Your Dreams Our Goal

POORNIMA UNIVERSITY

Member of Association of Indian Universities & Approved by UGC (Govt. of India) under 2(f) & 12(B)

FACULTY OF SCIENCE & HUMANITIES

DEPARTMENT OF SCIENCE & HUMANITIES

SCHEME & SYLLABUS BOOKLET

BATCH 2023-2026

SCHEME &

SYLLABUS

BATCH: 2023-26

INDEX

Disclaimer: The scheme, syllabus and other materials published in this booklet may be changed or modified as per the requirement after approval of competent authority. The decision taken by the management of Poornima University will be final and abiding to all.

Student Details

Name of Student:

Name of Program:

Semester: Year: Batch:

Faculty of:

Your Dreams Our Goal

POORNIMA UNIVERSITY

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VISION

To create knowledge based society with scientific temper, team spirit and dignity of labor to face global competitive challenges.

Mission

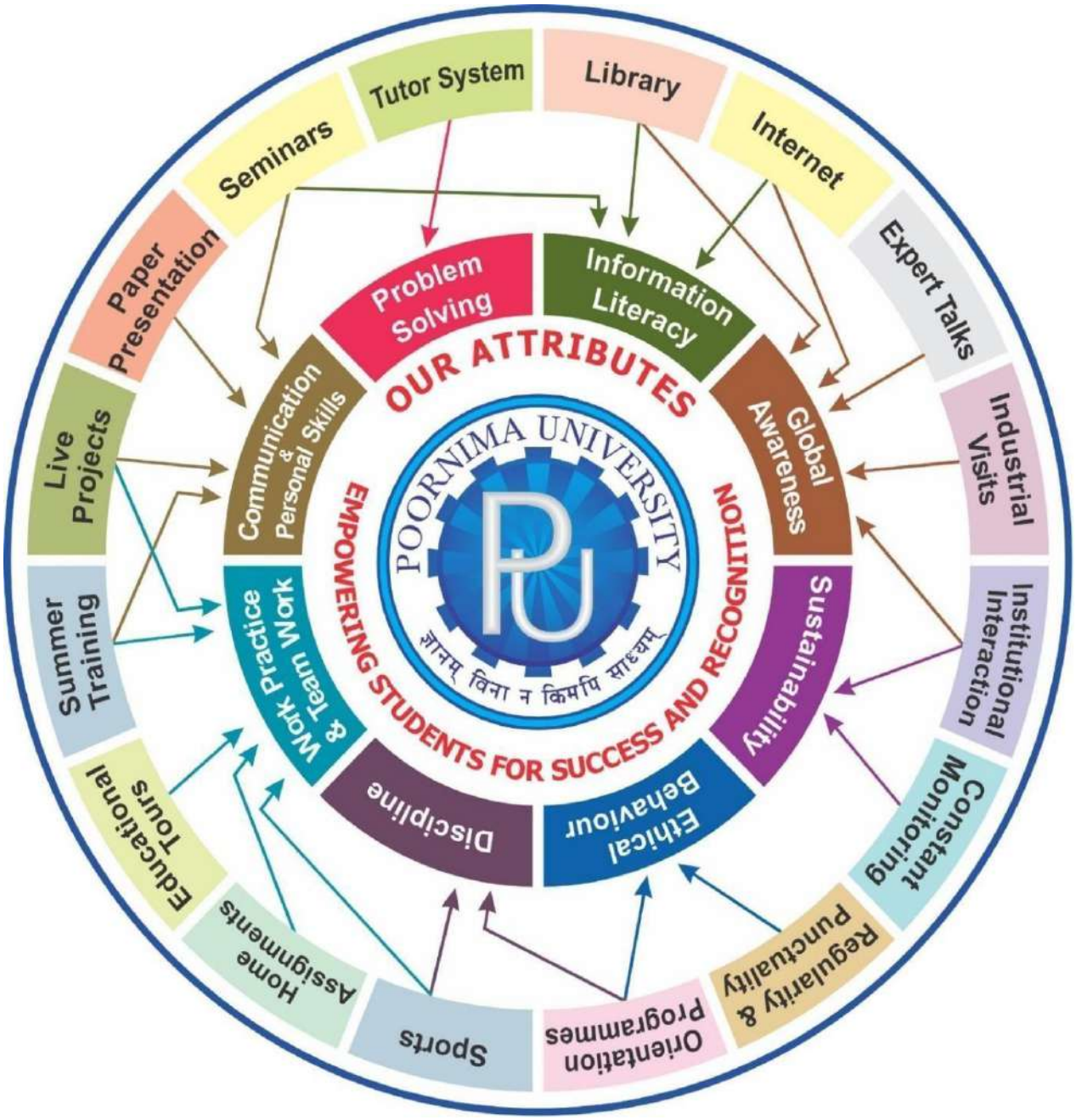
To evolve and develop skill based systems for effective delivery of knowledge so as to equip young professionals with dedication and commitment to excellence in all spheres of life.

Quality Policy

To provide Quality Education through Faculty development, updating of facilities and continual improvement meeting University norms and keeping stake holders satisfied.

Knowledge Wheel

At Poornima, the academic atmosphere is a rare blend of modern technical as wellas soft skills and traditional systems of learning processes.



About Program and Program Outcomes (PO):

Title of the Programme: Bachelor of Science (B. Sc.)

Nature of the Programme: B. Sc. is three-year full-time programme.

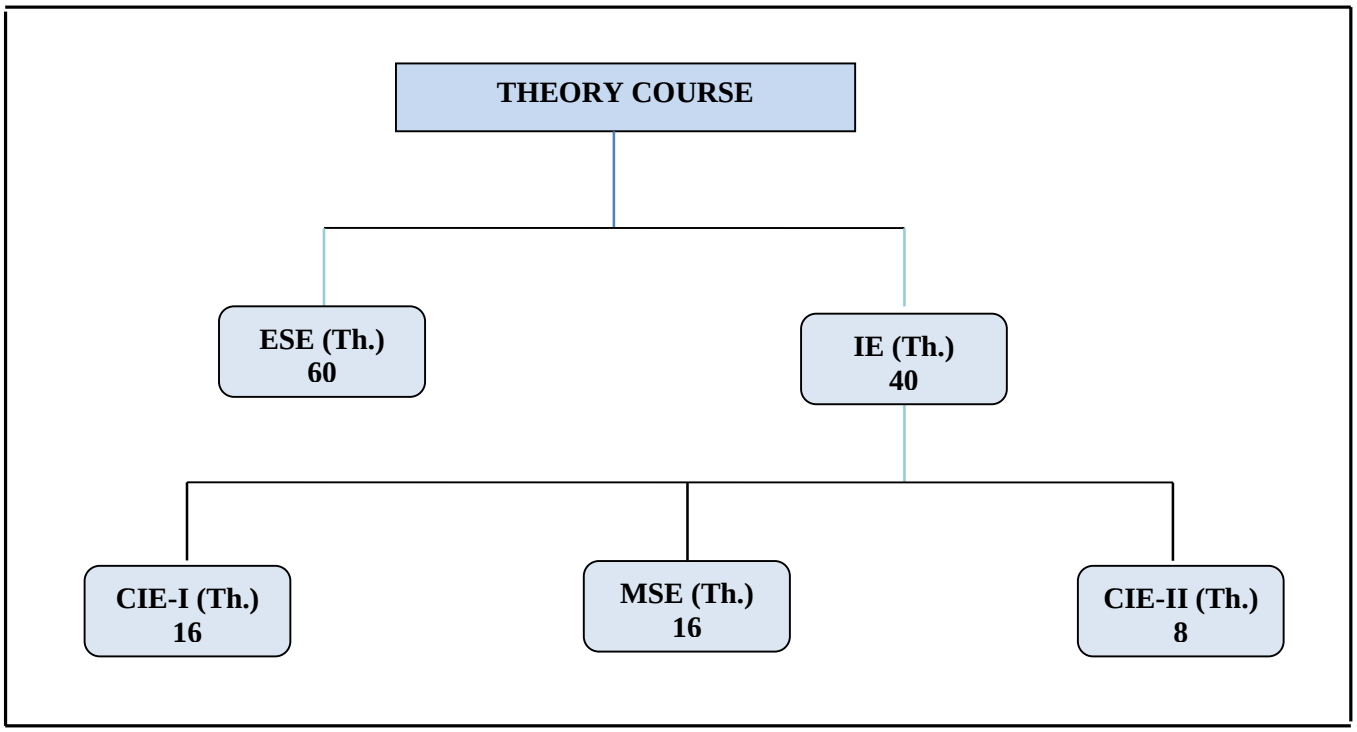
Program Outcomes (PO):

Science Graduates will be able to:

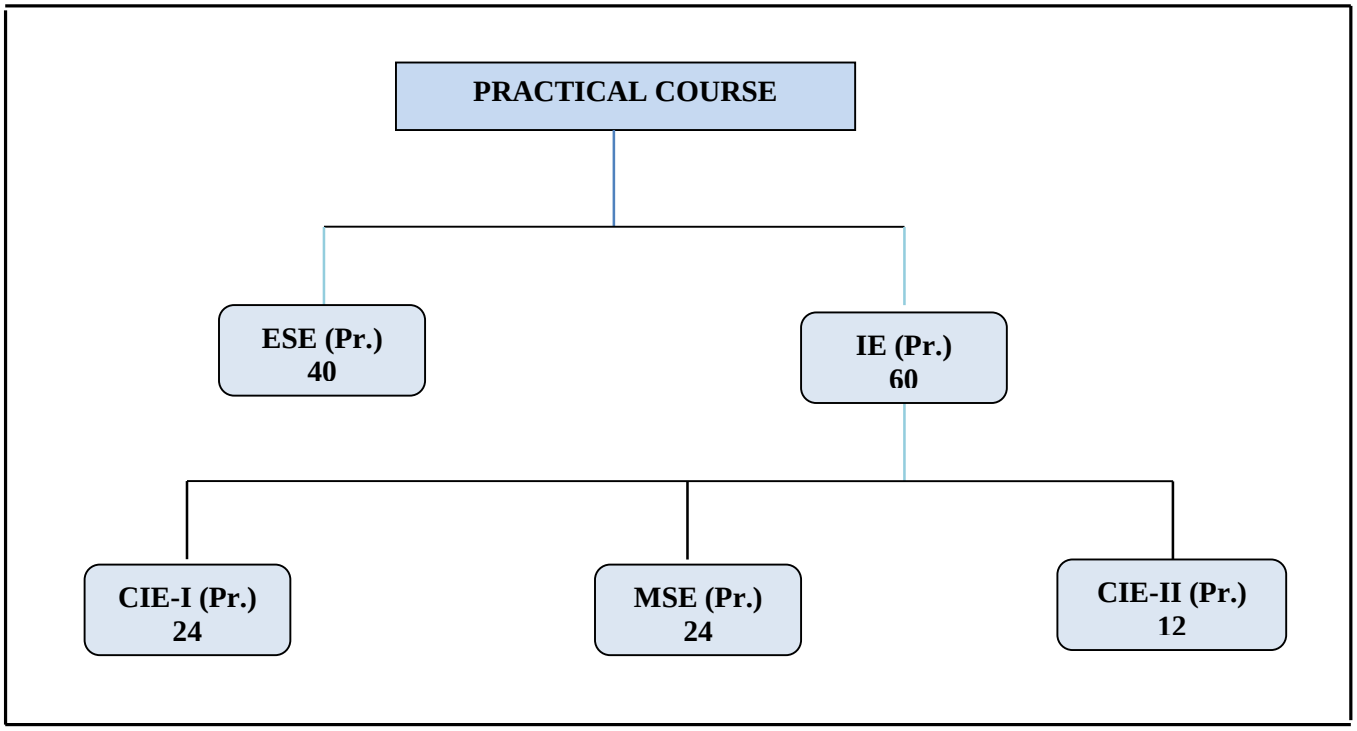
1. **Disciplinary knowledge:** Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of B.Sc. program.
2. **Scientific reasoning and Problem solving:** Ability to analyze, interpret and draw conclusions from quantitative/qualitative data; and critically evaluate ideas, evidence and experiences Capacity to extrapolate from what one has learned and apply their competencies to solve real life situations
3. **Analytical reasoning and Research related skills:** Define problems, formulate hypotheses, test, analyze, interpret and draw conclusions from data and report the results of an experiment or investigation
4. **Critical thinking:** identify relevant assumptions or implications; formulate coherent arguments; critically evaluate practices, policies and theories by following scientific approach to knowledge development.
5. **Digital literacy:** Capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information sources; and use appropriate software for analysis of data.
6. **Reflective thinking:** Possess knowledge of Critical sensibility to lived experiences, with self-awareness and beliefs of multiple cultures and a global perspective; and capability to effectively engage in a multicultural society and interact respectfully with diverse groups.
7. **Environment and sustainability: A**ppreciating environmental and sustainability issues; and adopting objective, unbiased and truthful actions in all aspects of work.
8. **Moral and ethical awareness:** Ability to embrace ethical values in conducting one's life, formulates a position about an ethical issue from multiple perspectives, and use ethical practices in all work.
9. **Leadership qualities:** Capability for mapping out the tasks of a team or an organization, and setting direction to work effectively and respectfully with diverse teams; and act together as a group or a team in the interests of a common cause and work efficiently as a member of a team.
10. **Communication Skills:** Ability to express thoughts and ideas effectively in writing and orally; Communicate with others using appropriate media; present complex information in a clear and concise manner.
11. **Project management and finance**: Ability to work independently, identify appropriate resources required for a project, and manage a project.
12. **Lifelong learning:** Ability to acquire knowledge and skills in learning activities throughout life aimed at personal development, meeting economic, social and cultural objectives, and adapting to changing trades and demands of work place.

