. Characteristic Equation
11.1 Eigenvalues and Eigenvectors
11.2 Some Results on Eigenvalues and Eigenvectors
12. Diagonalisation of Matrices
13. Unit Summary
14. Glossary
15. Self Assessment Questions
16. References

SLM:2

1. Relevance of the Unit
2. Objectives
3. Introduction
4. Complex Variable
4.1 Limits and continuity
4.2 Cauchy-Riemann equations
4.3 Complex integration
4.4 Cauchy's integral formula
4.5 Singularities of function of a complex variable
4.6 Taylor's theorem
4.7 Laurent's theorem

4.8 Residue theorem
4.9 Cauchy principal value of an integral
5. Special Functions
5.1 Gamma, Beta and Error functions
5.2 Regular and irregular singularities
6. Unit Summary
7. Glossary
8. Self Assessment Questions
9. References

Course No: PHS 101.2: Classical Mechanics

SLM: 3

1. Relevance of the Unit
2. Objectives
3. Introduction
    4.1 Single particle mechanics: basic conservation laws
    4.2 Rigid body dynamics: Constraints
    4.3Virtual displacement; Virtual work
        4.3.1 Principle of virtual work
        4.3.2 D'Alembert's principle
5.1 Lagrange's equation of motion from D'Alemberts's principle:
5.2 Rayleigh's dissipation function
5.3 Lagrangian in the rotating frame
6. Hamiltonian formulation
7. Lagrangian of a charged particle in an electromagnetic field
8. Lagrangian for light rays
9. Canonical or contact transformation
9.1 Integral invariant of Poincare: Lagrange bracket
9.2 Properties of Lagrange's bracket
9.3 Poisson Brackets
    9.3.1 Properties of Poisson brackets
9.4 Fundamental Poisson bracket
    9.4.1 Canonical invariance of Poisson bracket
10 Summary
11 Self assessment questions
12 References

SLM:4

1. Relevance of the Unit
2. Objectives
3. Introduction
4.1 Hamiltonian formulation
4.1.1 Cyclic coordinates and conservation theorem
4.2 Hamilton's principle
4.2.1 Hamilton's Equations from Variational Principle
4.2.2 The principle of least action
5.1 Hamilton-Jacobi method
5.1.1 Hamilton-Jacobi partial differential equation
5.1.2 Solution of Hamilton-Jacobi equation
5.1.3 Proof of Jacobi's theorem:
5.2 Hamilton's principal function
6. Small oscillations
6.1 One dimensional oscillator
7. Systems with many degrees of freedom: The Eigenvalue equation and Normal Coordinates
7.1 Molecular Vibration
8.1 Solution of harmonic oscillator problem by Hamilton-Jacobi method
8.2 Motion of a particle falling freely under gravity:
8.3 Hamilton-Jacobi equation for Hamilton's characteristic function
8.3.1 Physical significance of W (Hamilton's characteristic function)
8.3.2 Type of canonical transformation generated by W
8.4 Hamilton-Jacobi equation from Schrõdinger equation
9. Action-Angle Variables
9.1 Solution of harmonic oscillator problem by action angle variable method
10. Summary
11. Self assessment questions
12. References

Course No: PHS 102.1: Quantum Mechanics-I

SLM: 5

1. Relevance of the Unit
2. Objectives
3. Introduction
4. **Recapitulation of:**

4.1 Chronological evolution of quantum mechanics
4.2 Wave particle dualism
4.3 Uncertainty principle,

4.4 Wave packets in space and time

5. Formalism of Quantum Mechanics:

5.1 Development of the wave equation and the Schrodinger wave equation

5.2 Statistical interpretation of the wave function

5.3 Probability density and probability current density

5.4 Expectation values

5.5Ehrenfest's theorem,

5.6 Stationary states,

5.7 One dimensional square well potential

6. Some bound state problems:

6.1 Linear harmonic oscillator,

6.2 Spherically symmetric potential

6.3 The Hydrogen atom

7. Summary

8. Self-assessment questions

9. References

SLM: 6

1. Relevance of the Unit

2. Objectives

3. Introduction

4.1 Operators and operator algebra

4.2 Eigen functions and eigen values

4.3 Dirac bra-kets

4.4 Hilbert space of state vectors minimum uncertainty product

4.5 Coordinate and momentum representation

4.6Unitary transformations

5. Schrodinger, Heisenberg and interaction pictures

6. Matrix theory of harmonic oscillator

6.1 Symmetry and Conservation laws

6.2 Space and time displacement

6.3Angular momentum matrices

6.4 Addition of angular momentum

6.5 ClebshGordon coefficients

6.6 Spin matrices and eigenfunctions

7. Summary

8. Self-assessment questions

9. References

Course No: PHS 102.2: Solid State-1

SLM: 7

1. Relevance of the Unit
2. Objectives
3. Introduction
4. Basis of crystal structure
    4.1 Crystal symmetry operations
    4.2 Three dimensional Bravais lattice types
    4.3 Single crystal, polycrystal and amorphous materials
    4.4 Lattice Planes, Miller indices of lattice planes

5.1 X-ray diffraction and reciprocal lattice
5.1.1 Bragg theory of X-ray diffraction
5.1.2 Reciprocal lattice
5.1.3 Understanding the concepts of reciprocal lattice
5.1.4 Advantage of X-ray diffraction
6.1 Scattering of X-ray by a crystal
6.1.1 Derivation of scattering from an atom
6.1.2 Scattering from a crystal
6.1.3 Diffraction condition and Bragg's law in vector form
6.1.4 Laue equations
6.1.5 Geometrical structure factor
6.1.6 Structure factor calculation
6.1.7 X-ray powder diffraction (Debye-Scherrer) method
6.1.8 Brillouin Zone
7. Summary
8. Glossary
9. Self assessment questions
10. References / Bibliography

SLM:8

1. Relevance of the Unit

2. Objectives
3. Introduction
4. Simple Harmonic Oscillator

4.4.1 Vibration of Monatomic Lattice
4.4.2 One-dimensional diatomic lattice (Two atoms per unit cell)
4.4.3 Equivalence of vibrational mode and simple harmonic oscillator, Phonons
4.4.4 Anarmonicity and Thermal expansion

4.5 Introduction
4.6 Physical origin of energy gap
4.7 The Bloch Function

5. Essential features of Kronig-Penny model

5.1 Kronig-Penny model, extended, reduced and periodic zone schemes
5.2 The motion of electrons in one dimension according to the band theory
5.3 The effective mass of an electron

6. The distinction between metals, insulators and intrinsic semiconductors
7. Summary
8. Glossary
9. Self assessment questions
10. References / Bibliography

Course No: PHS 103.1: Electrodynamics

SLM:9

1. Relevance of the Unit
2. Objective
3. Introduction

4.1 Radiation emitted by excited atoms and ions
4.2 Bremsstrahlung losses
4.3 Cyclotron or betatron emission
4.4 Recombination radiation
4.5 Black body radiation

5. Phase space

5.1 Single-particle phase space
5.2 Many-particle phase space
5.3 Volume elements

6. Distribution function
7. The Boltzmann equation

7.1 Collisionless Boltzmann equation
7.2 Collisional Boltzmann equation
7.3 Conservation of particles

7.4 Conservation of mass
7.5 Conservation of charges
8. The Vlasov equation
9. Summary
10. Glossary
11. Self assessment questions
12. References / Bibliography

SLM:10

1. Relevance of the Unit
2. Objective
3. Introduction
4. Cherenkov radiation
4.1 Derivation of Cherenkov radiation
4.2 Classical theory of Cherenkov radiation
4.3 Basic Concepts about Scattering and Scattering Parameters
4.3.1 Differential scattering cross section
4.3.2. Total scattering cross section
5. Theory of Scattering of Electromagnetic Waves
5.1 Scattering by a free electron (Thomson scattering)
5.2 Resonant scattering
5.3 Rayleigh scattering (scattering by a bound electron)
5.3.1 Blue colour of the sky
5.3.2 Red colour of sunset or sunrise
5.3.3 Use of red light for danger signals
5.4 Polarization of Scattered Light
5.4.1 When the incident radiation is plane polarized
5.4.2 When incident wave is unpolarised
5.5 Coherence and Incoherence of Scattered Light
5.6 Dispersion and Absorption
5.6.1 Cauchy's empirical equation
5.6.2 Hartmann's empirical formula
5.6.3 Sellmeier’s formula
5.7 Elementary theory of dispersion
5.8 Dispersion in Gases (Lorentz Theory)
5.9 Experimental demonstration of anomalous dispersion
5.10 Dispersion in Liquids and Solids
5.11 Kramers-Kronig dispersion relations
6. Summary
7. Glossary

