Maharaja Ranjit Singh Punjab Technical University, Bathinda-151001

SUPPLEMENTARY AGENDA

PART – I (Page 490-832)

FOR THE

9TH MEETING OF ACADEMIC COUNCIL

TO BE HELD

ON

26.09.2023 (Tuesday) at

01:00 PM

IN

COMMITTEE ROOM, GZSCCET,

MRSPTU, Bathinda

INDEX

ITEM NO. S-09.19 TO APPROVE THE MINUTES OF 6TH MEETING OF FACULTY OF SCIENCES HELD ON 14.09.2023 AT MRSPTU, BATHINDA.

The meeting of Faculty of Sciences were held as per following detail to approve the various syllabi as approved by the respective Board of Studies, details of which are provided at **Item No. S-09.20.**

SNo.	ITEM	ANNEXURES
1.	Minutes of 6th Meeting of Faculty of Sciences held on 14.09.2023	**XXXIII At Page No.(490-492)**

The item is placed before the Academic Council for approval please.

ITEM NO. S-09.20 TO APPROVE VARIOUS SCHEMES & SYLLABI OF UG, PG & INTEGRATED-DUAL DEGREE PROGRAMMES.

The scheme and syllabi of following courses were approved by respective Board of Studies. Copy of the same is placed at **ANNEXURE-XXXIV at Page No. 493-1168** Further the same have been approved by Faculty of Sciences and Minutes of Meetings are placed in **ITEM No. S-09.19**.

SNo.	ITEM
1.	Scheme and syllabus of B.Sc. (Non-Medical) (1st -6th Sem.) for batch 2022 onwards with new CO's
2.	Scheme and Syllabus of Integrated/Dual Degree B.Sc.-M.Sc. (Forensic Science) (1st -6th Sem.) for batch 2023 onwards
3.	Scheme and syllabus of B.Sc. (Graphics and Web Designing) (2nd -4th Sem.) for batch 2021 onwards
4.	Scheme and Syllabus of B.A. (Computer Science) (1st -6th Sem.) for batch 2023 onwards
5.	Scheme and Syllabus of B.Sc. (Food Science and Technology)/ Bachelor of Food Science and Technology (Hons.) (1st -8th Sem.) for batch 2021 onwards with addition of Course Objectives and Outcomes.
6.	Scheme and Syllabus of M.Sc. (Food Science and Technology) (1st -4th Sem.) for batch 2021 onwards with addition of Course Objectives and Outcomes.
7.	Scheme and Syllabus of B.Sc. (Hons.) Agriculture (6th Sem.) for batch 2019 onwards
8.	Scheme and Syllabus of M.Sc. (Chemistry) (1st -4th Sem.) (CO's revised only) for batch 2020 onwards
9.	Scheme and Syllabus of B.Sc. (Hons.) Chemistry (1st -6th Sem.) (CO's revised only) for batch 2019 onwards

The item is placed before the Academic Council for approval please.

ITEM NO. S-09.21 RATIFICATION OF THE EXTENSION OF BOARD OF STUDIES IN AGRICULTURE SCIENCES UPTO 08.08.2024.

The Board of Studies in Agriculture Sciences which was constituted in 2021, expired on 12.08.2023. Whereas, the tenure of all other Board of Studies which were constituted in 2022 are expiring on 08.08.2024. Therefore, consequent upon the approval from the Competent Authority vide e-office File No. I-15/1258/2023-DEAN ACAD-MRSPTU-BTD dated 18.09.2023 **(ANNEXURE- XXXV at Page No. 1169-1173)**, notification regarding extension of Board of Studies in Agriculture Sciences upto 08.08.2024 vide notification no. DAA/MRSPTU/2023/4301 dated 19.09.2023 **(ANNEXURE-XXXVI at Page No. 1174)** has been done.

Further, Dr. Wineet Chawala, Assistant Professor, who has newly joined the School of Agriculture Engineering & Technology, MRSPTU has been included as co-opted member in this BoS.

The Item is placed before the Academic Council for ratification please.

ITEM NO. S-09.22 RATIFICATION OF SANCTIONED INTAKE INCREASED FROM 40 SEATS TO 60 SEATS IN PROGRAMME BMS (AIRLINES, TOURISM & HOSPITALITY) FROM ACADEMIC SESSION 2023-24.

Sanctioned Intake of BMS (Airlines, Tourism and Hospitality) programme at PSAEC, Patiala is 40 seats. A request was obtained from PSAEC, Patiala to increase seats from 40 to 60. Therefore, consequent upon the approval of the competent authority vide e-office File No. I-25/131/2023-PSAEC-PATIALA (Computer No. 109677) dated 13.09.2023, the sanctioned intake of the programme has been increased from existing 40 to 60 seats and the same has been updated on University Admission **(ANNEXURE-XXXVII at Page No. 1175-1178).**

The Item is placed before the Academic Council for ratification please.

ITEM NO. S-09.23 RATIFICATION OF VARIOUS INTER / INTRA UNIVERSITY MIGRATION CASES APPROVED AS SPCECIAL CASE.

Requested were received regarding Inter / Intra University Migration of students to the University in which students were interested to study in University Main Campus or in the affiliated college of University. Considering their requests, these cases were put up to the competent authority for approval as a special case under the following clause of Migration Regulation of MRSPTU, Bathinda.

Point no. 6: Power of Relaxation:

"Notwithstanding the existing Migration Regulations, the Vice-Chancellor in matters of exigency, to be recorded in writing, shall be authorized to consider migration on compassionate grounds for the cases that are not otherwise covered under Migration Regulations, to be ratified by BOG".

Therefore, consequent upon the approval of the competent authority vide e-office File No. I-15/1161/2023-DEAN ACAD-MRSPTU-BTD (Computer No. 108948) dated 04.09.2023, File No. I-15/1235/2023-DEAN ACAD-MRSPTU-BTD (Computer No. 109788) dated 14.09.2023, the students were migrated as per their requests vide order no. DAA/MRSPTU/2023/4304 dated 19.09.2023, DAA/MRSPTU/2023/4297 dated 18.09.2023 **(ANNEXURE-XXXVIII at Page No. 1179-1205)**.

The Item is placed before the Academic Council for ratification please.

ITEM NO. S-09.24 REGARDING APPROVAL FOR ISSUING OF Ph.D. DEGREE.

The following Ph.D. candidates have fulfilled all the necessary requirements of "MRSPTU Ph.D. regulations – 2016" for the award of Ph.D. degree. The doctoral theses of these candidates have undergone rigorous evaluation by subject matter experts. Each candidate has effectively defended their respective Ph.D. thesis before the Oral Defence Committee. Following approval from the Vice Chancellor, provisional Ph.D. degrees have been conferred upon them. Furthermore, these candidates have satisfied all conditions stipulated in the Minimum Standards and Procedure for the award of M.Phil/Ph.D. Degree Regulations – 2016 of UGC, New Delhi.

Sr. No.	Name of Candidate	Registration No.	Supervisor/ Co-Supervisor	Faculty	Title of Ph.D. thesis	Date of Viva Voce	Remarks
01	Ms. Shilpa	18301FPE01	Dr. Pritpal Singh Bhullar (S303M83010), Assistant Professor, University Business School, MRSPTU, Bathinda	UBS	STUDY OF INVESTMENT INTENTION OF AGRARIAN CLASS: A PERSPECTIVE FROM RURAL PUNJAB	10.05.23	Successfully Defended
02	Ms. Monika Bhatia	17311FPE03	Dr. Pritpal Singh Bhullar (S303M83010), Assistant Professor, University Business School, MRSPTU, Bathinda/ Dr. Dipayan Roy, Associate Professor, National Institute of Construction Management & Research (NICMAR), Pune	UBS	IMPACT OF BOARD'S GENDER DIVERSITY ON PROFITABILITY : EVIDENCE FROM INDIAN BANKING SECTOR	16.06.23	Successfully Defended
03	Mr. Amandeep Singh	17201MPE02	Dr. Raj Kumar Narang, Professor, ISF College of Pharmacy, Moga (S202M73005)	Pharmacy	DEVELOPMENT , CHARACTERIZATION AND EVALUATION OF MESALAMINE LOADED PROBIOTIC BASED MICROCARRIERS FOR THE MANAGEMENT OF ULCERATIVE COLITIS	10.01.23	Successfully Defended

Sr. No.	Name of Candidate	Registration No.	Supervisor/ Co-Supervisor	Faculty	Title of Ph.D. thesis	Date of Viva Voce	Remarks
04	Ms. Ankita Dadwal	17201FPE04	Dr. Raj Kumar Narang, Professor, ISF College of Pharmacy, Moga (S202M73005)	Pharmacy	COMPARATIVE STUDY OF DIFFERENT CLOBETASOL PROPIONATE LOADED NANO CARRIERS TOPICAL SYSTEMS FOR MANAGEMENT OF PSORIASIS	10.01.23	Successfully defended
05	Ms. Satinder Pal Kaur	17405FPE02	Dr. Ajay Kumar Mittal (S405M78006), Associate Professor, Department of Mathematics, Aryabhatta Group of Institutions, Barnala/ Prof. (Dr.) V.K. Kukreja, Professor, Department of Mathematics, Saint Longowal Institute of Engineering & Technology (SLIET), Longowal	Mathematics	SOLUTION OF TWO-POINT BOUNDARY VALUE PROBLEMS USING QUINTIC HERMITE COLLOCATION METHOD	12.09.23	Successfully defended
06	Mr. Sukhjinder Singh	1610AMPE01	Dr. Naresh Kumar Garg (S107M72006), Professor, Department of CSE, GZSCCET, MRPSTU, Bathinda	ECE	A FRAMEWORK FOR OFFLINE HANDWRITTEN DEVANAGARI WORD RECOGNITION	15.09.23	Successfully defended

The Item is placed before the Academic Council for approval please.

Further, since, the convocation of the University is scheduled on 17.10.2023, the Vice Chancellor may be authorize to issue degrees to candidates who complete their Ph.D. after this Academic Council on 26.09.2023 and before the convocation. The details of the same will be placed in subsequent meeting of Academic Council for ratification.

MAHARAJA RANJIT SINGH PUNJAB TECHNICAL UNIVERSITY
DABWALI ROAD, BATHINDA-151001
(Estb. by Govt. of Punjab Act 5(2015) & Approved u/s 2(f) & 12(b) of UGC Act, 1956)
Department of Chemistry
www.mrsptu.ac.in

Ref. No.: CHEM/23/1924 Date: 15/09/2023

Sub: MINUTES OF 6th MEETING OF FACULTY OF SCIENCES HELD ON 14.09.2023

6th meeting of Faculty of Sciences of Maharaja Ranjit Singh Punjab Technical University, Bathinda was held on 14.09.2023 at 3.15 PM onwards in virtual mode. The following members were present:-

1. **Dr. Sandeep Kansal,** — **Chairperson**
   Dean Faculty of Sciences,
   Maharaja Ranjit Singh Punjab Technical University, Bathinda
2. **Dr. Sanjay Bhatnagar** — **Member**
   Head, Deptt of Computational Sciences MRSPTU, Bathinda.
   (87250-72319) sanjay@mrsptu.ac.in
3. **Dr. Seema Sharma** — **Member & Convener (For 6th Meeting of Faculty of Sciences)**
   Head, Department of Chemistry, MRSPTU, Bathinda.
   (94171-14169) chemseema@mrsptu.ac.in
4. **Dr. Kawaljit Singh Sandhu** — **Member**
   Head, Deptt of Food Science & Technology, MRSPTU, Bathinda
   (70157-09403) kssandhu@mrsptu.ac.in
5. **Dr. Mamta Kansal** — **Member**
   Head, Deptt of Mathematics, MRSPTU, Bathinda
   (88722-11700) mamtakansal@mrsptu.ac.in
6. **Dr. Jasbir Singh Hundal** — **Member**
   Professor, Deptt of Physics, MRSPTU, Bathinda.
   (95928-03250) jashundal@yahoo.com
7. **Dr. Sudhanshu Pratap Singh** — **Member**
   Deptt. of Chemistry, MRSPTU, Bathinda.
   (99971-82264) chemsudhanshu@mrsptu.ac.in
8. **Dr. Anju Sharma** — **Member**
   Head, Deptt of Computational Sciences, PSAEC, Patiala.
   (98889-97297) anjusharma@mrsptu.ac.in
9. **Dr. Santosh Kumar Mahapatra** — **Member**
   Professor, Department of Physics
   School of Basic Sciences, Central University of Punjab, Ghudda, Bathinda.
   (98776-29971, 94715-58674) sk.mahapatra@cup.edu.in
10. **Dr. Rajesh Kumar** — **Member**
    Professor, Department of Chemistry, Central University of Punjab, Bathinda.
    (99149-69694) rajeshchem01@gmail.com

Member

11. **Dr. D C Saxena**
Professor, Department of Food Engg & Tech
Sant Longowal Institute of Engineering and Technology, Longowal, Sangrur, Punjab
(9815608859) dcsaxena@yahoo.com

After detailed deliberation following decision were taken:

Sr. No	Agenda Item no.	Agenda	Decision Taken
1	ITEM No. 06.01	**To Approve the Minutes of Meeting of Following Board Of Studies.**	
		(a) The minutes of meting of Board of Studies in Chemistry. (Annexure-06.01.A)	Approved.
		(b) The minutes of meeting of Board of Studies in Computational Sciences. **(ANNEXURE-06.01 – B to D)**	In agenda item 06.01B, a. the Program B.A in Computer Science in Punjabi medium was mentioned, whereas the concerned Chairperson informed all the members that this program is being run in dual mode i.e. Punjabi & English both. It is approved with the slight modification of inclusion of English medium. b. Also at one place instead of program BCA-MCA only BCA was mentioned. The Chairperson of BoS (Computational Science) assured that he will rectify the mistake and inform to all the BoS member regarding this. Agenda item no. 6.01 C & D) were approved as such.
		(e) The minutes of meeting of Board of Studies in Physics. **(ANNEXURE – 06.01.-E)**	Approved.
2	ITEM No. 06.02	**To Approve the Syllabi & Scheme of UG & PG Programme in the Department of Chemistry**	
		(a) Scheme and Syllabus of five year Integrated Degree B.Sc.-M.Sc. (Forensic Science) (1^{st} –6^{th} Sem.) for Batch 2023 onwards. **(Annexure 06.02 – A)**	Approved.
		(b) Scheme and Syllabus of B.Sc. (Non-Medical) (1^{st} – 6^{th} Sem.) for Batch 2022 onwards (New CO's). **(Annexure 06.02 – B)**	Approved.
		(c) Scheme and Syllabus of M.Sc. Chemistry (1^{st}–4^{th} Semester) (CO's revised only). **(Annexure 06.02 – C)**	Approved.
		(d) Scheme and Syllabus of B.Sc. Chemistry (1^{st} to 6^{th} Semester) (CO's revised only). **(Annexure 06.02 - D)**	Minor typographical mistakes were pointed out in the scheme of B.Sc. (Hons) Chemistry/semester Ist, where L's were missing under LTP for one subject. Chairperson BoS of Chemistry agreed to rectify the mistakes and it was approved.

3	ITEM No. 06.03	**To Approve the Syllabi & Scheme of UG And PG Programme in the Department of Computational Sciences.**	
		(a) Scheme and Syllabus of BA (Computer Science) (1^{st}–6^{th} Sem.) for Batch 2023 onwards. **(Annexure 06.03 – A)**	Members of FoS suggested little modifications regarding elective subjects in B.A, Computer Science program Chairperson Computational Sci. agreed for the same and modified file was provided. The modified syllabus was approved.
		(b) Scheme and Syllabus of B.Sc. (Graphics and Web Designing) (2^{nd} to 4^{th}) for Batch 2021 onwards. **(Annexure 06.03 - B)**	Approved.
4	ITEM No. 06.04	**To Approve the Syllabi & Scheme of UG and PG Programme in the Department of Food Science & Technology & Agriculture.**	
		(a) Scheme and Syllabus of B.Sc. (Food Science and Technology) / Bachelor of Food Science and Technology (Hons.) (1^{st}–6^{th} Sem.) for Batch 2021 onwards with addition of Course Objectives and Outcomes. **(Annexure 06.04 – A)**	Approved.
		(b) Scheme and Syllabus of M.Sc. (Food Science and Technology) (1^{st} – 4^{th} Sem.) for Batch 2021 onwards with addition of Course Objectives and Outcomes. **(Annexure 06.04 – B)**	Approved.
		(c) Syllabus of B.Sc. (Hons.) Agriculture (6th Sem.) for Batch 2K19 onwards. **(Annexure 06.04 - C)**	Approved.

General Observations: Following are the general observations of the members of Faculty of Sciences.

1. The cover page of syllabus, which is designed by DAA office needs some modifications regarding
   a. Instead of **"Faculty of Science"** name of department can be mentioned.
   b. The line **"Nobody is allowed to print it in any form"** should be rethought due to the reason that syllabus is needed by students and faculty in the printed form.
2. Dean, Faculty of Sciences pointed out that in the study scheme of B.Sc. (Hons.) Chemistry (already approved by earlier academic council) number of credits and marks earned by students varies with variation of electives although total no. of credits are well within the range of credits prescribed by UGC. It is worth mentioning the CBCS regulations of UGC published on 10^{th} April 2015 clearly mentioned that **"student may undertake as many credits as they can cope with"**

Submitted for approval please.

14/09/23

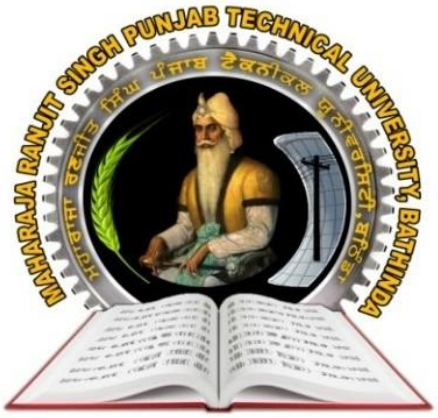
Dr. Seema Sharma
Member & Convener for
6^{th} meeting of Faculty of Sciences
MRSPTU, Bathinda.

14/9/23

Prof (Dr.) Sandeep Kansal
Dean, Faculty of Sciences
MRSPTU, Bathinda.

CC: - All the members (through email)

Maharaja Ranjit Singh Punjab Technical University
Bathinda-151001



FACULTY OF SCIENCES

SYLLABUS

FOR

B.SC. (NON-MEDICAL)

2022 BATCH ONWARDS

STUDY SCHEME

1st Semester		Course Type	Contact Hrs.			Marks			Credits
Sub. Code	Subject		L	T	P	Int.	Ext.	Total	
BHSMC0-042	English	AECC-I	2	0	0	40	60	100	2
BSNMS1-102	Mechanics	CC-I	4	0	0	40	60	100	4
BSNMS1-103	Inorganic Chemistry-I	CC-II A	3	0	0	40	60	100	3
BSNMS1-104	Organic Chemistry-I	CC-II B	3	0	0	40	60	100	3
BSNMS1-105	Differential Calculus-I	CC-III A	3	0	0	40	60	100	3
BSNMS1-106	Differential Calculus-II	CC-III B	3	0	0	40	60	100	3
BSNMS1-107	Mechanics Lab	CC-I Lab	0	0	4	60	40	100	2
BSNMS1-108	Chemistry Lab- I	CC-I Lab	0	0	4	60	40	100	2
Total			**18**	**0**	**8**	**360**	**440**	**800**	**22**

Type of Courses: Ability Enhancement Compulsory Course (AECC), Core Course (CC), Skill Enhancement Course (SEC), Discipline Specific Elective (DSE)

2nd Semester		Course Type	Contact Hrs.			Marks			Credits
Sub. Code	Subject		L	T	P	Int.	Ext	Total	
BMNCC0-041	Drug abuse: problem, management and prevention	AECC-II	2	0	0	100	00	100	0
BSNMS1-202	Electricity, Magnetism and EMT	CC-IV	4	0	0	40	60	100	4
BSNMS1-203	Physical Chemistry-I	CC-V A	3	0	0	40	60	100	3
BSNMS1-204	Organic Chemistry-II	CC-V B	3	0	0	40	60	100	3
BSNMS1-205	Differential Equations-I	CC-VI A	3	0	0	40	60	100	3
BSNMS1-206	Differential Equations-II	CC-VI B	3	0	0	40	60	100	3
BSNMS1-207	Electricity, Magnetism and EMT Lab	CC-IV Lab	0	0	4	60	40	100	2
BSNMS1-208	Chemistry Lab-II	CC-V Lab	0	0	4	60	40	100	2
Total			**18**	**0**	**08**	**420**	**380**	**800**	**20**

3rd Semester		Course Type	Contact Hrs.			Marks			Credits
Sub. Code	Subject		L	T	P	Int.	Ext.	Total	
BSNMS1-301	Thermal Physics and Statistical Mechanics	CC-VII	4	0	0	40	60	100	4
BSNMS1-302	Thermal Physics and Statistical Mechanics Lab	CC-VII Lab	0	0	4	60	40	100	2
BSNMS1-303	Inorganic Chemistry-II	CC-VIII A	3	0	0	40	60	100	3
BSNMS1-304	Physical Chemistry-II	CC-VIII B	3	0	0	40	60	100	3
BSNMS1-305	Chemistry Lab III	CC-VIII Lab	0	0	4	60	40	100	2
BSNMS1-306	Real Analysis-I	CC-IX A	3	0	0	40	60	100	3
BSNMS1-307	Real Analysis-II	CC-IX B	3	0	0	40	60	100	3
BSNMS1-308	Computational Physics Skills	SEC-I	0	0	4	60	40	100	2
Total			**16**	**0**	**12**	**380**	**420**	**800**	**22**

4th Semester		Course Type	Contact Hrs.			Marks			Credits
Sub. Code	Subject		L	T	P	Int.	Ext	Total	
BHSMC0-041	Environmental Science	AECC-III	3	0	0	40	60	100	3
BSNMS1-401	Waves and Optics	CC-X	4	0	0	40	60	100	4
BSNMS1-402	Waves and Optics Lab	CC-X Lab	0	0	4	60	40	100	2
BSNMS1-403	Organic Chemistry-III	CC-XI A	3	0	0	40	60	100	3
BSNMS1-404	Physical Chemistry-III	CC-XI B	3	0	0	40	60	100	3
BSNMS1-405	Chemistry Lab-IV	CC-XI Lab	0	0	4	60	40	100	2
BSNMS1-406	Algebra-I	CC-XII A	3	0	0	40	60	100	3
BSNMS1-407	Algebra-II	CC-XII B	3	0	0	40	60	100	3
BSNMS1-408	Basic Analytical Chemistry	SEC-II	0	0	4	60	40	100	2
Total			**19**	**0**	**12**	**420**	**480**	**900**	**25**

5th Semester		Course Type	Contact Hrs.			Marks			Credits
Sub. Code	Subject		L	T	P	Int	Ext	Total	
BSNMD1-511	Digital Analog and Instrumentation	DSE-I	4	0	0	40	60	100	4
BSNMD1-521	Chemistry of Main group elements	DSE-II	4	0	0	40	60	100	4
BSNMD1-531	Matrices	DSE-III A	3	0	0	40	60	100	3
BSNMD1-532	Linear Algebra	DSE-III B	3	0	0	40	60	100	3
BSNMD1-512	Digital Analog and Instrumentation Lab	DSE-I Lab	0	0	4	60	40	100	2
BSNMD1-522	Chemistry of Main group elements Lab	DSE-II Lab	0	0	4	60	40	100	2
BSNMS1-533	Computer Programming Lab	SEC-III	0	0	4	60	40	100	2
Total			**14**	**0**	**12**	**340**	**360**	**700**	**20**

6th Semester		Course Type	Contact Hrs.			Marks			Credits
Subject Code	Subject		L	T	P	Int.	Ext	Total	
BSNMD1-611	Elements of Modern Physics	DSE-IV	4	0	0	40	60	100	4
BSNMD1-612	Elements of Modern Physics Lab	DSE-IV Lab	0	0	4	60	40	100	2
BSNMD1-621	Comprehensive Chemistry	DSE-V	4	0	0	40	60	100	4
BSNMD1-622	Comprehensive Chemistry Lab	DSE-V Lab	0	0	4	60	40	100	2
BSNMD1-631	Numerical Methods	DSE-VI A	3	0	0	40	60	100	3
BSNMD1-632	Complex Analysis	DSE-VI B	3	0	0	40	60	100	3
BSNMS1-633	Numerical Analysis Lab	SEC-IV	0	0	4	60	40	100	2
Total			**14**	**0**	**12**	**340**	**360**	**700**	**20**

Distribution of Credits in various type of Courses:

Course Type	Type of Courses in the Programme				Total Credits in Semester
	AECC	CC	SEC	DSE	
Semester-I	2	20	0	0	**22**
Semester-II	0	20	0	0	**20**
Semester-III	0	20	2	0	**22**
Semester-IV	3	20	2	0	**25**
Semester-V	0	0	2	18	**20**
Semester-VI	0	0	2	18	**20**
Total Credits in Courses:	**5**	**80**	**8**	**36**	**129**

Type of Courses: Ability Enhancement Compulsory Course (AECC), Core Course (CC), Skill Enhancement Course (SEC), Discipline Specific Elective (DSE)

SEMESTER FIRST

ENGLISH

Subject Code: BHSMC0-042 **L T P C** **Duration:30 Hrs.**
2 0 0 2

UNIT-I (8 Hours)

Communication Skills: Introduction, Definition, the Importance of Communication,
The Communication Process – Source, Message, Encoding, Channel, Decoding, Receiver, Feedback, Context
Barriers to communication: Physiological Barriers, Physical Barriers, Cultural Barriers, Language Barriers, Gender Barriers, Interpersonal Barriers, Psychological Barriers, Emotional barriers

UNIT-II (7 Hours)

Perspectives in Communication: Introduction, Visual Perception, Language, Other factors affecting our perspective - Past Experiences, Prejudices, Feelings, Environment.
Elements of Communication: Introduction, Face to Face Communication - Tone of Voice, Body Language (Non-verbal communication), Verbal Communication, Physical Communication.

UNIT-III (7 Hours)

Communication Styles: Introduction, The Communication Styles Matrix with example for each Direct Communication Style, Spirited Communication Style, Systematic Communication Style, Considerate Communication Style.
Basic Listening Skills: Introduction, Self-Awareness, Active Listening, becoming an Active Listener, Listening in Difficult Situations

UNIT-IV (8 Hours)

Interview Skills: Purpose of an interview, Do's and Don'ts of an interview
Giving Presentations: Dealing with Fears, Planning your Presentation, Structuring Your Presentation, Delivering Your Presentation, Techniques of Delivery
Group Discussion: Introduction, Communication skills in group discussion, Do's and Don'ts of group discussion.

Recommended Books:

1. Ruther Ford A. J., 'Basic Communication Skills for Technology', 2nd Edition, Pearson Education, 2011.
2. Kumar S. and Pushplata, 'Communication Skills', 1st Edition, Oxford Press, 2011.
3. Stephen P. Robbins, 'Organizational Behaviour', 1st Edition, Pearson, 2013.
4. Gill H., 'Brilliant-Communication Skills', 1st Edition, Pearson Life, 2011.
5. Gopalawamy R., 'The Ace of Soft Skills: Attitude, Communication and Etiquette for Success', 5th Edition, Pearson, 2013.
6. Dalley D., Burton L. and Margaret G., 'Developing your Influencing Skills', Green Hall, 1 st Edition, Universe of Learning LTD,2010.
7. Konarnira, 'Communication Skills for Professionals', 2nd Edition, PHI, 2011.
8. Mitra B. K., 'Personality Development and Soft Skills', 1st Edition, Oxford Press, 2011.
9. 'Soft Skill for Everyone', Butter Field, 1stEdition, Cengage Learning India Pvt. Ltd., 2011.
10. Francis Peters S.J., 'Soft Skills and Professional Communication', 1st Edition, McGraw Hill Education, 2011.
10. John A., 'Effective Communication', 4th Edition, Pan MacMillan, 2009.
11. Aubrey D., 'Bringing out the Best in People', 2nd Edition, McGraw Hill,1999

MECHANICS

Subject Code: BSNMS1-102 **L T P C** **Duration: 60Hrs.**
4 0 0 4

Course Outcome (CO): After the completion of the course, student will be able to:

CO1: Understand the concepts of vector calculus and basic laws of motion
CO2: Gain the knowledge about gravitational motion, and global positioning system
CO3: Understand the concepts of harmonic oscillations.
CO4: Learn the concept of theory of Relativity.

UNIT-I (15 Hrs)

Vector algebra. Scalar and vector products. Derivatives of a vector with respect to a parameter. Laws of Motion: Frames of reference. Newton's Laws of motion. Dynamics of a system of particles. Centre of Mass. Momentum and Energy: Conservation of momentum. Work and energy.

Conservation of energy. Motion of rockets. Rotational Motion: Angular velocity and angular momentum. Torque, Conservation of angular momentum.

UNIT-II (15Hrs)

Gravitation: Newton's Law of Gravitation. Motion of a particle in a central force field (motion is in a plane, angular momentum is conserved, areal velocity is constant). Kepler's Laws (statement only). Satellite in circular orbit and applications. Geosynchronous orbits. Weightlessness. Basic idea of global positioning system (GPS).

UNIT-III (15Hrs)

Oscillations: Simple harmonic motion. Differential equation of SHM and its solutions. Kinetic and Potential Energy, Total Energy and their time averages. Damped oscillations. Elasticity: Hooke's law, Stress- strain diagram, Elastic moduli-Relation between elastic constants, Poisson's Ratio-Expression for Poisson's ratio in terms of elastic constants, Work done in stretching and work done in twisting a wire, Twisting couple on a cylinder, Determination of Rigidity modulus by static torsion, Torsional pendulum, Determination of Rigidity modulus and moment of inertia, q, η and σ by Searles method.

UNIT-IV (15 Hrs)

Special Theory of Relativity: Concept of Inertial and non-inertial frames, Concept of ether, Constancy of speed of light, Michelson-Morley Experiment, Galilean transformation, Postulates of Special Theory of Relativity, Lorentz transformation, Length contraction. Time dilation, Relativistic addition of velocities.

Recommended Books:

1.University Physics. FW Sears, MW Zemansky and HD Young13/e, 1986. Addison Wesley
2.Mechanics Berkeley Physics course, volume.1: Charles Kittel, et. Al. 2007, Tata McGraw Hill.
3.Physics – Resnick, Halliday & Walker 9/e, 2010, Wiley.
4.Engineering Mechanics, Basudeb Bhattacharya, 2nd edn., 2015, Oxford University Press.
5.University Physics, Ronald Lane Reese, 2003, Thomson Brooks/Cole.

INORGANIC CHEMISTRY-I

Subject Code: BSNMS1-103 **L T P C** **Duration: 45Hrs.**
3 0 0 3

Course Objectives

1. To familiarize with atomic structure, quantum numbers and shapes of orbitals
2. To understand periodic table and periodic properties of elements
3. To understand the concept of crystal structure of molecules
4. To understand the concept of various bonding theories

Course Outcomes: The completion of this course will make student to acquire the knowledge of:

CO1: Wave mechanics, atomic theories and shapes of orbitals
CO2: Periodic table and various periodic properties
CO3: Ionic bond and crystal structure of molecules
CO4: Covalent bond, metallic bond and various weak chemical forces

Unit-I (8 Hrs.)

Atomic Structure:

de-Broglie equation, Heisenberg's Uncertainty Principle and its significance. Schrödinger's wave equation and its derivation, significance of ψ and ψ^2. Quantum numbers. Normalized and orthogonal wave functions. Sign of wave functions. Radial and angular wave functions and distribution curves. Shapes of s, p, d and f orbitals.

Pauli's Exclusion Principle, Hund's rule of maximum multiplicity, Aufbau principle and its limitations.

Unit-II (7 Hrs.)

Chemical Periodicity:

Effective nuclear charge, shielding or screening effect (Slater rules), variation of effective nuclear charge in periodic table.

Atomic and ionic radii, Ionization enthalpy, Electron gain enthalpy and their trend in groups and periods.

Electronegativity and various scales. Variation of electronegativity with bond order, partial charge, hybridization, group electro negativity.

Unit-III (15 Hrs.)

Chemical Bonding-I:

Ionic bond: General characteristics of ionic compounds, size effects, radius ratio rule and its limitations. Efficiency of packing, Hexagonal close packing, Cubic close packing. Structures of different crystal lattices: Sodium chloride, Cesium chloride, Wurtzite, Zinc blende, Fluorite, Rutile, Cristobalite, Nickel arsenide, Pervoskite, Rhenium oxide, Calcium carbide, The calcite and aragonite structures.

Born-Landé equation with derivation and importance of Kapustinskii expression for lattice energy. Madelung constant, Born-Haber cycle and its application, Solvation energy.

Unit-IV (15 Hrs.)

Chemical Bonding-II:

Covalent bond: Lewis structure, Valence Bond theory, VSEPR theory (Prediction of structures and variation of bond angles on the basis of VSEPR theory, Shortcomings of VSEPR theory), Hybridization, Molecular orbital theory (LCAO method). Molecular orbital diagrams of diatomic and simple polyatomic molecules (Be_2, N_2, O_2, F_2, LiH, NO, CO, HCl, NO_2, BeH_2, NO_2^-), Formal charge, Covalent character in ionic compounds, polarizing power and polarizability. Fajan's rules and consequences of polarization. Ionic character in covalent compounds (Bond moment, dipole moment, Percentage ionic character)

Metallic Bond: Valence bond and band theories. Semiconductors and insulators, defects in solids. **Weak Interactions:** van der Waals forces, ion-dipole forces, dipole-dipole interactions, induced dipole interaction, Hydrogen bonding.

Recommended Books:

Latest edition of:

1. D.F.C. Shriver, P.W. Atkins and C.H. Langford, 'Inorganic Chemistry', ELBS Oxford.
2. J.E. Huheey, E.A. Keiter, R.L. Keiter, 'Inorganic Chemistry', Pearson Education, Singapore.
3. J.D. Lee, 'Concise Inorganic Chemistry', ELBS, Oxford.

ORGANIC CHEMISTRY-I

Subject Code: BSNMS1-104 **L T P C** **Duration: 45Hrs.**
3 0 0 3

Course Objectives:

1. To familiarize with the concepts of basics of organic chemistry
2. To understand the concept of mechanisms of organic reactions
3. To familiarize with the chemistry of alkanes and cycloalkanes
4. To understand chemistry of alkenes and alkynes
5. To know the chemistry behind aromatic hydrocarbons

Course outcomes: After the completion of course students will acquire the knowledge of:

CO1: Concepts of basics of structure and bonding
CO2: Mechanisms of organic reactions
CO3: Chemistry of aliphatic hydrocarbons
CO4: Chemistry behind aromatic hydrocarbons

Unit-I (15 Hrs.)

Structure and Bonding:

Hybridization, bond lengths, bond angles, bond energy, localized and delocalized chemical bond, van der Waals interactions, inclusion compounds, clatherates, charge transfer complexes, resonance, hyperconjugation, aromaticity, inductive and field effects, hydrogen bonding.

Mechanism of Organic Reactions:

Curved arrow notation, drawing electron movements with arrows, half-headed and double-headed arrows, homolytic and heterolytic bond breaking. Types of reagents- electrophiles and nucleophiles. Types of organic reactions. Energy considerations. Reactive intermediates (carbocations, carbanions, free radicals, carbenes, arynes and nitrenes). Assigning formal charges on intermediates and other ionic species.

Methods of determination of reaction mechanism (product analysis, intermediates, isotope effects, kinetic and stereochemical studies).

Unit-II (10 Hrs.)

Alkanes and Cycloalkanes:

Introduction, IUPAC nomenclature, Isomerism and classification of carbon atoms of alkanes. Sources, methods of formation (with special reference to Wurtz reaction, Kolbe reaction, Corey- House reaction and decarboxylation of carboxylic acids). Physical properties and chemical reactions of alkanes.

Mechanism of free radical halogenation of alkanes: orientation, reactivity and selectivity. Cycloalkanes - nomenclature, methods of formation, chemical reactions, Baeyer's strain theory and its limitations. Ring strain in small rings (cyclopropane and cyclobutane), theory of strainless rings. The case of cyclopropane ring; banana bonds.

Unit-III (14 Hrs.)

Alkenes, Cycloalkenes, Dienes and Alkynes:

Alkenes Nomenclature, methods of synthesis (mechanisms of dehydration of alcohols and dehydrohalogenation of alkyl halides, regioselectivity in alcohol dehydration. Saytzeff rule, Hofmann elimination), physical properties and relative stabilities of alkenes. Chemical reactions of alkenes - mechanisms involved in hydrogenation, electrophilic and free radical additions, Markownikoff's rule, hydroboration-oxidation, oxymercuration-reduction. Epoxidation, ozonolysis, hydration, hydroxylation and oxidation with $KMnO_4$, Polymerization of alkenes. Substitution at the allylic and vinylic positions of alkenes. Industrial applications of ethylene and propene.

Cycloalkenes Methods of formation, conformation and Chemical reactions of cycloalkenes.

Dienes Nomenclature and classification of dienes: isolated, conjugated and cumulated dienes. Structure of allenes and butadiene, methods of formation, polymerization. Chemical reactions – 1, 2 and 1,4 additions, Diels-Alder reaction.

Alkynes Nomenclature, structure and bonding in alkynes. Methods of formation. Chemical reactions of alkynes, acidity of alkynes. Mechanism of electrophilic and nucleophilic addition reactions, hydroboration oxidation, metal-ammonia reductions, oxidation and polymerization.

Unit-IV (6 Hrs.)

Aromatic hydrocarbons:

Preparation (Case benzene): from phenol, by decarboxylation, from acetylene, from benzene sulphonic acid.

Reactions: (Case benzene): Electrophilic substitution: nitration, halogenation and sulphonation. Friedel-Craft's reaction (alkylation and acylation) (upto 4 carbons on benzene). Side chain oxidation of alkyl benzenes (upto 4 carbons on benzene).

Recommended Books:

Latest edition of:

1. Morrison and Boyd, 'Organic Chemistry', Prentice Hall.
2. Solomons, 'Fundamentals of Organic Chemistry', JohnWiley.
3. F.A. Carey, 'Organic Chemistry', McGraw Hill,Inc.
4. L.G. Wade Jr., 'Organic Chemistry', Prentice Hall.
5. S.M. Mukherji, S.P. Singh and R.P. Kapoor, 'Organic Chemistry', Vol.-I, II & III, Wiley Eastern Ltd. (New Age International).

DIFFERENTIAL CALCULUS-I

Subject Code: BSNMS1-105 **L T P C** **Duration: 45 Hrs.**
3 0 0 3

Course Outcomes:

CO1: Understand the concept of Continuity and Differentiability.
CO2: Extend the knowledge to the different type of series, Roll's Theorem and Lagrange Mean Value Theorem
CO3: Develop the skill to sketch the curves in a plane using its mathematical properties in the different coordinate systems of reference.
CO4: Understand the concept of Partial Differential Equation.

Unit-I (12Hrs.)

Limit and Continuity (ε and δ definition), Types of discontinuities, Differentiability of functions, Successive differentiation, Leibnitz's theorem.

Unit-II (11Hrs.)

Rolle's theorem, Mean Value theorems, Taylor's theorem with Lagrange's and Cauchy's forms of remainder, Taylor's series, Maclaurin's series of $sin\ x$, $cos\ x$, ex, $\log(1+x)$, $(1+x)^m$, Maxima and Minima, Indeterminate forms.

Unit-III (14 Hrs.)

Tangents and normals, Curvature, Asymptotes, Singular points, Tracing of curves. Parametric representation of curves and tracing of parametric curves, Polar coordinates and tracing of curves in polar coordinates.

Unit-IV (8 Hrs.)

Partial differentiation - Function of two variables, Partial derivatives of higher order, Homogeneous functions, Euler's theorem and its extension (with proof), Composite functions, Total derivative,
Differentiation of implicit functions and composite functions, Jacobians and its properties.

Recommended Books:

1. H. Anton, I. Birens and S. Davis, Calculus, John Wiley and Sons, Inc., 2002.
2. G.B. Thomas and R.L. Finney, Calculus, Pearson Education, 2007.
3. Zafar Ahsan: Differential Equations and Their Applications, Second Edition, PrenticeHall of India Private Limited, New Delhi.
4. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000.
5. Erwin Kreyszig: Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.

DIFFERENTIAL CALCULUS-II

Subject Code: BSNMS1-106 **L T P C** **Duration: 45 Hrs.**
3 0 0 3

Course Outcomes:

CO1: Apply the knowledge of advanced concepts of calculus in order to study theoretical development of different mathematical techniques and their applications.
CO2: Develop the knowledge of computing arc length, area and volume by using integration.
CO3: Understand the concept of integration and different kind of functions.
CO4: Expand the knowledge of multiple integrals and vector surface integrals.

Unit-I (12Hrs.)

Tangent plane and normal to a surface, Maxima and Minima of functions of two variables, Working rule to find the extreme values of a function $z = f(x, y)$, Lagrange's method of undetermined multipliers.

Unit-II (10Hrs.)

Arc formula for the Cartesian equation $y = f(x)$, other expressions for lengths of arcs, Areas under curves, Area formulas for parametric, Polar equation, Area of the closed curve, Volume and surfaces of revolution of curves.

Unit-III (12Hrs.)

Integration by partial fractions, Integration of rational and irrational functions, Properties of definite integral, Reduction formulae for integrals of rational, Trigonometric, Exponential and Logarithmic function and of their combinations.

Unit-IV(11Hrs.)

Double integrals (Cartesian), Change of order of integration in double integrals, Change of variables (Cartesian to polar), Applications: Areas and volumes, Centre of mass and gravity, Triple integrals (Cartesian), Simple applications involving cubes, Sphere and rectangular parallelepipeds.

Recommended Books:

1. G. B. Thomas, M. D. Weir, J. Hass: Thomas' Calculus (Twelfth Edition), Pearson Education.
2. Gorakh Prasad: Integral Calculus, Fourteenth Edition, Reprint 2007, Pothishala Private Limited, Allahabad.
3. Zafar Ahsan: Differential Equations and Their Applications, Second Edition, Prentice Hall of India Private Limited, New Delhi.
4. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000.
5. Erwin Kreyszig: Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.

MECHANICS LAB

Subject Code: BSNMS1-107 **L T P C** **Duration: 60Hrs.**
0 0 4 2

Course Outcomes (COs): After the completion of the course, Student will be able to

CO1: Use basic measurements tools like Vernier caliper, screw gauge etc.
CO2: Find the Moment of Inertia of a Flywheel.
CO3: Determine the Modulus of elasticity
CO4: Learn about motion of Bar Pendulum and Kater's Pendulum.

List of Experiments:

1. Measurements of length (or diameter) using Vernier caliper, screw gauge and travelling microscope.
2. To determine the Height of a Building using a Sextant.
3. To determine the Moment of Inertia of a Flywheel.
4. To determine the Young's Modulus of a Wire by Optical Lever Method.
5. To determine the Modulus of Rigidity of a Wire by Maxwell's needle.
6. To determine the Elastic Constants of a Wire by Searle's method.
7. To determine g by Bar Pendulum.
8. To determine g by Kater's Pendulum.
9. To determine g and velocity for a freely falling body using Digital Timing Technique.
10. To study the Motion of a spring and calculate (a) Spring Constant (b) Value of g

Recommended Books:

1. Advanced Practical Physics for students, B.L. Flint and H.T. Worsnop, 1971, Asia Publishing House.
2. Advanced level Physics Practical's, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers.
3. Engineering Practical Physics, S.Panigrahi & B.Mallick, 2015, Cengage Learning India Pvt. Ltd.
4. A Text Book of Practical Physics, Indu Prakash and Ramakrishna, 11th Edition, 2011, Kitab Mahal, New Delhi.

CHEMISTRY LAB- I

Subject Code: BSNMS1-108 **L T P C** **Duration:60Hrs.**
0 0 4 2

Course Objectives:

1. To develop basic understanding of various lab practices including safety measures.
2. To understand qualitative semi micro analysis of mixtures.
3. To analyze unknown functional group in organic molecules.
4. To understand various chromatographic techniques used for separation of dyes.

Course Outcomes: The students will acquire knowledge of

CO1: Different safety measures in lab
CO2: Analysis of mixture for cations and anions
CO3: Analysis of unknown functional group in organic molecules
CO4: chromatographic techniques used for separation of dyes

Inorganic Chemistry:
Semi Micro analysis. Cation analysis, Separation and identification of ions from groups I, II, III, IV, V, and VI. Anionic analysis. Four ions with no interference.

Organic Chemistry Laboratory Techniques:
Detection of various functional groups in organic compounds (containing upto two extra elements)

Separation of mixtures by Chromatography: Measure the Rf value in each case (combination of two compounds to be given)
Identify and separate the components of a given mixture of two dyes (red and blue ink, fluorescent and methylene blue) by paper chromatography

Recommended Books:
Latest edition of:

1. H. Denny, W. Roesky, 'Chemical Curiosites', WILEY VCH.
2. G. Marr and B.W. Rocket,'Practical Inorganic Chemistry', University Science Books.
3. G. Pass and H. Sutcliffe, 'Practical Inorganic Chemistry', Chapman and Hall, London.
4. J. Mendham, R.C. Denney, J.D. Barnes, M.Thomas, 'Vogel's Textbook of Quantitative Analysis',Pearson Education.
5. G. Svehla, 'Vogel's Textbook of Quantitative Analysis', Pearson Education.

SEMESTER SECOND

DRUG ABUSE: PROBLEM, MANAGEMENT AND PREVENTION

Subject Code: BMNCC0-041 **L T P C** **Duration: 30Hrs.**
2 0 0 0

UNIT-I (6 Hours)

Meaning of Drug Abuse: Meaning: Drug abuse, Drug dependence and Drug addiction. Nature and extent of drug abuse in India and Punjab.

UNIT-II (8 Hours)

Consequences of Drug Abuse: Individual: Education, Employment, Income. Family: Violence. Society: Crime. Nation: Law and Order problem.

UNIT-III (8 Hours)

Prevention of Drug Abuse: Role of Family: Parent-child relationship, Family support, supervision, shipping values, active scrutiny. School: Counselling, Teacher as role-model, Parent-teacher-health professional coordination, Random testing on students.

UNIT-IV (8 Hours)

Treatment and Control of Drug Abuse: Medical Management: Medication for treatment and to reduce withdrawal effects. Psychological Management: Counselling, Behavioural and Cognitive therapy. Social Management: Family, Group therapy and Environmental intervention. Treatment: Medical, Psychological and Social Management. Control: Role of Media and Legislation.

Recommended Books:

1. Ram Ahuja, 'Social Problems in India', Rawat Publications, Jaipur, 2003.
2. 'Extent, Pattern and Trend of Drug Use in India', Ministry of Social Justice and Empowerment, Govt. of India, 2004.
3. J.A. Inciardi, 'The Drug Crime Connection', Sage Publications, Beverly Hills, 1981.
4. T. Kapoor, 'Drug Epidemic among Indian Youth', Mittal Publications, New Delhi, 1985.
5. Kessel, Neil and Henry Walton, 'Alcoholism, Harmond Worth', Penguin Books, 1982.
6. Ishwar Modi and Shalini Modi, 'Addiction and Prevention', Rawat Publications,Jaipur, 1997.
7. 'National Household Survey of Alcohol and Drug Abuse', Clinical Epidemiological Unit, All India Institute of Medical Sciences, New Delhi, 2003 &2004.
8. Ross Coomber and Others, 'Key Concept in Drugs and Society', Sage Publications, New Delhi,2013.
9. Bhim Sain, 'Drug Addiction Alcoholism, Smoking Obscenity', Mittal Publications, New Delhi,1991.
10. Ranvinder Singh Sandhu, 'Drug Addiction in Punjab: A Sociological Study', Guru Nanak Dev University, Amritsar, 2009.
11. Chandra Paul Singh, 'Alcohol and Dependence among Industrial Workers', Shipra,Delhi, 2000.
12. S.Sussman and S.L. Ames, 'Drug Abuse: Concepts, Prevention andCessation', Cambridge University Press, 2008.
13. P.S. Verma, 'Punjab's Drug Problem: Contours and Characteristics', Vol. LII, No. 3, P.P. 40-43, Economic and Political Weekly, 2017. 1
14. 'World Drug Report', United Nations Office of Drug and Crime, 2016.
15. 'World Drug Report', United Nations Office of Drug and Crime,2017

ELECTRICITY, MAGNETISM AND EMT

Subject Code: BSNMS1-202 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

Course Outcome (CO): After the completion of the course, Student will be able to

CO1: Understand the concepts of vector Algebra.
CO2: Understand the basic concepts of electrostatics
CO3: Gain the knowledge about the basic concepts of magneto-statics
CO4: Learn the concept of Maxwell equation and electromagnetic waves.

UNIT-I (13Hrs)

Vector Analysis: Review of vector algebra (Scalar and Vector product), gradient, divergence, Curl and their significance, Vector Integration, Line, surface and volume integrals of Vector fields, Gauss- divergence theorem and Stoke's theorem of vectors (statement only).

UNIT-II (16Hrs)

Electrostatics: Electrostatic Field, electric flux, Gauss's theorem of electrostatics. Applications of Gauss theorem- Electric field due to point charge, infinite line of charge, uniformly charged spherical shell and solid sphere, plane charged sheet, charged conductor. Electric potential as line integral of electric field, potential due to a point charge, electric dipole, uniformly charged spherical shell and solid sphere. Calculation of electric field from potential. Capacitance of an isolated spherical conductor. Parallel plate, spherical and cylindrical condenser. Energy per unit volume in electrostatic field. Dielectric
medium, Polarisation, Displacement vector. Gauss's theorem in dielectrics. Parallel plate capacitor completely filled with dielectric.

UNIT-III (16Hrs)

Magnetism: Magnetostatics: Biot-Savart's law & its applications- straight conductor, circular coil, solenoid carrying current. Divergence and curl of magnetic field. Magnetic vector potential. Ampere's circuital law. Magnetic properties of materials: Magnetic intensity, magnetic induction, permeability, magnetic susceptibility. Brief introduction of dia-, para- and ferro-magnetic materials. Electromagnetic Induction: Faraday's laws of electromagnetic induction, Lenz's law, self and mutual inductance, L of single coil, M of two coils. Energy stored in magnetic field.

UNIT-IV (15 Hrs)

Maxwell`s equations and Electromagnetic wave propagation: Equation of continuity of current, Displacement current, Maxwell's equations, Poynting vector, energy density in electromagnetic field, electromagnetic wave propagation through vacuum and isotropic dielectric medium, transverse nature of EM waves, polarization.

Recommended Books:

1. Electricity and Magnetism, Edward M. Purcell, 1986, McGraw-Hill Education.
2. Mechanics Berkeley Physics course, volume.1: Charles Kittel, et. Al. 2007, Tata McGraw Hill.
3. Electricity and Magnetism, J.H. Fewkes & J. Yarwood. Vol. I, 1991, Oxford Univ. Press.
4. Electricity and Magnetism, D C Tayal, 1988, Himalaya Publishing House.
5. University Physics, Ronald Lane Reese, 2003, Thomson Brooks/Cole.
6. D.J. Griffiths, Introduction to Electrodynamics, 3rd Edn, 1998, Benjamin Cummings.

PHYSICAL CHEMISTRY-I

Subject Code: BSNMS1-203 **L T P C** **Duration: 45 Hrs.**
3 0 0 3

Course Objectives:

1. To develop basic understanding of different states of matter.
2. To understand concept of chemical kinetics.
3. To understand underlying processes associated with various states of matter.
4. To familiarize with relevance of matter properties for realistic applications.

Course Outcomes: Students will be able to acquire the knowledge of

CO1: Basic understanding of different states of matter
CO2: Rate of chemical reactions and related theories.
CO3: Underlying processes associated with various states of matter
CO4: Relevance of matter properties for realistic applications

Unit-I (15 Hrs.)

Gaseous State:

Postulates of kinetic theory of gases, deviation from ideal behaviour, van der Waals equation of states, the isotherms of van der Waals equation, relationship between critical constants and van der Waals constants, the law of corresponding states, reduced equation of state. Molecular velocities: Root mean square, average and most probable velocities. Qualitative discussion of the Maxwell's distribution of molecular velocities, collision number, mean free path and collision diameter, Liquefaction of gases (based on Joule-Thomson effect).

Unit-II (8 Hrs.)

Liquid State:

Intermolecular forces, structure of liquids (a qualitative description) Structural differences between solids, liquids and gases. Liquid crystals: Difference between liquid crystal, solid and liquid, Classification, structure of nematic and cholesteric phases. Thermography and seven segment cell.

Unit-III (12Hrs.)

Solid state:

Nature of the solid state, law of constancy of interfacial angles, law of rational indices, Miller indices, elementary ideas of symmetry, symmetry elements and symmetry operations, qualitative idea of point and space groups, seven crystal systems and fourteen Bravais lattices; X-ray diffraction, Bragg's law, a simple account of rotating crystal method and powder pattern method. Analysis of powder diffraction patterns of NaCl, CsCl and KCl. Defects in crystals.

Unit-IV (10 Hrs.)

Basics of Chemical Kinetics:

The concept of reaction rates. Effect of temperature, pressure, catalyst and other factors on reaction rates. Order and molecularity of a reaction. Derivation of integrated rate equations for zero, first and second order reactions (both for equal and unequal concentrations of reactants). Half–life of a reaction. General methods for determination of order of a reaction. Concept of

activation energy and its calculation from Arrhenius equation. Theories of Reaction Rates: Collision theory and Activated Complex theory of bimolecular reactions. Comparison of the two theories (qualitative treatment only).

Recommended Books:

Latest edition of:

1. Atkins, P., Paula, J.de, Atkins Physical Chemistry; Pubs: Oxford University Press.
2. Puri, B.R., Sharma, L.R., Pathania, M.S., Principles of Physical Chemistry; Pubs: Vishal Publishing Co.
3. Barrow, G.M., Physical Chemistry; Pubs: McGraw Hill Inc.
4. Rao, C.N.R., University General Chemistry; Pubs: Macmillan India.
5. Berry, R.S., Rice, S.A., Ross, J., Physical Chemistry; Pubs: Oxford University Press.
6. Albert, R.A., Silbey, R.J., Physical Chemistry; Pubs: John Wiley & Sons Inc.
7. Dogra, S.K., Dogra, S., Physical Chemistry Through Problems; Pubs: Wiley Eastern Limited.
8. Levine, I.N., Physical Chemistry; Pubs: Tata McGraw Hill Publishing Co. Ltd.
9. Moore, W. J., Basic Physical Chemistry; Pubs: Prentice Hall of India Pvt. Ltd.
10. Metz, C.R., Theory and Problems of Physical Chemistry; Schaum's outline series, 2nd edition, Pubs: McGraw-Hall Book company.

ORGANIC CHEMISTRY-II

Subject Code: BSNMS1-204 **L T P C** **Duration: 45 Hrs.**
3 0 0 3

Course Objectives:

1. To understand the concepts of stereochemistry of organic compounds
2. To understand concepts behind aromaticity
3. To understand the concept of mechanisms of organic reactions
4. To familiarize with the aromatic electrophilic substitution reactions
5. To familiarize with the chemistry of alkyl and aryl halides

Course Outcomes: After the completion of course students will acquire the knowledge of

CO1: Concepts of stereochemistry of organic compounds
CO2: Concepts behind aromaticity
CO3: Mechanisms of organic reactions
CO4: Aromatic electrophilic substitution reactions
CO5: Chemistry of alkyl and aryl halides

Unit-I (15Hrs.)

Stereochemistry of Organic Compounds:

Concept of isomerism. Types of isomerism Optical isomerisin-elements of symmetry, molecular chirality, enantiomers, stereogenic centre, optical activity, properties of enantiomers, chiral and achiral molecules with two stereogenic centres, diastereomers, threo and erythro diastereomers, meso compounds, resolution of enantiomers, inversion, retention and racemization. Relative and absolute configuration, sequence rules, D & Land R & S systems of nomenclature. Geometric isomerism- determination of configuration of geometric isomers, E & Z system of nomenclature, geometric isomerism in oximes and alicyclic compounds. Conformational isomerism-conformational analysis of ethane and n-butane; conformations of cyclohexane, axial and equatorial bonds, conformation of mono substituted cyclohexane derivatives. Newman projection and Sawhorse formulae, Fischer and flying wedge formulae.

Unit-II (7 Hrs.)

Arenes and Aromaticity:

Nomenclature of benzene derivatives. The aryl group. Aromatic nucleus and side chain. Structure of benzene: molecular formula and Kekule structure. Stability and carbon-carbon bond lengths of benzene, resonance structure, MO diagram, the Huckel rule, aromatic ions.

Unit-III (11Hrs.)

Aromatic Electrophilic Substitution:

Aromatic electrophilic substitution-general pattern of the mechanism, role of σ and π complexes. Mechanism or nitration, halogenation, sulphonation, mercuration and Friedel-Crafts reaction. Energy profile diagrams. Activating and deactivating substituents, orientation and ortho/para ratio. Side chain reactions of benzene derivatives. Methods of formation and chemical reaction of alkylbenzenes alkynylbenzenes.

Unit-IV (12 Hrs.)

Alkyl and aryl halides:

Nomenclature and classes of alkyl halides, methods of formation chemical reactions. Mechanisms of nucleophilic substitution reactions of alkyl halides, SN^2 and SN^1 reactions with energy profile diagrams. Methods of formation of aryl halides, nuclear and side chain reactions. The addition elimination and the elimination-additional mechanisms of nucleophilic aromatic substitution reactions. Relative reactivities of alkyl halides vs allyl, vinyl and aryl halides.

Recommended Books:

Latest edition of:

1. Morrison and Boyd, 'Organic Chemistry', Prentice Hall.
2. Solomons, 'Fundamentals of Organic Chemistry', John Wiley.
3. F.A. Carey, 'Organic Chemistry', McGraw Hill,Inc.
4. L.G. Wade Jr., 'Organic Chemistry', Prentice Hall.
5. S.M. Mukherji, S.P. Singh and R.P. Kapoor, 'Organic Chemistry', Vol.-I, II & III, Wiley Eastern Ltd. (New Age International).

DIFFERENTIAL EQUATIONS-I

Subject Code: BSNMS1-205 **L T P C** **Duration: 45 Hrs.**
3 0 0 3

Course Outcomes:

CO1: Understand the concept of ordinary differential equation, its formation, order and degree.
CO2: Apply various methods to solve first order non-linear differential equation.
CO3: Solve linear differential equations of higher order by using various methods.
CO4: Apply differential equations to significant applied and theoretical problems.

Unit-I (12Hrs.)

First order exact differential equations. Integrating factors, rules to find an integrating factor. First order higher degree equations solvable for x, y, p. Methods for solving higher-order differential equations, Basic theory of linear differential equations, Wronskian and its properties, Solving a differential equation by reducing its order.

Unit-II (11Hrs.)

Linear homogenous equations with constant coefficients, Linear non-homogenous equations, The method of variation of parameters, The Cauchy-Euler equation, Simultaneous differential equations, Total differential equations.

Unit-III(12Hrs.)

General solution of homogeneous equation of second order, principle of superposition for a homogeneous equation, Wronskian, its properties and applications, Linear homogeneous and non-homogeneous equations of higher order with constant coefficients, Euler's equation, method of undetermined coefficients, method of variation of parameters, solutions of simultaneous equations.

Unit-IV (10Hrs.)

Classification of second order partial differential equations into elliptic, parabolic and hyperbolic through illustrations only.

Recommended Books:

1. Shepley L. Ross, Differential Equations, 3rd Ed., John Wiley and Sons, 1984.
2. I. Sneddon, Elements of Partial Differential Equations, McGraw-Hill, International Edition, 1967.
3. E.L.Ince: Theory of Ordinary Differential Equations. Dover, 1956.
4. M. Braun, 'Differential Equations and Their Applications', 4th Edn., Springer, 2011.
5. F. Braue and J.A. Nohel, 'The Qualitative Theory of Ordinary Differential Equations', Dover Publications, 1989.
6. E.A. Coddington, 'Ordinary Differential Equations', Tata McGraw Hill, 2002.

DIFFERENTIAL EQUATIONS-II

Subject Code: BSNMS1-206 **L T P C** **Duration: 45 Hrs.**
3 0 0 3

Course Outcomes:

CO1: Understand the concept of first order and linear partial differential equation.
CO2: Apply various power series methods to find series solution of differential equation.
CO3: Recognize the major classification of PDEs and the qualitative differences between the classes of equations.
CO4: Understand the formation and solution of some significant PDEs like wave and heat equation.

Unit-I (10Hrs.)

Order and degree of partial differential equations, Concept of linear and non-linear partial differential equations, Formation of first order partial differential equations, Linear partial differential equation of first order, Lagrange's method, Charpit's method.

Unit-II (13Hrs.)

Power Series solution about an ordinary point, solutions about singular points, The method of Frobenius, Bessel equation and Legendre equation, its properties and their recurrence relations, Hyper geometric equation, Bessel function and their recurrence relations, Strum liouville boundary values.

Unit-III (12Hrs.)

Separation of variables in a PDE, Laplace equation: mean value property, Weak and strong maximum principle, Green's function, Poisson's formula, Dirichlet's principle, Existence of solution using Perron's method (without proof).

Unit-IV (10Hrs.)

Heat equation: Initial value problem, Fundamental solution, Weak and strong maximum principle and uniqueness results, Wave equation: uniqueness, D'Alembert's method, method of spherical means and Duhamel's principle.

Recommended Books:

1. W.E.Boyce and P.C.Diprima: Elementary Differential Equations and Boundary value problems, John Wiley, 1986.
2. R. K. Jain and S.R.K.Iyengar: Advanced Engineering Mathematics, 2nd Edition, Narosa Publishing House, 2003.
3. E.L.Ince: Theory of Ordinary Differential Equations. Dover, 1956.
4. M. Braun, 'Differential Equations and Their Applications', 4th Edn., Springer, 2011.
5. F. Braue and J.A. Nohel, 'The Qualitative Theory of Ordinary Differential Equations', Dover Publications, 1989.
6. E.A. Coddington, 'Ordinary Differential Equations', Tata McGraw Hill, 2002.

ELECTRICITY, MAGNETISM AND EMT LAB

Subject Code: BSNMS1-207 **L T P C** **Duration: 60 Hrs.**
0 0 4 2

Course Outcome (CO): After the completion of the course, Student will be able to

CO1: Take measurements by using Multimeter.
CO2: Learn the measurement of charge, current and resistance using Method.
CO3: Determine resonance in LCR circuit.
CO4: Verify the Thevenin, Norton theorem and Maximum Power Transfer Theorem

List of Experiments:

1. To use a Multimeter for measuring (a) Resistances, (b) AC and DC Voltages, (c) DC Current, and (d) checking electrical fuses.
2. Ballistic Galvanometer: (i) Measurement of charge and current sensitivity (ii) Measurement of CDR (iii) Determine a high resistance by Leakage Method (iv) To determine Self Inductance of a Coil by Rayleigh's Method.
3. To compare capacitances using De' Sauty's bridge.
4. Measurement of field strength B and its variation in a Solenoid (Determined B/dx).
5. To study the Characteristics of a Series RC circuit.
6. To study the a series LCR circuit and determine its (a) Resonant Frequency, (b) Quality Factor
7. To study a parallel LCR circuit and determine its (a) Anti-resonant frequency and (b) Quality factor.
8. To determine a Low Resistance by Carey Foster's Bridge.
9. To verify the Thevenin and Norton theorem
10. To verify the Superposition, and Maximum Power Transfer theorem.

Recommended Books:

1. Advanced Practical Physics for students, B.L.Flint & H.T.Worsnop, 1971, Asia Publishing House.
2. A Text Book of Practical Physics, Indu Prakash and Ramakrishna, 11th Edition, 2011, Kitab Mahal, New Delhi.
3. Engineering Practical Physics, S.Panigrahi & B.Mallick,2015, Cengage Learning India Pvt. Ltd.
4. Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers.

CHEMISTRY LAB-II

Subject Code: BSNMS1-208 **L T P C** **Duration: 60 Hrs.**
0 0 4 2

Course Objectives:

1. To understand the concepts behind crystallization
2. To understand the determination of melting points and effect of impurities on m.p.
3. To understand various purification techniques used for purification.
4. To make students familiar with the determination of physical properties i.e; Viscosity, surface tension, rate of reaction and enthalpy of reaction.

Course Outcomes: After completion of course students will acquire the knowledge and practical hands on training of

CO1: Purification of organic compound using various solvent combinations
CO2: Determination of melting and boiling points of various organic compound
CO3: Chromatographic techniques
CO4: Calculation of physical properties i.e; Viscosity, surface tension, rate of reaction and enthalpy of reaction.

Laboratory Techniques:

1. Checking the calibration of the thermometer
2. Purification of organic compounds by crystallization using the following solvents:
   a. Water
   b. Alcohol
   c. Alcohol-Water
3. Determination of the melting points of above compounds and unknown organic compounds (Kjeldahl method and electrically heated melting point apparatus)
4. Effect of impurities on the melting point – mixed melting point of two unknown organic compounds
5. Determination of boiling point of liquid compounds. (boiling point lower than and more than 100 °C by distillation and capillary method)

Physical Chemistry: Experimental Chemical Kinetics

1. To determine the specific reaction rate of the hydrolysis of methyl acetate/ethyl acetate catalyzed by hydrogen ions at room temperature.
2. To study the effect of acid strength on the hydrolysis of an ester.
3. To determine the viscosity and surface tension of C_2H_5OH and glycerine solution in water
4. Calculation of the enthalpy of ionization of ethanoic acid.

Recommended Books:

Latest edition of:

1. H. Denny, W. Roesky, ‘Chemical Curiosites’, WILEY VCH.
2. J. Mendham, R.C. Denney, J.D. Barnes, M.Thomas, ‘Vogel’s Textbook of Quantitative Analysis’, Pearson Education.
3. G. Svehla, ‘Vogel’s Textbook of Quantitative Analysis’, Pearson Education.

SEMESTER THIRD

THERMAL PHYSICS AND STATISTICAL MECHANICS

Subject Code: BSNMS1- 301 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

Course Outcome (CO): After the completion of the course, Student will be able to

CO1: Understand the concepts of laws of thermodynamics, entropy.
CO2: Learn about the concepts of Maxwell's thermodynamic relations.
CO3: Gain knowledge of Laws associated with thermal radiations and kinetic theory of gases.
CO4: Understand the concepts of thermodynamic probability, phase space

UNIT-I (16 Hrs)

Laws of Thermodynamics: Thermodynamic Description of system: Zeroth Law of thermodynamics and temperature. First law and internal energy, conversion of heat into work, Various Thermodynamical Processes, Applications of First Law: General Relation between CP & CV, Work Done during Isothermal and Adiabatic Processes, Compressibility & Expansion Coefficient, Reversible & irreversible processes, Second law & Entropy, Carnot's cycle & theorem, Entropy changes in reversible & irreversible processes, Entropy-temperature diagrams, Third law of thermodynamics, Unattainability of absolute zero.

UNIT-II (16 Hrs)

Thermodynamic Potential and Theory of Radiation: Enthalpy, Gibbs, Helmholtz and Internal Energy functions, Maxwell's relations & applications - Joule-Thompson Effect, Clausius Clapeyron Equation, Expression for (CP – CV), CP/CV, TdS equations. Blackbody radiation, Spectral distribution, Concept of Energy Density, Derivation of Planck's law, Deduction of Wien's distribution law, Rayleigh Jeans Law, Stefan Boltzmann Law and Wien's displacement law from Planck's law.

UNIT-III (14 Hrs)

Kinetic Theory of Gases: Derivation of Maxwell's law of distribution of velocities and its experimental verification, Mean free path (Zeroth Order), Transport Phenomena: Viscosity, Conduction and Diffusion (for vertical case), Law of equipartition of energy (no derivation) and its applications to specific heat of gases; mono-atomic and diatomic gases.

UNIT-IV (14 Hrs)

Statistical Mechanics: Phase space, Macrostate and Microstate, Entropy and Thermodynamic probability, Maxwell-Boltzmann law, distribution of velocity, Quantum statistics, Fermi-Dirac distribution law, electron gas, Bose-Einstein distribution law, photon gas, comparison of three statistics.

Recommended Books:

1. Statistical Physics, thermodynamics and kinetic theory by V.S.Bhatia
2. Thermal Physics, S. Garg, R. Bansal and C. Ghosh, 1993, Tata McGraw-Hill.
3. A Treatise on Heat, Meghnad Saha, and B.N. Srivastava, 1969, Indian Press.
4. Thermodynamics, Enrico Fermi, 1956, Courier Dover Publications.
5. Heat and Thermodynamics, M.W.Zemasky and R. Dittman, 1981, McGraw Hill 14
6. Thermodynamics, Kinetic theory & Statistical thermodynamics, F.W.Sears & G.L.Salinger. 1988, Narosa
7. University Physics, Ronald Lane Reese, 2003, Thomson Brooks/Cole.
8. Thermal Physics, A. Kumar and S.P. Taneja, 2014, R. chand Publications.

THERMAL PHYSICS AND STATISTICAL MECHANICS LAB

Subject Code: BSNMS1- 302 **L T P C** **Duration: 60 Hrs.**
0 0 4 2

Course Outcome (CO): After the completion of the course, Student will be able to

CO1: Perform Mechanical Equivalent of Heat and thermal conductivity of related experiments.
CO2: Learn about the variation of thermo emf across two junctions of a thermocouple with temperature.
CO3: Record and analyze the cooling temperature using a thermocouple and suitable data acquisition system.
CO4: Calibrate Resistance Temperature Device (RTD

List of Experiments:

1. To determine Mechanical Equivalent of Heat, J, by Callender and Barne's constant flow method.
2. Measurement of Planck's constant using black body radiation.
3. To determine Stefan's Constant.
4. To determine the coefficient of thermal conductivity of copper by Searle's Apparatus.
5. To determine the Coefficient of Thermal Conductivity of Cu by Angstrom's Method.
6. To determine the coefficient of thermal conductivity of a bad conductor by Lee and Charlton's disc method.
7. To determine the temperature co-efficient of resistance by Platinum resistance thermometer.
8. To study the variation of thermo emf across two junctions of a thermocouple with temperature.
9. To record and analyze the cooling temperature of an hot object as a function of time using a thermocouple and suitable data acquisition system.
10. To calibrate Resistance Temperature Device (RTD) using Null Method/Off-Balance Bridge.

Recommended Books:

1. Advanced Practical Physics for students, B.L.Flint & H.T.Worsnop, 1971, Asia Publishing House.
2. Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers.
3. A Text Book of Practical Physics, Indu Prakash and Ramakrishna, 11th Edition, 2011, Kitab Mahal, New Delhi.
4. A Laboratory Manual of Physics for Undergraduate Classes, D.P. Khandelwal, 1985, Vani Publication.

INORGANIC CHEMISTRY-II

Subject Code: BSNMS1-303 **L T P C** **Duration: 45 Hrs.**
3 0 0 3

Course Objectives:

1. To understand chemistry of s block element
2. To familiarize with the concepts of acids and bases
3. To understand the concepts behind chemistry of s & p block elements
4. To understand the chemistry of various transition elements.

Course Outcomes: After the completion of course students will acquire the knowledge of:

CO1: Concepts behind acids and bases
CO2: Chemistry of s and p block elements
CO3: Concepts of chemistry of various transition elements

Unit-I (6 Hrs.)

s-Block Elements: Comparative studies, diagonal relationship, salient features of hydrides, solvation and complexation tendencies.

Acids and Bases: Arrhenius, Bronsted-Lowry, the Lux-Flood, solvent system and Lewis concepts of acids and bases.

Unit-II (12 Hrs.)

p–Block Elements–I: Comparative study (including diagonal relationship) of groups 13–17 elements, compounds like hydrides, oxides, oxyacids and halides of groups 13–17, hydrides of boron–diborane and higher boranes, Borazine, borohydrides, fullerenes. VBT, VSPER theory, MOT.

Unit-III (12 Hrs.)

p–Block Elements-II: Carbides, fluorocarbons, silicates (structural principle), tetrasulphur tetranitride, basic properties of halogens, interhalogens and polyhalide ,Silicones and phosphazenes as examples of inorganicpolymers, nature of bonding in triphosphazenes.

Unit-IV (15 Hrs.)

Chemistry of Transition Elements:

Characteristic properties of d–block elements. Properties of the elements of the first transition series, their simple compounds and complexes illustrating relative stability of their oxidation states, coordination number and geometry. General characteristics of elements of Second and Third Transition Series, comparative treatment with their 3d analogues in respect of ionic radii, oxidation states, magnetic behaviour. CFT and CFSE for Octahedral/Tetrahedral complexes.

Recommended Books:

Latest edition of:

1. Cotton, F.A., Wilkinson, G., Gaus, P.L., Basic Inorganic Chemistry; Pubs: John Wiley and Sons.
2. Lee, J.D., Concise Inorganic Chemistry;Pubs: Chapman & Hall Ltd.
3. Shriver, D.E., Atkins, P.W., Inorganic Chemistry; Pubs: Oxford University Press.
4. Douglas, B., Medaniel, D., Atenander, J., Concepts and Models of Inorganic Chemistry; Pubs: John Wiley and Sons Inc.
5. Porterfeild, W.W., Wesky, A., Inorganic Chemistry; Pubs: Addison-Wesky Publishing Company.
6. Miessler, G.L., Tarr, D.A., Inorganic Chemistry; Pubs: Pearson Education Inc.
7. Jolly, W.L., Modern Inorganic Chemistry; Pubs: Tata McGraw-Hill Publishing Company Limited.
8. Purcell, K.F., Kotz, J.C., Inorganic Chemistry; Pubs: W.B.Saunders Company.
9. Puri, B.R., Sharma, L.R., Kalia, K.K., Principles of Inorganic Chemistry; Pubs: Milestones Publisher.

PHYSICAL CHEMISTRY-II

Subject Code: BSNMS1-304 **L T P C** **Duration: 45 Hrs.**
3 0 0 3

Course Objectives:

1. To understand energy exchange processes
2. To familiarize with the system of variable compositions.
3. To understand the concepts of thermodynamics.
4. To understand the concept of chemical equilibrium.

Course Outcomes: On completion of this course, students will be able to:

CO1: Identify and describe energy exchange processes.
CO2: Manipulate physical parameters to favour a particular process.
CO3: Compare the system properties with variation in composition.
CO4: Identify and analyze uni/multicomponent system.