Examination System:

A. Marks Distribution of Theory Course:



B. Marks Distribution of Practical Course :



Th.: Theory, Pr.: Practical, **ESE:** End Semester Examination, **MSE:** Mid Semester Examination, **CIE:** Continuous Internal Evaluation.

CO Wise Marks Distribution:

Exam Entity	Theory Subject		Practical/ Studio Subject	
	Maximum Marks	CO to be Covered	CO to be Covered	Maximum Marks
CIE-I	16 (8 + 8)	1 & 2	1 & 2	24 (12 + 12)
MSE	16 (8 + 8)	3 & 4	3 & 4	24 (12 + 12)
CIE-II (Activity/ Assignment)	8 (8)	5	5	12 (12)
ESE	60	-	-	40
TOTAL	100	-	-	100

Minimum Passing Percentage in All Exams:

S No.	Program Name	Minimum Passing Percentage in		
		IE Component	ESE Component	Total Component
1	Course Work for PhD Registration	**-**	**-**	**50%**
2	B. Arch.	**-**	**45%**	**50%**
3	MBA, MCA, M.Des., M.Tech., M.Plan, MHA, MPH, MA	**-**	**40%**	**40%**
4	B. Tech., B. Des., BVA, BCA, B.Sc., BBA, B.Com., B.A.	**-**	**35%**	**35%**

SGPA Calculation

$$SGPA = \frac{C_1G_1 + C_2G_2 + \ldots\ldots\ldots + C_nG_n}{C_1 + C_2 + \ldots\ldots + C_n}$$

$$SGPA = \frac{\sum_i C_i \times G_i}{\sum_i C_i}$$

where (as per teaching scheme & syllabus):

C_i is the number of credits of subject i,

G_i is the Grade Point for the subject I and i = 1 to n,

n = number of subjects in a course in the semester

CGPA Calculation

$$CGPA = \frac{C_1G_1 + C_2G_2 + \ldots\ldots\ldots + C_nG_n}{C_1 + C_2 + \ldots\ldots + C_n}$$

$$CGPA = \frac{\sum_i C_i \times G_i}{\sum_i C_i}$$

where (as per teaching scheme & syllabus):

C_i is the number of credits of subject i,

G_i is the Grade Point for the subject I and i = 1 to n,

n = number of subjects in a course of all the semesters up to which CGPA is computed

Grading Table:

Applicable for B.Arch. & Ph.D. Courses

Academic Performance	Grade	Grade Point	Marks Range (in %)
Outstanding	O	10	90≤ x ≤100
Excellent	A+	9	80≤ x <90
Very Good	A	8	70≤ x <80
Good	B+	7	60≤ x <70
Above Average	B	6	50≤ x <60
Fail	F	0	x <50
Absent	Ab	0	Absent

Applicable for All Courses except B.Arch. & Ph.D.

Academic Performance	Grade	Grade Point	Marks Range (in %)
Outstanding	O	10	90≤ x ≤100
Excellent	A+	9	80≤ x <90
Very Good	A	8	70≤ x <80
Good	B+	7	60≤ x <70
Above Average	B	6	50≤ x <60
Average	C	5	40≤ x <50
Pass	P	4	35≤ x <40
Fail	F	0	x <35
Absent	Ab	0	Absent

CGPA to percentage conversion rule:

Equivalent % of Marks in the Program = *CGPA* *10

Award of Class

CGPA	Percentage	Equivalent Division
7.50 ≤ CGPA	75% or more	First Division with Distinction
6.00 ≤ CGPA < 7.50	60% ≤ x <75%	First Division
5.00 ≤ CGPA < 6.00	50% ≤ x <60%	Second Division
4.00 ≤ CGPA < 5.00	40% ≤ x < 50%	Pass Class

Guidelines for Massive Open Online Courses (MOOCs)

(Session 2023-24)

Poornima University, in its never ending endeavor to equip students with best-of-class learning and knowledge, has undertaken to include MOOC courses as part of its credit scheme from session 2023-24 onwards. The objective behind this is to enable students to study courses designed by the best teachers in the country and to scale their knowledge base with the rest of learners from the nation. The MOOCs which are included under this scheme is can be chosen from SWAYAM and NPTEL.

1. Introduction of MOOCs: SWAYAM and NPTEL

About SWAYAM:

SWAYAM is a programme initiated by Government of India and designed to achieve the three cardinal principles of Education Policy viz., access, equity and quality. The objective of this effort is to take the best teaching learning resources to all, including the most disadvantaged. SWAYAM seeks to bridge the digital divide for students who have hitherto remained untouched by the digital revolution and have not been able to join the mainstream of the knowledge economy.

This is done through a platform that facilitates hosting of all the courses, taught in classrooms to be accessed by anyone, anywhere at any time. All the courses are interactive, prepared by the best teachers in the country and are available, free of cost to any learner. However learners wanting a SWAYAM certificate should register for the final proctored exams that come at a fee and attend in-person at designated centers on specified dates. Eligibility for the certificate will be announced on the course page and learners will get certificates only if this criteria is matched.

The courses hosted on SWAYAM are in 4 quadrants – (1) video lecture, (2) specially prepared reading material that can be downloaded/printed (3) self-assessment tests through tests and quizzes and (4) an online discussion forum for clearing the doubts. Steps have been taken to enrich the learning experience by using audio-video and multi-media and state of the art pedagogy / technology.

In order to ensure that best quality content is produced and delivered, nine National Coordinators have been appointed. They are:

1. AICTE (All India Council for Technical Education) for self-paced and international courses
2. NPTEL (National Programme on Technology Enhanced Learning) for Engineering
3. UGC (University Grants Commission) for non-technical post-graduation education
4. CEC (Consortium for Educational Communication) for under-graduate education
5. NCERT (National Council of Educational Research and Training) for school education
6. NIOS (National Institute of Open Schooling) for school education
7. IGNOU (Indira Gandhi National Open University) for out-of-school students
8. IIMB (Indian Institute of Management, Bangalore) for management studies
9. NITTTR (National Institute of Technical Teachers Training and Research) for Teacher Training programme

Two types of courses are offered on SWAYAM platform: Credit Courses and Non- Credit Courses. Credit courses are offered for each semester in January and July every year. The list is available on SWAYAM official website: https://onlinecourses.swayam2.ac.in/

About NPTEL:

NPTEL (National Programme on Technology Enhanced Learning), is a joint venture of the IITs and IISc, funded by the Ministry of Education (MoE) Government of India, and was launched in 2003. Initially started as a project to take quality education to all corners of the country, NPTEL now offers close to 600+ courses for certification every semester in about 22 disciplines.

Some highlights:

- Largest online repository in the world of courses in engineering, basic sciences and selected humanities and management subjects
- YouTube channel for NPTEL – most subscribed educational channel, 1.3 billion views and 40+ lakhs subscribers
- More than 56000 hours of video content, transcribed and subtitled
- Most accessed library of peer-reviewed educational content in the world
- Translation of more than 12000 hrs of English transcripts in regional Indian languages

NPTEL Online Certification:

The objective of enabling students obtain certificates for courses is to make students employable in the industry or pursue a suitable higher education programme. Through an online portal, 4, 8, or 12-week online courses, typically on topics relevant to students in all years of higher education along with basic core courses in sciences and humanities with exposure to relevant tools and technologies, are being offered. Enrolment to and learning from these courses is free. Following these online courses, an in-person, proctored certification exam is conducted and a certificate is provided through the participating institutions and industry, as applicable.

Some statistics regarding the open online courses since March 2014 till Dec 2021

Completed courses: 3496;

Enrollments across courses: 1.58 CRORE +

Number of exam registrations: 15.1 LAKH +

All the statistics pertaining to completed courses are available at https://beta.nptel.ac.in/courses. All courses are completely free to enroll and learn from. The certification exam is optional and comes at a fee of Rs 1000/course exam.

2. MOOCs at Poornima University:

MOOCs envelops best in class teaching - learning processes along with meeting the requirements of various courses in terms of quality of teaching and evaluation system. To promote the MOOCs among students of Poornima University, it is decided to consider the credits earned through MOOCs.

(a) Options for MOOCs at Poornima University

(For this document, only those MOOCs will be considered which are available on SWAYAM & NPTEL platforms)

- Credit and Non-credit SWAYAM MOOCs can be opted by anyone, anytime, anywhere and in any language. However, prior-permission of the University Authorities is mandatory if the credits are to be transferred to regular degree.
- In case of credit courses, there are two ways to opt these courses for the purpose of credit transfer to PU system as given below:

OPTION–I: As Open Elective (for batches entered till 2022) / Multidisciplinary Courses (for batches admitted from 2023-24 onwards):

Open Elective (for batches entered till 2022) / Multidisciplinary Courses (for batches admitted from 2023-24 onwards) are available at University level in offline mode for which relevant booklets are already published. **These courses carries 02 credits.** These category/type of courses (similar/different) are also available as MOOC courses. The respective Deans / HODs shall provide both the options to all the students to either select offline courses or MOOCs as per details given below:

- Deans / HODs shall prepare a list of upto 05 appropriate MOOC courses of 02/03 credits each, well in advance (at-least 15 days prior to commencement of semester) and take approval from the Office of Dean, Academics / Pro-President, PU.
- After approval, the respective Deans / HODs shall circulate a notice to all their respective students so that they can select any one course from the list, the credits **(only 02)** of which will be counted against Open Elective/ Multidisciplinary courses pertaining to that particular semester.
- If the students are not willing to opt for MOOC Open Elective/ Multidisciplinary course, they can proceed with the current offline practice of opting for Multidisciplinary courses.
- The tutor of the class shall monitor the progress (assignments, feedback, any problem etc.) on weekly basis and report to Head/Dean.

OR

OPTION–II: As Major / Minor Courses:

- Deans / HODs shall identify a course of **03 credits** for each semester, well in advance (at-least 15 days prior to commencement of semester) and take approval from the Office of Dean, Academics / Pro-President, PU.
- After approval, the respective Deans / HODs shall circulate a notice to all their respective students citing that the particular course will be conducted through MOOCs only and is compulsory for all respective students. The credits of this course will be counted against Major/Minor courses pertaining to that particular semester.
- The tutor of the class shall monitor the progress (assignments, feedback, any problem etc.) on weekly basis and report to Head/Dean.
- This is to be noted that if Deans / HODs decide to conduct any major/minor course in any semester through MOOCs, no offline course will be conducted against that.

(b) Important points related to MOOCs at Poornima University

- Only one MOOC shall be allowed in a particular semester for the purpose of credit transfer in the beginning.
- No attendance will be taken for MOOC courses.
- Last period of T/T/S shall be taken for MOOC courses which shall be in self-study mode.
- The method of assessments of MOOC such as assignments and examination are completely associated with that particular MOOC and no exam will be conducted by the department as well as by the Examination Cell.
- The respective Dean / HOD must submit the detail of course i.e., code, name and credit of MOOC opted against that particular course in particular semester attached with highlighting in the related examination scheme of syllabus of that semester signed by BOS Convener / HoD and Dean of Faculty to the office of Pro-President before commencement of the classes.