8. Self-Assessment Questions
9. References

Course No: PHS 103.2: Materials: Preparation and Characterization

SLM:11

1. Relevance of the Unit
2. Objective

3. Introduction

4. Various methods of crystal Growth

4.1 Growth from the solution

4.2 Growth from melt

5. Preparation of Polycrystalline and Amorphous Materials

5.1 Solid State technique

5.2 Sol-Gel technique

5.3 Co-precipitation Method

5.4 Mechanical milling or Ball milling technique

5.5 Melting at high temperature

5.6 Glass and Glass Transition

5.7 Thick film preparation

6. Synthesis of low dimensional Materials

6.1 Lithography

6.2 Plasma Arc Discharge

6.3 Thermal evaporation method

6.4 e-beam evaporation technique

6.5 Thin films preparation (Poly-crystalline & Amorphous)

6.6 Sputtering

6.7 Chemical Vapour Deposition

6.8 Pulsed Laser Deposition

6.9 Molecular Beam Epitaxy

6.10 Electrodeposition

7. X-ray Diffraction (XRD)

8. X-ray photoelectron spectroscopy (XPS)

9. Introduction to Microscopy

9.1 Optical Microscopy

9.2 Electron Microscopy

9.2.1 Transmission Electron Microscopy

9.2.2 Scanning Electron Microscopy

9.3 Energy Dispersive Analysis of X-ray (EDAX)

9.4 Scanning Probe Microscopy

9.4.1 Scanning Tunneling Microscopy
9.4.2 Atomic Force Microscopy

10. Introduction to thermal analysis
10.1 Differential Scanning Calorimetry (DSC)
10.2 Thermogravimetric Analysis (TGA)
10.3 Differential Thermal Analysis (DTA)

11. Neutron Scattering and Neutron diffraction, NMR

12. Summary
13. Glossary
14. Self-Assessment Questions
15. References

SLM: 12

1. Relevance of the Unit
2. Objective
3. Introduction

4.Different Optical Measurements:
4.1 UV-VIS-NIR Spectrophotometer
4.2 Photoluminescence (PL)
4.3 Fourier Transform Infra-red Spectroscopy
4.4 Raman Spectroscopy

5. Conduction Mechanisms in 2D (thin films) and low dimensional systems

5.1 Arrhenius type Thermally Activated Conduction
5.2 Variable Range Hopping Conduction
5.3 Polaron Conduction

6. Concept of Vacuum Technology

6.1 Production and measurements of low pressure
6.2 Pirani gauge
6.3 Ionization vacuum gauge
6.4 Cold-cathode ionization/Penning vacuum gauges
6.5 RotaryVacuum Pump
6.6 (Oil) Diffusion pump
6.7 Turbo-molecular pump
6.8 Sputter-ion pump
6.9 Cryopumps

7. Sensor and Transducer Materials:

8. Summary
9. Glossary
10. Self-Assessment Questions
11. References

Course No: PHS 104.1: Analog Electronics-I

SLM: 13

1. Relevance of the Unit
2. Objectives
3. Subject Matters
4. **Elements of Operational Amplifier**

4.1 Introduction
4.2 Characteristics of an op-amp
4.3 Common mode rejection ratio (CMRR)
4.4 Emitter coupled difference amplifier
4.4.1 AC analysis of ECDA
4.5 Constant current source
4.6 Widlar current mirror
4.7 Current mirror with moderate beta valued BJTs
4.8 Constant current sources as active load
4.9 Some details of input stage of 741 op-amp with active load
4.10 Internal architecture of a typical op-amp
4.11 Characteristics and typical parameters of an operational amplifier

5. **Elements of Communication**

5.1 Introduction
5.2 Mathematical representation of conventional AM wave
5.3 Principle of frequency modulation (FM)
5.4 Frequency spectrum of FM wave
5.5 Transmission Bandwidth of FM Signal
5.6 Narrowband Frequency Modulated (NBFM) Signal
5.7 Generation of DSB-TC AM signal
5.8 Generation of DSB-SC AM signal
5.9 Generation of SSB-TC AM signal
5.10 Generation of SSB-SC AM signal: phase method
5.11. Detection of transmitted carrier AM signals
5.11.1 Envelope detection scheme
5.12 Detection of DSB-SC signal
5.13 Detection of SSB-SC signal
5.14 NBFM Generation using Balanced Modulator
5.15 Direct Method of FM Generation
5.16 FM Detection using limiter-discriminator

6. **Practical Communication System respectively**

6.1 Introduction
6.2 Product modulator
6.3 Bias modulated Class C amplifier modulator
6.4 AM modulator used in practical broadcast transmitter
6.5 Frequency standard for practical AM radio system
6.6 Super-heterodyne receiver principle
6.6.1 Image signal
6.7 General principle of FM modulator/ demodulator design
6.8 FM Radio Broadcasting
6.9 Stereo FM transmitter
6.10 Vestigial side band (VSB) AM signal
6.11 Quadrature Amplitude Modulation

7. Elements of antenna

7.1 Introduction
7. 2 Concept of Retarded Vector Potential
7.3 Thin wire antennas
7.3.1. Infinitesimal dipole or Hertzian dipoles
7.3.2. Half-wavelength dipole:
7.4. Two element array of infinitesimal dipoles
7.5. Linear N elements array

8. Radio wave propagation through free space

8.1 Introduction and Modes of propagation
8.2 Surface waves
8.3 Space wave or troposphere wave
8.4 Sky wave or ionosphere wave
8.5 Reflection and refraction from ionosphere
8.5.1 Effective permittivity of the ionospheric
8.5.2 Plasma frequency and critical frequency
8.5.3 Secant law
8.5.4 Maximum usable frequency (MUF)
8.5.5 Skip distance
8.6 Duct propagation
8.7 Fading

9. Summary
10. Glossary
11. Self assessment questions
12. References

SLM:14

1. Relevance of the Unit
2. Objectives
3. Introduction
4. **Elements of RADAR**
   - 4.1 Introduction
   - 4.2 Structure of a pulsed RADAR system
   - 4.2.1 High power oscillator
   - 4.3 Modulator
   - 4.4 Duplexer
   - 4.5 RADAR antenna
   - 4.6 RADAR Indicator
   - 4.7 RADAR range equation
   - 4.8 CW RADAR
   - 4.8.1 FM Radar
   - 4.9 MTI Radar
5. **Device characteristics and application of JFET and MOSFET**
   - 5.1 Introduction to MOSFET
   - 5.1.1 Enhancement MOSFET
   - 5.1.2 Depletion MOSFET
   - 5.2 Volt-ampere characteristics of MOSFET
   - 5.2.1 Drain characteristics of enhancement MOSFET
   - 5.2.2 Drain characteristics of depletion MOSFET
   - 5.2.3 I_D-V_{GS} characteristics of MOSFET
   - 5.3 FET amplifiers
   - 5.3.1 Biasing circuits for JFET amplifiers
   - 5.3.2 DC bias point of a given JFET amplifier
   - 5.4 Small signal ac analysis of JFET amplifier
   - 5.4.1 g_m-model and JFET parameters
   - 5.5 Different configurations of JFET amplifier
   - 5.5.1 Common source (CS) amplifier with bypassed source resistor
   - 5.5.2 Common source amplifier in presence of source resistor
   - 5.5.3 Common drain amplifier
   - 5.5.4 Common gate amplifier
   - 5.6 Enhancement type MOSFET (E-MOSFET) amplifiers
6. **Elements of Transducers and Sensors**
   - 6.1 Introduction
   - 6.2 Photo electric transducer
   - 6.3 Thermistor
   - 6.4 Photo emissive transducer
   - 6.5 Photo conductive transducer

6.6 Photo diode
6.7 Photo transistors
7. Summary
8. Glossary
9. Self assessment questions
10. References

Course No: PHS 104.2: Digital Electronics-I

SLM:15

1. Relevance of the Unit
2. Objectives
3. Introduction
4. logic gates
5. Boolean algebra
6. Standard representation of Boolean function.
   6.1 Sum of Product form
   6.2 Product of Sum form
   7.0 Conversion of Boolean Function in logic circuit diagram
   7.1. Karnaugh Map.
   7.1.1 K- Map in SOP form
   7.1.2 POS form
   8. Flip-flop
   8.1 Clocked SR flip flop
   8.1.1 Preset and Clear
   8.1.2 J-K Flip flop
   8.1.3 Race around condition
   8.1.4 Master Slave (M-S) flip flop
   8.1.5 D and T flip flop
   9.0 Registers
   9.1 Serial in Serial out register
   9.2 Serial in Parallel out register
   9.3 Parallel in Serial out register
   9.4 Parallel in parallel out register
   9.5 Bidirectional Shift register
   9.6 Universal register
   10. Summary
   11. Glossary
   12. Questions

13. Reference

SLM:16

1. Relevance of the Unit
2. Objectives
3. Introduction
4. Counter
    - 4.1 Ripple Counter
    - 4.2 Synchronous counter
    - 4.2.1 Design of MOD-8 counter
    - 4.2.3 UP/Down counter
    - 4.3 Ring Counter

5. Multivibrators
    - 5.1 MonostableMultivibrator
    - 5.2 BistableMultivibrator
    - 5.3 AstableMultivibrator

6. 555 Timer
    - 6.1 Duty Cycle
    - 7. Digital Display
    - 8. Summary
    - 9. Glossary
    - 10. Questions
    - 8.0 References

SEMESTER- II

Course No: PHS 201.1: Quantum Mechanics-II

SLM-17

1. Relevance of the Unit
2. Objectives
3.Introduction
4. Schrodinger, Heisenberg and interaction pictures
5. Matrix theory of harmonic oscillator