Unit-I (14 Hrs.)

Thermodynamics-I:

Definition of thermodynamic terms: System, surroundings etc. Types of systems, intensive and extensive properties. State and path functions and their differentials. Thermodynamic process. Concept of heat and work.

First Law of Thermodynamics: Statement, definition of internal energy and enthalpy. Heat capacity, heat capacities at constant volume and pressure and their relationship. Joule's law-Joule-Thomson coefficient and inversion temperature, Calculation of w,q,dU & dH for the expansion of ideal gases under isothermal and adiabatic conditions for reversible process.

Thermochemistry: Standard state, standard enthalpy of formation-Hess's Law of heat summation and its applications. Heat of reaction at constant pressure and at constant volume. Enthalpy of neutralization. Bond dissociation energy and its calculation from thermo-chemical data, temperature dependence of enthalpy. Kirchhoff's equation.

Unit-II (15 Hrs.)

Thermodynamics-II & III:

Second Law of Thermodynamics: Need for the law, different statements of the law, Carnot cycle and its efficiency, Carnot theorem. Thermodynamic scale of temperature.

Concept of Entropy: Entropy as a state function, entropy as a function of V & T, entropy as a function of P & T, entropy change in physical change, Clausius inequality, entropy as a criteria of spontaneity and equilibrium. Entropy change in ideal gases and mixing of gases.

Third Law of Thermodynamics: Nernst heat theorem, statement and concept of residual entropy, evaluation of absolute entropy from heat capacity data. Gibbs and Helmholtz functions; Gibbs function (G) and Helmholtz function (A) as thermodynamic quantities, A & G as criteria for thermodynamic equilibrium and spontaneity, their advantage over entropy change, Variation of G and A with P,V and T.

Unit-III (6 Hrs.)

Chemical Equilibrium:

Equilibrium constant and free energy. Thermodynamic derivation of law of mass action. Determination of Kp, Kc, Ka and their relationship, Clausius-Clapeyron equation, applications.

Unit-IV (10 Hrs.)

Introduction to Phase Equilibrium:

Statement and meaning of the terms-phase, component and degree of freedom, derivation of Gibbs phase rule, phase equilibria of one component system-water, CO_2 and S systems. Phase equilibria of two component systems-solid-liquid equilibria, simple eutectic-Bi-Cd, Pb-Ag systems, desilverisation of lead. Solid solutions-compound formation with congruent melting point (Mg-Zn) and incongruent melting point, (NaCl-H_2O), $FeCl_3$-H_2O) and $CuSO_4$-H_2O) system. Freezing mixtures, acetone-dry ice. Non-ideal system-azeotropes-HCl-H_2O and ethanol-water system. Partially miscible liquids Phenol-water, trines-thylamin-water, Nicotine-water System. Lower and upper consulate temperature, Effect of impurity on consolute temperature, immiscible liquids, steam distillation. Nernst distribution law-thermodynamic derivation and applications.

Recommended Books:

Latest edition of:

1. Atkins, P., Paula, J.de, Atkins Physical Chemistry; Pubs: Oxford University Press.
2. Puri, B.R., Sharma, L.R., Pathania, M.S., Principles of Physical Chemistry; Pubs: Vishal Publishing Co.
3. Barrow, G.M., Physical Chemistry; Pubs: McGraw Hill Inc.
4. Rao, C.N.R., University General Chemistry; Pubs: Macmillan India.
5. Berry, R.S., Rice, S.A., Ross, J., Physical Chemistry; Pubs: Oxford University Press.
6. Albert, R.A., Silbey, R.J., Physical Chemistry; Pubs: John Wiley & Sons Inc.
7. Dogra, S.K., Dogra, S., Physical Chemistry Through Problems; Pubs:Wiley Eastern Limited.
8. Levine, I.N., Physical Chemistry; Pubs: Tata McGraw Hill Publishing Co. Ltd.
9. Moore, W. J., Basic Physical Chemistry; Pubs: Prentice Hall of India Pvt. Ltd.
10. Metz, C.R., Theory and Problems of Physical Chemistry; Schaum's outline series, Pubs: McGraw-Hall Book company.

CHEMISTRY LAB III

Subject Code: BSNMS1-305 **L T P C** **Duration: 60 Hrs.**
0 0 4 2

Course Objectives:

1. To understand the concepts behind Estimation of metals.
2. To synthesis and separation if various inorganic compounds

Course Outcomes: After completion of course students will gain the knowledge of:

CO1: Obtaining precise results of estimation by titrations
CO2: Preparation separations of organic compounds.

Quantitative Analysis:

i. Volumetric Analysis

a) Determination of acetic acid in commercial vinegar using NaOH.
b) Determination of alkali content-antacid tablet using HCI.
c) Estimation of calcium content in chalk as calcium oxalate by permanganometry.
d) Estimation of hardness of water by EDTA.
e) Estimation of ferrous and ferric by dichromate method.
f) Estimation of copper using sodiumthiosulphate.

ii. Gravimetric Analysis

Analysis of Cu as CuSCN and Ni as Ni (dimethylgloxime)

Organic Chemistry Laboratory Techniques

Thin Layer Chromatography

a) Determination of R_f values and identification of organic compounds.
b) Separation of green leaf pigments (spinach leaves may be used).
c) Preparation and separation of 2, 4. dinitrophenylhydrazones of acetone, 2-butone, 2-Butanone, hexan-2 and 3-one using toluene and light petroleum (40 : 60).
d) Separation of a mixture of dyes using cyclohexane and ethyl acetate (8.5:1.5).

Recommended Books:

Latest edition of:

1. H. Denny, W. Roesky, 'Chemical Curiosites', WILEY VCH.
2. G. Marr and B.W. Rocket,'Practical Inorganic Chemistry', University Science Books.
3. G. Pass and H. Sutcliffe, 'Practical Inorganic Chemistry', Chapman and Hall, London.
4. J. Mendham, R.C. Denney, J.D. Barnes, M.Thomas, 'Vogel's Textbook of Quantitative Analysis, Pearson Education.
5. G. Svehla, 'Vogel's Textbook of Quantitative Analysis', Pearson Education6.
6. Vogel, A.I., Tatchell, A.R., Furnis, B.S., Hannaford, A.J. & Smith, P.W.G.,Textbook of Practical Organic Chemistry, Prentice-Hall.

REAL ANALYSIS-I

Subject Code: BSNMS1-306 **L T P C** **Duration: 45 Hrs.**
3 0 0 3

Course Outcomes:

CO1: Understand the various properties of the real line $\mathbb{R}$.
CO2: Understand the concept of different kinds of sequences, their convergence, squeeze theorem and Cauchy's theorem on limit.
CO3: Apply the various tests for convergence and absolute convergence of an infinite series of real numbers
CO4: Understand the concept of sequence in series function, M-test and power series methods.

Unit-I (12Hrs.)

Finite and infinite sets, examples of countable and uncountable sets. Real line, bounded sets, suprema and infima, completeness property of R, Archimedean property of R, intervals. Concept of cluster points and statement of Bolzano Weierstrass theorem.

Unit-II (11Hrs.)

Real Sequence, Bounded sequence, Cauchy convergence criterion for sequences. Cauchy's theorem on limits, order preservation and squeeze theorem, monotone sequences and their convergence (monotone convergence theorem without proof).

Unit-III (12Hrs.)

Infinite series. Cauchy convergence criterion for series, positive term series, geometric series, comparison test, convergence of p-series, Root test, Ratio test, alternating series, Leibnitz's test (Tests of Convergence without proof), Definition and examples of absolute and conditional convergence.

Unit-IV (10Hrs.)

Sequences and series of functions, Pointwise and uniform convergence. Mn-test, M-test, Statements of the results about uniform convergence and integrability and differentiability of functions, Power series and radius of convergence.

Recommended Books:

1) T. M. Apostol, Calculus (Vol. I), John Wiley and Sons (Asia) P. Ltd., 2002.
2) R.G. Bartle and D. R Sherbert, Introduction to Real Analysis, John Wiley and Sons (Asia) P. Ltd., 2000.
3) E. Fischer, Intermediate Real Analysis, Springer Verlag, 1983.
4) K.A. Ross, Elementary Analysis- The Theory of Calculus Series- Undergraduate Texts in Mathematics, Springer Verlag, 2003.
5) ROBERT G. Bartle and Donald R. Sherbert, Introduction to Real Analysis, 3/e, John Wiley & Sons, Inc. 2000.
6) Walter Rudin, Principles of Mathematical Analysis, 3/e, McGraw-Hill, 1976.
7) S.C. Malik and Savita Arora, Mathematical Analysis, New Age International Publisher, Reprint 2008.

REAL ANALYSIS-II

Subject Code: BSNMS1-307 **L T P C** **Duration: 45 Hrs.**
3 0 0 3

Course Outcomes:

CO1: Understand properties of Riemann integral and related theorems.
CO2: Illustrate the effect of uniform convergence on the limit function with respect to continuity, differentiability, and integrability.
CO3: Examine the point wise and uniform convergence using various tests
CO4: To understand basic topology of metric spaces.

Unit-I (11Hrs.)

Definition of Riemann integral, Its examples and properties, Bounded theorem, Riemann integrable functions, Cauchy criterion, The Squeeze theorem, Classes of Riemann integrable functions, Additivity theorem, Fundamental theorem- first and second form, Substitution theorem.

Unit-II (12Hrs.)

Pointwise and Uniform convergence, Interchange of limit and continuity, Interchange of limit and derivatives, Interchange of limit and integral, Bounded convergence theorem, Dini's theorem, The exponential functions logarithmic and trigonometric functions.

Unit-III (10Hrs.)

Absolutely and uniformly convergent series of functions defined on a domain, Interchange of integral and summation, Tests for uniform convergence—Cauchy criterion, Weirstrass M-test.

Unit-IV (12Hrs.)

Metric spaces, Examples of metric spaces, Neighbourhood of a point, Limit point and isolated points of a set, Closed set, Interior point of a set, Open set, Perfect set, Bounded set, Dense set, Union and intersection of open sets, Closure of a set.

Recommended Books:

1) T. M. Apostol, Calculus (Vol. I), John Wiley and Sons (Asia) P. Ltd., 2002.
2) R.G. Bartle and D. R Sherbert, Introduction to Real Analysis, John Wiley and Sons (Asia) P. Ltd., 2000.
3) E. Fischer, Intermediate Real Analysis, Springer Verlag, 1983.
4) K.A. Ross, Elementary Analysis- The Theory of Calculus Series- Undergraduate Texts in Mathematics, Springer Verlag, 2003. ROBERT G. Bartle and Donald R. Sherbert,
5) Introduction to Real Analysis, 3/e, John Wiley & Sons, Inc. 2000.
6) Walter Rudin, Principles of Mathematical Analysis, 3/e, McGraw-Hill, 1976.

COMPUTATIONAL PHYSICS SKILLS

Subject Code: BSNMS1-308 **L T P C** **Duration: 60 Hrs.**
0 0 4 2

Course Outcome (CO): After the completion of the course, Student will be able to

CO1: Learn the Importance of computers in Physics
CO2: Enhance skill in Linux and FORTRAN,
CO3: Understand the concepts of statements
CO4: Gain knowledge about the Computer programing

Introduction:

Importance of computers in Physics, paradigm for solving physics problems for solution. Algorithms and Flowcharts: Algorithm: Definition, properties and development. Flowchart: Concept of flowchart, symbols, guidelines, types. Examples: Cartesian to Spherical Polar Coordinates, Roots of Quadratic Equation, Sum of two matrices, Sum and Product of a finite series, calculation of sin (x) as a series, algorithm for plotting (1) lissajous figures and (2) trajectory of a projectile thrown at an angle with the horizontal.

Scientific Programming:

Some fundamental Linux Commands (Internal and External commands). Development of FORTRAN, Basic elements of FORTRAN: Character Set, Constants and their types, Variables and their types, Keywords, Variable Declaration and concept of instruction and program. Fortran Statements: I/O Statements (unformatted/formatted), Executable and Non-Executable Statements, Layout of Fortran Program, Format of writing Program and concept of coding, Initialization and Replacement Logic.

Control Statements:

Types of Logic (Sequential, Selection, Repetition), Branching Statements (Logical IF, Arithmetic IF, Block IF, Nested Block IF, SELECT CASE and ELSE IF Ladder statements), Looping Statements (DO-CONTINUE, DO-ENDDO, DOWHILE, Implied and Nested DO Loops), Jumping Statements (Unconditional GOTO, Computed GOTO, Assigned GOTO) Subscripted Variables (Arrays: Types of Arrays, DIMENSION Statement, Reading and Writing Arrays), Functions and Subroutines.

Visualization:

Introduction to graphical analysis and its limitations. Introduction to Gnuplot. Importance of visualization of computational and computational data.

Programming:

1. To print out all natural even/ odd numbers between given limits.
2. To find maximum, minimum and range of a given set of numbers.
3. Calculating Euler number using exp(x) series evaluated at x=1.
4. To compile a frequency distribution and evaluate mean, standard deviation etc.
5. To evaluate sum of finite series and the area under a curve.
6. To find the product of two matrices

7. To find a set of prime numbers and Fibonacci series.
8. To write program to open a file and generate data for plotting using Gnuplot.
9. Plotting trajectory of a projectile projected horizontally.
10. Plotting trajectory of a projectile projected making an angle with the horizontally.
11. To find the roots of a quadratic equation.
12. Motion of a projectile using simulation and plot the output for visualization.
13. Numerical solution of equation of motion of simple harmonic oscillator and plot the outputs for visualization.
14. Motion of particle in a central force field and plot the output for visualization

Recommended Books:

1. Introduction to Numerical Analysis, S.S. Sastry, 5th Edn., 2012, PHI Learning Pvt. Ltd.
2. Computer Programming in Fortran 77". V. Rajaraman (Publisher:PHI).
3. Gnuplot in action: understanding data with graphs, Philip K Janert, (Manning 2010)
4. Schaum's Outline of Theory and Problems of Programming with Fortran, S Lipsdutz and A Poe, 1986Mc-Graw Hill Book Co.
5. Computational Physics: An Introduction, R. C. Verma, et al. New Age International Publishers, New Delhi (1999)
6. A first course in Numerical Methods, U.M. Ascher and C. Greif, 2012, PHI Learning

SEMESTER FOURTH

ENVIRONMENTAL SCIENCE

Subject Code: BHSMC0-041 **L T P C** **Duration: 45 Hrs.**
3 0 0 3

Course Objectives:

1. To familiarize the student with the basic concept of Environmental and Environmental Chemistry.
2. To elaborate the ecosystem and their properties.
3. To understand the concept of Environmental Pollution and its diverse effect of pollution.
4. To understand the concept of sustainable and unsustainable development and its importance.

Course Outcomes: On completion of this course, students will be able to:

CO1: Understand the basics of Environment chemistry
CO2: Analyze the general concept of ecosystem and their components.
CO3: Comprehend the applicability of social issues and Environment.
CO4: Recognize the Environment Pollution and control measures of urban and industrial wastes.

Unit-I (08 Hours)

The Multidisciplinary nature of environmental studies, Natural Resources: Renewable and non-renewable resources

Unit-II (15 Hours)

Natural resources and associated problems: a) Forest resources; b) Water resources; c) Mineral resources; d) Food resources; e) Energy resources; f) Land resources: Role of an individual in conservation of natural resources.

Unit-III (12 Hours)

Ecosystems, Concept of an ecosystem, Structure and function of an ecosystem, Introduction, types, characteristic features of the ecosystems (a) Forest ecosystem (b) Grassland ecosystem (c) Desert ecosystem (d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Unit- IV (10 Hours)

Environmental Pollution: Air pollution; Water pollution; Soil pollution

Recommended Books:

1. Y.K. Sing, Environmental Science, New Age International Pvt, Publishers, Bangalore
2. Agarwal, K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.
3. Bharucha Erach, The Biodiversity of India, Mapin Pu blishing Pvt. Ltd., Ahmedabad – 380 013, India.
4. Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p.
5. Clark R.S., Marine Pollution, Clanderson Press Oxford.
6. Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Publ. House, Mumbai, 1196p.
7. De A.K., Environmental Chemistry, Wiley Eastern Ltd. 8. Down of Earth, Centre for Science and Environment

WAVES AND OPTICS

Subject Code: BSNMS1-401 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

Course Outcome (CO): After the completion of the course, Student will be able to

CO1: Understand the concepts of harmonic oscillations and wave motion.
CO2: Gain knowledge of simple harmonic motion and its applications.
CO3: Learn about the concepts of Interference.
CO4: Understand the concepts polarization and diffraction.

UNIT-I (15 Hrs)

Harmonic oscillators and Wave Motion:

Superposition of two collinear Harmonic oscillations: Linearity and Superposition Principle. (1) Oscillations having equal frequencies and (2) Oscillations having different frequencies (Beats). Superposition of Two Perpendicular Harmonic Oscillations: Graphical and Analytical Methods. Lissajous Figures with equal an unequal frequency and their uses. Transverse waves on a string. Travelling and standing waves on a string. Normal Modes of a string. Group velocity, Phase velocity. Plane waves. Spherical waves, Wave intensity

UNIT-II (15 Hrs)

Simple Harmonic motion and applications:

Simple harmonic motion - forced vibrations and resonance - Fourier's Theorem - Application to saw tooth wave and square wave - Intensity and loudness of sound - Decibels - Intensity levels - musical notes - musical scale. Acoustics of buildings: Reverberation and time of reverberation - Absorption coefficient - Sabine's formula - measurement of reverberation time - Acoustic aspects of halls and auditoria

UNIT-II (16 Hrs)

Wave optics and Interference:

Electromagnetic nature of light. Definition and Properties of wave front. Huygens Principle. Interference: Division of amplitude and division of wavefront. Young's Double Slit experiment. Lloyd's Mirror and Fresnel's Biprism. Phase change on reflection: Stokes' treatment. Interference in Thin Films: parallel and wedge-shaped films. Fringes of equal inclination (Haidinger Fringes); Fringes of equal thickness (Fizeau Fringes). Newton's Rings: measurement of wavelength and refractive index. Michelson's Interferometer: Idea of form of fringes (no theory needed), Determination of wavelength, Wavelength difference, Refractive index and Visibility of fringes.

UNIT-IV (14 Hrs)

Diffraction and Polarization:

Fraunhofer diffraction: Single slit; Double Slit. Multiple slits & Diffraction grating. Fresnel Diffraction: Half-period zones. Zone plate. Fresnel Diffraction pattern of a straight edge, a slit and a wire using half-period zone analysis. Transverse nature of light waves. Plane polarized light – production and analysis. Circular and elliptical polarization.

Recommended Books:

1. Fundamentals of Optics, F A Jenkins and H E White, 1976, McGraw-Hill
2. Principles of Optics, B.K. Mathur, 1995, Gopal Printing.
3. Fundamentals of Optics, H.R. Gulati and D.R. Khanna, 1991, R. Chand Publication.
4. University Physics. FW Sears, MW Zemansky and HD Young1986. Addison-Wesley.

WAVES AND OPTICS LAB

Subject Code: BSNMS1- 402 **L T P C** **Duration: 60 Hrs.**
0 0 4 2

Course Outcome (CO): After the completion of the course, Student will be able to

CO1: Learn about the motion of coupled oscillators and Lissajous Figures
CO2: Understand various diffraction phenomenon using prism and biprism
CO3: Determine the Refractive Index, dispersive Power of the Material, and Resolving Power of prism using various methods
CO4: Understand Schuster`s focusing and photo sensor

List of Experiments:

1. To investigate the motion of coupled oscillators.
2. To determine the Frequency of an Electrically Maintained Tuning Fork by Melde's Experiment and to verify λ2 – T Law.
3. To study Lissajous Figures.
4. Familiarization with Schuster`s focussing; determination of angle of prism.
5. To determine the Coefficient of Viscosity of water by Capillary Flow Method (Poiseuille's method).
6. To determine the Refractive Index of the Material of a given Prism using Sodium Light.
7. To determine Dispersive Power of the Material of a given Prism using Mercury Light.
8. To determine the value of Cauchy Constants of a material of a prism.
9. To determine the Resolving Power of a Prism.
10. To determine wavelength of sodium light using Fresnel Biprism.
11. To determine wavelength of sodium light using Newton's Rings.
12. To determine the wavelength of Laser light using Diffraction of Single Slit.
13. To determine wavelength of (1) Sodium & (2) spectrum of Mercury light using plane diffraction Grating.
14. To determine the Resolving Power of a Plane Diffraction Grating.
15. To measure the intensity using photosensor and laser in diffraction patterns of single and double slits.

Recommended Books:

1. Advanced Practical Physics for students, B.L. Flint & H.T. Worsnop, 1971, Asia Publishing House. 17.
2. Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers.
3. A Text Book of Practical Physics, Indu Prakash and Ramakrishna, 11th Edition, 2011, Kitab Mahal, New Delhi.

ORGANIC CHEMISTRY-III

Subject Code: BSNMS1-403 **L T P C** **Duration: 45 Hrs.**
3 0 0 3

Course Objectives:

1. To understand the chemistry of carboxylic acids and their derivatives
2. To understand the mechanisms of organic reactions
3. To understand ethers epoxides and nitrogen based organic compounds
4. To familiarize with the chemistry of organometallic compounds
5. To understand the chemistry behind heterocyclic compounds

Course Outcomes: After the completion of course students will acquire the knowledge of:

CO1: Chemistry behind carboxylic acids and their derivatives
CO2: Mechanisms of organic reactions
CO3: Chemistry of heteroatom based organic molecules.
CO4: Chemistry of organometallic compounds

Unit-I (12 Hrs.)

Carboxylic Acids: Nomenclature, structure and bonding, physical properties, acidity of carboxylic acids, effects of substituents on acid strength. Reactions of carboxylic acids. Hell-Volhard-Zelinsky reaction. Synthesis of acid chlorides, esters and amides. Reduction of carboxylic acids. Mechanism of decarboxylation.

Carboxylic Acids Derivatives: Structure and nomenclature of acid chlorides, esters, amides and acid anhydrides, Relative stability & reactivity of acyl derivatives. Physical properties, interconversion of acid derivatives by nucleophilic acyl substitution. Preparation of carboxylic acid derivatives, chemical reactions. Mechanisms of esterification and hydrolysis (acidic and basic).

Unit-II (20 Hrs.)

Ethers and Epoxides:

Nomenclature of ethers and methods of their formation, physical properties. Chemical reaction-cleavage and autoxidation, Ziesel's method. Synthesis of epoxides. Acid and base-catalyzed ring opening of epoxides, orientation of epoxide ring opening, reactions of Grignard and organolithium reagents with epoxides.

Organic Compounds of Nitrogen: preparation of nitroalkanes and nitroarenes. Chemical reactions of nitroalkanes, Mechanisms of nucleophilc substitution in nitroarenes and their reduction in acidic, neutral and alkaline media. Reactivity, Structure and nomenclature of amines, Methods of preparation of amines by Reductive amination of aldehydic and ketonic compounds, Gabriel-phthalimide reaction and Hofmann bromamide reaction. Physical properties. Stereochemistry of amines. Separation of a mixture of primary, secondary and tertiary amines. Structural features effecting basicity of amines. Amine salts as phase-transfer catalysts.

Unit-III (5 Hrs.)

Organometallic Compounds:

Organomagnesium Compounds: The Grignard reagents formation, structure and chemical reactions. Organolithium Compounds: Formation and chemical reactions.

Organozinc and Organo copper Compounds: Nomenclature, structural features, Methods of formation and chemical reactions.

Unit-IV (8 Hrs.)

Heterocyclic Compounds

Introduction: Molecular orbital picture and aromatic characteristics of pyrrole, furan, thiophene and pyridine. Methods of synthesis and chemical reactions with particular emphasis on the mechanism of electrophilic substitution. Mechanism of nucleophilic substitution reactions in pyridine derivatives. Comparison of basicity of pyridine, piperidine and pyrrole.

Recommended Books:

Latest edition of:

1. Morrison, R.T., Boyd, R.N., Organic Chemistry;Pubs: Prentice-Hall.
2. Wade Jr., L.G., Singh, M.S., Organic Chemistry; Pubs: Pearson Education.
3. Mukherji, S.M., Singh, S.P., Kapoor, R.P., Organic Chemistry; Pubs: Wiley Eastern Limited, 1985, Vol.I, II, III.
4. Solomons, T.W., Fryhle, C.B., Organic Chemistry; Pubs: Wiley India.
5. Carey, F.A., Organic Chemistry; Pubs: McGraw-Hill.
6. Streitwieser, A., Clayton, Jr., Heathcock, H., Introduction to Organic Chemistry; Pubs: Macmillan Publishing Company.
7. Introduction to Organic Chemistry, Sireitwieser, Heathcock and Kosover, Macmilan.

PHYSICAL CHEMISTRY-III

Subject Code: BSNMS1-404 **L T P C** **Duration: 45 Hrs.**
3 0 0 3

Course objectives:

1. To understand the redox perspective of various processes.
2. To familiarize with various nuclear and electronic phenomenon.
3. To understand concepts of electrochemistry.
4. To familiarize with basic concept of spectroscopy.

Course outcomes: On completion of this course, students will be able to:

CO1: Understand the redox perspective of various processes.
CO2: Understand various nuclear and electronic phenomenon.
CO3: Apply electrochemical concepts and analyse outcomes of different conditions.
CO4: Assign the reasoning for various physical phenomenon.

Unit-I (12 Hrs.)

Electrochemistry-I:

Electrical transport-conduction in metals and in electrolyte solutions, specific conductance and equivalent conductance, measurement of equivalent conductance, variation of equivalent and specific conductance with dilution. Migration of ions and Kohlrausch law, Arrhenius theory of electrolyte dissociation and its limitations, weak and strong electrolytes, Ostwald's dilution law, its uses and limitations. Debye-Huckel-Onsager's equation for strong electrolytes (elementary treatment only). Transport number, definition and determination by Hittorf method and moving boundary method. Applications of conductivity measurements: determination of degree of dissociation, determination of Ka of acids, determination of solubility product of a sparingly soluble salt, conductometric titrations.

Unit-II (12 Hrs.)

Electrochemistry – II:

Types of reversible electrodes-gas metal ion, metal ion, metal insoluble salt-anion and redox electrodes. Electrode reactions. Nernst equation, derivation of cell E.M.F. and Single electrode potential, standard hydrogen electrode, reference electrodes, standard electrode potential, sign conventions, electrochemical series and its significance. Electrolytic and Galvanic cells-reversible and irreverisible cells, conventional representation of electrochemical cells.

EMF of a cell and its measurements. Computation of cell. EMF, Calculation of thermodynamic quantities of cell reactions (ΔG ΔH and K), polarization, over potential and hydrogen overvoltage.

Concentration cells with and without transport, liquid junction potential, application of concentration cells, valency of ions, solubility product and activity coefficient, potentiometric titrations.

Definition of pH and pKa, determination of pH using hydrogen, quinhydrone and glass electrodes, by potentiometric methods. Buffers-mechanism of buffer action, Henderson-Hazel equation, Hydrolysis of salts. Corrosion-types, theories and methods of combating it.

Unit III (10 Hrs.)

Nuclear Chemistry:

Introduction: Radioactivity, Nuclear Structure, Size of Nucleus, Mass Defects and Binding Energy, Nuclear Stability, Nuclear Forces, Nuclear Spin and Moments of Nuclei, Nuclear Models, Nuclear Decay Processes, The Laws of Radioactive Decay, Soddy-Fajans Group Displacement Law, Rate of Nuclear Decay and Half Life Time (Kinetics of Radioactive Decay), Induced Nuclear Reactions, Types of Nuclear Processes, High Energy Nuclear Reactions, Nuclear Reaction Cross-Section, Artificial radioactivity, Detection and Measurement of Radioactivity, Nuclear Fission, Nuclear Fusion, Applications of Radioactivity.

Unit-IV (11 Hrs.)

Spectroscopy: Introduction, Electromagnetic radiation, regions of the spectrum, basic features of different spectrometers, statement of the Born-Oppenheimer approximation, degrees of freedom.

Electronic Spectrum: Concept of potential energy curves for bonding and antibonding molecular orbitals, qualitative description of selection rules and Franck-Condon principle. Qualitative description of s, p, and n M.O., their energy levels and the respective transitions

Recommended Books:

Latest edition of:

1. Atkins, P., Paula, J.de, Atkins Physical Chemistry; Pubs: Oxford University Press.
2. Puri, B.R., Sharma, L.R., Pathania, M.S., Principles of Physical Chemistry; Pubs: Vishal Publishing Co.
3. Barrow, G.M., Physical Chemistry; Pubs: McGraw Hill Companies Inc.
4. Rao, C.N.R., University General Chemistry; Pubs: Macmillan of India.
5. Berry, R.S., Rice, S.A., Ross, J., Physical Chemistry, Pubs: Oxford University Press.
6. Albert, R.A., Silbey, R.J., Physical Chemistry; Pubs: John Wiley & Sons Inc.
7. Levine, I.N., Physical Chemistry; Pubs: Tata McGraw Hill Publishing Co. Ltd.
8. Moore, W. J., Basic Physical Chemistry; Pubs: Prentice Hall of India Pvt. Ltd.
9. Metz, C.R., Theory and problems of Physical Chemistry; Schaum's outline series, Pubs: McGraw-Hall Book Company.
10. Friedlander, Kennedy, Miller and Macias Nuclear and Radio Chemistry: John Wiley & Sons Inc.
11. Choppin, Lijenzin, Rydberg and Ekberg Radio Chemistry and Nuclear Chemistry Pubs Elsevier.

CHEMISTRY LAB-IV

Subject Code: BSNMS1-405 **L T P C** **Duration: 60 Hrs.**
0 0 4 2

Course objectives:

1. To understand the principle and application of conductometric titrations.
2. To understand various physical processes and their principle.
3. To understand synthesis and analysis of inorganic complexes

Course outcomes: On completion of this course, students will be able to:

CO1: Understand the principle and application of conductometric titrations.
CO2: Understand various physical phenomenon and their principle.
CO3: Synthesis and analysis of inorganic complexes.

I. Synthesis and Analysis

a) Preparation of Sodium trioxalatoferrate (III)
b) Preparation of Ni-DMG Complex
c) Preparation of Copper tetrammine complex
d) Preparation of cis-bisoxalatodiaquachromate (III) ion

II. Physical Chemistry

a) Conductometric Titrations:

i. Determine the end point of the following titrations by the conductometric methods.
   - Strong acid-Strong base
   - Strong acid-Weak base
   - Weak acid-Strong base
   - Weak acid-Weak base

ii. Determine the composition of a mixture of acetic acid and the hydrochloric acid by conductometric titration.

b) Weight Determination

i. Molecular Weight Determination of acetanilide, napthalane, using camphor as solvent (Rast's methods).
ii. To determine the molecular weight of a polymer by viscosity measurements.

c) Adsorption

i. To study the adsorption of acetic acid oxalic/acid from aqueous solutions by charcoal.

d) Phase Equilibria to determine the distribution coefficient of iodine between CCl_4 and water.

e) Refractometry

i. Determination of refractive index of a liquid by Abbe refractometer, and hence the specific and molar refraction.
ii. To determine the composition of unknown mixture of two liquids by refractive index measurements.

f) Determining the half-life of radio isotope using GEIGER-MULLER COUNTER.

Recommended Books:
Latest edition of:

1. H. Denny, W. Roesky, 'Chemical Curiosites', WILEY VCH.
2. G. Marr and B.W. Rocket,'Practical Inorganic Chemistry, University Science Books.
3. G. Pass and H. Sutcliffe, 'Practical Inorganic Chemistry, Chapman and Hall, London.
4. J. Mendham, R.C. Denney, J.D. Barnes, M.Thomas, 'Vogel's Textbook of Quantitative Analysis', Pearson Education.
5. G. Svehla, 'Vogel's Textbook of Quantitative Analysis', Pearson Education.

ALGEBRA-I

Subject Code: BSNMS1-406 **L T P C** **Duration: 45 Hrs.**
3 0 0 3

Course Outcomes:

CO1: Understand the concept of groups and its properties.
CO2: Understand the concept of permutation group and groups of symmetries.
CO3: Analyze & demonstrate different types of algebraic structures such as subgroups, cosets and their properties.
CO4: Understand the concept of normal subgroup and Lagrange's theorem.

Unit-I (11Hrs.)

Definition and examples of groups, examples of abelian and non-abelian groups, the group Zn of integers under addition modulo n and the group U(n) of units under multiplication modulo n. Cyclic groups from number systems, complex roots of unity.

Unit-II (10Hrs.)

circle group, the general linear group GLn (n,R), groups of symmetries of (i) an isosceles triangle, (ii) an equilateral triangle, (iii) a rectangle, and (iv) a square, the permutation group Sym (n), Group of quaternions.

Unit-III (12Hrs.)

Subgroups, cyclic subgroups, the concept of a subgroup generated by a subset and the commutator subgroup of group, examples of subgroups including the center of a group. Cosets.

Unit-IV (12Hrs.)

Index of subgroup, Lagrange's theorem, order of an element, Normal subgroups: their definition, examples, and characterizations, Quotient groups.

Recommended Books:

1. John B. Fraleigh, A First Course in Abstract Algebra, 7th Ed., Pearson, 2002.
2. M. Artin, Abstract Algebra, 2nd Ed., Pearson, 2011.
3. Joseph A Gallian, Contemporary Abstract Algebra, 4th Ed., Narosa, 1999.
4. George E Andrews, Number Theory, Hindustan Publishing Corporation, 1984.
5. Surjeet Singh and QaziZameeruddin, 'Modern Algebra.' 7th Ed, Vikas Publishing House, New Delhi, 1993.
6. Herstein, I.N., 'Topics in Algebra. '2nd Ed, Vikas Publishing House, 1976.

ALGEBRA-II

Subject Code: BSNMS1-407 **L T P C** **Duration: 45 Hrs.**
3 0 0 3

Course Outcomes:

CO1: Understand the concept of Ring and their properties.
CO2: Apply the concepts of isomorphism, homomorphism, ideal and integral domain for rings to solve different types of problems.
CO3: Access the idea of inner product space and determine its orthogonality on vector space.
CO4: Understand the basic concepts of linear transformations, algebra of transformations, eigenvalues and corresponding eigenvectors.

Unit-I(12Hrs.)

Definition and examples of rings, examples of commutative and non-commutative rings: rings from number systems, Zn the ring of integers modulo n, ring of real quaternions, rings of matrices, polynomial rings, and rings of continuous functions.

Unit-II (11Hrs.)

Subrings and ideals, Integral domains and fields, examples of fields: Zp, Q, R, and C. Field of rational functions. Homomorphism, Isomorphism, Automorphism, Permutation of group, Even and Odd permutation, Cayley theorem, Sylow's theorem.

Unit-III (12Hrs.)

Inner product, Length, Orthogonality, Orthogonal projections, Cauchy-Schwartz inequality, Gram-Schmidt orthogonalisation process, Inner product spaces.

Unit-IV (10Hrs.)

Linear Transformation, Null space, Range space, Product of linear transformation, Singular and non singular transformation, Canonical forms, Jordan forms, Triangular forms, Rank-nullity theorem, Eigen value & Eigen vectors of linear transformation

Recommended Books:

1. David S. Dummit and Richard M Foote, 'Abstract Algebra,' John Wiley & Sons, 2004.
2. Surjeet Singh and QaziZameeruddin, 'Modern Algebra.' 7th Ed, Vikas Publishing House, New Delhi,1993.
3. Herstein, I.N., 'Topics in Algebra' 2nd Ed., Vikas Publishing House, 1976.
4. John B. Fraleigh, A First Course in Abstract Algebra, 7th Ed., Pearson, 2002.

BASIC ANALYTICAL CHEMISTRY

Subject Code: BSNMS1-408 **L T P C** **Duration: 60 Hrs.**
0 0 4 2

Course Objectives

1. To develop ability of analytical thinking.
2. To understand scientific data analyses.
3. To understand various analytical techniques.
4. To develop ability to analyze different types of samples.

Course Outcomes: On completion of this course, students will be able to:

CO1: Develop analytical thinking.
CO2: Analyse data in scientific manner.
CO3: Develop understanding of various analytical techniques.
CO4: Analyse different types of samples.

Introduction:

Introduction to Analytical Chemistry and its interdisciplinary nature. Concept of sampling. Importance of accuracy, precision and sources of error in analytical measurements. Presentation of experimental data and results, from the point of view of significant figures.

Analysis of soil:

Composition of soil, Concept of pH and pH measurement, Complexometric titrations, Chelation, Chelating agents, use of indicators. Determination of pH of soil samples. Estimation of Calcium and Magnesium ions as Calcium carbonate by complexometric titration.

Analysis of water:

Definition of pure water, sources responsible for contaminating water, water sampling methods, water purification methods. Determination of pH, acidity and alkalinity of a water sample. Determination of dissolved oxygen (DO) of a water sample.

Analysis of food products:

Nutritional value of foods, idea about food processing and food preservations and adulteration. Identification of adulterants in some common food items like coffee powder, asafoetida, chilli powder, turmeric powder, coriander powder and pulses, etc.
Analysis of preservatives and colouring matter.

Chromatography:

Definition, general introduction on principles of chromatography, paper chromatography, TLC etc.
Paper chromatographic separation of mixture of metal ion (Fe^{3+} and Al^{3+}).
To compare paint samples by TLC method.

Ion-exchange:

Column, ion-exchange chromatography etc. Determination of ion exchange capacity of anion

/ cation exchange resin (using batch procedure if use of column is not feasible).

Analysis of cosmetics:
Major and minor constituents and their function
Analysis of deodorants and antiperspirants, Al, Zn, boric acid, chloride, sulphate.
Determination of constituents of talcum powder: Magnesium oxide, Calcium oxide, Zinc oxide and Calcium carbonate by complexometric titration.

Suggested Applications (Any one):

a) To study the use of phenolphthalein in trap cases.
b) To analyze arson accelerants.
c) To carry out analysis of gasoline.

Suggested Instrumental demonstrations:

a) Estimation of macro nutrients: Potassium, Calcium, Magnesium in soil samples by flame photometry.
b) Spectro photometric determination of Iron in Vitamin / Dietary Tablets.
c) Spectro photometric Identification and Determination of Caffeine and Benzoic Acid in Soft Drink.

Recommended Books:
Latest edition of:

1. Willard, H.H., Merritt, L.L., Dean, J. & Settoe, F.A. Instrumental Methods of Analysis. Wadsworth Publishing Co. Ltd., Belmont, California, USA.
2. Skoog, D.A. Holler F.J. & Nieman, T.A. Principles of Instrumental Analysis, Cengage Learning India Ed.
3. Skoog, D.A.; West, D.M. & Holler, F.J. Fundamentals of Analytical Chemistry, Saunders College Publishing, Fort Worth.
4. Harris, D. C. Quantitative Chemical Analysis, W. H. Freeman.
5. Dean, J. A. Analytical Chemistry Notebook, McGraw Hill.
6. Day, R. A. & Underwood, A. L. Quantitative Analysis, Prentice Hall of India.
7. Freifelder, D. Physical Biochemistry, W.H. Freeman and Co., N.Y.USA.
8. Cooper, T.G. The Tools of Biochemistry, John Wiley and Sons, N.Y. USA. 16.
9. Vogel, A. I. Vogel's Qualitative Inorganic Analysis, Prentice Hall.
10. Vogel, A. I. Vogel's Quantitative Chemical Analysis, Prentice Hall.
11. Robinson, J.W. Undergraduate Instrumental Analysis, Marcel Dekker, Inc. New York.

SEMESTER FIFTH

DIGITAL ANALOG AND INSTRUMENTATION

Subject Code: BSNMD1-511 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

Course Outcome (CO): After the completion of the course, Student will be able to

CO1: Learn the Analog and Digital Circuits
CO2: Basic concepts of Semiconductor Devices
CO3: Learn about the concepts of Amplifiers
CO4: Gain knowledge about the basic physics instruments

UNIT-I (15 Hrs)

Digital Circuits:

Difference between Analog and Digital Circuits. Binary Numbers. Decimal to Binary and Binary to Decimal Conversion, AND, OR and NOT Gates (Realization using Diodes and Transistor). NAND and NOR Gates as Universal Gates. XOR and XNOR Gates.De Morgan's Theorems. Boolean Laws. Simplification of Logic Circuit using Boolean algebra. Fundamental Products. Minterms and Maxterms. Conversion of a Truth Table into an Equivalent Logic Circuit by (1) Sum of Products Method. Binary Addition. Binary Subtraction using 2's Complement Method).

UNIT-II (15 Hrs)

Semiconductor Devices:

Semiconductor Diodes: p and n type semiconductors. Barrier Formation in PN Junction Diode. Qualitative Idea of Current Flow Mechanism in Forward and Reverse Biased Diode. PN junction and its characteristics. Static and Dynamic Resistance. Principle and structure of (1) LEDs (2) Photodiode (3) Solar Cell.

UNIT-III (15 Hrs)

Amplifiers:

Bipolar Junction transistors: n-p-n and p-n-p Transistors. Characteristics of CB, CE and CC Configurations. Active, Cutoff, and Saturation Regions. Current gains α and β. Relations between α and β. Load Line analysis of Transistors. DC Load line and Q point. Voltage Divider Bias Circuit for CE Amplifier. h-parameter Equivalent Circuit. Analysis of a single-stage CE amplifier using Hybrid Model. Input and Output Impedance. Current, Voltage and Power Gains. Class A, B, and C Amplifiers.

UNIT-IV (15 Hrs)

Instrumentation:

Introduction to CRO: Block Diagram of CRO. Applications of CRO: (1) Study of Waveform, (2) Measurement of Voltage, Current, Frequency, and Phase Difference. Power Supply: Half-wave Rectifiers. Centre-tapped and Bridge Full-wave Rectifiers. Calculation of Ripple Factor and Rectification Efficiency, Basic idea about capacitor filter, Zener Diode and Voltage Regulation Timer IC: IC 555 Pin diagram and its application as Astable & Monostable Multivibrator

Recommended Books:

1. Integrated Electronics, J. Millman and C.C. Halkias, 1991, Tata Mc-Graw Hill.
2. Electronic devices and circuits, S. Salivahanan and N. Suresh Kumar, 2012, Tata Mc-Graw Hill.
3. Microelectronic Circuits, M.H. Rashid, 2ndEdn.,2011, Cengage Learning.
4. Digital Principles & Applications, A.P. Malvino, D.P. Leach & Saha, 7th Ed.,2011,
5. Tata McGraw Hill
6. Microelectronic circuits, A.S. Sedra, K.C. Smith, A.N. Chandorkar, 2014, 6th Edn.,Oxford University Press.
7. Fundamentals of Digital Circuits, A. Anand Kumar, 2nd Edition, 2009, PHI Learning Pvt. Ltd.
8. Modern Electronic Instrumentation & Measurement Tech., Helfrick&Cooper,1990, PHI Learning.

CHEMISTRY OF MAIN GROUP ELEMENTS

Subject Code: BSNMD1- 521 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

Course Objectives:

This course is intended

1. To provide the students an in-depth understanding of the groups of elements in Inorganic Chemistry.
2. To know the periodic properties of s, p and d block elements and their metallurgical purification.
3. To understand the physical and chemical properties of elements and their compounds.

Course Outcomes:

CO1: Acquire knowledge and understanding of essential facts, concepts, principles, theories and metallurgical purification techniques related to the elements of periodic table.
CO2: Develop comprehension abilities of structure, bonding and properties of the compound /polymers of the elements.
CO3: Application of the principles of metallurgical process
CO4: To develop skills to evaluate, analyze and solve problems competently.

Unit-I (15 Hrs.)

Acids and Bases: Brönsted–Lowry concept, conjugate acids and bases, relative strengths of acids and bases, effects of substituent and solvent, differentiating and levelling solvents. Lux-Flood concept and solvent system concept. Hard and soft acids and bases (HSAB concept), applications of HSAB process.

General Principles of Metallurgy: Chief modes of occurrence of metals based on standard electrode potentials, Ellingham diagrams for reduction of metal oxides using carbon and carbon monoxide as reducing agents. Hydrometallurgy with reference to cyanide process for gold and silver. Methods of purification of metals (Al, Pb, Ti, Fe, Cu, Ni, Zn, Au): electrolytic refining, zone refining, van Arkel-de Boer process, Parting Process, Mond's process and Kroll Process.

Unit-II (18 Hrs.)

s-and p-Block Elements: Periodicity in s- and p-block elements with respect to electronic configuration, atomic and ionic size, ionization enthalpy, electron gain enthalpy, electronegativity (Pauling scale). General characteristics of s-block metals like density, melting and boiling points, flame colour and reducing nature. Oxidation states of s and p block elements, inert-pair effect, diagonal relationships and anomalous behaviour of first member of each group. Allotropy in C, P and S. Complex forming tendency of s block elements and a preliminary idea of crown ethers and cryptates, structures of basic beryllium acetate, salicylaldehyde/ acetylacetonato complexes of Group 1 metals. Solutions of alkali metals in liquid ammonia and their properties. Common features, such as ease of formation, solubility and stability of oxides, peroxides, superoxides, sulphates and carbonates of s-block metals.

Unit-III (10 Hrs.)

Structure, bonding and properties (acidic/ basic nature, oxidizing/ reducing nature and hydrolysis of the following compounds and their applications in industrial and environmental

chemistry wherever applicable:
Diborane and concept of multicentre bonding, hydrides of Groups 13 (BH_3), 14, 15, 16 and 17. Oxides of N and P, Oxoacids of P, S and Cl. Halides and oxohalides of P and S (PCl_3, PCl_5, $SOCl_2$ and SO_2Cl_2) Interhalogen compounds. A brief idea of pseudohalides.

Unit-IV (17 Hrs.)

Noble gases: Rationalization of inertness of noble gases, clathrates, preparation and properties of XeF_2, XeF_4 and XeF_6 ,bonding in these compounds using VBT and shapes of noble gas compounds using VSEPR Theory.

Inorganic Polymers: Types of inorganic polymers and comparison with organic polymers, structural features, classification and important applications of silicates. Synthesis, structural features and applications of silicones. Borazines and cyclophosphazenes – preparation, properties and reactions. Bonding in $(NPCl_2)_3$.

Recommended Books:
Latest edition of:

1. Lee, J.D. Concise Inorganic Chemistry ELBS
2. Cotton, F.A., Wilkinson, G. & Gaus, P.L. Basic Inorganic Chemistry, Wiley.
3. Douglas, B.E., McDaniel, D.H. & Alexander, J.J. Concepts and Models in Inorganic Chemistry, John Wiley & Sons.
4. Greenwood, N.N. & Earnshaw. Chemistry of the Elements, Butterworth-Heinemann.
5. Rodger, G.E. Inorganic and Solid State Chemistry, Cengage Learning India.
6. Miessler, G. L. & Donald, A. Tarr. Inorganic Chemistry, Pearson.
7. Atkin, P. Shriver & Atkins' Inorganic Chemistry, Oxford University Press.

MATRICES

Subject Code: BSNMD1-531 **L T P C** **Duration: 45 Hrs.**
3 0 0 3

Course Outcomes:

CO1: Understand the concept of vector space.
CO2: Understand the concept of rotation and reflection in a point and numerical approach to eigen values and eigen vectors.
CO3: Develop the knowledge of matrices and its properties.
CO4: Develop the advanced knowledge of matrix and examples of matrix from various fields of sciences.

Unit-I (12Hrs.)

R, R^2, R^3 as vector spaces over R. Standard basis for each of them. Concept of Linear Independence and examples of different bases. Subspaces of R^2, R^3.

Unit-II (12Hrs.)

Translation, Dilation, Rotation, Reflection in a point, line and plane. Matrix form of basic geometric transformations. Interpretation of eigen values and eigen vectors for such transformations and eigen spaces as invariant subspaces.

Unit-III (9Hrs.)

Types of matrices Rank of a matrix, Invariance of rank under elementary transformations, Reduction to normal form, Solutions of linear homogeneous and non-homogeneous equations with number of equations and unknowns up-to four.

Unit-IV (12 Hrs.)

Matrices in diagonal form, Reduction to diagonal form up-to matrices of order 3, Computation of matrix inverses using elementary row operations, Rank of matrix. Solutions of a system of linear equations using matrices, Illustrative examples of above concepts from Geometry, Physics, Chemistry, Combinatorics and Statistics.

Recommended Books:

1. A.I. Kostrikin, Introduction to Algebra, Springer Verlag, 1984.
2. S. H. Friedberg, A. L. Insel and L. E. Spence, Linear Algebra, Prentice Hall of India Pvt. Ltd., New Delhi, 2004.
3. Richard Bronson, Theory and Problems of Matrix Operations, Tata McGraw Hill, 1989.

LINEAR ALGEBRA

Subject Code: BSNMD1-532 **L T P C** **Duration: 45 Hrs.**
3 0 0 3

Course Outcomes:

CO1: Apply the knowledge of algebra which enable to build mathematical thinking and skills.
CO2: Analyze and solve the problems related to rank and nullity of linear transformation.
CO3: Compute the eigenvalues and corresponding eigenvectors for a square matrix.
CO4: Apply the concepts of isomorphism to solve different types of problems.

Unit-I(10Hrs.)

Vector spaces, subspaces, algebra of subspaces, quotient spaces, linear combination of vectors, linear span, linear independence, basis and dimension, dimension of subspaces.

Unit-II(12Hrs.)

Linear transformations, null space, range, rank and nullity of a linear transformation, matrix representation of a linear transformation, algebra of linear transformations.

Unit-III(12Hrs.)

Dual Space, Dual Basis, Double Dual, Eigen values and Eigen vectors, Characteristic Polynomial.

Unit-IV (11Hrs.)

Isomorphisms, Isomorphism theorems, invertibility and isomorphisms, change of coordinate matrix.

Recommended Books:

1. Stephen H. Friedberg, Arnold J. Insel, Lawrence E. Spence, Linear Algebra, 4th Ed., Prentice-Hall of India Pvt. Ltd., New Delhi, 2004.
2. David C. Lay, Linear Algebra and its Applications, 3rd Ed., Pearson Education Asia, Indian Reprint, 2007.
3. S. Lang, Introduction to Linear Algebra, 2nd Ed., Springer, 2005.

DIGITAL ANALOG AND INSTRUMENTATION LAB

Subject Code: BSNMD1- 512 **L T P C** **Duration: 60 Hrs.**
0 0 4 2

Course Outcome (CO): After the completion of the course, Student will be able to

CO1: Verify and design different gates
CO2: Understand Half adder, Full adder and Adder-subtrector
CO3: Design monostable, astable multivibrator using 555 timer
CO4: Understand and design various circuits using Op-amp 741

List of Experiments:

1. To measure (a) Voltage, and (b) Frequency of a periodic waveform using a CRO
2. To verify and design AND, OR, NOT and XOR gates using NAND gates.
3. To minimize a given logic circuit.
4. Half adder, Full adder and 4-bit Binary Adder
5. Adder-Subtractor using Full Adder I.C.
6. To design an astable multivibrator of given specifications using 555 Timer.
7. To design a monostable multivibrator of given specifications using 555 Timer.
8. To study IV characteristics of PN diode, Zener and Light emitting diode
9. To study the characteristics of a Transistor in CE configuration.
10. To design a CE amplifier of a given gain (mid-gain) using voltage divider bias.
11. To design an inverting amplifier of given gain using Op-amp 741 and study its frequency response.
12. To design a non-inverting amplifier of given gain using Op-amp 741 and study its frequency Response.
13. To study a precision Differential Amplifier of given I/O specification using Opamp.
14. 14. To investigate the use of an op-amp as a Differentiator
15. To design a Wien Bridge Oscillator using an op-amp.

Recommended Books:

1. Basic Electronics: A text lab manual, P.B. Zbar, A.P. Malvino, M.A. Miller, 1994,Mc-Graw Hill.
2. Electronics: Fundamentals and Applications, J.D. Ryder, 2004, Prentice Hall.
3. OP-Amps and Linear Integrated Circuit, R. A. Gayakwad, 4th edition, 2000, PrenticeHall.
4. Electronic Principle, Albert Malvino, 2008, Tata Mc-Graw Hill.

CHEMISTRY OF MAIN GROUP ELEMENTS LAB

Subject Code: BSNMD1-522 **L T P C** **Duration: 60 Hrs.**
0 0 4 2

Course Objectives:

1. To understand the concepts behind Iodo/Iodimetric titrations
2. To develop basic understanding of gravimetric analysis and estimation of different metals using the concept
3. To make the students understand principles involved in estimation of dissolved impurities of water
4. To familiarize the students with inorganic preparation

Course Outcomes: After completion of course students will gain the knowledge and practical hands on training of

CO1: Obtaining precise results of Iodo/Iodimetric titrations
CO2: Gravimetric analysis and estimation of different metalions
CO3: Estimation of dissolved impurities of water
CO4: Preparation of transition metal based inorganic compounds

List of Experiments:

1) Iodometric estimation of potassium dichromate and copper sulphate.
2) Iodimetric estimation of antimony in tartaremetic.
3) Estimation of amount of available chlorine in bleaching powder and household bleaches.
4) Estimation of iodine in iodized salts.
5) Iodimetric estimation of ascorbic acid in fruit juices.
6) Estimation of dissolved oxygen in water samples.
7) Gravimetric estimation of sulphate as barium sulphate.
8) Gravimetric estimation of aluminium as oximato complex.
9) Preparation of the following: potash alum, chrome alum, tetraammine copper(II) sulphate monohydrate, potassium trioxalatoferrate(III) (any two, including one double salt and one complex).

Recommended Books:
Latest edition of:

1. Svehla, G. Vogel's Qualitative Inorganic Analysis, Pearson Education.
2. Mendham, J. Vogel's Quantitative Chemical Analysis, Pearson.

COMPUTER PROGRAMMING LAB

Subject Code: BSNMS1-533 **L T P C** **Duration: 60 Hrs.**
0 0 4 2

Course Outcomes: After the completion of the course, Student will be able to:

CO1: Learn the Importance of computers in Physics
CO2: Enhance skill in Linux and FORTRAN
CO3: Understand the concepts of statements
CO4: Gain knowledge about the graphical analysis and importance of visualization of computational and computational data

List of following programs are as follows:

1. Operators: Arithmetic, Logical, Conditional, Assignment, Increment/Decrement operators
2. Decision Making: switch, if-else, nested if, else-if ladder, break, continue, go to
3. Loops: while, do-while, for
4. Functions: Definition, Declaration, call by value, Call by reference, Recursive Function
5. Arrays: Arrays declarations, Single and multi-dimensional, Strings and string functions
6. Pointers: Pointer declarations, Pointer to function, Pointer to array.

Recommended Books:

1. Shubhnandan Jamwal, 'Programming in C', 3rd Edn., Pearson.
2. E. Balagurusamy, 'Programming in ANSI C', 3rd Edn., Tata McGraw Hill.
3. V. Rajaraman, 'Fundamentals of Computers', 3rd Edn., PHI.
4. P.K. Sinha, 'Computer Fundamentals', 5th Edn., BPB Publication.
5. Brian Kernighan and Dennis Ritchie, 'C Programming Language, 2nd Edn., PHI.
6. Byron Gottfried, 'Programming with C', 2nd Edn., Tata McGraw Hill.
7. Yashvant P. Kanetkar, 'Let us C', 4th Edn., BPB Publications, New Delhi.
8. R.S. Salaria, 'Application Programming in C', 2nd Edn., Khanna Book Publishing.

SEMESTER SIXTH

ELEMENTS OF MODERN PHYSICS

Subject Code: BSNMD1-611 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

Course Outcome (CO): After the completion of the course, Student will be able to

CO1: Gain knowledge about crystal structure
CO2: Understand the concepts of quantum mechanics.
CO3: Understand the concepts nuclear Physics.
CO4: Learn about Particle interactions and Conservation Laws.

UNIT-I (12 Hrs)

Crystal structure and lattice vibrations:

Solids: Amorphous and Crystalline Materials. Lattice Translation Vectors. Lattice with a Basis – Central and Non-Central Elements. Unit Cell, Types of Lattices. Miller Indices. Reciprocal Lattice. Brillouin Zones. Diffraction of X-rays by Crystals. Bragg's Law. Lattice Vibrations in Linear Monoatomic and Diatomic Chains. Concept of phonons, Dulong and Petit's Law, Einstein and Debye theories of specific heat of solids.

UNIT-II (18 Hrs)

Introduction to Quantum Mechanics:

Planck's quantum, Planck's constant and light as a collection of photons; Photo-electric effect and Compton scattering. De Broglie wavelength and matter waves; Davisson- German experiment. Problems with Rutherford model- instability of atoms and observation of discrete atomic spectra; Bohr's quantization rule and atomic stability; calculation of energy levels for hydrogen like atoms and their spectra. Wave-particle duality, Heisenberg uncertainty principle-impossibility of a particle following a trajectory; Estimating minimum energy of a confined particle using uncertainty principle; Energy-time uncertainty principle. One dimensional infinitely rigid box- energy eigenvalues and eigen functions, normalization; Quantum mechanical scattering and tunnelling in one dimension - across a step potential and across a rectangular potential barrier.

UNIT-III (15 Hrs)

Nuclear Physics:

Constituents of nucleus and their Intrinsic properties, quantitative facts about size, mass, charge density (matter energy), binding energy, average binding energy and its variation with mass number, main features of binding energy versus mass number curve, N/A plot, angular momentum, parity, magnetic moment, electric moments, nuclear excites states. Radioactive decay: alpha, beta and gamma decay, internal conversion, positron emission, electron capture, neutrino hypothesis. Interaction of Radiation with matter: Energy loss due to ionization (Bethe-Block formula), energy loss of electrons, Cerenkov radiation, Gamma ray interaction through matter.

UNIT-IV (15 Hrs)

Particle Physics:

Particle interactions; basic features, types of particles and its families. Symmetries and Conservation Laws: energy and momentum, angular momentum, parity, baryon number, Lepton number, Isospin, Strangeness and charm, concept of quark model, color quantum number and gluons. Accelerator facility available in India: Van-de Graaff generator (Tandem accelerator), Linear accelerator, Cyclotron, Synchrotrons.

Recommended Books:

1. Concepts of Modern Physics, Arthur Beiser, 2009, McGraw-Hill.
2. Modern Physics, John R. Taylor, Chris D. Zafiratos, Michael A.Dubson, 2009.
3. Quantum Physics, Berkeley Physics Course Vol.4. E.H. Wichman, 2008, Tata McGraw Hill Co.
4. Modern Physics, R.A. Serway, C.J. Moses, and C.A.Moyer, 2005, Cengage Learning.
5. Modern Physics, G. Kaur and G.R. Pickrell, 2014, McGraw Hill.
6. Quantum Mechanics, Walter Greiner, 4th Edn., 2001, Springer.

ELEMENTS OF MODERN PHYSICS LAB

Subject Code: BSNMD1-612 **L T P C** **Duration: 60 Hrs.**
0 0 4 2

Course Outcome (CO): After the completion of the course, Student will be able to

CO1: Gain practical knowledge about photoelectric effect
CO2: Understand the practically ionization potential, e/m ratio, Boltzmann constant
CO3: Gain knowledge about the absorption and emission spectra.
CO4: Study the diffraction patterns of single and double slits

List of Experiments:

1. To determine value of Boltzmann constant using V-I characteristic of PN diode.
2. To determine work function of material of filament of directly heated vacuum diode.
3. To determine value of Planck's constant using LEDs of at least 4 different colours.
4. To determine the ionization potential of mercury.
5. To determine the wavelength of H-alpha emission line of Hydrogen atom.
6. To determine the absorption lines in the rotational spectrum of Iodine vapour.
7. Photo-electric effect: photo current versus intensity and wavelength of light; maximum energy of photo-electrons versus frequency of light.
8. To determine the value of e/m by magnetic focusing.
9. To setup the Millikan oil drop apparatus and determine the charge of an electron.
10. To study the diffraction patterns of single and double slits using laser source and measure its intensity variation using Photosensor and compare with incoherent source-Na light.

Recommended Books:

1. Advanced Practical Physics for students, B.L. Flint & H.T. Worsnop, 1971, Asia Publishing House.
2. Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4thEdition, reprinted 1985, Heinemann Educational Publishers.
3. A Text Book of Practical Physics, Indu Prakash and Ramakrishna, 11th Edition, 2011, Kitab Mahal, New Delhi.

COMPREHENSIVE CHEMISTRY

Subject Code: BSNMD1-621 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

Course Objectives:

1. To understand the concepts behind basics of inorganic chemistry
2. To understand the concept of stereochemistry
3. To familiarize with the Bioinorganic Chemistry.
4. To understand concepts of spectroscopy.

Course Outcomes: Students will acquire the knowledge of

CO1: Synthesis and applications of heterocyclic compounds
CO2: Applications of spectroscopy for the structure determination of organic compounds
CO3: Co-ordination Chemistry.
CO4: Role of Bioinorganic Chemistry.

Unit-I (14 Hrs.)

Chemistry of 3d Block Elements: Oxidation states displayed by Cr, Fe, Co, Ni and Co. A study of the following compounds (including preparation and important properties); Peroxo compounds of Cr, $K_2Cr_2O_7$, $KMnO_4$, $K_4[Fe(CN)_6]$, sodium nitroprusside, $[Co(NH_3)_6]Cl_3$, $Na_3[Co(NO_2)_6]$.

Organometallic Compounds: Definition and Classification with appropriate examples based on nature of metalcarbon bond (ionic, s, p and multicentre bonds). Structures of methyl lithium, Zeiss salt and ferrocene. EAN rule as applied to carbonyls. Preparation, structure, bonding and properties of mononuclear and polynuclear carbonyls of 3d metals. p-acceptor behaviour of carbon monoxide. Synergic effects (VB approach)- (MO diagram of CO can be referred to for synergic effect to IR frequencies).

Unit-II (12 Hrs.)

Bio-Inorganic Chemistry: A brief introduction to bio-inorganic chemistry. Role of metal ions present in biological systems with special reference to Na^+, K^+ and Mg^{2+} ions: Na/K pump; Role of Mg^{2+} ions in energy production and chlorophyll. Role of Ca^{2+} in blood clotting, stabilization of protein structures and structural role (bones).

Unit-III (18 Hrs.)

Polynuclear and heteronuclear aromatic compounds:
Properties of the following compounds with reference to electrophilic and nucleophilic substitution reaction Naphthalene, Anthracene, Furan, Pyrrole, Thiophene, and Pyridine.

Active methylene compounds: Claisen condensation. Keto-enol tautomerism. Synthetic uses of ethylacetoacetate (preparation of non-heteromolecules having upto 6 carbon).

Unit-IV (16 Hrs.)

Application of Spectroscopy to Simple Organic Molecules:

Electromagnetic radiations, electronic transitions, λ_{max} & ε_{max}, chromophore, auxochrome, bathochromic and hypsochromic shifts. Woodward rules for calculating λ_{max} of conjugated dienes and α,β – unsaturated carbonyl compounds

Infrared radiation and types of molecular vibrations, functional group and fingerprint region. IR spectra of alkanes, alkenes and simple alcohols (inter and intra molecular hydrogen bonding), aldehydes, ketones, carboxylic acids and their derivatives (effect of substitution on >C=O stretching absorptions). Application of ultraviolet - visible and infrared spectroscopy in structure elucidation of organic molecules.

Recommended Books:

Latest edition of:

1. James E. Huheey, Ellen Keiter & Richard Keiter: Inorganic Chemistry:Principles of Structure and Reactivity, Pearson Publication.
2. G.L. Miessler & Donald A. Tarr: Inorganic Chemistry, Pearson Publication.
3. J.D. Lee: A New Concise Inorganic Chemistry, E.L.B.S.
4. F.A. Cotton & G. Wilkinson: Basic Inorganic Chemistry, John Wiley & Sons.
5. I.L. Finar: Organic Chemistry (Vol. I & II), E.L.B.S.
6. John R. Dyer: Applications of Absorption Spectroscopy of Organic Compounds, Prentice Hall
7. R.M. Silverstein, G.C. Bassler & T.C. Morrill: Spectroscopic Identification of Organic Compounds, John Wiley & Sons.
8. R.T. Morrison & R.N. Boyd: Organic Chemistry, Prentice Hall.
9. Peter Sykes: A Guide Book to Mechanism in Organic Chemistry, Orient Longman.
10. Arun Bahl and B. S. Bahl: Advanced Organic Chemistry, Pub: S. Chand.

COMPREHENSIVE CHEMISTRY LAB

Subject Code: BSNMD1-622 **L T P C** **Duration: 60 Hrs.**
0 0 4 2

Course Objectives:

1. To understand the concepts behind synthesis of various inorganic compounds.
2. To determine the melting points of Inorganic compounds.
3. To understand chemistry involved in Organic functional group determination.

Course Outcomes: After completion of course students will acquire the knowledge of:

CO1: Synthesis of Inorganic compounds
CO2: Determination of melting and boiling points of synthesized Inorganic compound
CO3: Organic Functional group tests.

Inorganic Chemistry

1) Separation of mixtures by chromatography: Measure the Rf value (Combination of two ions to be given)

   Paper chromatography:

   (a) separation of Fe^{3+}, $A1^{3+}$ and Cr^{3+}

   (b) separation of Ni^{2+}, Co^{2+}, Mn^{2+} and Zn^{2+}.

2) Preparation of any two of the following complexes and measurement of their conductivity:

   i. tetraamminecarbonatocobalt (III) nitrate
   ii. tetraamminecopper (II) sulphate
   iii. potassium trioxalatoferrate (III) trihydrate

   Compare the conductance of the complexes with that of M/1000 solution of NaCl, $MgCl_2$ and $LiCl_3$.

Organic Chemistry

Systematic Qualitative Analysis of Organic Compounds possessing mono functional groups (-COOH, phenolic, aldehydic, ketonic, amide, nitro, amines) and preparation of their one derivative.

Recommended Books:

Latest edition of:

1) A.I. Vogel: Qualitative Inorganic Analysis, Prentice Hall.
2) A.I. Vogel: Quantitative Chemical Analysis, Prentice Hall.
3) Vogel's Textbook of Practical Organic Chemistry, Prentice-Hall.
4) Mann, F.G. & Saunders, B.C. Practical Organic Chemistry Orient-Longman.

NUMERICAL METHODS

Subject Code: BSNMD1-631 **L T P C** **Duration: 45 Hrs.**
3 0 0 3

Course Outcomes:

CO1: Learn various types of numerical methods to find the roots of nonlinear equations and solution of a system of linear equations.
CO2: Find values for a tabulated function using interpolation techniques.
CO3: Apply different kind of numerical methods to solve integration.
CO4: Apply various numerical methods to solve ordinary differential equation.

Unit-I (12Hrs.)

Rate of Convergence, Bisection method, False position method, Fixed point iteration method, Newton's method, Secant method, LU decomposition, Gauss-Jacobi, Gauss-Siedel and SOR iterative methods.

Unit-II (12Hrs.)

Interpolation: Finite differences, Newton Gregory forward and backward formula, Lagrange's formulae with error, divided differences, Newton's formulae, Central differences, Hermite interpolation.

Unit-III (13 Hrs.)

Numerical differentiation and integration: Differentiation at tabulated and non-tabulated points, Maximum and minimum values of tabulated function, Newton-Cotes Formulae- Trapezoidal, Simpson's, Boole's and Weddle's rules of integration, Romberg integration, Gaussian integration, Double integration by Trapezoidal and Simpson rules.

Unit-IV (8 Hrs.)

Taylor series and Picard's methods, Euler and modified Euler methods, Runge–Kutta methods, Predictor- Corrector methods: Adams-Bashforth and Milne methods.

Recommended Books:

1) B. Bradie, A Friendly Introduction to Numerical Analysis, Pearson Education, India, 2007.
2) M.K. Jain, S.R.K. Iyengar and R.K. Jain, Numerical Methods for Scientific and Engineering Computation, 5th Ed., New age International Publisher, India, 2007.
3) S.D. Conte and C. De Boor, 'Elementary Numerical Analysis: An Algorithmic Approach', 3rd Edn, Mc Graw Hill, New York, 1980.
4) J.B. Scarborough, Numerical Mathematical Analysis, Oxford & IBH Publishing Co., 2001.

COMPLEX ANALYSIS

Subject Code: BSNMD1-632 **L T P C** **Duration: 45 Hrs.**
3 0 0 3

Course Outcomes:

CO1: Understand the calculus of complex functions, concept and consequences of analyticity.
CO2: Formulation of analytic function and their application.
CO3: Evaluation of contour integrals directly by use of Cauchy theorem and Cauchy's integral formula.
CO4: Represent complex function as Taylor, Power and Laurent series.

Unit-I (11Hrs.)

Limits, Limits involving the point at infinity, continuity. Properties of complex numbers, regions in the complex plane, functions of complex variable, mappings. Derivatives, differentiation formulas, Cauchy-Riemann equations, sufficient conditions for differentiability.

Unit-II (12Hrs.)

Analytic functions, examples of analytic functions, exponential function, Logarithmic function, trigonometric function, derivatives of functions, definite integrals of functions.

Unit-III (10Hrs.)

Contours, Contour integrals and its examples, upper bounds for moduli of contour integrals. Cauchy-Goursat theorem, Cauchy integral formula.

Unit-IV (12Hrs.)

Liouville's theorem and the fundamental theorem of algebra, Convergence of sequences and series, Taylor series and its examples, Laurent series and its examples, absolute and uniform convergence of power series.

Recommended Books:

1) James Ward Brown and Ruel V. Churchill, Complex Variables and Applications, 8th Ed., McGraw – Hill International Edition, 2009.
2) 2. Joseph Bak and Donald J. Newman, Complex analysis, 2nd Ed., Undergraduate Texts in Mathematics, Springer-Verlag New York, Inc., New York, 1997.
3) E.T. Capson,, An Introduction to the Theory of functions of a complex Variable, Oxford university press, 1995.
4) R. Churchill, J.W. Brown, 'Complex Variables and Applications', 6th Edn., New York, McGraw-Hill, 1996.
5) A.R. Shastri, 'An Introduction to Complex Analysis', Macmillan India Ltd., 2003.
6) S. Ponnusamy, Foundation of Complex Analysis, Narosa Book Distributors, 2011.

NUMERICAL ANALYSIS LAB

Subject Code: BSNMS1-633 **L T P C** **Duration: 60 Hrs.**
0 0 4 2

Course Outcomes:

CO1: Apply computer programming to solve algebraic equations, linear systems of equations, ordinary differential equation, eigenvalue problems & Carry out numerical differentiation, integration and interpolation.
CO2: Utilize the symbolic tools of C++ language for solving given problem.
CO3: Understand different modes of a numerical method in order to solve a given problem efficiently.
CO4: Develop understanding of numerical error and applicability of a particular method.

The following programs of following methods are to be practiced:

1. To find a real root of an algebraic/ transcendental equation by using Bisection method.
2. To find a real root of an algebraic/ transcendental equation by using Regula-Falsi method.
3. To find a real root of an algebraic/ transcendental equation by using Newton-Raphson method.
4. To find a real root of an algebraic/ transcendental equation by using Iteration method.
5. Implementation of Gauss- Elimination method to solve a system of linear algebraic equations.
6. Implementation of Jacobi's method to solve a system of linear algebraic equations.
7. Implementation of Jacobi's method to solve a system of linear algebraic equations.
8. Implementation of Gauss-Seidel method to solve a system of linear algebraic equations.
9. To find differential coefficients of 1st and 2nd orders using interpolation formulae.
10. To evaluate definite integrals by using Newton - Cotes integral formulae.
11. To evaluate definite integrals by using Gaussian Quadrature.
12. To evaluate double integrals by using Trapezoidal and Simpson method.
13. To compute the solution of ordinary differential equations with Taylor's series method.
14. To compute the solution of ordinary differential equations by using Euler's method.
15. To compute the solution of ordinary differential equations by using Runge -Kutta methods.
16. To compute the solution of ordinary differential equations by using Milne-Simpson method.

Recommended Books:

1. E. Balagurusamy, Object Oriented Programming with C++, Tata McGraw Hill, New Delhi, 1999.
2. J N Sharma, Numerical Methods for engineers and Scientists (2nd Edn) Narosa Publishing House, New Delhi/ Alpha Science International Ltd. Oxford UK, 2007.
3. Conte and de Boor, Numerical Analysis, McGraw Hill, New York, 1990
4. John H. Mathews, Numerical Methods for Mathematics, Science and Engineering (2nd Edn.), Prentice Hall, New Delhi, 2000.