- SWAYAM will award a certificate to all the students passing the examination along with the credit earned. The center of examination for SWAYAM MOOCs will be finalized by SWAYAM. All the responsibility related to registration for MOOCs, timely submission of assignments, examinations etc. will be borne by the students only.
- The list of registered students in MOOC along with name of course will be submitted to the Examination Cell by the Deans / HoDs before commencement of the classes.
- Any student who would not be able to register/present/clear/pass the MOOC in the stipulated time, it is the choice of the student that he or she may register in next semester (odd or even) with MOOC again or appear as a back exam candidate of the University as per PU norms.
- There will be no provision of re-evaluation of MOOC.
- The scorecard and related certificate of MOOC along with a consolidated list of students with marks of assignment and final exam will be submitted to the examination cell by the concerned Dean / HOD for further process. It is also recommended that alteration/changes/scaling in marks obtained by the students in any MOOC will not be considered.
- The exam registration fee of MOOC up to Max. INR 1000/- will be reimbursed to the student only after successful completion of the course in first attempt and submission of the fee receipt, score-card and certificate of the MOOC to the concerned department within stipulated time after declaration of the results.

NOTE: This is to be noted that the procedure for getting approval from BOS, Faculty Board, Academic Council and BoM is to be followed as per regular process.

Attached Items:

Open Elective Booklet	Annexure-1
Soft Skills Booklet	Annexure-2
Value Added Course Booklet	Annexure-3

POORNIMA UNIVERSITY, JAIPUR
FACULTY OF SCIENCE & HUMANITIES
BATCH: 2023-2026
TEACHING SCHEME (TOTAL CREDIT:141)

Course Code	FIRST SEMESTER B.Sc (PCM)	Credits
BSACSA1101	Mechanics	3
BSACSA1102	Inorganic Chemistry	3
BSACSA1103	Organic Chemistry	3
BSACSA1104	Calculus	3
BSACSA1105	Vector Calculus and Matrices	3
BSACSA1201	Chemistry Lab-I	1
BSACSA1202	Physics Lab-I	1
BSACSA1203	Exploratory Project-I	1
BUACHU1202	Foundation English	1
BULCSE1201	Skill Enhancement Generic Course-I	1
BUVCSA1102	Environmental Studies	2
Total Credit		**22**

Course Code	SECOND SEMESTER B.Sc (PCM)	Credits
BSACSA2101	Optics	3
BSACSA2102	Waves and Oscillations	3
BSACSA2103	Organic Chemistry	3
BSACSA2104	Numerical Analysis	3
BSACSA2105	Differential Equations	3
BSACSA2201	Chemistry Lab-II	1
BSACSA2202	Physics Lab-II	1
BSACSA2203	Exploratory Project-II	1
BSAEMC2121	MOOC Course-I	2
BUACHU2205	Human Values & Professional Ethics	1
BULCSE2201	Skill Enhancement Generic Course-II	1
BUVCPH2103	Nutrition & Fitness	2
Total Credit		**24**

Course Code	THIRD SEMESTER B.Sc (PCM)	Credits
BSACSA3101	Electromagnetism	3
BSACSA3102	Inorganic Chemistry	3
BSACSA3103	Physical Chemistry	3
BSACSA3104	Analytical Geometry	3
BSACSA3105	Statistics and Probability Theory	3
BSACSA3201	Chemistry Lab-III	1
BSACSA3202	Physics Lab-III	1
BSAESA3101	Thermodynamics Statistical Physics	3
BSAESA3102	Mathematical Modelling	
BSAEMC3121	MOOC Course-II	2
BUACHU3208	Communication Skills -I	1
BULCSE3201	Skill Enhancement Generic Course-III	1
Total Credit		**24**

Course Code	FOURTH SEMESTER B.Sc (PCM)	Credits
BSACSA4101	Electronic Devices and Circuits	3
BSACSA4102	Physical Chemistry	3
BSACSA4103	Organic Chemistry	3
BSACSA4104	Abstract Algebra	3
BSACSA4105	Optimization Techniques	3
BSACSA4201	Chemistry Lab-IV	1
BSACSA4202	Physics Lab-IV	1
BSAESA4101	Analog and Digital Electronics	3
BSAESA4102	Partial Differential Equations	
BSAEMC4121	MOOC Course-III	2
BUACHU4212	Communication Skills -II	1
BULCSE4201	Document Preparation and Presentation	2
Total Credit		**25**

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FACULTY OF SCIENCE & HUMANITIES
BATCH: 2023-2026
TEACHING SCHEME (TOTAL CREDIT:141)

Course Code	FIFTH SEMESTER B.Sc (PCM)	Credits
BSACSA5101	Nuclear Physics	3
BSACSA5102	Atomic and Molecular Spectroscopy	3
BSACSA5103	Organic Chemistry	3
BSACSA5104	Real Analysis	3
BSACSA5201	Chemistry Lab-V	1
BSACSA5202	Physics Lab-V	1
BSAESA5101	Inorganic Chemistry	3
BSAESA5102	Analog and Digital Circuits	
BSAEMC5121	MOOC Course-IV	2
BUACHU5115	Entrepreneurial & Managerial Skills	2
BULCSE5201	Office Automation Tool	2
BUVCHU5101	Gandhi & Education	2
BSACSA5401	Industrial Training & Seminar	1
Total Credit		**26**

Course Code	SIXTH SEMESTER B.Sc (PCM)	Credits
BSACSA6101	Quantum Mechanics	3
BSACSA6102	Physical Chemistry	3
BSACSA6103	Complex Analysis	3
BSACSA6201	Technical Seminar	1
BUACHU6120	Presentation & Interview Skills	2
BULCSE6201	Computer hardware and Troubleshooting Laboratory	2
BSACSA6401	Dissertation	6
Total Credit		**20**

CORE THEORY SUBJECT

Code: BSACSA1101 MECHANICS 3.0 Credits [LTP: 3-0-0]

COURSE OUTCOMES: Students will be able to:

CO1: Compare Inertial and non-inertial frames of reference using velocity, acceleration and coordinate system.

CO2: Differentiate among Elastic constants: Young's Modulus, Bulk Modulus, Modulus of Rigidity, Poisson's ratio and bending of beam.

CO3: Compute center of mass, motion of a system with varying mass and Charged particle scattering by nucleus charged particle scattering by nucleus

CO4: Solve the problems of bodies moving under the central forces using gravitational interaction, Kapler's law and different trajectories

CO5: Relate time dilation, length contraction, mass energy relation Lorentz transformation and variation of mass with velocity using Einstein's special theory of relativity.

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**2**	**2**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**
CO2	**2**	**3**	**1**	**2**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**
CO3	**3**	**2**	**1**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**
CO4	**3**	**3**	**3**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**
CO5	**3**	**2**	**2**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**

MAPPING OF COURSE OUTCOMES WITH PROGRAMME SPECIFIC OUTCOME

	PSO1	PSO2	PSO3
CO1	3	-	-
CO2	3	-	-
CO3	3	-	-
CO4	3	-	-
CO5	3	-	-

A.OUTLINE OF THE COURSE

Unit No.	Title of the Unit	Time required for the Unit (Hours)
1.	**Frames of Reference**	**8**
2.	**Elastic Properties of Matter**	**7**
3.	**Centre of Mass**	**7**
4.	**Motion Under Central Forces**	**7**
5.	**Special Theory of Relativity**	**7**

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Frames of Reference**
	• Introduction of the Unit • Inertial and non-inertial frames of references • Transformation of displacement • Velocity and acceleration in different coordinate system • Galilean transformation • Transformation of velocity and acceleration between rotating frames • Pseudo forces • Coriolis force and its application • Motion relative to earth • •Conclusion of the Unit
2.	**Elastic Properties of Matter**
	• Introduction of the Unit • Elastic constants: Young's Modulus, Bulk Modulus, Modulus of Rigidity • Poisson's ratio • Relations between the elastic constants, torsion of a cylinder • Bending of beams: Bending moment, Cantilever, • Principal moments and axes. • Kinematics of moving fluids, equation of continuity, Euler's equation, • Bernoulli's theorem. • •Conclusion of the Unit
3.	**Centre of Mass**
	• Introduction of the Unit • Centre of mass of a two particle system • Motion of centre of mass and reduced mass conservation of linear momentum • Elastic and inelastic collision of two particles in laboratory and center of mass frames • Motion of a system with varying mass • Angular momentum conservation with examples • Charged particle scattering by nucleus • •Conclusion of the Unit
4.	**Motion Under Central Forces**
	• Introduction of the Unit • Motion under central forces • Gravitational interaction, general solution under gravitational interaction • Discussion of trajectories • Cases of elliptical and circular orbits • Kepler's laws • •Conclusion of the Unit
5.	**Special Theory of Relativity**
	• Introduction of the Unit • Michelson Morley experiment • Postulates of special theory of relativity • Lorentz transformations • Length contraction • Time dilation • Addition of velocities • Variation of mass with velocity • Mass-energy relation • Relativistic energy-momentum relation

	• •Conclusion of the Unit

C. RECOMMENDED STUDY MATERIAL:

Sr.No	Reference Book	Author	Edition	Publication
1.	Elements of Mechanics	Gupta, Prakash and Agrawal	2004	PragatiPrakashan, Meerut
2.	Elements of Mechanics	J.C.Upadhyaya	2006	Himalaya Publishing House
3.	Mechanics	M. P. Saxena, R. P. Singh and S. S. Rawat	2006	CBH

Code: BSACSA1102	INORGANIC CHEMISTRY	3.0 Credits [LTP: 3-0-0]

COURSE OUTCOMES: Students will be able to:

CO1: Analyze the atoms on the basis of atomic theory and periodic properties.

CO2: Identify the properties, interaction and energies of compounds with respect to their chemical bonding.

CO3: Predict the anomalous change in geometry of molecules on account of valence bond theory, VSEPR theory and Molecular orbital Theory.

CO4: Compare the trends in characteristic properties and synthesis of hydrides of s block and p block elements.

CO5: Categorize the properties of noble gases and its compounds with use in daily life applications.

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**1**	**2**	**-**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**
CO2	**3**	**-**	**2**	**1**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**
CO3	**2**	**3**	**-**	**-**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**
CO4	**3**	**2**	**3**	**-**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**
CO5	**3**	**1**	**3**	**2**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	1

MAPPING OF COURSE OUTCOMES WITH PROGRAMME SPECIFIC OUTCOME

	PSO1	PSO2	PSO3
CO1	3	**–**	**–**
CO2	3	**–**	**–**
CO3	3	**–**	**–**
CO4	3	**–**	**–**
CO5	3	**–**	**–**

A. OUTLINE OF THE COURSE

Unit No.	Title of the unit	Time required for the Unit (Hours)
1.	**Atomic Structure & Periodic Properties**	**7**
2.	**Ionic Bond, Metallic Bond & Weak Interactions**	**7**
3.	**Covalent Bond**	**7**
4.	**s-Block Elements & p-Block Elements**	**8**
5.	**Chemistry of Noble Gases**	**7**

B. **DETAILED SYLLABUS**

Unit	Unit Details
1.	**Atomic Structure & Periodic Properties**
	• Introduction of the Unit • Bohrs Theory and its limitation • Heisenberg uncertainty principle • Quantum number and its Significance • Aufbau Principle, Hund's multiplicity rule and Pauli's exclusion principle • Electronic configuration of elements • Effective nuclear charge and shielding

	• Atomic and ionic radii • Ionization energy, electrode potential (use of redox potential-reaction feasibility) • Electron affinity and electro negativity evaluation • Trends in periodic table • Applications in predicting and explaining the chemical behavior • Periodic properties •Conclusion of the Unit
2.	**Ionic Bond, Metallic Bond &Weak Interactions**
	• Introduction of the Unit • Ionic bond-General characteristics • Radius ratio effect and coordination number • Lattice defects, lattice energy and Born-Haber cycle • Solvation energy and solubility of ionic solids • Polarizing power and polarizability • Fajan's rules • Metallic Bond- Free electron, valence bond and band theories • Weak Interactions- Hydrogen bonding, Vander walls Force • •Conclusion of the Unit
3.	**Covalent Bond**
	• Introduction of the Unit • Valence bond theory and its limitations • Valence shell electron pair repulsion (VSEPR) theory with suitable examples(NH_3, H_30^+ SF_4, CIF_3, ICl_2, H_2O) • Molecular orbital theory • Bonding, nonbonding and antibonding molecular orbital's • Linear combination of atomic orbital's (LCAO)-homonuclear and heteronuclear (CO and NO) diatomic molecules. • Multicenter bonding in electron deficient molecules, • Bond strength and bond energy • Percentage ionic character from dipole moment and electro negativity difference • •Conclusion of the Unit
4.	**s-Block Elements & p-Block Elements**
	• Introduction of the Unit • s-Block Elements -Comparative study, diagonal relationships • Solvation and complexation tendencies including their function in biosystems • Hydride- classification, preparation and characteristics • Introduction to alkyl and aryls • p-Block elements-Comparative study in periodicity, diagonal relationship • Hydrides of boron, diborane and higher boranes, borazine, borohydrides, fullerenes, carbides, fluorocarbons, silicates (structural principle), tetrasulphur tetranitride, • Basic properties of halogens, interhalogens and polyhalides • •Conclusion of the Unit
5.	**Chemistry of Noble Gases**
	• Introduction of the Unit • Chemical properties of Noble gases • Chemistry of Xenon • Structure and bonding in Xenon compound

	• Theories of Bonding in noble gases compound •Conclusion of the Unit

C. RECOMMENDED STUDY MATERIAL:

S. No	Reference Book	Author	Edition	Publication
1	A New Concise Inorganic Chemistry	J. D. Lee	Latest	Chapman & Hall, London
2	Modern Inorganic Chemistry	R. C. Aggarwal	Latest	KitabMahal, Allahabad
3	Basic Inorganic Chemistry	F. A. Cotton, G. Wilkinson, and Paul L. Gaus	Latest	John Wiley & Sons, New York

Code: BSACSA1103 ORGANIC CHEMISTRY 3.0 Credits [LTP: 3-0-0]

COURSE OUTCOMES: Students will be able to:

CO1: Demonstrate electronic displacements according to bonding, shapes, reactivity and energy consideration of reaction intermediate

CO2: Classify Hydrocarbons and discuss the methods of preparation of Hydrocarbons.