4.1. Symmetry and Conservation laws

4.2. Space and time displacement

4.3. Angular momentum matrices

4.4. Addition of angular momentum

4.5. Clebsh Gordon coefficients

4.6. Spin matrices and eigen functions

6. Approximation methods for bound states:

5.1. Stationary perturbation theory- non degenerate and degenerate cases

5.2. Stark effect

5.3. Zeeman effect

5.4. Variation method

5.5. Ground state of Helium atom

5.6. WKB approximation

7. Summary
8. Glossary
9. Exercises
10. References

SLM-18

1. Relevance of the Unit
2. Objectives

3. Introduction
4. Klein-Gordon equation
4.1 Klein-Gordon equation of a free particle
4.2 Solution of KG Equation
4.3 A spin zero particle in EM field
4.4 A spin zero particle in Coulomb field and fine structure
5. Dirac's equation
4.1.Dirac's equation for free particle
4.2.Dirac equation covariant form
4.3.Spin of Dirac particle
4.4.Solution of the Dirac's equation for free particle
4.5.Dirac equation in EM field
4.6.Spin orbit interaction in the Dirac equation
4.7.Dirac equation in Coulomb field
6. Summary
7. Glossary
8. Exercises
9. References

Course No: PHS 201.2: Methods of Mathematical Physics - II

SLM-19

1. Relevance of the Unit
2. Objectives
3. Introduction
4. Partial Differential Equation

3.1 Classification of PDEs
3.2 Boundary conditions
3.3 Solution of the firstt order PDE Pp + Qq = R (Lagrange's method)
3.4 Method of solution of PDEs
3.5 Green's function

5. Integral Transforms

4.1.Fourier series

4.2. Fourier transform

4.3. Dirac delta function and it's FT

4.4. Laplace transform and inverse Laplace transform

4.5. Solution of differential equation using FT and LT

6. Unit Summary
7. Glossary
8. Self Assessment Questions
9. References

SLM-20

1. Relevance of the Unit
2. Objectives
3. Introduction
4. Theory of Group

4.1. Definitions and terminologies

4.2. Cosets, classes and invariant subgroup

4.3. Isomorphism and homomorphism

4.4. Conjugate subgroup

4.5. Representation of groups

4.6. Character of a representation

4.7. Some applications of group theory in quantum mechanics

5. Integral Equations

5.1.Fredholm and volterra equations of the first and second kinds.

5.2.Fredholm's theory for non-singular kernel.

6. Unit Summary
7. Glossary
8. Self Assessment Questions
9. References

Course No: PHS 202.1: Solid State II

SLM-21

1. Relevance of the Unit
2. Objectives
3. Introduction
4. Superconductivity
5. Basic phenomenology
6. Thermodynamics of Superconducting transition
7. Resistance less circuit
8. Consequence of zero resistance
9. Meissner effect
10. Type I and II superconductors
11. Magnetic Levitation
12. London equation
13. Quantum Mechanical Current
14. Supercurrent Equation
15. Two-Fluid Model
16. Josephson Tunneling
17. D. C. Josephson Tunneling & A. C. Josephson Tunneling
18. Application of super conductivity
19. Summary
20. Glossary
21. Self assessment questions
22. References

SLM-22

1. Relevance of the Unit
2. Objectives
3. Introduction
4. Subject Matters
5. Dielectrics

6. Review of Dielectric in DC
7. Local field in liquids and Solids
8. Clausius-Mosotti Relation
9. Complex dielectric constant and dielectric losses
10. dielectric losses and relaxation time
11. Summary
12. Glossary
13. Self assessment questions
14. References

Course No: PHS 202.2: Semiconductor Physics

SLM-23

1. Relevance of the Unit
2. Objectives
3. Introduction

3.1 Introduction

3.2 Methods used to develop a *p-n* junction

3.3 *p-n* junction in equilibrium

3.3.1 Einstien Relation

3.3.2 Expression for Barrier potential

3.4 Diffusion length

3.5 Diode equation

3.6 Junction capacitance

3.6.1 Depletion capacitance

3.6.1.1 Abrupt junction

3.6.1.2 Linearly graded junction

3.6.2 Diffusion capacitance

3.7 Metal Semiconductor Junction

3.7.1 Schotky contact

3.7.2 Ohmic contact

4. Summary
5. Glossary
6. Self assessment questions
7. References

SLM-24

1 Relevance of the Unit
2 Objectives
3 Introduction
4 Equilibrium & Non-equilibrium carriers
5 Photoconductivity and related devices
6 Multilayer Structure
7 Laser diode
8 Recombination via trap
9 Solar cell
10 Summary
11 Glossary
12 Self assessment questions
13 References

Course No: PHS 203.1: Analog Electronics-II

SLM-25

1 Relevance of the Unit
2 Objectives
3 Introduction
4 Network analysis
5 Network theorems

6 Equivalent circuits

7 Two-port parameters hybrid parameters

8 Driving point impedance and admittance

9 Foster's reactance theorems

10 Properties of poles and zeros of reactance function

11 Topological descriptions of different commonly used networks

12 π to T and T to π conversions

13 Reduction of a complicated network into its equivalent T and π form

14 Filter Circuit

15 L filter

16 π filter

17 Iterative impedance

18 Image impedance of a network

19 Symmetrical network

20 Characteristic impedance and propagation constant of a network

21 Methods of development of different constant-k filters like high pass

22 Low pass

23 Band pass and band stop filter circuits

24 Transmission lines

25 Line parameters

26 Characteristic impedance and propagation constant of a transmission line,

27 Voltage and current equations of transmission line

28 telegraphers' equations and their complete solutions

29 Attenuation constant,

30 Phase constant,

31 Line of finite length behaving as a line of infinite length

32 Reflection co-efficient in a line

33 Velocity of signal in a line

34 Voltage standing wave ratio

35 Input impedance of lossless line

36 Line at radio frequency

37 Origin of distortions in a transmission line

38 Distortion less line

39 Cable fault location telephone cable

40 Summary

41 Glossary

42 Self assessment questions

43 References

SLM-26

1 Relevance of the Unit

2 Objectives

3 Introduction

4 Thyristors

5 SCR

6 Triac

7 Diac

8 Characteristics parameters

9 Thyristor rectifier & control circuits

10 DC Power control by SCR and AC power control by Triac

11 Transducer & sensors

12 Photo-transducer

13 Thermistor

14 Photo-electric transducer

15 Photo-conductors

16 Photo diodes

17 Photo-transistors

18 Summary

19 Glossary

20 Self assessment questions

21 References

Course No: PHS 203.2: Digital electronics-II

SLM-27

1 Relevance of the Unit
2 Objectives
3 Introduction
4 Combinational circuits
5 MUX
6 DeMUX
7 Encoder
8 Decoder
9 4 bit comparator
10 A to D and D to A Conversion
11 The ALU
12 ALU organization, Integer representation
13 Serial and Parallel Adders
14 1's and 2's complement arithmetic
15 Multiplication of signed binary numbers
16 Floating point representation
17 Overflow detection
18 Status flags
19 Memory Unit
20 Construction of memory
21 Expansion of memory
22 Memory classification
23 Bipolar and MOS storage cells
24 Organization of RAM
25 Address decoding

26 Registers and stack,

27 ROM, PROM,

28 EPROM,

29 EEPROM,

30 SRAM,

31 DRAM

32 FPLA.

33 Organization and erasing schemes,

34 Magnetic memories,

35 Optical Memories,

36 Semiconductor Memories.

37 Summary

38 Glossary

39 Self assessment questions

40 References

SLM-28

1 Relevance of the Unit

2 Objectives

3 Introduction

4 Review of 8085 Microprocessor,

5 Internal structure,

6 Different register system,

7 organization and assembly language.

8 Instructions of 8085 Microprocessor,

9 Microprocessor Programming.

10 Basic ideas of Digital Communication

11 Sampling theorem,

12 Pulse amplitude modulation,

13 Quantization,

14 Pulse Coded Communication System.

15 Summary

16 Glossary

17 Self assessment questions

18 References

Course No: C-PHS 204: Concepts of Physics: Inventions and applications (CBCS)

SLM-29

1 Relevance of the Unit

2 Objectives

3 Introduction

4. Important Developments of Physical Science before 20thcentury:
    i. Archimedes'principle,
    Inertia: Galileo Galilee,
    ii. Laws of motion and law of gravity:
    iii. Newton, Planetary motion:
    iv. Kepler's Law
    v. Concept of Classical Mechanics,
    vi. Wave theory of light:
    vii. Young, Atomic theory of matter:
    viii. Dalton, Discovery of electron
5. Progress of Physics in 20thcentury:
    i. Introduction,
    ii. Photoelectric effect: Einstein,
    iii. Discovery of the atomic nucleus:
    iv. Rutherford, Concept of Quantum Mechanics,

v. Radioactivity,
Introduction to electronics and devices,
vi. Electromagnetic induction, induction oven.