MRSPTU Integrated B.Sc. & M.Sc. (Forensic Science) SYLLABUS
2023 BATCH ONWARDS

STUDY SCHEME

1st Semester		Contact Hrs.			Marks			Credits
Sub. Code	**Subject**	**L**	**T**	**P**	**Int.**	**Ext.**	**Total**	
BHSMC0-042	English	2	0	0	40	60	100	2
BMFSS1-101	General Forensic Science and Criminal Law	3	0	0	40	60	100	3
BMFSS1-102	Elements of Questioned Document Examination	3	0	0	40	60	100	3
BSNMS1-103	Inorganic Chemistry-I	3	0	0	40	60	100	3
BSNMS1-104	Organic Chemistry-I	3	0	0	40	60	100	3
BSNMS1-108	Chemistry Lab- I	0	0	4	60	40	100	2
Group - I								
BMFSS1-103	Biodiversity (Microbes, Algae, Fungi &Archegoniate)	4	0	0	40	60	100	4
BMFSS1-104	Botany Lab. I	0	0	4	60	40	100	2
BMFSS1-105	Diversity of Animals-I	4	0	0	40	60	100	4
BMFSS1-106	Zoology Lab. I	0	0	4	60	40	100	2
Group - II								
BSNMS1-105	Differential Calculus-I	3	0	0	40	60	100	3
BSNMS1-106	Differential Calculus-II	3	0	0	40	60	100	3
BSNMS1-102	Mechanics	4	0	0	40	60	100	4
BSNMS1-107	Mechanics Lab	0	0	4	60	40	100	2
Total		**22/24**	**0**	**12/8**	**460/440**	**540/560**	**1000**	**28**

Type of Courses: Ability Enhancement Compulsory Course (AECC), Core Course (CC), Skill Enhancement Course (SEC), Discipline Specific Elective (DSE)
* Students can choose group of subjects among Group I and Group II.
Note : Exit policy is available as per UGC norms

2nd Semester		Contact Hrs.			Marks			Credits
Sub. Code	**Subject**	**L**	**T**	**P**	**Int.**	**Ext**	**Total**	
BMNCC0-041	Drug abuse: problem, management and prevention	2	0	0	40	00	40	0
BSNMS1-203	Physical Chemistry-I	3	0	0	40	60	100	3
BSNMS1-204	Organic Chemistry-II	3	0	0	40	60	100	3
BMFSS1-201	Fingerprints Examination and Forensic Photography	3	0	0	40	60	100	3
BMFSS1-202	Questioned Document and Fingerprint Laboratory	0	0	2	60	40	100	1
BSNMS1-208	Chemistry Lab-II	0	0	4	60	40	100	2
Group - I								
BMFSS1-203	Plant Ecology &Taxonomy	4	0	0	40	60	100	4
BMFSS1-204	Botany Lab. II	0	0	4	60	40	100	2
BMFSS1-205	Diversity of Animals-II	4	0	0	40	60	100	4
BMFSS1-206	Zoology Lab. II	0	0	4	60	40	100	2
Group - II								
BSNMS1-202	Electricity, Magnetism and EMT	4	0	0	40	60	100	4
BSNMS1-205	Differential Equations-I	3	0	0	40	60	100	3
BSNMS1-206	Differential Equations-II	3	0	0	40	60	100	3
BSNMS1-207	Electricity, Magnetism and EMT Lab	0	0	4	60	40	100	2
Total		**19/21**	**0**	**14/10**	**480/460**	**460/480**	**940**	**24**

3rd Semester		Contact Hrs.			Marks			Credits
Sub. Code	**Subject**	**L**	**T**	**P**	**Int.**	**Ext.**	**Total**	
BSNMS1-303	Inorganic Chemistry-II	3	0	0	40	60	100	3
BSNMS1-304	Physical Chemistry-II	3	0	0	40	60	100	3
BMFSS1-301	Criminalistics	3	0	0	40	60	100	3
BMFSS1-302	Criminalistics Laboratory	0	0	2	60	40	100	1
BSNMS1-305	Chemistry Lab III	0	0	4	60	40	100	2
Group - I								

BMFSS1-303	Plant Anatomy &Embryology	4	0	0	40	60	100	4
BMFSS1-304	Botany Lab. III	0	0	4	60	40	100	2
BMFSS1-305	Physiology & Biochemistry	4	0	0	40	60	100	4
BMFSS1-306	Zoology Lab. III	0	0	4	60	40	100	2
Group - II								
BSNMS1-306	Real Analysis-I	3	0	0	40	60	100	3
BSNMS1-307	Real Analysis-II	3	0	0	40	60	100	3
BSNMS1-301	Thermal Physics and Statistical Mechanics	4	0	0	40	60	100	4
BSNMS1-302	Thermal Physics and Statistical Mechanics Lab	0	0	4	60	40	100	2
Total		**17/19**	**0**	**14/10**	**440/420**	**460/480**	**900**	**24**

4th Semester		**Contact Hrs.**			**Marks**			**Credits**
Sub. Code	**Subject**	**L**	**T**	**P**	**Int.**	**Ext**	**Total**	
BHSMC0-041	Environmental Science	3	0	0	40	60	100	3
BSNMS1-403	Organic Chemistry-III	3	0	0	40	60	100	3
BSNMS1-404	Physical Chemistry-III	3	0	0	40	60	100	3
BSNMS1-405	Chemistry Lab-IV	0	0	4	60	40	100	2
BMFSS1-401	Forensic Psychology	3	0	0	60	40	100	3
Group - I								
BMFSS1-402	Plant Physiology &Metabolism	4	0	0	40	60	100	4
BMFSS1-403	Botany Lab. IV	0	0	4	60	40	100	2
BMFSS1-404	Genetics &Evolutionary Biology	4	0	0	40	60	100	4
BMFSS1-405	Zoology Lab. IV	0	0	4	60	40	100	2
Group - II								
BSNMS1-401	Waves and Optics	4	0	0	40	60	100	4
BSNMS1-402	Waves and Optics Lab	0	0	4	60	40	100	2

BSNMS1-406	Algebra-I	3	0	0	40	60	100	3
BSNMS1-407	Algebra-II	3	0	0	40	60	100	3
Total		**20/22**	**0**	**12/8**	**440/420**	**460/480**	**900**	**26**

5th Semester		**Contact Hrs.**			**Marks**			**Credits**
Sub. Code	**Subject**	**L**	**T**	**P**	**Int**	**Ext**	**Total**	
BSNMD1-521	Chemistry of Main group elements	4	0	0	40	60	100	4
BSNMD1-522	Chemistry of Main group elements Lab	0	0	4	60	40	100	2
BMFSS1-501	Fundamentals of Computer Forensics	3	0	0	40	60	100	3
BMFSS1-502	Computer Forensics Laboratory	0	0	2	60	40	100	1
Group - I								
BMFSS1-503	Botany-I Cell and Molecular Biology	4	0	0	40	60	100	4
BMFSS1-504	Botany Lab. V	0	0	4	60	40	100	2
BMFSS1-505	Comparative Anatomy & Vertebrates	4	0	0	40	60	100	4
BMFSS1-506	Zoology Lab. V	0	0	4	60	40	100	2
Group - II								
BSNMD1-531	Matrices	3	0	0	40	60	100	3
BSNMD1-532	Linear Algebra	3	0	0	40	60	100	3
BSNMD1-511	Digital Analog and Instrumentation	4	0	0	40	60	100	4
BSNMD1-512	Digital Analog and Instrumentation Lab	0	0	4	60	40	100	2
Total		**15/17**	**0**	**14/10**	**400/380**	**400/420**	**800**	**22**

6th Semester		**Contact Hrs.**			**Marks**			**Credits**
Subject Code	**Subject**	**L**	**T**	**P**	**Int.**	**Ext**	**Total**	
BSNMD1-621	Comprehensive Chemistry	4	0	0	40	60	100	4

BSNMD1-622	Comprehensive Chemistry Lab	0	0	4	60	40	100	2
BMFSS1-601	Forensic Audio Video Examination	3	0	0	40	60	100	3
BMFSS1-602	Forensic Audio Video Examination Laboratory	0	0	2	60	40	100	1
Group - I								
BMFSS1-603	Economic Botany and Biotechnology	4	0	0	40	60	100	4
BMFSS1-604	Developmental Biology	0	0	4	40	60	100	2
BMFSS1-605	Botany Lab. VI	4	0	0	60	40	100	4
BMFSS1-606	Zoology Lab.VI	0	0	4	60	40	100	2
Group - II								
BSNMD1-611	Elements of Modern Physics	4	0	0	40	60	100	4
BSNMD1-612	Elements of Modern Physics Lab	0	0	4	60	40	100	2
BSNMD1-631	Numerical Methods	3	0	0	40	60	100	3
BSNMD1-632	ComplexAnalysis	3	0	0	40	60	100	3
Total		**15/17**	**0**	**14/10**	**400/380**	**400/420**	**800**	**22**

SEMESTER

FIRST

ENGLISH

Subject Code: BHSMC0-042 **L T P C** **Duration:30 Hrs.**
2 0 0 2

Course Objective: To improve the communication skills of students.
Course Outcome: To make student capable for attending interviews and for presenting their research in conferences.

UNIT-I (8 Hours)

Communication Skills: Introduction, Definition, the Importance of Communication,
The Communication Process – Source, Message, Encoding, Channel, Decoding, Receiver, Feedback, Context
Barriers to communication: Physiological Barriers, Physical Barriers, Cultural Barriers, Language Barriers, Gender Barriers, Interpersonal Barriers, Psychological Barriers, Emotional barriers

UNIT-II (7 Hours)

Perspectives in Communication: Introduction, Visual Perception, Language, Other factors affecting our perspective - Past Experiences, Prejudices, Feelings, Environment.
Elements of Communication: Introduction, Face to Face Communication - Tone of Voice, Body Language (Non-verbal communication), Verbal Communication, Physical Communication.

UNIT-III (7 Hours)

Communication Styles: Introduction, The Communication Styles Matrix with example for each Direct Communication Style, Spirited Communication Style, Systematic Communication Style, Considerate Communication Style.
Basic Listening Skills: Introduction, Self-Awareness, Active Listening, becoming an Active Listener, Listening in Difficult Situations

UNIT-IV (8 Hours)

Interview Skills: Purpose of an interview, Do's and Don'ts of an interview
Giving Presentations: Dealing with Fears, Planning your Presentation, Structuring Your Presentation, Delivering Your Presentation, Techniques of Delivery
Group Discussion: Introduction, Communication skills in group discussion, Do's and Don'ts of group discussion.
Recommended Books:

1. R:uther Ford A. J., 'Basic Communication Skills for Technology', 2nd Edition, Pearson Education, 2011.
2. Kumar S. and Pushplata, 'Communication Skills', 1st Edition, Oxford Press,2011.
3. Stephen P. Robbins, 'Organizational Behaviour', 1st Edition, Pearson, 2013.
4. Gill H., 'Brilliant-Communication Skills', 1st Edition, Pearson Life, 2011.
5. Gopalawamy R., 'The Ace of Soft Skills: Attitude, Communication and Etiquettefor Success', 5th Edition, Pearson, 2013.
6. Dalley D., Burton L. and Margaret G., 'Developing your Influencing Skills', Green Hall, 1 st Edition, Universe of Learning LTD,2010.
7. Konarnira, 'Communication Skills for Professionals', 2nd Edition, PHI, 2011.
8. Mitra B. K., 'Personality Development and Soft Skills', 1st Edition, Oxford Press, 2011.
9. 'Soft Skill for Everyone', Butter Field, 1stEdition, Cengage Learning India Pvt. Ltd., 2011. 10. Francis Peters S.J., 'Soft Skills and Professional Communication', 1st Edition, McGraw Hill Education, 2011.
10. John A., 'Effective Communication', 4th Edition, Pan MacMillan, 2009.
11. Aubrey D., 'Bringing out the Best in People', 2nd Edition, McGraw Hill,1999.

GENERAL FORENSIC SCIENCE AND CRIMINAL LAW

Subject Code: BMFSS1-101 **L T P C** **Duration: 45Hrs.**
3 0 0 3

Course Objective:

1. To familiarize with history of Forensic Science.
2. To understand the importance of Forensic Science
3. To understand the working of Forensic Science labs and Police administration in India.
4. To understand various criminal laws and its importance in Forensic Science.

Course Outcome (CO): After the completion of the course, student will be able to:
CO1: Understand the concept of Forensic Science.
CO2: Learn the present scenario of Forensic Science in India and its scope
CO3: Gain knowledge about the various types of crimes.
CO4: Understand Criminal Law.

UNIT-I (15 Hrs)

Basic concepts of Forensic Science-I: Definition of Forensic Science by different authors, History of Forensic Science, Seven principles of Forensic Science, Nature, need, scope and functions of Forensic Science, Tools and techniques in forensic science, Ethics in Forensic Science, Subjective and objective observation, Qualitative and quantitative analysis, Preliminary and confirmatory tests, Positive control, negative control and blank samples.

Basic concepts of Forensic Science-II:, Modus operandi and its role in crime records, Corpus delicti, Prima facie, Admissibility of scientific evidence in the courtroom, Frye and Daubert standards.

UNIT-II (10Hrs)

Forensic Science Laboratories in India: Forensic science laboratories (FSLs) in India and its types- Central, State, Regional and Mobile FSLs, Branches of FSLs, Setup of FSLs, Hierarchy of experts in Forensic Science Laboratories, Services provided by FSLs, Functioning of FSLs, roles and responsibilities of forensic scientist, the Laboratory Information Management System(LIMS).

Report writing and Court testimony: FIR, Report writing and evidence evaluation, Components of report, Report format in respect of crime scene and laboratory findings, Court trial and testimony, Pre- Court Preparation and Court appearance e

UNIT-III (13Hrs)

Criminal Law:

Definitions: Actus rues, Mens rea and its types, Bailable/non-bailableoffences, Cognizable/non-cognizable,Summon cases andwarrant cases.

Special Forms of Crime: Organized Crime: Gangs/Criminal Networks, Socio-Economic Crime, Custodial Crime, White-Collar Crime, Crime against Women/Children, Sex Offences.

Correctional Therapy: Probation, Parole, Furlough, Remission and Pardon

Code of Criminal Procedure (CrPC):Sections- 291,292,293.

Indian Evidence Act (IEA): Sections-32, 45,46, 47, 57,58, 60, 73, 135,136, 137, 138,141.

Indian Penal Code(IPC): Sections(Offencesagainsttheperson)-299,300,302,304B,307,309,319,320,324,326,351,354,359,362,375,376,377and Sections(Offences against property)-378, 383,390,391,420, 463, 497,499, 503and 511.

UNIT-IV (07 Hrs)

Indian Constitution: Article 20 and 21.

Recentamendments in above mentioned sections of all laws.

Police Administration: History and development of police administration, Duties, roles, responsibilities and power of Police, Organizational structure of police, Relationship between police and forensic scientist with respect to crime investigation

People and society : Custodial deaths, Police and Human Rights.

Recommended Books:

1. Siegel J. A. and Mirakovits K: **Forensic Science: The Basics,** CRC Press, 3rd Edition,2016.
2. Siegel J. A. and Saukko P. J.: **Encyclopedia of Forensic Sciences,** Academic Press, 2ndEdition, 2013.
3. SafersteinR: **Forensic ScienceHand Book**,VolI,CRC Press,3rdEdition.2020.
4. SafersteinR: **ForensicScienceHand Book**,VolII,Pearson,2ndEdition.2005.
5. SafersteinR: **Forensic ScienceHand Book**,VolIII,Pearson, 2nd Edition.2010.
6. Saferstein, R: **Criminalistics: An Introduction to Forensic Science**, Pearson, 12thEdition, 2018.
7. SharmaB.R.: **Forensic Science in Criminal Investigation & Trials**, Universal Law Publishing, 6thEdition, 2020.
8. **The Constitution of India** by Legislative Department, Ministry of Law and Justice, Govt. of India.
9. **TheIndianEvidenceAct,1872**byLegislativeDepartment,MinistryofLawandJustice,Govt. ofIndia.

ELEMENTS OF QUESTIONED DOCUMENT EXAMINATION

Subject Code: BMFSS1-102 **L T P C** **Duration: 45Hrs.**
3 0 0 3

Course Objectives:

1. To understand the importance of Questioned Document as an evidence.
2. To understand the principles of handwriting.
3. To acquire the knowledge of comparison of type written and printed matter.
4. To acquire knowledge of Standards for comparison.

Course Outcome (CO): After the completion of the course, student will be able to:
CO1: Understand the concept of Questioned Documents.
CO2: Gain knowledge regarding forgery, its type and examination.
CO3: Gain knowledge of cases which fall under purview of digital crimes.
CO4: Understand the elements involved in investigation of digital crimes.

UNIT-I (15 Hrs)

Documents in general: Importance, Classification and Preliminary Examination. **Elements of Handwriting:** Elements of Execution and Style Development of Individuality in Handwriting and Principles of handwriting identification**.**

UNIT-II (10Hrs)

Natural Variations in handwriting: Definition and nature, Determination of range of variations (consistency) and its importance. **Fundamental divergence sin handwriting:** Its interpretation in relation to identification of handwriting, consideration of various writing instruments used in writing.

UNIT-III (12Hrs)

Standards for comparison: Requested and Collected Standards **Alterations in the document:** Erasures, Additions, Overwriting and Obliterations: their examination **Forgery:** Definitions, types and characteristics **Disguise:** Definition and Characteristics **Indented and Invisible Writings:** Introduction and Methods of examination.

UNIT-IV (08Hrs)

Comparison of typewritten and Printed matter: Working and Types, Printing and Machine Defects, alterations in Printed and typed text. Photostat Machines and Fax machines: Examination of printouts from them. Working and Principle of Projectina /video- spectral comparator (VSC), ESDA, Docucenter Examination of Currency. Comparison of digitally manipulated documents.

Recommended Books:

1. Huber, A. R. and Headrike, A.M. (1999), **Handwriting identification: facts and fundamental,** CRC LLC.
2. Ellen, D (Edition 2nd) (1997), **The scientific examination of Documents, Methods and techniques**, Taylor & Francis Ltd.
3. Morris (Edition 1st) (2000), **Forensic Handwriting Identification (fundamental concepts and Principals),**Academic Press Inc.
4. Harrison, W.R (1966**), Suspect Documents & their Scientific Examination**, Sweet & Maxwell Ltd., London.
5. Hilton, O (1982), **The Scientific Examination of Questioned Document**, Elsevier North Holland Inc., New York.
6. Sulner, H.F. (1966), **Disputed Document**, Oceana Publications Inc., New York.
7. Saxena B.L. (1968), **Saxena's Law & Techniques Relating to Finger Prints, Foot Prints & Detection of Forgery**, Central Law Agency, Allahabad (Ed. A.K. Singla).
8. Quirke, A.J. (1930), **Forged, Anonymous &Suspet Documents**, ReorgeRontledge& Sons Ltd., London.
9. Osborn, A. S. (1929), **Questioned Documents**, Boyd Printing Co., Chicago.
10. Levinson, J (2000), **Questioned Documents**, Academic Press, Tokyo.
11. Kelly, J.S and Lindblom, B.S (2006), **Scientific Examination of Questioned Documents,** Taylor & Francis, New York.
12. Brunelle, R.L. and Reed, R.W. (1984), **Forensic Examination of Ink and Paper**, Charles C Thomas Publisher, U.S.A.
13. Baker, J.N. (1955), **Law of Disputed and Forged Documents**, The Michie Company, Virginia

INORGANIC CHEMISTRY-I

Subject Code: BSNMS1-103 **L T P C** **Duration: 45Hrs.**
3 0 0 3

Course Objectives

1. To familiarize with atomic structure, quantum numbers and shapes of orbitals
2. To understand periodic table and periodic properties of elements
3. To understand the concept of crystal structure of molecules
4. To understand the concept of various bonding theories

Course Outcomes: The completion of this course will make student to acquire the knowledge of:

CO1: Wave mechanics, atomic theories and shapes of orbitals
CO2: Periodic table and various periodic properties
CO3: Ionic bond and crystal structure of molecules
CO4: Covalent bond, metallic bond and various weak chemical forces

Unit-I (8 Hrs.)

Atomic Structure:

de-Broglie equation, Heisenberg's Uncertainty Principle and its significance. Schrödinger's wave equation and its derivation, significance of ψ and ψ^2. Quantum numbers. Normalized and orthogonal wave functions. Sign of wave functions. Radial and angular wave functions and distribution curves. Shapes of s, p, d and f orbitals.

Pauli's Exclusion Principle, Hund's rule of maximum multiplicity, Aufbau principle and its limitations.

Unit-II (7 Hrs.)

Chemical Periodicity:

Effective nuclear charge, shielding or screening effect (Slater rules), variation of effective nuclear charge in periodic table.

Atomic and ionic radii, Ionization enthalpy, Electron gain enthalpy and their trend in groups and periods.

Electronegativity and various scales. Variation of electronegativity with bond order, partial charge, hybridization, group electro negativity.

Unit-III (15 Hrs.)

Chemical Bonding-I:

Ionic bond: General characteristics of ionic compounds, size effects, radius ratio rule and its limitations. Efficiency of packing, Hexagonal close packing, Cubic close packing. Structures of different crystal lattices: Sodium chloride, Cesium chloride, Wurtzite, Zinc blende, Fluorite, Rutile, Cristobalite, Nickel arsenide, Pervoskite, Rhenium oxide, Calcium carbide, The calcite and aragonite structures.

Born-Landé equation with derivation and importance of Kapustinskii expression for lattice energy. Madelung

constant, Born-Haber cycle and its application, Solvation energy.

Unit-IV (15 Hrs.)

Chemical Bonding-II:

Covalent bond: Lewis structure, Valence Bond theory, VSEPR theory (Prediction of structures and variation of bond angles on the basis of VSEPR theory, Shortcomings of VSEPR theory), Hybridization, Molecular orbital theory (LCAO method). Molecular orbital diagrams of diatomic and simple polyatomic molecules (Be_2, N_2, O_2, F_2, LiH, NO, CO, HCl, NO_2, BeH_2, NO_2^-), Formal charge, Covalent character in ionic compounds, polarizing power and polarizability. Fajan's rules and consequences of polarization. Ionic character in covalent compounds (Bond moment, dipole moment, Percentage ionic character)

Metallic Bond: Valence bond and band theories. Semiconductors and insulators, defects in solids. **Weak Interactions:** van der Waals forces, ion-dipole forces, dipole-dipole interactions, induced dipole interaction, Hydrogen bonding.

Recommended Books:

Latest edition of:

1. D.F.C. Shriver, P.W. Atkins and C.H. Langford, 'Inorganic Chemistry', ELBS Oxford.
2. J.E. Huheey, E.A. Keiter, R.L. Keiter, 'Inorganic Chemistry',Pearson Education, Singapore.
3. J.D. Lee, 'Concise Inorganic Chemistry', ELBS, Oxford.

ORGANIC CHEMISTRY-I

Subject Code: BSNMS1-104 **L T P C** **Duration: 45Hrs.**
3 0 0 3

Course Objectives:

1. To familiarize with the concepts of basics of organic chemistry
2. To understand the concept of mechanisms of organic reactions
3. To familiarize with the chemistry of alkanes and cycloalkanes
4. To understand chemistry of alkenes and alkynes
5. To know the chemistry behind aromatic hydrocarbons

Course outcomes: After the completion of course students will acquire the knowledge of:

CO1: Concepts of basics of structure and bonding
CO2: Mechanisms of organic reactions
CO3: Chemistry of aliphatic hydrocarbons
CO4: Chemistry behind aromatic hydrocarbons

Unit-I (15 Hrs.)

Structure and Bonding:

Hybridization, bond lengths, bond angles, bond energy, localized and delocalized chemical bond, van der Waals interactions, inclusion compounds, clatherates, charge transfer complexes, resonance, hyperconjugation, aromaticity, inductive and field effects, hydrogen bonding.

Mechanism of Organic Reactions:

Curved arrow notation, drawing electron movements with arrows, half-headed and double-headed arrows, homolytic and heterolytic bond breaking. Types of reagents- electrophiles and nucleophiles. Types of organic reactions. Energy considerations. Reactive intermediates (carbocations, carbanions, free radicals, carbenes, arynes and nitrenes). Assigning formal charges on intermediates and other ionic species.

Methods of determination of reaction mechanism (product analysis, intermediates, isotope effects, kinetic and stereochemical studies).

Unit-II (10 Hrs.)

Alkanes and Cycloalkanes:

Introduction, IUPAC nomenclature, Isomerism and classification of carbon atoms of alkanes. Sources, methods of formation (with special reference to Wurtz reaction, Kolbe reaction, Corey- House reaction and decarboxylation of carboxylic acids). Physical properties and chemical reactions of alkanes.

Mechanism of free radical halogenation of alkanes: orientation, reactivity and selectivity. Cycloalkanes - nomenclature, methods of formation, chemical reactions, Baeyer's strain theory and its limitations. Ring strain in small rings (cyclopropane and cyclobutane), theory of strainless rings. The case of cyclopropane ring; banana bonds.

Unit-III (14 Hrs.)

Alkenes, Cycloalkenes, Dienes and Alkynes:

Alkenes Nomenclature, methods of synthesis (mechanisms of dehydration of alcohols and dehydrohalogenation of alkyl halides, regioselectivity in alcohol dehydration. Saytzeff rule, Hofmann elimination), physical properties and relative stabilities of alkenes. Chemical reactions of alkenes - mechanisms involved in hydrogenation, electrophilic and free radical additions, Markownikoff's rule, hydroboration-oxidation, oxymercuration-reduction. Epoxidation, ozonolysis, hydration, hydroxylation and oxidation with $KMnO_4$, Polymerization of alkenes. Substitution at the allylic and vinylic positions of alkenes. Industrial applications of ethylene and propene.

Cycloalkenes Methods of formation, conformation and Chemical reactions of cycloalkenes.

Dienes Nomenclature and classification of dienes: isolated, conjugated and cumulated dienes. Structure of allenes and butadiene, methods of formation, polymerization. Chemical reactions – 1, 2 and 1,4 additions, Diels-Alder reaction.

Alkynes Nomenclature, structure and bonding in alkynes. Methods of formation. Chemical reactions of alkynes, acidity of alkynes. Mechanism of electrophilic and nucleophilic addition reactions, hydroboration oxidation, metal-ammonia reductions, oxidation and polymerization.

Unit-IV (6 Hrs.)

Aromatic hydrocarbons:

Preparation (Case benzene): from phenol, by decarboxylation, from acetylene, from benzene sulphonic acid.

Reactions: (Case benzene): Electrophilic substitution: nitration, halogenation and sulphonation. Friedel-Craft's reaction (alkylation and acylation) (upto 4 carbons on benzene). Side chain oxidation of alkyl benzenes (upto 4 carbons on benzene).

Recommended Books:

Latest edition of:

1. Morrison and Boyd, 'Organic Chemistry', Prentice Hall.
2. Solomons, 'Fundamentals of Organic Chemistry', JohnWiley.
3. F.A. Carey, 'Organic Chemistry', McGraw Hill,Inc.
4. L.G. Wade Jr., 'Organic Chemistry', Prentice Hall.
5. S.M. Mukherji, S.P. Singh and R.P. Kapoor, 'Organic Chemistry', Vol.-I, II & III, Wiley Eastern Ltd. (New Age International).

CHEMISTRY LAB- I

Subject Code: BSNMS1-108 **L T P C** **Duration:60Hrs.**
0 0 4 2

Course Objectives:

1. To develop basic understanding of various lab practices including safety measures.
2. To understand qualitative semi micro analysis of mixtures.
3. To analyze unknown functional group in organic molecules.
4. To understand various chromatographic techniques used for separation of dyes.

Course Outcomes: The students will acquire knowledge of

CO1: Different safety measures in lab
CO2: Analysis of mixture for cations and anions
CO3: Analysis of unknown functional group in organic molecules
CO4: chromatographic techniques used for separation of dyes

Inorganic Chemistry:
Semi Micro analysis. Cation analysis, Separation and identification of ions from groups I, II, III, IV, V, and VI. Anionic analysis. Four ions with no interference.

Organic Chemistry Laboratory Techniques:
Detection of various functional groups in organic compounds (containing upto two extra elements)

Separation of mixtures by Chromatography: Measure the Rf value in each case (combination of two compounds to be given)
Identify and separate the components of a given mixture of two dyes (red and blue ink, fluorescent and methylene blue) by paper chromatography

Recommended Books:
Latest edition of:

1. H. Denny, W. Roesky, 'Chemical Curiosites', WILEY VCH.
2. G. Marr and B.W. Rocket,'Practical Inorganic Chemistry', University Science Books.
3. G. Pass and H. Sutcliffe, 'Practical Inorganic Chemistry', Chapman and Hall, London.
4. J. Mendham, R.C. Denney, J.D. Barnes, M.Thomas, 'Vogel's Textbook of Quantitative Analysis',Pearson Education.
5. G. Svehla, 'Vogel's Textbook of Quantitative Analysis', Pearson Education.

GROUP-1

BIODIVERSITY(Microbes, Algae, Fungi &Archegoniate)

Subject Code: BMFSS1-103 **L T P C** **Duration: 60Hrs.**
4 0 0 4

Course Objectives:

1. To ensure students can achieve an up-to-date level of understanding of biodiversity of microbes, algae, fungi and archegoniate.
2. To provide training in scientific and transferable skills through modular lecture courses, research projects, written work,seminars and supervisions.
3. To provide knowledge of latest published findings.

Course Outcomes (CO): The completion of the course will make student to acquire the knowledge of:

CO1: Microbes, algae, Fungi.
CO2: Archegoniate, Bryophytes.
CO3: Pteridophytes and Gymnosperms.

Unit- 1(15Hours)

Microbes: Viruses – Discovery, general structure, replication (general account), DNAvirus (T-phage); Lytic and lysogenic cycle, RNA virus (TMV); Economic importance;Bacteria–Discovery,Generalcharacteristicsandcellstructure;Reproduction– vegetative, asexual and recombination (conjugation, transformation and transduction);Economicimportance.

Algae : General characteristics; Ecology and distribution; Range of thallus organizationand reproduction; Classification of algae; Morphology and life-cycles of the following:*Nostoc*,*Chlamydomonas, Oedogonium*,*Vaucheria*,Economicimportanceofalgae

Unit-2(15Hours)

Fungi : Introduction- General characteristics, ecology and significance, range of thallusorganization,cellwallcomposition,nutrition,reproductionandclassification;TrueFungi-
Generalcharacteristics,ecologyandsignificance,lifecycleof*Rhizopus*(Zygomycota),*Puccinia,Agaricus*(Basidiomycota);SymbioticAssociations-
Lichens:Generalaccount,reproductionandsignificance;Mycorrhiza:ectomycorrhizaandendomycorrhiza and their significance, Fungi like organisms Albugo, Phytophthora andslime molds

Unit-3(15 Hours)

Introduction to Archegoniate : Unifying features of archegoniates, Transition to landhabit,Alternation ofgenerations

Bryophytes: General characteristics, adaptations to land habit, Classification, Range ofthallusorganization.Classification(uptofamily),morphology,anatomyandreproduction of *Marchantia* and *Funaria*. (Developmental details not to be included).Ecologyand economicimportanceofbryophyteswith specialmention of*Sphagnum*.

Unit-4(15Hours)

Pteridophytes: General characteristics, classification, Early land plants (*Cooksonia*and*Rhynia*).Classification(uptofamily),morphology,anatomyandreproductiono f*Selaginella*,*Equisetum*and*Pteris*(Developmentaldetailsnottobeincluded).Heterospory and seed habit, stelar evolution. Ecological and economical importance ofPteridophytes.

Gymnosperms: Generalcharacteristics,classification.Classification(uptofamily),morpholo gy, anatomy andreproduction of *Cycas* and *Pinus*. (Developmental details not tobeincluded). Ecologicalandeconomical importance.

Recommended Books:

1. Kumar, H.D. (1999). Introductory Phycology. Affiliated East-West. Press Pvt. Ltd. Delhi.2ndedition.
2. Tortora, G.J., Funke, B.R., Case, C.L. (2010). Microbiology: An Introduction,PearsonBenjaminCummings, U.S.A. 10th edition.
3. Sethi,I.K.andWalia,S.K.(2011).TextbookofFungi&TheirAllies,MacMillanPublishersPvt.Ltd., Delhi.
4. B.R.Vashishta,(2016) BotanyForDegreeStudentsFungi.S Chand&Company.
5. GeetaSumbali,(2011)TheFungi.Alphascience IntlLtdSecondEdition.
6. KRAneja&RSMehrotra(2015)AnIntroductiontoMycology.NewAgeInternationalPublishersSe cond Edition.

Botany Lab-1

Subject Code: BMFSS1-104 **L T P C** **Duration: 60Hrs.**
0 0 4 2

Course Objectives:

1. To understand basic understanding of lab practices including safety measures.
2. To analyse the vegetative and reproductive structures of Nostoc, Chlamydomonas, Oedogonium, Vaucheria, Fucus.
3. To analyse the type of bacteria from slides.

Course Outcomes (CO): The completion of the practical will make student to acquire the knowledge of:

CO1: Different Safety measures in lab.
CO2: Analysis of the vegetative and reproductive structures.
CO3: Analysis of Pteridophytes and Gymnosperms

1. EMs/Modelsofviruses–T-PhageandTMV,Linedrawing/Photograph of LyticandLysogeniccycle.
2. Types of Bacteria from temporary/permanent slides/photographs; EM bacterium; BinaryFission;Conjugation; Structureof root nodule.
3. Gramstaining
4. Study of vegetative and reproductive structures of *Nostoc, Chlamydomonas* (electronMicrographs),*Oedogonium,Vaucheria,Fucus*andPolysiphonia*throughpermanentslides.
5. *RhizopusandPenicillium*:Asexualstagefromtemporarymountsandsexualstructuresthroughpermanentslides.
6. *Alternaria:* Specimens/photographs and tease mounts.
7. *Puccinia*:Herbariumspecimens of BlackStemRustofWheatandinfectedBarberryleaves
8. *Agaricus*:Specimensofbuttonstage andfullgrownmushroom
9. Lichens:Studyof growthformsoflichens(crustose,folioseandfruticose)
10. Mycorrhiza:ectomycorrhizaandendomycorrhiza(Photographs)
11. ***Marchantia***- morphology of thallus, w.m. rhizoids and scales, v.s. thallus throughgemmacup, w.m. gemmae (all temporary slides), v.s. antheridiophore, archegoniophore,l.s. sporophyte(allpermanent slides).
12. ***Funaria***- morphology, w.m. leaf, rhizoids, operculum, peristome, annulus, spores (temporaryslides);permanentslides showingantheridialand archegonialheads,l.s.capsuleandprotonema.
13. ***Selaginella***- morphology,w.m.leafwithligule,t.s.stem,w.m.strobilus,w.m.microsporophyllandmegasporophyll(temporaryslides),l.s.strobilus(permanentslide).
14. ***Equisetum***- morphology,t.s.internode,l.s.strobilus,t.s.strobilus,w.m.sporangiophore,w.m.spores(wetanddry)(temporaryslides);t.srhizome(permanent slide).
15. ***Pteris***- morphology, t.s. rachis, v.s. sporophyll, w.m. sporangium, w.m. spores (temporaryslides),t.s.rhizome,w.m.prothalluswithsex organsand

youngsporophyte(permanentslide).

16. ***Cycas***- morphology (coralloid roots, bulbil, leaf), t.s. coralloid root, t.s. rachis, v.s. leaflet,v.s.microsporophyll,w.m. spores(temporaryslides), l.s. ovule,t.s. root(permanentslide).
17. ***Pinus***- morphology (long and dwarf shoots, w.m. dwarf shoot, male and female), w.m.dwarfshoot,t.s.needle,t.s.stem,,l.s./t.s.malecone,w.m.microsporophyll,w.m.microspores(temporaryslides), l.s. femalecone, t.l.s.&r.l.s. stem (permanent slide).

Recommended Books:

1. Kumar, H.D. (1999). Introductory Phycology. Affiliated East-West. Press Pvt. Ltd. Delhi.2ndedition.
2. Tortora, G.J., Funke, B.R., Case, C.L. (2010). Microbiology: An Introduction,PearsonBenjaminCummings, U.S.A. 10th edition.
3. Sethi,I.K.andWalia,S.K.(2011).TextbookofFungi&TheirAllies,MacMillanPublishersPvt.Ltd., Delhi.
4. B.R.Vashishta,(2016) BotanyForDegreeStudentsFungi.S Chand&Company.
5. GeetaSumbali,(2011)TheFungi.Alphascience IntlLtdSecondEdition.
6. KRAneja&RSMehrotra(2015)AnIntroductiontoMycology.NewAgeInternationalPublishersSecond Edition.

DIVERSITY OF ANIMALS-1

Subject Code: BMFSS1-105 **L T P C** **Duration: 60Hrs.**
4 0 0 4

Course Objectives:

1. To ensure students can achieve an up-to-date level of understanding of biodiversity of animals.
2. To provide training in scientific and transferable skills through modular lecture courses, research projects, written work,seminars and supervisions.
3. To provide knowledge of latest published findings.

Course Outcomes (CO): The completion of the course will make student to acquire the knowledge of:

CO1: Kingdom Protista
CO2: Importance of Arthropodain in Forensic Sciences.
CO3: Importance of knowledge of Diversity of Animals in Forensic Science.

Unit-1(15 Hours)

KingdomProtista

Generalcharactersand classificationuptoclasses;LocomotoryOrganelles andlocomotioninProtozoa-Ameoba,Paramecium,Euglena

Unit-2(15 Hours)

PhylumPorifera

Generalcharactersandclassificationuptoclasses;CanalSystemin*Sycon*

PhylumCnidaria

Generalcharactersandclassificationuptoclasses;PolymorphisminHydrozoa,coral&coralreefs

Unit-3(15Hours)

PhylumPlatyhelminthes

Generalcharacters and classification up toclasses;Life history of*Taeniasolium and FasciolaHepatica*

PhylumAshelminthes

Generalcharactersandclassificationuptoclass**,**LifeCycleofAscaris,ParasiticadaptationinHelminthes

PhylumAnnelida

Generalcharactersandclassificationuptoclasses; MetamerisminAnnelida

Unit-4(15 Hours)

PhylumArthropoda

Generalcharactersand classificationuptoclasses;
VisioninArthropoda,MetamorphosisinInsects,ImportanceofArthropodainForensic Sciences

PhylumMollusca

Generalcharactersandclassificationuptoclasses; Torsioningastropods

Recommended Books:

1. Ruppert and Barnes, R.D. (2006). Invertebrate Zoology, VIII Edition. Holt Saunders International Edition.
2. Barnes, R.S.K., Calow, P., Olive, P.J.W., Golding, D.W. and Spicer, J.I. (2002).

3. Invertebrates: A New Synthesis, III Edition, Blackwell Science Young, J. Z. (2004).
4. The Life of Vertebrates. III Edition. Oxford university press.
5. Pough H. Vertebrate life, VIII Edition, Pearson International.
6. Hall B.K. and Hallgrimsson B. (2008). Strickberger's Evolution. IV Edition. Jones andBartlett Publishers Inc.

Zoology Lab-1

Subject Code: BMFSS1-106 **L T P C** **Duration: 60Hrs.**
0 0 4 2

Course Objectives:

1. To understand basic understanding of lab practices including safety measures.
2. To analyse pond water collected from different places.
3. To analyse the Obelia, Physalia, Millepora etc.

Course Outcomes (CO): The completion of the practical will make student to acquire the knowledge of:

CO1: Different Safety measures in lab.
CO2: Analysis of the Ascarislumbricoides and its lifestages (Slides/micro-photographs)
CO3: Analysis of Sycon (T.S.and L.S.),Hyalonema,Euplectella,Spongilla

1. StudyofwholemountofEuglena,AmoebaandParamecium,BinaryfissionandConjugationin Paramecium
2. Examinationofpond watercollectedfrom differentplacesfordiversityinprotista
3. StudyofSycon(T.S.andL.S.),Hyalonema,Euplectella,Spongilla
4. StudyofObelia,Physalia,Millepora,Aurelia,Tubipora,Corallium,Alcyonium,Gorgonia,Met ridium, Pennatula, Fungia, Meandrina,Madrepora
5. Onespecimen/slideof anyctenophore
6. Study of adult Fasciola hepatica, Taenia solium and their life cycles(Slides/microphotographs)
7. Studyof adult Ascarislumbricoidesanditslifestages (Slides/micro-photographs)
8. TosubmitaProjectReport onanyrelatedtopiconlifecycles/coral/ coralreefs.

RecommendedBooks:

1. Ruppert and Barnes, R.D. (2006). *Invertebrate Zoology*, VIII Edition. Holt SaundersInternationalEdition.
2. Barnes, R.S.K., Calow, P., Olive, P.J.W., Golding, D.W. and Spicer, J.I. (2002). *TheInvertebrates: A New Synthesis*,IIIEdition, BlackwellScience

3. Young,J.Z.(2004).*TheLifeofVertebrates*.IIIEdition. Oxforduniversitypress.
4. PoughH.*Vertebratelife*,VIIIEdition,PearsonInternational.
5. HallB.K.andHallgrimssonB.(2008).*Strickberger'sEvolution*.IVEdition.JonesandBartlettPublishersInc.

GROUP-2

DIFFERENTIAL CALCULUS-I

Subject Code: BSNMS1-105 **L T P C** **Duration: 45 Hrs.**
3 0 0 3

Course Objectives:

1. To ensure students can achieve an up-to-date level of understanding of differential calculus.
2. To provide training in scientific and transferable skills through modular lecture courses, research projects, written work,seminars and supervisions.
3. To provide knowledge of latest published findings.

Course Outcomes:

CO1: Understand the concept of Continuity and Differentiability.
CO2: Extend the knowledge to the different type of series, Roll's Theorem and Lagrange Mean Value Theorem
CO3: Develop the skill to sketch the curves in a plane using its mathematical properties in the different coordinate systems of reference.
CO4: Understand the concept of Partial Differential Equation.

Unit-I (12Hrs.)

Limit and Continuity (ε and δ definition), Types of discontinuities, Differentiability of functions, Successive differentiation, Leibnitz's theorem.

Unit-II(11Hrs.)

Rolle's theorem, Mean Value theorems, Taylor's theorem with Lagrange's and Cauchy's forms of remainder, Taylor's series, Maclaurin's series of $sin\ x$, $cos\ x$, ex , $\log(1+x)$, $(1+x)^m$, Maxima and Minima, Indeterminate forms.

Unit-III(14 Hrs.)

Tangents and normals, Curvature, Asymptotes, Singular points, Tracing of curves. Parametric representation of curves and tracing of parametric curves, Polar coordinates and tracing of curves in polar coordinates.

Unit-IV (8 Hrs.)

Partial differentiation-Function of two variables, Partial derivatives of higher order, Homogeneous functions, Euler's theorem and its extension (with proof), Composite functions, Total derivative,
Differentiation of implicit functions and composite functions, Jacobians and its properties.

RecommendedBooks:

1. H. Anton, I. Birens and S. Davis, Calculus, John Wiley and Sons, Inc., 2002.

2. G.B. Thomas and R.L. Finney, Calculus, Pearson Education, 2007.
3. Zafar Ahsan: Differential Equations and Their Applications, Second Edition, PrenticeHall of India Private Limited, New Delhi.
4. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000.
5. Erwin Kreyszig: Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.

DIFFERENTIAL CALCULUS-II

Subject Code: BSNMS1-106 **L T P C** **Duration: 45 Hrs.**
3 0 0 3

Course Objectives:

1. To ensure students can achieve an up-to-date level of understanding of Differential Calculus.
2. To provide training in scientific and transferable skills through modular lecture courses, research projects, written work,seminars and supervisions.
3. To provide knowledge of latest published findings.

Course Outcomes:

CO1: Apply the knowledge of advanced concepts of calculus in order to study theoretical development of different mathematical techniques and their applications.
CO2: Develop the knowledge of computing arc length, area and volume by using integration.
CO3: Understand the concept of integration and different kind of functions.
CO4: Expand the knowledge of multiple integrals and vector surface integrals.

Unit-I (12Hrs.)

Tangent plane and normal to a surface, Maxima and Minima of functions of two variables, Working rule to find the extreme values of a function $z = f(x, y)$, Lagrange's method of undetermined multipliers.

Unit-II (10Hrs.)

Arc formula for the Cartesian equation $y = f(x)$, other expressions for lengths of arcs, Areas under curves, Area formulas for parametric, Polar equation, Area of the closed curve, Volume and surfaces of revolution of curves.

Unit-III (12Hrs.)

Integration by partial fractions, Integration of rational and irrational functions, Properties of definite integral, Reduction formulae for integrals of rational, Trigonometric, Exponential and Logarithmic function and of their combinations.

Unit-IV(11Hrs.)

Double integrals (Cartesian), Change of order of integration in double integrals, Change of variables (Cartesian to polar), Applications: Areas and volumes, Centre of mass and gravity, Triple integrals (Cartesian), Simple applications involving cubes, Sphere and rectangular parallelepipeds.

Recommended Books:

1. G. B. Thomas, M. D. Weir, J. Hass: Thomas' Calculus (Twelfth Edition), Pearson Education.
2. Gorakh Prasad: Integral Calculus, Fourteenth Edition, Reprint 2007, Pothishala Private Limited, Allahabad.
3. Zafar Ahsan: Differential Equations and Their Applications, Second Edition, PrenticeHall of India Private Limited, New Delhi.
4. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000.

Erwin Kreyszig: Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006

MECHANICS

Subject Code: BSNMS1-102 **L T P C** **Duration: 60Hrs.**
4 0 0 4

Course Objectives:

1. To ensure students can achieve an up-to-date level of understanding of mechanics.
2. To provide training in scientific and transferable skills through modular lecture courses, research projects, written work,seminars and supervisions.
3. To provide knowledge of latest published findings.

Course Outcome (CO): After the completion of the course, student will be able to:

CO1: Understand the concepts of vector calculus and basic laws of motion
CO2: Gain the knowledge about gravitational motion, and global positioning system
CO3: Understand the concepts of harmonic oscillations.
CO4: Learn the concept of theory of Relativity.

UNIT-I (15 Hrs)

Vector algebra. Scalar and vector products. Derivatives of a vector with respect to aparameter. Laws of Motion: Frames of reference. Newton's Laws of motion. Dynamics of a system of particles. Centre of Mass. Momentum and Energy: Conservation of momentum. Work andenergy.
Conservation of energy. Motion of rockets. Rotational Motion: Angular velocity and angular momentum. Torque, Conservation of angular momentum.

UNIT-II (15Hrs)

Gravitation: Newton's Law of Gravitation. Motion of a particle in a central force field (motion is in a plane, angular momentum is conserved, areal velocity is constant). Kepler's Laws (statement only). Satellite in circular orbit and applications. Geosynchronous orbits. Weightlessness. Basic idea of global positioning system (GPS).

UNIT-III (15Hrs)

Oscillations: Simple harmonic motion. Differential equation of SHM and its solutions. Kinetic and Potential Energy, Total Energy and their time averages. Damped oscillations. Elasticity: Hooke's law, Stress- strain diagram, Elastic moduli-Relation between elastic constants, Poisson's Ratio-Expression for Poisson's ratio in terms of elastic constants, Work done in stretching and work done in twisting a wire, Twisting couple on a cylinder, Determination of Rigidity modulus by static torsion, Torsional pendulum, Determination of Rigidity modulus and moment of inertia, q, η and σ by Searles method.

UNIT-IV (15 Hrs)

Special Theoryof Relativity : Concept of Inertial and non-inertial frames, Concept of ether, Constancy of speed of light, Michelson-Morley Experiment, Galilean transformation, Postulates of Special Theory of Relativity, Lorentz transformation, Length contraction. Time dilation, Relativistic addition of velocities.

Recommended Books:

1.University Physics. FW Sears, MW Zemansky and HD Young13/e, 1986.AddisonWesley

2.Mechanics Berkeley Physics course, volume.1: Charles Kittel, et. Al. 2007, TataMcGrawHill.
3.Physics – Resnick, Halliday & Walker 9/e, 2010, Wiley.
4.Engineering Mechanics, Basudeb Bhattacharya, 2nd edn., 2015, Oxford UniversityPress.
5.University Physics, Ronald Lane Reese, 2003, ThomsonBrooks/Cole.

MECHANICS LAB

Subject Code: BSNMS1-107 **L T P C** **Duration: 60Hrs.**
0 0 4 2

Course Objectives:

1. To understand basic understanding of lab practices including safety measures.
2. To determine the modulus of elasticity.
3. To use basic measurement tools.

Course Outcomes (COs): After the completion of the course, Student will be able to

CO1: Use basic measurements tools like Vernier caliper, screw gauge etc.
CO2: Find the Moment of Inertia of a Flywheel.
CO3: Determine the Modulus of elasticity
CO4: Learn about motion of Bar Pendulum and Kater's Pendulum.

List of Experiments:

1. Measurements of length (or diameter) using Vernier caliper, screw gauge and travelling microscope.
2. To determine the Height of a Building using a Sextant.
3. To determine the Moment of Inertia of aFlywheel.
4. To determine the Young's Modulus of a Wire by Optical LeverMethod.
5. To determine the Modulus of Rigidity of a Wire by Maxwell'sneedle.
6. To determine the Elastic Constants of a Wire by Searle'smethod.
7. To determine g by BarPendulum.
8. To determine g by Kater'sPendulum.
9. To determine g and velocity for a freely falling body using Digital TimingTechnique.
10. To study the Motion of a spring and calculate (a) Spring Constant (b) Value ofg

RecommendedBooks:

1. Advanced Practical Physics for students, B.L.Flint and H.T.Worsnop, 1971, Asia Publishing House.
2. Advanced level Physics Practical's, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann EducationalPublishers.

3. Engineering Practical Physics, S.Panigrahi&B.Mallick,2015, Cengage Learning India Pvt. Ltd.
4. A Text Book of Practical Physics, Indu Prakash and Ramakrishna, 11th Edition, 2011, Kitab Mahal, New Delhi.

SEMESTER SECOND

DRUG ABUSE: PROBLEM, MANAGEMENT AND PREVENTION

Subject Code: BMNCC0-041 **L T P C** **Duration: 30Hrs.**
2 0 0 0

Course Objective: To make students aware about drug abuse and its effect on their financial and health status.
Course Outcome: To make students aware about treatment and control of drug abuse.

UNIT-I (6 Hours)

Meaning of Drug Abuse: Meaning: Drug abuse, Drug dependence and Drug addiction. Nature and extent of drug abuse in India and Punjab.

UNIT-II (8 Hours)

Consequences of Drug Abuse: Individual: Education, Employment, Income. Family: Violence. Society: Crime. Nation: Law and Order problem.

UNIT-III (8 Hours)

Prevention of Drug Abuse: Role of Family: Parent-child relationship, Family support, supervision, shipping values, active scrutiny. School: Counselling, Teacher as role-model, Parent-teacher-health professional coordination, Random testing on students.

UNIT-IV(8 Hours)

Treatment and Control of Drug Abuse: Medical Management: Medication for treatment and to reduce withdrawal effects. Psychological Management: Counselling, Behavioural and Cognitive therapy. Social Management: Family, Group therapy and Environmental intervention. Treatment: Medical, Psychological and Social Management. Control: Role of Media and Legislation.

Recommended Books:

1. Ram Ahuja, 'Social Problems in India', Rawat Publications, Jaipur, 2003.
2. 'Extent, Pattern and Trend of Drug Use in India', Ministry of Social Justice and Empowerment, Govt. of India, 2004.
3. J.A. Inciardi, 'The Drug Crime Connection', Sage Publications, Beverly Hills,1981.
4. T. Kapoor, 'Drug Epidemic among Indian Youth', Mittal Publications, New Delhi,1985.
5. Kessel, Neil and Henry Walton, 'Alcoholism, Harmond Worth', Penguin Books,1982.
6. Ishwar Modi and Shalini Modi, 'Addiction and Prevention', Rawat Publications,Jaipur, 1997.
7. 'National Household Survey of Alcohol and Drug Abuse', Clinical Epidemiological Unit, All India Institute of Medical Sciences, New Delhi, 2003 &2004.
8. Ross Coomber and Others, 'Key Concept in Drugs and Society', Sage Publications, New Delhi,2013.
9. BhimSain, 'Drug Addiction Alcoholism, Smoking Obscenity', Mittal Publications, New Delhi,1991.
10. Ranvinder Singh Sandhu, 'Drug Addiction in Punjab: A Sociological Study', Guru Nanak Dev University, Amritsar,2009.
11. Chandra Paul Singh, 'Alcohol and Dependence among Industrial Workers', Shipra,Delhi, 2000.
12. S.Sussman and S.L. Ames, 'Drug Abuse: Concepts, Prevention andCessation', Cambridge University Press,2008.
13. P.S. Verma, 'Punjab's Drug Problem: Contours and Characteristics', Vol. LII, No. 3, P.P. 40-43, Economic and

Political Weekly, 201

PHYSICAL CHEMISTRY-I

Subject Code: BSNMS1-203 **L T P C** **Duration: 45 Hrs.**
3 0 0 3

Course Objectives:

1. To develop basic understanding of different states of matter.
2. To understand concept of chemical kinetics.
3. To understand underlying processes associated with various states of matter.
4. To familiarize with relevance of matter properties for realistic applications.

Course Outcomes: Students will be able to acquire the knowledge of

CO1: Basic understanding of different states of matter
CO2: Rate of chemical reactions and related theories.
CO3: Underlying processes associated with various states of matter
CO4: Relevance of matter properties for realistic applications

Unit-I (15 Hrs.)

Gaseous State:

Postulates of kinetic theory of gases, deviation from ideal behaviour, van der Waals equation of states, the isotherms of van der Waals equation, relationship between critical constants and van der Waals constants, the law of corresponding states, reduced equation of state. Molecular velocities: Root mean square, average and most probable velocities. Qualitative discussion of the Maxwell's distribution of molecular velocities, collision number, mean free path and collision diameter, Liquefaction of gases (based on Joule-Thomson effect).

Unit-II (8 Hrs.)

Liquid State:

Intermolecular forces, structure of liquids (a qualitative description) Structural differences between solids, liquids and gases. Liquid crystals: Difference between liquid crystal, solid and liquid, Classification, structure of nematic and cholesteric phases. Thermography and seven segment cell.

Unit-III (12Hrs.)

Solid state:

Nature of the solid state, law of constancy of interfacial angles, law of rational indices, Miller indices, elementary ideas of symmetry, symmetry elements and symmetry operations, qualitative idea of point and space groups, seven crystal systems and fourteen Bravais lattices; X-ray diffraction, Bragg's law, a simple account of rotating crystal method and powder pattern method. Analysis of powder diffraction patterns of NaCl, CsCl and KCl. Defects in crystals.

Unit-IV (10 Hrs.)

Basics of Chemical Kinetics:

The concept of reaction rates. Effect of temperature, pressure, catalyst and other factors on reaction rates. Order and molecularity of a reaction. Derivation of integrated rate equations for zero, first and second order reactions (both for equal and unequal concentrations of reactants). Half–life of a reaction. General methods for determination of order of a reaction. Concept of activation energy and its calculation from Arrhenius equation. Theories of Reaction Rates: Collision theory and Activated Complex theory of bimolecular reactions. Comparison of the two theories (qualitative treatment only).

Recommended Books:

Latest edition of:

1. Atkins, P., Paula, J.de, Atkins Physical Chemistry; Pubs: Oxford University Press.
2. Puri, B.R., Sharma, L.R., Pathania, M.S., Principles of Physical Chemistry; Pubs: Vishal Publishing Co.
3. Barrow, G.M., Physical Chemistry; Pubs: McGraw Hill Inc.
4. Rao, C.N.R., University General Chemistry; Pubs: Macmillan India.
5. Berry, R.S., Rice, S.A., Ross, J., Physical Chemistry; Pubs: Oxford University Press.
6. Albert, R.A., Silbey, R.J., Physical Chemistry; Pubs: John Wiley & Sons Inc.
7. Dogra, S.K., Dogra, S., Physical Chemistry Through Problems; Pubs: Wiley Eastern Limited.
8. Levine, I.N., Physical Chemistry; Pubs: Tata McGraw Hill Publishing Co. Ltd.
9. Moore, W. J., Basic Physical Chemistry; Pubs: Prentice Hall of India Pvt. Ltd.
10. Metz, C.R., Theory and Problems of Physical Chemistry; Schaum's outline series, 2nd edition, Pubs: McGraw-Hall Book company.

ORGANIC CHEMISTRY-II

Subject Code: BSNMS1-204 **L T PC** **Duration: 45 Hrs.**
3 0 0 3

Course Objectives:

1. To understand the concepts of stereochemistry of organic compounds
2. To understand concepts behind aromaticity
3. To understand the concept of mechanisms of organic reactions
4. To familiarize with the aromatic electrophilic substitution reactions
5. To familiarize with the chemistry of alkyl and aryl halides

Course Outcomes: After the completion of course students will acquire the knowledge of

CO1: Concepts of stereochemistry of organic compounds
CO2: Concepts behind aromaticity
CO3: Mechanisms of organic reactions
CO4: Aromatic electrophilic substitution reactions
CO5: Chemistry of alkyl and aryl halides

Unit-I (15Hrs.)

Stereochemistry of Organic Compounds:

Concept of isomerism. Types of isomerism Optical isomerisin-elements of symmetry, molecular chirality, enantiomers, stereogeniccentre, optical activity, properties of enantiomers, chiral and achiral molecules with two stereogeniccentres, diastereomers, threo and erythro diastereomers, meso compounds, resolution of enantiomers, inversion, retention and racemization. Relative and absolute configuration, sequence rules, D & Land R & S systems of nomenclature. Geometric isomerism- determination of configuration of geometric isomers, E & Z system of nomenclature, geometric isomerism in oximes and alicyclic compounds. Conformational isomerism-conformational analysis of ethane and n-butane; conformations of cyclohexane, axial and equatorial bonds, conformation of mono substituted cyclohexane derivatives. Newman projection and Sawhorse formulae, Fischer and flying wedge formulae.

Unit-II (7 Hrs.)

Arenes and Aromaticity:

Nomenclature of benzene derivatives. The aryl group. Aromatic nucleus and side chain. Structure of benzene: molecular formula and Kekule structure. Stability and carbon-carbon bond lengths of benzene, resonance structure, MO diagram, the Huckel rule, aromatic ions.

Unit-III (11Hrs.)

Aromatic Electrophilic Substitution:

Aromatic electrophilic substitution-general pattern of the mechanism, role of σ and π complexes. Mechanism or nitration, halogenation, sulphonation, mercuration and Friedel-Crafts reaction. Energy profile diagrams. Activating and deactivating substituents, orientation and ortho/para ratio. Side chain reactions of benzene derivatives. Methods

of formation and chemical reaction of alkylbenzenes alkynylbenzenes.

Unit-IV (12 Hrs.)

Alkyl and aryl halides:

Nomenclature and classes of alkyl halides, methods of formation chemical reactions. Mechanisms of nucleophilic substitution reactions of alkyl halides, SN^2 and SN^1 reactions with energy profile diagrams. Methods of formation of aryl halides, nuclear and side chain reactions. The addition elimination and the elimination-additional mechanisms of nucleophilic aromatic substitution reactions. Relative reactivities of alkyl halides vs allyl, vinyl and aryl halides.

Recommended Books:

Latest edition of:

1. Morrison and Boyd, 'Organic Chemistry', Prentice Hall.
2. Solomons, 'Fundamentals of Organic Chemistry', John Wiley.
3. F.A. Carey, 'Organic Chemistry', McGraw Hill,Inc.
4. L.G. Wade Jr., 'Organic Chemistry', Prentice Hall.
5. S.M. Mukherji, S.P. Singh and R.P. Kapoor, 'Organic Chemistry', Vol.-I, II & III, Wiley Eastern Ltd. (New Age International).

FINGERPRINTS EXAMINATION AND FORENSIC PHOTOGRAPHY

Subject Code: BMFSS1-201 **L T P C** **Duration: 45 Hrs.**
3 0 0 3

Course Objectives:

1. To ensure students can achieve an up-to-date level of understanding of fingerprints and forensic photography.
2. To provide training in scientific and transferable skills through modular lecture courses, research projects, written work,seminars and supervisions.
3. To provide knowledge of latest published findings.

Course Outcome (CO): After the completion of the course, student will be able to:
CO1: Understand the concept of Fingerprints.
CO2: Understand the importance of fingerprint evidence in solving crimes.
CO3: Gain knowledge regarding classification of fingerprints.
CO4: Understand the concept of development of prints.

Unit-I (15Hrs.)

History and development of finger prints as a science for personal, identification, Finger PrintsBureau.

Classification of finger Prints: Patterntypes,patternarea,Henrysystemofclassification(Primary to tertiary and key classification) extension of Henry system searching of finger prints,classificationsystem, single digit classification system.

Palm prints, Sole prints: Importance, classification and examination.

Unit-II (12 Hrs.)

Chance Finger Prints: Latent prints, plastic prints, causes, composition of sweat. Developmentoflatentfingerprints:Conventionalmethodsasfluorescentpowder, magnetic powder.Fuming––methods: Iodine and cynoacrylate methods. Chemical methods: Ninhydrin and its analoguesilver nitrate, enhancement of latent prints, application of laser technologies, met
al depositionmethod.Biological methods of development of latentprints on skin.

Unit-III (10Hrs.)

Systematicapproachtolatentprintprocessing,preservingandliftingoffingerprints.PhotographyofFingerPrints,comparisonoffingerprints:basisofcomparison,classcharacteristics,individual characteristics,various typesof ridge characteristics.

Automatic Finger Print Identification system (AFIS) and its variants, digital Image processing offingerprints

andtheirenhancement.

Unit-IV (08 Hrs.)

Photography: Basicprinciplesandtechniques,Exposing,Developingand Printing,

ModernDevelopmentsinPhotography,DigitalPhotography,Videography/Highspeed Photography.CrimeSceneandLaboratoryPhotography.

Recommended Books:

1) DavidR.Ashbaugh(1999),**QuantitativeandQualitativeFrictionRidgeAnalysis**,CRCPress.
2) E.RolandMenzel(SecondEdition)(1999),**FingerprintDetectionwithLoseres**,MarcelDekker,Inc.
3) CowgerandJamesF.(1993),**FrictionRidgeskin:ComparisonandIdentificationofFingerprints**,Elsevier New York, CRC PressLondon.
4) CumminsandMidlo(1943),**FingerPrints,PalmsandSoles:AnIntroductiontoDermatoglyphics**,TheBlakistonofficeLondon.
5) Cherril,F.R.(1954),**TheFingerPrints.SystematScotlandYard**,HerMajestuy'soffice,London.
6) WentworthandWilder(1957),**PersonalIdentification**,Richard.G. Badger.Boston.
7) Mehta,M.K.(1980),**IdentificationofThumbImpression&CrossExaminationofFinger Prints,** N. M. Tripathi(P)Ltd.Bombay.
8) Moenssens(1975),**FingerPrintsTechniques**,ChittonBookCo.,Philadelphia,NewYork.
9) AllisonH.C.(1st Edition)(1973) **PersonalIdentification**,HolbrookPress.
10) Chatterjee S.K. and Hague R.V. (1988), **Fingerprints or Dactyloscopy andRidgeoscopy.**
11) E.RonaldMenzel(1997),**AmanualofFingerprintIdentification:FingerPrintDetection with Lasers.**
12) H.C. Lee, R.E. Gaensslen and S.R.Ramotowski (3rd Edition) (2013), **Advances inFingerprintTechnology**, CRC Press, BocaRaton.

13) C. Champod, C. Lennard, P. Margot, M. Stoilovic (2004), **Fingerprints and OtherRidge Skin Impression (International Forensic Science and Investigation Series)**,CRCPress, BocaRaton.

14) B.C. Bridges, Vollmer A. and M. Monir (2002), **Criminal Investigation PracticalFingerPrinting,ThumbImpressions,HandWriting,ExpertTestimony,OpinionEvidence,**Allahabad UniversityBook Agency.

15) DavidR.Ashbaugh(1999),**QuantitativeandQualitativeFrictionRidgeAnalysis**,CRCPress.

16) E.RolandMenzel(SecondEdition)(1999),**FingerprintDetectionwithLoseres**,MarcelDekker,Inc.

17) CowgerandJamesF.(1993),**FrictionRidgeskin:ComparisonandIdentificationofFingerprints**,Elsevier New York, CRC PressLondon.

18) CumminsandMidlo(1943),**FingerPrints,PalmsandSoles:AnIntroductiontoDermatoglyphics**,TheBlakistonofficeLondon.

19) Cherril,F.R.(1954),**TheFingerPrints.SystematScotlandYard**,HerMajestuy'soffice,London.

20) WentworthandWilder(1957),**PersonalIdentification**,Richard.G. Badger.Boston.

21) Mehta,M.K.(1980),**IdentificationofThumbImpression&CrossExaminationofFinger Prints,** N. M. Tripathi(P)Ltd.Bombay.

22) Moenssens(1975),**FingerPrintsTechniques**,ChittonBookCo.,Philadelphia,NewYork.

23) AllisonH.C.(1st Edition)(1973) **PersonalIdentification**,HolbrookPress.

24) Chatterjee S.K. and Hague R.V. (1988), **Fingerprints or Dactyloscopy andRidgeoscopy.**

25) E.RonaldMenzel(1997),**AmanualofFingerprintIdentification:FingerPrintDetection with Lasers.**

26) H.C. Lee, R.E. Gaensslen and S.R.Ramotowski (3rd Edition) (2013), **Advances inFingerprintTechnology**, CRC Press, BocaRaton.

27) C. Champod, C. Lennard, P. Margot, M. Stoilovic (2004), **Fingerprints and OtherRidge Skin Impression (International Forensic Science and Investigation Series)**,CRCPress, BocaRaton.

28) B.C. Bridges, Vollmer A. and M. Monir (2002), **Criminal Investigation PracticalFingerPrinting,ThumbImpressions,HandWriting,ExpertTestimony,OpinionEvidence,**Allahabad UniversityBook Agency.

29) DaluzH.M(2015),**FingerprintAnalysisLaboratoryWorkbook**,CRCPress.

QUESTIONED DOCUMENT AND FINGERPRINT LABORATORY

Subject Code: BMFSS1-202 **L T P C** **Duration: 60 Hrs.**
0 0 4 2

Course Objectives:

1. To understand basic understanding of lab practices including safety measures.
2. To develop and analyse the different fingerprint patterns.
3. To identify core, delta and to do ridge counting and ridge tracing.
4. To use physical and chemical methods to develop latent prints

Course Outcomes (CO): The completion of the practical will make student to acquire the knowledge of:

CO1: Different Safety measures in lab.
CO2: Analysing the fingerprint evidence.
CO3: Development of latent print from crime scene.

1. How to procure fingerprints &method of taking fingerprints manually (rolled &plain).
2. To carry out ten digit classification of fingerprints.
3. To identify different fingerprint patterns.
4. To identify core and delta.
5. To carry out ridge tracing and ridge counting.
6. To investigate physical methods of fingerprint detection.
7. To investigate chemical methods of fingerprint detection.
8. Sole prints comparison and their lifting from the scene of crime.
9. Palm prints comparison and their lifting from the scene of crime.
10. Evaluation of Crime scene and photographs.

Recommended Books:

1. J.E.Cowger,FrictionRidgeSkin,CRCPress,BocaRaton(1983).
2. D.A.Ashbaugh,Quantitative-QualitativeFrictionRidgeAnalysis,CRCPress,BocaRaton(2000).
3. C. Champod, C. Lennard, P. Margot an M. Stoilovic, Fingerprints and other Ridge SkinImpressions,CRC Press, BocaRaton (2004).
4. LeeandGaensleen's, Advancesin FingerprintTechnology,3rdEdition,R.S.Ramotowski(Ed.), CRCPress, BocaRaton (2013).

CHEMISTRY LAB-II

Subject Code: BSNMS1-208 **L T P C** **Duration: 60 Hrs.**
0 0 4 2

Course Objectives:

1. To understand the concepts behind crystallization
2. To understand the determination of melting points and effect of impurities on m.p.
3. To understand various purification techniques used for purification.
4. To make students familiar with the determination of physical properties i.e; Viscosity, surface tension, rate of reaction and enthalpy of reaction.

Course Outcomes: After completion of course students will acquire the knowledge and practical hands on training of

CO1: Purification of organic compound using various solvent combinations
CO2: Determination of melting and boiling points of various organic compound
CO3: Chromatographic techniques
CO4: Calculation of physical properties i.e; Viscosity, surface tension, rate of reaction and enthalpy of reaction.

Laboratory Techniques:

1. Checking the calibration of the thermometer
2. Purification of organic compounds by crystallization using the following solvents:
    a. Water
    b. Alcohol
    c. Alcohol-Water
3. Determination of the melting points of above compounds and unknown organic compounds (Kjeldahl method and electrically heated melting point apparatus)
4. Effect of impurities on the melting point – mixed melting point of two unknown organic compounds
5. Determination of boiling point of liquid compounds. (boiling point lower than and more than 100 °C by distillation and capillary method)

Physical Chemistry: Experimental Chemical Kinetics

1. To determine the specific reaction rate of the hydrolysis of methyl acetate/ethyl acetate catalyzed by hydrogen ions at room temperature.
2. To study the effect of acid strength on the hydrolysis of an ester.
3. To determine the viscosity and surface tension of C_2H_5OH and glycerine solution in water
4. Calculation of the enthalpy of ionization of ethanoic acid.

Recommended Books:

Latest edition of:

1. H. Denny, W. Roesky, ‘Chemical Curiosites’, WILEY VCH.
2. J. Mendham, R.C. Denney, J.D. Barnes, M.Thomas, ‘Vogel’s Textbook of Quantitative Analysis’, Pearson Education.
3. G. Svehla, ‘Vogel’s Textbook of Quantitative Analysis’, Pearson Education.

GROUP-1

PLANT ECOLOGY& TAXONOMY

Subject Code: BMFSS1-203 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

Course Objectives:

1. To ensure students can achieve an up-to-date level of understanding of plant ecology & Taxonomy.
2. To provide training in scientific and transferable skills through modular lecture courses, research projects, written work,seminars and supervisions.
3. To provide knowledge of latest published findings.

Course Outcomes (CO): The completion of the course will make student to acquire the knowledge of:

CO1: Plant communities and their characteristics.
CO2: Ecosystem and its structure.
CO3: Pollution and ecological footprints

Unit-1(15 Hours)

Introduction Ecological factors: Soil: Origin, formation, composition, soil profile. Water: States of water in the environment, precipitation types. Light and temperature: Variation Optimal and limiting factors; Shelford law of tolerance. Adaptation of hydrophytes and xerophytes.

Plant communities: Characters; Ecotone and edge effect; Succession; Processes and types.

Ecosystem: Structure; energy flow trophic organisation; Food chains and food webs, Ecological pyramidsproduction and productivity; Biogeochemical cycling; Cycling of carbon, nitrogen and Phosphorous **Pollution:** Types, control and prevention **Ecological Footprints:** Carbon footprint, Carbon dating

Unit-2(15 Hours)

Introduction to plant taxonomy: Identification, Classification, Nomenclature.

Identification : Functions of Herbarium, important herbaria and botanical gardens of the world and India; Documentation: Flora, Keys: single access and multi-access

Botanical nomenclature: Principles and rules (ICN); ranks and names; binominal system, typification, author citation, valid publication, rejection of names, principle of priority and its limitations.

Unit-3(15Hours)

Classification: Types of classification-artificial, natural and phylogenetic. Bentham and Hooker (upto series), Engler and Prantl (up to series).

Unit-4 (15Hours)

Complete description of families : Brassicaceae (Brassica, Iberis), Asteraceae (Sonchus, Ageratum), Solanaceae (Solanum, Withania), Lamiaceae (Salvia, Ocimum), Liliaceae, (Asphodelus), Ranunculus (Ranunculus), Gramineae (Triticum, Oryza)

Suggested Readings:

1. Kormondy, E.J. (1996). Concepts of Ecology. Prentice Hall, U.S.A. 4th edition
2. Sharma, P.D. (2010) Ecology and Environment. Rastogi Publications, Meerut, India. 8th edition.
3. Simpson, M.G. (2006). Plant Systematics. Elsevier Academic Press, San Diego, CA, U.S.A.
4. Singh, G. (2012). Plant Systematics: Theory and Practice. Oxford & IBH Pvt. Ltd., NewDelhi.
5. J.S. Singh, S.P. Singh, S.R.Gupta (2015) Ecology ,Environmental Science & Conservation S. Chand Publisher

BOTANY LAB-2

Subject Code: BMFSS1-204 **L T P C** **Duration: 60 Hrs.**
0 0 4 2

Course Objectives:

1. To understand basic understanding of lab practices including safety measures.
2. To analyse soil samples
3. To analyse the morphological adaptations of hydrophytes and xerophytes.

Course Outcomes (CO): The completion of the practical will make student to acquire the knowledge of:

CO1: Different Safety measures in lab.
CO2: Analysis of the soil
CO3: Analysis of microclimatic variables

1. Study of instruments used to measure microclimatic variables: Soil thermometer, maximum and minimum thermometer, anemometer, psychrometer/hygrometer, rain gauge and lux meter
2. Determination of pH, and analysis of two soil samples for carbonates, chlorides, nitrates, sulphates, organic matter and base deficiency by rapid field test.
3. Comparison of bulk density, porosity and rate of infiltration of water in soil of three habitats.
4. (a) Study of morphological adaptations of hydrophytes and xerophytes (four each). (b)Study of biotic interactions of the following: Stem parasite (Cuscuta), Root parasite (Orobanche), Epiphytes, Predation (Insectivorous plants)
5. Determination of minimal quadrat size for the study of herbaceous vegetation in the college campus by species area curve method (Species to be listed).
6. Quantitative analysis of herbaceous vegetation in the college campus for frequency and comparison with Raunkiaer's frequency distribution law
7. Study of vegetative and floral characters of the following families (Description, V.S. flower, section of ovary, floral diagram/s, floral formula/e and systematic position according to Bentham & Hooker's system of classification):Brassicaceae -Brassica, Alyssum / Iberis; Asteraceae -Sonchus/Launaea, Vernonia/Ageratum, Eclipta/Tridax; Solanaceae -Solanum nigrum, Withania; Lamiaceae -Salvia, Ocimum; Liliaceae -Asphodelus / Lilium / Allium. 8.
8. Mounting of a properly dried and pressed specimen of any wild plant with herbarium label (to be submitted in the record book).

Suggested Readings:

1. Kormondy, E.J. (1996). Concepts of Ecology. Prentice Hall, U.S.A. 4th edition
2. Sharma, P.D. (2010) Ecology and Environment. Rastogi Publications, Meerut, India. 8th edition.
3. Simpson, M.G. (2006). Plant Systematics. Elsevier Academic Press, San Diego, CA, U.S.A.
4. Singh, G. (2012). Plant Systematics: Theory and Practice. Oxford & IBH Pvt. Ltd., NewDelhi.
5. J.S. Singh, S.P. Singh, S.R.Gupta (2015) Ecology ,Environmental Science & Conservation S. Chand Publisher

DIVERSITY OF ANIMALS-II

Subject Code: BMFSS1-205 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

Course Objectives:

1. To ensure students can achieve an up-to-date level of understanding of diversity of animals.
2. To provide training in scientific and transferable skills through modular lecture courses, research projects, written work,seminars and supervisions.
3. To provide knowledge of latest published findings.

Course Outcomes (CO): The completion of the course will make student to acquire the knowledge of:

CO1: General characteristics and classification of chordates.
CO2: Agnatha,Pisces, Aves.
CO3 : Reptilia, Mammals and Zoogeography.

Unit 1(15 Hours)

Introduction to Chordates General characteristics and outline classification

ProtochordataGeneral characteristics of Hemichordata, Urochordata and Cephalochordata; Study of larval forms in protochordates; Retrogressive metamorphosis in Urochordata

Unit-2(15 Hours)

Origin of Chordata Dipleurula concept and the Echinoderm theory of origin of chordates Advanced features of vertebrates over Protochordata

AgnathaGeneral characteristics and classification of cyclostomes up to class

Unit-3(15Hours)

Pisces General characteristics of Chondrichthyes and Osteichthyes, classification up to order Migration, Osmoregulation and Parental care in fishes

Amphibia Origin of Tetrapoda (Evolution of terrestrial ectotherms); General characteristics and classification up to order; Parental care in Amphibians.