CO3: Categorize the stability and reactivity of hydrocarbons as per bonding and structure of hydrocarbons.

CO4: Compare the physical and chemical properties of Hydrocarbons.

CO5: Analyze the applications of various hydrocarbons and their derivatives.

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**2**	**-**	**2**	–	–	–	–	–	–	–	–
CO2	**3**	**1**	**2**	**-**	–	–	–	–	–	–	–	–
CO3	**2**	**1**	**3**	**-**	–	–	–	–	–	–	–	–
CO4	**3**	**2**	**0**	**2**	–	–	–	–	–	–	–	–
CO5	**2**	**-**	**3**	**-**	–	–	–	–	–	–	–	**1**

MAPPING OF COURSE OUTCOMES WITH PROGRAMME SPECIFIC OUTCOME

	PSO1	PSO2	PSO3
CO1	3	–	–
CO2	3	–	–
CO3	3	–	–
CO4	3	–	–
CO5	3	–	–

A. OUTLINE OF THE COURSE

Unit No.	Title of the Unit	Time required for the Unit (Hours)
1.	**Fundamentals of Organic Chemistry**	**8**
2.	**Alkanes**	**7**
3.	**Alkenes**	**7**
4.	**Alkynes**	**7**
5.	**Cycloalkanes, Cycloalkenes & Dienes**	**7**

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Fundamentals of Organic Chemistry**
	• Introduction of the Unit • Electronic displacements: inductive effect, electromeric effect, resonance and hyperconjugation • Cleavage of Bonds: homolysis and heterolysis • Structure, shape and reactivity of organic molecules: nucleophiles and electrophiles • Reactive Intermediates: carbocations, carbanions and free radicals , nitrene, carbene, benzyne, Assigning formal charge • Types of organic reactions, energy considerations. • Methods of determination of reaction mechanism (product analysis, intermediates, isotope effects, kinetic and stereochemical studies)

	• •Conclusion of the Unit
2.	**Alkanes**
	• Introduction of the Unit • Alkanes:(Upto 5 Carbons) • IUPAC nomenclature of branched and unbranched alkyl group • Classification of carbon atoms in alkanes, Physical properties • Preparation: catalytic hydrogenation, Wurtz reaction, Kolbe synthesis, decarboxylation of carboxylic acid, Grignard reagent, Corey-house reaction • Reactions: free radical substitution: halogenations • Reactivity and selectivity • •Conclusion of the Unit
3.	**Alkenes**
	• Introduction of the Unit • Alkenes: (Upto 5 Carbons) • Preparation: elimination reactions: dehydration of alcohols and dehydrohalogenation of alkyl halides (Saytzeff's rule); cis alkenes (partial catalytic hydrogenation) and trans alkenes (birch reduction), Hofmanns elimination • Chemical reactions of alkenes –electrophilic and free radical additions. Epoxidation, mechanisms involved in hydrogenation, oxidation with $KMn0_4$, Substitution at the allylic and vinylic positions of alkenes, polymerization of alkenes • Reactions: cis-addition (alk. KMnO4) and trans-addition (bromine), addition of HX (Markownikoff's and anti-Markownikoff's addition), hydration, ozonolysis, oxymecuration–demercuration, Hydroboration-oxidation. • Industrial application of ethylene and propene • •Conclusion of the Unit
4.	**Alkynes**
	• Introduction of the Unit • Alkynes: (Upto 5 Carbons) • Preparation: Acetylene from CaC_2 and conversion into higher alkynes; by dehalogenation of tetra halides and dehydrohalogenation of vicinal-dihalides, acidity of alkynes • Reactions: formation of metal acetylides, addition of bromine and alkaline $KMnO_4$, • ozonolysis and oxidation with hot alkaline. $KMnO_4$,hydroboration- oxidation, metal ammonia reduction, polymerization • •Conclusion of the Unit
5.	**Cycloalkanes, Cycloalkenes&Dienes**
	• Introduction of the Unit • Cycloalkanes: Nomenclature, method of formation, chemical reactions • Baeyer strain theory and its limitations • Ring strain in small rings (cyclopropane and cyclobutane), theory of strainless rings, Mohrs Sachse theory • The case of cyclopropane ring: banana bond • Cycloalkenes: Nomenclature, method of formation, chemical reactions • Dienes: Nomenclature and classification of dienes • Structure of allenes and butadiene, methods of formation, polymerization, chemical reactions, 1,2and 1,4- additions, Diels-Alder reaction • conjugated and cumulated dienes • •Conclusion of the Unit

C. RECOMMENDED STUDY MATERIAL:

Sr. No	Reference Book	Author	Edition	Publication
1	A Text Book of Organic Chemistry	O. P. Agarwal	Vol. I & II	Latest
2.	A Text Book of Organic Chemistry	B. S. Bahl and ArunBahl	Latest	S. Chand
3.	Organic Chemistry	S. M. Mukherji, S. P. Singh and R. P. Kapoor	Vol. I, II & III	Wiley Eastern Ltd. (New Age International)
4.	Organic Chemistry	Morrison & Boyd	Latest	Prentice Hall

Code: BSACSA1104	CALCULUS	3.0 Credits [LTP: 3-0-0]

COURSE OUTCOME: Students would be able to**:**

CO1: Solve mathematical problems using ordinary, partial differentiation equations.

CO2: Obtain Maxima and Minima of functions of two or more variables.

CO3: Calculate radius of curvature and asymptotes of curves using cartesian form and polar form.

CO4: Solve the integration, surface and volume of curves using Beta and Gamma functions.

CO5: Evaluate double and triple integrals using volume and surface area.

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**2**	**1**	**2**	–	–	–	–	–	–	–	–
CO2	**3**	**1**	**2**	**2**	–	–	–	–	–	–	–	–
CO3	**3**	**1**	**2**	**2**	–	–	–	–	–	–	–	–
CO4	**3**	**2**	**1**	**2**	–	–	–	–	–	–	–	–
CO5	**2**	**3**	**1**	**2**	–	–	–	–	–	–	–	–

MAPPING OF COURSE OUTCOMES WITH PROGRAMME SPECIFIC OUTCOME

	PSO1	PSO2	PSO3
CO1	3	-	–
CO2	3	2	–
CO3	3	-	–
CO4	3	2	–
CO5	3	2	–

A. OUTLINE OF THE COURSE

Unit No.	Title of the Unit	Time required for the Unit(Hours)
1	**Differential Calculus I**	**8**
2	**Differential Calculus II**	**6**
3	**Geometrical Applications of Differential Calculus**	**7**
4	**Integral Calculus**	**7**
5	**Multiple Integrals and Its Applications**	**8**

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Differential Calculus I**
	• Introduction of Unit • Successive differentiation • Partial differentiation • Euler's theorem on homogeneous functions • Total differentiation • •Conclusion of the Unit
2.	**Differential Calculus II**

	• Introduction of Unit • Maxima and minima for functions of two or more variables • Lagrange's method (without proof) • Derivative of length of an arc • •Conclusion of the Unit
3.	**Geometrical Applications of Differential Calculus**
	• Introduction of Unit • Curvature, Radius of Curvature (Cartesian Curves only) • Asymptotes • Curve tracing for standard Curves (Cartesian and Polar Curves) • •Conclusion of the Unit
4.	**Integral Calculus**
	• Introduction of Unit • Beta and gamma Functions • Reduction formulae (simple Standard Formulae) • Volume and surface of solid of revolution • •Conclusion of the Unit
5.	**Multiple Integrals and Its Applications**
	• Introduction of Unit • Double integral in Cartesian and polar coordinates • Change of order of integration, • Triple integral • Applications of multiple integrals in volume and surface • •Conclusion of the Unit

C. RECOMMENDED STUDY MATERIAL:

Sr.No	Reference Book	Author	Edition	Publication
1.	Calculus	H. Anton, I. Birens and S. Davis,	2002	John Wiley and Sons
2.	Calculus	G.B. Thomas and R.L. Finney,	2007	Pearson Education, India
3.	Differential and Integral Calculus	Chandrika Prasad and Gorakh Prasad	1992	Pothishala Pvt. Ltd., Allahabad

Code: BSACSA1105 VECTOR CALCULUS AND MATRICES 3.0 Credits [LTP: 3-0-0]

COURSE OUTCOME: Students would be able to:

CO1: Manipulate vectors to perform geometrical calculations in three dimensions.
CO2: Obtain important features of operator and its various forms in gradient, divergenceand curl.
CO3: Use Green's theorem, Stokes theorem and the Divergence theorem to compute integrals
CO4: Analysis the basic concept of matrices and their various properties.
CO5: Obtain the solution of Eigen value and Eigen vectors and inverse of matrix using Cayley Hamilton theorem.

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**1**	**2**	**2**	–	–	–	–	–	–	–	–
CO2	**3**	**2**	**1**	**2**	–	–	–	–	–	–	–	–
CO3	**2**	**3**	**1**	**2**	–	–	–	–	–	–	–	–
CO4	**2**	**2**	**2**	**3**	–	–	–	–	–	–	–	–
CO5	**3**	**2**	**1**	**2**	–	–	–	–	–	–	–	–

MAPPING OF COURSE OUTCOMES WITH PROGRAMME SPECIFIC OUTCOME

	PSO1	PSO2	PSO3
CO1	3	2	–
CO2	3	2	–
CO3	3	-	–
CO4	3	-	–
CO5	3	2	–

A. OUTLINE OF THE COURSE

Unit No.	Title of the Unit	Time required for the Unit(Hours)
1	**Vector Calculus I**	**8**
2	**Vector Calculus II**	**7**
3	**Vector Calculus III**	**7**
4	**Matrix**	**8**
5	**Eigen Values and Eigen Vectors**	**6**

B. **DETAILED SYLLABUS**

Unit	Unit Details
1.	**Vector Calculus I**
	• Introduction of Unit • Scalar and Vector quantity, • Representation of vectors, Laws of vector additions, • Product of two vectors, Scalar and vector fields, • Derivative of a vector function, Velocity and accelerations • •Conclusion of the Unit
2.	**Vector Calculus II**

	• Introduction of Unit • Del operator, Gradient, Divergence and Curl. • Directional derivative • Integration of vectors, • Line Integral • •Conclusion of the Unit
3.	**Vector Calculus III**
	• Introduction of Unit • Surface and Volume Integration. • Green's, Gauss's and Stokes's theorem(without Proof) and their simple applications • •Conclusion of the Unit
4.	**Matrix**
	• Introduction of Unit • Types of matrices and elementary operations on matrices • Rank of a matrix, Normal form • Consistency of system of linear simultaneous equations (Homogeneous and Nonhomogeneous) and its solutions • •Conclusion of the Unit
5.	**Eigen Values and Eigen Vectors**
	• Introduction of Unit • Characteristic equation • Eigen values and Eigen vectors • Cayley - Hamilton theorem and its application to find inverse of matrix • Diagonalisation of matrix • •Conclusion of the Unit

C. RECOMMENDED STUDY MATERIAL:

Sr.No	Reference Book	Author	Edition	Publication
1.	Vector Calculus	Speigel	5th Edition	Tata McGraw Hill, 1989.
2.	Vector Calculus	J.L Bansal	1989	JPH, Jaipur
3.	Theory and Problems of Matrix Operations	S Richard Bronson	1995	Tata McGraw Hill, 1989.

Code: BSACSA1201	CHEMISTRY LAB-I	1.0 Credit [LTP: 0-0-2]

COURSE OUTCOMES: Students will be able to:

CO1: Design and carry out scientific experiments as well as accurately record and analyze the resultsof such experiments.