6. Physics of Nature:
   i. Bluesky,
   ii. Scattering of light,
   iii. Colour of Sun,
   iv. Rainbow,
   v. Halo,
   Refraction and reflection of light,
   vi. Mirage
7. Summary
8. Glossary
9. Self assessment questions
10. References

SLM-30

1 Relevance of the Unit
2 Objectives
3 Introduction
4 Electrical conductivity,
5 perfect conductivity,
6 super conductivity,
7 meissner effect,
8 magnetic levitation
9 Electromagnetic wave,
10 Basic idea about the generation of electromagnetic spectrum from radio frequency to y-ray,
11 Microwave oven
12 Crystal and amorphous,
13 Nano materials,
14 Glass materials

15 Summary

16 Glossary

17 Self assessment questions

18 References

SLM-31

1 Relevance of the Unit

2 Objectives

3 Introduction

4 Development of different light sources:

5 Incandescent bulb,

6 Vapour lamp,

7 Arc Lamp,

8 Fluorescence Lamp (Tube light, CFL),

9 Light Emitting Diode (LED),

10 LASER,

11 basic idea on different level laser system,

12 Field emission.

13 Basic idea about: Optical fiber,

14 photo-detector,

15 Holography,

16 Non-linear Optics.

17 Summary

18 Glossary

19 Self assessment questions

20 References

SLM-32

1 Relevance of the Unit

2 Objectives

3 Introduction

4. Medical Instrumentation:
    i. X-ray,
    ii. Ultrasonography(USG),
    iii. Magneto Resonance Imaging(MRI),
    iv. Photodynamical Therapy (PDT).
5. Working principle of Optical camera,
6. Transistor radio,
7. AM and FM radio,
8. Digital Camera,
9. Mobile,
10. Fan,
11. electric generator,
12. Refrigerator.
13. Summary
14. Glossary
15. Self assessment questions
16. References

SEMESTER-III

Course No: PHS 301.1: Quantum Mechanics-III

SLM: 33

1. Relevance of the Unit:
2. Objectives:
3. Introduction:

3.1. System of identical particles
3.2. Permutation symmetry
3.3. Symmetric and anti-symmetric wave function
3.4. Pauli exclusion principle
3.5. Spin functions for two and three electron atoms
3.6. Heliumatom (ground state and first excited state)
4.1. Atoms, Molecules: Central field approximation
4.2. Hartree and Hartree-Fock approximation, Koopman's theorem
4.3. Thomas-Fermi statistical model
4.4. LS coupling,
4.5.JJ coupling,
4.6.Hund's rule, spectral terms
4.7. Zeeman effect (weak field, strong field, quadratic).
4.8. Molecules, Classification of energy levels, rotation and vibration of diatomic molecules
4.9. Hydrogen molecule

5. Summary
6. Glossary
7. Exercises
8. References

SLM: 34

1. Relevance of the Unit:
2. Objectives:
3. Introduction:
4. Time dependent perturbation
5. Ionization of a Hydrogen atom
6. Sudden approximation
7. Fermi's golden rule, transition probabilities,
8. Harmonic perturbations
9. Semi-classical treatment of radiation

10. Intensity ratio of transitions in alkali atoms
11. Quantum theory of scattering -cross sections
12. Scattering Amplitude
13. Partial wave analysis , phase shifts , optical theorem
14. Schrodinger's equation as an integral equation, Green's function
15. Lippman Schwinger equation
16. Born's approximation
17. Coulomb scattering.
18. Summary:
19. Glossary:
20. Exercises:
21. References:

Course No: PHS 301.2: Statistical Mechanics -1

SLM 35

1. Relevance of the Unit:
2. Objectives:
3. Introduction:
4. Recapitulation: Connection between statistical mechanics and thermodynamics
5. Macroscopic and microscopic states, classical ideal gas, micro casnonical ensamble, Canonical ensamble
6. Gibbs paradox
7. Elements of ensamble theory: Phase space and density function, Liouville‟s theorem
8. Mean-square fluctuation of an observable, energy fluctuation in the canonical ensamblecorrespondence with the micro canonical ensamble
9. A system of harmonicoscillator, thermodynamics of magnetic systems: negative temperature problems
10. Summary:
11. Glossary:
12. Exercises:
13. References:

SLM 36

1. Relevance of the Unit:
2. Objectives:
3. Introduction:

4. Quantum mechanical ensamble theory: Postulates of Quantum Statiatical mechanics
5. Density matrix
6. Statistics of various ensambles Ideal gas in Quantum mechanical miro canonical ensamble
7. Determination of entropy in Boltzman Gas, Bose gas, Fermi gas, Ideal gas in other quantum mechanical ensambles
8. Summary
9. Glossary
10. Exercises
11. References

Course No: PHS 302.1: Molecular Spectroscopy & Laser Physics

SLM 37

1. Relevance of the unit
2. Objectives
3. Introduction
4.1. Microwave Spectroscopy
4.1.1. Classification of molecules
4.1.2. Rotational Spectra
4.2. Diatomic molecular rotational spectroscopy of rigid and non-rigid diatomic molecules
4.2.1. The rigid diatomic molecule
4.2.1.1. The intensities of Spectral lines
4.2.1.2. The effect of Isotopic substitutions
4.2.2. The Non-Rigid Rotator
4.2.2.1 The spectrum of non-rigid rotator
5. Polyatomic Molecules
5.1. Linear Molecules:
5.2. Symmetric Top Molecule
6. The Stark Effect
7. Summary
8. Glossary
9. Self assessment questions
10. References

SLM 38

1. Relevance of the unit
2. Objectives
3. Introduction to Infra-Red Spectroscopy

3.1 The Vibrating Diatomic Molecule

- 3.1.1 The energy of a diatomic molecule
- 3.1.2 The Simple Harmonic Oscillator
- 3.1.3 The Anharmonic Oscillator
- 3.1.4 The Diatomic Vibrating-Rotator

4. Visible and ultraviolet spectroscopy:
   - 4.1 Molecular electronic spectroscopy
   - 4.2 Frank Condon principle
   - 4.3 Molecular electronic vibrational-rotational spectroscopy
   - 4.4 Fortrat diagram
5. The Einstein coefficients of absorption and emission
6. Theory of amplification of light
7. Production of laser
   - 7.1 Laser resonator
   - 7.2 Active and Passive laser resonator
   - 7.3 Population Inversion
   - 7.4 Threshold condition
   - 7.5 Quality Factor
8. Classifications of Lasers
   - 8.1Laser rate equations
   - 8.2 Two level laser
   - 8.3 Three level laser
   - 8.4 Four level laser
9. Some Laser systems
   - 9.1 Ruby lasers
   - 9.2 He – Ne laser
   - 9.3 CO_2 laser
   - 9.4 Dye laser (tunable laser)
   - 9.5 Q-Switching
   - 9.6 Mode locking in lasers
   - 9.7 Applications of laser
10. Summary
11. Glossary
12. Self assessment questions
13. References

Course No: PHS 302.2: Nuclear Physics-I

SLM 39

1. Relevance of the Unit:
2. Objectives:
3. Introduction:
4. General Properties of Nuclei
    - 4.1 Double Focusing Mass Spectrometer
        - 4.1.1 Dempter's double focusing mass spectrograph
        - 4.1.2 Bainbridge and Jordon mass Spectrograph
        - 4.1.3 Mattauch-Herzog mass spectrograph
        - 4.1.4 Johnson and Nier mass spectrograph
    - 4.2 Nuclear Spin
    - 4.3 Determination of Nuclear magnetic moment using Rabi method
    - 4.4 Nuclear Shape – Electric Quadrupole moment
    - 4.5 Parity of Nuclei
    - 4.6 Statistics of Nuclei
5. Stable Nuclides
    - 5.1 Constituents of nuclei
    - 5.2 Isotopes, Isobars, Isotones Isomers and mirror nuclei
    - 5.3 The odd even classification of nuclei
    - 5.4 Nuclear mass and Binding Energy
    - 5.5 The mass parabola for isobars
4. Summary
5. Glossary
6. Self-assessment questions
7. References

SLM 40

1. Relevance of the Unit:
2. Objectives:
3. Introduction:
4. Alpha Decay
    - i. Identification of a – particles by Spectroscopic Method
    - ii. Determination of Velocity of a – particles
    - iii. Range of the a – particles
    - iv. Range-Energy relationship for a – particles
    - v. Geiger-Nuttall Law
    - vi. Gamow theory of a – decay
5. Beta Decay
    - i. Determination of the ß energy
    - ii. Origin of Continuous ß spectrum

iii. Neutrino hypothesis of Pauli
iv. Fermi's theory of ß decay
v. Kurie plot
vi. Simple idea of Parity violation in ß decay

6. Gamma Rays
   i. Origin of the γ – rays
   ii. The modes of gamma transitions
   iii. γ – rays spectrum
   iv. Determination of γ – ray Energy
   v. Internal Conversions
   vi. Nuclear Isomerism
   vii. Gamma ray spectroscopy
   viii. γ – rays absorption in matter
7. Summary
8. Glossary
9. Self-assessment questions
10. References