Unit-4(15Hours)

Reptilia

General characteristics and classification up to order; Affinities of Sphenodon; Poison apparatus and Biting mechanism in snakes**Aves** General characteristics and classification up to order Archaeopteryx-- a connecting link; Principles and aerodynamics of flight, Flight adaptations and Migration in birds

Mammals General characters and classification up to order; Affinities of Prototheria; Adaptive radiation with reference to locomotory appendages

Zoogeography Zoogeographical realms, Theories pertaining to distribution of animals, Plate tectonic and Continental drift theory, distribution of vertebrates in different.

Recommended Books:

1. Ruppert and Barnes, R.D. (2006). Invertebrate Zoology, VIII Edition. Holt Saunders International Edition.
2. Barnes, R.S.K., Calow, P., Olive, P.J.W., Golding, D.W. and Spicer, J.I. (2002).
3. Invertebrates: A New Synthesis, III Edition, Blackwell Science Young, J. Z. (2004).
4. The Life of Vertebrates. III Edition. Oxford university press.
5. Pough H. Vertebrate life, VIII Edition, Pearson International.
6. Hall B.K. and Hallgrimsson B. (2008). Strickberger's Evolution. IV Edition. Jones and Bartlett Publishers Inc

ZOOLOGY LAB-II

Subject Code: BMFSS1-206 **L T P C** **Duration: 60 Hrs.**
0 0 4 2

Course Objectives:

1. To understand basic understanding of lab practices including safety measures.
2. To analyse the slides prepared
3. To analyse the photographs of various fishes.

Course Outcomes (CO): The completion of the practical will make student to acquire the knowledge of:

CO1: Different Safety measures in lab.
CO2: Analysis of the identification marks of poisonous and non-poisonous snakes.
CO3: Analysis of Amphibia.

1. Protochordata Balanoglossus, Herdmania, Branchiostoma, Colonial UrochordataSections of Balanoglossus through proboscis and branchiogenital regions, Sections of Amphioxus through pharyngeal, intestinal and caudal regions. Permanent slide of Herdmania spicules

2. Agnatha,Petromyzon, Myxine

3. Fishes: Scoliodon, Sphyrna, Pristis, Torpedo, Chimaera, Mystus, Heteropneustes, Labeo, Exocoetus, Echeneis, Anguilla, Hippocampus, Tetrodon/ Diodon, Anabas, Flat fish

4. Amphibia: Ichthyophis/Ureotyphlus, Necturus, Bufo, Hyla, Alytes, Salamandra

5. Reptilia: Chelone, Trionyx, Hemidactylus, Varanus, Uromastix, Chamaeleon, Ophiosaurus, Draco, Bungarus, Vipera, Naja, Hydrophis, Zamenis, Crocodylus Key for Identification of poisonous and non-poisonous snakes

6. Aves:Study of six common birds from different orders. Types of beaks and claws

7. Mammalia: Sorex, Bat (Insectivorous and Frugivorous), Funambulus, Loris, Herpestes, Erinaceous.

SUGGESTED READINGS

1 Young, J. Z. (2004). The Life of Vertebrates. III Edition. Oxford university press.

2 Pough H. Vertebrate life, VIII Edition, Pearson International.

3 Darlington P.J. The Geographical Distribution of Animals, R.E. Krieger Pub Co.

4 Hall B.K. and Hallgrimsson B. (2008). Strickberger's Evolution. IV Edition. Jones and Bartlett Publishers Inc

GROUP-2

ELECTRICITY, MAGNETISM AND EMT

Subject Code: BSNMS1-202 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

Course Objectives:

1. To ensure students can achieve an up-to-date level of understanding of electricity, magnetism and emt.
2. To provide training in scientific and transferable skills through modular lecture courses, research projects, written work,seminars and supervisions.
3. To provide knowledge of latest published findings.

Course Outcome (CO): After the completion of the course, Student will be able to

CO1: Understand the concepts of vector Algebra.
CO2: Understand the basic concepts of electrostatics
CO3: Gain the knowledge about the basic concepts of magneto-statics
CO4: Learn the concept of Maxwell equation and electromagnetic waves.

UNIT-I (13Hrs)

Vector Analysis: Review of vector algebra (Scalar and Vector product), gradient, divergence, Curl and their significance, Vector Integration, Line, surface and volume integrals of Vector fields, Gauss- divergence theorem and Stoke's theorem of vectors (statement only).

UNIT-II(16Hrs)

Electrostatics: Electrostatic Field, electric flux, Gauss's theorem of electrostatics. Applications of Gauss theorem- Electric field due to point charge, infinite line of charge, uniformly charged spherical shell and solid sphere, plane charged sheet, charged conductor. Electric potential as line integral of electric field, potential due to a point charge, electric dipole, uniformly charged spherical shell and solid sphere. Calculation of electric field from potential. Capacitance of an isolated spherical conductor. Parallel plate, spherical and cylindrical condenser. Energy per unit volume in electrostatic field. Dielectric
medium, Polarisation, Displacement vector. Gauss's theorem in dielectrics. Parallel plate capacitor completely filled with dielectric.

UNIT-III(16Hrs)

Magnetism: Magnetostatics: Biot-Savart's law & its applications- straight conductor, circular coil, solenoid carrying current. Divergence and curl of magnetic field. Magnetic vector potential. Ampere's circuital law. Magnetic properties of materials: Magnetic intensity, magnetic induction, permeability, magnetic susceptibility. Brief introduction of dia-, para- and ferro-magnetic materials. Electromagnetic Induction: Faraday's laws of electromagnetic induction, Lenz's

law, self and mutual inductance, L of single coil, M of two coils. Energy stored in magneticfield.

UNIT-IV(15 Hrs)

Maxwell`s equations and Electromagnetic wave propagation: Equation of continuity of current, Displacement current, Maxwell's equations, Poynting vector, energy density in electromagnetic field, electromagnetic wave propagation through vacuum and isotropic dielectric medium, transverse nature of EM waves,polarization.

Recommended Books:

1. Electricity and Magnetism, Edward M. Purcell, 1986, McGraw-HillEducation.
2. Mechanics Berkeley Physics course,volume.1: Charles Kittel, et. Al. 2007, TataMcGrawHill.
3. Electricity and Magnetism, J.H. Fewkes& J. Yarwood. Vol. I, 1991, Oxford Univ.Press.
4. Electricity and Magnetism, D C Tayal, 1988, Himalaya PublishingHouse.
5. University Physics, Ronald Lane Reese, 2003, ThomsonBrooks/Cole.
6. D.J. Griffiths, Introduction to Electrodynamics, 3rd Edn, 1998, Benjamin Cummings.

DIFFERENTIAL EQUATIONS-I

Subject Code: BSNMS1-205 **L T P C** **Duration: 45 Hrs.**
3 0 0 3

Course Objectives:

1. To ensure students can achieve an up-to-date level of understanding of differential equations.
2. To provide training in scientific and transferable skills through modular lecture courses, research projects, written work,seminars and supervisions.
3. To provide knowledge of latest published findings.

Course Outcomes:

CO1: Understand the concept of ordinary differential equation, its formation, order and degree.
CO2: Apply various methods to solve first order non-linear differential equation.
CO3: Solve linear differential equations of higher order by using various methods.
CO4: Apply differential equations to significant applied and theoretical problems.

Unit-I (12Hrs.)

First order exact differential equations. Integrating factors, rules to find an integrating factor. First order higher degree equations solvable for x, y, p. Methods for solving higher-order differential equations, Basic theory of linear differential equations, Wronskian and its properties, Solving a differential equation by reducing its order.

Unit-II(11Hrs.)

Linear homogenous equations with constant coefficients, Linear non-homogenous equations, The method of variation of parameters, The Cauchy-Euler equation, Simultaneous differential equations, Total differential equations.

Unit-III(12Hrs.)

General solution of homogeneous equation of second order, principle of superposition for a homogeneous equation, Wronskian, its properties and applications, Linear homogeneous and non-homogeneous equations of higher order with constant coefficients, Euler's equation, method of undetermined coefficients, method of variation of parameters, solutions of simultaneous equations.

Unit-IV (10Hrs.)

Classification of second order partial differential equations into elliptic, parabolic and hyperbolic through illustrations only.

Recommended Books:

1. Shepley L. Ross, Differential Equations, 3rd Ed., John Wiley and Sons, 1984.
2. I. Sneddon, Elements of Partial Differential Equations, McGraw-Hill, International Edition, 1967.
3. E.L.Ince: Theory of Ordinary Differential Equations. Dover,1956.
4. M. Braun, 'Differential Equations and Their Applications', 4th Edn., Springer, 2011.
5. F. Braue and J.A. Nohel, 'The Qualitative Theory of Ordinary Differential Equations', Dover Publications, 1989.
6. E.A. Coddington, 'Ordinary Differential Equations', Tata McGraw Hill, 2002.

DIFFERENTIAL EQUATIONS-II

Subject Code: BSNMS1-206 **L T P C** **Duration: 45 Hrs.**
3 0 0 3

Course Objectives:

1. To ensure students can achieve an up-to-date level of understanding of differential equations.
2. To provide training in scientific and transferable skills through modular lecture courses, research projects, written work,seminars and supervisions.
3. To provide knowledge of latest published findings.

Course Outcomes:

CO1: Understand the concept of first order and linear partial differential equation.
CO2: Apply various power series methods to find series solution of differential equation.
CO3: Recognize the major classification of PDEs and the qualitative differences between the classes of equations.
CO4: Understand the formation and solution of some significant PDEs like wave and heat equation.

Unit-I (10Hrs.)

Order and degree of partial differential equations, Concept of linear and non-linear partial differential equations, Formation of first order partial differential equations, Linear partial differential equation of first order, Lagrange's method, Charpit's method.

Unit-II(13Hrs.)

Power Series solution about an ordinary point, solutions about singular points, The method of Frobenius, Bessel equation and Legendre equation, its properties and their recurrence relations, Hyper geometric equation, Bessel function and their recurrence relations, Strum liouville boundary values.

Unit-III(12Hrs.)

Separation of variables in a PDE, Laplace equation: mean value property, Weak and strong maximum principle, Green's function, Poisson's formula, Dirichlet's principle, Existence of solution using Perron's method (without proof).

Unit-IV (10Hrs.)

Heat equation: Initial value problem, Fundamental solution, Weak and strong maximum principle and uniqueness results, Wave equation: uniqueness, D'Alembert's method, method of spherical means and Duhamel's principle.

Recommended Books:

1. W.E.Boyce and P.C.Diprima: Elementary Differential Equations and Boundary value problems, John Wiley, 1986.
2. R. K. Jain and S.R.K.Iyengar: Advanced Engineering Mathematics, 2nd Edition, Narosa Publishing House, 2003.
3. E.L.Ince: Theory of Ordinary Differential Equations. Dover,1956.
4. M. Braun, 'Differential Equations and Their Applications', 4th Edn., Springer, 2011.
5. F. Braue and J.A. Nohel, 'The Qualitative Theory of Ordinary Differential Equations', Dover Publications, 1989.
6. E.A. Coddington, 'Ordinary Differential Equations', Tata McGraw Hill, 2002.

ELECTRICITY, MAGNETISM AND EMT LAB

Subject Code: BSNMS1-207 **L T P C** **Duration: 60 Hrs.**
0 0 4 2

Course Objectives:

1. To ensure students can achieve an up-to-date level of understanding of electricity, magnetism and emt.
2. To provide training in scientific and transferable skills through modular lecture courses, research projects, written work,seminars and supervisions.
3. To provide knowledge of latest published findings.

Course Outcome (CO): After the completion of the course, Student will be able to

CO1: Take measurements by using Multimeter.
CO2: Learn the measurement of charge, current and resistance using Method.
CO3: Determine resonance in LCR circuit.
CO4: Verify the Thevenin, Norton theorem and Maximum Power Transfer Theorem

List of Experiments:

1. To use a Multimeter for measuring (a) Resistances, (b) AC and DC Voltages, (c) DCCurrent, and (d) checking electricalfuses.
2. Ballistic Galvanometer: (i) Measurement of charge and current sensitivity (ii) Measurementof CDR (iii) Determine a high resistance by Leakage Method (iv) To determine Self Inductance of a Coil by Rayleigh'sMethod.
3. To compare capacitances using De'Sauty'sbridge.
4. Measurement of field strength B and its variation in a Solenoid (DeterminedB/dx).
5. To study the Characteristics of a Series RC circuit.
6. To study the a series LCR circuit and determine its (a) Resonant Frequency, (b) QualityFactor
7. To study a parallel LCR circuit and determine its (a) Anti-resonant frequency and (b) Quality factor.
8. To determine a Low Resistance by Carey Foster'sBridge.
9. To verify the Thevenin and Nortontheorem
10. To verify the Superposition, and Maximum Power Transfer theorem.

RecommendedBooks:

1. Advanced Practical Physics for students, B.L.Flint&H.T.Worsnop, 1971, Asia Publishing House.
2. A Text Book of Practical Physics, Indu Prakash and Ramakrishna, 11th Edition, 2011, Kitab Mahal, New Delhi.
3. Engineering Practical Physics, S.Panigrahi& B.Mallick,2015, Cengage Learning India Pvt. Ltd.
4. Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann EducationalPublishers.

SEMESTER THIRD

INORGANIC CHEMISTRY-II

Subject Code: BSNMS1-303 **L T P C** **Duration: 45 Hrs.**
3 0 0 3

Course Objectives:

1. To understand chemistry of s block element
2. To familiarize with the concepts of acids and bases
3. To understand the concepts behind chemistry of s & p block elements
4. To understand the chemistry of various transition elements.

Course Outcomes: After the completion of course students will acquire the knowledge of:

CO1: Concepts behind acids and bases
CO2: Chemistry of s and p block elements
CO3: Concepts of chemistry of various transition elements

Unit-I (6 Hrs.)

s-Block Elements: Comparative studies, diagonal relationship, salient features of hydrides, solvation and complexation tendencies.

Acids and Bases: Arrhenius, Bronsted-Lowry, the Lux-Flood, solvent system and Lewis concepts of acids and bases.

Unit-II (12 Hrs.)

p–Block Elements–I: Comparative study (including diagonal relationship) of groups 13–17 elements, compounds like hydrides, oxides, oxyacids and halides of groups 13–17, hydrides of boron–diborane and higher boranes, Borazine, borohydrides, fullerenes. VBT, VSPER theory, MOT.

Unit-III (12 Hrs.)

p–Block Elements-II: Carbides, fluorocarbons, silicates (structural principle), tetrasulphur tetranitride, basic properties of halogens, interhalogens and polyhalide ,Silicones and phosphazenes as examples of inorganicpolymers, nature of bonding in triphosphazenes.

Unit-IV (15 Hrs.)

Chemistry of Transition Elements:

Characteristic properties of d–block elements. Properties of the elements of the first transition series, their simple compounds and complexes illustrating relative stability of their oxidation states, coordination number and geometry. General characteristics of elements of Second and Third Transition Series, comparative treatment with their 3d analogues in respect of ionic radii, oxidation states, magnetic behaviour. CFT and CFSE for Octahedral/Tetrahedral

complexes.

Recommended Books:
Latest edition of:

1. Cotton, F.A., Wilkinson, G., Gaus, P.L., Basic Inorganic Chemistry; Pubs: John Wiley and Sons.
2. Lee, J.D., Concise Inorganic Chemistry;Pubs: Chapman & Hall Ltd.
3. Shriver, D.E., Atkins, P.W., Inorganic Chemistry; Pubs: Oxford University Press.
4. Douglas, B., Medaniel, D., Atenander, J., Concepts and Models of Inorganic Chemistry; Pubs: John Wiley and Sons Inc.
5. Porterfeild, W.W., Wesky, A., Inorganic Chemistry; Pubs: Addison-Wesky Publishing Company.
6. Miessler, G.L., Tarr, D.A., Inorganic Chemistry; Pubs: Pearson Education Inc.
7. Jolly, W.L., Modern Inorganic Chemistry; Pubs: Tata McGraw-Hill Publishing Company Limited.
8. Purcell, K.F., Kotz, J.C., Inorganic Chemistry; Pubs: W.B.Saunders Company.
9. Puri, B.R., Sharma, L.R., Kalia, K.K., Principles of Inorganic Chemistry; Pubs: Milestones Publisher.

PHYSICAL CHEMISTRY-II

Subject Code: BSNMS1-304 **L T P C** **Duration: 45 Hrs.**
3 0 0 3

Course Objectives:

1. To understand energy exchange processes
2. To familiarize with the system of variable compositions.
3. To understand the concepts of thermodynamics.
4. To understand the concept of chemical equilibrium.

Course Outcomes: On completion of this course, students will be able to:

CO1: Identify and describe energy exchange processes.
CO2: Manipulate physical parameters to favour a particular process.
CO3: Compare the system properties with variation in composition.
CO4: Identify and analyze uni/multicomponent system.

Unit-I (14 Hrs.)

Thermodynamics-I:

Definition of thermodynamic terms: System, surroundings etc. Types of systems, intensive and extensive properties. State and path functions and their differentials. Thermodynamic process. Concept of heat and work.

First Law of Thermodynamics: Statement, definition of internal energy and enthalpy. Heat capacity, heat capacities at constant volume and pressure and their relationship. Joule's law-Joule-Thomson coefficient and inversion temperature, Calculation of w,q,dU&dH for the expansion of ideal gases under isothermal and adiabatic conditions for reversible process.

Thermochemistry: Standard state, standard enthalpy of formation-Hess's Law of heat summation and its applications. Heat of reaction at constant pressure and at constant volume. Enthalpy of neutralization. Bond dissociation energy and its calculation from thermo-chemical data, temperature dependence of enthalpy. Kirchhoff's equation.

Unit-II (15 Hrs.)

Thermodynamics-II & III:

Second Law of Thermodynamics: Need for the law, different statements of the law, Carnot cycle and its efficiency, Carnot theorem. Thermodynamic scale of temperature.

Concept of Entropy: Entropy as a state function, entropy as a function of V & T, entropy as a function of P & T, entropy change in physical change, Clausius inequality, entropy as a criteria of spontaneity and equilibrium. Entropy change in ideal gases and mixing of gases.

Third Law of Thermodynamics: Nernst heat theorem, statement and concept of residual entropy, evaluation of absolute entropy from heat capacity data. Gibbs and Helmholtz functions; Gibbs function (G) and Helmholtz function (A) as thermodynamic quantities, A &G as criteria for thermodynamic equilibrium and spontaneity, their advantage over entropy change, Variation of G and A with P,V and T.

Unit-III (6 Hrs.)

Chemical Equilibrium:

Equilibrium constant and free energy. Thermodynamic derivation of law of mass action. Determination of Kp, Kc, Ka and their relationship, Clausius-Clapeyron equation, applications.

Unit-IV (10 Hrs.)

Introduction to Phase Equilibrium:

Statement and meaning of the terms-phase, component and degree of freedom, derivation of Gibbs phase rule, phase equilibria of one component system-water, CO_2 and S systems. Phase equilibria of two component systems-solid-liquid equilibria, simple eutectic-Bi-Cd, Pb-Ag systems, desilverisation of lead. Solid solutions-compound formation with congruent melting point (Mg-Zn) and incongruent melting point, ($NaCl$-H_2O), $FeCl_3$-H_2O) and $CuSO_4$-H_2O) system. Freezing mixtures, acetone-dry ice. Non-ideal system-azeotropes-HCl-H_2O and ethanol-water system. Partially miscible liquids Phenol-water, trines-thylamin-water, Nicotine-water System. Lower and upper consulate temperature, Effect of impurity on consolute temperature, immiscible liquids, steam distillation. Nernst distribution law-thermodynamic derivation and applications.

Recommended Books:

Latest edition of:

1. Atkins, P., Paula, J.de, Atkins Physical Chemistry; Pubs: Oxford University Press.
2. Puri, B.R., Sharma, L.R., Pathania, M.S., Principles of Physical Chemistry; Pubs: Vishal Publishing Co.
3. Barrow, G.M., Physical Chemistry;Pubs: McGraw Hill Inc.
4. Rao, C.N.R., University General Chemistry; Pubs: Macmillan India.
5. Berry, R.S., Rice, S.A., Ross, J., Physical Chemistry; Pubs: Oxford University Press.
6. Albert, R.A., Silbey, R.J., Physical Chemistry; Pubs: John Wiley & Sons Inc.
7. Dogra, S.K., Dogra, S., Physical Chemistry Through Problems; Pubs:Wiley Eastern Limited.
8. Levine, I.N., Physical Chemistry; Pubs: Tata McGraw Hill Publishing Co. Ltd.
9. Moore, W. J., Basic Physical Chemistry; Pubs: Prentice Hall of India Pvt. Ltd.
10. Metz, C.R., Theory and Problems of Physical Chemistry; Schaum's outline series, Pubs: McGraw-Hall Book company.

CRIMINALISTICS

Subject Code: BMFSS1-301 **L T P C** **Duration: 45 Hrs.**
3 0 0 3

Course Objectives:

1. To ensure students can achieve an up-to-date level of understanding of criminalistics.

2. To provide training in scientific and transferable skills through modular lecture courses, research projects, written work,seminars and supervisions.
3. To provide knowledge of latest published findings.

Course Outcome (CO): After the completion of the course, student will be able to:
CO1: Gain knowledge of Crime scene investigation.
CO2: Gain knowledge regarding physical evidences recovered at crime scene and its importance.
CO3: Understand the concept of Voice analysis.
CO4: Understand the importance of trace evidences and its examination.

Unit-I (15Hrs.)

Crime Scene Investigation: Definition, Types of crime scene (Primary and Secondary, Indoor, Outdoor and Mobile, other specific types of Crime Scene), Purpose of crime scene examination, First responding officers, Protection of the crime Scene, Documentation of Crime scene, Methods of search for physical clue materials, Plan of Action, Note Taking, Reconstruction of Crime scene, Crime scene sketching, Photography of crime scene, Legal Implications for Crime Scene Searches.
Physical Evidences: Definition, their classification, collection, preservation, packing, labelling, sealing, forwarding and transportation, Chain of custody.

Unit-II (10 Hrs.)

Tool marks: Types, Importance, location, nature, collection and evaluation.
Restoration of Erased /Obliterated Marks.
Track marks: Types, Importance, nature, location, collection and evaluation.
Glass: Types of glass and their composition, Forensic examination of glass, Glass fracture analysis, Interpretation of glass evidence.
Density, Refractive Index; Other Optical Properties of Crystalline Material.
Paints: Types of paint and their composition, Forensic examination of paints, Interpretation of paint evidence.

Unit-III (08 Hrs.)

Soil: Types of soil, Composition and colour of soil, Forensic examination of soil, Interpretation of soil evidence.
Fibre: Introduction, morphology of fibre, types, Synthetic fibre analysis, microscopy, optical properties, refractive index, fluorescence, dye analysis, Birefringence, difference between man-made fibres and natural fibres.

Unit-IV (12 Hrs.)

Building Materials: Types of cement and their composition, Determination of adulterants, Analysis of Bitumen and road material, Analysis of cement mortar and cement concrete and stones.
Voice Identification: Introduction, Significance, Theory of generation of voice, Characteristics, Voice Spectrography, Analysis of Audio-Video Signal for Authenticity.
Forensic examination of electrical appliances/installations.
Miscellaneous Clue Materials: Examination of strings/ropes, Fibers, Threads and fabrics, Wires/cables, Seals, Counterfeit coins.

Recommended Books:

1) Horswell J.(2016). The Practice of Crime Scene Investigation. New York, CRC Press.
2) James S. H. (2014). Forensic Science: An Introduction to Scientific and Investigative Techniques. New York, Taylor & Francis.
3) Saferstein R. (8th Edition) (2011): Forensic Science Handbook, Prentice Hall Inc. USA.
4) Nickolas P. and Sherman H. (2006), Illustrated guide to Crime Scene Investigation, CRC press.
5) Siegel J. A. &Mirakovits K.(2006). Forensic Science: The Basics. New York, CRC Press.
6) Sharma B.R. (2003). Forensic Science in Criminal Investigation and Trials. India, Universal Law House.
7) Nordby, James, S.H. & J.J. (2003). Forensic Science: an Introduction to Scientific and Investigative Techniques. USA, CRC Press.
8) Rose P. (2001). Forensic Speaker Identification; Forensic Science Series. London, Taylor and Francis.
9) Bengold&Moryson N. (1999). Speech and Audio Signal Processing. USA, John Wiley & Sons.
10) Gilbert N. (3rd Edition) (1993), Criminal Investigation, Macmillan Publishing company.
11) Saferstein R. (1976), Criminalistics, Prentice Hall Inc. USA.

CRIMINALISTICS LABORATORY

Subject Code: BMFSS1-302 **L T P C** **Duration: 60 Hrs.**
0 0 4 2

Course Objectives:

1. To understand basic understanding of lab practices including safety measures.
2. To anaylse the comparison of soil,glass, cloth, bangles, threads.
3. To analyse the biological fluids

Course Outcomes (CO): The completion of the practical will make student to acquire the knowledge of:

CO1: Different Safety measures in lab.

CO2: Collection of various types of samples from the crime scene

CO3: Analysis of paint samples, tyre marks etc.

1.Collection, Packing, Labelling &Forwarding of the Following Physical Evidences:
(A) Biological Fluids (B) Soil/Dust (C) Wet Exhibits (D) Hair/ Fibre (E) Glass Material (F) Liquids (G) Pharmaceutical Products/Drugs of Abuse (H) Botanical Material (I) Shell Case/Cartridge/Bullet/Pellets, (J) Charred Documents etc.
2. Comparison of Soil samples.
3. Comparison of glass pieces.
4. Comparison of Miscellaneous material like Cloth, Bangles, threads etc.
5. To prepare a cast of Shoe prints and their comparison.
6. Examination of Paint samples.
7. Examination of Tyre marks (Digital Matching of Suspected Tyre/Foot Wear Impressions)
8. Detection of adulterants in food.
12. Restoration of Erased Punched Mark on Metal Piece by Chemical Treatment.
13. Identification of Glass Fractures.
14. Comparison of Tool Marks and Fired Cartridge/ Bullet Using Comparison Microscope.

Recommended Books:

1) Horswell J.(2016). The Practice of Crime Scene Investigation. New York, CRC Press.
2) James S. H. (2014). Forensic Science: An Introduction to Scientific and Investigative Techniques. New York, Taylor & Francis.
3) Saferstein R. (8th Edition) (2011): Forensic Science Handbook, Prentice Hall Inc. USA.
4) Nickolas P. and Sherman H. (2006), Illustrated guide to Crime Scene Investigation, CRC press.
5) Siegel J. A. &Mirakovits K.(2006). Forensic Science: The Basics. New York, CRC Press.
6) Sharma B.R. (2003). Forensic Science in Criminal Investigation and Trials. India, Universal Law House.
7) Nordby, James, S.H. & J.J. (2003). Forensic Science: an Introduction to Scientific and Investigative Techniques. USA, CRC Press.
8) Rose P. (2001). Forensic Speaker Identification; Forensic Science Series. London, Taylor and Francis.
9) Bengold&Moryson N. (1999). Speech and Audio Signal Processing. USA, John Wiley & Sons.
10) Gilbert N. (3rd Edition) (1993), Criminal Investigation, Macmillan Publishing company.
11) Saferstein R. (1976), Criminalistics, Prentice Hall Inc. USA.

CHEMISTRY LAB III

Subject Code: BSNMS1-305 **L T P C** **Duration: 60 Hrs.**
0 0 4 2

Course Objectives:

1. To understand the concepts behind Estimation of metals.
2. To synthesis and separation if various inorganic compounds

Course Outcomes: After completion of course students will gain the knowledge of:
CO1: Obtaining precise results of estimation by titrations

CO2: Preparation separations of organic compounds.

Quantitative Analysis:

i. Volumetric Analysis

a) Determination of acetic acid in commercial vinegar using NaOH.
b) Determination of alkali content-antacid tablet using HCI.
c) Estimation of calcium content in chalk as calcium oxalate by permanganometry.
d) Estimation of hardness of water by EDTA.
e) Estimation of ferrous and ferric by dichromate method.
f) Estimation of copper using sodiumthiosulphate.

ii. Gravimetric Analysis

Analysis of Cu as CuSCN and Ni as Ni (dimethylgloxime)

Organic Chemistry Laboratory Techniques

Thin Layer Chromatography

a) Determination of R_f values and identification of organic compounds.
b) Separation of green leaf pigments (spinach leaves may be used).
c) Preparation and separation of 2, 4. dinitrophenylhydrazones of acetone, 2-butone, 2-Butanone, hexan-2 and 3-one using toluene and light petroleum (40 : 60).
d) Separation of a mixture of dyes using cyclohexane and ethyl acetate (8.5:1.5).

Recommended Books:

Latest edition of:

1. H. Denny, W. Roesky, 'Chemical Curiosites', WILEY VCH.
2. G. Marr and B.W. Rocket,'Practical Inorganic Chemistry', University Science Books.
3. G. Pass and H. Sutcliffe, 'Practical Inorganic Chemistry', Chapman and Hall, London.

   J. Mendham, R.C. Denney, J.D. Barnes, M.Thomas, 'Vogel's Textbook of Quantitative Analysis, Pearson Education.
4. G. Svehla, 'Vogel's Textbook of Quantitative Analysis', Pearson Education6.
5. Vogel, A.I., Tatchell, A.R., Furnis, B.S., Hannaford, A.J. & Smith, P.W.G.,Textbook of Practical Organic Chemistry, Prentice-Hall.

GROUP-1

PLANT ANATOMY & EMBRYOLOGY

Subject Code: BMFSS1-303 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

Course Objectives:

1. To ensure students can achieve an up-to-date level of understanding of plant anatomy and embryology.
2. To provide training in scientific and transferable skills through modular lecture courses, research projects, written work,seminars and supervisions.
3. To provide knowledge of latest published findings.

Course Outcomes (CO): The completion of the course will make student to acquire the knowledge of:

CO1: Tissues and organs
CO2: Secondary growth, adaptive and protective systems
CO3 : Structural organization of flowers.

Unit-1(15 Hours)

- **Tissues and Organs:** Root and shoot apical meristems; Simple and complex tissues. Structure of dicot and monocot root stem and leaf.
- **Secondary Growth:** Vascular cambium – structure and function, seasonal activity. Secondary growth in root andstem, Wood (heartwood and sapwood).

Unit-2(15 Hours)

- **Adaptive and protective systems:** Epidermis, cuticle, stomata; General account of adaptations in xerophytes and hydrophytes.
- **Structural organization of flower:** Structure of anther and pollen; Structure and types of ovules; Types of embryo sacs, organization and ultrastructure of mature embryo sac.

Unit-3(15 Hours)

Pollination and fertilization: Pollination mechanisms and adaptations; Double fertilization; Seed-structure appendages and dispersal mechanisms.

Unit-4(15 Hours)

- **Embryo and endosperm :** Endosperm types, structure and functions; Dicot and monocot embryo; Embryo-endosperm relationship
- **Apomixis and polyembryony:** Definition, types and practical applications

SuggestedReadings

1. Bhojwani,S.S.&Bhatnagar,S.P.(2011).EmbryologyofAngiosperms.VikasPublica tionHousePvt.Ltd. New Delhi. 5th edition.
2. Mauseth,J.D.(1988).PlantAnatomy.TheBenjamin/CummingsPublisher,USA.
3. J.P.Goyal&ArunaSaini(2016)Angiosperms:Structure,Development&ReproductionTruema n
4. PC Vasishta(2003). PlantAnatomy. Pradeep Publications

BOTANY LAB III

Subject Code: BMFSS1-304 **L T P C** **Duration: 60 Hrs.**
0 0 4 2

Course Objectives:

1. To understand basic understanding of lab practices including safety measures.
2. To analyse slides prepared.
3. To analyse the adaptative anatomy.

Course Outcomes (CO): The completion of the practical will make student to acquire the knowledge of:

CO1: Different Safety measures in lab.
CO2: Analysis of the structure of anther
CO3: Analysis of Tissues

1. Study of meristems through permanent slides and photographs
2. Tissues (parenchyma, collenchyma and sclerenchyma); Macerated xylary elements, Phloem (Permanent slides, photographs)
3. Stem: Monocot: *Zea mays;* Dicot: *Helianthus*; Secondary: *Helianthus* (only Permanent Slides).
4. Root: Monocot: *Zea mays*; Dicot: *Helianthus*; Secondary: *Helianthus* (only Permanent slides).
5. Leaf: Dicot and Monocot leaf (only Permanent slides).
6. Adaptive anatomy: Xerophyte (*Nerium* leaf); Hydrophyte (*Hydrilla* stem).
7. Structure of anther (young and mature), tapetum (amoeboid and secretory) (Permanent slides).
8. Types of ovules: anatropous, orthotropous, circinotropous, amphitropous/ campylotropous.
9. Female gametophyte: *Polygonum* (monosporic) type of Embryo sac Development (Permanent slides/photographs).
10. Ultrastructure of mature egg apparatus cells through electron micrographs.
11. Pollination types and seed dispersal mechanisms (including appendages, aril, caruncle) (Photographs and specimens).
12. Calculation of percentage of germinated pollen in a given medium.

Recommended Books:

1. Alexopoulos, C.J., Mims, C.W., Blackwell, M. (1996). Introductory Mycology, John Wiley and Sons (Asia), Singapore. 4th edition.

2. Bhatnagar, S.P. and Moitra, A. (1996). Gymnosperms. New Age International (P) Ltd Publishers, New Delhi, India.

3. Kumar, H.D. (1999). Introductory Phycology. Affiliated East-West. Press Pvt. Ltd. Delhi. 2nd edition

. 4. Parihar, N.S. (1991). An introduction to Embryophyta. Vol. I. Bryophyta. Central Book Depot, Allahabad.

5. Raven, P.H., Johnson, G.B., Losos, J.B., Singer, S.R., (2005). Biology. Tata McGraw Hill, Delhi, India.

6. Sethi, I.K. and Walia, S.K. (2011). Text book of Fungi & Their Allies, MacMillan Publishers Pvt. Ltd., Delhi.

7. Thakur, A.K. and Bassi, S.K. (2008). Diversity of Microbes and Cryptogams. S. Chand & Co., Delhi.

8. Tortora, G.J., Funke, B.R., Case, C.L. (2010). Microbiology: An Introduction, Pearson Benjamin Cummings, U.S.A. 10th edition.

9. Vashishta, P.C., Sinha, A.K., Kumar, A., (2010). Pteridophyta, S. Chand. Delhi, India

PHYSIOLOGY & BIOCHEMISTRY

Subject Code: BMFSS1-305 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

Course Objectives:

1. To ensure students can achieve an up-to-date level of understanding of physiology and biochemistry.
2. To provide training in scientific and transferable skills through modular lecture courses, research projects, written work,seminars and supervisions.
3. To provide knowledge of latest published findings.

Course Outcomes (CO): The completion of the course will make student to acquire the knowledge of:

CO1: Digestion and absorption of food.
CO2: Respiratory Physiology and renal physiology
CO3: Endocrine and reproductive physiology.

Unit-1(15 Hours)

Digestion and Absorption of Food Structure and function of digestive glands; Digestion and absorption of carbohydrates, fats and proteins; Nervous and hormonal control of digestion (in brief)

Unit-2(15 Hours)

Functioning of Excitable Tissue (Nerve and Muscle) Structure of neuron, Propagation of nerve impulse (myelinated and non-myelinated nerve fibre); Structure of skeletal muscle, Mechanism of muscle contraction (Sliding filament theory), Neuromuscular junction

Respiratory Physiology Ventilation, External and internal Respiration, Transport of oxygen and carbon dioxide in blood, Factors affecting transport of gases.

Unit- 3 (15Hours)

Renal Physiology Functional anatomy of kidney, Mechanism and regulation of urine formation

Cardiovascular Physiology Structure of heart, Coordination of heartbeat, Cardiac cycle, ECG.

Unit-4 (15 Hours)

Endocrine and Reproductive Physiology Structure and function of endocrine glands (pituitary, thyroid, parathyroid, pancreas, adrenal, ovaries, and testes), Brief account of spermatogenesis and oogenesis, Menstrual cycle.

Recommended Books:

1. Tortora, G.J. and Derrickson, B.H. (2009). Principles of Anatomy and Physiology, XII Edition, John Wiley & Sons, Inc.
2. Widmaier, E.P., Raff, H. and Strang, K.T. (2008) Vander's Human Physiology, XI Edition., McGraw Hill

3. Guyton, A.C. and Hall, J.E. (2011). Textbook of Medical Physiology, XII Edition, Harcourt Asia Pvt. Ltd/ W.B. Saunders Company
4. Berg, J. M., Tymoczko, J. L. and Stryer, L. (2006). Biochemistry. VI Edition. W.H Freeman and Co.
5. Nelson, D. L., Cox, M. M. and Lehninger, A.L. (2009). Principles of Biochemistry. IV Edition. W.H. Freeman and Co.
6. Murray, R.K., Granner, D.K., Mayes, P.A. and Rodwell, V.W. (2009). Harper's Illustrated Biochemistry. XXVIII Edition. Lange Medical Books/Mc Graw3Hill.

ZOOLOGY LAB III

Subject Code: BMFSS1-306 **L T P C** **Duration: 60 Hrs.**
0 0 4 2

Course Objectives:

1. To understand basic understanding of lab practices including safety measures.
2. To analyse temporary mounts.
3. To estimate haemoglobin.

Course Outcomes (CO): The completion of the practical will make student to acquire the knowledge of:

CO1: Different Safety measures in lab.
CO2: Analysis of the permanent histological sections of mammalian oesophagus.
CO3: Preparati n of haemin and haemochromogen crystals.

1. Preparation of temporary mounts: Neurons and Blood film.
2. Preparation of haemin and haemochromogen crystals.
3. Estimation of haemoglobin using Sahli's haemoglobinometer.
4. Examination of permanent histological sections of mammalian oesophagus, stomach, duodenum, rectum, lung, kidney, thyroid, pancreas, adrenal, testis, ovary.

SUGGESTED READINGS

1. Tortora, G.J. and Derrickson, B.H. (2009). Principles of Anatomy and Physiology, XII Edition, John Wiley and Sons, Inc.

2. Widmaier, E.P., Raff, H. and Strang, K.T. (2008). Vander's Human Physiology, XI Edition, McGraw Hill.

3. Guyton, A.C. and Hall, J.E. (2011). Textbook of Medical Physiology, XII Edition, Harcourt Asia Pvt. Ltd/ W.B. Saunders Company.

4. Marieb, E. (1998). Human Anatomy and Physiology, IV Edition, Addison-Wesley. Kesar, S. and Vashisht, N. (2007). Experimental Physiology, Heritage Publishers.

5. Prakash, G. (2012). Lab Manual on Blood Analysis and Medical Diagnostics, S. Chand and Company Ltd.

GROUP-2

REAL ANALYSIS-I

Subject Code: BSNMS1-306 **L T P C** **Duration: 45 Hrs.**
3 0 0 3

Course Objectives:

1. To ensure students can achieve an up-to-date level of understanding of real analysis.
2. To provide training in scientific and transferable skills through modular lecture courses, research projects, written work,seminars and supervisions.
3. To provide knowledge of latest published findings.

Course Outcomes:

CO1: Understand the various properties of the real line $\mathbb{R}$.
CO2: Understand the concept of different kinds of sequences, their convergence, squeeze theorem and Cauchy's theorem on limit.
CO3: Apply the various tests for convergence and absolute convergence of an infinite series of real numbers
CO4: Understand the concept of sequence in series function, M-test and power series methods.

Unit-I(12Hrs.)

Finite and infinite sets, examples of countable and uncountable sets. Real line, bounded sets, suprema and infima, completeness property of R, Archimedean property of R, intervals. Concept of cluster points and statement of BolzanoWeierstrass theorem.

Unit-II(11Hrs.)

Real Sequence, Bounded sequence, Cauchy convergence criterion for sequences. Cauchy's theorem on limits, order preservation and squeeze theorem, monotone sequences and their convergence (monotone convergence theorem without proof).

Unit-III(12Hrs.)

Infinite series. Cauchy convergence criterion for series, positive term series, geometric series, comparison test, convergence of p-series, Root test, Ratio test, alternating series, Leibnitz's test (Tests of Convergence without proof), Definition and examples of absolute and conditional convergence.

Unit-IV (10Hrs.)

Sequences and series of functions, Pointwise and uniform convergence. Mn-test, M-test, Statements of the results about uniform convergence and integrability and differentiability of functions, Power series and radius of convergence.

RecommendedBooks:

1) T. M. Apostol, Calculus (Vol. I), John Wiley and Sons (Asia) P. Ltd., 2002.
2) R.G. Bartle and D. R Sherbert, Introduction to Real Analysis, John Wiley and Sons (Asia) P. Ltd., 2000.
3) E. Fischer, Intermediate Real Analysis, Springer Verlag, 1983.
4) K.A. Ross, Elementary Analysis- The Theory of Calculus Series- Undergraduate Texts in Mathematics, Springer Verlag, 2003.
5) ROBERT G. Bartle and Donald R. Sherbert, Introduction to Real Analysis, 3/e, John Wiley & Sons, Inc. 2000.

6) Walter Rudin, Principles of Mathematical Analysis, 3/e, McGraw-Hill, 1976.
7) S.C. Malik and Savita Arora, Mathematical Analysis, New Age International Publisher, Reprint 2008.

REAL ANALYSIS-II

Subject Code: BSNMS1-307 **L T P C** **Duration: 45 Hrs.**
3 0 0 3

Course Objectives:

1. To ensure students can achieve an up-to-date level of understanding of real analysis.
2. To provide training in scientific and transferable skills through modular lecture courses, research projects, written work,seminars and supervisions.
3. To provide knowledge of latest published findings.

Course Outcomes:

CO1: Understand properties of Riemann integral and related theorems.
CO2: Illustrate the effect of uniform convergence on the limit function with respect to continuity, differentiability, and integrability.
CO3: Examine the point wise and uniform convergence using various tests
CO4: To understand basic topology of metric spaces.

Unit-I(11Hrs.)

Definition of Riemann integral, Its examples and properties, Bounded theorem, Riemann integrable functions, Cauchy criterion, The Squeeze theorem, Classes of Riemann integrable functions, Additivity theorem, Fundamental theorem-first and second form, Substitution theorem.

Unit-II(12Hrs.)

Pointwise and Uniform convergence, Interchange of limit and continuity, Interchange of limit and derivatives, Interchange of limit and integral, Bounded convergence theorem, Dini's theorem, The exponential functions logarithmic and trigonometric functions.

Unit-III (10Hrs.)

Absolutely and uniformly convergent series of functions defined on a domain, Interchange of integral and summation, Tests for uniform convergence—Cauchy criterion, Weirstrass M-test.

Unit-IV(12Hrs.)

Metric spaces, Examples of metric spaces, Neighbourhood of a point, Limit point and isolated points of a set, Closed set, Interior point of a set, Open set, Perfect set, Bounded set, Dense set, Union and intersection of open sets, Closure of a set.

RecommendedBooks:

1) T. M. Apostol, Calculus (Vol. I), John Wiley and Sons (Asia) P. Ltd., 2002.

2) R.G. Bartle and D. R Sherbert, Introduction to Real Analysis, John Wiley and Sons (Asia) P. Ltd., 2000.
3) E. Fischer, Intermediate Real Analysis, Springer Verlag, 1983.
4) K.A. Ross, Elementary Analysis- The Theory of Calculus Series- Undergraduate Texts in Mathematics, Springer Verlag, 2003. ROBERT G. Bartle and Donald R. Sherbert,
5) Introduction to Real Analysis, 3/e, John Wiley & Sons, Inc. 2000.
6) Walter Rudin, Principles of Mathematical Analysis, 3/e, McGraw-Hill, 1976.

THERMAL PHYSICS AND STATISTICAL MECHANICS

Subject Code: BSNMS1- 301 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

Course Objectives:

1. To ensure students can achieve an up-to-date level of understanding of thermal physics.
2. To provide training in scientific and transferable skills through modular lecture courses, research projects, written work,seminars and supervisions.
3. To provide knowledge of latest published findings.

Course Outcome (CO): After the completion of the course, Student will be able to

CO1: Understand the concepts of laws of thermodynamics, entropy.
CO2: Learn about the concepts of Maxwell's thermodynamic relations.
CO3: Gain knowledge of Laws associated with thermal radiations and kinetic theory of gases.
CO4: Understand the concepts of thermodynamic probability, phase space

UNIT-I(16 Hrs)

Laws of Thermodynamics: Thermodynamic Description of system: Zeroth Law of thermodynamics and temperature. First law and internal energy, conversion of heat into work, Various Thermodynamical Processes, Applications of First Law: General Relation between CP & CV, Work Done during Isothermal and Adiabatic Processes, Compressibility & Expansion Coefficient, Reversible & irreversible processes, Second law & Entropy, Carnot's cycle & theorem, Entropy changes in reversible & irreversible processes, Entropy-temperature diagrams, Third law of thermodynamics, Unattainability of absolute zero.

UNIT-II (16 Hrs)

Thermodynamic Potential and Theory of Radiation: Enthalpy, Gibbs, Helmholtz and Internal Energy functions, Maxwell's relations & applications - Joule-Thompson Effect, ClausiusClapeyron Equation, Expression for (CP – CV), CP/CV, TdS equations. Blackbody radiation, Spectral distribution, Concept of Energy Density, Derivation of Planck's law, Deduction of Wien's distribution law, RayleighJeans Law, Stefan Boltzmann Law and Wien's displacement law from Planck's law.

UNIT-III (14 Hrs)

Kinetic Theory of Gases: Derivation of Maxwell's law of distribution of velocities and its experimental verification, Mean free path (Zeroth Order), Transport Phenomena: Viscosity, Conduction and Diffusion (for vertical case), Law of equipartition of energy (no derivation) and its applications to specific heat of gases; mono-atomic and diatomic gases.

UNIT-IV (14 Hrs)

Statistical Mechanics: Phase space, Macrostate and Microstate, Entropy and Thermodynamic probability, Maxwell-Boltzmann law, distribution of velocity, Quantum statistics, Fermi-Dirac distribution law, electron gas, Bose-Einstein distribution law, photon gas, comparison of three statistics.

Recommended Books:

1. Statistical Physics, thermodynamics and kinetic theory by V.S.Bhatia
2. Thermal Physics, S. Garg, R. Bansal and C. Ghosh, 1993, Tata McGraw-Hill.
3. A Treatise on Heat, Meghnad Saha, and B.N. Srivastava, 1969, Indian Press.
4. Thermodynamics, Enrico Fermi, 1956, Courier Dover Publications.
5. Heat and Thermodynamics, M.W.Zemasky and R. Dittman, 1981, McGraw Hill 14
6. Thermodynamics, Kinetic theory & Statistical thermodynamics, F.W.Sears&G.L.Salinger. 1988, Narosa
7. University Physics, Ronald Lane Reese, 2003, Thomson Brooks/Cole.
8. Thermal Physics, A. Kumar and S.P. Taneja, 2014, R. chand Publications.

THERMAL PHYSICS AND STATISTICAL MECHANICS LAB

Subject Code: BSNMS1- 302 **L T P C** **Duration: 60 Hrs.**
0 0 4 2

Course Objectives:

1. To understand basic understanding of lab practices including safety measures.
2. To analyse the cooling temperature using thermocouple.
3. To calibrate Resistance Temperature device.

Course Outcome (CO): After the completion of the course, Student will be able to

CO1: Perform Mechanical Equivalent of Heat and thermal conductivity of related experiments.
CO2: Learn about the variation of thermo emf across two junctions of a thermocouple with temperature.
CO3: Record and analyze the cooling temperature using a thermocouple and suitable data acquisition system.
CO4: Calibrate Resistance Temperature Device (RTD

List of Experiments:

1. To determine Mechanical Equivalent of Heat, J, by Callender and Barne's constant flow method.
2. Measurement of Planck's constant using black body radiation.
3. To determine Stefan's Constant.
4. To determine the coefficient of thermal conductivity of copper by Searle's Apparatus.
5. To determine the Coefficient of Thermal Conductivity of Cu by Angstrom's Method.
6. To determine the coefficient of thermal conductivity of a bad conductor by Lee and Charlton's disc method.
7. To determine the temperature co-efficient of resistance by Platinum resistance thermometer.
8. To study the variation of thermo emf across two junctions of a thermocouple with temperature.
9. To record and analyze the cooling temperature of an hot object as a function of time using a thermocouple and suitable data acquisition system.
10. To calibrate Resistance Temperature Device (RTD) using Null Method/Off-Balance Bridge.

Recommended Books:

1. Advanced Practical Physics for students, B.L.Flint&H.T.Worsnop, 1971, Asia Publishing House.
2. Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers.
3. A Text Book of Practical Physics, Indu Prakash and Ramakrishna, 11th Edition, 2011, Kitab Mahal, New Delhi.
4. A Laboratory Manual of Physics for Undergraduate Classes, D.P. Khandelwal, 1985, Vani Publication.

SEMESTER FOURTH

ENVIRONMENTAL SCIENCE

Subject Code: BHSMC0-041 **L T P C** **Duration: 45 Hrs.**
3 0 0 3

Course Objectives:

1. To familiarize the student with the basic concept of Environmental and Environmental Chemistry.
2. To elaborate the ecosystem and their properties.
3. To understand the concept of Environmental Pollution and its diverse effect of pollution.
4. To understand the concept of sustainable and unsustainable development and its importance.

Course Outcomes: On completion of this course, students will be able to:

CO1: Understand the basics of Environment chemistry
CO2: Analyze the general concept of ecosystem and their components.
CO3: Comprehend the applicability of social issues and Environment.
CO4: Recognize the Environment Pollution and control measures of urban and industrial wastes.

Unit-I (08 Hours)

The Multidisciplinary nature of environmental studies, Natural Resources: Renewable and non-renewable resources

Unit-II (15 Hours)

Natural resources and associated problems: a) Forest resources; b) Water resources; c) Mineral resources; d) Food resources; e) Energy resources; f) Land resources: Role of an individual in conservation of natural resources.

Unit-III (12 Hours)

Ecosystems, Concept of an ecosystem, Structure and function of an ecosystem, Introduction, types, characteristic features of the ecosystems (a) Forest ecosystem (b) Grassland ecosystem (c) Desert ecosystem (d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Unit- IV (10 Hours)

Environmental Pollution: Air pollution; Water pollution; Soil pollution

Recommended Books:

1. Y.K. Sing, Environmental Science, New Age International Pvt, Publishers, Bangalore
2. Agarwal, K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.
3. Bharucha Erach, The Biodiversity of India, Mapin Pu blishing Pvt. Ltd., Ahmedabad – 380 013, India.
4. Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p.
5. Clark R.S., Marine Pollution, Clanderson Press Oxford.
6. Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Publ. House, Mumbai, 1196p.
7. De A.K., Environmental Chemistry, Wiley Eastern Ltd. 8. Down of Earth, Centre for Science and Environment

ORGANIC CHEMISTRY-III

Subject Code: BSNMS1-403 **L T P C** **Duration: 45 Hrs.**
3 0 0 3

Course Objectives:

1. To understand the chemistry of carboxylic acids and their derivatives
2. To understand the mechanisms of organic reactions
3. To understand ethers epoxides and nitrogen based organic compounds
4. To familiarize with the chemistry of organometallic compounds
5. To understand the chemistry behind heterocyclic compounds

Course Outcomes: After the completion of course students will acquire the knowledge of:

CO1: Chemistry behind carboxylic acids and their derivatives
CO2: Mechanisms of organic reactions
CO3: Chemistry of heteroatom based organic molecules.
CO4: Chemistry of organometallic compounds

Unit-I (12 Hrs.)

Carboxylic Acids: Nomenclature, structure and bonding, physical properties, acidity of carboxylic acids, effects of substituents on acid strength. Reactions of carboxylic acids. Hell-Volhard-Zelinsky reaction. Synthesis of acid chlorides, esters and amides. Reduction of carboxylic acids. Mechanism of decarboxylation.

Carboxylic Acids Derivatives: Structure and nomenclature of acid chlorides, esters, amides and acid anhydrides, Relative stability & reactivity of acyl derivatives. Physical properties, interconversion of acid derivatives by nucleophilic acyl substitution. Preparation of carboxylic acid derivatives, chemical reactions. Mechanisms of esterification and hydrolysis (acidic and basic).

Unit-II (20 Hrs.)

Ethers and Epoxides:

Nomenclature of ethers and methods of their formation, physical properties. Chemical reaction- cleavage and autoxidation, Ziesel's method. Synthesis of epoxides. Acid and base-catalyzed ring opening of epoxides, orientation of epoxide ring opening, reactions of Grignard and organolithium reagents with epoxides.

Organic Compounds of Nitrogen: preparation of nitroalkanes and nitroarenes. Chemical reactions of nitroalkanes, Mechanisms of nucleophilc substitution in nitroarenes and their reduction in acidic, neutral and alkaline media. Reactivity, Structure and nomenclature of amines, Methods of preparation of amines by Reductive amination of aldehydic and ketonic compounds, Gabriel-phthalimide reaction and Hofmann bromamide reaction. Physical properties. Stereochemistry of amines. Separation of a mixture of primary, secondary and tertiary amines. Structural features effecting basicity of amines. Amine salts as phase-transfer catalysts.

Unit-III (5 Hrs.)

Organometallic Compounds:

Organomagnesium Compounds: The Grignard reagents formation, structure and chemical reactions. Organolithium Compounds: Formation and chemical reactions.

Organozinc and Organo copper Compounds: Nomenclature, structural features, Methods of formation and chemical

reactions.

Unit-IV (8 Hrs.)

Heterocyclic Compounds

Introduction: Molecular orbital picture and aromatic characteristics of pyrrole, furan, thiophene and pyridine. Methods of synthesis and chemical reactions with particular emphasis on the mechanism of electrophilic substitution. Mechanism of nucleophilic substitution reactions in pyridine derivatives. Comparison of basicity of pyridine, piperidine and pyrrole.

Recommended Books:

Latest edition of:

1. Morrison, R.T., Boyd, R.N., Organic Chemistry;Pubs: Prentice-Hall.
2. Wade Jr., L.G., Singh, M.S., Organic Chemistry; Pubs: Pearson Education.
3. Mukherji, S.M., Singh, S.P., Kapoor, R.P., Organic Chemistry; Pubs: Wiley Eastern Limited, 1985, Vol.I, II, III.
4. Solomons, T.W., Fryhle, C.B., Organic Chemistry; Pubs: Wiley India.
5. Carey, F.A., Organic Chemistry; Pubs: McGraw-Hill.
6. Streitwieser, A., Clayton, Jr., Heathcock, H., Introduction to Organic Chemistry; Pubs: Macmillan Publishing Company.
7. Introduction to Organic Chemistry, Sireitwieser, Heathcock and Kosover, Macmilan.

PHYSICAL CHEMISTRY-III

Subject Code: BSNMS1-404 **L T P C** **Duration: 45 Hrs.**
3 0 0 3

Course objectives:

1. To understand the redox perspective of various processes.
2. To familiarize with various nuclear and electronic phenomenon.
3. To understand concepts of electrochemistry.
4. To familiarize with basic concept of spectroscopy.

Course outcomes: On completion of this course, students will be able to:

CO1: Understand the redox perspective of various processes.
CO2: Understand various nuclear and electronic phenomenon.
CO3: Apply electrochemical concepts and analyse outcomes of different conditions.
CO4: Assign the reasoning for various physical phenomenon.

Unit-I (12 Hrs.)

Electrochemistry-I:

Electrical transport-conduction in metals and in electrolyte solutions, specific conductance and equivalent conductance, measurement of equivalent conductance, variation of equivalent and specific conductance with dilution. Migration of ions and Kohlrausch law, Arrhenius theory of electrolyte dissociation and its limitations, weak and strong electrolytes, Ostwald's dilution law, its uses and limitations. Debye-Huckel-Onsager's equation for strong electrolytes (elementary treatment only). Transport number, definition and determination by Hittorf method and moving boundary method. Applications of conductivity measurements: determination of degree of dissociation, determination of Ka of acids, determination of solubility product of a sparingly soluble salt, conductometric titrations.

Unit-II (12 Hrs.)

Electrochemistry – II:

Types of reversible electrodes-gas metal ion, metal ion, metal insoluble salt-anion and redox electrodes. Electrode reactions. Nernst equation, derivation of cell E.M.F. and Single electrode potential, standard hydrogen electrode, reference electrodes, standard electrode potential, sign conventions, electrochemical series and its significance. Electrolytic and Galvanic cells-reversible and irreverisible cells, conventional representation of electrochemical cells. EMF of a cell and its measurements. Computation of cell. EMF, Calculation of thermodynamic quantities of cell reactions (ΔG ΔH and K), polarization, over potential and hydrogen overvoltage.

Concentration cells with and without transport, liquid junction potential, application of concentration cells, valency of ions, solubility product and activity coefficient, potentiometric titrations.

Definition of pH and pKa, determination of pH using hydrogen, quinhydrone and glass electrodes, by potentiometric methods. Buffers-mechanism of buffer action, Henderson-Hazel equation, Hydrolysis of salts. Corrosion-types, theories and methods of combating it.

Unit III (10 Hrs.)

Nuclear Chemistry:

Introduction: Radioactivity, Nuclear Structure, Size of Nucleus, Mass Defects and Binding Energy, Nuclear Stability,

Nuclear Forces, Nuclear Spin and Moments of Nuclei, Nuclear Models, Nuclear Decay Processes, The Laws of Radioactive Decay, Soddy-Fajans Group Displacement Law, Rate of Nuclear Decay and Half Life Time (Kinetics of Radioactive Decay), Induced Nuclear Reactions, Types of Nuclear Processes, High Energy Nuclear Reactions, Nuclear Reaction Cross-Section, Artificial radioactivity, Detection and Measurement of Radioactivity, Nuclear Fission, Nuclear Fusion, Applications of Radioactivity.

Unit-IV (11 Hrs.)

Spectroscopy: Introduction, Electromagnetic radiation, regions of the spectrum, basic features of different spectrometers, statement of the Born-Oppenheimer approximation, degrees of freedom.

Electronic Spectrum: Concept of potential energy curves for bonding and antibonding molecular orbitals, qualitative description of selection rules and Franck-Condon principle.

Qualitative description of s, p, and n M.O., their energy levels and the respective transitions

Recommended Books:

Latest edition of:

1. Atkins, P., Paula, J.de, Atkins Physical Chemistry; Pubs: Oxford University Press.
2. Puri, B.R., Sharma, L.R., Pathania, M.S., Principles of Physical Chemistry; Pubs: Vishal Publishing Co.
3. Barrow, G.M., Physical Chemistry; Pubs: McGraw Hill Companies Inc.
4. Rao, C.N.R., University General Chemistry; Pubs: Macmillan of India.
5. Berry, R.S., Rice, S.A., Ross, J., Physical Chemistry, Pubs: Oxford University Press.
6. Albert, R.A., Silbey, R.J., Physical Chemistry; Pubs: John Wiley & Sons Inc.
7. Levine, I.N., Physical Chemistry; Pubs: Tata McGraw Hill Publishing Co. Ltd.
8. Moore, W. J., Basic Physical Chemistry; Pubs: Prentice Hall of India Pvt. Ltd.
9. Metz, C.R., Theory and problems of Physical Chemistry; Schaum's outline series, Pubs: McGraw-Hall Book Company.
10. Friedlander, Kennedy, Miller and Macias Nuclear and Radio Chemistry: John Wiley & Sons Inc.
11. Choppin, Lijenzin, Rydberg and Ekberg Radio Chemistry and Nuclear Chemistry Pubs Elsevier.

CHEMISTRY LAB-IV

Subject Code: BSNMS1-405 **L T P C** **Duration: 60 Hrs.**

0 0 4 2

Course objectives:

1. To understand the principle and application of conductometric titrations.
2. To understand various physical processes and their principle.
3. To understand synthesis and analysis of inorganic complexes

Course outcomes: On completion of this course, students will be able to:

CO1: Understand the principle and application of conductometric titrations.
CO2: Understand various physical phenomenon and their principle.
CO3: Synthesis and analysis of inorganic complexes.

I. Synthesis and Analysis

a) Preparation of Sodium trioxalatoferrate (III)
b) Preparation of Ni-DMG Complex
c) Preparation of Copper tetrammine complex
d) Preparation of cis-bisoxalatodiaquachromate (III) ion

II. Physical Chemistry

a) Conductometric Titrations:

i. Determine the end point of the following titrations by the conductometric methods.
   - Strong acid-Strong base
   - Strong acid-Weak base
   - Weak acid-Strong base
   - Weak acid-Weak base

ii. Determine the composition of a mixture of acetic acid and the hydrochloric acid by conductometric titration.

b) WeightDetermination

i. Molecular Weight Determination of acetanilide, napthalane, using camphor as solvent (Rast's methods).
ii. To determine the molecular weight of a polymer by viscosity measurements.

c) Adsorption

i. To study the adsorption of acetic acid oxalic/acid from aqueous solutions by charcoal.

d) Phase Equilibria to determine the distribution coefficient of iodine between CCl_4 and water.

e) Refractometry

i. Determination of refractive index of a liquid by Abbe refractometer, and hence the specific and molar refraction.
ii. To determine the composition of unknown mixture of two liquids by refractive index measurements.

f) Determining the half-life of radio isotope using GEIGER-MULLER COUNTER.

Recommended Books:

Latest edition of:

1. H. Denny, W. Roesky, 'Chemical Curiosites', WILEY VCH.
2. G. Marr and B.W. Rocket,'Practical Inorganic Chemistry, University Science Books.
3. G. Pass and H. Sutcliffe, 'Practical Inorganic Chemistry, Chapman and Hall, London.
4. J. Mendham, R.C. Denney, J.D. Barnes, M.Thomas, 'Vogel's Textbook of Quantitative Analysis', Pearson Education.
5. G. Svehla, 'Vogel's Textbook of Quantitative Analysis', Pearson Education.

FORENSIC PSYCHOLOGY

Subject Code: BMFSS1-401 **L T P C** **Duration: 45 Hrs.**
3 0 0 3

Course Objectives:

1. To ensure students can achieve an up-to-date level of understanding of Forensic Psychology.
2. To provide training in scientific and transferable skills through modular lecture courses, research projects, written work,seminars and supervisions.
3. To provide knowledge of latest published findings.

Course Outcome (CO): After the completion of the course, student will be able to:
CO1: Understand the concept of Forensic psychology and Forensic Psychiatry.
CO2: Gain knowledge regarding assessment of mental competency.
CO3: Gain knowledge of psychology behind criminal behavior
CO4: Understand the methods of detection of deception.

Unit-I (10 Hrs.)

Basics of Forensic Psychology. Definition and fundamental concepts of forensic psychology and forensic psychiatry.
Psychology and law. Ethical issues in forensic psychology. Assessment of mental competency. Mental disorders and forensic psychology. Psychology of evidence – eyewitness testimony, confession evidence.

Unit-II (10 Hrs.)

Criminal profiling. Psychology in the courtroom, with special reference to Section 84 IPC.
Psychology and Criminal Behavior Psychopathology and personality disorder. Psychological assessment and its importance. Serial murderers. Psychology of terrorism.

Unit III (10 Hrs.)

Biological factors and crime – social learning theories, psycho-social factors, abuse. Juvenile delinquency – theories of offending (social cognition, moral reasoning), Child abuse (physical, sexual, emotional), juvenile sex offenders, legal controversies.

Unit-IV (15Hrs.)

Detection of Deception Tools for detection of deception – interviews, non-verbal detection, statement analysis, voice stress analyzer, hypnosis. Polygraphy – operational and question formulation techniques, ethical and legal aspects, the guilty knowledge test. Narco analysis and brain electrical oscillation signatures – principle and theory, ethical and legal issues.

Recommended Books:

1. S.H. James and J.J. Nordby, Forensic Science: An Introduction to Scientific and Investigative Techniques, 2nd Edition, CRC Press, Boca Raton(2005).

2. D.E. Zulawski and D.E. Wicklander, Practical Aspects of Interview and Interrogation, CRC Press, Boca Raton(2002).
3. R. Saferstein, Criminalistics, 8th Edition, Prentice Hall, New Jersey(2004).
4. J.L. Jackson and E. Barkley, Offender Profiling: Theory, Research and Practice, Wiley, Chichester(1997).
5. R. Gupta, Sexual Harassment at Workplace, LexisNexis, Gurgaon(2014).
6. A.A. Moenssens, J. Starrs, C.E. Henderson and F.E. Inbau, Scientific Evidence in Civil and Criminal Cases, 4th Edition, The Foundation Press, Inc., New York(1995).
7. R. Saferstein, Criminalistics, 8th Edition, Prentice Hall, New Jersey(2004).
8. J.C. DeLadurantey and D.R. Sullivan, Criminal Investigation Standards, Harper & Row, New York(1980).
9. J. Niehaus, Investigative Forensic Hypnosis, CRC Press, Boca Raton(1999).
10. E.ElaadinEncyclopediaofForensicScience,Volume2,J.A.Siegel,P.J.Saukkoand G.C. Knupfer (Eds.), Academic Press, London (2000).

GROUP-1

PLANT PHYSIOLOGY & METABOLISM

Subject Code: BMFSS1-402 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

Course Objectives:

1. To ensure students can achieve an up-to-date level of understanding of Plant physiology and metabolism.
2. To provide training in scientific and transferable skills through modular lecture courses, research projects, written work,seminars and supervisions.
3. To provide knowledge of latest published findings.

Course Outcomes (CO): The completion of the course will make student to acquire the knowledge of:

CO1: Importance of water and its components.
CO2: Essential elements and its role.
CO3: Composition of phloem.

Unit-1 (15Hours)

Plant-water relations: Importance of water, water potential and its components; Transpiration and its significance; Factors affecting transpiration; Root pressure and guttation.

Mineral nutrition : Essential elements, macro and micronutrients; Criteria of essentiality of elements; Role of essential elements; Transport of ions across cell membrane, active and passive transport, carriers, channels and pumps.

Translocation in phloem: Composition of phloem sap, girdling experiment; Pressure flow model; Phloem loading and unloading.

Unit-2(15Hours)

Photosynthesis: Photosynthetic Pigments (Chl a, b, xanthophylls, carotene); Photosystem I and II, reactioncenter, antenna molecules; Electron transport and mechanism of ATP synthesis; C3, C4 and CAM pathways of carbon fixation; Photorespiration.

Respiration: Glycolysis, anaerobic respiration, TCA cycle; Oxidative phosphorylation, Glyoxylate, Oxidative Pentose Phosphate Pathway.

Unit-3(15Hours)

Enzymes: Structure and properties; Mechanism of enzyme catalysis and enzyme inhibition

Nitrogen metabolism: Biological nitrogen fixation; Nitrate and ammonia assimilation.

Plant growth regulators: Discovery and physiological roles of auxins, gibberellins, cytokinins, ABA, ethylene.

Unit-4(15Hours)

Plant response to light and temperature: Photoperiodism (SDP, LDP, Day neutral plants); Phytochrome (discovery and structure), red and far red light responses on photomorphogenesis; Vernalization. Biological nitrogen fixation; Nitrate and ammonia assimilation.

Plant growth regulators Discovery and physiological roles of auxins, gibberellins, cytokinins, ABA, ethylene.

Plant response to light and temperature

Photoperiodism (SDP, LDP, Day neutral plants); Phytochrome (discovery and structure), redvand far red light responses on photomorphogenesis; Vernalization.

Suggested Readings

1. Taiz, L., Zeiger, E., (2010). Plant Physiology. Sinauer Associates Inc., U.S.A. 5th Edition.
2. Hopkins, W.G., Huner, N.P., (2009). Introduction to Plant Physiology. John Wiley & Sons, U.S.A. 4th Edition.
3. Bajracharya, D., (1999). Experiments in Plant Physiology- A Laboratory Manual. Narosa Publishing House, New Delhi.
4. A.N. Parashar (1985), Plant Physiology. Trueman Book Company

BOTANY LAB-4

Subject Code: BMFSS1-403 **L T P C** **Duration: 60 Hrs.**
0 0 4 2

Course Objectives:

1. To understand basic understanding of lab practices including safety measures.
2. To determine osmotic potential of plant cell.
3. To demonstrate the hill reaction.

Course Outcomes (CO): The completion of the practical will make student to acquire the knowledge of:

CO1: Different Safety measures in lab.
CO2: Calculation of stomatal index.
CO3: Study the effect of ligt intensity.

Practical

1. Determination of osmotic potential of plant cell sap by plasmolytic method.
2. To study the effect of two environmental factors (light and wind) on transpiration by excised twig.
3. Calculation of stomatal index and stomatal frequency of a mesophyte and a xerophyte.
4. Demonstration of Hill reaction.
5. Demonstrate the activity of catalase and study the effect of pH and enzyme concentration.
6. To study the effect of light intensity and bicarbonate concentration on O2 evolution in photosynthesis.
7. Comparison of the rate of respiration in any two parts of a plant.
8. Separation of amino acids by paper chromatography.

Demonstration experiments (any four)

1. Bolting.
2. Effect of auxins on rooting.
3. Suction due to transpiration
4. R.Q.
5. Respiration in roots.

Recommended Books:

1. Alexopoulos, C.J., Mims, C.W., Blackwell, M. (1996). Introductory Mycology, John Wiley and Sons (Asia), Singapore. 4th edition.
2. Bhatnagar, S.P. and Moitra, A. (1996). Gymnosperms. New Age International (P) Ltd Publishers, New Delhi, India.
3. Kumar, H.D. (1999). Introductory Phycology. Affiliated East-West. Press Pvt. Ltd. Delhi. 2nd edition.

4. Parihar, N.S. (1991). An introduction to Embryophyta. Vol. I. Bryophyta. Central Book Depot, Allahabad.

5. Raven, P.H., Johnson, G.B., Losos, J.B., Singer, S.R., (2005). Biology. Tata McGraw Hill, Delhi, India.

6. Sethi, I.K. and Walia, S.K. (2011). Text book of Fungi & Their Allies, MacMillan Publishers Pvt. Ltd., Delhi.

7. Thakur, A.K. and Bassi, S.K. (2008). Diversity of Microbes and Cryptogams. S. Chand & Co., Delhi.

8. Tortora, G.J., Funke, B.R., Case, C.L. (2010). Microbiology: An Introduction, Pearson Benjamin Cummings, U.S.A. 10th edition.

9. Vashishta, P.C., Sinha, A.K., Kumar, A., (2010). Pteridophyta, S. Chand. Delhi, India.

GENETICS AND EVOLUTIONARY BIOLOGY

Subject Code: BMFSS1-404 **L T P C** **Duration: 60Hrs.**
4 0 0 4

Course Objectives:

1. To ensure students can achieve an up-to-date level of understanding of genetics and evolutionary biology.
2. To provide training in scientific and transferable skills through modular lecture courses, research projects, written work,seminars and supervisions.
3. To provide knowledge of latest published findings.

Course Outcomes (CO): The completion of the course will make student to acquire the knowledge of:

CO1: Mendelian Genetics and its importance in Forensic Science.
CO2: Mutation and its types.
CO3: Sex determination and how it is used in paternity disputes.

Unit-1(15 Hours)

Mendelian Genetics and its Extension Principles of inheritance, Incomplete dominance and co-dominance, Multiple alleles, lethal alleles, Epistasis, Pleiotropy, Sex-linked, sex influenced and sex-limited characters inheritance.

Linkage Crossing Over and Chromosomal Mapping Linkage and crossing over, Cytological basis of crossing over, Molecular mechanisms of crossing over including models of recombination, Recombination frequency as a measure of linkage intensity, Two factor and three factor crosses, Interference and coincidence, Somatic cell hybridization.

Unit-2(15Hours)

Mutations Types of gene mutations (Classification), Types of chromosomal aberrations (Classification, figures and with one suitable example of each), Molecular basis of mutations in relation to UV light and chemical mutagens; Detection of mutations: CLB methods, attached X method.

Sex Determination Chromosomal mechanisms of sex determination in Drosophila and Man

Unit-3(15Hours)

Extra-chromosomal Inheritance Criteria for extra-chromosomal inheritance, Antibiotic resistance in Chlamydomonas, Mitochondrial mutations in Saccharomyces, Infective heredity in Paramecium and Maternal effects.

Polygenic Inheritance Polygenic inheritance with suitable examples; simple numericals based on it.

Unit-4(15Hours)

Recombination in Bacteria and Viruses Conjugation, Transformation, Transduction, Complementation test in Bacteriophage

Transposable Genetic Elements Transposons in bacteria, Ac-Ds elements in maize and P elements in Drosophila, Transposons in human.

Recommended Books:

1. Gardner, E.J., Simmons, M.J., Snustad, D.P. (2008). Principles of Genetics. VIII Edition. Wiley India.
2. Snustad, D.P., Simmons, M.J. (2009). Principles of Genetics. V Edition. John Wiley and Sons Inc.
3. Klug, W.S., Cummings, M.R., Spencer, C.A. (2012). Concepts of Genetics. X Edition. Benjamin Cummings.
4. Russell, P. J. (2009). Genetics- A Molecular Approach. III Edition. Benjamin Cummings.
5. Hall, B. K. and Hallgrimsson, B. (2008). Evolution. IV Edition. Jones and Bartlett Publishers.

ZOOLOGY LAB- IV

Subject Code: BMFSS1-405 **L T P C** **Duration: 60Hrs.**
0 0 4 2

Course Objectives:

1. To understand basic understanding of lab practices including safety measures.
2. To study the mendelian laws
3. To analyse chi-square using seeds.

Course Outcomes (CO): The completion of the practical will make student to acquire the knowledge of:

CO1: Different Safety measures in lab.
CO2: Analysis of the linkage maps
CO3: Study of human karyotype.

1. To study the Mendelian laws and gene interactions.
2. Chi-square analyses using seeds/beads/Drosophila.
3. Linkage maps based on data from conjugation, transformation and transduction.
4. Linkage maps based on data from Drosophila crosses.
5. Study of human karyotype (normal and abnormal).
6. Pedigree analysis of some human inherited traits.

SUGGESTED READINGS

1. Gardner, E.J., Simmons, M.J., Snustad, D.P. (2008). Principles of Genetics. VIII Edition. Wiley India
2. Snustad, D.P., Simmons, M.J. (2009). Principles of Genetics. V Edition. John Wiley and Sons Inc
3. Klug, W.S., Cummings, M.R., Spencer, C.A. (2012). Concepts of Genetics. X Edition. Benjamin Cummings
4. Russell, P. J. (2009). Genetics- A Molecular Approach.III Edition. Benjamin Cummings
5. Griffiths, A.J.F., Wessler, S.R., Lewontin, R.C. and Carroll, S.B. Introduction to Genetic Analysis. IX Edition. W. H. Freeman and Co
6. Fletcher H. and Hickey I. (2015). Genetics. IV Edition. G

GROUP-2

WAVES AND OPTICS

Subject Code: BSNMS1-401 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

Course Objectives:

1. To ensure students can achieve an up-to-date level of understanding of waves and optics.
2. To provide training in scientific and transferable skills through modular lecture courses, research projects, written work,seminars and supervisions.
3. To provide knowledge of latest published findings.