CO2: Impart the students a thorough knowledge of Systematic qualitative analysis of mixturescontaining two acid and two basic radicals

CO3: Develop skills for quantitative estimation using the different branches of volumetric Analysis.CO4: Develop skills required for the qualitative analysis of organic compounds

CO5: Learn and apply basic techniques used in the organic laboratory for preparation, purification and identification of organic compounds.

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**2**	**3**	**2**	–	–	–	–	–	–	–	–	–
CO2	**2**	**2**	**3**	–	–	–	–	–	–	–	–	–
CO3	**2**	**3**	**3**	–	–	–	–	–	–	–	–	–
CO4	**2**	**3**	**2**	–	–	–	–	–	–	–	–	–
CO5	**2**	**2**	**3**	–	–	–	–	–	–	–	–	–

MAPPING OF COURSE OUTCOMES WITH PROGRAMME SPECIFIC OUTCOME

	PSO1	PSO2	PSO3
CO1	3	–	–
CO2	3	–	–
CO3	3	–	–
CO4	3	–	–
CO5	3	–	–

LIST OF EXPERIMENTS

Inorganic Chemistry	
1	To analyze mixture contains two acidic and two basic radicals in a given mixture.
2	To analyze mixture contains two acidic and two basic radicals in a given mixture.
3	To analyze mixture containing three acidic and three basic radicals.
4	To analyze mixture containing three acidic and three basic radicals.
5	To analyze mixture containing three acidic and three basic radicals.
6	Estimation of $KMnO_4$ by oxalic acid.
Organic Chemistry	
7	To detect the functional group from the given organic compound (Alcohol/carbonylcompound).
8	To detect the functional group from the given organic compound (Nitrogen containingcompound).
9	To determine the melting point of given organic compound (Naphthalene).
10	To determine the melting point of given organic compound (Urea).
11	To determine the boiling point of given organic compound (Ethanol).
12	To determine the boiling point of given organic compound (Benzene).

Code: BSACSA1202	PHYSICS LAB-I	1 Credits [LTP: 0-0-2]

COURSE OUTCOMES: Students will be able to:

CO1: Learn the constants of elasticity by the help of different methods.
CO2: Learn the concept of Poisson's ratio and surface tension of water.
CO3: Learn conversion of Galvanometer to Ammeter and Voltmeter.
CO4: Learn to evaluate of RLC and CR, DC circuits.
CO5: Identify and calculate the magnetic field around a current carrying circular coil.

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**2**	**–**	**2**	**–**	**–**	**–**	**–**	**–**	**–**	**3**	**2**
CO2	**2**	**3**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**2**	**3**
CO3	**2**	**3**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**2**	**3**
CO4	**–**	**3**	**–**	**2**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**3**
CO5	**3**	**3**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**3**	**3**

MAPPING OF COURSE OUTCOMES WITH PROGRAMME SPECIFIC OUTCOME

	PSO1	PSO2	PSO3
CO1	3	–	–
CO2	3	–	–
CO3	3	–	–
CO4	3	–	–
CO5	3	–	–

LIST OF EXPERIMENTS

1	Study of bending of a beam and determination of Young's modulus
2	Modulus of rigidity by Dynamical method (Maxwell's needle)
3	Elastic constant by Searle's method
4	To determine the Poisson's ratio of a rubber tube
5	Determination of surface tension of water by Jaegger's method
6	Convert Galvanometer to ammeter into a given range.
7	Convert Galvanometer to voltmeter into a given range.
8	Study of phase relations in CR circuit
9	Study of phase relations in LCR circuit
10	Study of Faraday's Law
11	To determine the modulus of rigidity by statically method.
12	To study the magnetic field along the axis of a current carrying circular coil and find the radius of circular coil.

Code: BSACSA1203 **EXPLORATORY PROJECT-I** **1 Credits [LTP: 0-0-2]**

COURSE OUTCOMES: Students would be able to:

CO1: Predict a problem of current relevance to society
CO2: Formulate the problem and identify suitable modelling paradigm
CO3: Categorize the problem and identify the solution methodology
CO4: Simulate and design systems using various modern tools
CO5: Validate the results and prepare a project report

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	–	–	–	–	–	–	–	–	–	–	**3**	**3**
CO2	–	–	–	–	–	–	–	–	–	–	**3**	**3**
CO3	–	–	–	–	–	–	–	–	–	–	**3**	**3**
CO4	–	–	–	–	–	–	–	–	–	–	**3**	**3**
CO5	–	–	–	–	–	–	–	–	–	–	**3**	**3**

MAPPING OF COURSE OUTCOMES WITH PROGRAMME SPECIFIC OUTCOME

	PSO1	PSO2	PSO3
CO1	3	–	–
CO2	3	–	–
CO3	3	–	–
CO4	3	–	–
CO5	3	–	–

List of Activity

1	Allocation of groups Max. 2 Members & guide
2	Black board presentation on topics as per the choice & feasibility
3	Submission of abstract & synopsis of the project
4	Procurement of the components
5	2D/3D figure or model
6	Paper work like any circuit diagram and tentative cost
7	Final project report submission
8	Final presentation

Code: BULCHU1202 FOUNDATION ENGLISH 1 Credits [LTP: 0-0-2]

COURSE OUTCOMES: Students would be able to:

CO1: Demonstrate the grammar skills involved in writing sentences and short paragraphs.

CO2: Build up a good command over and vocabulary to be able to ace error spotting.

CO3: Define unknown words in sentence level context using a picture dictionary or by creating a memory link for support.

CO4: Understand, analyze and effectively use the conventions of the English language.

CO5: Develop their interest in reading and enhance their oral and silent reading skills along with sharpen their critical and analytical thinking.

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	–	–	–	–	–	–	–	–	–	3	–	2
CO2	–	–	–	–	–	–	–	–	–	3	–	2
CO3	–	–	–	–	–	–	–	–	–	3	–	2
CO4	–	–	–	–	–	–	–	–	–	3	–	2
CO5	–	–	–	–	–	–	–	–	–	3	–	2

MAPPING OF COURSE OUTCOMES WITH PROGRAMME SPECIFIC OUTCOME

	PSO1	PSO2	PSO3
CO1	–	–	3
CO2	–	–	3
CO3	–	–	3
CO4	–	–	3
CO5	–	–	3

A. OUTLINE OF THE COURSE

Unit No.	Title of the Unit	Time required for the Unit (Hours)
1	**Basics of Grammar**	8
2	**Spotting the Grammatical Errors and Rectification**	2
3	**Vocabulary Building**	4
4	**Basics of Writing Skills**	2
5	**Reading Comprehension**	8

B. DETAILED SYLLABUS

	LIST OF LABS
1.	Parts of Speech: Theory & Practice through various Exercises
2.	Sentence Structures: Theory & Practice through various Exercises
3.	Tenses: Theory & Practice through various Exercises
4.	Spotting the Errors: Applying the rules and Practice Questions
5.	Vocabulary Building-I: Practice by sentence formation
6.	Vocabulary Building-II: Practice by sentence formation
7.	Paragraph Writing
8.	Article Writing
9.	Précis Writing

10.	Formal & Informal Letter Writing
11.	Reading Comprehension- I: Beginner's level reading and Answering the Questions (Competitive Exams)
12.	Reading Comprehension- II: Intermediate's level reading and Answering the Questions (Competitive Exams)

Code: BULCSE1201 SKILL ENHANCEMENT GENERIC COURSES-I 1 Credit [LTP: 0-0-2]

COURSEOUTCOMES: Students will be able to:

CO.1: Enhance problem solving skills.
CO.2: Prepare for various public and private sector exams & placement drives
CO.3: Communicate effectively & appropriately in real life situation.
CO.4: Improve verbal ability skill among students.
CO.5: Enrich their knowledge and to develop their logical reasoning thinking ability.

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	–	–	2	–	–	–	–	–	–	2	–	2
CO2	–	–	2	–	–	–	–	–	–	2	–	2
CO3	–	–	2	–	–	–	–	–	–	2	–	2
CO4	–	–	2	–	–	–	–	–	–	2	–	2
CO5	–	–	2	–	–	–	–	–	–	2	–	2

MAPPING OF COURSE OUTCOMES WITH PROGRAMME SPECIFIC OUTCOME

	PSO1	PSO2	PSO3
CO1	–	–	3
CO2	–	–	3
CO3	–	–	3
CO4	–	–	3
CO5	–	–	3

LIST OF ACTIVITIES	
1	SMART Goals, Goal Setting (IKIGAI), Wheel of Satisfaction, Exchanging pleasantries
2	Root Words, Prefix-Suffix, Antonyms, Synonyms & Analogies, Sentence Correction-1
3	Numbers, Relations & Functions, HCF & LCM, Average & Divisibility
4	Resume Tips & Resume Review
5	How to win friends & Influence people, Sentence Correction-2
6	Series & Progressions
7	Number Series & Letter Series, Crypto-arithmetic, SWOT/SWOC
8	Percentage, Profit & Loss, Ratio Proportion, CI & SI
9	Mixtures and Allegations, Short Cut Tricks, Seating Arrangement, Sequencing & Ranking
10	Surds & Indices, Problem on ages, Solving Equations - Quadratic & Linear
11	Time & Distance, Boats & Streams, Clocks and Calendars
12	GD, Practice of GD, Reading and Comprehension

Code: BUVCSA1102 ENVIRONMENTAL STUDIES 2.0 Credits [LTP: 2-0-0]

COURSEOUTCOMES: Students will be able to:

CO.1: Understand the scope of environmental studies and explain the concept of ecology, ecosystem and biodiversity.

CO2: Implement innovative ideas of controlling different categories of Environmental Pollution.

CO3: Explain different environmental issues together with various Environmental Acts, regulations and International Agreements.

CO4: Summarize social issues related to population, resettlement and rehabilitation of project affected persons and demonstrate disaster management with special reference to floods, earthquakes, cyclones, landslides.

CO5: Determine the local environmental assets with simple ecosystems and identify local flora and fauna.

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	–	–	–	–	–	–	**2**	**2**	–	–	–	**1**
CO2	–	–	–	–	–	–	**3**	**2**	–	–	**1**	**1**
CO3	–	–	–	–	–	–	**2**	**3**	–	–	**1**	**1**
CO4	–	–	–	–	–	–	**3**	**2**	–	–	**1**	**1**
CO5	–	–	–	–	–	–	**2**	**3**	–	–	**1**	**1**

MAPPING OF COURSE OUTCOMES WITH PROGRAMME SPECIFIC OUTCOME

	PSO1	PSO2	PSO3
CO1	3	-	-
CO2	3	-	-
CO3	3	-	-
CO4	3	-	-
CO5	3	-	-

A. OUTLINE OF THE COURSE

Unit No.	Title of the Unit	Time required for the Unit (Hours)
1.	Introduction to Environmental Studies	**5**
2.	Environmental Pollution and its Control	**5**
3.	Environmental Policies & Practices	**5**
4.	Human Communities and the Environment	**5**
5.	Field Work	**4**

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Introduction to Environmental studies**
	• Introduction of Unit • Multidisciplinary nature of environmental studies Concept of sustainability and sustainable development. • Ecosystem: Structure and function of ecosystem • Energy flow in an ecosystem: food chains, food webs and ecological succession. Case studies\ • Case studies of the following ecosystems: Forest ecosystem, Grassland ecosystem, Desert ecosystem

	• Aquatic ecosystems • Biodiversity and Conservation Conclusion of the Unit
2.	**Environmental Pollution and its Control**
	• Introduction of Unit • Environmental pollution: types, causes, effects and controls; Air, water, soil and noise pollution • Nuclear hazards and human health risks • Solid waste management: Control measures of urban and industrial waste. • Pollution case studies • Conclusion of the Unit
3.	**Environmental Policies & Practices**
	• Introduction of Unit • Climate change, global warming, ozone layer depletion, acid rain and impacts on human communities and agriculture • Energy resources: Renewable and non-renewable energy sources, use of alternate energy sources, growing energy needs, case studies. • Environment Laws: Environment Protection Act; Air (Prevention & Control of Pollution) Act; Water (Prevention and control of Pollution) Act; Wildlife Protection Act; Forest Conservation Act. • International agreements: Montreal and Kyoto protocols and Convention on Biological Diversity (CBD) • Conclusion of the Unit
4.	**Human Communities and the Environment**
	• Introduction of Unit • Human population growth: Impacts on environment, human health and welfare. • Resettlement and rehabilitation of project affected persons; case studies. • Disaster management: floods, earthquake, cyclones and landslides. • Conclusion of the Unit
5.	**Field Work**
	• Introduction of Unit • Visit to an area to document environmental assets: river/ forest/ flora/fauna, etc. • Visit to a local polluted site-Urban/Rural/Industrial/Agricultural. • Study of common plants, insects, birds and basic principles of identification. • Study of simple ecosystems-pond, river, Delhi Ridge, etc. • Conclusion of the Unit

C. RECOMMENDED STUDY MATERIAL:

S. No	Reference Book	Author	Edition	Publication
1	Environmental Studies	ErachBarucha	Latest	UGC
2	Environmental Studies	Benny Joseph	Latest	Tata McgrawHill
3	Environmental Studies	R. Rajagopalan	Latest	Oxford University Press
4	Principles of Environmental Science and Engineering	P. Venugoplan Rao	Latest	Prentice Hall of India.
5	Environmental Science and Engineering	Meenakshi	Latest	Prentice Hall India.