Course No: PHS 303A: Solid State Physics -I

SLM 41

1. Relevance of the Unit
2. Objectives
3. Introduction
4. Band theory of solid
   i. Empty Lattice Approximation
   ii. Nearly free electron model
   iii. Tight binding approximation
   iv. Effective mass approximation method
5. Optical Properties
   i. Transverse plasma frequency
   ii. propagation of electromagnetic wave in a material
6. Longitudnial plasma frequency &plasmon
7. Electrostatic screening
8. Thomas Fermi dielectric function
9. Motts metal to insulator transition
10. Polariton& LST relation
    i. Polaron
    ii. Exciton

iii. Raman effect in crystal
11. KramersKronigreleation
12. Summary
13. Glossary
14. Self assessment questions
15. References

SLM 42

1. Relevance of the Unit
2. Objectives
3. Introduction
4. Subject Matters
5. Defect studies
   i. Luminescence
   ii. Colour center
   iii. Point defects in solid
   iv. Line defect
   v. Plane defect
6. Diffusion in an ioniccrystal
7. Ionic conductivity
8. Types of bonding
9. Quantization of orbit in a magnetic field
10. De Haas Van Alphen Effect
11. Magnetic breakdown
12. Boltzman transport equation
    i. electrical conductivity of a metal
13. Dielectrics in AC
14. Ferroelectric
    i. Characteristics of ferroelectric
    ii. Classification of ferroelectric
15. Polarization catastrophe
16. Origin of ferroelectricity
17. Landaus theory of ferroelectric transition.
18. Summary
19. Glossary
20. Self assessment questions
21. References

Course No: PHS 303B: Applied Electronics-I

SLM 43

1. Relevance of the Unit:
2. Objectives:
3. Introduction:
4. OP- AMP Circuit & applications:

4.1 Bridge amplifier.
4.2 Instrumentation amplifiers.
4.3 Logarithmic amplifiers and anti-log amplifier.
4.4 Analog multiplier.
4.5 Summing integrator.
4.6 Chopper modulator and chopper stabilized amplifier.
4.7 Pulse width modulator
4.8 Regenerative comparators and their uses
4.9 Pulse generator
4.10 Ramp generator
4.11 Square and triangular wave generator

5. Crystal oscillator.

5.1.Voltage controlled oscillator (VCO),

6. Active filters
   6.1. Butterworth characteristics,
   6.2. First, second and higher order low pass and high pass active filters;
   6.3. Band pass and band stop active filters.
7. Voltage regulators
8. Series Op-amp regulator, IC regulator, precision current and voltage sources, Switching Regulators
9. Summary
10. Glossary
11. Exercises
12. References

SLM 44

1. Relevance of the Unit:
2. Objectives:
3. Introduction:
4. Phase Lock Loop (PLL) & applications:

4.1 PLL operational characteristics and parameters.

4.2 Frequency multiplication, tracking.
4.3 FM demodulation.
4.4 Order of PLL.

5. Detectors: Peak detectors, zero-crossing detectors, phase-sensitive detectors.
6. Summary:
7. Glossary:
8. Exercises:
9. References:

PHS 303B.2: Applied Digital Electronics-I

SLM 45

1. Relevance of the Unit:
2. Objectives:
3. Introduction
4. Unit Structure:
5. Digital Logic Families:
   i. Introduction
   ii. Types of Logic Families
   iii. Positive logic and negative logic
   iv. Performance parameters
   v. Advantages and disadvantages
6. Different memory systems:
   i. Memory organization and addressing
   ii. Sequential memory
   iii. Static and dynamic memories
   iv. Shift Registers
   v. Read Only Memory (ROM)
      a. Development
      b. Types
   vi. Random Access Memories
      i. Overview
      ii. Types: RAM, MRAM, RRAM
   vii. Programmable Array Logic (PAL)
   viii. Field Programmable Logic Array (FPLA)
   ix. Charge Coupled Device (CCD)
7. Summary
8. Glossary
9. Self assessment questions

10. References

SLM 46

1.Relevance of the Unit:
2. Objectives:
3. Introduction
4. Unit Structure :
5. Multiplexers, Encoders, Decoders and Code conversions:
   a. Revision of different types of multiplexers
   b. Encoders
   c. Decoders
   d. Code conversions
      i. BCD to Binary Converter
      ii. Binary to BCD Converter
6. Specialised Communication Systems:
   a) Mobile Communication
      i. Principle
      ii. Cellular System Architecture
         1. Cell
         2. Cluster
         3. Cell Splitting
         4. Frequency reuse
         5. Handoff
         6. Cellular Communication Standards
         7. Pagers
7. Computer Communication:
   i. Overview
   ii. Types of networks
   iii. Circuit message and packet switched networks
   iv. Features of network design
   v. ARPANET
   vi. LAN
   vii. ISDN
8. Medium Access Techniques:
   i. Overview
   ii. TDMA
   iii. FDMA
   iv. Slotted ALOHA

v. CSMA/CD
9. Basics of protocol
10. Summary
11. Glossary
12. Self assessment questions
13. References

Course No: C-PHS 304: Introductory Astrophysics (CBCS)

SLM 47

1. Relevance of the Unit:
2. Objectives:
3. Introduction
4. Our Planet, our Universe :
   a. Our motion in the Universe:
   b. The night sky,
   c. basic concepts in astronomy such as distances
      constellations and the celestial sphere
   d. Dwarf planets
   e. Asteroids, Comets & Meteorites
   f. Formation of our solar system
   g. Sun-Moon-Earth configurations that result in Moon phases
      Solar and Lunar eclipses
   h. Rotation of Earth : Lattice and Longitude
5. Summary
6. Glossary
7. Self assessment questions
8. References

SLM 48

1. Relevance of the Unit:
2. Objectives:
3. Introduction
4. Light as a tool to probe the Universe.
5. Properties of light.
6. The wave particle nature of light.
7. Atoms and spectroscopy.
8. The thermal spectrum.

9. Stellar classification:
    i. Hertz sprung-Russell diagram.
    ii. Composition of a star's outer layers and its surface temperature
    iii. The Inverse square law.
    iv. Telescopes to learn about astrophysical phenomena.
10. Summary
11. Glossary
12. Self assessment questions
13. References

SLM 49

1. Relevance of the Unit:
2. Objectives:
3. Introduction
4. The Sun :
    i. Basic parameters of Sun
    ii. Origin of solar energy
    iii. Nuclear fusion
    iv. Solar cycle
    v. Solar activity
    vi. Solar wind
    vii. Solar missions
    viii. Main-Sequence lifetime
5. Evolution of Stars:
    i. Post-main-sequence evolution of a Sun-like star
    ii. Planetary nebulae
    iii. White dwarfs
    iv. Neutron Stars
    v. Difference between stars
    vi. Brown dwarfs and giant planets
    vii. Supernova explosions
    viii. Neutron stars and black holes
    ix. Color-magnitude diagrams
    x. Binary star systems
6. Summary
7. Glossary
8. Self assessment questions
9. References

SLM 50

1. Relevance of the Unit:
2. Objectives:
3. Introduction
4. Galaxy and Cosmos :
   i. Populations of stars and star clusters
   ii. Galaxy types and the formation and interaction of galaxies
   iii. The Milky Way
   iv. Active galactic nuclei
   v. The rotation of our galaxy
   vi. Dark matter
   vii. The expansion of the Universe and the Big Bang Theory.
5. Summary
6. Glossary
7. Self assessment questions
8. References

SEMESTER- IV

Course no: PHS 401.1: Particle Physics

SLM 51

1. Relevance of the Unit
2. Objectives
3. Introduction
4. Fundamental Interactions
   i. Range and Time Scale of Fundamental Interaction
   ii. Strength of Fundamental Interaction

5. Classification of elementary particles
   i. Iso-spin
   ii. Standard Model of particle physics

6. Quark Model and S – I3 Diagram

Summary
Glossary
Self-assessment questions
References

SLM 52

1. Relevance of the Unit
2. Objectives
3. Introduction

4.Discrete Symmetry
   i. Parity (P)
   ii. Charge Conjugation (C) Symmetry
   iii. G-Parity
   iv. Time Reversal
   v. CPT Theorem

5.Relativistic Collisions
6.Quark Level Diagram for QED and QCD
Summary
Glossary
Self-assessment questions
References

Course No: PHS 401.2: Statistical Mechanics-II

SLM 53

Relevance of the Unit
Objectives
Introduction
1. Ideal Bose system: Thermodynamicalbehaviour, BE condensation, blackbody radiation
2. Ideal Fermi System: Thermodynamicalbehaviour; Magnetic behaviour of an ideal Fermi gas:
3. Pauli paramagnetism
   i. Landau diamagnetism
   ii. DeHaas-van Alphen affect
   iii. electron gas in metal
   iv. thermo ionic emission, photoelectric emission

Summary
Glossary
Self-assessment questions
References

SLM 54

1. Relevance of the Unit
2. Objectives
3. Introduction
4. Theory of phase transition : Theory of Yang and Lee ,
5. Ising model (one and Two dimensional)
6. Summary
7. Glossary
8. Self-assessment questions
9. References