Course Outcome (CO): After the completion of the course, Student will be able to

CO1: Understand the concepts of harmonic oscillations and wave motion.
CO2: Gain knowledge of simple harmonic motion and its applications.
CO3: Learn about the concepts of Interference.
CO4: Understand the concepts polarization and diffraction.

UNIT-I (15 Hrs)

Harmonic oscillators and Wave Motion:

Superposition of two collinear Harmonic oscillations: Linearity and Superposition Principle. (1) Oscillations having equal frequencies and (2) Oscillations having different frequencies (Beats). Superposition of Two Perpendicular Harmonic Oscillations: Graphical and Analytical Methods. Lissajous Figures with equal an unequal frequency and their uses. Transverse waves on a string. Travelling and standing waves on a string. Normal Modes of a string. Group velocity, Phase velocity. Plane waves. Spherical waves, Wave intensity

UNIT-II (15 Hrs)

Simple Harmonic motion and applications:

Simple harmonic motion - forced vibrations and resonance - Fourier's Theorem - Application to saw tooth wave and square wave - Intensity and loudness of sound - Decibels - Intensity levels - musical notes - musical scale. Acoustics of buildings: Reverberation and time of reverberation - Absorption coefficient - Sabine's formula - measurement of reverberation time - Acoustic aspects of halls and auditoria

UNIT-II (16 Hrs)

Wave optics and Interference:
Electromagnetic nature of light. Definition and Properties of wave front. Huygens Principle. Interference: Division of amplitude and division of wavefront. Young's Double Slit experiment. Lloyd's Mirror and Fresnel's Biprism. Phase change on reflection: Stokes' treatment. Interference in Thin Films: parallel and wedge-shaped films. Fringes of equal inclination (Haidinger Fringes); Fringes of equal thickness (Fizeau Fringes). Newton's Rings: measurement of wavelength and refractive index. Michelson's Interferometer: Idea of form of fringes (no theory needed), Determination of wavelength, Wavelength difference, Refractive index and Visibility of fringes.

UNIT-IV(14 Hrs)

Diffraction and Polarization:
Fraunhofer diffraction: Single slit; Double Slit. Multiple slits & Diffraction grating. Fresnel Diffraction: Half-period zones. Zone plate. Fresnel Diffraction pattern of a straight edge, a slit and a wire using half-period zone analysis. Transverse nature of light waves. Plane polarized light – production and analysis. Circular and elliptical polarization.

Recommended Books:
1. Fundamentals of Optics, F A Jenkins and H E White, 1976, McGraw-Hill
2. Principles of Optics, B.K. Mathur, 1995, Gopal Printing.
3. Fundamentals of Optics, H.R. Gulati and D.R. Khanna, 1991, R. Chand Publication.
4. University Physics. FW Sears, MW Zemansky and HD Young1986. Addison-Wesley.

WAVES AND OPTICS LAB

Subject Code: BSNMS1- 402 **L T P C** **Duration: 60 Hrs.**
0 0 4 2

Course Objectives:

1. To understand basic understanding of lab practices including safety measures.
2. To analyse the motion of coupled oscillation.
3. Todetermiine refractive index and its importance in forensic science.

Course Outcome (CO): After the completion of the course, Student will be able to

CO1: Learn about the motion of coupled oscillators and Lissajous Figures
CO2: Understand various diffraction phenomenon using prism and biprism
CO3: Determine the Refractive Index, dispersive Power of the Material, and Resolving Power of prism using various methods
CO4: Understand Schuster`s focusing and photo sensor

List of Experiments:

1. To investigate the motion of coupled oscillators.
2. To determine the Frequency of an Electrically Maintained Tuning Fork by Melde's Experiment and to verify $\lambda 2 - T$ Law.
3. To study Lissajous Figures.
4. Familiarization with Schuster`s focussing; determination of angle of prism.
5. To determine the Coefficient of Viscosity of water by Capillary Flow Method (Poiseuille's method).
6. To determine the Refractive Index of the Material of a given Prism using Sodium Light.

7. To determine Dispersive Power of the Material of a given Prism using Mercury Light.
8. To determine the value of Cauchy Constants of a material of a prism.
9. To determine the Resolving Power of a Prism.
10. To determine wavelength of sodium light using Fresnel Biprism.
11. To determine wavelength of sodium light using Newton's Rings.
12. To determine the wavelength of Laser light using Diffraction of Single Slit.
13. To determine wavelength of (1) Sodium & (2) spectrum of Mercury light using plane diffraction Grating.
14. To determine the Resolving Power of a Plane Diffraction Grating.
15. To measure the intensity using photosensor and laser in diffraction patterns of single and double slits.

Recommended Books:

1. Advanced Practical Physics for students, B.L. Flint & H.T. Worsnop, 1971, Asia Publishing House. 17.
2. Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers.
3. A Text Book of Practical Physics, Indu Prakash and Ramakrishna, 11th Edition, 2011, Kitab Mahal, New Delhi.

ALGEBRA-I

Subject Code: BSNMS1-406 **L T P C** **Duration: 45 Hrs.**
3 0 0 3

Course Objectives:

1. To ensure students can achieve an up-to-date level of understanding of algebra.
2. To provide training in scientific and transferable skills through modular lecture courses, research projects, written work,seminars and supervisions.
3. To provide knowledge of latest published findings.

Course Outcomes:

CO1: Understand the concept of groups and its properties.
CO2: Understand the concept of permutation group and groups of symmetries.
CO3: Analyze & demonstrate different types of algebraic structures such as subgroups, cosets and their properties.
CO4: Understand the concept of normal subgroup and Lagrange's theorem.

Unit-I(11Hrs.)

Definition and examples of groups, examples of abelian and non-abelian groups, the group Zn of integers under

addition modulo n and the group U(n) of units under multiplication modulo n. Cyclic groups from number systems, complex roots of unity.

Unit-II(10Hrs.)

circle group, the general linear group GLn (n,R), groups of symmetries of (i) an isosceles triangle, (ii) an equilateral triangle, (iii) a rectangle, and (iv) a square, the permutation group Sym (n), Group of quaternions.

Unit-III (12Hrs.)

Subgroups, cyclic subgroups, the concept of a subgroup generated by a subset and the commutator subgroup of group, examples of subgroups including the center of a group. Cosets.

Unit-IV(12Hrs.)

Index of subgroup, Lagrange's theorem, order of an element, Normal subgroups: their definition, examples, and characterizations, Quotient groups.

RecommendedBooks:

1. John B. Fraleigh, A First Course in Abstract Algebra, 7th Ed., Pearson, 2002.
2. M. Artin, Abstract Algebra, 2nd Ed., Pearson, 2011.
3. Joseph A Gallian, Contemporary Abstract Algebra, 4th Ed., Narosa, 1999.
4. George E Andrews, Number Theory, Hindustan Publishing Corporation, 1984.
5. Surjeet Singh and QaziZameeruddin, 'Modern Algebra.' 7th Ed, Vikas Publishing House, New Delhi,1993.
6. Herstein, I.N., 'Topics in Algebra.'2nd Ed, Vikas Publishing House, 1976.

ALGEBRA-II

Subject Code: BSNMS1-407 **L T P C** **Duration: 45 Hrs.**
3 0 0 3

Course Objectives:

1. To ensure students can achieve an up-to-date level of understanding of algebra.
2. To provide training in scientific and transferable skills through modular lecture courses, research projects, written work,seminars and supervisions.
3. To provide knowledge of latest published findings.

Course Outcomes:

CO1: Understand the concept of Ring and their properties.
CO2: Apply the concepts of isomorphism, homomorphism, ideal and integral domain for rings to solve different

types of problems.

CO3: Access the idea of inner product space and determine its orthogonality on vector space.

CO4: Understand the basic concepts of linear transformations, algebra of transformations, eigenvalues and corresponding eigenvectors.

Unit-I(12Hrs.)

Definition and examples of rings, examples of commutative and non-commutative rings: rings from number systems, Zn the ring of integers modulo n, ring of real quaternions, rings of matrices, polynomial rings, and rings of continuous functions.

Unit-II(11Hrs.)

Subrings and ideals, Integral domains and fields, examples of fields: Zp, Q, R, and C. Field of rational functions. Homomorphism, Isomorphism, Automorphism, Permutation of group, Even and Odd permutation, Cayley theorem, Sylow's theorem.

Unit-III(12Hrs.)

Inner product, Length, Orthogonality, Orthogonal projections, Cauchy-Schwartz inequality, Gram-Schmidt orthogonalisation process, Inner product spaces.

Unit-IV(10Hrs.)

Linear Transformation, Null space, Range space, Product of linear transformation, Singular and non singular transformation, Canonical forms, Jordan forms, Triangular forms, Rank-nullity theorem, Eigen value & Eigen vectors of linear transformation

Recommended Books:

1. David S. Dummit and Richard M Foote, 'Abstract Algebra,' John Wiley & Sons, 2004.
2. Surjeet Singh and QaziZameeruddin, 'Modern Algebra.' 7th Ed, Vikas Publishing House, New Delhi,1993.
3. Herstein, I.N., 'Topics in Algebra'2nd Ed., Vikas Publishing House, 1976.
4. John B. Fraleigh, A First Course in Abstract Algebra, 7th Ed., Pearson, 2002.

SEMESTER FIFTH

CHEMISTRY OF MAIN GROUP ELEMENTS

Subject Code: BSNMD1- 521 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

Course Objectives:

This course is intended

1. To provide the students an in-depth understanding of the groups of elements in Inorganic Chemistry.
2. To know the periodic properties of s, p and d block elements and their metallurgical purification.
3. To understand the physical and chemical properties of elements and their compounds.

Course Outcomes:

CO1: Acquire knowledge and understanding of essential facts, concepts, principles, theories and metallurgical purification techniques related to the elements of periodic table.
CO2: Develop comprehension abilities of structure, bonding and properties of the compound /polymers of the elements.
CO3: Application of the principles of metallurgical process
CO4: To develop skills to evaluate, analyze and solve problems competently.

Unit-I (15 Hrs.)

Acids and Bases: Brönsted–Lowry concept, conjugate acids and bases, relative strengths of acids and bases, effects of substituent and solvent, differentiating and levelling solvents. Lux-Flood concept and solvent system concept. Hard and soft acids and bases (HSAB concept), applications of HSAB process.

General Principles of Metallurgy: Chief modes of occurrence of metals based on standard electrode potentials, Ellingham diagrams for reduction of metal oxides using carbon and carbon monoxide as reducing agents. Hydrometallurgy with reference to cyanide process for gold and silver. Methods of purification of metals (Al, Pb, Ti, Fe, Cu, Ni, Zn, Au): electrolytic refining, zone refining, van Arkel-de Boer process, Parting Process, Mond's process and Kroll Process.

Unit-II (18 Hrs.)

s-and p-Block Elements: Periodicity in s- and p-block elements with respect to electronic configuration, atomic and ionic size, ionization enthalpy, electron gain enthalpy, electronegativity (Pauling scale). General characteristics of s-block metals like density, melting and boiling points, flame colour and reducing nature. Oxidation states of s and p block elements, inert-pair effect, diagonal relationships and anomalous behaviour of first member of each group. Allotropy in C, P and S. Complex forming tendency of s block elements and a preliminary idea of crown ethers and cryptates, structures of basic beryllium acetate, salicylaldehyde/ acetylacetonato complexes of Group 1 metals. Solutions of alkali metals in liquid ammonia and their properties. Common features, such as ease of formation, solubility and stability of oxides, peroxides, superoxides, sulphates and carbonates of s-block metals.

Unit-III (10 Hrs.)

Structure, bonding and properties (acidic/ basic nature, oxidizing/ reducing nature and hydrolysis of the following compounds and their applications in industrial and environmental chemistry wherever applicable:

Diborane and concept of multicentre bonding, hydrides of Groups 13 (BH_3), 14, 15, 16 and 17. Oxides of N and P, Oxoacids of P, S and Cl. Halides and oxohalides of P and S (PCl_3, PCl_5, $SOCl_2$ and SO_2Cl_2) Interhalogen compounds.

A brief idea of pseudohalides.

Unit-IV (17 Hrs.)

Noble gases: Rationalization of inertness of noble gases, clathrates, preparation and properties of XeF_2, XeF_4 and XeF_6 ,bonding in these compounds using VBT and shapes of noble gas compounds using VSEPR Theory.

Inorganic Polymers: Types of inorganic polymers and comparison with organic polymers, structural features, classification and important applications of silicates. Synthesis, structural features and applications of silicones. Borazines and cyclophosphazenes – preparation, properties and reactions. Bonding in $(NPCl_2)_3$.

Recommended Books:

Latest edition of:

1. Lee, J.D. Concise Inorganic Chemistry ELBS
2. Cotton, F.A., Wilkinson, G. &Gaus, P.L. Basic Inorganic Chemistry, Wiley.
3. Douglas, B.E., McDaniel, D.H. & Alexander, J.J. Concepts and Models in Inorganic Chemistry, John Wiley & Sons.
4. Greenwood, N.N. & Earnshaw. Chemistry of the Elements, Butterworth-Heinemann.
5. Rodger, G.E. Inorganic and Solid State Chemistry, Cengage Learning India.
6. Miessler, G. L. & Donald, A. Tarr. Inorganic Chemistry, Pearson.
7. Atkin, P. Shriver & Atkins' Inorganic Chemistry, Oxford University Press.

CHEMISTRY OF MAIN GROUP ELEMENTS LAB

Subject Code: BSNMD1-522 **L T P C** **Duration: 60 Hrs.**
0 0 4 2

Course Objectives:

1. To understand the concepts behind Iodo/Iodimetric titrations
2. To develop basic understanding of gravimetric analysis and estimation of different metals using the concept
3. To make the students understand principles involved in estimation of dissolved impurities of water
4. To familiarize the students with inorganic preparation

Course Outcomes: After completion of course students will gain the knowledge and practical hands on training of

CO1: Obtaining precise results of Iodo/Iodimetric titrations
CO2: Gravimetric analysis and estimation of different metalions
CO3: Estimation of dissolved impurities of water
CO4: Preparation of transition metal based inorganic compounds

List of Experiments:

1) Iodometric estimation of potassium dichromate and copper sulphate.
2) Iodimetric estimation of antimony in tartaremetic.
3) Estimation of amount of available chlorine in bleaching powder and household bleaches.
4) Estimation of iodine in iodized salts.
5) Iodimetric estimation of ascorbic acid in fruit juices.
6) Estimation of dissolved oxygen in water samples.
7) Gravimetric estimation of sulphate as barium sulphate.
8) Gravimetric estimation of aluminium as oximato complex.
9) Preparation of the following: potash alum, chrome alum, tetraamminecopper(II) sulphate monohydrate, potassium trioxalatoferrate(III) (any two, including one double salt and one complex).

Recommended Books:

Latest edition of:

1. Svehla, G. Vogel's Qualitative Inorganic Analysis, Pearson Education.
2. Mendham, J. Vogel's Quantitative Chemical Analysis, Pearson.

FUNDAMENTALS OF COMPUTER FORENSICS

Subject Code: BMFSS1-501 **L T P C** **Duration: 45 Hrs.**
3 0 0 3

Course Objectives:

1. To ensure students can achieve an up-to-date level of understanding of computer forensics.
2. To provide training in scientific and transferable skills through modular lecture courses, research projects, written work,seminars and supervisions.
3. To provide knowledge of latest published findings.

Course Outcome (CO): After the completion of the course, student will be able to:
CO1: Understand the concept of Cyber Crime and Computer crime.
CO2: Gain knowledge regarding electronic evidences recovered at crime scene.
CO3: Gain knowledge regarding forensic tools and techniques used in analyzing the electronic evidences.
CO4: Understand the Mobile phone Forensic.

Unit-I (15 Hrs.)

CyberCrimeandComputercrime:

Introduction to Digital Forensics, Definition and types of Computer crimes, electronic evidenceandhandling,electronicmedia,collection,searchingandstorageofelectronicmedia,introductiontointernetcrimes,hackingandcracking,creditcardandATMfrauds,webtechnology,cryptographyandemergingdigital crimes.

BasicsofComputer:

Computerorganization,componentsofcomputer-inputandoutputdevices,CPU,Memoryhierarchy, types of memory, storage devices, system softwares, application softwares, basics ofcomputerlanguages.

Unit-II (10 Hrs.)

Forensic Tools and Processing of Electronic Evidence

Introduction to Forensic Tools, Usage of Slack space, tools for Disk Imaging, Data Recovery, Vulnerability Assessment Tools, Encase and FTK tools, Anti Forensics and probable counters, retrieving information, process of computer forensics and digital investigations, processing ofdigitalevidence,digitalimages,damagedSIManddatarecovery,multimediaevidence,retrieving deleted data: desktops, laptops and mobiles, retrieving data from slack space, renamed file, ghosting, compressed files.

Unit-III (12 Hrs.)

BiometricsFundamentals

Introduction – Benefits of biometric security – Verification and identification Basic working ofbiometric matching–Accuracy–False matchrate–Falsenon-matchrate–Failuretoenrollrate
– Derived metrics – Layered biometric solutions. Types of Biometric Tools, Fingerprints, Face,IrisandRetinalscan,Voice,DNAandHandwriting.RelevanceofBiometricsinForensicScience.

Unit-IV (08Hrs.)

MobilePhoneForensics

Crime and mobile phones, forensic procedures for seizing Mobile Phones, Role of IMEI, IMSI,ICCID, CDRs & TDRs in Crime Investigation, Recovery of data available in SIM Card, internal&externalmemoryPhones,Mobile operating systems.

Recommended Books:

1. R.K.Tiwari,P.K.SastryandK.V.Ravikumar,ComputerCrimesandComputerForensic s,Select Publihers, NewDelhi(2003).
2. C.B. Leshin, Internet InvestigationsinCriminalJustice,PrenticeHall,NewJersey(1997).
3. R.Saferstein,Criminalistics,8thEdition,PrenticeHall,NewJersey(2004).
4. E.Casey,DigitalEvidenceandComputerCrime,AcademicPress, London(2000).

COMPUTER FORENSIC LABORATORY

Subject Code: BMFSS1-502 **L T P C** **Duration: 45 Hrs.**
3 0 0 3

Course Objectives:

1. To understand basic understanding of lab practices including safety measures.
2. To identify IP address of the sender of e-mails.
3. To trace routes followed by e-mails and chats.

Course Outcomes (CO): The completion of the practical will make student to acquire the knowledge of:

CO1: Different Safety measures in lab.
CO2: Analysis of the encrypted files
CO3: Analysis of hidden files.

1. Toidentify,seizeandpreservedigital evidence fromcrimescenes.
2. Todetectdeletions,obliterationsandmodificationsoffilesusingencasesoftware.

3. Totraceroutesfollowed bye-mailsandchats.
4. ToidentifytheIPaddressof the senderofe-mails.
5. Totracetheheaderofanemail.
6. Toidentifyencrypted files.
7. To identifyhiddenfiles.
8. Tousedigitalsignaturesforsecuringe-mailandonlinetransactions.
9. ToacquiredatafromPCs/laptops/HDDs/USBs,pendrives,memorycardsandSIMcards.
10. TocalculatetheHashvalueoffile.
11. TocalculatetheHashvalueofHard-diskandtopreparetheHash tables.

Recommended Books:

1. R.K.Tiwari,P.K.SastryandK.V.Ravikumar,ComputerCrimesandComputerForensic s,Select Publishers, NewDelhi(2003).
2. C.B. Leshin, Internet InvestigationsinCriminalJustice,PrenticeHall,NewJersey(1997).
3. R.Saferstein,Criminalistics,8thEdition,PrenticeHall,NewJersey(2004).
4. E.Casey,DigitalEvidenceandComputerCrime,AcademicPress, London(2000).

GROUP-1

CELL AND MOLECULAR BIOLOGY

Subject Code: BMFSS1-503 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

Course Objectives:

1. To ensure students can achieve an up-to-date level of understanding of cell and molecular biology.

2. To provide training in scientific and transferable skills through modular lecture courses, research projects, written work,seminars and supervisions.
3. To provide knowledge of latest published findings.

Course Outcomes (CO): The completion of the course will make student to acquire the knowledge of:

CO1: Techniques in biology and its uses in forensic science.
CO2: Cell organelles
.**CO3:** DNA and its importance in Forensic Science.

Unit-1(15Hours)

TechniquesinBiology:Principlesofmicroscopy;LightMicroscopy;Phasecontrastmicroscopy;Fluorescencemicroscopy;Confocalmicroscopy;SamplePreparationforlightmicroscopy; Electron microscopy (EM)-Scanning EM and Scanning Transmission EM (STEM);SamplePreparationfor electron microscopy;X-raydiffraction analysis.
CellasaunitofLife:TheCellTheory;Prokaryoticandeukaryoticcells;Cellsizeandshape;EukaryoticCellcomponents.

Unit-2(15Hours)

CellOrganelles:Mitochondria:Structure,markerenzymes,composition;Semiautonomousnature; Symbiotic hypothesis; Proteins synthesized within mitochondria; mitochondrial DNA.Chloroplast Structure, marker enzymes, composition; semiautonomous nature, chloroplast DNA.ER,Golgi body& Lysosomes: Structures androles.
PeroxisomesandGlyoxisomes:Structures,composition,functionsinanimalsandplantsandbiogenesis.
Nucleus: NuclearEnvelope-structureofnuclearporecomplex;chromatin;molecular

Organization,DNApackagingineukaryotes,euchromatinandheterochromatin,nucleolusandRibosomestructure(brief).

Unit-3(15Hours)

Cell Membrane and Cell Wall : The functions of membranes; Models of membrane structure;Thefluidityofmembranes;Membraneproteinsandtheirfunctions;Carbohydratesinthemembrane;Faces of themembranes; Selectivepermeabilityofthemembranes; Cellwall.

CellCycle: OverviewofCellcycle,MitosisandMeiosis;Molecularcontrols.
Genetic material: DNA:Miescher to Watson and Crick- historic perspective, Griffith'sandAvery's transformation experiments, Hershey-Chase bacteriophage experiment, DNA structure,typesofDNA, types ofgeneticmaterial.

Unit-4(15Hours)

DNAreplication(Prokaryotesandeukaryotes):bidirectional replication,semi–conservative,semi discontinuous RNA priming, Ǿ (theta) mode of replication , replication oflinear,ds-DNA,replicatingthe5́end oflinearchromosomeincludingreplicationenzymes.
Transcription(ProkaryotesandEukaryotes):TypesofstructuresofRNA(mRNA,tRNA,rRNA), RNA polymerase- various types; Translation (Prokaryotes and eukaryotes), genetic code.**Regulationofgeneexpression:**Prokaryotes,LacoperonandTryptophanoperon;andinEukaryotes.

SuggestedReadings

1. Karp,G.2010.CellandMolecularBiology:ConceptsandExperiments.6thEdition.JohnWiley &Sons.Inc.
2. De Robertis, E.D.P. and De Robertis, E.M.F. 2006. Cell and Molecular Biology. 8thedition.LippincottWilliams and Wilkins,Philadelphia.
3. Cooper,G.M.andHausman,R.E. 2009.TheCell:A MolecularApproach.5thedition.ASMPress&Sunderland, Washington, D.C.; Sinauer Associates,MA.
4. Becker, W.M., Kleinsmith, L.J., Hardin. J. and Bertoni, G. P. 2009. The World of theCell.7thedition. PearsonBenjaminCummingsPublishing, SanFrancisco.

BOTANY LAB-5

Subject Code: BMFSS1-504 **L T P C** **Duration: 60 Hrs.**
0 0 4 2

Course Objectives:

1. To understand basic understanding of lab practices including safety measures.
2. To analyse the micrographs of cell organelles.
3. To study mitosis and meiosis.

Course Outcomes (CO): The completion of the practical will make student to acquire the knowledge of:

CO1: Different Safety measures in lab.

CO2: Procedure of measure of cell size.

CO3: Analysis of DNA packaging by micrographs.

1Tostudyprokaryoticcells(bacteria),viruses, eukaryoticcellswiththehelpoflightandElectronmicrographs.

2. Studyofthephotomicrographs of cell organelles
3. Tostudythestructureof plant cell through temporarymounts.
4. To study the structure of animal cells by temporary mounts-squamous epithelial cell andNervecell.
5. Preparationoftemporarymountsofstriatedmusclefiber
6. To prepare temporary stained preparation of mitochondria from striated muscle cells /cheekepithelialcellsusingvital stain Janus green.
7. Studyof mitosis and meiosis (temporarymounts and permanent slides).
8. Studytheeffectoftemperature,organicsolventonsemipermeablemembrane.
9. Demonstrationofdialysisofstarchandsimple sugar.
10. Studyofplasmolysisanddeplasmolysison*Rhoeo*leaf.
11. Measurethecell size(either lengthorbreadth/diameter) bymicrometry.
12. Studythestructureofnuclearporecomplexbyphotograph (fromGerald Karp) Studyofspecialchromosomes (polytene &lampbrush) either byslides or photographs.
13. StudyDNApackagingbymicrographs.
14. Preparationofthekaryotypeandideogramfromgivenphotographofsomaticmetaphasechromosome.

SuggestedReadings

1. Karp,G.2010.CellandMolecularBiology:ConceptsandExperiments.6thEdition.JohnWiley &Sons.Inc.
2. De Robertis, E.D.P. and De Robertis, E.M.F. 2006. Cell and Molecular Biology. 8th edition.LippincottWilliams and Wilkins,Philadelphia.
3. Cooper,G.M.andHausman,R.E. 2009.TheCell:A MolecularApproach.5thedition.ASMPress&Sunderland, Washington, D.C.; Sinauer Associates,MA.
4. Becker, W.M., Kleinsmith, L.J., Hardin. J. and Bertoni, G. P. 2009. The World of theCell.7thedition. PearsonBenjaminCummingsPublishing, SanFrancisco.

COMPARATIVE ANATOMY OF VETEBRATE

Subject Code: BMFSS1-505 **L T P C** **Duration:60 Hrs.**
0 0 4 2

Course Objectives:

1. To ensure students can achieve an up-to-date level of understanding of anatomy of vertebrae.
2. To provide training in scientific and transferable skills through modular lecture courses, research projects, written work,seminars and supervisions.
3. To provide knowledge of latest published findings.

Course Outcomes (CO): The completion of the course will make student to acquire the knowledge of:

CO1: Integumentary system in detail.
CO2: Skeleton system and its importance in forensic science.

CO3 : Nervous system and its functioning.

Unit-1(15 Hours)

IntegumentarySystem

Structure,functionsandderivativesofintegument

Skeletal System

Overviewofaxialandappendicularskeleton,Jawsuspensorium,Visceralarches

Unit-2(15Hours)

DigestiveSystem

Alimentarycanalandassociatedglands,dentition

RespiratorySystem

Skin,gills,lungsandairsacs; Accessoryrespiratoryorgans

Unit-3(15Hours)

CirculatorySystem

Generalplanofcirculation,evolutionofheartandaorticarches

UrinogenitalSystem

Successionofkidney,Evolutionofurinogenitalducts,Typesofmammalianuteri

Unit-4(15Hours)

NervousSystem

ComparativeaccountofbrainAutonomicnervoussystem,Spinalcord,Cranialnervesinmammals

SenseOrgans

ClassificationofreceptorsBriefaccountofvisualandauditoryreceptorsinman

Recommended Books:

1. Kardong, K.V. (2005) Vertebrates' Comparative Anatomy, Function and Evolution. IV Edition. McGraw-Hill Higher Education.
2. Kent, G.C. and Carr R.K. (2000). Comparative Anatomy of the Vertebrates. IX Edition. The McGraw-Hill Companies.
3. Hilderbrand, M and Gaslow G.E. Analysis of Vertebrate Structure, John Wiley and Sons.
4. Walter, H.E. and Sayles, L.P; Biology of Vertebrates, Khosla Publishing House.
5. Balinsky, B.I. (2008). An introduction to Embryology, International Thomson Computer Press.

ZOOLOGY LAB-5

Subject Code: BMFSS1-506 **L T P C** **Duration:60 Hrs.**
0 0 4 2

Course Objectives:

1. To understand basic understanding of lab practices including safety measures.
2. To analyse the mammalian skull
3. To analyse the dissection of rat

Course Outcomes (CO): The completion of the practical will make student to acquire the knowledge of:

CO1: Different Safety measures in lab.
CO2: Analysis of the disarticulated skeleton of frog, varanus.
CO3: Analysis of the disarticulated skeleton of fowl and rabbit.

1. Studyofplacoid,cycloidandctenoidscalesthroughpermanentslides/photographs
2. DisarticulatedskeletonofFrog,Varanus,Fowl,Rabbit
3. Carapaceandplastronofturtle/tortoise
4. Mammalianskulls:Oneherbivorousandonecarnivorousanimal
5. Dissectionofrattostudyarterialandurinogenital system(subjecttopermission)
6. Studyofstructureofanytwoorgans(heart,lung,kidney,eyeandear)fromvideorecording(maybeincludedifdissection notpermitted)
7. Projectonskeletalmodificationsinvertebrates(maybeincludedifdissectionnotpermitted)

SUGGESTEDREADINGS●

- Kardong, K.V. (2005) Vertebrates' Comparative Anatomy, Function and Evolution. IV Edition.McGraw-Hill Higher Education ●
- Kent,G.C.andCarrR.K.(2000).ComparativeAnatomyoftheVertebrates.IXEdition.The McGraw-Hill Companies ●
- Hilderbrand,MandGaslowG.E.AnalysisofVertebrateStructure,JohnWileyandSons●
- Walter,H.E.andSayles,L.P;BiologyofVertebrates,KhoslaPublishingHouse

GROUP-2

MATRICES

Subject Code: BSNMD1-531 **L T P C** **Duration: 45 Hrs.**
3 0 0 3

Course Objectives:

1. To ensure students can achieve an up-to-date level of understanding of matrices.
2. To provide training in scientific and transferable skills through modular lecture courses, research projects, written work,seminars and supervisions.
3. To provide knowledge of latest published findings.

Course Outcomes:

CO1: Understand the concept of vector space.
CO2: Understand the concept of rotation and reflection in a point and numerical approach to eigen values and eigen vectors.
CO3: Develop the knowledge of matrices and its properties.
CO4: Develop the advanced knowledge of matrix and examples of matrix from various fields of sciences.

Unit-I(12Hrs.)

R, R^2, R^3 as vector spaces over R. Standard basis for each of them. Concept of Linear Independence and examples of different bases. Subspaces of R^2, R^3.

Unit-II(12Hrs.)

Translation, Dilation, Rotation, Reflection in a point, line and plane. Matrix form of basic geometric transformations. Interpretation of eigen values and eigen vectors for such transformations and eigen spaces as invariant subspaces.

Unit-III(9Hrs.)

Types of matrices Rank of a matrix, Invariance of rank under elementary transformations, Reduction to normal form, Solutions of linear homogeneous and non-homogeneous equations with number of equations and unknowns up-to four.

Unit-IV(12 Hrs.)

Matrices in diagonal form, Reduction to diagonal form up-to matrices of order 3, Computation of matrix inverses using elementary row operations, Rank of matrix. Solutions of a system of linear equations using matrices, Illustrative examples of above concepts from Geometry, Physics, Chemistry, Combinatorics and Statistics.

RecommendedBooks:

1. A.I. Kostrikin, Introduction to Algebra, Springer Verlag, 1984.
2. S. H. Friedberg, A. L. Insel and L. E. Spence, Linear Algebra, Prentice Hall of India Pvt. Ltd., New Delhi, 2004.
3. Richard Bronson, Theory and Problems of Matrix Operations, Tata McGraw Hill, 1989.

LINEAR ALGEBRA

Subject Code: BSNMD1-532 **L T P C** **Duration: 45 Hrs.**
3 0 0 3

Course Objectives:

1. To ensure students can achieve an up-to-date level of understanding of linear algebra.
2. To provide training in scientific and transferable skills through modular lecture courses, research projects, written work,seminars and supervisions.
3. To provide knowledge of latest published findings.

Course Outcomes:

CO1: Apply the knowledge of algebra which enable to build mathematical thinking and skills.
CO2: Analyze and solve the problems related to rank and nullity of linear transformation.
CO3: Compute the eigenvalues and corresponding eigenvectors for a square matrix.
CO4: Apply the concepts of isomorphism to solve different types of problems.

Unit-I(10Hrs.)

Vector spaces, subspaces, algebra of subspaces, quotient spaces, linear combination of vectors, linear span, linear independence, basis and dimension, dimension of subspaces.

Unit-II(12Hrs.)

Linear transformations, null space, range, rank and nullity of a linear transformation, matrix representation of a linear

transformation, algebra of linear transformations.

Unit-III(12Hrs.)

Dual Space, Dual Basis, Double Dual, Eigen values and Eigen vectors, Characteristic Polynomial.

Unit-IV (11Hrs.)

Isomorphisms, Isomorphism theorems, invertibility and isomorphisms, change of coordinate matrix.

RecommendedBooks:

1. Stephen H. Friedberg, Arnold J. Insel, Lawrence E. Spence, Linear Algebra, 4th Ed., Prentice-Hall of India Pvt. Ltd., New Delhi, 2004.
2. David C. Lay, Linear Algebra and its Applications, 3rd Ed., Pearson Education Asia, Indian Reprint, 2007.
3. S. Lang, Introduction to Linear Algebra, 2nd Ed., Springer, 2005.

DIGITAL ANALOG AND INSTRUMENTATION

Subject Code: BSNMD1-511 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

Course Objectives:

1. To ensure students can achieve an up-to-date level of understanding of digital analog and instrumentation.
2. To provide training in scientific and transferable skills through modular lecture courses, research projects, written work,seminars and supervisions.
3. To provide knowledge of latest published findings.

Course Outcome (CO): After the completion of the course, Student will be able to

CO1: Learn the Analog and Digital Circuits
CO2: Basic concepts of Semiconductor Devices
CO3: Learn about the concepts of Amplifiers
CO4: Gain knowledge about the basic physics instruments

UNIT-I (15 Hrs)

Digital Circuits:

Difference between Analog and Digital Circuits. Binary Numbers. Decimal to Binary and Binary to Decimal

Conversion, AND, OR and NOT Gates (Realization using Diodes and Transistor). NAND and NOR Gates as Universal Gates. XOR and XNOR Gates.De Morgan's Theorems. Boolean Laws. Simplification of Logic Circuit using Boolean algebra. Fundamental Products. Minterms and Maxterms. Conversion of a Truth Table into an Equivalent Logic Circuit by (1) Sum of Products Method. Binary Addition. Binary Subtraction using 2's Complement Method).

UNIT-II (15 Hrs)

Semiconductor Devices:

Semiconductor Diodes: p and n type semiconductors. Barrier Formation in PN Junction Diode. Qualitative Idea of Current Flow Mechanism in Forward and Reverse Biased Diode. PN junction and its characteristics. Static and Dynamic Resistance. Principle and structure of (1) LEDs (2) Photodiode (3) Solar Cell.

UNIT-III (15 Hrs)

Amplifiers:

Bipolar Junction transistors: n-p-n and p-n-p Transistors. Characteristics of CB, CE and CC Configurations. Active, Cutoff, and Saturation Regions. Current gains α and β. Relations between α and β. Load Line analysis of Transistors. DC Load line and Q point. Voltage Divider Bias Circuit for CE Amplifier. h-parameter Equivalent Circuit. Analysis of a single-stage CE amplifier using Hybrid Model. Input and Output Impedance. Current, Voltage and Power Gains. Class A, B, and C Amplifiers.

UNIT-IV (15 Hrs)

Instrumentation:

Introduction to CRO: Block Diagram of CRO. Applications of CRO: (1) Study of Waveform, (2) Measurement of Voltage, Current, Frequency, and Phase Difference. Power Supply: Half-wave Rectifiers. Centre-tapped and Bridge Full-wave Rectifiers. Calculation of Ripple Factor and Rectification Efficiency, Basic idea about capacitor filter, Zener Diode and Voltage Regulation Timer IC: IC 555 Pin diagram and its application as Astable& Monostable Multivibrator

Recommended Books:

1. Integrated Electronics, J. Millman and C.C. Halkias, 1991, Tata Mc-Graw Hill.
2. Electronic devices and circuits, S. Salivahanan and N. Suresh Kumar, 2012, Tata Mc-Graw Hill.
3. Microelectronic Circuits, M.H. Rashid, 2ndEdn.,2011, Cengage Learning.
4. Digital Principles & Applications, A.P. Malvino, D.P. Leach & Saha, 7th Ed.,2011,
5. Tata McGraw Hill
6. Microelectronic circuits, A.S. Sedra, K.C. Smith, A.N. Chandorkar, 2014, 6th Edn.,Oxford University Press.
7. Fundamentals of Digital Circuits, A. Anand Kumar, 2nd Edition, 2009, PHI Learning Pvt. Ltd.
8. Modern Electronic Instrumentation & Measurement Tech., Helfrick&Cooper,1990, PHI Learning.

DIGITAL ANALOG AND INSTRUMENTATION LAB

Subject Code: BSNMD1- 512 **L T P C** **Duration: 60 Hrs.**
0 0 4 2

Course Objectives:

1. To ensure students can achieve an up-to-date level of understanding of digital analog and instrumentation.
2. To provide training in scientific and transferable skills through modular lecture courses, research projects, written work,seminars and supervisions.
3. To provide knowledge of latest published findings.

Course Outcome (CO): After the completion of the course, Student will be able to

CO1: Verify and design different gates
CO2: Understand Half adder, Full adder and Adder-subtrector
CO3: Design monostable, astable multivibrator using 555 timer
CO4: Understand and design various circuits using Op-amp 741

List of Experiments:

1. To measure (a) Voltage, and (b) Frequency of a periodic waveform using a CRO
2. To verify and design AND, OR, NOT and XOR gates using NAND gates.
3. To minimize a given logic circuit.
4. Half adder, Full adder and 4-bit Binary Adder
5. Adder-Subtractor using Full Adder I.C.
6. To design an astable multivibrator of given specifications using 555 Timer.
7. To design a monostable multivibrator of given specifications using 555 Timer.
8. To study IV characteristics of PN diode, Zener and Light emitting diode
9. To study the characteristics of a Transistor in CE configuration.
10. To design a CE amplifier of a given gain (mid-gain) using voltage divider bias.
11. To design an inverting amplifier of given gain using Op-amp 741 and study its frequency response.
12. To design a non-inverting amplifier of given gain using Op-amp 741 and study its frequency Response.
13. To study a precision Differential Amplifier of given I/O specification using Opamp.
14. 14. To investigate the use of an op-amp as a Differentiator
15. To design a Wien Bridge Oscillator using an op-amp.

Recommended Books:

1. Basic Electronics: A text lab manual, P.B. Zbar, A.P. Malvino, M.A. Miller, 1994,Mc-Graw Hill.
2. Electronics: Fundamentals and Applications, J.D. Ryder, 2004, Prentice Hall.
3. OP-Amps and Linear Integrated Circuit, R. A. Gayakwad, 4th edition, 2000, PrenticeHall.
4. Electronic Principle, Albert Malvino, 2008, Tata Mc-Graw Hill.

SEMESTER SIXTH

COMPREHENSIVE CHEMISTRY

Subject Code: BSNMD1-621 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

Course Objectives:

1. To understand the concepts behind basics of inorganic chemistry
2. To understand the concept of stereochemistry
3. To familiarize with the Bioinorganic Chemistry.
4. To understand concepts of spectroscopy.

Course Outcomes: Students will acquire the knowledge of

CO1: Synthesis and applications of heterocyclic compounds
CO2: Applications of spectroscopy for the structure determination of organic compounds
CO3: Co-ordination Chemistry.
CO4: Role of Bioinorganic Chemistry.

Unit-I (14 Hrs.)

Chemistry of 3d Block Elements: Oxidation states displayed by Cr, Fe, Co, Ni and Co. A study of the following compounds (including preparation and important properties); Peroxo compounds of Cr, $K_2Cr_2O_7$, $KMnO_4$, $K_4[Fe(CN)_6]$, sodium nitroprusside, $[Co(NH_3)_6]Cl_3$, $Na_3[Co(NO_2)_6]$.

Organometallic Compounds: Definition and Classification with appropriate examples based on nature of metalcarbon bond (ionic, s, p and multicentre bonds). Structures of methyl lithium, Zeiss salt and ferrocene. EAN rule as applied to carbonyls. Preparation, structure, bonding and properties of mononuclear and polynuclear carbonyls of 3d metals. p-acceptor behaviour of carbon monoxide. Synergic effects (VB approach)- (MO diagram of CO can be referred to for synergic effect to IR frequencies).

Unit-II (12 Hrs.)

Bio-Inorganic Chemistry: A brief introduction to bio-inorganic chemistry. Role of metal ions present in biological systems with special reference to Na^+, K^+ and Mg^{2+} ions: Na/K pump; Role of Mg^{2+} ions in energy production and chlorophyll. Role of Ca^{2+} in blood clotting, stabilization of protein structures and structural role (bones).

Unit-III (18 Hrs.)

Polynuclear and heteronuclear aromatic compounds:

Properties of the following compounds with reference to electrophilic and nucleophilic substitution reaction

Naphthalene, Anthracene, Furan, Pyrrole, Thiophene, and Pyridine.

Active methylene compounds: Claisen condensation. Keto-enol tautomerism. Synthetic uses of ethylacetoacetate (preparation of non-heteromolecules having upto 6 carbon).

Unit-IV (16 Hrs.)

Application of Spectroscopy to Simple Organic Molecules:

Electromagnetic radiations, electronic transitions, λ_{max} & ε_{max}, chromophore, auxochrome, bathochromic and hypsochromic shifts. Woodward rules for calculating λ_{max} of conjugated dienes and α,β – unsaturated carbonyl compounds

Infrared radiation and types of molecular vibrations, functional group and fingerprint region. IR spectra of alkanes, alkenes and simple alcohols (inter and intra molecular hydrogen bonding), aldehydes, ketones, carboxylic acids and their derivatives (effect of substitution on >C=O stretching absorptions). Application of ultraviolet - visible and infrared spectroscopy in structure elucidation of organic molecules.

Recommended Books:

Latest edition of:

1. James E. Huheey, Ellen Keiter& Richard Keiter: Inorganic Chemistry:Principles of Structure and Reactivity, Pearson Publication.
2. G.L. Miessler& Donald A. Tarr: Inorganic Chemistry, Pearson Publication.
3. J.D. Lee: A New Concise Inorganic Chemistry, E.L.B.S.
4. F.A. Cotton & G. Wilkinson: Basic Inorganic Chemistry, John Wiley & Sons.
5. I.L. Finar: Organic Chemistry (Vol. I & II), E.L.B.S.
6. John R. Dyer: Applications of Absorption Spectroscopy of Organic Compounds, Prentice Hall
7. R.M. Silverstein, G.C. Bassler& T.C. Morrill: Spectroscopic Identification of Organic Compounds, John Wiley & Sons.
8. R.T. Morrison & R.N. Boyd: Organic Chemistry, Prentice Hall.
9. Peter Sykes: A Guide Book to Mechanism in Organic Chemistry, Orient Longman.
10. Arun Bahl and B. S. Bahl: Advanced Organic Chemistry, Pub: S. Chand.

COMPREHENSIVE CHEMISTRY LAB

Subject Code: BSNMD1-622 **L T P C** **Duration: 60 Hrs.**
0 0 4 2

Course Objectives:

1. To understand the concepts behind synthesis of various inorganic compounds.
2. To determine the melting points of Inorganic compounds.
3. To understand chemistry involved in Organic functional group determination.

Course Outcomes: After completion of course students will acquire the knowledge of:

CO1: Synthesis of Inorganic compounds
CO2: Determination of melting and boiling points of synthesized Inorganic compound
CO3: Organic Functional group tests.

Inorganic Chemistry

1) Separation of mixtures by chromatography: Measure the Rf value (Combination of two ions to be given)
   Paper chromatography:
   (a) separation of Fe^{3+}, $A1^{3+}$ and Cr^{3+}
   (b) separation of Ni^{2+}, Co^{2+}, Mn^{2+} and Zn^{2+}.
2) Preparation of any two of the following complexes and measurement of their conductivity:
   i. tetraamminecarbonatocobalt (III) nitrate
   ii. tetraamminecopper (II) sulphate
   iii. potassium trioxalatoferrate (III) trihydrate

   Compare the conductance of the complexes with that of M/1000 solution of NaCl, $MgCl_2$ and $LiCl_3$.

Organic Chemistry

Systematic Qualitative Analysis of Organic Compounds possessing mono functional groups (-COOH, phenolic, aldehydic, ketonic, amide, nitro, amines) and preparation of their one derivative.

Recommended Books:

Latest edition of:

1) A.I. Vogel: Qualitative Inorganic Analysis, Prentice Hall.
2) A.I. Vogel: Quantitative Chemical Analysis, Prentice Hall.
3) Vogel's Textbook of Practical Organic Chemistry, Prentice-Hall.
4) Mann, F.G. & Saunders, B.C. Practical Organic Chemistry Orient-Longman.

FORENSIC AUDIO VIDEO EXAMINATION

Subject Code: BMFSS1-601 **L T P C** **Duration: 45 Hrs.**
3 0 0 3

Course Objectives:

1. To ensure students can achieve an up-to-date level of understanding of
2. To provide training in scientific and transferable skills through modular lecture courses, research projects, written work,seminars and supervisions.
3. To provide knowledge of latest published findings.

Course Outcome (CO): After the completion of the course, student will be able to:
CO1: Understand the concept of Forensic audio video analysis.
CO2: Gain knowledge regarding Speech spectrographic analysis.
CO3: Gain knowledge regarding human voice production system
CO4: Understand the Process of speaker recognition.

Unit-I (10 Hrs.)

Forensic audio video analysis: Voltage, decibels, audio line levels, frequency measurements, spectrum analysis, noise characteristics, digital filters and audio enhancement, authentication of recorded audio. **Speech spectrographic**

analysis: Magnetic developing and optical methods Falsification in video recording, video frame sequence, method. **Waveform:** Spectroscope, videogrametry and photogrametry techniques, video image analysis, facial image recognition from video frame image.

Unit-II (10 Hrs.)

Introduction to Speaker Identification: Scope, significance, human vocal tract, anatomy, vocal cords, nasal cavity, larynx, trachea, lungs, bronchitis. **Human voice production:** Theories, different types of voice production, vocal fold and air flow oscillation graph analysis. **Speech signals:** Processing of speech signals, pattern recognition, acoustic characteristics, speech signal analysis, tone and voice etc.

Unit-III (15 Hrs.)

Introduction to Speech Components: Basic sound factors in speech, speech components, analogue and digital speech signals, speech anatomy, mechanism of producing speech, principles and methods of speaker recognition. **Acoustic and Auditory Parameters:** Forensic phonetic parameters, Acoustic and Auditory Parameters, linguistic and individual variation factors, qualitative and quantitative parameters, continuous and discrete parameters.

Unit-IV (10 Hrs.)

Speaker recognition process: Fourier analysis, speech enhancement, examination of video and audio signal for authenticity, Voice identification, speaker identification – listener method, computerized approach, analysis of sound spectrogram, sound spectrograph, working and principle.

Recommended Books:

1. Saferstein, Richard. CRIMINALISTICS: AN INTRODUCTION TO FORENSIC SCIENCE, Pearson Education, Inc., Upper Saddle River, NJ (2007).
2. Damjanovski, V. CCTV NETWORKING AND DIGITAL TECHNOLOGY, Butterworth-Heinemann: Waltham, MA, 2000.
3. Zakia, R. D. THE FOCAL ENCYCLOPE
4. McClure, David. Report: Focus Group on Scientific and Forensic Evidence in the Courtroom (online), 2007, https://www.ncjrs.gov/pdffiles1/nij/grants/220692.pdf
5. Vancouver Police Department, Integrated Riot Investigation Team, Vancouver Riot 2011: Help Identify Suspects (https://riot2011.vpd.ca/identify-a-suspect)
6. Mellinger, Philip T., “Cracking Watergate’s Infamous 18 1/2 Minute Gap”, FORENSIC MAGAZINE (online), February 18, 2011, http://www.forensicmag.com/article/cracking-watergatesinfamous-18-12-minute-gap
7. Law Enforcement & Emergency Services Video Association (LEVA) (http://www.leva.org/)
8. International Association for Identification (IAI) (http://www.theiai.org/certifications/video/index.php)

9. Scientific Working Group on Imaging Technology (SWGIT) (https://www.swgit.org/)
10. Scientific Working Group on Digital Evidence (SWGDE) (https://www.swgde.org/)
11. American Society of Crime Laboratory Directors Laboratory Accreditation Board (ASCLD/LAB) (http://www.ascld-lab.org/)
12. National Technical Investigators Association (NATIA) (http://www.natia.org/i4a/pages/index.cfm?pageid=1)
13. BEST PRACTICES FOR THE ACQUISITION OF DIGITAL MULTIMEDIA EVIDENCE, VERSION 3.0 (April 14, 2010), LEVA.
14. Cohen N, MacLennan-Brown K. "Retrieval of Video Evidence and Production of Working Copies from Digital CCTV Systems v2.0," (http://tna.europarchive.org/20100413151426/http:/scienceandresearch.homeoffice.gov.uk/hosdb/publications/cctv-publications/66-08_Retrieval_of_Video_Ev12835.pdf?view=Binary), Home Office Scientific Development Branch.
15. "Cracking Watergate's Infamous 18½-Minute Gap", (http://www.forensicmag.com/article/cracking-watergates-infamous-18-12- minute-gap), Philip T. Mellinger, 2/18/11, FORENSIC MAGAZINE.
16. CRIME LABORATORY EVIDENCE SUBMISSION MANUAL, Florida Department of Law Enforcement, Gerald M. Bailey, Commissioner, 2009. GUIDELINES FOR THE BEST PRACTICE IN THE FORENSIC ANALYSIS OF VIDEO EVIDENCE, LEVA. Housemate tips police to Smith after seeing video (http://articles.cnn.com/2004- 02-05/us/missing.girl_1_susan-schorpen-carlie-brucia-carwash-parkinglot?_s=PM:US) (CNN report).
17. LEVA Forensic Video Analysis Certification Program, (http://leva.org/index.php?option=com_content&view=article&id=66&Itemid =144) (accessed 4/2/2012). "Section 7: Best Practices for Forensic Video Analysis," (https://www.swgit.org/pdf/Section 7 Best Practices for Forensic Video Analysis?docID=51SWGIT) guidelines document.
18. Technical Support Working Group (TSWG). "Best Practices for the Retrieval of Digital CCTV Systems," (http://www.tswg.gov/subgroups/isf/electronicevidence/DCCTV_Web_.doc.pdf) Home Office Scientific Development Branch.

FORENSIC AUDIO VIDEO EXAMINATION LABORATORY

Subject Code: BMFSS1-602 **L T P C** **Duration: 60Hrs.**
3 0 0 3

Course Objectives:

1. To understand basic understanding of lab practices including safety measures.
2. To segregation of speech sample.
3. To analyse the audio and video evidences and its importance as a evidence.

Course Outcomes (CO): The completion of the practical will make student to acquire the knowledge of:

CO1: Different Safety measures in lab.
CO2: Extraction of audio from a video recording.
CO3: Analysis of speech sample using IPA symbol.

1. Recording the voice of a speaker using a tape recorder and measures for keeping it in the safe custody.
2. Making a working copy of the recording in appropriate format in analog mode.
3. Recording the speech sample of a speaker using digital audio tape recorder.
4. Measures to be taken care during recording the specimen speech sample of a suspect.
5. Digitization of analog speech sample.
6. Segregation of speech sample.
7. Transcription of speech sample using IPA symbols.
8. Selection of verbatim for speaker identification.
9. Extraction of audio from a video recording.
10. Anthropometric measurements in facial recognition from a still image/ photograph.

Recommended Books:

1. Saferstein, Richard. CRIMINALISTICS: AN INTRODUCTION TO FORENSIC SCIENCE, Pearson Education, Inc., Upper Saddle River, NJ (2007).
2. Damjanovski, V. CCTV NETWORKING AND DIGITAL TECHNOLOGY, Butterworth-Heinemann: Waltham, MA, 2000.
3. CRIME LABORATORY EVIDENCE SUBMISSION MANUAL, Florida Department of Law Enforcement, Gerald M. Bailey, Commissioner, 2009. GUIDELINES FOR THE BEST PRACTICE IN THE FORENSIC ANALYSIS OF VIDEO EVIDENCE, LEVA. Housemate tips police to Smith after seeing video (http://articles.cnn.com/2004- 02-05/us/missing.girl_1_susan-schorpen-carlie-brucia-carwash-parkinglot?_s=PM:US) (CNN report).
4. LEVA Forensic Video Analysis Certification Program, (http://leva.org/index.php?option=com_content&view=article&id=66&Itemid =144) (accessed 4/2/2012). "Section 7: Best Practices for Forensic Video Analysis," (https://www.swgit.org/pdf/Section 7 Best Practices for Forensic Video Analysis?docID=51SWGIT) guidelines document.
5. Technical Support Working Group (TSWG). "Best Practices for the Retrieval of Digital CCTV Systems," (http://www.tswg.gov/subgroups/isf/electronicevidence/DCCTV_Web_.doc.pdf) Home Office Scientific Development Branch.

GROUP-1

ECONOMIC, BOTANY & BIOTECHNOLOGY

Subject Code: BMFSS1-603 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

Course Objectives:

1. To ensure students can achieve an up-to-date level of understanding of economic, botany and biotechnology.
2. To provide training in scientific and transferable skills through modular lecture courses, research projects, written work,seminars and supervisions.
3. To provide knowledge of latest published findings.

Course Outcomes (CO): The completion of the course will make student to acquire the knowledge of:

CO1: Cereals, legumes, spices, beverages, oils and fats.
CO2: Biotechnology and its significance in forensic science.
CO3: DNA techniques.

UNIT-1(10 Hours)

OriginofCultivatedPlants: Conceptofcentresoforigin,theirimportancewithreferencetoVavilov'swork
Cereals: Wheat-Origin, morphology,use.

UNIT-2(10Hours)

Legumes: GeneralaccountwithspecialreferencetoGramandsoybean
Spices: Generalaccountwithspecialreferencetocloveandblackpepper(Botanicalname,family,part used, morphologyand uses)

UNIT-3(10Hours)

Beverages: Tea (morphology,processing, uses
Oils and Fats: Generaldescriptionwithspecialreferencetogroundnut
Fibre Yielding Plants: GeneraldescriptionwithspecialreferencetoCotton(Botanicalname,family,part used, morphologyand uses)

UNIT-4(30Hours)

Introductiontobiotechnology

Planttissueculture: Micropropagation;haploidproductionthroughandrogenesisandgynogenesis;brief account of embryo & endosperm culture with their applications

RecombinantDNATechniques: Blottingtechniques:Northern,SouthernandWesternBlotting,DNA Fingerprinting; Molecular DNA markers i.e. RAPD, RFLP, SNPs; DNA sequencing, PCR and Reverse Transcriptase-PCR. Hybridoma and monoclonal antibodies, ELISA andImmunodetection.Moleculardiagnosisofhumandisease, HumangeneTherapy.

SuggestedReadings

1. Kochhar,S.L.(2011). EconomicBotanyintheTropics,MacMillanPublishersIndiaLtd.,New Delhi. 4thedition.
2. Bhojwani,S.S.andRazdan, M.K.,(1996).PlantTissueCulture:TheoryandPractice.ElsevierScienceAmsterdam. TheNetherlands.
3. Glick,B.R.,Pasternak, J.J.(2003).MolecularBiotechnology-PrinciplesandApplicationsofrecombinantDNA. ASM Press, Washington.

DEVELOPMENTAL BIOLOGY

Subject Code: BMFSS1-604 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

Course Objectives:

1. To ensure students can achieve an up-to-date level of understanding of developmental biology.
2. To provide training in scientific and transferable skills through modular lecture courses, research projects, written work,seminars and supervisions.
3. To provide knowledge of latest published findings.

Course Outcomes (CO): The completion of the course will make student to acquire the knowledge of:

CO1: Early embryonic development
CO2: Late embryonic development.
CO3: Implications of developmental biology.

UNIT-1(15 Hours)

Historical perspective and basic concepts: Phases of development, Cell-Cell interaction, Patternformation,Differentiationandgrowth,Differentialgeneexpression,Cytoplasmicdeterminantsandasymmetriccelldivision.

Unit-2 (15Hours)

EarlyEmbryonicDevelopment

Gametogenesis, Spermatogenesis, Oogenesis; Types of eggs, Egg membranes; Fertilization (External andInternal): Changes in gametes, Blocks to polyspermy; Planes and patterns of cleavage; Types of Blastula;Fate maps (including Techniques); Early development of frog and chick up to gastrulation; Embryonicinductionandorganizers

Unit-3(15Hours)

LateEmbryonicDevelopment

FateofGermLayers;Extra-embryonicmembranesinbirds;Implantationofembryoinhumans,Placenta(Structure,types and functionsofplacenta).

Unit-4(15Hours)

PostEmbryonicDevelopment

Metamorphosis:Changes,hormonal regulationsinamphibiansandinsects;Regeneration:Modesofregeneration, epimorphosis, morphallaxis and compensatory regeneration (with one example each);Ageing: Concepts andTheories

ImplicationsofDevelopmentalBiology

Teratogenesis:Teratogenicagentsandtheireffectsonembryonicdevelopment;Invitrofertilization,Stemcell(ESC), Amniocentesis

.

Recommended Books:

1. Kardong, K.V. (2005) Vertebrates' Comparative Anatomy, Function and Evolution. IV• Edition. McGraw-Hill Higher Education.
2. Kent, G.C. and Carr R.K. (2000). Comparative Anatomy of the Vertebrates. IX Edition. The McGraw-Hill Companies.
3. Walter, H.E. and Sayles, L.P; Biology of Vertebrates, Khosla Publishing House.
4. Gilbert, S. F. (2006). Developmental Biology, VIII Edition, Sinauer Associates, Inc., Publishers, Sunderland, Massachusetts, USA.
5. Balinsky, B.I. (2008). An introduction to Embryology, International Thomson Computer Press.

BOTANY LAB-6

Subject Code: BMFSS1-605 **L T P C** **Duration: 60 Hrs.**
0 0 4 2

Course Objectives:

1. To understand basic understanding of lab practices including safety measures.
2. To get familiar with basic tools used in tissue culture.
3. To study the economically important plants.

Course Outcomes (CO): The completion of the practical will make student to acquire the knowledge of:

CO1: Different Safety measures in lab.
CO2: Molecular techniques nd its uses in forensic science.
CO3: Analysis of photographs.

1. Studyofeconomicallyimportantplants:Wheat,Gram, Soybean,Blackpepper, CloveTea,Cotton, Groundnutthrough specimens, sectionsandmicrochemicaltests
2. Familiarizationwithbasicequipmentsintissueculture.

3. Studythroughphotographs:Antherculture,somaticembryogenesi

s,endospermandembryoculture; micropropagation.

4. Studyofmoleculartechniques: PCR,Blottingtechniques, AGE and PAGE.

Recommended Books:

1. Kardong, K.V. (2005) Vertebrates' Comparative Anatomy, Function and Evolution. IV• Edition. McGraw-Hill Higher Education.
2. Kent, G.C. and Carr R.K. (2000). Comparative Anatomy of the Vertebrates. IX Edition. The McGraw-Hill Companies.
3. Walter, H.E. and Sayles, L.P; Biology of Vertebrates, Khosla Publishing House.
4. Gilbert, S. F. (2006). Developmental Biology, VIII Edition, Sinauer Associates, Inc., Publishers, Sunderland, Massachusetts, USA.
5. Balinsky, B.I. (2008). An introduction to Embryology, International Thomson Computer Press.

ZOOLOGY LAB- VI

Subject Code: BMFSS1-606 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

Course Objectives:

1. To understand basic understanding of lab practices including safety measures.
2. To analyse whole mount and sections f frog through permanent slides.
3. To analyse the whole mounts of developmental stages of hick thorough permanent slides.

Course Outcomes (CO): The completion of the practical will make student to acquire the knowledge of:

CO1: Different Safety measures in lab.
CO2: Analysis of the developmental stages and lifecycle of Drosophila from stock culture.
CO3: Study of different sections of placenta.

1. Study of whole mounts and sections of developmental stages of frog through permanent slides: Cleavage stages, blastula, gastrula, neurula, tail-budstage,tadpole(externalandinternalgillstages)

2. Study of whole mounts of developmental stages of chick through permanent slides: Primitive streak(13 and 18 hours), 21, 24, 28, 33, 36, 48, 72, and 96 hours of incubation (Hamilton and Hamburgerstages)

3. StudyofthedevelopmentalstagesandlifecycleofDrosophilafromstockculture

4. Studyofdifferentsectionsofplacenta(photomicropgraph/slides)

5. ProjectreportonDrosophilaculture/chickembryodevelopment

SUGGESTED READINGS

Gilbert, S. F. (2010). Developmental Biology, IX Edition, Sinauer Associates,• Inc., Publishers,Sunderland,Massachusetts,USA
Balinsky B. I. and Fabian B. C. (1981). An Introduction to Embryology, V Edition, InternationalThompsonComputerPress
Carlson,R.F.Patten's Foundations of Embryology
Kalthoff (2008). Analysis of Biological Development, II Edition,

McGraw Hill•PublishersLewisWolpert

(2002).PrinciplesofDevelopment.IIEdition,OxfordUniversity•Press

GROUP-2

ELEMENTS OF MODERN PHYSICS

Subject Code: BSNMD1-611 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

Course Objectives:

1. To ensure students can achieve an up-to-date level of understanding of elements of modern physics.
2. To provide training in scientific and transferable skills through modular lecture courses, research projects, written work,seminars and supervisions.

To provide knowledge of latest published findings

Course Outcome (CO): After the completion of the course, Student will be able to

CO1: Gain knowledge about crystal structure
CO2: Understand the concepts of quantum mechanics.
CO3: Understand the concepts nuclear Physics.
CO4: Learn about Particle interactions and Conservation Laws.

UNIT-I (12 Hrs)

Crystal structure and lattice vibrations:

Solids: Amorphous and Crystalline Materials. Lattice Translation Vectors. Lattice with a Basis – Central and Non-Central Elements. Unit Cell, Types of Lattices. Miller Indices. Reciprocal Lattice. Brillouin Zones. Diffraction of X-rays by Crystals. Bragg's Law. Lattice Vibrations in Linear Monoatomic and Diatomic Chains. Concept of phonons, Dulong and Petit's Law, Einstein and Debye theories of specific heat of solids.

UNIT-II (18 Hrs)

Introduction to Quantum Mechanics:

Planck's quantum, Planck's constant and light as a collection of photons; Photo-electric effect and Compton scattering. De Broglie wavelength and matter waves; Davisson- German experiment. Problems with Rutherford model- instability of atoms and observation of discrete atomic spectra; Bohr's quantization rule and atomic stability; calculation of energy levels for hydrogen like atoms and their spectra. Wave-particle duality, Heisenberg uncertainty principle-impossibility of a particle following a trajectory; Estimating minimum energy of a confined particle using uncertainty principle; Energy-time uncertainty principle. One dimensional infinitely rigid box- energy eigenvalues and eigen functions, normalization; Quantum mechanical scattering and tunnelling in one dimension - across a step potential and across a rectangular potential barrier.

UNIT-III (15 Hrs)

Nuclear Physics:

Constituents of nucleus and their Intrinsic properties, quantitative facts about size, mass, charge density (matter energy), binding energy, average binding energy and its variation with mass number, main features of binding energy versus mass number curve, N/A plot, angular

momentum, parity, magnetic moment, electric moments, nuclear excites states. Radioactive decay: alpha, beta and gamma decay, internal conversion, positron emission, electron capture, neutrino hypothesis. Interaction of Radiation with matter: Energy loss due to ionization (Bethe-Block formula), energy loss of electrons, Cerenkov radiation, Gamma ray interaction through matter.

UNIT-IV (15 Hrs)

Particle Physics:

Particle interactions; basic features, types of particles and its families. Symmetries and Conservation Laws: energy and momentum, angular momentum, parity,baryon number, Lepton number, Isospin, Strangeness and charm, concept of quark model, color quantum number and gluons. Accelerator facility available in India: Van-de Graaff generator (Tandem accelerator), Linear accelerator, Cyclotron, Synchrotrons.

Recommended Books:

1. Concepts of Modern Physics, Arthur Beiser, 2009, McGraw-Hill.
2. Modern Physics, John R. Taylor, Chris D. Zafiratos, Michael A.Dubson,2009.
3. Quantum Physics, Berkeley Physics Course Vol.4. E.H. Wichman, 2008, Tata McGraw Hill Co.
4. Modern Physics, R.A. Serway, C.J. Moses, and C.A.Moyer, 2005, Cengage Learning.
5. Modern Physics, G. Kaur and G.R. Pickrell, 2014, McGraw Hill.
6. Quantum Mechanics, Walter Greiner, 4thEdn., 2001, Springer.

ELEMENTS OF MODERN PHYSICS LAB

Subject Code: BSNMD1-612 **L T P C** **Duration: 60 Hrs.**
0 0 4 2

Course Objectives:

1. To understand basic understanding of lab practices including safety measures.
2. To gain knowledge about absorption and emission spectra and its importance in forensic science.
3. To measure the value of e/m by magnetic focusing.

Course Outcome (CO): After the completion of the course, Student will be able to

CO1: Gain practical knowledge about photoelectric effect
CO2: Understand the practically ionization potential, e/m ratio, Boltzmann constant
CO3: Gain knowledge about the absorption and emission spectra.
CO4: Study the diffraction patterns of single and double slits

List of Experiments:

1. To determine value of Boltzmann constant using V-I characteristic of PN diode.
2. To determine work function of material of filament of directly heated vacuum diode.
3. To determine value of Planck's constant using LEDs of at least 4 different colours.
4. To determine the ionization potential of mercury.
5. To determine the wavelength of H-alpha emission line of Hydrogen atom.
6. To determine the absorption lines in the rotational spectrum of Iodine vapour.
7. Photo-electric effect: photo current versus intensity and wavelength of light; maximum energy of photo-electrons versus frequency of light.
8. To determine the value of e/m by magnetic focusing.
9. To setup the Millikan oil drop apparatus and determine the charge of an electron.
10. To study the diffraction patterns of single and double slits using laser source and measure its intensity variation using Photosensor and compare with incoherent source-Na light.

Recommended Books:

1. Advanced Practical Physics for students, B.L. Flint & H.T. Worsnop, 1971, Asia Publishing House.
2. Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4thEdition, reprinted 1985, Heinemann Educational Publishers.
3. A Text Book of Practical Physics, Indu Prakash and Ramakrishna, 11th Edition,2011, Kitab Mahal, New Delhi.

NUMERICAL METHODS

Subject Code: BSNMD1-631 **L T P C** **Duration: 45 Hrs.**

3 0 0 3

Course Objectives:

1. To ensure students can achieve an up-to-date level of understanding of numerical methods.
2. To provide training in scientific and transferable skills through modular lecture courses, research projects, written work,seminars and supervisions.
3. To provide knowledge of latest published findings.

Course Outcomes:

CO1: Learn various types of numerical methods to find the roots of nonlinear equations and solution of a system of linear equations.
CO2: Find values for a tabulated function using interpolation techniques.
CO3: Apply different kind of numerical methods to solve integration.
CO4: Apply various numerical methods to solve ordinary differential equation.

Unit-I (12Hrs.)

Rate of Convergence, Bisection method, False position method, Fixed point iteration method, Newton's method, Secant method, LU decomposition, Gauss-Jacobi, Gauss-Siedel and SOR iterative methods.

Unit-II (12Hrs.)

Interpolation: Finite differences, Newton Gregory forward and backward formula, Lagrange's formulae with error, divided differences, Newton's formulae, Central differences, Hermite interpolation.

Unit-III (13 Hrs.)

Numerical differentiation and integration: Differentiation at tabulated and non-tabulated points, Maximum and minimum values of tabulated function, Newton-Cotes Formulae-Trapezoidal, Simpson's, Boole's and Weddle's rules of integration, Romberg integration, Gaussian integration, Double integration by Trapezoidal and Simpson rules.

Unit-IV (8 Hrs.)

Taylor series and Picard's methods, Euler and modified Euler methods, Runge–Kutta methods, Predictor- Corrector methods: Adams-Bashforth and Milne methods.

Recommended Books:

1) B. Bradie, A Friendly Introduction to Numerical Analysis, Pearson Education, India, 2007.
2) M.K. Jain, S.R.K. Iyengar and R.K. Jain, Numerical Methods for Scientific and Engineering Computation, 5th Ed., New age International Publisher, India, 2007.
3) S.D. Conte and C. De Boor, 'Elementary Numerical Analysis: An Algorithmic Approach', 3rd Edn, Mc Graw Hill, New York, 1980.
4) J.B. Scarborough, Numerical Mathematical Analysis, Oxford & IBH Publishing Co., 2001.

COMPLEX ANALYSIS

Subject Code: BSNMD1-632 **L T P C** **Duration: 45 Hrs.**
3 0 0 3

Course Objectives:

1. To ensure students can achieve an up-to-date level of understanding of complex analysis.
2. To provide training in scientific and transferable skills through modular lecture courses, research projects, written work,seminars and supervisions.
3. To provide knowledge of latest published findings.

Course Outcomes:

CO1: Understand the calculus of complex functions, concept and consequences of analyticity.
CO2: Formulation of analytic function and their application.
CO3: Evaluation of contour integrals directly by use of Cauchy theorem and Cauchy's integral formula.
CO4: Represent complex function as Taylor, Power and Laurent series.

Unit-I(11Hrs.)

Limits, Limits involving the point at infinity, continuity. Properties of complex numbers, regions in the complex plane, functions of complex variable, mappings. Derivatives, differentiation formulas, Cauchy-Riemann equations, sufficient conditions for differentiability.

Unit-II(12Hrs.)

Analytic functions, examples of analytic functions, exponential function, Logarithmic function, trigonometric function, derivatives of functions, definite integrals of functions.

Unit-III (10Hrs.)

Contours, Contour integrals and its examples, upper bounds for moduli of contour integrals. Cauchy-Goursat theorem, Cauchy integral formula.

Unit-IV (12Hrs.)

Liouville's theorem and the fundamental theorem of algebra, Convergence of sequences and series, Taylor series and its examples, Laurent series and its examples, absolute and uniform convergence of power series.

RecommendedBooks:

1) James Ward Brown and Ruel V. Churchill, Complex Variables and Applications, 8th Ed., McGraw – Hill International Edition, 2009.
2) 2. Joseph Bak and Donald J. Newman, Complex analysis, 2nd Ed., Undergraduate Texts in Mathematics, Springer-Verlag New York, Inc., New York, 1997.
3) E.T. Capson,, An Introduction to the Theory of functions of a complex Variable, Oxford university press, 1995.
4) R. Churchill, J.W. Brown, 'Complex Variables and Applications', 6th Edn., New York,

McGraw-Hill, 1996.

5) A.R. Shastri, 'An Introduction to Complex Analysis', Macmillan India Ltd., 2003.

6) S. Ponnusamy, Foundation of Complex Analysis, Narosa Book Distributors, 2011.

Semester 2nd		Contact Hrs.			Marks			Credits
Subject Code	**Subject Name**	**L**	**T**	**P**	**Int.**	**Ext.**	**Total**	
BGWDS1-201	Fundamentals of Animation	3	1	0	40	60	100	4
BGWDS1-202	Web Development Using PHP & MySQL	3	1	0	40	60	100	4
BGWDS1-203	Object Oriented Programming using C++	3	1	0	40	60	100	4
BGWDS1-204	Software Lab IV (Object Oriented Programming Using C++)	0	0	4	60	40	100	2
BGWDS1-205	Software Lab V (Animation Based Minor Project Using Tools such as Scratch etc.)	0	0	4	60	40	100	2
BGWDS1-206	Software Lab VI (Project based on PHP and MySQL)	0	0	4	60	40	100	2
BHSMC0-041	Environmental Sciences	3	0	0	40	60	100	3
BGWDS1-207	Mentoring and Professional Development	0	0	1	25	--**	25	1
Total		**-**	**-**	**-**	**365**	**360**	**725**	**22**

** The Mentoring and Professional Development course will have internal evaluation only. (See guidelines at the last page of this file)

FUNDAMENTALS OF ANIMATION

Subject Code- BGWDS1-201 **L T P C** **Total Hours: 60**
3 1 0 4

Course Outcomes:

1. Learn the different mediums of Drawing and its importance for animation.
2. Know about the different mediums and techniques of drawing pencils and painting brushes.
3. Draw landscape with proper sketching sense, draw trees, plants, buildings, sky and to create the animation backgrounds.
4. Learn about the light and shadow and surface and texture sketching.

UNIT-I (14 Hrs.)

Starting with the tools for drawing:

Types of pencils:-(HB,B,2B,4B,6B,8B,10B,12B),Charcoal Pencil, Clutch Pencil.

Sheets:-Cartridge, Hand-Made, Ivory, Art-Card, duplex, News-Print, Mount board sheet etc.

Colors:-Poster color, water color, pastel color, pencil color, waterproof ink.

Brushes:-Round and Flat

Object Drawing: Principles of object drawing, draw common shapes, forms on a Two-Dimension(2D)surface with geometry-structure, surface and texture, perspective and points of view, Knowing about line and make effects that can build, definition of light and shadow on objects and an assignment.

UNIT-II (15 Hrs.)

Rendition: Rendition of the effect of light on simple forms and objects mood changing, quality of surface, solidity, drama, and impact.

View point Drawing: Viewpoint Drawing. Theory of viewpoint, one point and two point perspective as applied to objects, furniture, interior and exteriors of the buildings, study of light and shade etc.

Unit–III (14 Hrs.)

Study of Living World: Drawing from Nature, Location drawing and learning to represent trees, plants, bushes, shrubs, insects, birds, and animals with attention to structured morphology, proportion, volume, and behavior.

UNIT-IV (17 Hrs.)