CODE: BSACSA2101	OPTICS	3.0 Credits [LTP: 3-0-0]

COURSE OUTCOMES: Students will be able to-

CO1: Exercise the method to produce coherent sources and phenomena of interference.

CO2: Prepare& demonstrate the comprehensive knowledge of polarization and its applications**.**

CO3: Produce Holography and LASER assembly, types of LASER and its wide application from medical to industry

CO4: Learn & exhibit the in-depth knowledge of Laser light and apply it for suitable applications

CO5: Prepare the arrangement of Fraunhofer diffraction and apply it for suitable applications.

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**2**	**2**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**
CO2	**3**	**2**	**3**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**
CO3	**3**	**3**	**2**	**2**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**
CO4	**3**	**2**	**2**	**3**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**
CO5	**2**	**3**	**2**	**3**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**

MAPPING OF COURSE OUTCOMES WITH PROGRAMME SPECIFIC OUTCOME

	PSO1	PSO2	PSO3
CO1	3	-	-
CO2	3	-	-
CO3	3	-	-
CO4	3	-	-
CO5	3	-	-

A. OUTLINE OF THE COURSE

Unit No.	Title of the Unit	Time required for the Unit (Hours)
1.	**Interference**	**7**
2.	**Polarization**	**9**
3.	**Laser and Holography**	**6**
4.	**Holography**	**6**
5.	**Fraunhofer Diffraction**	**9**

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Interference**
	• Introduction of the Unit • Division of Amplitude and Division of Wave front • Interference in Thin Films: Parallel and Wedge-shaped Films • Fringes of Equal Inclination and Fringes of Equal Thickness • Newton's Rings: Measurement of Wavelength and Refractive Index • Michelson's Interferometer and their applications • •Conclusion of the Unit
2.	**Polarization**

	• Introduction of the Unit • Concept of polarization • Different kind of polarized lights • Malus law and Brewster's law • Double refraction • Quarter wave and half wave plate • Production and detection of different polarized lights • Specific Rotation: Half shade polarimeter • Determination of specific rotation of sugar solution by polarimeters • •Conclusion of the Unit
3.	**Laser**
	• Introduction of the Unit • Theory of LASER action: Absorption, spontaneous emission and stimulated emission • Einstein's coefficients • Threshold conditions for LASER Action • Method and Mechanism of production of He-Ne LASER, Semiconductor Laser • Application of Laser • •Conclusion of the Unit
4.	**Holography**
	• Introduction of the Unit • Holography versus photography • Principle of Holography • Applications of Holography in Microscopy and Interferometry • Optical Fibre: Principle, construction • Numerical Aperature Derivation • •Conclusion of the Unit
5.	**Fraunhofer Diffraction**
	• Introduction of the Unit • Diffraction due to (1) a Single Slit (2) a Plane Transmission Grating • Characteristics of plane transmission grating • Rayleigh's criterion of resolution • Resolving Power and Dispersive Power of a Plane Diffraction Grating • Comparison of grating and prism spectra • •Conclusion of the Unit

C. **RECOMMENDED STUDY MATERIAL:**

Sr.No	Reference Book	Author	Edition	Publication
1.	Optics	N. Subramanyam and BrijLal	Latest	S. Chand Publication, Delhi
2.	Optics	AjoyGhatak	Latest	TMH, New Delhi
3.	Fundamentals of Optics	F. A. Jenkins and Harvey Elliott White	Latest	McGraw-Hill

Code: BSACSA2102 WAVES AND OSCILLATIONS 3.0 Credits [LTP: 3-0-0]

COURSE OUTCOMES: Students will be able to:

CO1: Produce about simple harmonic motion of different systems.
CO2: Point out about superposition of two Collinear Harmonic Oscillations.
CO3: Learn and exhibit knowledge about system having two degrees of freedom.
CO4: Prepare equation of motion of waves and its properties.
CO5: Classify the waves in bounded medium and its properties with respect to position and time.

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**2**	**2**	**3**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**
CO2	**3**	**2**	**3**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**
CO3	**3**	**2**	**2**	**3**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**
CO4	**3**	**3**	**2**	**1**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**
CO5	**–**	**2**	**3**	**3**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**

MAPPING OF COURSE OUTCOMES WITH PROGRAMME SPECIFIC OUTCOME

	PSO1	PSO2	PSO3
CO1	3	-	-
CO2	3	-	-
CO3	3	-	-
CO4	3	-	-
CO5	3	-	-

A. OUTLINE OF THE COURSE

Unit No.	Title of the Unit	Time required for the Unit (Hours)
1.	**Simple Harmonic Motion**	**7**
2.	**Driven Harmonic Oscillator**	**7**
3.	**Coupled Oscillator**	**6**
4.	**Wave Motion**	**9**
5.	**Waves in the Bounded Medium**	**7**

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Simple Harmonic Motion**
	• Introduction of the Unit • Simple harmonic motion, examples-spring mass system, mass on a spring, torsional oscillator, • LC circuit, energy of the oscillator • Differential equation of simple harmonic motion and its general solution • Damped harmonic oscillator, Mathematical formulation of damped harmonic oscillator, • Energy of damped oscillator, • Power dissipation, Relaxation time, Quality factor of damped harmonic oscillator • •Conclusion of the Unit
2.	**Driven Harmonic Oscillator**

	• Introduction of the Unit • Driven harmonic oscillator • Mathematical formulation of driven harmonic oscillator • Frequency response on amplitude and phase • Quality factor of driven oscillator • Resonance • Sharpness of resonance • Power absorption by forced oscillator • Series and parallel LCR circuit • •Conclusion of the Unit
3.	**Coupled Oscillator**
	• Introduction of the Unit • Equation of motion of two coupled simple harmonic oscillators • Normal modes • Energy transfer between modes • Electrically coupled circuits (capacitive and inductive) • Effect of coupling and resistive load • •Conclusion of the Unit
4.	**Wave Motion**
	• Introduction of the Unit • Plane and Spherical Waves • Longitudinal and Transverse Waves • Plane Progressive (Travelling) Waves • Particle and Wave Velocities • Transverse wave in a stretched string • Velocity of transverse vibrations of stretched strings • Newton's formula for velocity of sound • Laplace's correction • •Conclusion of the Unit
5.	**Waves in the Bounded Medium**
	• Introduction of the Unit • Standing (Stationary) waves in a string: Fixed and free ends • Normal modes of stretched strings • Longitudinal standing waves and normal modes • Open and closed pipes • Flow of energy in stationary waves • Phase and group velocities • •Conclusion of the Unit

C. RECOMMENDED STUDY MATERIAL:

Sr.No	Reference Book	Author	Edition	Publication
1.	Vibrations and Waves	A. P. French	1987	CBS Pub. &Dist
2.	Fundamentals of Waves & Oscillations	K. Uno Ingard	1988	University Press
3.	An Introduction to Mechanics	Daniel Kleppner and Robert J. Kolenkow	1973	Tata McGrawHill

CODE: BSACSA2103 ORGANIC CHEMISTRY 3.0 Credits [LTP: 3-0-0]

COURSE OUTCOMES: Students will be able to:

CO1: Distinguish between aromatic and antiaromatic compounds by comparing their structures along with their electrophilic aromatic substitution reactions.

CO2: Explain basic principles of stereochemistry as well as differentiate configuration andconformation, Flying wedge and Fischer projection formula

CO3: Categorize Nucleophilic Substitution (S_N1, S_N2 and S_Ni) reactions with energy profilediagram.

CO4: Explain the addition-elimination and the elimination-addition mechanisms of nucleophilic aromatic substitution reaction, relative reactivities of alkyl, allyl, vinyl and arylhalides.

CO5: Classify and prepare 1°, 2° and 3° alcohols and demonstrate their reaction.

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**2**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	**3**	**-**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	**2**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	**3**	**2**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

MAPPING OF COURSE OUTCOMES WITH PROGRAMME SPECIFIC OUTCOME

	PSO1	PSO2	PSO3
CO1	3	-	-
CO2	3	-	-
CO3	3	-	-
CO4	3	-	-
CO5	3	-	-

A. OUTLINE OF THE COURSE

Unit No.	Title of the Unit	Time required for the Unit(Hours)
1.	**Aromaticity**	**7**
2	**Stereochemistry**	**8**
3.	**Alkyl Halides**	**7**
4.	**Aryl Halides**	**7**
5.	**Alcohols**	**7**

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Aromaticity**
	• Introduction of the Unit • Aromaticity:Nomenclature of benzene derivatives. The aryl group, aromatic nucleus and side chain. • Structure of benzene: Kekule structure. • Resonance theory and Molecular orbital theory • Stability and carbon-carbon bond lengths of benzene, resonance structure, MO diagram • Hückel's rule, aromatic character of arenes, cyclic carbocations/carbanions and heterocyclic compounds with suitable examples

	• Electrophilic aromatic substitution: mechanism, role of sigma and pi-complexes. • Halogenation, sulphonation, mercuration, Friedel-Crafts reactions and Mechanism of nitration, chloromethylation. • Energy profile diagrams. Activating and dectivating substituents. • Directive influence - orientation and ortho/para ratio. • Side chain reactions of benzene derivatives. Birch Reduction. •Conclusion of the Unit
2.	**Stereochemistry**
	• Introduction of the Unit • Concept of isomerism • Types of isomerism • Difference between configuration and conformation, • Flying wedge and Fischer projection formula • Optical isomerism- Elements of symmetry, molecular chirality, stereogenic centre, optical activity • Properties of enantiomers, chiral and achiral molecules with two stereogeniccentre • Diastereomers,threo and erythro isomers • Mesocompounds • Resolution of enantiomers • Inversion, retention and racemization. • Relative and absolute configuration, sequence rules ,D and L and R/S system of nomenclature. • Geometric isomerism-Determination of configuration of geometrical isomers, ; *cis–trans* and E / Z nomenclature • Geometric isomerism in oximes and alicyclic compounds • Conformational isomerism-Newman projection and saw house formula • Conformational analysis of ethane, n butane and cyclo hexane • •Conclusion of the Unit
3.	**Alkyl Halides**
	• Introduction of the Unit • (Upto 5 Carbons) Nomenclature • Preparation*:* from alkenes *and* alcohols, methods of formation of alkyl halides. • Reactions: hydrolysis, nitrite & nitro formation, nitrile &isonitrile formation. Williamson's ether synthesis: Elimination versus substitution • Types of Nucleophilic Substitution (SN1, SN2 and SNi) reactions with energy profile diagram • Polyhalogen compounds: Chloroform, carbon tetrachloride, DDT, BHC • •Conclusion of the Unit
4.	**Aryl Halides**
	• Introduction of the Unit • Aryl Halides Preparation:(Chloro, bromo and iodo-benzene case): from phenol, Sandmeyer & Gattermann reactions • Methods of formation of aryl halides, nuclear and side chain reactions. The addition-elimination and the elimination-addition mechanisms of nucleophilic aromatic substitution reactions. Relative reactivities of alkyl, allyl, vinyl and aryl halides • Reactions *(*Chlorobenzene*):* Aromatic nucleophilic substitution (replacement by –OH group) and effect of nitro substituent. Benzyne Mechanism: KNH_2/NH_3 (or $NaNH_2/NH_3$). • Reactivity and Relative strength of C-Halogen bond in alkyl, allyl, benzyl, vinyl and aryl halides

	• •Conclusion of the Unit
5.	**Alcohols**
	• Introduction of the Unit • Alcohols: • Classification and Nomenclature**.** • Monohydric Alcohols-Preparation*:* Preparation of 1^o, 2^o and 3^o alcohols: using Grignard reagent, Ester hydrolysis, Reduction of aldehydes, ketones, carboxylic acid and esters,Hydogen bonding, Acidic Nature • Reactions*:* With sodium, HX (Lucas test), esterification, oxidation (with PCC, alk. $KMnO_4$, acidic dichromate, conc. HNO_3), Oppeneauer oxidation • Dihydric Alcohols*:* (Upto 6 Carbons) Methods of Formation, Chemical Reactions of Vicinal Glycols, oxidation of diols, Pinacol-Pinacolone, rearrangement. • TrihydricAlcohols : Methods of Formation, Chemical Reactions of Glycerols. • •Conclusion of the Unit

C. RECOMMENDED STUDY MATERIAL:

Sr.No	Reference Book	Author	Edition	Publication
1	A Text Book of Organic Chemistry	K. S. Tiwari, S. N. Mehrotra and N. K. Vishnoi	Latest	Vikas Publishing House
2.	Modern Principles of Organic Chemistry	M. K. Jain & S. C. Sharma	2015	Vishal Publishing Co
3	A Text Book of Organic Chemistry	B. S. Bahl and ArunBahl	Latest	S. Chand
4	Organic Chemistry	S. M. Mukherji, S. P. Singh and R. P. Kapoor	Vol. I, II & III	Wiley Eastern Ltd. (New Age International)
5	Organic Chemistry	Morrison & Boyd	Latest	Prentice Hall

CODE: BSACSA2104 NUMERICAL ANALYSIS 3.0 Credits [LTP: 3-0-0]

COURSE OUTCOMES: Students will be able to:

CO1: Solve equal and unequal intervals for Interpolation problem.