Course No: PHS 402.1: Nuclear Physics-II

SLM 55

Relevance of the Unit
Objectives
Introduction
1. Nuclear Interactions and Reactions
   i. Nucleon- Nucleon Interaction
   ii. Exchange Forces and Tensor Forces

iii. The deuteron - Square Well Potential
iv. Neutron – proton and proton - proton scattering at low energies
v. Classifications of Nuclear reactions
vi. Conservations Laws and Reaction Channels
vii. The mass and Energy Balance in Nuclear Reactions
viii. Direct and Compound Nuclear Reaction Mechanisms
ix. Compound Nuclear Model
x. Basic Ideas on Continuum Theory
xi. Nuclear Resonance

2. Nuclear Models
   i. Liquid Drop Model
   ii. Bohr- Wheeler Theory of Fission
   iii. Experimental Evidence for Shell Effect
   iv. Shell Model: Infinite Square well potential, Spin- Orbit Coupling
   v. Angular Momenta and Parity of Nuclear Ground State
   vi. Collective Model

Summary
Glossary
Self-assessment questions
References

SLM 56

Relevance of the Unit
Objectives
Introduction
1.0 Neutron Physics
1.1 Discovery of Neutron
1.2 Properties of Neutron
1.3 Classification of Neutron According to Energy
1.4 Sources of Neutrons
1.5 Thermal Neutrons
1.6 Neutron Velocity Selection Using Time of Flight Methods
1.7 Elements of Neutron Optics
2.0 Reactor Physics
2.1 Discovery of Nuclear Fission
2.2 Energy Release in Fission
2.3 Nuclear Reactor: Types of Reactor, Reactor Theory, Reactor Materials
2.4 Moderator and Moderating ratio
2.5 Reactor Controls: Effect of Delayed Neutrons
2.6 Research and Development of Rectors

2.7 Nuclear Reactor Programme in India
2.8 Biological and Other Effects of Nuclear Radiations
3.0 High Energy Physics
3.1 Fundamental Interactions: Relative Strength, Range, Characteristics Time and Mediator
3.2 Classification of elementary particles
3.3 Conservation Laws
3.4 Parity, Time Reversal and CPT Theorem
3.5 Quark Model
3.6 The Standard Model
Summary
Glossary
Self-assessment questions
References

Course No: PHS 402.2: Quantum Field Theory

SLM 57

Relevance of the Unit
Objectives
Introduction

1. Elements of field theory
2. Symmetries and Noether's theorem
3. Canonical Quantization
   Creation-Annihilation operators
4. Quantization of Klien-Gordan field
5. Dirac field
   quantization of electromagnetic field
6. Discrete symmetries of the Dirac theory

Summary
Glossary
Self-assessment questions
References

SLM 58

Relevance of the Unit
Objectives
Introduction

1. Interacting fields - Perturbation theory
2. Wick's theorem
3. Feynman diagrams
4. Cross sections and S-matrix.
5. Non-perturbative methods - Field and Mass renormalization
   LSZ reduction formula
6. Renormalized charge and Ward Identities.
7. Brief idea on Gauge theory
8. Weak and strong interactions
9. brief discussion on Weinberg - Salem model
10. Grand unified theories

Summary
Glossary
Self-assessment questions
References

Course No: PHS 403.1: Semiconductor Devices

SLM 59

Relevance of the Unit
Objectives
Introduction
Subject Matters

1. Transistor
2. FET
3. MOSFET
4. Tunnel Diode
5. Gunn effect oscillator
6. Single Electron Transistor
7. Boltzman transport equation
   i. For non degenerate semiconductor
   ii. Electrical conductivity
8. Hall effect
   i. Thermoelectric effect in semiconductor
   ii. Quantum Hall effect

Summary
Glossary
Self assessment questions
References

SLM 60

Relevance of the Unit
Objectives
Introduction
Subject Matters
1. Phototransistors
2. UJT
3. Four- layer pnpn device
4. Diac
5. Triac

Summary
Glossary
Self assessment questions
References

Course No: PHS 403.2: Applied Optics

SLM 61

Relevance of the Unit
Objectives
Introduction

A. Fibre Optics
    1. Relevance of the unit
    2. Objectives
    3. Introduction
    4. Different types (single and multimode) of step index and graded index optical fibre
    5. Ray path in graded index optical fibre
    6. Multipath broadening
    7. Modal Analysis of Electromagnetic waves in planer waveguide
    8. Application of fibre in digital communication
    9. Summary
    10. Theoretical questions
    11. Numerical
B. Holography
    1. Relevance of the unit
    2. Objectives
    3. Introduction

4. Coherent light and application of coherent light in holography
5. Recording and reconstruction of wave front

Summary
Glossary
Self-assessment questions
References

SLM 62

Relevance of the unit
Objectives

1. Introduction
2. Non-linearity of medium
3. Second and higher harmonic generation
4. Phase matching condition
5. Frequency addition and frequency subtraction
6. Self-focussing and defocussing
7. Pokels& Kerr type nonlinear materials
8. Examples of organic and inorganic non-linear materials
9. Summary
10. Glossary
11. Self assessment questions
12. References

Course No: PHS 404A: Solid State Physics - II

SLM 63

Relevance of the Unit
Objectives
Introduction

1. Magnetism

- **i.** Quantum theory of diamagnetism
- **ii.** Quantum theory of paramagnetism
- **iii.** Transition
- **iv.** Rare-earth elements
- **v.** Ferromagnetic
- **vi.** anti-ferromagnetic
- **vii.** Ferri-magnetic order
- **viii.** Molecular fields
- **ix.** Direct and indirect exchange interaction

2. Heisenberg and Ising model
3. Domain theory
4. Bloch wall
5. spin waves
6. magnons
7. Magnetic resonance
    i. NMR
    ii. EPR
    iii. ESR

Summary
Glossary
Self assessment questions
References

SLM 64

Relevance of the Unit
Objectives
Introduction
Subject Matters

1. Superconductivity
    - Review of experimental results
    - London-Pippard theory
    - coherence length
    - electron-phonon interaction
2. Cooper pair
3. BCS Theory
    - Transition temperature
4. Ginzburg Landau theory
    - Flux quantization
    - Critical current density
5. SQUID
6. Superconducting devices
7. Advances on high Tc superconductors

Summary
Glossary
Self assessment questions
References

Course No: PHS 404B: Applied Electronics –II

PHS 404B.1: Applied Analog Electronics –II

SLM 65

Relevance of the Unit
Objectives
Introduction

1. Television:
   - 1.1 Working principle.
   - 1.2 TV camera- Image Orthicon.
   - 1.3 Vidicon, Plumbicon.
   - 1.4 Picture tube- B/W and Colour.
   - 1.5 Scanning and deflection, synchronization.
   - 1.6 Details of composite video signal, Transmitting and Receiving systems, Vestigial Side band transmission.
   - 1.7 Television standards, Advantages of Negative modulation.
   - 1.8 TV antenna, BW TV receiver.
   - 1.9 Colour TV standards: NTSC, PAL SECAM, colour television principles. Colour subcarrier, transmission format of intensity and colour signal.
   - 2. Summary
   - 3. Glossary
   - 4. Self assessment questions
   - 5. References

SLM 66

Relevance of the Unit
Objectives
Introduction

1. Wave Guides :

1.1 Wave guides coaxial, rectangular and cylindrical; Different modes of propagation of em signal through wave guides.

1.2 Resonators.

2. Instrumentations:

2.1 Digital voltmeter: different types, Digital ammeter and ohmmeters.

2.2 Ultrasonic techniques and instrumentations.

Summary
Glossary

Self assessment questions
References

PHS 404B.1: Applied Digital Electronics –II

SLM 67

- Objectives:
- Introduction
- Unit Structure :

1. Specialised Communication Systems:
    1.1: Mobile Communication
        1.1.1: Principle
        1.1.2: Cellular System Architecture
            1.1.2.1: Cell
            1.1.2.2: Cluster
            1.1.2.3: Cell Splitting
            1.1.2.4: Frequency reuse
            1.1.2.5: Handoff
        1.1.3: Cellular Communication Standards
        1.1.4: Pagers
    1.2. Computer Communication:
        1.2.1: Overview
        1.2.2: Types of networks
        1.2.3: Circuit message and packet switched networks
        1.2.4: Features of network design
        1.2.5: ARPANET
        1.2.6: LAN
        1.2.7: ISDN
    1.3. Medium Access Techniques:
        1.3.1: Overview
        1.3.2: TDMA
        1.3.3: FDMA
        1.3.4: Slotted ALOHA
        1.3.5: CSMA/CD
    1.4: Basics of protocol
2. Signal Processing and data conversion:
        2.1: Basic concept
        2.2: Signal sampling

2.3: Aliasing effect
2.4: Sample and hold systems
2.5: Anti-aliasing filter
2.6: Analog multiplexer
2.7: Basic idea of digital image processing
2.8: Successive approximation A/D converter

3. Pulse modulation and demodulation techniques:
3.1: Overview
3.2: Sampling theorem
3.3: Pulse amplitude modulation and demodulation
3.4: Pulse width modulation and demodulation
3.5: Pulse position modulation and demodulation
3.6: Pulse code modulation
3.6.1: Coding technique
3.6.2: Modulation
3.6.3: Demodulation
3.7: Differential pulse-code modulation
3.8: Delta Modulation

- Summary
- Glossary
- Self assessment questions
- References

SLM 68

- Relevance of the Unit:
- Objectives:
- Introduction
- Unit Structure:

1: Digital modulation techniques :
1.1: Overview
1.2: Principle, Modulation and Demodulation:
1.2.1: Amplitude Shift Keying (ASK)
1.2.2: Frequency Shift Keying (FSK)
1.2.3: Phase Shift Keying (PSK)
1.2.4: Differential Phase Shift Keying (DPSK)
1.2.5: Quadrature Phase Shift Keying (QPSK)
1.2.6: Minimum Shift Keying (MSK)
2: Microprocessor and their applications:
2.1: Intel 8085/8085A microprocessor:

SEMESTER- I **M.Sc. in Zoology**

Paper-ZOO101
(Non-Chordate & Chordates)

Group A. Non-Chordate
SLM-1

Title of the Unit 1: Origin and Evolution of Metazoa: Phylogenetic Overview of Major Phyla

Structure of the Content

Title of the Unit 2: Comparative account about different larval forms of coelomate non-chordates

Structure of the Content

Title of the Unit 3: Biology of free living nematodes-feeding mechanisms and role of nematodes in ecosystem

Structure of the content

Title of the Unit 4: Bryozoa - anatomical peculiarities, feeding mechanisms and phylogenetic relationships

Structure of the Content

Paper-ZOO101
SLM-2

Title of the Unit 5: Rotifera 5: General organization, Mastax, Reproduction and Cyclomorphosis

Structure of the Content

Title of the Unit 6: Foraminifera-Characteristics, origin, distribution, biology and ecological role of foraminifera

Structure of the Content

Title of the Unit 7: Conservation strategies of invertebrate diversity, importance and threats; alternative approaches to species focused conservation; conservation status evaluation for invertebrate species

Structure of Content

Paper-ZOO101
Group B. Chordates
SLM-3

Title of the Unit 1: Origins of Chordates
Structure of the Content

Title of the Unit 2: Proto chordates: Structure of endostyle and Iodine binding capacity
Structure of the Content

Title of the Unit 6: Echolocation
Structure of the Content

Paper-ZOO101

SLM-4

Title of the Unit 3: Fish Taxonomy, RespirationSystem, Excretion and Osmoregulation

Structure of the Content

Paper-ZOO102
(Histochemistry & Animal Physiology)

Group A. Histochemistry
SLM-5

Title of the Unit 1: Introduction to Microtechnique, Chemistry of Fixation, Dye and Staining (Topic 1-4)

Structure of the Content

Paper-ZOO102

SLM-6

Title of the Unit 5: Enzyme Histochemistry-acid phosphatase and alkaline phosphatase

Structure of Content

Title of the Unit 6: Immunohistochemistry- Fluorescence markers, ABC and colloidal gold Method

Structure of the Content

Paper-ZOO102
Group B. Animal Physiology
SLM-7

Title of the Unit-1a: Blood Circulation and Respiration

Structure of the content

Paper-ZOO102

SLM-8

Title of the Unit 2: Cardiovascular System, Thermoregulation, Stress physiology (Topic 1b,2,3)

Structure of the Content

Paper-ZOO103
(Immunology & Methods in Biology)

Group A. Immunology
SLM-9

Title of the Unit 1: Cells and organs involved in Immune System, Antigenicity and Immunogenicity, Structure and Function of Immunoglobulin (Ig) and its Isotype, Compliment system Applied Immunology (Topic 1,2,5,6)

Structure of the Content

Paper-ZOO103

SLM-10

Title of the Unit 3: Origin and maturation of T and B lymphocyte, Antigen Processing and presentation (Topic 3, 4)

Structure of the Content

Paper-ZOO103
Group B. Methods in Biology
SLM-11

Title of the Unit 1: Molecular Biotechnology
Structure of the Content

Paper-ZOO103

SLM-12

Title of the Unit 2: Environmental Biotechnology

Structure of the Content

Paper-ZOO103

SLM-13

Title of the Unit 3: Techniques and Bioinstrumentation

Structure of the content

Paper-ZOO104
(Cell Biology & Cytogenetics)

Group A. Cell Biology
SLM-14

Title of the Unit 1: Biomembrane Structure

Structure of the Content

Title of the Unit 2: Transmembrane Transport of Ions and Small Molecules

Structure of the Content

Title of the Unit 3: Moving Proteins into Membranes and Organelles

Structure of the Content

Title of the Unit7: Interactions between cells and their environment

Structure of the Content

Paper-ZOO104

SLM-15

Title of the Unit 4: Signal Transduction

Structure of the Content

Title of the Unit 5 : Cytoskeleton & Cellular Motility

Structure of the Content

Title of the Unit 6: Cell cycle & its regulation

Structure of the Content

Paper-ZOO104
Group B. Cytogenetics
SLM-16

Title of the Unit 1: Genetic Fine Structure

Structure of the content

Paper-ZOO104

SLM-17

Title of the Unit 2: Recombination in Bacteria, Tumor Inducing Virus and Viral Oncogenes, Genetic Structure of Population (Topic 2,3,4)

Structure of the Content

SEMESTER- II

Paper-ZOO201
(Biosystematics & Ecological Principles)

Group A. Biosystematics
SLM-18

Title of the Unit 1: Microtaxonomy, Macrotaxonomy, Concept of species, Newer systematic (Topic 1,2,3,4)

Structure of the content

Paper-ZOO201

SLM-19

Title of the Unit 5: Molecular systematics, Macromolecular and micromolecular systematics, Role of systematics in applied biology, Systematics and public health management (Topic 5-8)

Structure of the Content

Paper-ZOO201

Group B. Ecological principles
SLM-20

Title of the Unit 1: Basics of Ecology, Population Ecology (Topic 1,2)
Structure of the Content

Paper-ZOO201
SLM-21

Title of the Unit 3: Community & Ecosystem

Structure of the content

Title of the Unit 4: Habitat Ecology

Structure of the Content

Title of the Unit 5: Evolutionary Ecology

Structure of the Content

Paper ZOO 202
(Biophysics & Biochemistry)

Group A. Biophysics
SLM-22

Title of the Unit 1: Biophysical Principles, Thermodynamics, Colloidal system (Topic 1,2,3)

Structure of the Content

Paper ZOO 202
SLM-23

Title of the Unit 4: Microscopy in biology and medicine, Biophysics of membrane, Dynamics of circulation (topic 4,5,6)

Structure of the Content

Paper ZOO 202
Group B. Biochemistry
SLM-24

Title of the Unit 1: Stabilizing interactions
Structure of the content

Title of the Unit 2: Protein conformation
Structure of the content

Title of the Unit 3: Enzymes

Structure of the content

Title of the Unit 4: Biological oxidation
Structure of the content

Paper ZOO 202
SLM-25

Title of the Unit 5: Lipid Metabolism
Structure of the Content

Title of the Unit 6: Protein Metabolism

Structure of the Content

Title of the Unit 7: Carbohydrate Metabolism

Structure of the Content

Paper ZOO 203
(Molecular Biology & Parasitology)

Group A. Molecular Biology
SLM-26

Title of the Unit 1: DNA Replication

Structure of the Content

Paper ZOO 203
SLM-27

Title of the Unit 2: The Transcription Process, Protein Synthesis (Topic 2-3)

Structure of the Content

Title of the Unit 4: Gene Regulation in Prokaryotes: Concept of Operon

Structure of the Content

Paper ZOO 203
Group B. Parasitology
SLM-28

Title of the Unit 1: Concept of Parasitism, Symbiosis, Phoresis, Commensalism and Mutualism, Epidemiology and transmission of parasitic diseases, Zoonosis and Zoonotic diseases, Structure and composition of helminthes outer structure (1,4,5,6)

Structure of the content

Paper ZOO 203

SLM-29

Title of the Unit 2: Molecular, Cellular and Physiological basis of Host Parasite Interactions,Life Cycle of *Plasmodium and Trypanosoma,*Vector Biology with special reference to mosquito, sand-fly and ticks (Topic 2,3,7)

Structure of the content

Paper C-ZOO-204 (CBCS)

(Wildlife and Eco management & Aqua Informatics)

Group A: Wildlife and Eco management

SLM-30

Title of the Unit 1: Wildlife Diversity and Conservation

Structure of the content

Paper C-ZOO-204 (CBCS)
SLM-31

Title of the Unit 2: Wild life management
Structure of the content

Paper C-ZOO-204 (CBCS)
GroupB: Aqua Informatics
SLM-32

Title of the Unit 1: Database development, Climate change (Topic 1, 2)

Structure of the content

Paper C-ZOO-204 (CBCS)
SLM-33

Title of the Unit 3: Recent approaches in Aquatic floral -faunal conservation, Integrated Information Management system in Aquaculture (Topic 3,4)

Structure of the content

SEMESTER- III

Paper-ZOO301
(Basic & Applied Entomology and Ecotoxicology)

Group A. Basic & Applied Entomology
SLM-34

Title of the Unit 1: The importance, diversity and conservation of insects

Structure of the Content

Title of the Unit 4: Aquatic insects

Structure of the Content

Title of the Unit 6: Insects and Plants

Structure of the Content

Paper-ZOO301
Group A. Basic & Applied Entomology
SLM-35

Title of the Unit 2: General characters and classification of insects up to order