Human Creativity: Explanation to human figure drawing–Drawings from Mannequin, Sketching of person figures from outside as well as inside. To know and catch the signs of the human form, weight, balance, Rhythm and proportion.

Making Storyboard: What is storyboard, usage of storyboard, drawing on storyboard, understanding and drawing movements of camera in storyboard.

Reference Books:

1. Drawing for the Absolute and Utter Beginner, Watson-Guptill, 2018.

2. Sketching for Animation: Developing Ideas, Characters and Layouts in Your Sketchbook, Peter Parr, Fairchild Books, 2016.

WEB DEVELOPMENT USING PHP & MYSQL

Subject Code- BGWDS1-202 **L T P C** **Total Hours: 60**
3 1 0 4

Course Outcomes:

1. Learn about server side script and its environment. Further, compare and contrast it with respect to client side script.
2. Learn the use of control structures and numerous native data types with their methods.
3. Make database connectivity between front end and back end.
4. Develop dynamic websites that can interact with different kinds of Database Languages.

UNIT-I (14 Hrs.)

Introduction to PHP: Evolution of PHP & its comparison Interfaces to External systems, Hardware and Software requirements, PHP Scripting. Basic PHP Development, Working of PHP scripts, Basic PHP syntax, PHP data types.

Displaying type information: Testing for a specific data type, changing type with Set type, Operators, Variable manipulation, Dynamic variables and Variables scope.

UNIT-II (15 Hrs.)

Control Statements: if() and elseif() condition Statement, The switch statement, Using the while() Loop, The do while statement, Using the for() Loop**.**

Functions: Function definition, Creation, Returning values, Library Functions, User defined functions, Dynamic function, default arguments, passing arguments to a function by value.

Array Anatomy of an Array, Creating index based and Associative array, Looping array using each() and for each() loop.

UNIT-III (17 Hrs.)

Forms : Working with Forms, Super global variables, Super global array, Importing user input, Accessing user input, Combine HTML and PHP code, Using hidden fields, Redirecting the user..

Working with File and Directories: Understanding file & directory, Opening and closing a file, Coping, renaming and deleting a file, working with directories, File Uploading & Downloading. Generating Images with PHP: Basics of Computer graphics, Creating Image.

UNIT-IV (14 Hrs.)

Database Connectivity with MySql: Introduction to RDBMS, Connection with MySql Database, Performing basic database operation (DML) (Insert, Delete, Update, Select).

Reference Books:

1. PHP: The Complete Reference, “Steven Holzner”, Tata McGraw Hill.
2. Programming PHP, “Kevin Tetroi”, O' Reilly.
3. Robin Nixon, Learning PHP, MySQL, and JavaScript, Shroff/O'Reilly.

OBJECT ORIENTED PROGRAMMING USING C++

Subject Code- BGWDS1-203 **L T P C** **Total Hours: 60**
3 1 0 4

Course Outcomes:

1. To learn programming from real world examples.
2. To Understand Object oriented approach for finding Solutions to various problems with the help of C++ language.
3. To create computer based solutions to various real-world problems using C++.
4. To learn various concepts of object oriented approach towards problem solving.

Unit-I (14 hours)

Principles of Object Oriented programming: Introduction to OOP and its basic features, Basic components of a C++, Program and program structure, Compiling and Executing C++ Program. Difference between Procedure Oriented Language (C) and Object Oriented Language

Unit-II (15 hours)

Classes and Objects: Defining Classes, Defining Member Functions, Declaration of Objects To Class, Access to Member Variables from Objects, Different Forms of Member functions, Access specifiers (Private, public, protected), Array of Objects.

Concept of Constructors: Introduction To Constructors, Parameterized Constructor, Copy Constructor, Multiple Constructors in Class, Dynamic Initialization of Objects, Destructors.

Unit-III (17 hours)

Inheritance and Operator Overloading: Introduction to Inheritance, Types Of Inheritance:- Single Inheritance, Multiple Inheritance, Multilevel inheritance, Hierarchical inheritance, Hybrid inheritance, Defining Operator Overloading, Overloading of Unary and Binary operators, Rules for overloading operators.

Unit-IV (14 hours)

Polymorphism and File Handling: Early Binding, Late Binding, Virtual Functions, pure virtual functions, Abstract Classes. Opening and Closing File, Reading and Writing a file.

Reference Books:

1. Object Oriented Programming with C++, E. Balaguru Sami, Fourth Edition, Tata Mc-Graw Hill, 2009.
2. Object Oriented Programming in Turbo C++, Robert Lafore, Fourth Edition Galgotia Publications, 2013.
3. The C++ Programming Language, Bjarne Stroustrup, Third Edition, Addison- Wesley Publishing Company, 2015.
4. Object Oriented Programming Using C++, Salaria, R.S, Fourth Edition, Khanna Book Publishing, 2017.

OBJECT ORIENTED PROGRAMMING USING C++ (SOFTWARE LAB-IV)

Subject Code: BGWDS1-204 **L T PC**
0 0 4 2

Course Outcomes:

1. To learn programming from real world examples.
2. To understand an object oriented approach for finding Solutions to various problems with the help of C++ language.
3. To create computer based solutions to various real-world problems using C++.
4. To learn various concepts of object oriented approach towards problem solving.

This laboratory course will comprise of following assignments and projects:

1. Write a program to enter mark of 6 different subjects and find out the total mark (Using cin and cout statement)
2. Write a function using reference variables as arguments to swap the values of pairs of integers.
3. Write a function to find the largest of three numbers.
4. Write a program to find the factorial of a number.
5. Define a class to represent a bank account which includes the following members as

Data Members:

a) Name of the depositor
b) Account Number
c) Withdrawal amount d) Balance amount in the account

Member Functions:

a) To assign initial values
b) To deposit an amount
c) To withdraw an amount after checking the balance
d) To display name and balance.

6. Write the above program for handling n number of account holders using an array of objects.
7. Write a C++ program to compute the area of right angle triangle, equilateral triangle, isosceles triangle using function overloading concept.
8. Consider an example of declaring the examination result. Design three classes: student, exam and result. The student has data members such as roll no, name. Create the class exam by inheriting the student class. The exam class adds data members representing the marks scored in 5 subjects. Derive the result from exam-
Class and it has its own data members like total, avg.
9. Write a program for overloading the Unary ++ operator.
10. Write a program for overloading of Binary + operator.
11. Write a program of Virtual Functions.
12. Write a program of Abstract Classes.
13. Write a program to read and write from a file.

Reference Books:

1. Object Oriented Programming with C++, E. Balaguru Sami, Fourth Edition, Tata Mc-Graw Hill, 2009.
2. To understand an object oriented approach for finding Solutions to various problems with the help of C++ language.
3. To create computer based solutions to various real-world problems using C++.
4. To learn various concepts of object oriented approach towards problem solving.

ANIMATION BASED MINOR PROJECT (SOFTWARE LAB-V)

Subject Code: BGWDS1-205 **L T PC**
0 0 4 2

Course Outcomes:

1. Create basic shapes and forms on a two-dimensional surface using geometry.
2. Analyze how to draw various objects based on their attributes.
3. Learn how to visually observe, visualize, and experience content based on nature.
4. Study about human figures for character drawing.

This laboratory course will comprise as exercises with tools such as Scratch to supplement that is learnt under the subject code:

1 Assignment on sketching by using Drawing pencils:- (HB, B, 2B,4B, 6B,8B, 10B, 12B), Charcoal Pencil, Clutch Pencil.

2 Assignment on drawing scenery by using colors (poster color, Water Color, Pastel color, Pencil Color, waterproof ink).

3 Assignment on poster designs with shades by using sheets (Cartridge, Hand Made, Ivory, Art Card, Duplex, News Print, Mount board sheet etc.).

4 Assignment on Round and Flat brush painting.

5 Assignment on design based on geometry - structure, surface and texture.

6 Assignment on light and shadow on objects and an assignment.

7 Assignment on design based on objects mood changing, quality of surface, solidity, drama, and impact.

8 Assignment on one point and two point perspective.

9 Assignment on furniture, interior and exteriors of the buildings Designs.

10 Assignment on drawing Nature & Location scene.

11 Assignment on Design based on light and shade of the pencils and brushes.

12 Drawing assignments on Nature, Location drawing, trees, plants, bushes, shrubs, insects, birds, and animals.

13 Assignment on drawings from Mannequin, Sketching of person figures from outside as well as inside.

14 Assignment on drawing on storyboard, understand and draw movements of camera in storyboard.

Reference Books:

1. Sketching for Animation: Developing Ideas, Characters and Layouts in Your Sketchbook, Peter Parr, Fairchild Books, 2016.

PROJECT BASED ON PHP AND MYSQL (SOFTWARE LAB VI)

Subject Code: BGWDS1-206 **L T PC**
0 0 4 2

Course Outcomes:

1. Solve simple to advanced online problems of web pages.
2. Develop logics of various programming problems using numerous data types and control structures.
3. Client Server concepts, Static & Dynamic environment of the websites etc.
4. Design and implement the concept of Database connectivity.

This laboratory course will comprise of following assignments and projects:

1. Take values from the user and compute sum, subtraction, multiplication, division and exponent of value of the variables.
2. Write a program to find the area of following shapes: circle, rectangle, triangle, square, trapezoid and parallelogram.
3. Compute and print roots of quadratic equations.
4. Write a program to determine whether a triangle is isosceles or not?
5. Print multiplication table of a number input by the user.
6. Calculate sum of natural numbers from one to n number.
7. Print Fibonacci series up to n numbers e.g. 0 1 1 2 3 5 8 13 21…..n
8. Write a program to find the factorial of any number.
9. Determine prime numbers within a specific range.
10. Write a program to compute the Average and Grade of student's marks.
11. Compute addition, subtraction and multiplication of a matrix.
12. Count the total number of vowels in a word "Develop & Empower Individuals".
13. Determine whether a string is palindrome or not?
14. Display word after Sorting in alphabetical order.
15. Check whether a number is in a given range using functions.
16. Write a program that accepts a string and calculates the number of upper case letters and lower case letters available in that string.
17. Design a program to reverse a string word by word.
18. Write a program to create a login form. On submitting the form, the user should navigate to the profile page.
19. Design the front page of a college or department using a graphics method.
20. Write a program to upload and download files.

Reference Books:

PHP: The Complete Reference, "Steven Holzner", January 1, 2007. Tata McGraw- Hill Education.
Programming PHP, "Kevin Tetroi", O' Reilly. Published by Wiley Publishing, Inc. 10475 Cross point Boulevard Indianapolis, IN 46256

ENVIRONMENTAL SCIENCES

Subject Code: BHSMC0-041 **L T P C** **Duration: 45 Hrs.**
3 0 0 3

Unit-I (08 Hours)

The Multidisciplinary nature of environmental studies, Natural Resources: Renewable and non-renewable resources

Unit-II (15 Hours)

Natural resources and associated problems
a) Forest resources; b) Water resources; c) Mineral resources; d) Food resources; e) Energy resources;
f) Land resources: Role of an individual in conservation of natural resources.

Unit-III (12 Hours)

Ecosystems, Concept of an ecosystem, Structure and function of an ecosystem, Introduction, types, characteristic features of the ecosystems (a) Forest ecosystem (b) Grassland ecosystem (c)
(d) Desert ecosystem (e) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Unit- IV (10 Hours)

Environmental Pollution: Air pollution; Water pollution; Soil pollution

Recommended Books (Latest edition):

1. Y.K. Sing, Environmental Science, New Age International Pvt, Publishers, Bangalore
2. Agarwal, K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.
3. Bharucha Erach, The Biodiversity of India, Mapin Pu blishing Pvt. Ltd., Ahmedabad – 380 013, India,
4. Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p
5. Clark R.S., Marine Pollution, Clanderson Press Oxford
6. Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Publ. House, Mumbai, 1196p
7. De A.K., Environmental Chemistry, Wiley Eastern Ltd. 8. Down of Earth, Centre for Science and Environment

**** Guidelines regarding Mentoring and Professional Development**

The objective of mentoring will be development of:

- Overall Personality
- Aptitude (Technical and General)
- General Awareness (Current Affairs and GK)
- Communication Skills
- Presentation Skills

The course shall be split in two sections i.e. outdoor activities and class activities.
For achieving the above, suggestive list of activities to be conducted are:

Part – A (Class Activities)

1. Expert and video lectures
2. Aptitude Test
3. Group Discussion
4. Quiz (General/Technical)
5. Presentations by the students
6. Team building Exercises

Part – B (Outdoor Activities)

1. Sports/NSS/NCC
2. Society Activities of various students chapter i.e. ISTE, SCIE, SAE, CSI, Cultural Club, etc.

Evaluation shall be based on rubrics for Part – A & B Mentors/Faculty in charge shall maintain proper record student wise of each activity conducted and the same shall be submitted to the department.

Semester 3rd		Contact Hours			Marks			Credits
Subject Code	**Subject Name**	**L**	**T**	**P**	**Int.**	**Ext.**	**Total**	
BGWDS1-301	Data Structures	3	1	0	40	60	100	4
BGWDS1-302	Elements of Design	3	1	0	40	60	100	4
BGWDS1-303	Database Management Systems	3	1	0	40	60	100	4
BGWDS1-304	Image Editing & Photography	3	0	0	40	60	100	3
BGWDS1-305	Software Lab VII (Based on Data Structures)	0	0	4	60	40	100	2
BGWDS1-306	Software Lab VIII (Based on Elements of Design)	0	0	4	60	40	100	2
BGWDS1-307	Software Lab IX (Based on Database Management Systems)	0	0	4	60	40	100	2
BGWDS1-308	Software Lab X(Image Editing & Photography)	0	0	2	20	30	50	1
BGWDS1-309	Mentoring and Professional Development	0	0	1	25	--**	25	1
Total		**12**	**3**	**15**	**385**	**390**	**775**	**23**

** The Mentoring and Professional Development course will have internal evaluation only. (See guidelines at the last page of this file)

Semester 4th		Contact Hours			Marks			Credits
Subject Code	**Subject Name**	**L**	**T**	**P**	**Int.**	**Ext.**	**Total**	
BGWDS1-401	Programming in Python	3	1	0	40	60	100	4
BGWDS1-402	Digital Marketing	3	1	0	40	60	100	4
BGWDS1-403	Computer Graphics	3	1	0	40	60	100	4
BGWDS1-404	Video Editing	3	0	0	40	60	100	3
BGWDS1-405	Software Lab XI(Based on Programming in Python)	0	0	4	60	40	100	2
BGWDS1-406	Software Lab XII(Based on Digital Marketing)	0	0	4	60	40	100	2
BGWDS1-407	Software Lab XIII(Based on Computer Graphics)	0	0	4	60	40	100	2
BGWDS1-408	Software Lab XIV(Based on Video Editing)	0	0	2	20	30	50	1
BGWDS1-409	Mentoring and Professional Development	0	0	1	25	--**	25	1
Total		**12**	**3**	**15**	**385**	**390**	**775**	**23**

** The Mentoring and Professional Development course will have internal evaluation only. (See guidelines at the last page of this file)

3RD SEMESTER

Data Structures

Subject Code- BGWDS1-301 **L T P C** **Total Hours: 60 hrs.**
3 1 0 4

Course Outcomes

1. Use appropriate data structures for problem solving and programming.
2. Understand basic data structures such as arrays, linked lists, stacks and queues and solve problems involving graphs, trees and heaps.
3. Apply appropriate searching and/or sorting techniques for application development.

UNIT-I (14 Hrs.)

Introduction to Data Structures: Algorithms and flowcharts, basics analysis on algorithm, complexity of algorithm, introduction and definition of data structure, classification of data, arrays, various types of data structure, static and dynamic memory allocation, function and recursion.
Arrays, Pointers and Strings: Introduction to arrays- definition, one dimensional array and multidimensional arrays, pointer, pointer to structure, array and pointer, strings- introduction to strings, definition, library functions of strings.

UNIT-II (15 Hrs.)

Stack: Introduction to stack, definition, stack implementation, operations of stack, applications of stack, multiple stacks- implementation of multiple stacks.
Queue: Introduction to queue, definition, queue implementation operations of queue, circular queue, de-queue and priority queue.

UNIT-III (17 Hrs.)

Linked List: Introduction, representation and operations of linked lists, singly linked list, doubly linked list, circular linked list, and circular doubly linked list.
Tree: Introduction to tree, tree terminology binary tree, binary search tree, strictly binary tree, complete binary tree, tree traversal, threaded binary tree, avl tree b tree, b+ tree.

UNIT-IV (14 Hrs.)

Graphs: Introduction, representation to graphs, graph traversals, shortest path algorithms.
Searching and Sorting: Searching, types of searching, sorting, types of sorting like quick sort, bubble sort, merge sort, selection sort.
Hashing: Hash function, types of hash functions, collision, collision resolution technique (CRT) and perfect hashing.

Reference Books:

1. Horowitz & Sawhaney: Fundamentals of Data Structures, Galgotia Publishers.
2. Tenenbaum, Y. Lanhghsam and A. J. Augenstein, “Data Structures Using C and C++", Prentice Hall of India.
3. Seymour Lipschutz “Theory & Practice of Data Structures”, McGraw Hill..

Elements of Design

Subject Code: BGWDS1-302 **L T PC** **Total Hours: 60 hrs.**
3 1 0 4

Course outcomes:

1. Learn about the components of Design..
2. Learn methods & means to create images using the elements of design – space, depth, overlaps, transparency, plane, volume etc.
3. Gain the knowledge of formal systems of visual representation.

UNIT-I (15 Hrs.)

Introduction: Visual perception and design: introduction of art and ideas - visual & critical thinking and analysis of 2 dimensional (2d) art through history, theoretical introduction to the perception, phenomenology, definition of design –different applications of design.

Design Elements: Elements of design: The concepts of design space and concepts of design, visual elements - line and shape, form, value, texture, color - measure, type, direction, character visual elements.

UNIT-II (17 Hrs.)

Principles of Design: Composition in contrast: Black and white, positive and negatives, tessellation, units and their shapes, transformations, alteration, unity and variety / element of interest, contrast, elaboration, dominance, expressive content, color and composition – balance, harmony and rhythm.

UNIT-III (14 Hrs.)

Composition: Three principles- unity, balance, center of interest, achieving emphasis- light shade, details, contrasts, balance- asymmetrical balance, informal balance, radial balance.

Text: Type; text and meaning, typography as text and as image, typography as text and as image combined with pictorial representation.

UNIT-IV (14 Hrs.)

Color Wheel: Mixing of primary, secondary and tertiary colors, tint, shades, hues, tones, warm colors and cool colors, different color schemes (complimentary, split complementary, analogous, triadic etc.).

Reference books:

1. The Elements of Graphic Design, Alex W. White, Second Edition, Allworth Publications, 2011.

Database Management Systems

Subject Code: BGWDS1-303 **L T P C** **Total Hours: 60 hrs.**
3 1 0 4

Course outcomes:

1. Understand the basic concepts of DBMS.
2. Demonstrate an understanding of normalization theory and apply such knowledge to the normalization of a database.
3. Understand the concept of Transaction and Query processing in DBMS.

UNIT-I (14 Hrs.)

Introduction: Introduction of DBMS, data modeling for a database, three level architecture of DBMS, components of a DBMS.
Data Models: Hierarchical, network and relational model, comparison of network, hierarchical and relational model, entity relationship model.

UNIT-II (15 Hrs.)

Relational Database: Relational algebra and calculus, SQL fundamentals, DDL, DML, DCL, PL/SQL concepts, cursors, stored procedures, stored functions, database triggers.

UNIT-III (17 Hrs.)

Introduction to Normalization: First, second, third normal forms, dependency preservation, Boyce-Codd normal form, multi-valued dependencies and fourth normal form, join dependencies and fifth normal form, domain-key normal form (DKNF).

UNIT-IV (14 Hrs.)

Database Recovery: Concurrency management, database security, integrity and control, structure of a distributed database, design of distributed databases.

Reference Books:

1. "SQL, PL/SQL The Programming Language of Oracle", Ivan Bayross, BPB Publications, 4th Revised Edition (2009)
2. "An Introduction to Database Systems", C. J. Date, A. Kannan, S. Swamynathan, 8th Edition, Pearson Education, (2006).

Image Editing & Photography

Subject Code: BGWDS1-304 **L T P C** **Total Hours: 45 hrs.**
3 0 0 3

Course outcomes:

1. Know about the basic functions and features of digital camera
2. Understanding of describing image quality and being able to enhance it.
3. Learn the various formats of camera and functioning of SLR camera and its controls.

UNIT-I (11 Hrs.)

Camera Controls: Introduction of camera: its parts and types. Menu items and shooting modes (Auto vs. Scene vs. Priority).

Exposure, Black and White Conversion, Intro to Lighting: Black and White photographs angle and their conceptual editing - Black &White conversion practice Exposure compensation. Concept of high- and low key Studio session.

UNIT-II (13 Hrs.)

The Portrait: Introduction of Portrait Image and its types. Discussion of portrait genres and lighting techniques (studio, natural) Review aperture, shutter speed, ISO. Practice, editing and cropping.

Composition tips, and Shooting: Composition tips and photography shooting methods. Night/Day photography and low light shooting and their differences.

UNIT-III (11 Hrs.)

Conceptual Photography and Contemporary Art: Photography Methods for conceptual click. Contemporary art shoot and editing techniques.

Creating a Body of Work: Sequence editing Trouble shooting with editing.

UNIT-IV (10 Hrs.)

Basics of Editing: Introduction to Editing, fixing blemishes, color correcting and selective edits.

Output: Ready images for final output. Web vs. print. Color space conversion.

Reference Books:

1. Tate - The Photography Ideas Book, Lorna Yabsley, 2019.

Software Lab VII (Based on Data Structures)

Subject Code: BGWDS1-305 **L T P C** **Total Hours: 60 hrs.**
0 0 4 2

This laboratory course will comprise of following assignments and projects:

1. Program for implementing selection sort.
2. Program for implementing insertion sort.
3. Program for implementing quick sort.
4. Program for implementing merge sort.
5. Program for implementing Stack using array.
6. Program for converting infix to postfix form.
7. Program for implementing Queue using array.
8. Program for implementing Binary Search Tree.
9. Program for implementing Singly Linked list.
10. Program for Breadth First Search (BFS) for graph traversal.
11. Program for Depth First Search (DFS) for graph traversal.

Software Lab VIII (Based on Elements of Design)

Subject Code: BGWDS1-306 **L T P C** **Total Hours: 60 hrs.**
0 0 4 2

This laboratory course will comprise of following assignments and projects:

1. Assignment on pattern design by sketching
2. Assignment on creating cartoon character design.
3. Assignment on visual logo designing
4. Assignment on designing 5 different types of conceptual Branding creative.
5. Assignment on magazine covers design by using typography.
6. Assignment on line and shape design
7. Assignment on creating character visual elements design
8. Assignment on Masking and Manipulation of pictures
9. Assignment on to develop one creative by Radial Balance.
10. Assignment on creating design by mixing Primary, Secondary and Tertiary Colors.
11. Assignment on text and as image combined with pictorial representation.
12. Assignment on creating Background design by using Warm Colors and Cool Colors.
13. Assignment on design & Print any five most important activities of your college in a collage.
14. Assignment on designing & Printing any brochure.

Software Lab IX (Based on Database Management Systems)

Subject Code: BGWDS1-307 **L T P C** **Total Hours: 60 hrs.**
0 0 4 2

This laboratory course will comprise of following assignments and projects:

1. Use of CREATE, ALTER, RENAME and DROP statement in the database tables (relations)
2. Use of INSERT INTO, DELETE and UPDATE statement in the database tables (relations)
3. Use of simple select statements.
4. Use of select query on two relations
5. Use of nesting of queries.
6. Use of aggregate functions.
7. Use of substring comparison.
8. Use of order by statement.
9. Count the customers with grades above Amritsar's average.
10. Find the name and numbers of all salesmen who had more than one customer.
11. List all salesmen and indicate those who have and don't have customers in their cities (Use UNION operation.)
12. Create a view that finds the salesman who has the customer with the highest order of a day.
13. Demonstrate the DELETE operation by removing salesmen with id 1000. All his orders must also be deleted.
14. Write a PL/SQL code to add two numbers and display the result. Read the numbers during run time.
15. Write a PL/SQL code to find sum of first 10 natural numbers using while and for loop.

Software Lab X (Image Editing & Photography)

Subject Code: BGWDS1-308 **L T P C** **Total Hours: 30hrs.**
0 0 2 1

This laboratory course will comprise of following assignments and projects:

1. Assignment on lighting techniques for product photography and portrait photography.
2. Assignment on photo shoots (Exposure, Role of different focal lengths, Visual Composition).
3. Assignment on clicking the photos from different genres.
4. Assignment on digital workflow (Editing the image in the software).
5. Assignment on working with strobe lights & on-camera Flash.
6. Assignment on detailed understanding of exposure metering.
7. Assignment on digital workflow (Digital black and white photography).
8. Assignment on High Dynamic Range (HDR Photography).
9. Assignment on studio photography techniques (post shoot processing of photographs).
10. Assignment on the submission of Theme/Project based campaign.

4TH SEMESTER

Programming in Python

Subject Code- BGWDS1-401 **L T P C** **Total Hours: 60 hrs.**
3 1 0 4

Course Outcomes:

1. Familiar with Python environment, data types, operators used in Python and Learn the use of control structures and numerous native data types
2. Design user defined functions, modules, and packages and exception handling methods.
3. Create and handle files in Python and learn Object Oriented Programming Concepts

UNIT-I (17 Hrs.)

Introduction to Python Programming Language: Programming Language, History and Origin of Python Language, Features of Python, Limitations, Major Applications of Python, Getting, Installing Python, Setting up path and environment variables, Running Python, First Python Program, Python interactive help feature, Python differences from other languages.

Python Data Types & Input/Output: Keywords, Identifiers, Python Statement, Indentation, Documentation, Variables, Understanding Data Type, Python Input and Output Functions, Import command.

Operators and Expressions: Operators in Python, Expressions, Precedence, Associativity of Operators, Non Associative Operators.

UNIT-II (14 Hrs.)

Control Structures: Decision making statements, Python loops, Python control statements.

Python Native Data Types: Numbers, Lists, Tuples, Sets, Dictionary, Functions & Methods of Dictionary, strings.

UNIT-III (15 Hrs.)

Python Functions: Functions, Advantages of Functions, Built-in Functions, User defined functions, Anonymous functions, Pass by value Vs. Pass by Reference, Recursion, Scope and Lifetime of Variables.

Python Modules: Module definition, Need of modules, Creating a module, Importing module, Path searching of a module, module reloading, Standard Modules, Python Packages.

UNIT-IV (14 Hrs.)

Exception Handling: Exceptions, Built-in exceptions, Exception handling, User defined exceptions in Python.

File Management in Python: Operations on files (opening, modes, attributes, encoding, closing), read () & write () methods, tell() & seek() methods, renaming & deleting files in Python.

Classes and Objects: The concept of OOPS in Python, Designing classes, Creating objects, Accessing attributes, Editing class attributes, Built-in class attributes, Garbage collection, Destroying objects.

Reference Books:

1. Python, The complete Reference, Martin C. Brown, Mc Graw Hill Education.

2. Python in a Nutshell, A. Martelli, A. Ravenscroft, S. Holden, OREILLY.

Digital Marketing

Subject Code- BGWDS1-402 **L T P C** **Total Hours: 60 hrs.**
3 1 0 4

Course Outcomes:

1. Learn how to use new media such as mobile, search and social networking.
2. Understand how and why to use digital marketing for multiple goals within a larger
3. Marketing and/or media strategy.
4. Understand the major digital marketing channels - online advertising: Digital display,
5. Video, mobile, search engine, and social media.

UNIT-I (14 Hrs.)

Introduction to Digital Marketing: Difference between Traditional Marketing and Digital Marketing, Benefits of using Digital Media, Inbound and Outbound Marketing, Online marketing POEM: (Paid, Owned, and Earned Media), Components of Online Marketing (Email, Forum, Social network, Banner, Blog), Impact of Online Marketing, Basics of Affiliate Marketing, Viral Marketing, Influencer Marketing, Referral Marketing.

Email Marketing: Email newsletters, Digests, Dedicated Emails, Lead Nurturing, Sponsorship Emails and Transactional Emails, Drawbacks of Email Marketing.

Social Media Marketing (SMM): Different types of Social Media Marketing like Facebook, LinkedIn, Twitter, Video, Instagram etc.

UNIT-II (17 Hrs.)

Search Engine Optimization (SEO): About SEO, Need of an SEO friendly website, Importance of Internet and Search Engines; Role of Keywords in SEO.

On-Page Optimization (Onsite): Basics of Website Designing / Development; HTML Basics for SEO; Onsite Optimization Basics; Website Structure and Navigation Menu Optimization; SEO Content Writing. Keywords Research and Analysis (eg. SWOT analysis of website, finding appropriate keywords).

Off Page Optimization: Introduction; Local marketing of websites depending on locations; Promoting Subsequent pages of the website. Introduction to organic SEO vs non-organic SEO; Social Media Optimization Techniques and Page Rank Technology.

UNIT–III (15 Hrs.)

Website Planning & Creation Content Marketing Strategy: Goals and concepts, Strategic building blocks Content creation & channel distribution, Tools of the trade, Advantages and challenges.

Keywords Research and Analysis: Introduction to Keyword Research; Business Analysis; Types of Keywords; Keywords Analysis Tools.

Web Presence: How to increase online presence and drive more traffic for a website, Search result visibility in search engines for chosen keyword and phrases, Using e-mail marketing to drive traffic for a website, Posting social media content for lead generation, Tools to create and manage content, Use of Blogging as content strategy.

Creating content: Writing and posting content on the web and in social networks, blog and video; Create, manage and implement a content marketing strategy; Monitoring and recording results to improve content marketing campaigns; Successful content marketing strategies and case studies.

UNIT-IV (14 Hrs.)

Online Advertising, Mobile Marketing and Web analytics: Introduction to Online Advertising and its advantages, Paid versus Organic, Pay Per Click (PPC) Model. Basic concepts Cost per Click (CPC), CPM, CTR, CR etc. About Mobile Marketing, Objectives of Mobile Advertising, Creating a Mobile Marketing Strategy, Introduction to SMS Marketing. About Web.

Reference Books:

1. Ian Dodson, The Art of Digital Marketing: The Definitive Guide to Creating Strategic, Targeted and Measurable Online Campaigns, Publication Wiley India Pvt Ltd.
2. Philip Kotler, Hermawan Kartajaya, Iwan Setiawan, Marketing 4.0: Moving from Traditional to Digital, Publication Wiley India Pvt Ltd.
3. Venkataramana Rolla, “Digital Marketing Practice guide for SMB: SEO, SEM and SMM”, CreateSpace Independent Publishing Platform, First edition.
4. Enge, E., Spencer, S., Stricchiola, J., & Fishkin, R. (2012). The art of SEO. "O'Reilly Media, Inc.".

Computer Graphics

Subject Code- BGWDS1-403 **L T P C** **Total Hours: 60 hrs.**
3 1 0 4

Course Outcomes:

1. Let students understand the basics of Computer Graphics, Input/output primitive and basic transformations, which can be applied to objects of graphics.
2. To Develop The Logical And Reasoning Skills Of The Students.
3. Learn Graphical primitives and their algorithms.

UNIT-I (17 Hrs.)

Introduction to Computer Graphics: Applications of Computer Graphics. Graphs and Types of Graphs.

Input Devices: Light Pens, Graphic Tablets, Joysticks, Track Ball, Data Glove, Digitizers, Image Scanner.

Video Display Devices: Refresh Cathode Ray Tube, Raster Scan Displays, Random Scan Displays, Color CRT-monitors and Color generating techniques (Shadow Mask, Beam Penetration), Flat-Panel Displays; 3-DViewing Devices, Graphics Monitors And Workstations, Color Models(RGB and CMY), Lookup Table.

Introduction Virtual Reality & Environments: Applications in Engineering, Architecture, Education, Medicine, Entertainment, Science, Training.

UNIT-II (14 Hrs.)

Scan-conversions: Process and need of Scan Conversion, Scan conversion algorithms for Line, Circle and Ellipse using direct method, Bresenham's algorithms for line & circle and Midpoint Ellipse Algorithm along with their derivations, Area Filling Techniques, Flood Fill Techniques, Character Generation.

UNIT-III (15 Hrs.)

2–Dimensional Graphics: Cartesian and need of Homogeneous coordinate system, Geometric Transformations (Translation, Scaling, Rotation, Reflection, Shearing),Viewing transformation and clipping (line, polygon and text) using Cohen-Sutherland, Sutherland Hodgeman and Liang Barsky algorithm for clipping

UNIT-IV (14 Hrs.)

3–Dimensional Graphics: Introduction to 3-dimensional Graphics: Geometric Transformations (Translation, Scaling, and Rotation), Mathematics of Projections (Parallel & Perspective).Color Shading. Introduction to Morphing Techniques.

Reference Books:

1. D. Hearn and M.P. Baker, Computer Graphics, PHI New Delhi.
2. J.D. Foley, A.V. Dam, S.K. Feiner, J.F. Hughes, R.L Phillips, Computer Graphics Principles & Practices, Second Edition, Pearson Education,2007.
3. R.A. Plastock and G. Kalley, Computer Graphic, McGraw Hill, 1986.

Video Editing

Subject Code- BGWDS1-404 **L T P C** **Total Hours:-45 hrs.**
3 0 0 3

Course Outcomes:

1. Create different modes using various sounds, which will further help them integrate the same into their film projects.
2. Know about editing basics, tools and broadcast systems.
3. Knowledge of working with footages in an editing software.

UNIT-I (11 Hrs.)

Sound: Introduction to Audio, interrelationship between sound, culture and media theory. Ear Training, Critical listening, Role of sound in film, Storytelling through sound, Sound editing, working with Dialogue.

UNIT-II (10 Hrs.)

Mixing: The mixing process, Monitoring basics of mixing, Basic Mixing Rules and techniques, Equalizing, Audio equipment, Studio Production Techniques, Effects introduction, overview, compression.

UNIT –III (11 Hrs.)

Audio Formats - Digital and Analogue practical assignments and practice, Mastering -Introduction to mastering - Mastering setups – Monitoring (The whole practice will be done practically).

UNIT-IV (13 Hrs.)

Voiceover-The art of voiceover, how to lend voice to a short film, Voice modulation, voice sync. Submission-Design a soundtrack for a short film.

Reference Books:

1. Editing Digital Video (Digital Video and Audio Series, Robert Goodman & Patrick McGrath, McGraw-Hill Education, 2002.

Software Lab XI (Based on Programming in Python)

Subject Code: BGWDS1-405 **L T P C** **Total Hours: 60 hrs.**
0 0 4 2

This laboratory course will comprise exercises to supplement that is learnt under the Subject.

1. Compute sum, subtraction, multiplication, division and exponent of given variables input by the user.
2. Compute area of following shapes: circle, rectangle, triangle, square, trapezoid and Parallelogram.
3. Compute volume of following 3D shapes: cube, cylinder, cone and sphere.
4. Compute and print roots of quadratic equation ax 2 +bx+c=0, where the values of a, b, and c are input by the user.
5. Print numbers up to N which are not divisible by 3, 6, 9,, e.g., 1, 2, 4, 5, 7,….
6. Write a program to determine whether a triangle is isosceles or not?
7. Print multiplication table of a number input by the user.
8. Compute sum of natural numbers from one to n number.
9. Print Fibonacci series up to n numbers e.g. 0 1 1 2 3 5 8 13…..n
10. Compute the factorial of a given number.
11. Count occurrence of a digit 5 in a given integer number input by the user.
12. Print Geometric and Harmonic means of a series input by the user.

Software Lab XII (Based on Digital marketing)

Subject Code: BGWDS1-406 **L T PC** **Total Hours: 60 hrs.**
0 0 4 2

This laboratory course will comprise exercises to supplement that is learnt under the Subject.

1. Explore Facebook, LinkedIn, Twitter, Video, Instagram, blog etc.
2. Explore Online Display Advertising, Ecommerce Marketing, Mobile Web and Content marketing.
3. Explore Email Marketing; Google AdWords and Google Analytics.
4. How to increase online presence and drive more traffic for a website.
5. Search result visibility in Google for chosen keywords and phrases.
6. Using e-mail marketing to drive traffic for a website.
7. Posting social media content for lead generation.
8. Tools to create and manage content.
9. Use of Blogging as a content strategy.
10. Show results for Search Engine Algorithms & Pagerank Technology
11. How to promote home page, SWOT Analysis of Website & finding right appropriate keywords.

Software Lab XIII (Based on Computer Graphics)

Subject Code: BGWDS1-407 **L T P C** **Total Hours: 60 hrs.**
0 0 4 2

This laboratory course will comprise exercises to supplement that is learnt under the Subject.

1. Use of basic functions of graphic available like circle, rectangle, arc, ellipse, flood fill, set color etc.
2. Design a logo/poster using primitive functions.
3. Draw a 3D object using palettes.
4. Line Drawing Algorithm: Direct method and DDA.
5. Bresenham's Line Drawing Algorithm
6. Bresenham's Circle Generating Algorithm.
7. Draw an ellipse using the Midpoint Algorithm.
8. Translation transformation on a polygon.
9. Scaling transformation on a polygon.
10. Rotation transformation on a polygon.
11. Shearing transformation on a polygon.
12. Minor project (eg Game/ Animation etc.)

Software Lab XIV (Based on Video Editing)

Subject Code: BGWDS1-408 **L T P C** **Total Hours: 30 hrs.**
0 0 2 1

This laboratory course will comprise exercises to supplement that is learnt under the Subject.

1. Assignment on creating one short video footage by using basic functions of the software
2. Assignment on designing a background, text and colors editing in video.
3. Assignment on editing a video by using a time in frames.
4. Assignment based on the mixing of 2 or more videos.
5. Assignment based on Audio equipment, Studio Production Techniques.
6. Assignment based on effects introduction, overview, compression.
7. Assignment based on Audio Formats- Digital and Analogue practical assignments and practice.
8. Assignment based on mastering setups – Monitoring the sound, background.
9. Assignment based on video editing by adding Voiceover.
10. Assignment based on voice modulation, voice synchronization.
11. Assignment based on design a soundtrack for a short film

Maharaja Ranjit Singh Punjab Technical University
Bathinda-151001

FACULTY OF SCIENCES

SYLLABUS

FOR

B.A. (COMPUTER SCIENCE)

2023 BATCH ONWARDS

SEMESTER1st		Contact Hrs.			Marks			Credits
Subject Code	**Subject Name**	**L**	**T**	**P**	**Int.**	**Ext.**	**Total**	
BACSS1-101	General English - I	4	0	0	40	60	100	4
BACSS1-102	General Punjabi – I	4	0	0	40	60	100	4
BACSS1-103	Introduction of Information Technology and Office Automation	4	0	0	40	60	100	4
BACSS1-104	Introduction of Information Technology and Office Automation (Lab)	0	0	4	40	60	100	2
Department Elective Subjects (Any Two)								
BACSD1-111	History – I	4	0	0	40	60	100	4
BACSD1-112	Political Science – I	4	0	0	40	60	100	4
BACSD1-113	Mathematics – I	4	0	0	40	60	100	4
BACSD1-114	Physical Education – I	4	0	0	40	60	100	4
BACSD1-115	Elective English – I	4	0	0	40	60	100	4
BACSD1-116	Economics – I	4	0	0	40	60	100	4
BACSD1-117	Elective Punjabi - I	4	0	0	40	60	100	4
BACSD1-118	Sociology - 1	4	0	0	40	60	100	4
BACSD1-119	Web Designing - I	4	0	0	40	60	100	4
Total		**20**	**0**	**4**	**240**	**360**	**600**	**22**

SEMESTER 2nd		Contact Hrs.			Marks			Credits
Subject Code	**Subject Name**	**L**	**T**	**P**	**Int.**	**Ext.**	**Total**	
BACSS1-201	General English - II	4	0	0	40	60	100	4
BACSS1-202	General Punjabi – II	4	0	0	40	60	100	4
BACSS1-203	Trends in IT and Office automation	4	0	0	40	60	100	4
BACSS1-204	Trends in IT and Office automation (Lab)	0	0	4	40	60	100	2
Department Elective Subjects (Any Two)								
BACSD1-211	History – II	4	0	0	40	60	100	4
BACSD1-212	Political Science – II	4	0	0	40	60	100	4
BACSD1-213	Mathematics (Algebra) - II	4	0	0	40	60	100	4
BACSD1-214	Physical Education – II	4	0	0	40	60	100	4
BACSD1-215	Elective English – II	4	0	0	40	60	100	4
BACSD1-216	Economics – II	4	0	0	40	60	100	4
BACSD1-217	Elective Punjabi – II	4	0	0	40	60	100	4
BACSD1-218	Sociology - II	4	0	0	40	60	100	4
BACSD1-219	Web Designing - II	4	0	0	40	60	100	4
Total		**20**	**0**	**4**	**240**	**360**	**600**	**22**

SEMESTER 3rd		Contact Hrs.			Marks			Credits
Subject Code	**Subject Name**	**L**	**T**	**P**	**Int.**	**Ext.**	**Total**	
BACSS1-301	General English – III	4	0	0	40	60	100	4
BACSS1-302	General Punjabi – III	4	0	0	40	60	100	4
BACSS1-303	Computer Networks and Internet Applications	4	0	0	40	60	100	4
BACSS1-304	Computer Networks and Internet Applications (Lab)	0	0	4	40	60	100	2
Department Elective Subjects (Any Two)								
BACSD1-311	History – III	4	0	0	40	60	100	4
BACSD1-312	Political Science – III	4	0	0	40	60	100	4
BACSD1-313	Mathematics (Calculus) - III	4	0	0	40	60	100	4
BACSD1-314	Physical Education – III	4	0	0	40	60	100	4
BACSD1-315	Elective English – III	4	0	0	40	60	100	4
BACSD1-316	Economics – III	4	0	0	40	60	100	4
BACSD1-317	Elective Punjabi – III	4	0	0	40	60	100	4
Total		**20**	**0**	**4**	**240**	**360**	**600**	**22**

SEMESTER 4th		Contact Hrs.			Marks			Credits
Subject Code	**Subject Name**	**L**	**T**	**P**	**Int.**	**Ext.**	**Total**	
BACSS1-401	General English – IV	4	0	0	40	60	100	4
BACSS1-402	General Punjabi – IV	4	0	0	40	60	100	4
BACSS1-403	Multimedia & Its Applications	4	0	0	40	60	100	4
BACSS1-404	Multimedia & Its Applications (Lab)	0	0	4	40	60	100	2
Department Elective Subjects (Any Two)								
BACSD1-411	History – IV	4	0	0	40	60	100	4
BACSD1-412	Political Science – IV	4	0	0	40	60	100	4
BACSD1-413	Mathematics (Analytical Geometry) - IV	4	0	0	40	60	100	4
BACSD1-414	Physical Education – IV	4	0	0	40	60	100	4
BACSD1-415	Elective English – IV	4	0	0	40	60	100	4
BACSD1-416	Economics – IV	4	0	0	40	60	100	4
BACSD1-417	Elective Punjabi – IV	4	0	0	40	60	100	4
Total		**20**	**0**	**4**	**240**	**360**	**600**	**22**

SEMESTER 5th		Contact Hrs.			Marks			Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.	Total	
BACSS1-501	General English – V	4	0	0	40	60	100	4
BACSS1-502	General Punjabi – V	4	0	0	40	60	100	4
BACSS1-503	Software Engineering	4	0	0	40	60	100	4
BACSS1-504	Software Engineering (Lab)	0	0	4	40	60	100	2
Department Elective Subjects (Any Two)								
BACSD1-511	History – V	4	0	0	40	60	100	4
BACSD1-512	Political Science – V	4	0	0	40	60	100	4
BACSD1-513	Mathematics (Differential Geometry) - V	4	0	0	40	60	100	4
BACSD1-514	Physical Education – V	4	0	0	40	60	100	4
BACSD1-515	Elective English – V	4	0	0	40	60	100	4
BACSD1-516	Economics – V	4	0	0	40	60	100	4
BACSD1-517	Elective Punjabi – V	4	0	0	40	60	100	4
Total		**20**	**0**	**4**	**240**	**360**	**600**	**22**

SEMESTER 6th		Contact Hrs.			Marks			Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.	Total	
BACSS1-601	General English – VI	4	0	0	40	60	100	4
BACSS1-602	General Punjabi – VI	4	0	0	40	60	100	4
BACSS1-603	Introduction to Computer Network and Internet Programming	4	0	0	40	60	100	4
BACSS1-604	Introduction to Computer Network and Internet Programming (Lab)	0	0	4	40	60	100	2
BACSS1-605	Human Values and Professional Ethics	3	0	0	40	60	100	3
Department Elective Subjects (Any Two)								
BACSD1-611	History – VI	4	0	0	40	60	100	4
BACSD1-612	Political Science – VI	4	0	0	40	60	100	4
BACSD1-613	Mathematics (Analysis) - IV	4	0	0	40	60	100	4
BACSD1-614	Physical Education – VI	4	0	0	40	60	100	4
BACSD1-615	Elective English – VI	4	0	0	40	60	100	4
BACSD1-616	Economics – VI	4	0	0	40	60	100	4
BACSD1-617	Elective Punjabi – VI	4	0	0	40	60	100	4
Total		**23**	**0**	**4**	**280**	**420**	**700**	**25**

Semester	Marks	Credits
Semester – 1st	600	22
Semester – 2nd	600	22
Semester – 3rd	600	22
Semester – 4th	600	22
Semester – 5th	600	22
Semester – 6th	700	25
Total	**3700**	**135**

PROGRAM OUTCOMES (POS)

PO 1. The program enables the students to acquire communication efficacy which would help

them to communicate effectively with the community as well as society.

PO 2. The students acquire knowledge in the field of social sciences, literature and humanities

Which make them sensitive and sensible enough?

PO 3. The program also empowers the graduates to appear for various competitive examinations or choose the post graduate programme of their choice.

PO 4.The program enables the students to acquire the knowledge with human values.

PO 5. The students will be kindled enough to think and act over for the solution of various issues prevailed in the human life.

PO 6. Programme provides the base to be the responsible citizen.

SEMESTER - I

ਪੰਜਾਬੀ ਲਾਜਮੀ _ I

Subject Code:BACSS1-102 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

COs	Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO1	**Language Skills:** Enhance reading, writing, listening, and speaking skills in Punjabi	3	1	2			
CO2	**Vocabulary and Grammar:** Learn essential Punjabi vocabulary and grammar rules	3		2			
CO3	**Writing Skills:** Learn to write short essays, paragraphs, and simple compositions in Punjabi	3		2		1	
CO4	**Reading Comprehension:** Improve the ability to read and understand Punjabi Poems	2		1	2		

ਪਾਠਕ੍ਰਮ

1. ਅਧੁਨਿਕਪੰਜਾਬੀਕਵਿਤਾਦਾਅਧਿਐਨ
2. ਲੇਖਰਚਨਾ
3. ਵਿਆਕਰਨ: ਸਿਧਾਂਤਅਤੇਵਿਹਾਰ

ਯਨਿਟ – I (15 Hrs)

(ੳ) ਕਾਵਿਸੁਮੇਲਪੁਸਤਕਵਿਚੋਂਪ੍ਰਸੰਗਸਹਿਤਵਿਆਖਿਆ।

(ਅ) ਕਵਿਤਾਦਾਕੇਂਦਰੀਭਾਵ।

ਯਨਿਟ – II (15 Hrs)

ਲੇਖਰਚਨਾ) 500 ਸ਼ਬਦਾਵਿੱਚ (ਚਲੰਤਮਸਲਿਆਂਤੇ।

ਯਨਿਟ – III (15 Hrs)

ਵਿਆਕਰਨਦੀਪਰਿਭਾਸ਼ਾ, ਮਹੱਤਵ।

ਯਨਿਟ – IV (15 Hrs)

ਵਿਹਾਰਕਪ੍ਰਸ਼ਨ।

- **Recommended Books:-**

(i) ਕਾਵਿ_ਸੁਮੇਲ (ਸੰਪਾਦਕ) ਡਾ. ਕਰਮਜੀਤਸਿੰਘ, ਪਬਲੀਕੇਸ਼ਨਬਿਊਰੋ।

(ii) ਸਹਾਇਕਪੁਸਤਕਾਂ : ਬਰਾੜ, ਬੂਟਾਸਿੰਘ (ਡਾ.), ਪੰਜਾਬੀਵਿਆਕਰਨਸਿਧਾਂਤਅਤੇਵਿਹਾਰਚੇਤਨਾਪ੍ਰਕਾਸ਼ਨਲੁਧਿਆਣਾ 2008।

(iii) ਮਨਜੀਤਕੌਰ, ਪੰਜਾਬੀਭਾਸ਼ਾ : ਵਰਤੋਂਤੇਬਣਤਰ, ਲੋਕਗੀਤਪ੍ਰਕਾਸ਼ਨ, ਚੰਡੀਗੜ੍ਹ।

1. ਜੱਸਲਕੰਵਰਜੀਤ, ਪੰਜਾਬੀਵਿਆਕਰਨਦੇਕੁਝਪੱਖ, ਰਵੀਸਾਹਿਤਪ੍ਰਕਾਸ਼ਨਹਾਲਬਜਾਰਅਮ੍ਰਿਤਸਰ 2012

GENERAL ENGLISH- I

Subject Code:BACSS1-101 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

COs	Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO1	**Language Proficiency:** Develop proficiency in the English Language	3	2	2		1	
CO2	**Vocabulary and Grammar:** Learn essential English vocabulary and grammar rules	3		2			
CO3	**Writing Skills:** Learn to write paragraphs in English	3		2		1	
CO4	**Reading Comprehension:** Improve the ability to read and understand English Poetry and Prose	2		1	2		

UNIT-1 Peotry (15 Hrs.)

1. Song 36 from Gitanjali – Rabindernath Tagore.
2. Pippa's song - Robert Browning.
3. women's rights annie lennox walker.
4. The soul's prayer - Sarojini naidu.

UNIT-2 Prose (15 Hrs.)

1. Spoken English and broken English – G.B shaw.
2. Garif – Antor Chekov.
3. Uncle podger hangs a picture -Jerome k Jerome.
4. The doll's house - Katherine Mansfield.

UNIT-3 (15 Hrs.)

1. Paragraph writing –Discriptive & Narrative?
2. Comprehensiom of passage prose text.

UNIT-4 (15 Hrs.)

i.) Grammer →voice,Determiner,modals,antonyms.
ii.) Translation→ from varnaculer to English (four out of six sentences)

Textbook:-

i.) The poetic palatte (orient blackswan, for-1/2Sem Second edition, 2016)
ii.) Prose parables (orient black swan,2013)
iii.) English at work (selection from poetry & prose Vijay kumar, B.T. Seetha, A.V Suresh Kumar, Y.L. Srinivas, New Delhi; Macmillan, India Ltd.2012 (Punjab University) revised edition.

INTRODUCTION INFORMATION TECHNOLOGY AND OFFICE AUTOMATION

Subject Code: BACSS1-103 **L T P C** **Duration: 60 Hrs.**
4 00 4

COs	Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO1	**IT Fundamentals:** Introduce students to the basic principles and concepts of information technology like hardware, software, networks, Input devices and output devices			3		2	
CO2	**Office Automation Tools:** Familiarize students with commonly used office automation tools such as word processors, spreadsheets and email applications			2		3	
CO3	**Internet and Web Browsing:** Acquaint students to internet usage and web browsing	1		3		3	

UNIT-I(15 Hrs.)

Computer Fundamentals: Block diagram of a Computer, Characteristics of Computers, Hardware, Software, Machine Language, Assembly Language and Assembler, High Level Language and Compiler v/s Interpreter.
Computer software: Types of software, application software and system software.
Input Devices: Keyboard, Mouse, Joystick, Track Ball, Touch Screen, Light Pen, Digitizer, Scanners, monitors, printers, plotters.
Output Devices: Monitors, Impact Printers - Dot matrix, Character and Line printer, non impact Printers – DeskJet and Laser printing, Plotter

ਕੰਪਿਊਟਰਬੁਨਿਆਦੀ: ਇੱਕਕੰਪਿਊਟਰਦਾਬਲਾਕਚਿੱਤਰ, ਕੰਪਿਊਟਰਦੀਆਂਵਿਸ਼ੇਸ਼ਤਾਵਾਂ, ਹਾਰਡਵੇਅਰ, ਸੌਫਟਵੇਅਰ, ਮਸ਼ੀਨਭਾਸ਼ਾ, ਅਸੈਂਬਲੀਭਾਸ਼ਾਅਤੇਅਸੈਂਬਲਰ, ਉੱਚਪੱਧਰੀਭਾਸ਼ਾਅਤੇਕੰਪਾਈਲਰ v/s ਦੁਭਾਸ਼ੀਏ।
ਕੰਪਿਊਟਰਸਾਫਟਵੇਅਰ: ਸਾਫਟਵੇਅਰ, ਐਪਲੀਕੇਸ਼ਨਸਾਫਟਵੇਅਰਅਤੇਸਿਸਟਮਸਾਫਟਵੇਅਰਦੀਆਂਕਿਸਮਾਂ।
ਇਨਪੁਟਡਿਵਾਈਸ: ਕੀਬੋਰਡ, ਮਾਊਸ, ਜੋਇਸਟਿਕ, ਟ੍ਰੈਕਬਾਲ, ਟੱਚਸਕਰੀਨ, ਲਾਈਟਪੈੱਨ, ਡਿਜੀਟਾਈਜ਼ਰ, ਸਕੈਨਰ, ਮਾਨੀਟਰ, ਪ੍ਰਿੰਟਰ, ਪਲਾਟਰ।
ਆਉਟਪੁੱਟਉਪਕਰਣ: ਮਾਨੀਟਰ, ਪ੍ਰਭਾਵਪ੍ਰਿੰਟਰ - ਡਾਟਮੈਟ੍ਰਿਕਸ, ਅੱਖਰਅਤੇਲਾਈਨਪ੍ਰਿੰਟਰ, ਗੈਰਪ੍ਰਭਾਵੀਪ੍ਰਿੰਟਰ - ਡੈਸਕਜੈੱਟਅਤੇਲੇਜ਼ਰਪ੍ਰਿੰਟਿੰਗ, ਪਲਾਟਰ

UNIT-II(15 Hrs.)

Memories: Memories: Main Memories - RAM ROM and Secondary Storage Devices - Hard Disk, Compact Disk and DVD.
File Manipulation: Creating, Deleting, coping, renaming file.
Introduction to Internet: Evolution of Internet, Internet Applications, WWW, E-mail, FTP, TELNET, Web Browsers.

ਯਾਦਾਂ: ਯਾਦਾਂ: ਮੁੱਖਯਾਦਾਂ - RAM ROM ਅਤੇਸੈਕੰਡਰੀਸਟੋਰੇਜਡਿਵਾਈਸ - ਹਾਰਡਡਿਸਕ, ਕੰਪੈਕਟਡਿਸਕਅਤੇ DVD।

ਫਾਈਲਹੇਰਾਫੇਰੀ: ਫਾਈਲਬਣਾਉਣਾ, ਮਿਟਾਉਣਾ, ਨਜਿੱਠਣਾ, ਨਾਮਬਦਲਣਾ।

ਇੰਟਰਨੈਟਦੀਜਾਣ-ਪਛਾਣ: ਇੰਟਰਨੈਟਦਾਵਿਕਾਸ, ਇੰਟਰਨੈਟਐਪਲੀਕੇਸ਼ਨ, ਡਬਲਯੂਡਬਲਯੂਡਬਲਯੂ, ਈ-ਮੇਲ, ਐਫਟੀਪੀ, ਟੇਲਨੈੱਟ, ਵੈੱਬਬ੍ਰਾਉਜ਼ਰ।

UNIT-III(15 Hrs.)

Word Processing Tool: Salient features of Word Processing, File, Edit, View, Insert, Format, Tools, Tables, Window, help options and all of their features, Options and Sub Options etc.,

Windows: Windows concept, Features, Desktop, Windows, And Accessories: Paint, Notepad, WordPad etc, Window Explorer, And Organization of data in Windows.

ਵਰਡਪ੍ਰੋਸੈਸਿੰਗਟੂਲ: ਵਰਡਪ੍ਰੋਸੈਸਿੰਗ, ਫਾਈਲ, ਐਡਿਟ, ਵਿਊ, ਇਨਸਰਟ, ਫਾਰਮੈਟ, ਟੂਲਸ, ਟੇਬਲ, ਵਿੰਡੋ, ਮਦਦਵਿਕਲਪਅਤੇਉਹਨਾਂਦੀਆਂਸਾਰੀਆਂਵਿਸ਼ੇਸ਼ਤਾਵਾਂ, ਵਿਕਲਪਅਤੇਉਪਵਿਕਲਪਆਦਿਦੀਆਂਪ੍ਰਮੁੱਖਵਿਸ਼ੇਸ਼ਤਾਵਾਂ,

ਵਿੰਡੋਜ਼: ਵਿੰਡੋਜ਼ਸੰਕਲਪ, ਵਿਸ਼ੇਸ਼ਤਾਵਾਂ, ਡੈਸਕਟਾਪ, ਵਿੰਡੋਜ਼, ਅਤੇਸਹਾਇਕਉਪਕਰਣ: ਪੇਂਟ, ਨੋਟਪੈਡ, ਵਰਡਪੈਡਆਦਿ, ਵਿੰਡੋਐਕਸਪਲੋਰਰ, ਅਤੇਵਿੰਡੋਜ਼ਵਿੱਚਡੇਟਾਦਾਸੰਗਠਨ।

UNIT-IV(15 Hrs.)

Presentation Tool: Making Presentations, Inserting Objects, and Animations.

Spreadsheet Tool: Excel Worksheet, Data Entry, Editing, Cell Addressing ranges, Commands, Menus, Copying & Moving Cell Content, Inserting and Deleting Rows and Column, Column formats, Cell Protection, Printing, Creating, Displaying and Printing Graphs, Statistical Functions.

ਪੇਸ਼ਕਾਰੀਟੂਲ: ਪ੍ਰਸਤੁਤੀਆਂਬਣਾਉਣਾ, ਵਸਤੂਆਂਨੂੰਸ਼ਾਮਲਕਰਨਾ, ਅਤੇਐਨੀਮੇਸ਼ਨ।

ਸਪ੍ਰੈਡਸ਼ੀਟਟੂਲ: ਐਕਸਲਵਰਕਸ਼ੀਟ, ਡੇਟਾਐਂਟਰੀ, ਸੰਪਾਦਨ, ਸੈੱਲਐਡਰੈਸਿੰਗਰੇਂਜ, ਕਮਾਂਡਾਂ, ਮੀਨੂ, ਸੈੱਲਸਮੱਗਰੀਨੂੰਕਾਪੀਕਰਨਾਅਤੇਮੂਵਕਰਨਾ, ਕਤਾਰਾਂਅਤੇਕਾਲਮਨੂੰਸ਼ਾਮਲਕਰਨਾਅਤੇਮਿਟਾਉਣਾ, ਕਾਲਮਫਾਰਮੈਟ, ਸੈੱਲਪ੍ਰੋਟੈਕਸ਼ਨ, ਪ੍ਰਿੰਟਿੰਗ, ਬਣਾਉਣਾ, ਡਿਸਪਲੇਕਰਨਾਅਤੇਪ੍ਰਿੰਟਿੰਗਗ੍ਰਾਫ਼, ਅੰਕੜੇ।

Recommended Books:

1. V. Rajaraman, 'Fundamentals of Computers', 5th Edn., PHI, 2010.2. Satish Jain, 'Information Technology Concepts', ns, 4th Edn., BPB Publications, 2006.
3. Turban, Mclean and Wetherbe, 'Information Technology for Management', 4th Edn., John Wiley & Sons, 2006.4. G. Courter, 'Mastering MS Office 2000 Professional', 3rd Edn., BPB Publication, 2006.5. Steve Sagman, 'MS Office 2000 For Windows', 3rd Edn., Addison Wesley, 2008.

HISTORY– I

Subject Code: BACSD1-111 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

COs	Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO1	**Chronological Understanding:** Develop a chronological understanding of Ancient Indian History		2	3		1	
CO2	**Civilizations and Empires:** Study the rise and fall of significant ancient civilizations and empires in India, such as the Indus Valley Civilization, Maurya Empire, Gupta Empire, etc.		1		1	1	
CO3	**Cultural and Religious Heritage:** Explore contribution of different religions like Jainism and Buddhism				1	1	1

UNIT– I (15 Hrs.)

Ancient Indian History and its Importance, Physical Features and Impact, Sources of Early Indian History.

ਪ੍ਰਾਚੀਨਭਾਰਤਦਾਇਤਿਹਾਸਅਤੇਮਹੱਤਵ, ਭਾਰਤਦੀਆਂਭੂਗੋਲਿਕਵਿਸ਼ੇਸ਼ਤਾਵਾਂ, ਪ੍ਰਭਾਵ, ਪ੍ਰਾਚੀਨਭਾਰਤਦੇਸੋਮੇ।

UNIT– II(15 Hrs.)

Indus Valley Civilizations or Harappa Culture, The Early Vedic Age, Later Vedic Age.

ਸਿੰਧੂਘਾਟੀਦੀਸਭਿਅਤਾਜਾਂਹੜੱਪਾਸੰਸਕ੍ਰਿਤੀ, ਮੁੱਢਲਾਵੈਦਿਕਕਾਲ, ਉੱਤਰਵੈਦਿਕਕਾਲ।

UNIT– III(15 Hrs.)

Jainism and Buddhism, Alexander's Invasion of India, The Maurya Empire, The Kushana Empire, The Gupta Empire

ਜੈਨਧਰਮਅਤੇਬੁੱਧਧਰਮ, ਸਿੰਕਦਰਦਾਭਾਰਤਉੱਤੇਹਮਲਾ, ਮੌਰੀਆਸਾਮਰਾਜ, ਕੁਸ਼ਾਣਸਮਰਾਜ, ਗੁਪਤਸਮਰਾਜ।

UNIT– IV(15 Hrs.)

Harsha Vardhana and His Time, Principal Dynasties of South India, Origin and Rise of the Rajputs.

ਹਰਸ਼ਵਰਧਨਅਤੇਉਸਦਾਸਮਾਂ, ਦੱਖਣੀਭਾਰਤਦੇਮਹੱਤਵਪੂਰਣਰਾਜਵੰਸ਼, ਰਾਜਪੂਤਾਂਦੀਉਤਪੱਤੀਅਤੇਉਥਾਨ।

Books: -

ਪ੍ਰਾਚੀਨਭਾਰਤਦਾਇਤਿਹਾਸ) Ancient History of India) Writer Dr. A.C. Arora

A.D. : - (Starting to 1200 CE)

POLTICAL SCIENCE - I

Subject Code: BACSD1-112 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

COs	Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO1	**Introduction:** Familiarize students with the discipline of political science, theories of origin of states		2	3			1
CO2	**Political Thinkers:** To acquaint students to the concepts of various political thinkers and philosophers		2	2	1		1
CO3	**Political Theories and Ideologies:** Explore major political theories and ideologies			3	1	1	

UNIT – I(15 Hrs.)

- Political Theory – Ancient , Traditional and Modern - Distinction Between Political Theory and Political Science.
- Relationship of Poitiers Seine with Social Sciences.

UNIT – II(15 Hrs.)

- The State : Meaning and Its Elements - destination Between State and society.
- Theories of the origin of State: - Social Contract theory and Historical Evolutionary Theory.

UNIT – III(15 Hrs.)

- Liberal, Maxiom and Gandhian View of State function of state - Socialist Perspective
- Functions of state: Liberal Theory Welfare State : Concept and functions

UNIT – IV(15 Hrs.)

- Sovereignty Meaning - Sovereignty and Its Monistic Theory, Austin theory of Sovereignty
- Pluralistic Theory of Sovereignty and Political Systems: Main Element of Political System, Main Structure of Political System.

Recommended Books:

1. Political Theory – J.S. Badyal, Raj Publications
2. Comparative Political System and International Politics – J.S. Badyal

MATHEMATICS -I

Subject Code: BACSD1-113 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

COs	Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO1	**Graphing and Functions:** Develop an understanding of graphing techniques and functions to visualize and analyze mathematical relationships			3		2	
CO2	**Probability and Statistics:** Introduce students to probability theory and basic analysis and interpretation		1	2		3	
CO3	**Calculus Concepts:** Introduce fundamental concepts of calculus			2		2	

UNIT-I (15 Hrs.)

Set Theory: Sets, Type of sets, set operations, Principle of Inclusion-Exclusion, Cartesian product of sets, Partitions.
Logic: Propositions, Implications, Precedence of logical operators, Truth table, Arguments and validity of arguments, equivalence and implication laws of logic, Principle of Mathematical induction.
Relations: Relations and diagraph, n-ary relations and their applications, properties of relations, representing relations, closure of relation, equivalence relation, operation on relations, partial ordering. Functions: Functions, One-to-one Functions, Onto Functions, Inverse and Composition of Functions, Floor Function, Ceiling Function.

UNIT-II (15 Hrs.)

Integration by Partial fractions, integration of rational and irrational functions, Properties of definite integral, Reduction formulae for integrals of rational, trigonometric, exponential and logarithmic function and of their combinations.

UNIT-III(15 Hrs.)

Graph Theory. Graphs: Introduction to Graph, Graph terminology, Representing graphs and Graph Isomorphism, Connectivity, Euler Paths and Circuits, Hamiltonian paths and circuits, Shortest Path Problems, Planar Graphs.
Trees: Trees, labeled trees, Tree Traversal, Undirected trees, Spanning Trees, Minimum spanning trees.

UNIT–IV(15 Hrs.)

Probability: Definition, Addition law of Probability, Multiplication law, Binomial Distribution, Poisson Distribution, Normal Distribution
Statistics and Applications of Logarithms: Introduction to Statistics, Measures of Central Tendency- Mean, Median and Mode, Measures of Dispersion, Mean Deviation, Standard Deviation and Coefficient of Variation. Problems related to Compound Interest, Depreciation and Annuities.

PHYSICAL EDUCATION - I

Subject Code: BACSD1-114 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

COs	Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO1	**Physical Fitness:** Improve the understanding of Physical Fitness concepts and practice			2		3	1
CO2	**Motor Skills Development:** Enhance the students' motor skills like running, jumping, throwing, catching, kicking and other fundamental movement			2		2	
CO3	**Teamwork and Cooperation:** Promote teamwork, cooperation, and sportsmanship through various sports and group activities	1		2		1	1
CO4	**Health Awareness:** Raise awareness about the importance of regular physical activity for maintaining overall health			1		3	
CO5	**Physical Education and Lifelong Activity:** Foster an understanding of the importance of lifelong		1			1	1

(THEORY – 60 MARKS)

UNIT – I(15 Hrs.)

- **Physical Education**: Introduction, Objectives, Scope and Importance of Physical Education in the modern society.
- **Health Education**: Introduction, Aim & objectives, Principles and its Importance.
- **Olympic Games**: Introduction, Organization, Administration and Ceremonies of Ancient and Modern Olympic Games.
  Asian & Commonwealth Games: Introduction, Ceremonies, Venues.

UNIT – II(15 Hrs.)

- **Growth and Development**: Introduction, Difference, Development Characteristics at Different stages of Development and factors affecting growth & Development.
- **Heredity and Environment**: Introduction, Effect of Heredity & Environment on Growth & development, Chronological age, Anatomical age and Physiological age.
- **Personal Hygiene**: Introduction, Personal Cleanliness, Rest, Relaxation and Sleep.

UNIT – III(15 Hrs.)

- **Terminologies of Physical Education**: Kinesiology, Anatomy, Physiology Exercise Physiology, Bio Mechanics, Anthropometry and Sports Medicine.
- **Cell:** Structure, Parts and its Function.
- **Digestive System** : Introduction, Structure, Organs & Functions of Digestive System

UNIT – IV(15 Hrs.)

- **Athletics**: Introduction, Classification of Events, General Rules of Track Events and Types of Start & Finish.
- **Football**: History, Laws of the Game, Major tournaments and Arjuna Awardees.
- **Volleyball**: History, Layout, General Rules and Regulation, Officials, Major Tournaments and Arjuna Awardees.

PRACTICAL (40 MARKS)

VOLLEYBALL, FOOTBALL AND SPRINTS (ATHLETICS)

Evaluation will be based on skill test, Performance, Practical file and Viva Voce.

Recommended Books:

1. Dr. Nishan Singh Deol (1980): Text Book of Physical Education & Sports. (AP Publishiers, Jalandhar)
2. Singh Ajmer et al (2000): Modren Text book of Physical Edcation, Health and Sports, Kalyani Publishers, Ludhiana.

ELECTIVE ENGLISH – I

Subject Code: BACSD1-115 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

COs	Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO1	**Improving Language Proficiency:** Enhance overall language skills, including speaking, listening, reading, and writing, to communicate effectively in English			2		3	1
CO2	**Grammar and Vocabulary:** Develop a solid understanding of English grammar rules			2		2	
CO3	**Writing Skills:** Develop the ability to write clear, coherent, and organized letters	1		2		1	1

UNIT–I (15 Hrs.)

- Literary Terms: ballad ode, sonnet. Dramatic Monologue, Interior Monologue, Blank verse, free verse, Mock Epic. Metaphysical Conceit, Negative capability, Egotistical sublime, fancy, imagination, Irony, Paradox, Ambiguity ,Alliteration, Assonance, Imagery.

UNIT–II (15 Hrs.)

- letter writing- official
- Applied Grammar - Voice, Direct Indirect

UNIT–III (15 Hrs.)

- Transformation of Sentences- Simple compound complex,
- Articles, Proposition, conjunctions
- Vocabulary - Antonyms/Synonym,
- Uses of words Phrases in English.

UNIT–IV (15 Hrs.)

- Text Prescribed from Fluency in English.
  (a) Inzy Lets things Flow over Him. - Kadamba Murali
  (b) Haroun and the sea of stories. : Salman Rushdil.
  (c) Sisters-Poem : Saleem Peeradina
  (d) Understanding Satire - A Ten Day Test: Harishanker Passai
  (e) Go, kiss the world- Subroto Bagachi
  (f) Amaltanti : Nirendranath Chakrabarti
  (g) Hitting Downy for a six- Kalpana Sharma
  (h) Chocolate : Manju Kapur
  (i) Ref Book :

Fluency in English: Ed Promodini Verma, Mukti Sanyal, Tulika Prasad, New Delhi-Macmillan India, 2009 .

ECONOMICS -I

Subject Code:BACSD1-116 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

COs	Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO1	To provide students with an overview of the economics concepts, theories and models related to micro economics		2	2		3	1
CO2	To understand the fundamental principles of supply and demand and how they determine market prices and quantities		2	2	1	2	
CO3	To study firm behavior, production theory, cost analysis and how firms make production and pricing decisions in different market structures		2	2		3	1

UNIT – I (15 Hrs.)

Introduction: Definition, Meaning, Nature and scope of Economics.
Theory of Demand and Consumer Behaviour Utility Analysis & Indifference Curve Analysis, Law of Demand & Exceptions. Elasticity of Demand its Measurement consumer surplus & its measurement.

UNIT – II (15 Hrs.)

Theory of production and costs: Concept, law of variable proportions & Law of Return to scale. Cost concept.
Market forms and Revenue: Behaviour of Average Revenue and Marginal Revenue under perfect competition. Relationship Between Average Revenue, Marginal Revenue.

UNIT – III (15 Hrs.)

Price and Output Determination: Determination of the firm & industry under perfect competition, monopoly – In short and long seen.

UNIT – IV (15 Hrs.)

Distribution: Marginal productivity and modern theories of wage determination.
Theory of interest ,risk and uncertainty theories of profit.
Ref Books:

(a) *Microeconomics – TR Jain ,Mukesh Trehan ,AS Sandhu*
(b) *Microeconomics- Chopra P.N ,Theory& welfare economics ,Kalyani Publishers ,New Delhi.*
(c) *Microeconomics- Chopra P.N ,Singh Joginder & Grewal ,PS (Punjbai Medium) Latest edition Price Theory & Distribution ,Kalyani Publishers ,Ludhiana.*

ਪੰਜਾਬੀਇਲੈਕਟਿਵ - I

Subject Code: BACSD1-117 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

COs	Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO1	**Language Skills:** Enhance reading, writing, listening, and speaking skills in Punjabi	3	1	2			
CO2	**Writing Skills:** Learn to write story in Punjabi	3		2		1	
CO3	**Reading Comprehension:** Improve the ability to read and understand Punjabi text written by famous authors, poems by Punjabi poets	2		1	2		

ਪਾਠਕ੍ਰਮ

1. ਆਧੁਨਿਕਪੰਜਾਬੀਕਵਿਤਾਦਾਅਧਿਐਨ
2. ਭਾਸ਼ਾਤੇਪੰਜਾਬੀ (ਭਾਸ਼ਾ)
3. ਸਾਹਿਤਦੇਰੂਪ

ਯਨਿਟ – I (15Hrs)

(ੳ) ‘ਨਕਸ਼ਨੁਹਾਰ’ ਪੁਸਤਕਵਿੱਚੋਂਪ੍ਰਸੰਗਸਹਿਤਵਿਆਖਿਆ।

(ਅ) ਕਾਵਿਸੰਗ੍ਰਹਿਵਿੱਚੋਂਕਿਸੇਇਕਕਵਿਤਾਦਾਵਿਸ਼ਾ_ਵਸਤੂ।

ਯਨਿਟ – II (15Hrs)

ਭਾਸ਼ਾਅਤੇਪੰਜਾਬੀਭਾਸ਼ਾ . ਭਾਸ਼ਾਦੀਪਰਿਭਾਸ਼ਾ , ਮਹੱਤਵ

ਯਨਿਟ – III (15Hrs)

ਸਾਹਿਤਦੇਰੂਪ . ਕਵਿਤਾ , ਗੀਤ , ਗਜਲ

ਯਨਿਟ – IV (15Hrs)

ਇਕਾਂਗੀ , ਕਹਾਣੀ (ਸ਼ਾਹਿਤ ਦੇ ਰੂਪ), ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਦੀਆਂ ਵਿਸ਼ੇਸ਼ਤਾਵਾਂ।

- ਕੋਰਸ

‘ਨਕਸ਼ਨੁਹਾਰ’ (ਸੰਪਾਦਕ) ਡਾ. ਜਸਵਿੰਦਰਸਿੰਘਆਧੁਨਿਕਪੰਜਾਬੀਕਵਿਤਾ (1901 ਈ. ਤੋਂ 2000 ਈ. ਤੱਕ)।
ਸਹਾਇਕਪੁਸਤਕਾਂ: (ਨਿਰਧਾਰਿਤ ਕਵੀ: ਭਾਈ ਵੀਰ ਸਿੰਘ, ਪ੍ਰੋ. ਪੂਰਨ ਸਿੰਘ, ਧਨੀ ਰਾਮ ਚਤ੍ਰਿਕ, ਪ੍ਰੋ. ਮੋਹਨ ਸਿੰਘ, ਅੰਮ੍ਰਿਤਾ ਪ੍ਰੀਤਮ, ਬਾਵਾ ਬਲਵੰਤ, ਸ਼ਿਵ ਕੁਮਾਰ ਬਟਾਲਵੀ, ਡਾ. ਹਰਭਜਨ ਸਿੰਘ, ਡਾ. ਜਗਤਾਰ ।)

1. ਬਰਾੜ, ਬੂਟਾਸਿੰਘ (ਡਾ.) ਪੰਜਾਬੀਭਾਸ਼ਾਸ੍ਰੋਤਤੇਸਰੂਪਵਾਰਿਸ਼ਸ਼ਾਹਫਉਡੇਸ਼ਨ, ਅਮ੍ਰਿਤਸਰ 2012 ।
2. ਪਾਜਾਬੀਸਾਹਿਤਦਾਇਤਿਹਾਸ (ਆਧੁਨਿਕਕਾਲ) ਪੰਜਾਬੀਯੂਨੀਵਰਸਿਟੀਪਟਿਆਲਾ।

ਵਿਸ਼ਾ: ਸਮਾਜ ਸ਼ਾਸਤਰ – I (Sociology –I)

ਸਮੈਸਟਰ – ਪਹਿਲਾ

Subject Code: BACSD1-119 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

COs	Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6
CO1	Articulate a sociological perspective. Apply sociological theories to understand social phenomena.		2	3			1
CO2	Critically evaluate explanations of human behavior and social phenomena.		2	2	1		1
CO3	Use sociological knowledge to inform policy debates and promote public understanding.			3	1	1	

ਯੂਨਿਟ – I (15 Hrs.)