CO2: Apply numerical methods to obtain approximate solutions to mathematical problems.CO3: Solve the linear simultaneous equations using numerical methods

CO4: Solve the transcendental and algebraic equations using Secant, Regula Falsi, Successive iteration method, Newton-Raphson etc.

CO5: Analyze the numerical methods to solve differential equations.

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**1**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	**3**	**2**	**1**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	**3**	**2**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	**3**	**2**	**1**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	**3**	**2**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

MAPPING OF COURSE OUTCOMES WITH PROGRAMME SPECIFIC OUTCOME

	PSO1	PSO2	PSO3
CO1	3	2.1	-
CO2	3	-	-
CO3	3	2	-
CO4	3	2	-
CO5	3	2	-

A OUTLINE OF THE COURSE

Unit No.	Title of the Unit	Time required for the Unit (Hours)
1	**Interpolation**	**9**
2	**Numerical Differentiation and Integration**	**6**
3	**Numerical Solution of Linear Simultaneous Equations**	**6**
4	**Numerical Solution of Algebraic and Transcendental Equations**	**7**
5	**Numerical Solution of Ordinary Differential Equations**	**8**

B. DETAILED SYLLABUS

Unit	Unit Details
1	**Interpolation**
	• Introduction of the Unit • Interpolation: Differences, relation between differences and derivatives. • Newton's formulae for forward and backward interpolation, • Sterling's formula, Divided difference, Newton's divided difference,

	• Lagrange's interpolation formula •Conclusion of the Unit
2	**Numerical Differentiation and Integration:**
	• Introduction of the Unit • Numerical differentiation simple methods, • Numerical integration: Derivation of General Quadrature formulas, • Trapezoidal rule, Simpson's one third and Simpson's three eighth rule, • Gauss Quadrature Formulae • •Conclusion of the Unit
3	**Numerical Solution of Linear Simultaneous Equations**
	• Introduction of the Unit • Solution of linear simultaneous equations: • Direct methods - Gauss elimination • Gauss-Jordan • LU decomposition • Gauss-Seidel method • •Conclusion of the Unit
4	**Numerical Solution of Algebraic and Transcendental Equations:**
	• Introduction of the Unit • Solution of algebraic and transcendental equations using • Bisection method • Secant method • Regula Falsi method • Successive iteration method, • Newton-Raphson method • •Conclusion of the Unit
5	**Numerical Solution of Ordinary Differential Equations**
	• Introduction of the Unit • Solution of ordinary differential equations of first order with initial condition using • Picard's method • Euler's and Modified Euler's methods • Runge-Kutta method of fourth order • Milne Predictor Corrector method • •Conclusion of the Unit

C. RECOMMENDED STUDY MATERIAL:

Sr.No	Reference Book	Author	Edition	Publication
1.	Numerical Methods for Scientific and Engineering Computation	M.K. Jain, S.R.K. Iyengar and R.K. Jain	2000	New age International Publisher, India, 2007.
2.	Numerical Methods in Engineering & Science,	B. S. Grewal ,	2007	Khanna Publication
3.	Numerical Methods	Balaguruswamy	1992	TMH, India

Code: BSACSA2105 DIFFERENTIAL EQUATIONS 3.0 Credits [LTP: 3-0-0]

COURSE OUTCOME: Students would be able to:

CO1: Identify the type of a given differential equation, select, and apply the appropriate analytical technique for finding the solution.

CO2: Solve the first order and higher degree differential equations solvable for *x, y, p, Clairaut's* form and orthogonal trajectories.

CO3: Solve linear differential equations with constant coefficients, linear simultaneous differential equations and Cauchy-Euler equation.

CO4: Determine the complete solutions to the linear equations of second order

CO5: Explain the order and degree of partial differential equations and their solutions.

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**2**	**1**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	**3**	**1**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	**3**	**1**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	**1**	**2**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	**2**	**2**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

MAPPING OF COURSE OUTCOMES WITH PROGRAMME SPECIFIC OUTCOME

	PSO1	PSO2	PSO3
CO1	3	2	-
CO2	3	2	-
CO3	3	-	-
CO4	3	2.1	-
CO5	3	-	-

A. OUTLINE OF THE COURSE

Unit No.	Title of the Unit	Time required for the Unit (Hours)
1	**First order and First Degree Differential Equations**	**8**
2	**First Order and Higher Degree Differential Equations**	**7**
3	**Higher Order and Simultaneous Linear Differential Equations**	**7**
4	**Second Order Linear Differential Equation with Variable Coefficients**	**8**
5	**Partial Differential Equations**	**6**

B. DETAILED SYLLABUS

Unit	Unit Details

1	**First order and First Degree Differential Equations**
	• Introduction of the Unit • Degree and order of Differential equation • Variable separation, Homogeneous, • Linear equations and equations reducible to linear form. • Exact Differential equation and reducible to exact •Conclusion of the Unit
2	**First Order and Higher Degree Differential Equations**
	• Introduction of the Unit • First order and higher degree equations solvable for *x, y, p.* • Clairaut's form and singular solutions. • Orthogonal trajectories. • •Conclusion of the Unit
3	**Higher Order and Simultaneous Linear Differential Equations**
	• Introduction of the Unit • Higher order linear differential equation with constant coefficientsLinear • Simultaneous differential equations • •Conclusion of the Unit
4	**Second Order Linear Differential Equation with Variable Coefficients**
	• Introduction of the Unit • Linear differential equation of second order: • Homogeneous equation, Exact equation • Change of dependent variable and independent variable method • Method of variation of parameters • •Conclusion of the Unit
5	**Partial Differential Equations**
	• Introduction of the Unit • Order and degree of a partial differential equation • Linear partial differential equation of first order: Lagrange's method • Standard forms and Charpit's method • Classification of second order partial differential equations into elliptic, parabolic and hyperbolic (simple concept only) • •Conclusion of the Unit

C. RECOMMENDED STUDY MATERIAL:

Sr.No	Reference Book	Author	Edition	Publication
1.	Differential Equations,	Shepley L. Ross,	3rd Edition 1984	John Wiley and Sons, India
2.	Elements of Partial Differential Equations	I. Sneddon	1967	McGraw-Hill, International Edition India
3.	Schaum outline of Differential Equation,	Richard Bronson, Gabriel Costa,	third edition 2001	TMH India

Code: BSACSA2201	CHEMISTRY LAB-II	1.0 Credit [LTP: 0-0-2]

COURSE OUTCOMES: Students will be able to:

CO1: Identify the physical and chemical properties of common organic functional groups.
CO2:Learn the concept of separating the mixture
CO3: Become familiar with instrumental analysis techniques in chemistry.
CO4:Understand the concept of surface tension and viscosity
CO5: Understand the states of matter.

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**2**	**3**	**2**	–	–	–	–	–	–	–	–	–
CO2	**2**	**3**	**3**	–	–	–	–	–	–	–	–	–
CO3	**2**	**3**	**3**	–	–	–	–	–	–	–	–	–
CO4	**2**	**3**	**2**	–	–	–	–	–	–	–	–	–
CO5	**2**	**2**	**3**	–	–	–	–	–	–	–	–	–

MAPPING OF COURSE OUTCOMES WITH PROGRAMME SPECIFIC OUTCOME

	PSO1	PSO2	PSO3
CO1	3	–	–
CO2	3	–	–
CO3	3	–	–
CO4	3	–	–
CO5	3	–	–

LIST OF EXPERIMENTS

Organic Chemistry	
1	To determine the functional group and identify the given organic compound.
2	To determine the functional group and identify the given organic compound.
3	To determine the functional group and identify the given organic compound.
4	To crystallize s acetanilide from hot water
5	To purify the given organic mixture by Sublimation
6	To separate the mixture (1 solid+1 liquid) by distillation.
Physical Chemistry	
7	To determine the surface tension of the pure liquid (alcohol etc.) with the help of Stalagmometer.
8	To determine the viscosity of the given liquid with the help of viscometer.
9	To determine critical solution temperature and composition of phenol water system.
10	To determine the percentage composition of a given mixture (non-interacting system) by viscosity method/ surface tension method.
11	Estimation of Fe(II) with $K_2Cr_2O_7$ using internal indicator (diphenylamine, N-phenylanthranilic acid) and discussion of external indicator.
12	Estimation of sodium carbonate using standardized HCl.

Code: BSACSA2202	PHYSICS LAB-II	1.0 Credit [LTP: 0-0-2]

COURSE OUTCOMES: Students will be able to:

CO1: Learn the concept of interference by the help of Newton's ring & MichelsonInterferometer

CO2: Learn the phenomenon of polarisation and diffraction through biquartz polarimeter &Grating respectively

CO3: Learn the dispersive power of the material of the prism & resolving power of thetelescope

CO4: Learn the concept of De-Sauty Bridge, phenomenon of charging & discharching &Lissajous figures.

CO5: Understand the characteristics of LR circuit with the source of constant emf and ACpower source.

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**2**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**3**	**2**
CO2	**2**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**2**	**–**
CO3	**3**	**2**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**3**	**2**
CO4	**2**	**3**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**2**	**3**
CO5	**3**	**3**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**3**	**3**

MAPPING OF COURSE OUTCOMES WITH PROGRAMME SPECIFIC OUTCOME

	PSO1	**PSO2**	**PSO3**
CO1	3	-	-
CO2	3	-	-
CO3	3	-	-
CO4	3	-	-
CO5	3	-	-

LIST OF EXPERIMENTS:

1.	Specific rotation of sugar solution by biquartzpolarimeter
2.	Wavelength of sodium light by Michelson's Interferometer
3.	Wavelength of mercury light by plane transmission grating.
4.	Wavelength of sodium light by Newton's ring method.
5.	Dispersive power of material of prism by spectrometer
6.	Verification of Malus law
7.	Resolving power of a Telescope
8.	Measurement of capacitance by De-Sauty bridge
9.	Study of charging and discharging of CR circuit
10.	Study of phase and frequency by using CRO (Lissajous figures)
11.	To study the rise and decay of current in an LR circuit with a source of constant emf.
12.	To study the voltage and current behavior of an LR circuit with an AC power source. Also, determine power.

Code: BSACSA2203 EXPLORATORY PROJECT-II 1.0 Credit [LTP: 0-0-2]

COURSE OUTCOMES: Students would be able to:

CO1: Predict a problem of current relevance to society
CO2: Formulate the problem and identify suitable modelling paradigm
CO3: Categorize the problem and identify the solution methodology
CO4: Simulate and design systems using various modern tools
CO5: Validate the results and prepare a project report

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	–	–	–	–	–	–	–	–	–	–	**3**	**3**
CO2	–	–	–	–	–	–	–	–	–	–	**3**	**3**
CO3	–	–	–	–	–	–	–	–	–	–	**3**	**3**
CO4	–	–	–	–	–	–	–	–	–	–	**3**	**3**
CO5	–	–	–	–	–	–	–	–	–	–	**3**	**3**

MAPPING OF COURSE OUTCOMES WITH PROGRAMME SPECIFIC OUTCOME

	PSO1	PSO2	PSO3
CO1	3	-	-
CO2	3	-	-
CO3	3	-	-
CO4	3	-	-
CO5	3	-	-

List of Activity

1	Working Model of the project
2	Mounting the components
3	Final hardware evaluation/presentation
4	Submission of the final hardware to the coordinator
5	Final report submission (after project exhibition)
6	Paper presentation on the selected project in seminars /conferences/journals
7	Viva voce
8	Final project report submission
9	Final presentation

Code: BULCHU2205 HUMAN VALUES & PROFESSIONAL ETHICS 1.0 Credit [LTP: 0-0-2]

COURSE OUTCOMES: Students will be able to:

CO1: Understand the importance of human values and learn from others' experiences to become the conscious practitioners of the same.