Structure of the Content

Title of the Unit 3: Biology, Nature of damage and Control of insects' pests

Structure of the Content

Title of the Unit 5: Insect Behavior

Structure of the Content

Paper-ZOO301
Group B. Ecotoxicology
SLM 36

Title of the Unit 1: Xenobiotics,Toxicity test & Bioassay

Structure of the content

Paper-ZOO301
SLM 37

Title of the Unit 3: Aquatic Toxicology
Structure of the content
3.0 Objective
3.1 Introduction
3.2 History of Aquatic toxicology
3.3 Aquatic environment
  3.3.1 Different types of Aquatic environment
3.4 Factors affecting the Environmental Contraction of Chemicals
3.5Toxicological concepts and principles
3.6 Factors influence toxicity
3.7Toxic agents and their effects
3.8 Concentration-response relationships
3.9 Toxicity testing
3.10 Biomonitoring data and Environmental regulation
3.11 Summary
3.12 Glossary
3.13 Self assessment questions
3.14 Referrences

Title of the Unit 4: Immunotoxicology

Structure of the content

Title of the Unit 5: Environmental Genotoxicology

Structure of the content

Paper-ZOO 302
(Molecular Evolution and Microbiology)

Group A. Molecular Evolution
SLM-38

Title of the Unit 1: Neo-Darwinism, Molecular phylogenetic, Evolution and tinkering

Structure of the content

Paper-ZOO 302
Group B. Microbiology
SLM-39

Title of the Unit 1: Outline classification of microorganisms: 5 –kingdom, 8- kingdom system, Bergey's manual, Classification & morphology of Bacteria, General accounts of Algae, Protists, Fungi & Virus, Nutrition of microbes (Topic 1,2,3,5)

Structure of the Content

Paper-ZOO 302
SLM-40

Title of the Unit 4: Microbial Physiology, Microbes in soil Ecology and Microbial fermentation (Topic 4, 6, 7)

Structure of the content

Paper-ZOO 303A
(FISHERY SPECIAL PAPER)

(Fish Taxonomy & Biology and Oceanography)

Group A. Fish Taxonomy & Biology
SLM-41

Title of the Unit 1: Classification of fishes
Structure of the content

Title of the Unit 2: Fish nutrition and growth

Structure of the content

Title of the Unit 3: Fish reproduction and development
Structure of the content

Paper-ZOO 303A
SLM-42

Title of the Unit 4: Fish Endocrinology

Structure of the content

Title of the Unit 5: Fish Migration

Structure of the content

Paper-ZOO 303A
Group B. Oceanography
SLM-43

Title of the Unit 1: Basic concept of Oceanography (Topic 1-4)

.

Paper-ZOO 303A

SLM-44

Title of the Unit 5: Oceanic resources & Oceanic pollution (Topic 5,6)

Structure of the Content

Paper-ZOO 303B
(ECOLOGY SPECIAL PAPER)

Group A. Biodiversity and Conservation Ecology
SLM-45

Title of the Unit 1: Biodiversity and conservation biology
Structure of the content

Title of the Unit 3: **Conservation of biodiversity**

Structure of the content

SEMESTER III
Paper-ZOO 303B
(ECOLOGY SPECIAL PAPER)

Group A. Biodiversity and Conservation Ecology
SLM-46

Title of the Unit 2: Wildlife Management
Structure of the content

Paper-ZOO303B
Group B. Aquatic Ecology
SLM-47

Title of the Unit 1: Water as resource
Structure of the content

Title of the Unit 4: Aquatic Biota, types & tropics interactions -Macrophytes, Phytoplankton, Zooplankton, Periphyton, benthos & Nekton

Structure of the content

Paper-ZOO 303B
Group B. Aquatic Ecology
SLM-48

Title of the Unit 2: Structure and function of aquatic ecosystem and their management (Topic 2,3)

Structure of the content

Paper C-ZOO-304 (CBCS)

GroupA: Genetics
SLM 49

Title of the Unit 1: **Sex Chromosome Inheritance**

Structure of the content

Title of the Unit 5: **Central Dogma**

Structure of the content

Paper C-ZOO-304 (CBCS)
Group A: Genetics
SLM-50

Title of the Unit 2: **Genetic Linkage and Chromosomal Mapping**

Structure of the content

C-ZOO-304 (CBCS)
Group B: Haematology
SLM-51

Title of the Unit 1: Haemopoetic tissues

Structure of the Content

Title of the Unit 2: Blood cells

Structure of the Content

Paper C-ZOO-304 (CBCS)
Group B: Haematology
SLM-52

Title of the Unit 3: Red cell abnormalities
Structure of the content

Title of the Unit 4: White cells and their disorders

Structure of the content

Title of the Unit 5: Coagulation and Haemostasis

Structure of the content

SEMESTER- IV

Paper-ZOO 401
(Environmental pollution & management and Biostatistics)

Group A: Environmental pollution & management

SLM 53

Title of the Unit 1: Global Environmental problem, Environmental management (Topic1, 6)

Structure of the content

Paper-ZOO 401
SLM 54

Title of the Unit 2: Environmental pollution (Topic 2-5)

Structure of the content
2.0 Objectives
2.1 Introduction

2.2 Categories of Environmental pollution Air, Water, Soil and Noise

2.3 Causes: Natural and Manmade

2.4 Global scenario of pollution

3.0 Air Pollution

3.1 Sources of air pollution – point and nonpoint sources

3.2 Monitoring and measurement of air pollutants

3.3 Role of oxides of nitrogen and sulphur as air pollutants

3.4 Photochemical smog

3.5 Air pollutants effects on plants, animal & man

3.6 Air pollution abatement strategies

3.7 Air pollution control measure through Legislative/Policy measures

4.0 Water Pollution

4.1 Water pollutants – Nature, behavior and fate of water pollutants

4.2 Surface water pollution – River, Lake, Estuary and coastal areas

4.3 Water borne diseases

4.4 Water treatment system

4.5 Waste water treatment system

5.0 Soil Pollution

5.5 Soil pollutants-sources and their chemical and biological nature

5.6 Soil Acidification

5.7 Soil erosion and nutrient loss

5.8 Soil borne disease

5.9 Soil pollution control

5.10 Soil Bioremediation

5.11 Summary
5.12Glossary
5.13 Self assessment questions
5.14 References

Paper-ZOO 401

Group B: Biostatistics
SLM 55

Title of the Unit 1: Concept of Biostatistics, Probability distribution, Testing of Hypothesis & Analysis of frequencies (Topic 1-9)

Structure of the content

Paper-ZOO 401

SLM 56

Title of the Unit 10: Correlation and Regression

Structure of the Content

Title of the Unit 11: Analysis of Variances
(Anova) Structure of the content

Paper-ZOO 402
Group A: Developmental Biology
SLM-57

Title of the Unit 1: Early development of Amphibian axis formation (Topic 1-2)

Structure of the content

Paper-ZOO 402
SLM-58

Title of the Unit 3: Beginning of a new organism

Structure of the Content

Paper ZOO402
Group B: Neuro-endocrinology
SLM 59

Title of the Unit 1: Basic concept of neural system, neural circuit in vertebrates & neuroendocrine glands (Topic 1-3)

Structure of the Content

Paper ZOO402
SLM 60

Title of the Unit 4: Neuro-immuno endocrine pathways, Neural/ endocrine disorder (Topic 4-5)

Structure of the Content

Paper-ZOO 403A
FISHERY SPECIAL
(Aquaculture &Fish Technology and Inland & Marine fisheries)

Group A. Aquaculture & Fish Technology
SLM-61

Title of the Unit 1: Aquaculture, Integrated fish farming system, fish breeding & Fishing methods (Topic 1-3)

Structure of the Content

Paper-ZOO 403A

SLM 62

Title of the Unit 4: Fish disease

Structure **of the Content**

Title of the Unit 5: Fisheries planning, economics and extension

Structure of the Content

Paper-ZOO 403A

Group B. Inland and Marine fisheries

SLM 63

Title of the Unit 1: Freshwater and Marine Resources, Trends in Aquaculture, RS-GIS in Aquaculture (Topic 1,2, 6)

Structure of the Content

Paper-ZOO 403A
Group B. Inland and Marine fisheries
SLM 64

Title of the Unit 5: Waste water management, Fishery traits (Topic 5,7)

Structure of the Content

ZOO 403B
ECOLOGY SPECIAL
(System Ecology& Human Ecology)

Group A. System Ecology
SLM-65

Title of the Unit 1: Community ecology, Restoration ecology, Ecotourism, System structure and function (Topic 1,2,3,6)

Structure of the content

ZOO-403B
SLM 66

Title of the Unit 4: Ecological Economics, Mathematical Ecology (Topic 4-5)

Structure of the content

ZOO-403B
Group B Human Ecology
SLM 67

Title of the Unit 1: Global Environmental Issues, Environmental management &Act Bioinvasion (Topic 1,3,6)

Structure of the content

ZOO-403B
SLM 68

Title of the Unit 2: Solid waste recycling, Urbanization, Wasteland and watershed management (Topic 2,4,5)

Structure of the content