- Introduction to Sociology:- ਸਮਾਜ ਵਿਗਿਆਨ ਦੀ ਭੂਮਿਕਾ, ਸਮਾਜ ਵਿਗਿਆਨ ਦਾ ਜਨਮ ਤੇ ਵਿਕਾਸ
- ਸਮਾਜ ਵਿਗਿਆਨ ਦੀ ਪ੍ਰਕਿਰਤੀ, ਸਮਾਜ ਵਿਗਿਆਨ ਦੀ ਅਸਲ ਪ੍ਰਕਿਰਤੀ.

ਯੂਨਿਟ – I I (15 Hrs.)

- ਮਨੁੱਖੀ ਸਮਾਜ, ਸਮਾਜ ਦਾ ਆਮ ਸਰੂਪ, ਵਿਸ਼ੇਸ਼ਤਾਵਾਂ, ਵਿਅਕਤੀ ਅਤੇ ਸਮਾਜ
- ਸਮਾਜਿਕ ਸਮੂਹ.

ਯੂਨਿਟ – I I I (15 Hrs.)

- ਸੰਸਕ੍ਰਿਤੀ, ਅਰਥ, ਪਰਿਭਾਸ਼ਾ, ਵਿਸ਼ੇਸ਼ਤਾਵਾਂ, ਸੰਸਕ੍ਰਿਤੀ ਦੇ ਕਾਰਜ ਕਿਸਮਾਂ, ਸੰਸਕ੍ਰਿਤਕ ਪਛੜਾਪਨ, ਸੰਸਕ੍ਰਿਤੀ ਤੇ ਸੱਭਿਅਤਾ

ਯੂਨਿਟ – I V (15 Hrs.)

- ਸਮਾਜੀਕਰਣ:- ਅਰਥ, ਪਰਿਭਾਸ਼ਾ, ਵਿਸ਼ੇਸ਼ਤਾਵਾਂ ਤੇ ਸਾਧਨ
- ਸਮਾਜਿਕ ਨਿਯੰਤਰਣ:- ਅਰਥ ਪਰਿਭਾਸ਼ਾ, ਵਿਸ਼ੇਸ਼ਤਾਵਾਂ, ਲੋੜ, ਸਾਧਨ

Recommended Books:

1. ਸਮਾਜ ਵਿਗਿਆਨ ਨਾਲ ਜਾਣ-ਪਛਾਣ (ਡੇਜ਼ੀ ਅੰਜਲਾ)
2. ਸਮਾਜ ਸ਼ਾਸਤਰ ਦਾ ਪਾਠਕ (ਮਧੁਰਿਮਾ)
3. ਸਮਾਜਿਕ ਸੰਸਥਾਵਾਂ (ਡਾ. ਸੁਕੌਨਿਆ ਦਾਸ)
4. Bhushan Vidya & Sachdeva D.D (2014) : An Introduction of Sociology Kilab Maal Allahabad

Web Designing-I

Subject Code: BACSD1-119 L T P C Duration: 60 Hrs

4 0 0 4

COs	Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6
CO1	Understand, analyze and create web pages using HTML			3		2	
CO2	Understand, analyze and build interactive web applications			2		3	
CO3	Students should be able to design and implement a basic website.	1		3		3	

UNIT - I

Basic Terminology: Introduction to web programming, Website, Webpage, Static Website, Dynamic Website, Internet, Intranet, Extranet, WWW, URL, client server architecture, internet domains.

Introduction to HTML: Basics of HTML5, difference between HTML & HTML5,Structure of an HTML program, understanding document tags.

UNIT - II

HTML5 formatting: Formatting tags e.g. font, Bold, italic, super script, subscript, delete, mark etc.

Lists: Unordered List, Ordered Lists, Definition lists.

Adding Images: Img element using Border, Width, Height, Align, ALT Attributes

UNIT - III

Introduction to LINK: anchor element, internal linking and external linking, attribute of anchor tag.

Tables: Caption Tag, Width, Border, Cell padding, Cell spacing, BGCOLOR, COLSPAN and ROWSPAN Attribute

UNIT - IV

HTML Frames: Introduction to frameset tag, frame tag, iframes and respective attributes.

Forms: Attributes of Form element, Input element: Text Element, Password, Button, Submit Button, Reset Button, The Checkbox, Radio, TextArea, Select and Option.

Faculty members can take practical sessions during the lectures.

Recommended Books:

1. Kogent Learning Solutions Inc.," HTML 5 in simple steps", Dreamtech Press.

2. Murray, Tom/Lynchburg," Creating a Web Page and Web Site",2002.

3. Steven M. Schafer," HTML, XHTML, and CSS Bible, 5ed", Wiley India.

SEMESTER - II

ਪੰਜਾਬੀਲਾਜਮੀ - II

Subject Code: BACSS1-202 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

COs	Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO1	**Language Skills:** Enhance reading, writing, listening, and speaking skills in Punjabi	3	1	2			
CO2	**Vocabulary and Grammar:** Learn essential Punjabi vocabulary and grammar rules	3		2			
CO3	**Writing Skills:** Learn to write Notices	3		2		1	
CO4	**Reading Comprehension:** Improve the ability to read, understand and summarize Punjabi stories	2		1	2		

ਪਾਠਕ੍ਰਮ

1. ਪੰਜਾਬੀਕਹਾਣੀਆਦਾਅਧਿਐਨ
2. ਮੁਹਾਵਰੇ
3. ਸੂਚਨਾਹਿੱਤਨੋਟਿਸ

ਯਨਿਟ – I (15 Hrs)

ਕਥਾਕਹਾਣੀਪੁਸਤਕਵਿੱਚੋਂਕਿਸੇਇੱਕਕਹਾਣੀਦਾਵਿਸ਼ਾਦੱਸਕੇਸਾਰਲਿਖਣਾ।

ਯਨਿਟ – II (15 Hrs)

ਕਹਾਣੀਸੰਗ੍ਰਹਿਵਿਚੋਂਸੰਖੇਪਉੱਤਰਾਂਵਾਲੇਪ੍ਰਸ਼ਨ।

ਯਨਿਟ – III (15 Hrs)

ਮੁਹਾਵਰੇ , ਅਰਥਦਸਕੇਵਾਕਬਣਾਉਣੇ।

ਯਨਿਟ – IV (15 Hrs)

ਸੂਚਨਾਹਿੱਤਨੋਟਿਸ) ਸਾਹਿਤਕ , ਸੱਭਿਆਚਾਰਕਤੇਖੇਡਖੇਤਰਨਾਲਸੰਬੰਧਿਤ(।

- ਕੋਰਸ

  ਕਥਾਕਹਾਣੀਪੁਸਤਕ (ਸੰਪਾਦਕ) ਡਾ. ਧਨਵੰਤਕੌਰ , ਪਬਲੀਕੇਸ਼ਨਬਿਊਰੋ।

ਸਹਾਇਕ ਪੁਸਤਕਾਂ : 1. ਅਗਨੀਹੋਤਰੀ , ਵੇਦ , ਪਰਿਚਾਇਕ , ਭਾਸ਼ਾਵਿਗਿਆਨ , ਦੀਪਕਪਬਲਿਕੇਸ਼ਨਜਲੰਧਰ 1981 ।
2. ਜੱਸਲਕੰਵਲਜੀਤ , ਪੰਜਾਬੀਵਿਆਕਰਨਦੇਕੁੱਝਪੱਖ , ਰਵੀਸਾਹਿਤਪ੍ਰਕਾਸ਼ਨਹਾਲ , ਬਾਜਾਰਅਮ੍ਰਿਤਸਰ 2012 ।

GENERAL ENGLISH - II

Subject Code: BACSS1-201 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

COs	Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO1	**Language Proficiency:** Develop proficiency in the English Language	3	2	2		1	
CO2	**Vocabulary and Grammar:** Learn essential English vocabulary and grammar rules	3		2			
CO3	**Writing Skills:** Learn and practice letter writing and unseen passage	3		2		1	
CO4	**Reading Comprehension:** Improve the ability to read and understand English Poetry and Prose	2		1	2		

UNIT -1 (Poetry) (15 Hrs.)

i.) I know why the caged bird sings - Maya Angelou.
ii.) From homecoming – R.Parthasarathy.
iii.) Where the mind is without fear - Rabindranath tagore.
iv.) Goodbye party for Miss Pushpa T.S - Nissim Ezekiel.
v.)

UNIT -2 (Prose) (15 Hrs.)

i.) Principles of good writing - L.A. Hill.
ii.) The doctor's word – R.K. Narayan.
iii.) The eyes are not here - Ruskin bond.
iv.) The conjurer's revenge - Stephen leacock.

UNIT-3 (15 Hrs.)

i.) Letter writing (Pessonal only).
ii.) Comple hension of unseen Pessage.

UNIT- 4 (15 Hrs.)

i.) Grammer →Narration,Preposotion,conjunction, synonyms.
ii.) Translation from hindi to English (four out of six sentences) Idiom Based.

Textbook:-

i.) The poetic palatte (orient blackswan, for-1/2Sem Second edition, 2016)
iv.) Prose parables (orient black swan,2013)
v.) English at work (selection from poetry & prose Vijay kumar, B.T. Seetha, A.V Suresh Kumar, Y.L. Srinivas, New Delhi; Macmillan, India Ltd.2012 (Punjab University) revised edition.

TRENDS IN IT AND OFFICE AUTOMATION

Subject Code: BACSS1-203 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

COs	Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO1	**IT Trends:** Introduce students to recent trends of information technology like mobile internet, 4G, cloud technology and social media trends			3		2	
CO2	**Office Automation Tools:** Familiarize students with word processing software, editing and formatting text			2		3	
CO3	**Networking and Software:** Introduce the students to soft computing, software process models and IOT	1		3		3	

UNIT-I(15 Hrs.)

1. **Trends in IT:** Mobile Internet, GPS, 3G, 4G, Wi-Fi, Bluetooth, Cloud Technology, Virtual LAN Technology, Firewall, Nanotechnology, online shopping, Social media, You tube, Face book, Twitter, Goggle+ .

IT ਵਿੱਚਰੁਝਾਨ:ਮੋਬਾਈਲਇੰਟਰਨੈਟ, GPS, 3G, 4G, Wi-Fi, ਬਲੂਟੁੱਥ, ਕਲਾਉਡਟੈਕਨਾਲੋਜੀ, ਵਰਚੁਅਲ LAN ਤਕਨਾਲੋਜੀ, ਫਾਇਰਵਾਲ, ਨੈਨੋਤਕਨਾਲੋਜੀ, ਔਨਲਾਈਨਖਰੀਦਦਾਰੀ, ਸੋਸ਼ਲਮੀਡੀਆ, ਯੂਟਿਊਬ, ਫੇਸਬੁੱਕ, ਟਵਿੱਟਰ, ਗੋਗਲ+।

UNIT-II(15 Hrs.)

2. **E-mail:-** introduction, Advantages and disadvantages, Structure of an Email message, working of Email(Sending and receiving message, managing E-mail(creating new folder, deleting messages, forwarding messages, filtering messages), Telnet, HTTP, TCP/IP, HTML, DHTML.

3. **Mail merge:** Creating merged envelops, creating merged mailing labels

ਈ-ਮੇਲ:-ਜਾਣ-ਪਛਾਣ, ਫਾਇਦੇਅਤੇਨੁਕਸਾਨ, ਈਮੇਲਸੰਦੇਸ਼ਦੀਬਣਤਰ, ਈਮੇਲਦਾਕੰਮ (ਸੁਨੇਹੇਭੇਜਣਾਅਤੇਪ੍ਰਾਪਤਕਰਨਾ, ਈ-ਮੇਲਦਾਪ੍ਰਬੰਧਨਕਰਨਾ (ਨਵਾਂਫੋਲਡਰਬਣਾਉਣਾ, ਸੰਦੇਸ਼ਾਂਨੂੰਮਿਟਾਉਣਾ, ਸੰਦੇਸ਼ਾਂਨੂੰਅੱਗੇਭੇਜਣਾ, ਸੁਨੇਹਿਆਂਨੂੰਫਿਲਟਰਕਰਨਾ), ਟੇਲਨੈੱਟ, HTTP, TCP /IP, HTML, DHTML। ਮੇਲਮਰਜ:ਵਿਲੀਨਲਿਫਾਫੇਬਣਾਉਣਾ, ਵਿਲੀਨਮੇਲਿੰਗਲੇਬਲਬਣਾਉਣਾ

UNIT – III(15 Hrs.)

4. **Word Processing Software**: Basics of Word Processing: creating, opening, saving, and printing document, Menu Toolbars.

5. **Editing Text:** Copy, Paste, Delete, Move etc., Finding and Replacing Text, Spell Check, Autocorrect feature, language setting and thesaurus

6. **Formatting:** Character, Paragraph and Page formatting, working with indents, Bulleted and numbered lists, adding Headers and Footers, setting up Multiple Columns

ਵਰਡਪ੍ਰੋਸੈਸਿੰਗਸੌਫਟਵੇਅਰ: ਵਰਡਪ੍ਰੋਸੈਸਿੰਗਦੀਆਂਮੂਲਗੱਲਾਂ: ਦਸਤਾਵੇਜ਼ਬਣਾਉਣਾ, ਖੋਲ੍ਹਣਾ, ਸੇਵਕਰਨਾਅਤੇਪ੍ਰਿੰਟਿੰਗਕਰਨਾ, ਮੀਨੂਟੂਲਬਾਰ।

ਟੈਕਸਟਨੂੰਸੰਪਾਦਿਤਕਰਨਾ: ਕਾਪੀਕਰੋ, ਪੇਸਟਕਰੋ, ਮਿਟਾਓ, ਮੂਵਕਰੋਆਦਿ, ਟੈਕਸਟਲੱਭਣਾਅਤੇਬਦਲਣਾ, ਸਪੈਲਚੈੱਕ, ਸਵੈ-ਸੁਧਾਰਵਿਸ਼ੇਸ਼ਤਾ, ਭਾਸ਼ਾਸੈਟਿੰਗਅਤੇਥੀਸੌਰਸ

ਫਾਰਮੈਟਿੰਗ: ਅੱਖਰ, ਪੈਰਾਗ੍ਰਾਫਅਤੇਪੰਨਾਫਾਰਮੈਟਿੰਗ, ਇੰਡੈਂਟਸਦੇਨਾਲਕੰਮਕਰਨਾ, ਬੁਲੇਟਡਅਤੇਨੰਬਰਵਾਲੀਆਂਸੂਚੀਆਂ, ਸਿਰਲੇਖਅਤੇਫੁੱਟਰਜੋੜਨਾ, ਕਈਕਾਲਮਸਥਾਪਤਕਰਨਾ

UNIT-IV(15 Hrs.)

7. **Soft Computing:-**Introduction to Neural Network-intelligence, Neurons, artificial neural networks, application scope of neural network, brain Vs computer.
8. **Software Process Models:** Software Development Life Cycle, Waterfall Life Cycle Model, Prototype Model, Spiral Model, Introduction to Agile Models.
9. **IOT architecture: -** Topologies, edge routers, client-server architecture, P2P, M2M.

ਸਾਫਟਕੰਪਿਊਟਿੰਗ: - ਨਿਊਰਲਨੈੱਟਵਰਕ-ਇੰਟੈਲੀਜੈਂਸ, ਨਿਊਰੋਨਸ, ਆਰਟੀਫਿਸ਼ੀਅਲਨਿਊਰਲਨੈੱਟਵਰਕ, ਨਿਊਰਲਨੈੱਟਵਰਕਦਾਐਪਲੀਕੇਸ਼ਨਸਕੋਪ, ਦਿਮਾਗਬਨਾਮਕੰਪਿਊਟਰਦੀਜਾਣ-ਪਛਾਣ।

ਸਾਫਟਵੇਅਰਪ੍ਰੋਸੈਸਮਾਡਲ: ਸਾਫਟਵੇਅਰਡਿਵੈਲਪਮੈਂਟਲਾਈਫਸਾਈਕਲ, ਵਾਟਰਫਾਲਲਾਈਫਸਾਈਕਲਮਾਡਲ, ਪ੍ਰੋਟੋਟਾਈਪਮਾਡਲ, ਸਪਾਈਰਲਮਾਡਲ, ਐਗਾਇਲਮਾਡਲਾਂਦੀਜਾਣ-ਪਛਾਣ।

IOT ਆਰਕੀਟੈਕਚਰ: - ਟੋਪੋਲੋਜੀਜ਼, ਐਜਰਾਊਟਰ, ਕਲਾਇੰਟ-ਸਰਵਰਆਰਕੀਟੈਕਚਰ, P2P, M2M

Recommended Books:

1. Peter Nortorn's, 'Introduction to Computer', Tata McGraw Hill, 2004.
2. R.K. Taxali, 'Introduction to Software Package', Galgotia Publications.3. P.K. Sinha, 'Introduction to Computer

HISTORY - II

Subject Code:BACSD1-211 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

COs	Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO1	**Historical Timeline:** To provide students with a chronological overview of Sikh history		2	3		1	
CO2	**Guru Tradition:** To explore the lives and teachings of Sikh Gurus and their contribution to shaping Sikhism's Principles and practices			2	3	2	1
CO3	**Key Events and Turning Points:** To identify and analyze significant events and turning points in Sikh History, such as the establishment of the Khalsa, Sikh rulers, British rule and Freedom struggle				1	1	1

UNIT – I(15 Hrs.)

Shri Guru Nanak Dev Ji, Expansion and consolidation of Sikhism, Shri Guru Arjun Dev Ji
ਸ਼੍ਰੀਗੁਰੂਨਾਨਕਦੇਵਜੀ , ਸਿੱਖਧਰਮਦਾਵਿਕਾਸ , ਸ਼੍ਰੀਗੁਰੂਅਰਜਨਦੇਵਜੀ

UNIT – II(15 Hrs.)

Development of Sikhism, Creation of The Khasla, Banda Singh Bahadur
ਸਿੱਖਧਰਮਦਾਵਿਕਾਸ , ਖਾਲਸਾਦੀਸਿਰਜਨਾ , ਬੰਦਾਸਿੰਘਬਹਾਦਰ

UNIT – III(15 Hrs.)

Punjab Under Maharaja Ranjit Singh, British Rule, Socio-Religious reform Movements
ਮਾਹਾਰਾਜਾਰਣਜੀਤਸਿੰਘਦੇਅਧੀਨਪੰਜਾਬ , ਅੰਗਰੇਜੀਰਾਜਸਮਾਜਿਕਅਤੇਧਾਰਮੀਕਸੁਧਾਰਅੰਦੋਲਨ

UNIT – IV(15 Hrs.)

Phase of the Freedom Struggle, Development after Independence
ਸਵਤੰਤਰਤਾਸੰਗਰਾਮਦੀਅਵਸਥਾ , ਸਵਤੰਤਰਤਾਬਾਅਦਦਾਵਿਕਾਸ।

Books: -
History of Punjab M.S. Mann (1469-1966)

POLTICAL SCIENCE - II

Subject Code:BACSD1-212 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

COs	Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO1	**Introduction:** Familiarize students with the discipline of political science, theories of power and authority		2	3			1
CO2	**Rights and Duties:** Awareness about rights and duties		2	2	1		1
CO3	**Political Concepts:** Study about concept of liberty, equality, legitimacy			3	1	1	

UNIT – I (15 Hrs.)

- Concept of Power: Meaning and Definition of Power, Characteristic of Power, Sources of formed. Different forms of Power Criticism the concept of Power.
- Concept of Authority - Meaning and Definitions of Authority, Characteristics of Authority kinds of Authority and Its Basis.

UNIT – II (15 Hrs.)

- Concept of legitimacy: Meaning and its legitimacy, Characteristics of legitimacy kinds of legitimacy, Crisis of legitimacy. Importance of legitimacy.
- Political Culture :- Meaning and Definitions of Political, Characteristics of Political Culture components of Political Culture, kinds of Political culture.

UNIT – III (15 Hrs.)

- Political Specialisation - Meaning and Its Definition, Characteristic of Political Socialisation Types of political Socialisation , Agents of Political specialisation, and Its Importance.
- Rights and Duties - Meaning and Definitions of Rights, Nature the characteristics of Rogues, Classification of Rights, duties & Classification. Relationship Between Rights and Duties.

UNIT – IV (15 Hrs.)

- Liberty: - Meaning and Definition of Liberty and its Characteristics Different forms or kind of liberty, main supporters of this theory.
- Concept of Equality: Meaning and it's - Definitions characteristics of Equality. Various dimensions of Equality. Relationship Between Liberty and finality.

Recommended Books:

1. Political Theory – J.S. Badyal, Raj Publications
2. Comparative Political System and International Politics – J.S. Badyal

MATHEMATICS (ALGEBRA) - II

Subject Code: BACSD1-213 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

COs	Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO1	**Basic Operations:** To understand and apply the fundamental operations in algebra			3		2	
CO2	**Solving Equations:** To learn how to solve linear and quadric equations		1	2		3	
CO3	**Systems of Equations:** To solve systems of linear equations using various methods			2		2	

UNIT-I(15 Hrs.)

Matrices, Row and Column Space of Matrix, Row reduction and echelon forms, Rank, Systems of linear equations, Gaussian elimination, Determinants and their properties, Cramer's rule, Vector equations, The matrix equation AX = B, Solution sets of linear systems (Homogeneous & Non-homogeneous), Applications of linear systems.

UNIT –II(15 Hrs.)

Eigen values, Eigenvectors, Characteristic polynomial, Minimal polynomial, Characteristic equation of a matrix, Cayley-Hamilton theorem and its use in finding the inverse of a matrix, Diagonalization, Linear transformations, Representation of linear transformations by matrices, Change of basis, Rank-nullity theorem, Minimal polynomial.

UNIT-III(15 Hrs.)

Binary space, Definition of group, Ring and field, Vector space, Subspace, Linear combination, linear span, Dimension of vector space, direct sum of spaces, Quotient space, Homomorphism & Isomorphism of vector space.

UNIT-IV(15 Hrs.)

Linear Transformation, Null space, Range space, Product of linear transformation, Singular and nonsingular transformation, Canonical forms, Jordan forms, Triangular forms, Rank-nullity theorem, Eigen value & Eigen vectors of linear transformation

PHYSICAL EDUCATION - II

Subject Code: BACSD1-214 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

COs	Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO1	**Physical Fitness:** Improve the understanding of Physical Fitness concepts and practice			2		3	1
CO2	**Motor Skills Development:** Enhance the students' motor skills like running, jumping, throwing, catching, kicking and other fundamental movement			2		2	
CO3	**Teamwork and Cooperation:** Promote teamwork, cooperation, and sportsmanship through various sports and group activities	1		2		1	1
CO4	**Health Awareness:** Raise awareness about the importance of regular physical activity for maintaining overall health			1		3	
CO5	**Physical Education and Lifelong Activity:** Foster an understanding of the importance of lifelong		1			1	1

(THEORY – 60)

UNIT – I(15 Hrs.)

- **Children and Sports**: Introduction, Stages of Motor Development in Children, Benefits of Exercise for Children, Weight Training and their Advantages or Disadvantages for Children.
- **Body Types**: Introduction, Sheldon and Kretschmer's Classification.
- **Communicable Diseases** : Introduction, Classification, Causes, Symptoms, Prevention and Control of Communicable Disease (Cholera, Typhoid, Tuberculosis, AIDS, Hepatitis A & B, Rabies and Malaria)

UNIT – II(15 Hrs.)

- **Sports Terminologies**: Isometric, Isotonic, Isokinetic, Reflex Action, Over Load, Recovery and Motor Ability.
- **Skeleton System**: Introduction, Types, Functions and various Bones of Body.
- **Joints** : Introduction, Classification of various Joints of Human Body and Kinds of Joint Movements

UNIT – III(15 Hrs.)

- **Description of the following**:
  (a) N.S.N.I.S. (Netaji Subhash National Institute of Sports)
  (b) S.A.I (Sports Authority of India)
  (c) I.O.A. (Indian Olympic Association)
  (d) I.A.A.F. (International Association of Athletic Federation)
- **Drugs**: Introduction, Causes, Symptoms, Harmful Effects and its Prevention.
  Doping: Introduction, Types, Prohibited Substances & Methods and its Effects.
- **Warming up and Cooling Down** : Introduction, Method type of Warm Up, Significance and Guidelines.

UNIT – IV(15 Hrs.)

- **Long Jump** : Introduction, Rules, Layout, Techniques and Arjuna Awardees.
- **Hockey & Basketball**: History, Layout, General Rules and Regulations, Officials, Major tournaments and Arjuna Awardees.
- **Sports Awards**:
  (a) Maharaja Ranjit Singh
  (b) Arjuna Award
  (c) Dronacharya Award
  (d) MAKA Trophy
  (e) Rajiv Gandhi Khel Ratan Award

PRACTICAL (40 MARKS)
BASKETBALL, HOCKEY AND LONG JUMP

Evaluation will be based on skill test, Performance, Practical file and Viva Voce.

**********END*******

References:

(a) *Dr. Nishan Singh Deol (1980) : Text book of Physical Education & Sports. (AP Publishers, Jalandhar).*

(b) *Singh Ajmer et al (2000) : Modern Text Book of Physical Education, Health and Sports",*
Kalyani Publishers, Ludhiana

ELECTIVE ENGLISH - II

Subject Code: BACSD1-215 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

COs	Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO1	**Improving Language Proficiency:** Enhance overall language skills, including speaking, listening, reading, and writing, to communicate effectively in English			2		3	1
CO2	**Grammar and Vocabulary:** Develop a solid understanding of English grammar rules			2		2	
CO3	**Writing Skills:** Develop the ability paragraph writing	1		2		1	1

UNIT – I (15 Hrs.)

- literary Terms : Prose, Essay, Expository Essay, Analytical essay, Lyrical essay, Descriptive Essay, Imaginative Essay, Philosophical Essay, short Story, Long story, Drama Dramatic plot, Character, Incident, setting, Structure Tragedy, Comedy, Tragi - comedy.

UNIT – II (15 Hrs.)

- Paragraph writing. (based on outline, a situation a string of questions etc).
- Applied Grammar
  (a) Corrections.
  (b) Use of the same words as different Parts of speech.

UNIT – III (15 Hrs.)

- Translation from vernacular into English
- Antonyms / Synonyms

UNIT – IV (15 Hrs.)

A Collection of essays ,short stories & one acts plays : Ed RK Kaushik & SC Bhatia ,New Delhi ,OUP ,2006

ECONOMICS - II

Subject Code: BACSD1-216 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

COs	Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO1	To provide students with an overview of the economics concepts, theories and models related to macro economics		**2**	**2**		**3**	**1**
CO2	To understand the fundamental principles of Money and Banking; income and employment		**2**	**2**	**1**	**2**	
CO3	To study inflation, theories of inflation, policies for stabilization of inflation		**2**	**2**		**3**	**1**

UNIT – I (15 Hrs.)

Introduction : Nature ,Meaning and Scope of Macro Economics.
Consumption Function: Average and Marginal Propensity to consume.
Investment Function: Types of Investment, Investment Demand Schedule and factors affecting investment decisions.

UNIT – II (15 Hrs.)

Determination of income & employment: Classical & Keynesian theories of income output &employment ,says ‘s law of market.

UNIT – III (15 Hrs.)

Money – Definition, function, role Quantity theory of money – fishers‘s equation Keynesian liquidity preference theory
Banking: Major function & meaning of commerce banks.

UNIT – IV (15 Hrs.)

Inflation and macro economics polices : Cost push and demand pull theories of inflation.
Monetary & fiscal policies for stabilization.

Reference Books:

(a) Macro Economics : Sharma ,OP (Punjabi Medium)
(b) Macro Economics – TR Jain, Ashok Gupta.

ਪੰਜਾਬੀਇਲੈਕਟਿਵ - II

Subject Code: BACSD1-217 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

COs	Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO1	**Language Skills:** Enhance reading, writing, listening, and speaking skills in Punjabi	3	1	2			
CO2	**Writing Skills:** Learn to write story in Punjabi	3		2		1	
CO3	**Reading Comprehension:** Improve the ability to read and understand Punjabi text written by famous authors, poems by Punjabi poets	2		1	2		

ਪਾਠਕ੍ਰਮ

1. ਆਧੁਨਿਕਪੰਜਾਬੀਕਵਿਤਾਦਾਅਧਿਐਨ
2. ਭਾਰਤੀਕਾਵਿਸ਼ਾਸ਼ਤਰ
3. ਸਾਹਿਤਆਲੋਚਨਾ

ਯਨਿਟ – I (Hrs)

)ੳ (ਨਕਸ਼ਾ_ਨੁਹਾਰਕਾਵਿਪੁਸਤਕਵਿੱਚੋਂਪ੍ਰਸੰਗਸਹਿਤਵਿਆਖਿਆ।

)ਅ (ਕਾਵਿਸੰਗ੍ਰਹਿਵਿੱਚੋਂਕਿਸੇਇਕਕਵਿਤਾਦਾਵਿਸ਼ਾ_ਵਸਤੂ।

ਯਨਿਟ – II (Hrs)

ਧੁਨੀ ਸੰਪਰਦਾਇ ।

ਯਨਿਟ – III (Hrs)

ਅਲੰਕਾਰ ਸੰਪਰਦਾਇ) ਮੁੱਢਲੀਜਾਣਪਛਾਣ(।

ਯਨਿਟ – IV (Hrs)

ਸਾਹਿਤਆਲੋਚਨਾ : ਸਾਹਿਤਦੀਪ੍ਰੀਭਾਸ਼ਾ ,ਪ੍ਰਕ੍ਰਿਤੀਅਤੇਤੱਤ।

- ਕੋਰਸ

ਨਕਸ਼ਨੁਹਾਰ, (ਸੰਪਾਦਕ) ਡਾ. ਜਸਵਿੰਦਰਸਿੰਘਆਧੁਨਿਕਪੰਜਾਬੀਕਵਿਤਾ (1901 ਈ. ਤੋਂ 2000 ਈ. ਤੱਕ) ਪਬਲੀਕੇਸ਼ਨਬਿਊਰੋ।

ਸਹਾਇਕਪੁਸਤਕਾਂ: (ਨਿਰਧਾਰਿਤ ਕਵੀ: ਪਾਸ਼, ਸੰਤ ਰਾਮ ਉਦਾਸੀ, ਸੁਰਜੀਤ ਪਾਤਰ, ਜਸਵੰਤ ਦੀਦ, ਨਵਤੇਜ ਭਾਰਤੀ, ਸੁਖਵਿੰਦਰ ਅਮ੍ਰਿੰਤ, ਦਰਸ਼ਨ ਬੁਲੰਦਵੀ, ਜਸਵਿੰਦਰ, ਸੁਖਪਾਲ) ।

1. ਜੱਗੀ ,ਰਤਨਸਿੰਘ (ਡਾ.) ਸਾਹਿਤਦੇਰੂਪਪਬਲੀਕੇਸ਼ਨਬਿਊਰੋ ,ਪੰਜਾਬੀਯੂਨੀਵਰਸਿਟੀਪਟਿਆਲਾ।
2. ਪਾਜਾਬੀਸਾਹਿਤਦਾਇਤਿਹਾਸ (ਆਧੁਨਿਕਕਾਲ) ਭਾਸ਼ਾਵਿਭਾਗ ,ਪਟਿਆਲਾ।

ਵਿਸ਼ਾ: ਸਮਾਜ ਸ਼ਾਸਤਰ – II (Sociology –II)

ਸਮੈਸਟਰ – ਦੂਜਾ

Subject Code: BACSD1-218 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

COs	Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6
CO1	Articulate a sociological perspective. Apply sociological theories to understand social phenomena.		2	3			1
CO2	Critically evaluate explanations of human behavior and social phenomena.		2	2	1		1
CO3	Use sociological knowledge to inform policy debates and promote public understanding.			3	1	1	

ਯੂਨਿਟ – I (15 Hrs.)

- ਸਮਾਜਿਕ ਸਤਰੀਕਰਣ : ਅਰਥ, ਪਰਿਭਾਸ਼ਾ, ਕਾਰਜ, ਆਧਾਰ
- ਸਮਾਜਿਕ ਅਸਮਾਨਤਾਵਾਂ : ਅਰਥ, ਪਰਿਭਾਸ਼ਾ, ਆਧਾਰ

ਯੂਨਿਟ – II (15 Hrs.)

- ਕਾਰਲ ਮਾਰਕਸ : ਸੰਘਰਸ਼ ਦਾ ਸਿਧਾਂਤ
- ਮੈਕਸ ਵੈਬਰ : ਬਹੁ ਆਯਾਮੀ ਸਿਧਾਂਤ

ਯੂਨਿਟ – III (15 Hrs.)

- ਜਾਤ : ਅਰਥ, ਪਰਿਭਾਸ਼ਾ, ਵਿਸ਼ੇਸ਼ਤਾਵਾਂ
- ਜਮਾਤ : ਅਰਥ, ਪਰਿਭਾਸ਼ਾ, ਵਿਸ਼ੇਸ਼ਤਾਵਾਂ

ਯੂਨਿਟ – IV (15 Hrs.)

- ਸਮਾਜਿਕ ਗਤੀਸ਼ੀਲਤਾ : ਅਰਥ, ਕਾਰਨ, ਵਿਸ਼ੇਸ਼ਤਾਵਾਂ, ਕਿਸਮਾਂ

Recommended Books:

1. Ghurya G.S. (1983) : Cast, Class and occupation, Bombay Popular Prakashan
2. Bendix, RS Lipset, SM (1974) : Class, Status, Power, Social Stratification in comparative perspective, London, Routledge & Kegan Paul

Web Designing-II

Subject Code: BACSD1-219 L T P C Duration: 60 Hrs.

4 0 0 4

COs	Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6
CO1	Describe basic knowledge of DHTML and CSS			**3**		**2**	
CO2	Analyze the utility of different tools in web designing for different applications			**2**		**3**	
CO3	Students should be able to design and implement a basic website.	**1**		**3**		**3**	

UNIT - I

Introduction to DHTML: Basics of DHTML, difference between HTML & DHTML, Structure of an DHTML program, client-side script and server-side script.

UNIT - II

CSS: introduction to CSS3, ways to Insert CSS in HTML document (External Style Sheet, Internal Style Sheet, Inline Styles), CSS id and class, div and span tag.

UNIT - III

CSS background: background color, background image (repeat horizontally or vertically, set position and no-repeat)

CSS Text: text color, text alignment, text decoration

CSS Font: style, family, SizeCSS lists, CSS Links

UNIT - IV

CSS Tables: Table borders, collapse borders, table width and height, table text alignment, table padding, table color.

CSS border: style, width, color

CSS margin: margin, padding

Faculty members can take practical sessions during the lectures.

Recommended Books:

1. Kogent Learning Solutions Inc.," HTML 5 in simple steps", Dreamtech Press.

2. Murray, Tom/Lynchburg," Creating a Web Page and Web Site",2002.

3. Steven M. Schafer," HTML, XHTML, and CSS Bible, 5ed", Wiley India.

SEMESTER - III

ਪੰਜਾਬੀਲਾਜਮੀ - III

Subject Code: BACSS1-302 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

Course Outcomes:
CO1: To develop a bonding with the mother tongue of the student.
CO2: To gain knowledge and understanding of the rich folk and cultural heritage of Punjab.
CO3: Knowledge and understanding of the various intricacies of the grammar and literature of Punjabi.
CO4: The program connects the students to their roots.

COURSE ARTICULATION MATRIX

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3		3	3			2					
CO2	3		3	3			2		3	3		
CO3	3		3	3			2					
CO4	3		3	3			2		3	3		

ਪਾਠਕ੍ਰਮ

1. ਪੰਜਾਬੀਸੱਭਿਆਚਾਰਬਾਰੇਨਿਬੰਧਾਦਾਅਧਿਐਨ
2. ਚਿੱਠੀ_ਪੱਤਰ
3. ਵਿਆਕਰਨ : ਸਿਧਾਂਤਤੇਵਿਹਾਰ

ਯਨਿਟਅਤੇਥੀਮ

1. (ੳ) ‘ਪੰਜ _ ਆਬ, ਪੁਸਤਕਵਿੱਚੋਂਕਿਸੇਇਕਨਿਬੰਧਦਾਵਿਸ਼ਾਦੱਸਕੇਸਾਰਲਿਖਣਾ।
   (ਅ) ‘ਪੰਜ _ ਆਬ, ਪੁਸਤਕਵਿੱਚੋਸੰਖੇਪਉੱਤਰਾਂਵਾਲੇਪ੍ਰਸ਼ਨ।
2. ਚਿੱਠੀਪੱਤਰ (ਦਫ਼ਤਰੀ, ਵਪਾਰਕ, ਸਮਾਜਿਕ, ਸੱਭਿਆਚਾਰਕਮਸਲਿਆਂਬਾਰੇਸੰਪਾਦਕਨੂੰਪੱਤਰ।
3. ਵਿਆਕਰਨ : ਸਿਧਾਂਤਤੇਵਿਹਾਰ
   ਸ਼ਬਦਤੇਸ਼ਬਦਰਚਨਾ : ਪਰਿਭਾਸ਼ਾਤੇਵਰਗੀਕਰਨ
   ਭਾਵਅੰਸ਼ : ਬੰਦਤੇਖੁੱਲ੍ਹੇ

- ਕੋਰਸ

  ‘ਪੰਜ _ ਆਬ, ਪੁਸਤਕ (ਸੰਪਾਦਕ) ਪ੍ਰੋ. ਭੁਪਿੰਦਰਸਿੰਘਖਹਿਰਾ।

ਸਹਾਇਕਪੁਸਤਕਾਂ : 1. ਹਰਕੀਤਰਸਿੰਘ) ਡਾ (. ਕਾਲਜਪੰਜਾਬਵਿਆਕਰਨ ,
ਪੰਜਾਬਸਟੇਟਯੂਨੀਵਰਸਿਟੀਟੈਕਸਟਬੁੱਕਬੋਰਡ ,ਚੰਡੀਗੜ੍ਹ 1999।

2. ਜੱਸਲਕੰਵਲਜੀਤ ,ਪੰਜਾਬੀਵਿਆਕਰਨਦੇਕੁੱਝਪੱਖ ,ਰਵੀਸਾਹਿਤਪ੍ਰਕਾਸ਼ਨਹਾਲ ,ਬਾਜਾਰਅਮ੍ਰਿਤਸਰ
   2012 ।

GENERAL ENGLISH - III

Subject Code: BACSS1-301 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

Course Outcomes:
CO1: To demonstrate awareness of English language and literature in various contexts.
CO2: To get basic knowledge of the English grammar when they acquire their degree.
CO3: To communicate and present the ideas and use of sources accurately and efficiently.
CO4: To acquaint the students with cultural and behavioral approaches for global competence.

COURSE ARTICULATION MATRIX

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3		3	3			2					
CO2	3		3	3			2					
CO3	3		3	3			2					
CO4	3		3	3			2		3	3		

UNIT- 1 (Poetry) (15 Hrs.)

i.) Ode to autumn - John keats.
ii.) The road not taken - Robert frost.
iii.) Money madness – D.H. Lawrence.
iv.) I, Too - langston hughes.

UNIT -2 (prose) (15 Hrs.)

i.) On letter writing - A.G. Gardiner.
ii.) Not Just Oranges - Isai Tobolsky.
iii.) Film-making - Satyajit Ray.
iv.) Work brings solace – A.P.J. Abdul Kalam.

UNIT-3(15 Hrs.)

i.) Note – making (one out of two is to attempted).
ii.) Do as dissected (based on transformation of sentences).

UNIT- 4(15 Hrs.)

i.) Non- five verbs.
ii.) Punctuation (A short paragraph).

Test prescribed for 3,4 Semester English for empowerment, eds, G.Damoda. D.Venkateshwarlu, M.Narendra,M.Sarat Babu, G.M.Sundera valli,Hydranad; orient black swan,2009.

COMPUTER NETWORKS AND INTERNET APPLICATIONS

Subject Code: BACSS1-303 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

Course Outcomes:
CO1: The ability to understand analyze and develop computer program in the areas related to algorithms , system software , multimedia web design, application program , database , graphics and networking for efficient design of computer based system of varying complexities.
CO2: To inculcate knowledge on graphics and multimedia concepts.
CO3: To get sufficient knowledge on various system resources.
CO4: To support automation and digitization in all walks of life.

COURSE ARTICULATION MATRIX

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		3	3			2					2	2
CO2						2					3	2
CO3			3			2						
CO4						3					3	

UNIT-I(15 Hrs.)

Introduction: Internet and its working, Business use of Internet, Services offered by Internet, Evaluation of Internet, Internet Service Provider (ISP), Windows environment for dial up networking (connecting to Internet), Audio on Internet, Internet Addressing (DNS) and IP addresses).

ਜਾਣ-ਪਛਾਣ: ਇੰਟਰਨੈਟਅਤੇਇਸਦਾਕੰਮਕਾਜ, ਇੰਟਰਨੈਟਦੀਵਪਾਰਕਵਰਤੋਂ, ਇੰਟਰਨੈਟਦੁਆਰਾਪੇਸ਼ਕੀਤੀਆਂਜਾਂਦੀਆਂਸੇਵਾਵਾਂ, ਇੰਟਰਨੈਟਦਾਮੁਲਾਂਕਣ, ਇੰਟਰਨੈਟਸੇਵਾਪ੍ਰਦਾਤਾ (ISP), ਡਾਇਲਅੱਪਨੈਟਵਰਕਿੰਗ (ਇੰਟਰਨੈੱਟਨਾਲਜੁੜਨਾ), ਇੰਟਰਨੈਟਤੇਆਡੀਓ, ਇੰਟਰਨੈਟਐਡਰੈਸਿੰਗ (DNS) ਅਤੇ IP ਪਤੇ)।

UNIT-II(15 Hrs.)

Introduction to Computer networks and applications: Network Structure and Architecture, Network Hardware and Software (protocol hierarchies, design issues for layers, interfaces and services: connection oriented and connection less), Network structure and architecture-point to point, multicast, broadcast, Classification of networks on the basis of Geographical Span (PAN, LAN, MAN and WAN), LAN topologies (Bus, Ring, Star, Mesh, Tree and Hybrid). Network Connecting Devices: Repeaters, Hubs, Bridges, Routers, Gateways and Switches, Network Reference models: OSI model, TCP / IP model. Comparison between OSI and TCP/IP.

ਕੰਪਿਊਟਰਨੈੱਟਵਰਕਾਂਅਤੇਐਪਲੀਕੇਸ਼ਨਾਂਦੀਜਾਣ-ਪਛਾਣ: ਨੈੱਟਵਰਕਢਾਂਚਾਅਤੇਆਰਕੀਟੈਕਚਰ, ਨੈੱਟਵਰਕਹਾਰਡਵੇਅਰਅਤੇਸੌਫਟਵੇਅਰ (ਪ੍ਰੋਟੋਕੋਲਲੜੀ, ਲੇਅਰਾਂ, ਇੰਟਰਫੇਸਅਤੇਸੇਵਾਵਾਂਲਈਡਿਜ਼ਾਈਨਮੁੱਦੇ:

ਕੁਨੈਕਸ਼ਨਓਰੀਐਂਟਡਅਤੇਕੁਨੈਕਸ਼ਨਘੱਟ), ਨੈੱਟਵਰਕਬਣਤਰਅਤੇਆਰਕੀਟੈਕਚਰ,ਪੁਆਇੰਟਟੂਪੁਆਇੰਟ, ਮਲਟੀਕਾਸਟ, ਪ੍ਰਸਾਰਣ, ਵਰਗੀਕਰਨ।ਭੂਗੋਲਿਕਸਪੈਨ (PAN, LAN, MAN ਅਤੇ WAN), LAN ਟੌਪੋਲੋਜੀਜ਼ (ਬੱਸ, ਰਿੰਗ, ਸਟਾਰ, ਜਾਲ, ਰੁੱਖਅਤੇਹਾਈਬ੍ਰਿਡ) ਦੇਆਧਾਰ ,ਤੇਨੈੱਟਵਰਕਾਂਦਾ।ਨੈੱਟਵਰਕਕਨੈਕਟਕਰਨਵਾਲੇਯੰਤਰ: ਰੀਪੀਟਰ, ਹੱਬ, ਬ੍ਰਿਜ, ਰਾਊਟਰ, ਗੇਟਵੇਅਤੇਸਵਿੱਚ, ਨੈੱਟਵਰਕਰੈਫਰੈਂਸਮਾਡਲ: OSI ਮਾਡਲ, TCP/IP ਮਾਡਲ। OSI ਅਤੇ TCP/IP ਵਿਚਕਾਰਤੁਲਨਾ।

UNIT-III(15 Hrs.)

Internet Protocol - Introduction, File transfer protocol (FTP), Gopher, Telnet, other protocols like HTTP and TCP/IP.

Application Layer: World Wide Web (WWW), Domain Name System (DNS), E-mail, File Transfer Protocol (FTP), Introduction to Network security.

ਇੰਟਰਨੈੱਟਪ੍ਰੋਟੋਕੋਲ - ਜਾਣ-ਪਛਾਣ, ਫਾਈਲਟ੍ਰਾਂਸਫਰਪ੍ਰੋਟੋਕੋਲ (FTP), ਗੋਫਰ, ਟੇਲਨੈੱਟ, HTTP ਅਤੇ TCP/IP ਵਰਗੇਹੋਰਪ੍ਰੋਟੋਕੋਲ।

ਐਪਲੀਕੇਸ਼ਨਲੇਅਰ: ਵਰਲਡਵਾਈਡਵੈੱਬ (WWW), ਡੋਮੇਨਨੇਮਸਿਸਟਮ (DNS), ਈ-ਮੇਲ, ਫਾਈਲਟ੍ਰਾਂਸਫਰਪ੍ਰੋਟੋਕੋਲ (FTP), ਨੈੱਟਵਰਕਸੁਰੱਖਿਆਦੀਜਾਣ-ਪਛਾਣ।

UNIT-IV(15 Hrs.)

Search Engine: About search engine, Component of search engine, working of search engine, Difference between search engine and web directory.

Intranet and Extranet - Introduction, Application of Intranet, Business value of Intranet, working of Intranet, Role of Extranet, working of Extranet, Difference between Intranet and Extranet.

ਖੋਜਇੰਜਣ: ਖੋਜਇੰਜਣਬਾਰੇ, ਖੋਜਇੰਜਣਦਾਹਿੱਸਾ, ਖੋਜਇੰਜਣਦਾਕੰਮ, ਖੋਜਇੰਜਣਅਤੇਵੈਬਡਾਇਰੈਕਟਰੀਵਿੱਚਅੰਤਰ।

ਇੰਟ੍ਰਾਨੈੱਟਅਤੇਐਕਸਟ੍ਰਾਨੈੱਟ - ਜਾਣ-ਪਛਾਣ, ਇੰਟ੍ਰਾਨੈੱਟਦੀਵਰਤੋਂ, ਇੰਟ੍ਰਾਨੈੱਟਦਾਵਪਾਰਕਮੁੱਲ, ਇੰਟ੍ਰਾਨੈੱਟਦਾਕੰਮਕਰਨਾ, ਐਕਸਟ੍ਰਾਨੈੱਟਦੀਭੂਮਿਕਾ, ਐਕਸਟ੍ਰਾਨੈੱਟਦਾਕੰਮਕਰਨਾ, ਇੰਟ੍ਰਾਨੈੱਟਅਤੇਐਕਸਟ੍ਰਾਨੈੱਟਵਿਚਕਾਰਅੰਤਰ।

HISTORY - III

Subject Code: BACSD1-311 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

Course Outcomes:
CO1: To identify and analyze contemporary issues and concerns and find solutions.
CO2: To develop the ability of critical and logical thinking, select relevant facts , establish relationships and draw inferences and conclusions .
CO3: Acquaint with range of issues related to Indian history that span distinct eras.
CO4: Think and argue historically and critically in writing and discussion.

COURSE ARTICULATION MATRIX

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1					3		3	1	2			
CO2							3	3	3			
CO3									3			
CO4	3		3					2				

UNIT – I(15 Hrs.)

Foundation of Muslim Rule in India-Invention of Mehmud Ghaznavi and Mohammad Ghori, Establishment of Delhi Sutanate, Rise and Growth of The Khilji's, Tuqhlaq Dyansty, Vijay Nagar Empire.

ਭਾਰਤਵਿੱਚਮੁਸਲਿਮਸ਼ਾਸਨਦੀਸਥਾਪਨਾ ,ਖਿਲਜੀਵੰਸ਼ ,ਤੁਗਲਕਵੰਸ਼ ,ਵਿਜੇਨਗਰਸਾਮਰਾਜ

UNIT – II(15 Hrs.)

Babar (1526-30 A.D.), Humayun (1530-40), (1555-56 A.D.), Shershah Suri, (1540-45 A.D.) Akbar The Great, (1556-1605 A.D.) Mughal Government.

ਬਾਬਰ 1526-30 ਈ ,.ਹੁਮਾਯੂੰ ,1530-40 ,1555-56 ਈ ,.ਸ਼ੇਰਸ਼ਾਹਸੂਰੀ) 1540-45 ਈ ,(.ਅਕਬਰਮਹਾਨ)1556-45 A.D.), ਮੁਗਲਸ਼ਾਸਨਵਿਵਸਥਾ।

UNIT – III(15 Hrs.)

Jahangir 1605-27 A.D., Shah Jahan 1627-58 A.D., Aurangazeb 1658-1707 A.D., Rise and Establishment of Maratha Power, Deccan Policy of Mughals.

ਜਹਾਂਗੀਰ 1605-27 ਈ ,ਸ਼ਾਹਜਹਾਂ 1627-58 ਈ ,.ਔਰੰਗਜੇਬ 1658-1707 ਈ ,.ਮਰਾਠਾਸ਼ਕਤੀਦੀਸਥਾਪਨਾ , ਮੁਗਲਾਂਦੀਆਂਉੱਤਰ_ਪੱਛਮੀਸੀਮਾਂਨੀਤੀ।

UNIT – IV(15 Hrs.)

Society and Economy in 16th and 17th CE Literature Art and Architecture under the Mughals, Bhakti Movement and Sufisim Rajputs and Religious Policies of the Mughals causes of decline of Mughal Empire.

16ਵੀ-17ਵੀਸਦੀਆਂਵਿੱਚਸਮਾਜਦੀਅਰਥਿਕਵਿਵਸਥਾਮੁਗਲਾਂਅਧੀਨਸਹਿਤਕਲਾਅਤੇਭਵਨਨਿਰਮਾਨਕਲਾ , ਭਾਰਤੀਅੰਦੋਲਨਅਤੇਸੂਫੀਮੱਤ ,ਮੁਗਲਸਮਰਾਟਾਦੀਆਂਰਾਜਪੂਤਅਤੇਧਾਰਮਿਕਨੀਤੀਆਂ , ਮੁਗਲਸਾਮਰਾਜਦੇਪਤਨਦੇਕਾਰਨ।

Books: -

History of Medieval India (From 1000 A.D. to 1750 A.D.)

ਮੱਧਕਾਲੀਨਭਾਰਤਦਾਇਤਿਹਾਸ) 1000 ਈ. ਤੋਂ 1750 ਈ.)

POLTICAL SCIENCE - III

Subject Code: BACSD1-312 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

Course Outcomes:

CO1: Get a comprehensive overview of polity and the various stages through which it evolved in the world.

CO2: Gain understanding of the intricacies of democratic system of the states and center level in India.

CO3: Get to know of the important notes and concepts of various political thinkers and philosophers of the world.

CO4: To observe and think critically of the politically events of the country and abroad.

COURSE ARTICULATION MATRIX

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1			3		2			2	1			
CO2			3		2			2				
CO3			3		2			2				
CO4					2			2				

UNIT – I (15 Hrs.)

- United Notices which Human Rights Provisions, Native and Characteristics of Human Rights Preamble of the Human Rights.
- Philosophy of the Declaration of Human Rights: Philosophy of Human Rights, classification of the Rights Included in Declaration.

UNIT – II (15 Hrs.)

- Environment - Meaning and Definition, forms of Environment, Types of Environment. Need of Environment Protection.
- Environment Protection is a Global Issue and Efforts Made at National level and efforts Made at International Level.

UNIT – III (15 Hrs.)

- Theories of Negative and Positive Liberty. Supporters of liberty Theory. Included positive and Negative and criticism of Positive Theory of liberty.
- Safeguard of liberty : Relationship between Authority to leave and liberty.

UNIT – IV (15 Hrs.)

- Meaning of Equality - Characteristics of Equality Definitions of Equality, Various Dimensions of Equality.
- Facts Responsible for the Growth of Negative Liberalism or Individualism
  - Main supporters of Negative liberalism. Criticisms of Negative liberalism,

MATHEMATICS (CALCULUS) – III

Subject Code: BACSD1-313 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

Course Outcomes:

CO1: Apply critical thinking skills to solve applied problems.
CO2: Use knowledge skill necessary for immediate employment and acceptance into a graduate program.
CO3: Apply mathematical concepts and principles to perform computation.
CO4: Maintain a core of mathematical and technical knowledge that is adoptable to changing technologies and provide a solid foundation for future learning.

COURSE ARTICULATION MATRIX

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1					2			2				3
CO2			2									3
CO3			3									3
CO4			2									3

UNIT-I(15 Hrs.)

Basic concept of limit and continuity, Properties of limit and classification of discontinuities, Properties of continuous functions, Differentiability and differentials, Successive differentiation and Leibnitz theorem, Derivatives of higher order, nth derivative of well-known functions.

UNIT-II(15 Hrs.)

Concavity, Convexity, Points of inflexion, Increasing and decreasing function, Asymptotes, Polar curves, Multiple points, Tracing of Cartesian curves, Idea of some well-known parametric and polar curves, Curvature of a curve at a point, Radius of curvature for Cartesian, Parametric, Polar forms, Centre of curvature.

UNIT-III(15 Hrs.)

Partial differentiation –Function of two variables, Partial derivatives of higher order, Homogeneous functions, Euler's theorem and its extension (with proof), Composite functions, Total derivative, Differentiation of implicit functions and composite functions, Jacobins and its properties.

UNIT IV(15 Hrs.)

Tangent plane and normal to a surface, Maxima and Minima of functions of two variables, working rule to find the extreme values of a function z= f (x, y), Lagrange's method of undetermined multipliers, Gradient, Curl and Divergence, Geometrical interpretation and basic properties, Directional Derivative

PHYSICAL EDUCATION - III

Subject Code: BACSD1-314 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

Course Outcomes:

CO1: To study the behavior of India and world physical education.
CO2: Learning how to resist unfavorable and working conditions, decreasing fatigue during professional activities and raising the quality of results.
CO3: Fostering of motivational attitude to the physical education, healthy life style and regular exercising.
CO4: Learning the methods of self control while exercising.

COURSE ARTICULATION MATRIX

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1					2		3		3	1		
CO2			3		3		3			1		
CO3			3		3		3	1		3		
CO4			2				3					

(THEORY – 60)

UNIT – I(15 Hrs.)

- **Play** : Introduction, Theories and Importance.
- **Childhood Adolescence** : Growth and Development (Physical, Mental, Mental, Emotional & Social
- **Age and Sex Differences**: Introduction, Age & Sex differences, Structural difference Physiological differences and Gynecological differences.

UNIT – II(15 Hrs.)

- **Yoga**: Introduction, Aim, Importance and Types of Yoga.
- **Pranayam**: Meaning, Types, Objectives and its Importance.
- **Shudhi Kriyas** : Introduction, Types, Objectives and its Effects.

UNIT – III(15 Hrs.)

- **Physiology of Asanas** : Effective on various system of body.
- **Endocrine System**: Introduction, Glands, Location & Functions.
- **Excretory System**: Introduction, Organs, Structure and Functions.

UNIT – IV(15 Hrs.)

- **Asanas** : Introduction, Importance, Types and Techniques of Padamasana, Vajrasana, Sukhasana, Shavasana, Makarasana, Halasna, Mayurasna and Chakrasna.
- **Kabaddi (National style)** : History, Layout, General Rules and Regulations, Officials, Major Tournaments and Arjuna Awardees.
- **Shot put** : Rules, Layout and Techniques.

PRACTICAL (40 MARKS)

KABADDI, YOGA AND SHOT PUT

Evaluation will be based on skill test, Performance, Practical file and Viva Voce.

ELECTIVE ENGLISH - III

Subject Code: BACSD1-315 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

Course Outcomes:
CO1: Students are encouraged and enabled to read various types of text on their own and discuss them among peers.
CO2: Students can develop their linguistic and pragmatic competence for learning.
CO3: Students are introduced to the grammatical properties in order to enable them to write and speak English consciously.
CO4: Students are introduced to appropriate literary strategies to read literature.

COURSE ARTICULATION MATRIX

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3		3	3			2					
CO2	3		2	2			2					
CO3	3		2	3			2					
CO4	3		2	3			2					

UNIT – I (15 Hrs.)

- Literally Terms :Drama, Myth of Dionysus, Liturgical Drama, Miracle plays Mystery Plays, Interlude, Mimesis catharsis, Tragic Hero, organic unity, Revenge Tragedy, Poetic Drama, Verse Drama, Myth & Drama, Ritual & Drama, Yaksyana Theory. Indian theory of Drama, Puppelty, Ardharishwara

UNIT – II (15 Hrs.)

- . W. Shakespheare - The Merchant of Venice.

UNIT – III (15 Hrs.)

- Grammar
  (a) Dialogue writing (Based on a descriptive Passage of 300-400 words)
  (b) Identify figures of speech in Sentences (Unseen) Simite, Metaphor, Alliteration, Assonance.

UNIT – IV (15 Hrs.)

- Grammar
  (a) Idioms and Pleases
  (b) One word substitution.
  (c) Comprehension. (un seen Passage)

ECONOMICS - III

Subject Code: BACSD1-316 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

Course Outcomes:

CO1: Developing the skill of data collection and use of sampling technique in research.
CO2: Developing the knowledge about theories of economic growth and development and issues of economic planning.
CO3: Understanding various issues of population, poverty, availability of resources and uses of Natural resources for sustainable development.
CO4: Developing research knowledge in economics.

COURSE ARTICULATION MATRIX

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1							2				1	3
CO2			3			1						
CO3				1	3				2			
CO4			3									

UNIT – I (15 Hrs.)

Introduction to public Finance: Nature, Scope, importance.
Public Expenditure: Meaning, Features, Importance Objectives, Principle of maximum social advantages, Wiseman peacock hypothesis causes for the recent growth of public expenditure in India.
Taxation: Meaning, Types of Tax, Classification of good Tax System.

UNIT – II (15 Hrs.)

Incidence and Impact of Taxation: Demand & Supply Theory.
Taxable capacity: Absolute & Relative capacity, Determinates of taxable capacity.
Public Debt: Meaning Types, Role, Methods of its redemption.
Deficit Financing: Meaning, Objectives, Limitation.

UNIT – III (15 Hrs.)

Pure Theory of International Trade: Classical Theories, the Theory of reciprocal Demand.
Trade: Concept, Meaning and Types.

UNIT – IV (15 Hrs.)

Exchange Rates: Meaning & its Determination, fixed v/s flexible rate of exchange.
IMF and IBRD: Meaning ,objectives working ,achievements

Reference Books:

(a) Sharma ,OP, Sarvjnik vit,Punajbi University Patiala.
(b) Bhatia H.L- Public finance, vikas publishing house Pvt Ltd.
(c) Public Finance & International Economics: TR Jain, Satpal Gupta.

ਪੰਜਾਬੀਇਲੈਕਟਿਵ - III

Subject Code: BACSD1-317 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

Course Outcomes:
CO1: To develop a bonding with the mother tongue of the student.
CO2: To gain knowledge and understanding of the rich folk and cultural heritage of Punjab.
CO3: Knowledge and understanding of the various intricacies of the grammar and literature of Punjabi.
CO4: The program connects the students to their roots.

COURSE ARTICULATION MATRIX

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3		1				1					
CO2			1	3			1		3	3		
CO3	3		2	3			1		2	2		
CO4			2						3	2		

ਪਾਠਕ੍ਰਮ

1. ਮੱਧਕਾਲਦੀਚੋਣਵੀਕਵਿਤਾ
2. ਪੰਜਾਬੀਸਾਹਿਤਦਾਇਤਿਹਾਸ : ਗੁਰਮਤਿਕਾਵਿ
3. ਭਾਸ਼ਾਵਿਗਿਆਨ

ਯੂਨਿਟਅਤੇਥੀਮ

1. (ੳ) ਮੱਧਕਾਲੀਪੰਜਾਬੀਕਾਵਿਰੰਗਪੁਸਤਕਵਿੱਚੋਂਪ੍ਰਸੰਗਸਹਿਤਵਿਆਖਿਆ।
   (ਅ) ਕਾਵਿਪੁਸਤਕਵਿੱਚੋਂਦਾਵਿਸ਼ਾ- ਵਸਤੂ।ਭਾਰਤੀਕਾਵਿਸ਼ਾਸ਼ਤਰ।
2. ਪੰਜਾਬੀਸਾਹਿਤਦਾਇਤਿਹਾਸ (ਗੁਰਮਤਿਕਾਵਿ) ਸੰਖੇਪਉਤਰਾਂਵਾਲੇਪ੍ਰਸ਼ਨ।
3. ਭਾਸ਼ਾਵਿਗਿਆਨ : ਟਕਸ਼ਾਲੀਭਾਸ਼ਾ, ਵਿਅਕਤੀਭਾਸ਼ਾ, ਅਪਭਾਸ਼ਾਗੁਪਤ, ਗੁਪਤਭਾਸ਼ਾ।

- ਕੋਰਸ

  ਮੱਧਕਾਲੀਪੰਜਾਬੀਕਾਵਿ-ਰੰਗ (ਸੰਪਾਦਕ) ਡਾ. ਯੋਗਰਾਜਅੰਗਰਿਸ਼ਨਿਰਧਾਰਤਕਵੀ (ਗੁਰੂਨਾਨਕਦੇਵਜੀ, ਗੁਰੂਅਰਜਨਦੇਵਜੀ, ਗੁਰੂਤੇਗਬਹਾਦਰਜੀ, ਗੁਰੂਗੋਬਿੰਦਸਿੰਘਜੀ)

ਸਹਾਇਕਪੁਸਤਕਾਂ:

1. ਪੰਜਾਬੀਸਾਹਿਤਦਾਇਤਿਹਾਸ (1701-1900), ਪੰਜਾਬਯੂਨੀਵਰਸਿਟੀਚੰਡੀਗੜ।
2. ਉਹੀ, ‹ਸਿਧਾਂਤਕਭਾਸ਼ਾਵਿਗਿਆਨ› ਮਦਾਨਪਬਲੀਕੇਸ਼ਨਜ਼ਪਟਿਆਲਾ 2002।

SEMESTER - IV

ਪੰਜਾਬੀਲਾਜਮੀ - IV

Subject Code: BACSS1-402 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

Course Outcomes:
CO1: To develop a bonding with the mother tongue of the student.
CO2: To gain knowledge and understanding of the rich folk and cultural heritage of Punjab.
CO3: Knowledge and understanding of the various intricacies of the grammar and literature of Punjabi.
CO4: The program connects the students to their roots.

COURSE ARTICULATION MATRIX

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3		3	3			2					
CO2	3		3	3			2		3	3		
CO3	3		3	3			2					
CO4	3		3	3			2		3	3		

ਪਾਠਕ੍ਰਮ

1 ਇਕਾਂਗੀ

2 ਪੰਜਾਬੀਦੀਆਂਉਪਭਾਸ਼ਾਵਾਂ

1. ਵਿਆਕਰਨ : ਸਿਧਾਂਤ

ਯਨਿਟਅਤੇਥੀਮ

1. (ੳ) ‹ਛੇਛੱਲਾਂ› ਇਕਾਂਗੀਸੰਗ੍ਰਹਿਦਾਵਿਸ਼ਾਸ਼ਾਰ।
   (ਅ) ‹ਛੇਛੱਲਾ› ਵਿੱਚੋਂਪਾਤਰਚਿਤਰਨਕਰਨਾ।
2. ਇਕਾਂਗੀਸੰਗ੍ਰਹਿਵਿੱਚੋਂਪ੍ਰਸ਼ਨ _ ਉੱਤਰ
3. ਪੰਜਾਬੀਦੀਆਂਉਪ _ ਭਾਸ਼ਾਵਾਂ (ਮਾਝੀ, ਮਲਵਈ, ਦੁਆਬੀ)
4. ਵਿਆਕਰਨ : ਵਿਕਾਰੀਤੇਅਵਿਕਾਰੀਸ਼ਬਦ, ਸਧਾਰਨ, ਸਮਾਸੀ, ਮਿਸ਼ਰਤ, ਸ਼ਬਦਜੋੜਾਂਦੇਨਾਮ।

- ਕੋਰਸ

ਛੇਛੱਲਾ) ਸੰਪਾਦਕ (ਡਾ. ਆਤਮਜੀਤਸਿੰਘ, ਪਬਲੀਕੇਸ਼ਨਬਿਊਰੋਇਕਾਂਗੀ।
ਸਹਾਇਕਪੁਸਤਕਾਂ : 1. ਹਰਕੀਤਰਸਿੰਘ) ਡਾ ,(. ਕਾਲਜਪੰਜਾਬੀਵਿਆਕਰਨ ,
ਪੰਜਾਬਸਟੇਟਯੂਨੀਵਰਸਿਟੀਟੈਕਸਟਬੁੱਕਬੋਰਡ, ਚੰਡੀਗੜ੍ਹ 1999।

2. ਬਰਾੜ, ਬੂਟਾਸਿੰਘ (ਡਾ.) ਸਿਧਾਂਤਕਭਾਸ਼ਾਵਿਗਿਆਨਅਤੇਵਿਹਾਰ, ਚੇਤਨਾਪ੍ਰਕਾਸ਼ਨਲੁਧਿਆਣਾ 2008।
3. ਜੱਸਲਕੰਵਲਜੀਤ, ਪੰਜਾਬੀਵਿਆਕਰਨਦੇਕੁੱਝਪੱਖ, ਰਵੀਸਾਹਿਤਪ੍ਰਕਾਸ਼ਨਹਾਲ, ਬਾਜਾਰਅਮ੍ਰਿਤਸਰ 2012।

GENERAL ENGLISH - IV

Subject Code: BACSS1-401 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

Course Outcomes:
CO1: To demonstrate awareness of English language and literature in various contexts.
CO2: To get basic knowledge of the English grammar when they acquire their degree.
CO3: To communicate and present the ideas and use of sources accurately and efficiently.
CO4: To acquaint the students with cultural and behavioral approaches for global competence.

COURSE ARTICULATION MATRIX

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3		3	3			2					
CO2	3		3	3			2					
CO3	3		3	3			2					
CO4	3		3	3			2		3	3		

UNIT- 1 (Poetry Section) (15 Hrs.)

i.) I will embrace only the sun - Tripuraneni srinivas.
ii.) Refugee mother and child - Chinua achebe.
iii.) This is a photograph of me - Margaret atwood.
iv.) I sit and look out - Walt Whitman.

UNIT -2 (Prose Section) (15 Hrs.)

i.) On shaking hands – A.G. Gardiner.
ii.) Freedom of the press – Shashi tharoor.
iii.) No man is an island – Minoo Masani.
iv.) A service of love – O henry.

UNIT- 3 (15 Hrs.)

i.) Repot writing.
ii.) Paragraph in 250 words.

UNIT – 4 (15 Hrs.)

i.) Using nouns as verbs or vice versa.
ii.) Dialogue writing.

Text prescribed: - English for empowerment.

MULTIMEDIA & ITS APPLICATIONS

Subject Code: BACSS1-403 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

Course Outcomes:
CO1: The ability to understand analyze and develop computer program in the areas related to algorithms , system software , multimedia web design, application program , database , graphics and networking for efficient design of computer based system of varying complexities.
CO2: To inculcate knowledge on graphics and multimedia concepts.
CO3: To get sufficient knowledge on various system resources.
CO4: To support automation and digitization in all walks of life.

COURSE ARTICULATION MATRIX

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		3	3			2					2	2
CO2						2					3	2
CO3			3			2						
CO4						3					3	

UNIT-I(15 Hrs.)

Introduction: Multimedia & its types, Hyper Media, Hyper Text, Multimedia system and its characteristics, challenges, desirable features, components and applications, Trends in Multimedia.

ਜਾਣ-ਪਛਾਣ: ਮਲਟੀਮੀਡੀਆਅਤੇਇਸਦੀਆਂਕਿਸਮਾਂ, ਹਾਈਪਰਮੀਡੀਆ, ਹਾਈਪਰਟੈਕਸਟ, ਮਲਟੀਮੀਡੀਆਸਿਸਟਮਅਤੇਇਸਦੀਆਂਵਿਸ਼ੇਸ਼ਤਾਵਾਂ, ਚੁਣੌਤੀਆਂ, ਲੋੜੀਂਦੀਆਂਵਿਸ਼ੇਸ਼ਤਾਵਾਂ, ਭਾਗਅਤੇਐਪਲੀਕੇਸ਼ਨ, ਮਲਟੀਮੀਡੀਆਵਿੱਚਰੁਝਾਨ।

UNIT-II(15 Hrs.)

Multimedia Technology: Multimedia systems technology, Multimedia Hardware devices, Multimedia Software devices, Multimedia Software development tools, Multimedia authoring tools, Multimedia standards for document architecture, Multimedia software for different media.

ਮਲਟੀਮੀਡੀਆਟੈਕਨਾਲੋਜੀ: ਮਲਟੀਮੀਡੀਆਸਿਸਟਮਤਕਨਾਲੋਜੀ, ਮਲਟੀਮੀਡੀਆਹਾਰਡਵੇਅਰਡਿਵਾਈਸ, ਮਲਟੀਮੀਡੀਆਸਾਫਟਵੇਅਰਡਿਵਾਈਸ, ਮਲਟੀਮੀਡੀਆਸਾਫਟਵੇਅਰਡਿਵੈਲਪਮੈਂਟਟੂਲ, ਮਲਟੀਮੀਡੀਆਆਥਰਿੰਗਟੂਲ, ਡੌਕੂਮੈਂਟਆਰਕੀਟੈਕਚਰਲਈਮਲਟੀਮੀਡੀਆਸਟੈਂਡਰਡ, ਵੱਖ-ਵੱਖਮੀਡੀਆਲਈਮਲਟੀਮੀਡੀਆਸਾਫਟਵੇਅਰ।

UNIT-III(15 Hrs.)

Storage Media: Magnetic and optical media RAID and RAID Levels, Compact Disks and DVDs and their standards, Multimedia servers.

Audio: Basics of Digital Audio, Applications of Digital Audio, Digitization of Sound, Sample Rates and bit size, Typical Audio Formats, Introduction to MIDI (Musical Instrument Digital Interface), Components of MIDI system, MIDI Hardware aspects, MIDI messages.

ਸਟੋਰੇਜ਼ਮੀਡੀਆ: ਚੁੰਬਕੀਅਤੇਆਪਟੀਕਲਮੀਡੀਆ RAID ਅਤੇ RAID ਪੱਧਰ, ਸੰਖੇਪਡਿਸਕਅਤੇ DVD ਅਤੇਉਹਨਾਂਦੇਮਿਆਰ, ਮਲਟੀਮੀਡੀਆਸਰਵਰ।

ਆਡੀਓ:ਡਿਜੀਟਲਆਡੀਓਦੀਆਂਮੂਲਗੱਲਾਂ, ਡਿਜੀਟਲਆਡੀਓਦੀਆਂਐਪਲੀਕੇਸ਼ਨਾਂ, ਧੁਨੀਦਾਡਿਜੀਟਾਈਜ਼ੇਸ਼ਨ, ਨਮੂਨਾਦਰਾਂਅਤੇਬਿੱਟਆਕਾਰ, ਆਮਆਡੀਓਫਾਰਮੈਟ, MIDI (ਸੰਗੀਤਸਾਧਨਡਿਜੀਟਲਇੰਟਰਫੇਸ) ਦੀਜਾਣ-ਪਛਾਣ, MIDI ਸਿਸਟਮਦੇਹਿੱਸੇ, MIDI ਹਾਰਡਵੇਅਰਪਹਿਲੂ, MIDI ਸੁਨੇਹੇ।

UNIT-IV(15 Hrs.)

Image and Graphics Compression: Color in Images, Types of Color Models, Graphic / Image File Format, TIFF, RIFF, BMP, PNG, PDF, Graphic / Image data, JPEG Compression, GIF Compression.

ਚਿੱਤਰਅਤੇਗ੍ਰਾਫਿਕਸਕੰਪਰੈਸ਼ਨ: ਚਿੱਤਰਾਂਵਿੱਚਰੰਗ, ਰੰਗਮਾਡਲਾਂਦੀਆਂਕਿਸਮਾਂ, ਗ੍ਰਾਫਿਕ / ਚਿੱਤਰਫਾਈਲਫਾਰਮੈਟ, TIFF, RIFF, BMP, PNG, PDF, ਗ੍ਰਾਫਿਕ / ਚਿੱਤਰਡੇਟਾ, JPEG ਕੰਪਰੈਸ਼ਨ, GIF ਕੰਪਰੈਸ਼ਨ।

HISTORY - IV

Subject Code: BACSD1-411 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

Course Outcomes:
CO1: To identify and analyze contemporary issues and concerns and find solutions.
CO2: To develop the ability of critical and logical thinking, select relevant facts , establish relationships and draw inferences and conclusions .
CO3: Acquaint with range of issues related to Indian history that span distinct eras.
CO4: Think and argue historically and critically in writing and discussion.

COURSE ARTICULATION MATRIX

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1					3		3	1	2			
CO2							3	3	3			
CO3									3			
CO4	3		3					2				

UNIT – I(15 Hrs.)

ਅਬਦੁਸਸਮਦਖਾਂ, ਜ਼ਕਰੀਆਂਖ਼ਾਂਅਤੇਮੀਰਮੰਨੂ, ਦਲਖ਼ਾਲਸਾਦਾਉੱਥਾਨਅਤੇਇਸਦੀਯੁੱਧਪ੍ਰਣਾਲੀ, ਮੁਗਲਾਂਅਧੀਨਪੰਜਾਬਦੀਸਮਾਜੀਕਅਤੇਆਰਥਿਕਅਵਸਥਾ।

Abdus Samad Khan, Zakariya Khan and Mir Mannu, Their relations with Sikhs, Rise of the Dal Khalsa and its mode of fighting social and economic conditions of the Punjab.

UNIT – II(15 Hrs.)

ਅਹਿਮਦਸ਼ਾਹਅਬਦਾਲੀਦੇਹਮਲੇ, ਸਿੱਖਮਿਸਲਾਂ, ਮਹਾਰਾਜਾਰਣਜੀਤਸਿੰਘਦਾਜੀਵਨਅਤੇਜਿੱਤਾ।

Invasion of Ahmad Shah Abdali, The Sikh Misls, Maharaja Ranjit Singh's Career and consquests.

UNIT – III(15 Hrs.)

ਐਗਲੋ-ਸਿੱਖਸੰਬੰਧ 1800-39 ਈ, ਰਣਜੀਤਸਿੰਘਦੇਅਫ਼ਗਾਨਿਸਤਾਨਨਾਲਸੰਬੰਧਅਤੇਉਸਦੀਉੱਤਰ-ਪੱਛਮੀਸੀਮਾਨੀਤੀ, ਮਹਾਰਾਜਾਰਣਜੀਤਸਿੰਘਦਾਸ਼ਾਸ਼ਨ।

Anglo-Sikh Relations 1800-39, Maharaja Ranjit Singh's Relations with Afghanistan and his N.W.F. Policy, Administration of Maharaja Ranjit Singh .

UNIT – IV(15 Hrs.)

ਮਹਾਰਾਜਾਰਣਜੀਤਸਿੰਘਦਾਆਚਰਨਅਤੇਸ਼ਖਸੀਅਤ, ਪਹਿਲਾਐਗਲੋਯੁੱਧ, ਦੂਸਰਾਐਗਲੋਸਿੱਖਯੁੱਧ।

Character and Personality of Maharaja Ranjit Singh First and Second Anglo Sikh War.

Books: -
History of Punjab by Prof. Manjeet Singh Sodhi.

POLTICAL SCIENCE - IV

Subject Code: BACSD1-412 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

Course Outcomes:
CO1: Get a comprehensive overview of polity and the various stages through which it evolved in the world.
CO2: Gain understanding of the intricacies of democratic system of the states and center level in India.
CO3: Get to know of the important notes and concepts of various political thinkers and philosophers of the world.
CO4: To observe and think critically of the politically events of the country and abroad.

COURSE ARTICULATION MATRIX

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1			3		2			2	1			
CO2			3		2			2				
CO3			3		2			2				
CO4					2			2				

UNIT – I (15 Hrs.)

- **Social change :·** Meaning and definitions,characteristic of social change implication and modes of social change and ,factors of social change
- Theories of social change and hindrances of social change

UNIT – II (15 Hrs.)

- **Democracy :·** Meaning, characteristics of democracy definitions and venous aspects of democracy kinds of democracy
- Merits and demerits of democracy

→ Necessary conditions for the success of democracy
→ Theory of democracy, liberal and elitist
→ Explanation of elitist theory of democracy

UNIT – III (15 Hrs.)

- Marxist theory of democracy capitalist democracy, dictatorship of the proletariat socialist democracy
- Critical evaluation of the Marxian concept of the democracy.
- Difference between liberal democracy and Marxian democracy.

UNIT – IV (15 Hrs.)

- Meaning of comparative government, meaning of comparative politics differences between comparative government comparative politics.
- Nature and politics characteristics of comparative government and politics, scope and utility of comparative government and politics.

MATHEMATICS (ANALYTICAL GEOMETRY) - IV

Subject Code: BACSD1-413 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

Course Outcomes:

CO1: Apply critical thinking skills to solve applied problems.
CO2: Use knowledge skill necessary for immediate employment and acceptance into a graduate program.
CO3: Apply mathematical concepts and principles to perform computation.
CO4: Maintain a core of mathematical and technical knowledge that is adoptable to changing technologies and provide a solid foundation for future learning.

COURSE ARTICULATION MATRIX

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1					2			2				3
CO2			2									3
CO3			3									3
CO4			2									3

UNIT – I (15 Hrs.)

Transformation of axes, Shifting of origin, Rotation of axes, Reduction of the second degree equation into standard for ms by transformation of co -ordinates, Intersection of three planes, Condition for three planes to intersect in a point or along a line or to for m a prism.

UNIT-II(15 Hrs.)

Co ne with a vertex at the origin as the graph of homogeneous equation of second degree in x, y, z, Cone as a surface generated by a line passing through a fixed curve and fixed point outside the plane of the curve, Right circular and elliptic cones.

UNIT-III(15 Hrs.)

Cylinder as surface generated by a line moving parallel to a fixed line and through fixed curve. Different kinds of cylinders such as right circular, elliptic, hyperbolic and parabolic in standard forms.

UNIT-IV(15 Hrs.)

Sphere, Section of a sphere b y a plane, Spheres of a given circle, Intersection of a line and a sphere, Tangent line, Tangent plane, Power of a point w.r.t. a sphere, Radical planes.

PHYSICAL EDUCATION - IV

Subject Code: BACSD1-414 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

Course Outcomes:

CO1: To study the behavior of India and world physical education.

CO2: Learning how to resist unfavorable and working conditions, decreasing fatigue during professional activities and raising the quality of results.

CO3: Fostering of motivational attitude to the physical education, healthy life style and regular exercising.

CO4: Learning the methods of self control while exercising.

COURSE ARTICULATION MATRIX

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1					2		3		3	1		
CO2			3		3		3			1		
CO3			3		3		3	1		3		
CO4			2				3					

(TEHEORY – 60 MARKS)

UNIT – I(15 Hrs.)

- **Sports Psychology**: Introduction, Importance.
- **Learning:** Meaning, Laws of Learning and their Implication in Sports.
- **Transfer of Training** : Types and its application in Sports.

UNIT – II(15 Hrs.)

- **Motivation** : Introduction, Types, Methods of Motivation and its Importance in Physical Education and Sports
- **Personality** : Introduction, Types and Characteristics of Personality
- **First Aid** : Introduction, Principles, Qualities of First Aider, Process of Providing First Aid during different Calamity (Burns, Electric Shock, Heat Stroke, Drowning).

UNIT – III(15 Hrs.)

- **Muscles**: Structural and Function Classification of Muscles
- **Circulatory System** : Structure and Function of heart.
- **Sports Injuries** : Introduction, Causes, Symptoms, Treatment and Prevention of (Sprain, Strain, Contusion, Dislocation and Fracture).

UNIT – IV(15 Hrs.)

- **High Jump** : Rules and Regulations, Layout and Techniques.
- **Discus Throw** : Rules and Regulations, Layout and Techniques.
- **Kho- Kho** : History, Layout, General Rules and Regulation, Officials, Major Tournaments.

PRACTICAL (40 MARKS)

KHO-KHO , HIGH JUMP AND DISCUS THROW

Evaluation will be based on skill test, Performance, Practical file and Viva Voce.

*********END********

References:

(c) Dr. Nishan Singh Deol (1980) : Text book of Physical Education & Sports. (AP Publishers, Jalandhar).

(d) *Singh Ajmer et al (2000) : Modern Text Book of Physical Education, Health and Sports",*
Kalyani Publishers, Ludhiana

ELECTIVE ENGLISH - IV

Subject Code: BACSD1-415 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

Course Outcomes:

CO1: Students are encouraged and enabled to read various types of text on their own and discuss them among peers.
CO2: Students can develop their linguistic and pragmatic competence for learning.
CO3: Students are introduced to the grammatical properties in order to enable them to write and speak English consciously.
CO4: Students are introduced to appropriate literary strategies to read literature.

COURSE ARTICULATION MATRIX

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3		3	3			2					
CO2	3		2	2			2					
CO3	3		2	3			2					
CO4	3		2	3			2					

UNIT – I (15 Hrs.)

- Literary Terms :Allegory, Allusion, Epic, Epithet, Hyperbole, Internal Rhyme, Rhyme Royal, Terza Rima, Metaphor, Metonymy, Medias Res, oxymoron , Mood, Tone, Personification, Stanza ,Satire Free Paragraph.

UNIT – II (15 Hrs.)

- Recommended test: An Anthology of English verse. Ed. Department of English; Deen Dyal Upadhayaya, Gorakhpur University ,New delhi : OUP 2004

Prescribed poems :

(a) John Donne : The Sun Rising
(b) Alexander Pope :From Essay on Man
(c) A Thing of Beauty : John keats
(d) Ring out, wild Bells : Alfred Tennyson.
(e) William Blake : The Tiger
(f) Tennyson : Ulysses.
(g) Browning : My Last Duchies.
(h) W.B Yeats : A Prayer from my daughter
(i) T.S Eliot. : Journey of the Magi
(j) William words worth – Tintern Abbey.

UNIT – III (15 Hrs.)

- Précis Writing
- Identify figure of speech (Unseen) Metonmy, Epithet, Oxymoron, Epigram

UNIT – IV (15 Hrs.)

- Choose the correct meaning of the word.

- Complete Incomplete sentences
- One word substitution.
- Comprehension (unseen Passage of 1000 words)

ECONOMICS - IV

Subject Code: BACSD1-416 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

Course Outcomes:

CO1: Developing the skill of data collection and use of sampling technique in research.
CO2: Developing the knowledge about theories of economic growth and development and issues of economic planning.
CO3: Understanding various issues of population, poverty, availability of resources and uses of Natural resources for sustainable development.
CO4: Developing research knowledge in economics.

COURSE ARTICULATION MATRIX

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1							2				1	3
CO2			3			1						
CO3				1	3				2			
CO4			3									

UNIT – I (15 Hrs.)

Quantitative Methods:
Elementary Idea of sets & Function: Simple and partial derivatives, differentiation of simple function - Polynomial & Exponential.

UNIT – II (15 Hrs.)

Matrices: Definition & Types, Operation – (Sum ,Difference ,Product & Transpose) Adjoin & Inverse matrix ,grammar's rule.
Measures of central Tendency: Mean Median partition values, mode, and measures of dispersion skewness.

UNIT – III (15 Hrs.)

Correlation: Karl Pearson's, Spearman's, Simple regression.
Interpolations: Meaning, Concept, Binomial, expansion method & Lagrange's method.

UNIT – IV (15 Hrs.)

Index Number: Concepts, utility of index number problems in construction of index numbers, Simple & weighted index number lapser's &fishers index number only.
Analysis of Time Series: Components of time series, importance, methods – Least square and moving average method.

Reference Books:

(a) Quantitative methods . Kalyani Publisher.
(b) Gupta S C – Fundamentals of statics Himalaya publishing house.
(c) Quantitative Techniques & Methods: TR Jain & SC Aggarwal.

ਪੰਜਾਬੀਇਲੈਕਟਿਵ - IV

Subject Code: BACSD1-417 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

Course Outcomes:
CO1: To develop a bonding with the mother tongue of the student.
CO2: To gain knowledge and understanding of the rich folk and cultural heritage of Punjab.
CO3: Knowledge and understanding of the various intricacies of the grammar and literature of Punjabi.
CO4: The program connects the students to their roots.

COURSE ARTICULATION MATRIX

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3		1				1					
CO2			1	3			1		3	3		
CO3	3		2	3			1		2	2		
CO4			2						3	2		

ਪਾਠਕ੍ਰਮ

1. ਮੱਧਕਾਲਦੀਚੋਣਵੀਕਵਿਤਾ
2. ਕਹਾਣੀਸੰਗ੍ਰਹਿ
3. ਪੰਜਾਬੀਸਾਹਿਤਦਾਇਤਿਹਾਸ
4. ਉਪਭਾਸ਼ਾਵਿਗਿਆਨ

ਯਨਿਟਅਤੇਥੀਮ

1. (ੳ) ਮੱਧਕਾਲੀਪੰਜਾਬੀਕਾਵਿਰੰਗਪੁਸਤਕਵਿੱਚੋਂਪ੍ਰਸੰਗਸਹਿਤਵਿਆਖਿਆ।
2. (ੳ) ਕਥਾਪ੍ਰਵਾਹਪੁਸਤਕਵਿੱਚੋਂਘਟਨਾਵਾਂ, ਥੀਮ, ਪਾਤਰਚਿਤਰਨ
3. ਕਾਵਿਸੰਗ੍ਰਹਿਅਤੇਕਹਾਣੀਸੰਗ੍ਰਹਿਵਿਚੋਂਲਘੂਉਤਰਾਂਵਾਲੇਪ੍ਰਸ਼ਨ।
4. ਪੰਜਾਬੀਸਾਹਿਤਦਾਇਤਿਹਾਸ _ ਕਿੱਸਾਕਾਵਿ।
5. ਉਪਭਾਸ਼ਾਵਿਗਿਆਨ : ਉਪਭਾਸ਼ਾਦੀਪਰਿਭਾਸ਼ਾ, ਭਾਸ਼ਾਅਤੇਉਪਭਾਸ਼ਾ।

- ਕੋਰਸ

1. ਮੱਧਕਾਲੀਪੰਜਾਬੀਕਾਵਿ_ਰੰਗ (ਸੰਪਾਦਕ) ਡਾ. ਯੋਗਰਾਜਅੰਗਰਿਸ਼।
2. ਕਥਾ _ ਪ੍ਰਵਾਹ (ਸੰਪਾਦਕ) ਸੁਰਿੰਦਰਕੁਮਾਰਦਵੇਸ਼ਵਰ।

ਸਹਾਇਕਪੁਸਤਕਾਂ:

1. ਈਸ਼ਰਸਿੰਘਤਾਂਘ, ਪੱਛਮੀਸਮੀਖਿਆਦੇਸਿਧਾਂਤਦੀਪਪ੍ਰਕਾਸ਼ਨ, ਅੰਬਾਲਾਸ਼ਹਿਰ।

2. ਡਾ. ਸੁਰਿੰਦਰਸਿੰਘਕੋਹਲੀ, ਪੰਜਾਬੀਸਾਹਿਤਦਾਇਤਿਹਾਸਪਬਲੀਕੇਸ਼ਨਬਿਊਰੋ, ਪੰਜਾਬਯੂਨੀਵਰਸਿਟੀ, ਚੰਡੀਗੜ।

SEMESTER - V

ਪੰਜਾਬੀਲਾਜਮੀ _ V

Subject Code: BACSS1-502 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

Course Outcomes:
CO1: To develop a bonding with the mother tongue of the student.
CO2: To gain knowledge and understanding of the rich folk and cultural heritage of Punjab.
CO3: Knowledge and understanding of the various intricacies of the grammar and literature of Punjabi.
CO4: The program connects the students to their roots.

COURSE ARTICULATION MATRIX

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3		3	3			2					
CO2	3		3	3			2		3	3		
CO3	3		3	3			2					
CO4	3		3	3			2		3	3		

ਪਾਠਕ੍ਰਮ

1. ਮੱਧਕਾਲੀਨਪੰਜਾਬੀਕਾਵਿਦਾਅਧਿਐਨ
2. ਪੈਰਾਰਚਨਾ
3. ਲਿਪੀ

ਯਨਿਟਅਤੇਥੀਮ

1. (ੳ) ਮੱਧਕਾਲੀਨਪੰਜਾਬੀਕਾਵਿ _ ਸੁਰਾਂਪੁਸਤਕਵਿੱਚੋਂਕਵਿਤਾਦਾਸਾਰਤੇਕੇਂਦਰੀਭਾਵ।
   (ਅ) ਕਾਵਿਸੰਗ੍ਰਹੀਵਿੱਚੋਂਸੰਖੇਪਉੱਤਰਾਂਵਾਲੇਪ੍ਰਸ਼ਨ _ ਉੱਤਰ।
2. ਪੈਰ੍ਹਾਰਚਨਾ (ਲਗਭਗ 250) ਸ਼ਬਦਾਵਿੱਚ।
3. ਲਿਪੀਦੀਮੁੱਢਲੀਜਾਣ _ ਪਛਾਣ, ਲਿਪੀਦੀਪਰਿਭਾਸ਼ਾਜਨਮਤੇਵਿਕਾਸ।

- ਕੋਰਸ

ਮੱਧਕਾਲੀਪੰਜਾਬੀਕਾਵਿਸੁਰਾਂਪੁਸਤਕਡਾ. ਸੁਖਦੇਵਸਿਰਸਾਪਬਲਿਕੇਸ਼ਨਬਿਊਰੋ।

ਸਹਾਇਕਪੁਸਤਕਾਂ : 1. ਧਾਲੀਵਾਲ, ਪ੍ਰੇਮਸਿੰਘ) ਡਾ (. ਰੂਪਵਿਗਿਆਨਅਤੇਪੰਜਾਬੀਸ਼ਬਦਰਚਨਾ, ਮਦਾਨਪਬਲੀਕੇਸ਼ਨਜ਼ਪੰਜਾਬੀਯੂਨੀਵਰਸਿਟੀਪਟਿਆਲਾ 2002।

2. ਜੱਸਲਕੰਵਲਜੀਤ, ਪੰਜਾਬੀਵਿਆਕਰਨਦੇਕੁੱਝਪੱਖ, ਰਵੀਸਾਹਿਤਪ੍ਰਕਾਸ਼ਨਹਾਲ, ਬਾਜਾਰਅਮ੍ਰਿਤਸਰ 2012।

GENERAL ENGLISH - V

Subject Code: BACSS1-501 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

Course Outcomes:
CO1: To demonstrate awareness of English language and literature in various contexts.
CO2: To get basic knowledge of the English grammar when they acquire their degree.
CO3: To communicate and present the ideas and use of sources accurately and efficiently.
CO4: To acquaint the students with cultural and behavioral approaches for global competence.

COURSE ARTICULATION MATRIX

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3		3	3			2					
CO2	3		3	3			2					
CO3	3		3	3			2					
CO4	3		3	3			2		3	3		

UNIT -1 (15 Hrs.)

I.) Arms and the man – G.B. Shaw.

UNIT -2 (15 Hrs.)

i.) Freedom at midnight - Larry collins & Dominique lapierre.
ii.) Driving miss daisy - Alfred uhry.
iii.) Ulysses - Alfred lord Tennyson.

UNIT -3 (15 Hrs.)

i.) Our urgent need for self esteem - Nathaniel branden.
ii.) Kalahandi - Junagarh Prasad das.
iii.) Corruption→causes, consequences and agenda for further research - Paolo Mauro.

UNIT- 4 (Grammer) (15 Hrs.)

i.) Antonyms.
ii.) One word substitution.
iii.) Precis writing.

Test prescribed for sem-5,6
Insights a course in english literature and language - K. Elango.

SOFTWARE ENGINEERING

Subject Code: BACSS1-503 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

Course Outcomes:

CO1: The ability to understand analyze and develop computer program in the areas related to algorithms , system software , multimedia web design, application program , database , graphics and networking for efficient design of computer based system of varying complexities.
CO2: To inculcate knowledge on graphics and multimedia concepts.
CO3: To get sufficient knowledge on various system resources.
CO4: To support automation and digitization in all walks of life.

COURSE ARTICULATION MATRIX

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		3	3			2					2	2
CO2						2					3	2
CO3			3			2						
CO4						3					3	

UNIT-I(15 Hrs.)

Introduction: Software crisis, Myths, Software Processes, Software Life Cycle Models: Waterfall, Prototype, Evolutionary, Spiral and Agile Models.

ਜਾਣ-ਪਛਾਣ: ਸਾਫਟਵੇਅਰਸੰਕਟ, ਮਿੱਥ, ਸਾਫਟਵੇਅਰਪ੍ਰਕਿਰਿਆਵਾਂ, ਸਾਫਟਵੇਅਰਲਾਈਫਸਾਈਕਲਮਾਡਲ: ਵਾਟਰਫਾਲ, ਪ੍ਰੋਟੋਟਾਈਪ, ਈਵੇਲੂਸ਼ਨਰੀ, ਸਪਿਰਲਅਤੇਐਗਾਇਲਮਾਡਲ।

UNIT-II(15 Hrs.)

Software Requirements Analysis & Specifications: Requirement Engineering, Requirement Analysis using DFD, Data Dictionaries, Requirement Documentation, Nature of SRS, Characteristics and Organization of SRS.

ਸੌਫਟਵੇਅਰਲੋੜਾਂਦਾਵਿਸ਼ਲੇਸ਼ਣਅਤੇਵਿਵਰਣ: ਲੋੜਇੰਜੀਨੀਅਰਿੰਗ, DFD ਦੀਵਰਤੋਂਕਰਦੇਹੋਏਲੋੜਾਂਦਾਵਿਸ਼ਲੇਸ਼ਣ, ਡੇਟਾਡਿਕਸ਼ਨਰੀਆਂ, ਲੋੜਾਂਦੇਦਸਤਾਵੇਜ਼, SRS ਦੀਪ੍ਰਕਿਰਤੀ, SRS ਦੀਆਂਵਿਸ਼ੇਸ਼ਤਾਵਾਂਅਤੇਸੰਗਠਨ।

UNIT-III(15 Hrs.)

Software Testing: Testing Process, **White Box Testing:** Basic Path, Control Structure, **Black Box Testing:** Graph Based Testing Models, Equivalence Partitioning Functional, Unit

Testing, Integration Testing and System Testing.

ਸੌਫਟਵੇਅਰਟੈਸਟਿੰਗ. ਟੈਸਟਿੰਗਪ੍ਰਕਿਰਿਆ, ਵ੍ਹਾਈਟਬਾਕਸਟੈਸਟਿੰਗ. ਬੇਸਿਕਪਾਥ, ਕੰਟਰੋਲਸਟ੍ਰਕਚਰ, ਬਲੈਕ**ਬਾਕਸਟੈਸਟਿੰਗ**. ਗ੍ਰਾਫਬੇਸਡਟੈਸਟਿੰਗਮਾਡਲ, ਸਮਾਨਤਾਵਿਭਾਗੀਕਰਨਫੰਕਸ਼ਨਲ, ਯੂਨਿਟਟੈਸਟਿੰਗ, ਏਕੀਕਰਣਟੈਸਟਿੰਗਅਤੇਸਿਸਟਮਟੈਸਟਿੰਗ।

UNIT-IV(15 Hrs.)

Software Maintenance : Management of Maintenance, Maintenance Process, Reverse Engineering, Software re-engineering, Configuration Management.

ਸਾਫਟਵੇਅਰਮੇਨਟੇਨੈਂਸ. ਮੇਨਟੇਨੈਂਸਦਾਪ੍ਰਬੰਧਨ, ਮੇਨਟੇਨੈਂਸਪ੍ਰਕਿਰਿਆ, ਰਿਵਰਸਇੰਜੀਨੀਅਰਿੰਗ, ਸਾਫਟਵੇਅਰਰੀ-ਇੰਜੀਨੀਅਰਿੰਗ, ਕੌਂਫਿਗਰੇਸ਼ਨਮੈਨੇਜਮੈਂਟ।

HISTORY - V

Subject Code: BACSD1-511 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

Course Outcomes:
CO1: To identify and analyze contemporary issues and concerns and find solutions.
CO2: To develop the ability of critical and logical thinking, select relevant facts , establish relationships and draw inferences and conclusions.
CO3: Acquaint with range of issues related to Indian history that span distinct eras.
CO4: Think and argue historically and critically in writing and discussion.

COURSE ARTICULATION MATRIX

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1					3		3	1	2			
CO2							3	3	3			
CO3									3			
CO4	3		3					2				

UNIT – I(15 Hrs.)

Foundation of British Rule in India Battles Clive, Warren Hastings, Wellesley & Dalhousie, Feforms of Conwallis, Bentinck and Dalhousie.

ਭਰਤਵਿੱਚਬ੍ਰਿਟਿਸ਼ਸ਼ਾਸ਼ਨਦੀਨੀਂਹਪਲਾਸੀਅਤੇਬਕਸਰਦਾਯੁੱਧ, ਬ੍ਰਿਟਿਸ਼ਸਾਮਰਾਜਦਾਵਿਸਤਾਰ, ਕਲਾਈਵ, ਵਾਰਨਹੇਸਟਿੰਗਜ਼, ਵੈਲਜ਼ਲੀਅਤੇਡਲਹੋਜ, ਕਾਰਨਵਾਲਿਸ਼, ਬੈਟਿੰਗਅਤੇਡਲਹੌਜੀਵਿੱਚਸੁਧਾਰ।

UNIT – II(15 Hrs.)

The Great uprising of 1857, New Education system and Rise of Middle Class, Economic changes under the British Rule, Socio Cultural Movements.

1857 ਈ. ਦਾਮਹਾਨਵਿਦਰੋਹ, ਨਵੀਸਿਖਿਆਪ੍ਰਣਾਲੀਮੱਧਵਰਗਦਾਉੱਥਾ, ਬ੍ਰਿਟਿਸ਼ਸ਼ਾਸ਼ਨਦੇਅਧਿਨਆਰਥੀਕਪਰਿਵਰਤਨ, ਸਮਾਜਿਕਅਤੇਸੰਸਕ੍ਰਿਤੀਅਨਦੋਲਨ।

UNIT – III(15 Hrs.)

Depressed Classes Movement, Constitutional Development, Rise of Political Consciousness and Indian National Congress, National Movement, 1906-19.

ਦਲਿਤਵਰਗਦਾਅੰਦੋਲਨ, ਸੰਵਿਧਾਨਿਕਵਿਕਾਸਭਾਰਤਵਿੱਚਰਾਜਨੀਤਿਕਚੇਤਨਾਦਾਉਥਾਨਅਤੇਇੰਡੀਅਨਨੇਸ਼ਨਲਕਾਂਗਰਸ, ਰਾਸ਼ਟਰੀਅੰਦੋਲਨ, 1906-19 ਈ।

UNIT – IV(15 Hrs.)

Struggle for freedom, 1919-1947 A.D. Significant development after independence, salient features of the Indian Constitution, Problem of Rehabilitation after Independence.

Books: -
ਆਧੁਨਿਕਭਾਰਤਦਾਇਤਿਹਾਸ

History of Modern India (1707 A.D. to 1964 A.D.)
Writer:- S.P. Sabharwal

POLTICAL SCIENCE - V

Subject Code: BACSD1-512 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

Course Outcomes:

CO1: Get a comprehensive overview of polity and the various stages through which it evolved in the world.

CO2: Gain understanding of the intricacies of democratic system of the states and center level in India.

CO3: Get to know of the important notes and concepts of various political thinkers and philosophers of the world.

CO4: To observe and think critically of the politically events of the country and abroad.

COURSE ARTICULATION MATRIX

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1			3		2			2	1			
CO2			3		2			2				
CO3			3		2			2				
CO4					2			2				

UNIT – I (15 Hrs.)

- Development of comparative method in the study of politics; Meaning and definitions of comparative method, Operational aspect of comparative method. Unity or Importance of comparative method.
- Various Aspects of British Political Thought and Tradition; Main Provisions of magnacarta.

UNIT – II (15 Hrs.)

1. Main sources of British constitution, salient features of British constitution
   - Rights of British Citizens.
   - The British Constitution is child of accident and Design.
   - Recent Constitutional Trends.

UNIT – III (15 Hrs.)

1. Conventions of British constitutions: Meaning and definitions of conventions.
   - Differences between conventions and law.
   - Classifications of the conventions.
   - Sanctions behind conventions.

2. Monarchy: Role and Functions.
   - Royal Privilages and immunities.
   - Differences between the king and the crown.
   - Sources of the powers of the king or crown.

- Powers and Functions of the Monarch.

UNIT – IV (15 Hrs.)

1. Parliamentary Government: (British Cabinet System)

- Meaning and Definition of Parliamentary Government.

- Salient features of the British Cabinet System.
- Origin and Development of British Cabinet.
- Appointment of Ministers.

2. Evolutions of American Political System:
    - Historical Evolutions of American Political System.
    - War of American Independence.
    - Causes Responsible for war.
    - Major Events of the war of American Independence.
-

MATHEMATICS (DIFFERENTIAL GEOMETRY) - V

Subject Code: BACSD1-513 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

Course Outcomes:

CO1: Apply critical thinking skills to solve applied problems.
CO2: Use knowledge skill necessary for immediate employment and acceptance into a graduate program.
CO3: Apply mathematical concepts and principles to perform computation.
CO4: Maintain a core of mathematical and technical knowledge that is adoptable to changing technologies and provide a solid foundation for future learning.

COURSE ARTICULATION MATRIX

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1					2			2				3
CO2			2									3
CO3			3									3
CO4			2									3

UNIT-I(15 Hrs.)

Curves in Space: Space curves, Path, Arc length, Tangent line, Contact of nth order of a curve and surface, Plane of curvature, Tangent plane at any point of the surface f(x ,y , z)=0.The Principal nor mal and bi-norm al, Definitions of curvature, Torsion and screw-curvature, Serret -Fernet Formulae, To find curvature and torsion of curve, Helices.

UNIT-II(15 Hrs.)

Intrinsic equations, Fundamental theorems for space curves, the circle of curvature, Osculating sphere, Behaviors of curve in the neighborhood of a point, Involute and Evolute.

UNIT-III(15 Hrs.)

Concept of a Surface and Fundamental Forms: Concept and Definition of a surface, Curvilinear equations of the curve on the surface, Para metric curves, Tangent plane and nor mal, First and Second Fundamental For m, Derivatives of N, Weingarten equations, Angle between parametric curves, Direction coefficients, Angle between an y two intersecting curves on the surface.

UNIT-IV(15 Hrs.)

Geodesics: Geodesics, Differential equation of geodesics, Normal property of geodesics, Geodesics curvature, Gauss bonnet theorem, Torsion of geodesics, Geodesics on Geodesics parallel.

PHYSICAL EDUCATION - V

Subject Code: BACSD1-514 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

Course Outcomes:

CO1: To study the behavior of India and world physical education.
CO2: Learning how to resist unfavorable and working conditions, decreasing fatigue during professional activities and raising the quality of results.
CO3: Fostering of motivational attitude to the physical education, healthy life style and regular exercising..
CO4: Learning the methods of self control while exercising.

COURSE ARTICULATION MATRIX

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1					2		3		3	1		
CO2			3		3		3			1		
CO3			3		3		3	1		3		
CO4			2				3					

(THEORY – 60 MARKS)

UNIT – I(15 Hrs.)

- **Recreation**: Introduction, Aims, Objectives, Types, Principles, Importance and Agencies
  providing Recreation, Camping: Introduction, Objectives, Importance, Types, and Layout of Campsite and Organization of Camps.
  Athletic Meet: Introduction, Planning, Organization and Importance.
- **Leadership**: Introduction, Importance, Types, Qualities and Responsibilities of Leader

UNIT – II(15 Hrs.)

- **Posture**: Introduction and Characteristics of Good Posture, Causes of Poor Posture corrections different postural positions (Walking, Standing, Sitting and Lying Postures)
- **Postural Deformities**: Introduction, Causes and Corrective Measures for Spinal
- **Deformities:** (Kyphosis, Lordosis and Scoliosis), Foot and Leg Deformities (Flat Foot, Knock Knee and Bow Legs).
- **Motion**: Introduction, Types, Laws of Motion and their application in i Sports & Games.

UNIT – III(15 Hrs.)

- **Respiratory System**: Introduction, Structure & Functions of Respiratory System
- **Blood pressure & Pulse Rate**: Introduction, and Technique of Measurement.
- **Physical Education as Profession**: Qualities of Physical Education Teachers. Career opportunities in Physical Education profession, courses offered and institutions available for Physical Education in India

UNIT – IV(15 Hrs.)

- **Handball**: History, Layout, General Rules and Regulation, Officials, Major tournaments Arjuna Awardees.
- **Badminton**: History, Layout, General Rules and Regulation, Officials, Major tournaments, Arjuna Awardees.
- **Javelin throw**: Rules and Regulations, Layout and Technique, Arjuna Awardees.

PRACTICAL (40 MARKS)
HANDBALL, BADMINTON AND JAVELIN THROW

Evaluation will be based on skill test, Performance, Practical file and Viva Voce.

ELECTIVE ENGLISH - V

Subject Code: BACSD1-515 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

Course Outcomes:

CO1: Students are encouraged and enabled to read various types of text on their own and discuss them among peers.
CO2: Students can develop their linguistic and pragmatic competence for learning.
CO3: Students are introduced to the grammatical properties in order to enable them to write and speak English consciously.
CO4: Students are introduced to appropriate literary strategies to read literature.

COURSE ARTICULATION MATRIX

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3		3	3			2					
CO2	3		2	2			2					
CO3	3		2	3			2					
CO4	3		2	3			2					

UNIT – I (15 Hrs.)

- Literary Terms: Literatures Indian Languages, Colonialism Post. Colonial, Multicultural society
  Orientalism Hybridity, Ideology, Gender, Race, Class, Nation, Importance of Translation In India (Methods of translation).

UNIT – II (15 Hrs.)

- Modern Indian Literature: Poems and Short stories Edited by the Dept of university of Delhi, OUP 2007, New Delhi.
- Jibanananda Das
  (a) Before Dying
  (b) Windy Night
  (c) I shall return to This Bengal.
- Sri-Sri.
  (a) Forward March
  (b) From some people Laugh, some people cry
- G.M. Mukti bodh
  (a) The void
  (b) So very far.

Short-stories

- Premchand : The Holy Panchayat
- RK Narayan : The MCC
- Sandat Hasan Manto : Toba Tek Singh
- Ambai - Squirrel

UNIT – III (15 Hrs.)

- Note Making (A Passage of about 1000 hundreds to be given for this Purposes)
- Comprehension. with ten multiple choice question.

UNIT – IV (15 Hrs.)

- One word substitution and then use it in sentences.

- Voice.

ECONOMICS - V

Subject Code: BACSD1-516 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

Course Outcomes:

CO1: Developing the skill of data collection and use of sampling technique in research.
CO2: Developing the knowledge about theories of economic growth and development and issues of economic planning.
CO3: Understanding various issues of population, poverty, availability of resources and uses of Natural resources for sustainable development.
CO4: Developing research knowledge in economics.

COURSE ARTICULATION MATRIX

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1							2				1	3
CO2			3			1						
CO3				1	3				2			
CO4			3									

UNIT – I (15 Hrs.)

Economic Growth & Development: Concept & Measurement main features of under developed economy.
Determinates of Economic Development:
Capital formation – Its source's Lewis Theory of Unlimited Supply of labour.

UNIT – II (15 Hrs.)

Classical Model of growth: One sector Neo classical model of growth, Solow model of growth.

UNIT – III (15 Hrs.)

Theory of big push: Strategic of economic development: Balanced vs UN Balanced growth, Rostov's Theory of stages of growth.

UNIT – IV (15 Hrs.)

Theory of planning in developing countries: Meaning need objective .Strategies problems of planning
Emerging Strategic – Export promotion and Import Substitution strategy.

Reference Books:

(a) Economics of development and planning – By R.C Agarwal
(b) TR Jain,Ashok Gupta & AS Sandhu.

ਪੰਜਾਬੀਇਲੈਕਟਿਵ _ V

Subject Code: BACSD1-517 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

Course Outcomes:
CO1: To develop a bonding with the mother tongue of the student.
CO2: To gain knowledge and understanding of the rich folk and cultural heritage of Punjab.
CO3: Knowledge and understanding of the various intricacies of the grammar and literature of Punjabi.
CO4: The program connects the students to their roots.

COURSE ARTICULATION MATRIX

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3		1				1					
CO2			1	3			1		3	3		
CO3	3		2	3			1		2	2		
CO4			2						3	2		

ਪਾਠਕ੍ਰਮ

1. ਪੁਰਾਤਨਪੰਜਾਬੀਕਾਵਿ
2. ਪੰਜਾਬੀਸਾਹਿਤਦਾਇਤਿਹਾਸ
3. ਭਾਰਤੀਕਾਵਿਸ਼ਾਸ਼ਤਰ
4. ਸਾਹਿਤਦੇਰੂਪ

ਯਨਿਟਅਤੇਥੀਮ

1. (ਓ) ਮੱਧਕਾਲਅਤੇਮੁੱਢਲੇਬਸਤੀਵਾਦੀਕਾਲਦੀਪੰਜਾਬੀਕਵਿਤਾਪੁਸਤਕਵਿੱਚੋਂਪ੍ਰਸੰਗਸਹਿਤਵਿਆਖਿਆ (ਦੋਵਿੱਚੋਇੱਕ)
   (ਅ) ਕਾਵਿ_ਪੁਸਤਕਵਿੱਚੋਂਕਵਿਤਾਦਾਵਿਸ਼ਾ_ਵਸਤੂ।
2. ਪੰਜਾਬੀਸਾਹਿਤਦਾਇਤਿਹਾਸ
   ਕਿਸਾਕਾਵਿਅਤੇਵਾਰਕਾਵਿਵਿੱਚੋਂਇਤਿਹਾਸਨਾਲਸੰਬੰਧਿਤ (ਸੰਖੇਪਉੱਤਰਾਂਵਾਲੇਪ੍ਰਸ਼ਨ)
3. ਭਾਰਤੀਕਾਵਿ _ ਸ਼ਾਸ਼ਤਰ _ ਰੀਤੀਸੰਪ੍ਰਦਾਇ
4. ਸਾਹਿਤਦੇਰੂਪ : ਜਨਮਸਾਖੀ, ਕਿੱਸਾ, ਵਾਰ

- ਕੋਰਸ

ਮੱਧਕਾਲੀਅਤੇਮੁੱਢਲੇਬਸਤੀਵਾਦੀਕਾਲਦੀਪੰਜਾਬੀਕਵਿਤਾ, ਡਾ. ਯੋਗਰਾਜਨਿਰਧਾਰਤਕਵੀ) ਵਾਰਿਸ਼ਸ਼ਾਹ, ਹਾਸ਼ਮਸ਼ਾਹ, ਅਹਮਦਯਾਰ, ਸ਼ਾਹਮੁਹੰਮਦ (

ਸਹਾਇਕਪੁਸਤਕਾਂ:

1. ਡਾ. ਗੋਪਾਲਸਿੰਘ, ਪੰਜਾਬੀਸਾਹਿਤਦਾਇਤਿਹਾਸ, ਪਲਬੀਕੇਸ਼ਨਬਿਊਰੋ, ਪੰਜਾਬਯੂਨੀਵਰਸਿਟੀਚੰਡੀਗੜ।
2. ਬਰਾੜ, ਬੂਟਾਸਿੰਘ (ਡਾ.) ਪੰਜਾਬੀਭਾਸ਼ਾਸ੍ਰੋਤਤੇਸਰੂਪ, ਵਾਰਿਸ਼ਸ਼ਾਹਫਾਉਡੇਸ਼ਨ, ਅਮ੍ਰਿਤਸਰ 2012।

SEMESTER - VI

ਪੰਜਾਬੀਲਾਜਮੀ - VI

Subject Code: BACSS1-602 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

Course Outcomes:
CO1: To develop a bonding with the mother tongue of the student.
CO2: To gain knowledge and understanding of the rich folk and cultural heritage of Punjab.
CO3: Knowledge and understanding of the various intricacies of the grammar and literature of Punjabi.
CO4: The program connects the students to their roots.

COURSE ARTICULATION MATRIX

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3		3	3			2					
CO2	3		3	3			2		3	3		
CO3	3		3	3			2					
CO4	3		3	3			2		3	3		

UNIT – I

1. ਨਾਵਲਦਾਅਧਿਐਨ
2. ਅਖ਼ਬਾਰਲਈਪ੍ਰੈਸਨੋਟ
3. ਗੁਰਮੁੱਖੀਲਿਪੀ
4. ਵਿਆਕਰਨ

UNIT – II

(ii) (ੳ) ਅਨੂਪਕੌਰਨਾਵਲਵਿਚੋਂਪ੍ਰਸੰਗਸਾਹਿਤਵਿਆਖਿਆ।

(ਅ) ਨਾਵਲਦਾਵਿਸ਼ਾਤੇਪਾਤਰਚਿਤਰਨਤੇਪ੍ਰਸ਼ਨਉੱਤਰ।

(iii) ਅਖ਼ਬਾਰਲਈਪ੍ਰੈਸਨੋਟ,
ਕਾਲਜਦੀਆਸਾਹਿਤਕਸੱਭਿਆਚਾਰਕਖੇਡਾਂਅਤੇਅਕਾਦਮਿਕਖੇਤਰਨਾਲਸੰਬੰਧਿਤਸਰਗਰਮੀਆਂਬਾਰੇ।ਲਗਭਗ 200 ਸ਼ਬਦਾਵਿੱਚ

(iv) ਗੁਰਮੁੱਖੀਲਿਪੀ : ਨਾਮਕਰਣ, ਗੁਰਮੁੱਖੀਲਿਪੀਦਾਪੰਜਾਬੀਭਾਸ਼ਾਲਈਅਨੁਕੂਲਤਾ।

(v) ਵਿਆਕਰਨ : ਵਾਕਤੇਉਪਵਾਕਦੀਪਰਿਭਾਸ਼ਾ, ਸਧਾਰਨ, ਸੰਯੁਕਤਤੇਮਿਸ਼ਰਤਵਾਕ

- ਕੋਰਸ

1. ਅਨੂਪਕੌਰ, ਹਰਨਾਮਦਾਸਸਹਿਗਈ, ਪੰਜਾਬਸਾਹਿਤਪ੍ਰਕਾਸ਼ਨਅਮ੍ਰਿਤਸਰ।

- ਸਹਾਇਕਪੁਸਤਕਾਂਵਿਆਕਰਨਲਈ : ਬਰਾੜ, ਬੂਟਾਸਿੰਘ (ਡਾ.)

2. ਜੱਸਲਕੰਵਰਜੀਤ, ਪੰਜਾਬੀਵਿਆਕਰਨਦੇਕੁਝਪੱਖ,
ਰਵੀਸਾਹਿਤਪ੍ਰਕਾਸ਼ਨਹਾਲਬਜਾਰਅਮ੍ਰਿਤਸਰ 2012

GENERAL ENGLISH - VI

Subject Code: BACSS1-601 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

Course Outcomes:

CO1: To demonstrate awareness of English language and literature in various contexts.
CO2: To get basic knowledge of the English grammar when they acquire their degree.
CO3: To communicate and present the ideas and use of sources accurately and efficiently.
CO4: To acquaint the students with cultural and behavioral approaches for global competence.

COURSE ARTICULATION MATRIX

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3		3	3			2					
CO2	3		3	3			2					
CO3	3		3	3			2					
CO4	3		3	3			2		3	3		

UNIT-1 (Novel) (15 Hrs.)

i.) The Guide – R.K. Narayan.

UNIT-2 (15 Hrs.)

i.) The diary of anne frank – Anne frank.
ii.) Because i couldn't stop for death - Emily Dickinson.
iii.) Swami and friends –R.K. Narayan.

UNIT-3(15 Hrs.)

i.) The sporting spirit – George orwell.
ii.) Building an internet culture – Philip agre.
iii.) Odds against us – Satyajit ray.

UNIT– 4(15 Hrs.)

i.) Writing business emails.
ii.) Comprehension of unseen passage.
iii.) Narration (direct to indirect),voice (active passive),transformation of sentences.

INTRODUCTION TO COMPUTER NETWORK AND INTERNET PROGRAMMING

Subject Code: BACSS1-603 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

Course Outcomes:

CO1: The ability to understand analyze and develop computer program in the areas related to algorithms , system software , multimedia web design, application program , database , graphics and networking for efficient design of computer based system of varying complexities.
CO2: To inculcate knowledge on graphics and multimedia concepts.
CO3: To get sufficient knowledge on various system resources.
CO4: To support automation and digitization in all walks of life.

COURSE ARTICULATION MATRIX

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		3	3			2					2	2
CO2						2					3	2
CO3			3			2						
CO4						3					3	

UNIT–I(15 Hrs.)

Computer Networks: Hardware, Software, users, goals and applications of computer networks.

Types of Network: LAN, MAN, WAN and value added networks and their features.

Transmission Media: Magnetic Media, trusted pair, coaxial cables, fibre optics, radio transmission, microwave transmission, infrared waves and Line of sight transmission, cellular radio and communication satellites.

ਕੰਪਿਊਟਰਨੈੱਟਵਰਕ: ਹਾਰਡਵੇਅਰ, ਸਾਫਟਵੇਅਰ, ਉਪਭੋਗਤਾ, ਟੀਚੇਅਤੇਕੰਪਿਊਟਰਨੈੱਟਵਰਕਾਂਦੇਐਪਲੀਕੇਸ਼ਨ।

ਨੈੱਟਵਰਕਦੀਆਂਕਿਸਮਾਂ: LAN, MAN, WAN ਅਤੇਵੈਲਯੂਐਡਿਡਨੈੱਟਵਰਕਅਤੇਉਹਨਾਂਦੀਆਂਵਿਸ਼ੇਸ਼ਤਾਵਾਂ।

ਟਰਾਂਸਮਿਸ਼ਨਮੀਡੀਆ: ਮੈਗਨੈਟਿਕਮੀਡੀਆ, ਭਰੋਸੇਯੋਗਜੋੜਾ, ਕੋਐਕਸ਼ੀਅਲਕੇਬਲ, ਫਾਈਬਰਆਪਟਿਕਸ, ਰੇਡੀਓਟ੍ਰਾਂਸਮਿਸ਼ਨ, ਮਾਈਕ੍ਰੋਵੇਵਟ੍ਰਾਂਸਮਿਸ਼ਨ, ਇਨਫਰਾਰੈੱਡਤਰੰਗਾਂਅਤੇਦ੍ਰਿਸ਼ਟੀਪ੍ਰਸਾਰਣਦੀਲਾਈਨ, ਸੈਲੂਲਰਰੇਡੀਓਅਤੇਸੰਚਾਰਉਪਗ੍ਰਹਿ।

UNIT–II(15 Hrs.)

Internet: Internet , its advantages and disadvantages, internet facilities through WWW and

HTML, Internet Protocols, TCP/IP, FTP, newsgroups, remote logins, chat groups etc.

WWW: The Client- side, the Server side, web browsers, web pages, locating information on the web.

E-Mail: Architecture, Various aspects, the user agent, message format, message transfer, E-Mail Privacy.

Network Security: Various threats, Preventions and solutions.

ਇੰਟਰਨੈਟ: ਇੰਟਰਨੈਟ, ਇਸਦੇਫਾਇਦੇਅਤੇਨੁਕਸਾਨ, WWW ਅਤੇ HTML ਦੁਆਰਾਇੰਟਰਨੈਟਸੁਵਿਧਾਵਾਂ, ਇੰਟਰਨੈਟਪ੍ਰੋਟੋਕੋਲ, TCP/IP, FTP, ਨਿਊਜ਼ਗਰੁੱਪ, ਰਿਮੋਟਲੌਗਿਨ, ਚੈਟਗਰੁੱਪਆਦਿ।

WWW: ਕਲਾਇੰਟ-ਸਾਈਡ, ਸਰਵਰਸਾਈਡ, ਵੈੱਬਬ੍ਰਾਊਜ਼ਰ, ਵੈਬਪੇਜ, ਵੈੱਬ ,ਤੇਜਾਣਕਾਰੀਦਾਪਤਾਲਗਾਉਣਾ।

ਈ-ਮੇਲ: ਆਰਕੀਟੈਕਚਰ, ਕਈਪਹਿਲੂ, ਉਪਭੋਗਤਾਏਜੰਟ, ਸੁਨੇਹਾਫਾਰਮੈਟ, ਸੁਨੇਹਾਟ੍ਰਾਂਸਫਰ, ਈ-ਮੇਲਗੋਪਨੀਯਤਾ। ਨੈੱਟਵਰਕਸੁਰੱਖਿਆ: ਕਈਖਤਰੇ, ਰੋਕਥਾਮਅਤੇਹੱਲ।

UNIT–III(15 Hrs.)

HTML: Intoduction to HTML, SGML, Internet and Web Structure of HTML document, starting an HTML document, Head element, body element, style element, Script element, Text formatting, Using lists to organize information.

Organising Data with Tables: Basic Table Structures, individual cells and headings vertical controls, database considerations, displaying real data with a table.

Table Layout and Presentation: Table syntax, two column layout, staggered body with an index, traditional newspaper layout.

HTML: HTML, SGML, HTML ਦਸਤਾਵੇਜ਼ਦੇਇੰਟਰਨੈਟਅਤੇਵੈੱਬਢਾਂਚੇਦੀਜਾਣ-ਪਛਾਣ, ਇੱਕ HTML ਦਸਤਾਵੇਜ਼ਸ਼ੁਰੂਕਰਨਾ, ਮੁੱਖਤੱਤ, ਸਰੀਰਤੱਤ, ਸ਼ੈਲੀਤੱਤ, ਸਕ੍ਰਿਪਟਤੱਤ, ਟੈਕਸਟਫਾਰਮੈਟਿੰਗ, ਜਾਣਕਾਰੀਨੂੰਸੰਗਠਿਤਕਰਨਲਈਸੂਚੀਆਂਦੀਵਰਤੋਂਕਰਨਾ।

ਟੇਬਲਾਂਦੇਨਾਲਡੇਟਾਨੂੰਸੰਗਠਿਤਕਰਨਾ: ਮੂਲਸਾਰਣੀਬਣਤਰ, ਵਿਅਕਤੀਗਤਸੈੱਲਅਤੇਸਿਰਲੇਖਲਂਬਕਾਰੀਨਿਯੰਤਰਣ, ਡੇਟਾਬੇਸਵਿਚਾਰ, ਇੱਕਸਾਰਣੀਦੇਨਾਲਅਸਲਡੇਟਾਪ੍ਰਦਰਸ਼ਿਤਕਰਨਾ।

ਟੇਬਲਲੇਆਉਟਅਤੇਪ੍ਰਸਤੁਤੀ: ਸਾਰਣੀਸੰਟੈਕਸ, ਦੋਕਾਲਮਲੇਆਉਟ, ਇੱਕਸੂਚਕਾਂਕਦੇਨਾਲਸਟਗਰਡਬਾਡੀ, ਰਵਾਇਤੀਅਖਬਾਰਲੇਆਉਟ।

UNIT–IV(15 Hrs.)

URLs: Absolute URLs, Relative URLs, fragment URLs, Types of URL schemes- HTTP, mailto, news, FTP, Telnet, File etc.

Using Hyper Links and Anchors: Uses to Hyper Links, Structure of Hyper links, links to specialised contents.

URLs: ਸੰਪੂਰਨ URL, ਸੰਬੰਧਿਤ URL, ਟੁਕੜੇ URL, URL ਸਕੀਮਾਂਦੀਆਂਕਿਸਮਾਂ - HTTP, mailto, ਖ਼ਬਰਾਂ, FTP, ਟੇਲਨੈੱਟ, ਫਾਈਲਆਦਿ।

ਹਾਈਪਰਲਿੰਕਸਅਤੇਐਂਕਰਸਦੀਵਰਤੋਂਕਰਨਾ: ਹਾਈਪਰਲਿੰਕਸਦੀਵਰਤੋਂ, ਹਾਈਪਰਲਿੰਕਸਦੀਬਣਤਰ, ਵਿਸ਼ੇਸ਼ਸਮੱਗਰੀਦੇਲਿੰਕ।

HUMAN VALUES AND PROFESSIONAL ETHICS

Subject Code: BACSS1-605 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

Course Outcomes:

CO1: Indentify ethical concerns in research and intellectual contexts, including academic

integrity, use & citation of sources and the objective presentation of data.

CO2: Proving value educations to the students.

CO3: Indentify the multiple ethical interests at a state in a real world situation or practice.

CO4: Understanding practically the importance of trust, mutually satisfying human behavior & enriching interaction with nature.

COURSE ARTICULATION MATRIX

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		2			2	2	3					
CO2							3		3			
CO3					3		2					
CO4		1					2		3			

UNIT-I(15 Hrs.)

CourseIntroduction-Need,BasicGuidelines,ContentandProcessforValueEducation

Understandingtheneed,basicguidelines,contentandprocessforValueEducation.Self-Exploration-whatisit?-itscontentandprocess;"NaturalAcceptance"andExperientialValidation- as the mechanism for self-exploration, Continuous Happiness and Prosperity- A lookat basic Human Aspirations Right understanding, Relationship and Physical Facilities- the basicrequirements for fulfillment of aspirations of every human being with their correct priority,Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenarioMethod to fulfill the above human aspirations: understanding and living in harmony at variouslevels

UNIT-II(15 Hrs.)

UnderstandingHarmonyin theHumanBeing -Harmonyin Myself!

Understandinghumanbeingasa co-existenceofthesentient"I" and thematerial"Body"Understandingthe needsofSelf("I") and"Body" -*Sukh*and *Suvidha*

Understandingthe Bodyasaninstrument of"I" (Ibeingthedoer,seer andenjoyer)Understandingthe characteristics and activitiesof"I"and harmonyin "I"

UnderstandingtheharmonyofIwiththeBody:*Sanyam*and*Swasthya*;correctappraisalofPhysicalneeds, meaningofProsperityin detail, Programsto ensure*Sanyam*and *Swasthya*

UnderstandingHarmonyintheFamilyandSociety-HarmonyinHuman-HumanRelationship:

Understanding harmony in the Family- the basic unit of human interaction; Understanding valuesinhuman-humanrelationship;meaningof*Nyaya*andprogramforitsfulfillmenttoensure*Ubhay-tripti*; Trust (*Vishwas)* and Respect (*Samman)* as the foundational values of relationship;Understandingthemeaningof*Vishwas*;Differencebetweenintentionandcompetenceunderstanding the meaning of *Samman*, Difference between respect and differentiation; the othersalient valuesin relationship.

UNIT-III(15 Hrs.)

Understanding the Harmony in the Society (Society Being an Extension of Family):*Samadhan,Samridhi,Abhay,Sah-astitva*ascomprehensiveHumanGoalsVisualizingauniversalharmonious order in

society- Undivided Society (*AkhandSamaj),* Universal Order(*SarvabhaumVyawastha)*-from familyto world family!

Understanding Harmony in the Nature and Existence - Whole existence as Co-existence: UnderstandingtheharmonyintheNature;Interconnectednessandmutualfulfillment amongthefourordersofnature-recyclabilityandself-regulationinnature;UnderstandingExistenceasCo-existence (*Sah-astitva*) ofmutuallyinteractingunitsinall-pervasive space;Holistic perceptionofharmonyat all levels ofexistence.

UNIT-IV(15 Hrs.)

Implications of the above Holistic Understanding of Harmony on Professional Ethics: NaturalacceptanceofhumanvaluesDefinitivenessofEthicalHumanConduct;Basisfor HumanisticEducation,HumanisticConstitutionandHumanisticUniversalOrder;Competence inprofessional ethics:

1. Abilitytoutilizetheprofessional competenceforaugmentinguniversal humanorder,
2. Abilitytoidentifythescopeandcharacteristicsofpeople-friendlyandeco-friendlyproductionsystems,
3. Abilitytoidentifyanddevelop appropriatetechnologiesandmanagementpatternsfor above
4. productionsystems;
5. Casestudiesoftypicalholistictechnologies,managementmodelsandproductionsystems;Strategyfortransition from thepresentstate to Universal Human Order:
6. Atthelevelofindividual:associallyandecologicallyresponsibleengineers,technologistsand managers
7. Atthelevel ofsociety: as mutuallyenrichinginstitutions andorganizations

RecommendedBooks:

1. R.R.Gaur,R.Sangal,G.P.Bagaria,'A FoundationCourseinValueEducation', **2009.**
2. IvanIllich,'Energy&Equity',TheTrinityPress,Worcester,andHarperCollins,USA, 1974.
3. E.F.Schumacher,'SmallisBeautiful:AStudyofEconomicsasifPeopleMattered',Blond& Briggs, Britain,**1973.**
4. A.Nagraj,'JeevanVidyaekParichay',DivyaPathSansthan,Amarkantak,**1998.**
5. SussanGeorge,'Howthe OtherHalfDie's,PenguinPress. Reprinted,**1986,1991.**
6. P.L.Dhar,R.R.Gaur,'ScienceandHumanism', CommonWealthPublishers,**1990**.
7. A.N.Tripathy,'Human Values',NewAgeInternationalPublishers,**2003.**
8. Subhas Palekar, 'How to Practice Natural Farming', Pracheen (Vaidik) Krishi Tantra Shodh,Amravati,**2000.**

HISTORY - VI

Subject Code: BACSD1-611 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

Course Outcomes:

CO1: To identify and analyze contemporary issues and concerns and find solutions.
CO2: To develop the ability of critical and logical thinking, select relevant facts , establish relationships and draw inferences and conclusions .
CO3: Acquaint with range of issues related to Indian history that span distinct eras.
CO4: Think and argue historically and critically in writing and discussion.

COURSE ARTICULATION MATRIX

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1					3		3	1	2			
CO2							3	3	3			
CO3									3			
CO4	3		3					2				

UNIT – I(15 Hrs.)

ਸ਼੍ਰੀਗੁਰੂਨਾਨਕਦੇਵਜੀਅਤੇਸ਼੍ਰੀਗੁਰੂਅੰਗਦਦੇਵਜੀ।

Sri Guru Nanak Dev Ji and Sri Guru Angand Dev Ji

UNIT – II(15 Hrs.)

ਸ਼੍ਰੀਗੁਰੂਅਮਰਦਾਸਜੀਅਤੇਸ਼੍ਰੀਗੁਰੂਰਾਮਦਾਸਜੀ।

Sri Guru Amar Das Ji and Sri Guru Ram Das Ji

UNIT – III(15 Hrs.)

ਸ਼੍ਰੀਗੁਰੂਅਰਜਨਦੇਵਜੀ ,ਸ਼੍ਰੀਗੁਰੂਹਰਗੋਬਿੰਦਜੀਅਤੇਸ਼੍ਰੀਗੁਰੂਹਰਿਰਾਏਜੀ।

Sri Guru Arjan Dev Ji, Sri Guru Hargobind Ji and Sri Guru Har Rai ji

UNIT – IV(15 Hrs.)

ਸ਼੍ਰੀਗੁਰੂਹਰਕ੍ਰਿਸ਼ਨਜੀ ,ਸ਼੍ਰੀਗੁਰੂਤੇਗਬਹਾਦਰਜੀਅਤੇਸ਼੍ਰੀਗੁਰੂਗੋਬਿੰਦਸਿੰਘਜੀ।

Sri Guru Har Krishan Ji, Sri Guru Tegbahadar Ji and Sri Guru Gobind Singh Ji

Books: -

ਸਿੱਖਗੁਰੂਆਂਦਾਇਤਿਹਾਸ

History of Sikh Guru

POLTICAL SCIENCE - VI

Subject Code: BACSD1-612 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

Course Outcomes:

CO1: Get a comprehensive overview of polity and the various stages through which it evolved in the world.

CO2: Gain understanding of the intricacies of democratic system of the states and center level in India.

CO3: Get to know of the important notes and concepts of various political thinkers and philosophers of the world.

CO4: To observe and think critically of the politically events of the country and abroad.

COURSE ARTICULATION MATRIX

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1			3		2			2	1			
CO2			3		2			2				
CO3			3		2			2				
CO4					2			2				

UNIT – I(15 Hrs.)

1. **International politics:·**
   →Meaning, nature and scope of international politics
   → Difference between international politics and international relations.
   →Nature and subject matter of international politics.
2. **International politics:·**
   →Realist and idealist approaches.
   → Nature of realist approach
   → Morgenthau realist theory Model.
   → Six principle ofmorgenthaus theory.
   → Criticism of morgenthau's theory

UNIT – II (15 Hrs.)

1. **Inealism or idealist approach:·**
   → Basicassumptions idealist approach.
   → Basic characteristics of idealist approach.
   → Suggestions for sowing international problems.
   → Critical evaluation of idealist approach.
   → Difference between realist and idealist approach.

UNIT – III(15 Hrs.)

1. **National Power:·**
   → Meaning and definition of power and national power.
   → Characteristics of national power.
   → Kids of forms of national power.
   → Methods of exerusing national power.
   → Components of national power.

UNIT – IV(15 Hrs.)

1. **Balance of power:·**
   → Meaning and definition of Balance of power.
   → **Natureof** balance of power.
   → Methods of balance of power.
   → Critical evaluation of balance of power.
2. **Collective security:·**
   → Definition of collective security.
   → Characteristics of collective security.
   → Collective security and Collective defense.
   → Similarity between collectivesecurity and balance of power.

MATHEMATICS (ANALYSIS) - IV

Subject Code: BACSD1-613 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

Course Outcomes:

CO1: Apply critical thinking skills to solve applied problems.
CO2: Use knowledge skill necessary for immediate employment and acceptance into a graduate program.
CO3: Apply mathematical concepts and principles to perform computation.
CO4: Maintain a core of mathematical and technical knowledge that is adoptable to changing technologies and provide a solid foundation for future learning.

COURSE ARTICULATION MATRIX

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1					2			2				3
CO2			2									3
CO3			3									3
CO4			2									3

UNIT-I(15 Hrs.)

Real Numbers Preliminaries: Sets and Functions, Mathematical induction, Finite and infinite sets. Algebraic and order properties of R, Absolute value and the real line, Completeness property of R, Applications of supermom property, Archie median property, Density of rational numbers in R, Intervals- Characterization theorem, Nested intervals, Nested interval property, The unaccountability of R, Binary and decimal representation of real numbers.

UNIT-II(15 Hrs.)

Sequences of Real Numbers A sequence in R, The limit of a sequence, Convergence of a sequence, Uniqueness of limits, Limit theorems, Monotone sequence, Euler's number, Subsequence, Divergent criteria, Monotone subsequence theorem, Bolzano - Weierstrass theorem, Cauchy sequence, Cauchy convergence criterion, Properties of divergent sequences.

UNIT-III(15 Hrs.)

Infinite Series Infinite Series, Convergence of infinite series, thither m test, Cauchy criterion for series, the harmonic series, P- series, Comparison test. Absolute convergence, Tests for absolute convergence - The root test, the ratio test, the integral test, The Rabbe's test, Logarithmic test, Gauss test, Alternating series, Leibnitz test, Dirichlettest, Abel's test.

UNIT-IV(15 Hrs.)

Limits and Continuity of Functions Limits and Continuity of functions, Cluster point of a subset of R, Limit of a function at a cluster point of a set, Sequential criterion for the limits, Divergence criterion, Limit theorems, Squeeze theorem, Infinite limits. Continuous functions, Sequential criterion of continuity, Discontinuity criterion, Combinations of continuous functions- sum, Difference, Product and quotient and compositions. Continuous functions on intervals, Boundedness theorem, Maxi mu m-Mini mu m theorem, Bolzano's Inter mediate value theorem, Preservation of intervals theorem. Uniform continuity, Non-uniform

continuity criteria, Uniform continuity theorem, Lipchitz functions, Continuous Extension theorem, Approximations of continuous functions by step functions and by piece wise linear functions, Weierstrass Approximation theorem.

PHYSICAL EDUCATION - VI

Subject Code: BACSD1-614 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

Course Outcomes:

CO1: To study the behavior of India and world physical education.
CO2: Learning how to resist unfavorable and working conditions, decreasing fatigue during professional activities and raising the quality of results.
CO3: Fostering of motivational attitude to the physical education, healthy life style and regular exercising..
CO4: Learning the methods of self control while exercising.

COURSE ARTICULATION MATRIX

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1					2		3		3	1		
CO2			3		3		3			1		
CO3			3		3		3	1		3		
CO4			2				3					

(THEORY – 60 MARKS)

UNIT – I(15 Hrs.)

- **Intramural and Extramural Tournaments**: Introduction, Importance and Organization.
- **Tournaments**: Introduction and various classifications: Elimination (Knock out), Round robin (League Cyclic, Tabular and Staircase Method), Combination & challenge
- **Life Sketch of Sports Personalities**: Major Dhyan Chand, S. Milkha Singh, Prof. Aimer Singh, P.T.Usha, Leander Paes and Abhinav Bindra.

UNIT – II(15 Hrs.)

- **Balanced Diet & Nutrition**: Introduction, Components, Sources and Functions of each Component.
- **Obesity and Over Weight Management**: Introduction, Causes, General Problems Effects on Health, Preventive and Remedial Measures.
- **Physiological Terminologies**: Hemoglobin, Cardiac output, Stroke volume, Oxygen

UNIT – III(15 Hrs.)

- **Sports Training**: Introduction, Aims & Objectives, Characteristics and Principles.
- **Physical Fitness**: Introduction, its Components and their Types (Speed, Strength, Endurance, Co-ordination and Flexibility), factors affecting physical fitness.
- **Training Method**: Circuit training, Interval training, Fartlek training, Weight training Plyometric training and Cross country.

UNIT – IV(15 Hrs.)

- **Sports Performance**: Introduction, Causes of Deterioration of sports performance, Indian Performance at Olympics, Asian & Commonwealth Games, and Suggestions for improving Indian Sports Performance.

- **Relay Races**: Rules & Regulations, Layout and Technique.
- **Cricket**: History, Layout, General Rules & Regulation, Officials, Major Tournaments and Arjuna Awardees.

PRACTICAL (40 MARKS)
RELAY RACES AND CRICKET

Evaluation will be based on skill test, Performance, Practical file and Viva Voce.

- **Blood Pressure And Pulse Rate (Practical)**
  Operational techniques to measure blood pressure & pulse rate with different medical equipment.

**********END*******

References:

(e) *Dr. Nishan Singh Deol (1980) : Text book of Physical Education & Sports. (AP Publishers, Jalandhar).*

(f) *Singh Ajmer et al (2000) : Modern Text Book of Physical Education, Health and Sports", Kalyani Publishers, Ludhiana*

ELECTIVE ENGLISH - VI

Subject Code: BACSD1-615 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

Course Outcomes:

CO1: Students are encouraged and enabled to read various types of text on their own and discuss them among peers.
CO2: Students can develop their linguistic and pragmatic competence for learning.
CO3: Students are introduced to the grammatical properties in order to enable them to write and speak English consciously.
CO4: Students are introduced to appropriate literary strategies to read literature.

COURSE ARTICULATION MATRIX

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3		3	3			2					
CO2	3		2	2			2					
CO3	3		2	3			2					
CO4	3		2	3			2					

UNIT – I(15 Hrs.)

- Literary Teams. :Fiction, Non-fiction, Narrative, Building Sroman, Picaresque Novel, Novel of sensibility, Historical Romance, Grothic novel, Realistic novel, Psychological naval, political novel, Regional novel, point of views, omniscient Author, first person Narrator, stream of consciousness, Protagonist/ Antagonist. Plot/story,Character, Structure..

UNIT – II(15 Hrs.)

- R.K Narayal- Noval – The Guide

UNIT – III(15 Hrs.)

- A Essay on one topic of International importance.
- Report waiting

UNIT – IV(15 Hrs.)

- Translation from Punjabi to English
- Direct / Indirect

ECONOMICS - VI

Subject Code: BACSD1-616 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

Course Outcomes:

CO1: Developing the skill of data collection and use of sampling technique in research.
CO2: Developing the knowledge about theories of economic growth and development and issues of economic planning.
CO3: Understanding various issues of population, poverty, availability of resources and uses of Natural resources for sustainable development.
CO4: Developing research knowledge in economics.

COURSE ARTICULATION MATRIX

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1							2				1	3
CO2			3			1						
CO3				1	3				2			
CO4			3									

UNIT – I(15 Hrs.)

- Features of Indian economy on the eve of independence
- Nature and characteristics of Indian economy.
- Agriculture in India – Importance & Productivity.
- New Agricultural district or area programme (IADP- Features, Objectives, Achievements of IADP Criticism)
- Application of Technology in Indian Agriculture : Meaning and Types of Agriculture Technology)
- Main Inputs of Modern Techniques of agriculture .
- Green Revolution (Features/ Causes/Factors)
- Land Reforms (Features, Need or Role)

UNIT – II(15 Hrs.)

Industry – Role and problems of industrial development in India, measures for industrial development or steps taken by the govt for industrial development.
Public Enterprises: Objectives of public enterprises role or significance of public enterprises. Causes of low profitability in public sector organisation of public sector enterprises.

- Role and Problems of small and large scale industries.
- Industrial Pollution (Types of Steps taken by the govt to control industrial pollution)

UNIT – III(15 Hrs.)

Foreign Trade: Direction and composition of exports and imports main features of foreign Trade.
India's Balance of Payments - Meaning, Trends of Balance of Payments of Current Account, Measures / suggestions to correct Disqualification in the Balance of Payments.
Export Promotion : Meaning/ Need, Importance of Export promotion in India
Measures of Export promotion: Multinational Corporations: Meaning / features Advantages Role & Disadvantages.

UNIT – IV(15 Hrs.)

Planning: Features, Objectives, Failures of plans, Critical evolution of the latest fire year plan.

Money supply and Inflation in India: Introduction and meaning of Money supply, factors Affecting money supply in India

Inflation - Definitions, Types, Effects. causes

Unemployment : meaning, Nature and Types, causes. Suggestions to serve Unemployment Problems.

Inequalities of Income and wealth in India :Meaning/Nature, causes.

Role of Banks in Economic Development :Bank Meaning/functions/features

Reference Books:

(a) *Indian Economy – By TR Jain,Dr Rajinder Uppal,Mukesh Trehan,Ranju Trehan.*

ਪੰਜਾਬੀਇਲੈਕਟਿਵ - VI

Subject Code: BACSD1-617 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

Course Outcomes:
CO1: To develop a bonding with the mother tongue of the student.
CO2: To gain knowledge and understanding of the rich folk and cultural heritage of Punjab.
CO3: Knowledge and understanding of the various intricacies of the grammar and literature of Punjabi.
CO4: The program connects the students to their roots.

COURSE ARTICULATION MATRIX

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3		1				1					
CO2			1	3			1		3	3		
CO3	3		2	3			1		2	2		
CO4			2						3	2		

ਪਾਠਕ੍ਰਮ

1. ਪ੍ਰਗਤਨਪੰਜਾਬੀਕਾਵਿ
2. ਪੰਜਾਬੀਨਿਬੰਧਾਂਦਾਅਧਿਐਨ
3. ਪੰਜਾਬੀਸਾਹਿਤਦਾਇਤਿਹਾਸ
4. ਭਾਸ਼ਾਵਿਗਿਆਨ

ਯਨਿਟਅਤੇਥੀਮ

1. (ੳ) ਮੱਧਕਾਲਅਤੇਮੁੱਢਲੇਬਸਤੀਵਾਦੀਕਾਲਦੀਪੰਜਾਬੀਕਵਿਤਾਪੁਸਤਕਵਿੱਚੋਂਪ੍ਰਸੰਗਸਾਹਿਤਵਿਆਖਿਆ।
   (ਅ) ਕਾਵਿਪੁਸਤਕਵਿੱਚੋਂਕਵਿਤਾਦਾਵਿਸ਼ਾਵਸਤੂ।
2. (ੳ) ਨਿਬੰਧਦੀਸਾਹਿਤਕਪਰਖ।
   (ਅ) ਨਿਬੰਧਸੰਗ੍ਰਹਿਵਿਚੋਂਲਘੂਉਤਰਾਂਵਾਲੇਪ੍ਰਸ਼ਨ।
3. ਪੰਜਾਬੀਸਾਹਿਤਦਾਇਤਿਹਾਸ (ਸੂਫੀਕਾਵਿ, ਮੁੱਢਲੇਬਸਤੀਵਾਦਨਾਲਸੰਬੰਧਿਤਕਿੱਸਾਕਾਵਿ।
4. ਭਾਸ਼ਾਵਿਗਿਆਨ : ਭਾਸ਼ਾਵਿਗਿਆਨਦੀਪ੍ਰੀਭਾਸ਼ਾ
   ਖੇਤਰਤੇਹੋਰਵਿਗਿਆਨਾਂਨਾਲਸੰਬੰਧ (ਮਨੋਵਿਗਿਆਨਅਤੇਸਮਾਜਵਿਗਿਆਨ)

- ਕੋਰਸ

(iv) ਮੱਧਕਾਲਅਤੇਮੁੱਢਲੇਬਸਤੀਵਾਦੀਕਾਲਦੀਪੰਜਾਬੀਕਵਿਤਾ, ਡਾ. ਯੋਗਰਾਜਅੰਗਰਿਸ।
(v) ਨਿਬੰਧਪ੍ਰਕਾਸ਼, ਪਬਲੀਕੇਸ਼ਨਬਿਊਰੋ, ਪੰਜਾਬਯੂਨੀਵਰਸਿਟੀ, ਚੰਡੀਗੜ।

ਸਹਾਇਕਪੁਸਤਕਾਂ: ਡਾ. ਸੁਰਿੰਦਰਸਿੰਘਕੋਹਲੀ, ਪੰਜਾਬੀਸਾਹਿਤਦਾਇਤਿਹਾਸਪਬਲੀਕੇਸ਼ਨਬਿਊਰੋ, ਪੰਜਾਬਯੂਨੀਵਰਸਿਟੀ, ਚੰਡੀਗੜ।