CO2: Enhance their self-esteem, confidence and assertive behaviour to handle difficult situations with grace, style, and professionalism

CO3: Distinguish among various levels of professional ethics while developing an understanding of them as a process in an organization.

CO4: Implement emotional intelligence to achieve set targets and excel in interpersonal as well as intrapersonal

CO5: Demonstrate knowledge of personal beliefs and values and a commitment to continuing personal reflection and reassessment.

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	–	–	**3**	**2**	–	–	–
CO2	-	-	-	-	-	–	–	**3**	**2**	–	–	–
CO3	-	-	-	-	-	–	–	**3**	**2**	–	–	–
CO4	-	-	-	-	-	–	–	**3**	**2**	–	–	–
CO5	-	-	-	-	-	–	–	**3**	**2**	–	–	–

MAPPING OF COURSE OUTCOMES WITH PROGRAMME SPECIFIC OUTCOME

	PSO1	PSO2	PSO3
CO1	-	-	**3**
CO2	-	-	**3**
CO3	-	-	**3**
CO4	-	-	**3**
CO5	-	-	**3**

A. OUTLINE OF THE COURSE

Unit No.	Title of the Unit	Time required for the Unit (Hours)
1	**Introduction of Human Values**	**6**
2	**Study of Self**	**6**
3	**Introduction to Professional Ethics**	**8**
4	**Emotional Intelligence**	**2**
5	**Life Skills & Value Education**	**2**

B. DETAILED SYLLABUS

LIST OF LABS	
1.	Human Values: Love & Compassion
2.	Truth, Non-Violence, Righteousness
3.	Peace, Service, Renunciation (Sacrifice)
4.	Self-Esteem: Do's and Don'ts to develop positive self-esteem

5.	Self-Assertiveness: Development of Assertive Personality
6.	Ambition & Desire: Self & Body (concepts & differences)
7.	Professional Ethics: Personal & Professional Ethics
8.	Emotional Intelligence: Skill Building for Strengthening the Elements of Self-awareness, Self-regulation,Internal motivation, Empathy, Social skills
9.	Governing Ethics & Ethics Dilemma
10.	Profession, Professionalism & Professional Risks
11.	Professional Accountabilities & Professional Success
12.	Life Skills & Value Education

CODE: BULCSE2201 SKILL ENHANCEMENT GENERIC COURSES-II 1 Credit[LTP: 0-0-2]

COURSEOUTCOMES: Students will be able to:

CO.1: Enhance problem solving skills.
CO.2: Prepare for various public and private sector exams & placement drives
CO.3: Communicate effectively & appropriately in real life situation.
CO.4: Improve verbal ability skill among students.
CO.5: Enrich their knowledge and to develop their logical reasoning thinking ability.

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	–	–	2	–	–	–	–	–	–	2	–	2
CO2	–	–	2	–	–	–	–	–	–	2	–	2
CO3	–	–	2	–	–	–	–	–	–	2	–	2
CO4	–	–	2	–	–	–	–	–	–	2	–	2
CO5	–	–	2	–	–	–	–	–	–	2	–	2

MAPPING OF COURSE OUTCOMES WITH PROGRAMME SPECIFIC OUTCOME

	PSO1	PSO2	PSO3
CO1	–	–	3
CO2	–	–	3
CO3	–	–	3
CO4	–	–	3
CO5	–	–	3

LIST OF ACTIVITIES	
1	Types of Interviews, Interview Practice
2	Time & Work, Syllogisms
3	Critical Reasoning
4	Mensuration, Cubes & Dices
5	Para Jumble, Permutations & Combinations
6	Blood Relations & Direction Sense, Manners & Etiquette
7	Idiom & Phrases, Prefix-Suffix
8	Probability. Puzzles
9	Data Sufficiency, Logical Choices & Connectives
10	Date Interpretations, Deductions
11	Essay Writing, E-mail Writing
12	Personal Grooming

Code: BUVCPH2103 NUTRITION & FITNESS 2.0 Credits [LTP: 2-0-

COURSE OUTCOMES:

Students would be able to:

CO1: Understand the components of health and fitness and the role of nutrition in these.

CO2: Make nutritional, dietary and physical activity recommendations to achieve fitness and well-being

CO3: Develop ability to evaluate fitness and well-being.

CO4: Enable students to understand the basis of human nutritional requirements and recommendations through the life cycle.

CO5: Be familiar with the special nutritional support techniques.

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	2	-	-	-	-	-	-	-	3
CO2	-	-	-	2	-	-	-	-	-	-	-	3
CO3	-	-	-	2	-	-	-	-	-	-	-	3
CO4	-	-	-	2	-	-	-	-	-	-	-	3
CO5	-	-	-	2	-	-	-	-	-	-	-	3

MAPPING OF COURSE OUTCOMES WITH PROGRAMME SPECIFIC OUTCOME

	PSO1	PSO2	PSO3
CO1	2	-	-
CO2	2	-	-
CO3	2	-	-
CO4	2	-	-
CO5	2	-	-

A. OUTLINE OF THE COURSE

Unit No.	Title of the Unit	Time required for the Unit (Hours)
1.	**Understanding Fitness**	**5**
2.	**Importance of Nutrition**	**4**
3.	**Importance of Physical Activity**	**5**
4.	**Weight Management**	**5**
5.	**Nutrition for Special Conditions**	**5**

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Understanding Fitness**
	• Introduction of the Unit • Definition of fitness, health and related terms • Assessment of fitness • Approaches for keeping fit • Conclusion of the unit
2.	**Importance of Nutrition**
	• Introduction of the Unit • Role of nutrition in fitness • Nutritional guidelines for health and fitness • Nutritional supplements

	• Conclusion of the unit
3.	**Importance of Physical Activity**
	• Introduction of the Unit • Importance and benefits of physical activity • Physical Activity – frequency, intensity, time and type with examples • Physical Activity Guidelines and physical activity pyramid • Conclusion of the unit
4.	**Weight Management**
	• Introduction of the Unit • Assessment, etiology, health complications of overweight and obesity • Diet and exercise for weight management • Fad diets • Principles of planning weight reducing diets • Conclusion of the unit
5.	**Nutrition for Special Conditions**
	• Introduction of the Unit • Introduction to nutrition for physical fitness and sport • Feeding problems in children with special needs • Considerations during natural and man-made disasters e.g. floods, war.- basic guidelines in disaster management • Conclusion of the unit

C. RECOMMENDED STUDY MATERIAL:

Sr. No	Reference Book	Author	Edition	Publication
1	Fundamentals of Foods, Nutrition and Diet Therapy	Mudambi, SR and Rajagopal, MV.	2012	New Age International Publishers
2.	Textbook of Nutrition and Health	Lakra P, Singh MD	2008	Academic Excellence
3.	Nutrition for health, fitness and sports	Williams Melvin.	2004	Mc Graw Hill
4.	Nutrition and Dietetics	Joshi AS.	2010	Tata Mc Graw Hill.

Code: BSACSA3101	ELECTROMAGNETISM	3.0 Credits [LTP: 3-0-0]

COURSE OUTCOMES: Students will be able to:

CO1: Explain the basic field vectors and their physical significance

CO2: Apply and acquire knowledge about electric field lines, electric flux, Gauss's law and its applications.

CO3: Learn and exhibit knowledge of electric potential and its various applications, relation between electric field and electric potential.

CO4: Discuss the dielectric and polarization properties of matter

CO5: Interpret the deeper knowledge of various laws of electromagnetic induction and A.C. Circuits.

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**2**	**1**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**
CO2	**3**	**3**	**–**	**2**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**
CO3	**3**	**2**	**1**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**
CO4	**3**	**3**	**3**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**
CO5	**2**	**2**	**2**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**

MAPPING OF COURSE OUTCOMES WITH PROGRAMME SPECIFIC OUTCOME

	PSO1	PSO2	PSO3
CO1	3	-	-
CO2	3	-	-
CO3	3	-	-
CO4	3	-	-
CO5	3	-	-

A. OUTLINE OF THE COURSE

Unit No.	Title of the Unit	Time required for the Unit (Hours)
1.	**Scalar and Vector Fields**	**6**
2.	**Electric Field in Matter**	**8**
3.	**Magnetic Fields in Matter**	**8**
4.	**Dielectric**	**7**
5.	**Maxwell's Equations and Electromagnetic Waves**	**7**

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Scalar and Vector Fields**
	• Introduction of the Unit • Coulomb's law, Gauss's law. • Gradient of a scalar function, Vector Flux • Divergence of a vector function • Line Integral of vector field • Curl of vector function

	• Physical significance of curl • Gauss divergence theorem • Stoke's theorem • Poisson's and Laplace's equations • Solution of Laplace's equation for simple cases. •Conclusion of the Unit
2.	Electric Field in Matter
	• Introduction of the Unit • The moment of a charge distribution. • Atomic and molecular dipoles. • Atomic polarizability. • Permanent dipole moment, dielectrics. • The Capacitor filled with a dielectric. • The potential and field due to a polarized sphere. • •Conclusion of the Unit
3.	Magnetic Fields in Matter
	• Introduction of the Unit • Electric current due to orbital electron, the field of current loop, Bohr magneton. • Orbital gyro magnetic ratio Electron spin and magnetic moment. • Magnetic susceptibility, magnetic field caused by magnetized matter. • Magnetization current. Free current and the field H. • •Conclusion of the Unit
4.	**Dielectric**
	• Introduction of the Unit • Dielectric. Dielectric sphere placed in a uniform field. • The field of charge in dielectric medium and Gauss's law. • The connection between electric susceptibility and atomic polarizability. • Polarization in changing field. • The bound charge (polarization) current. • •Conclusion of the Unit
5.	**Maxwell's Equations and Electromagnetic Waves**
	• Introduction of the Unit • Maxwell's equations in differential and integral form. • Maxwell's displacement current • Maxwell's equations in free space • Poynting theorem • EM Wave equation • EM waves in a non-conducting dielectric medium • Plane monochromatic waves in a non-conducting medium • Energy flux in a plane electromagnetic wave • Radiation pressure • •Conclusion of the Unit

C. RECOMMENDED STUDY MATERIAL:

S.No	Reference Book	Author	Edition	Publication
1.	Electromagnetism	M.P. Saxena, S.S. Rawat and P. R. Singh	2015	CBH, Jaipur
2.	Electricity and Magnetism with Electronics	K.K. Tiwari	1996	S. Chand Publication, Delhi
3.	Electricity and Magnetism	A.S. Majahan and A.A. Rangwala	1997	TMH, Delhi

Code: BSACSA3102	INORGANIC CHEMISTRY	3.0 Credits [LTP: 3-0-0]

COURSE OUTCOMES: The students will be able to:

CO1: Describe the electronic configuration, atomic radii, ionic radii, oxidation state of lanthanides and their separation.

CO2: Differentiate between Lanthanides and Actinides and learn the separation techniques of trans-uranium elements.

CO3: Demonstrate the preparation, structure and industrial applications of inorganic polymers.

CO4: Interpret the chemistryof coordination compounds on the basis of Werner's Theory and its industrial applications.

CO5: Examine the basic principle of crystallization, distillation, solvent extraction, TLC and column chromatography.

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**2**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	**3**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	**2**	**3**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	**2**	**3**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	**3**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

MAPPING OF COURSE OUTCOMES WITH PROGRAMME SPECIFIC OUTCOME

	PSO1	PSO2	PSO3
CO1	3	-	-
CO2	3	-	-
CO3	3	-	-
CO4	3	-	-
CO5	3	-	-

A. OUTLINE OF THE COURSE

Unit No.	Title of the Unit	Time required for the Unit (Hours)
1.	**Lanthanides**	**8**
2.	**Actinides**	**7**
3.	**Inorganic Polymer**	**7**
4.	**Coordination Compounds**	**8**
5.	**Separation Techniques and Chromatography**	**6**

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Lanthanides**

	• Introduction to the Unit • **Lanthanides:** Comparative study of lanthanide elements with respect to electronicconfiguration, atomic and ionic radii, oxidation state and complex formation. • Lanthanide contraction. Occurrence and principles of separation of lanthanides. • General features and chemistry of Lanthanides • Conclusion of the Unit
2.	**Actinides**
	• Introduction to the Unit • **Actinides:** Comparative study of actinide elements with respect to electronic configuration, atomic and ionic radii, oxidation states and complex formation; • Occurrence and principles of separation. • General features and chemistry of actinides, principles of separation of Np, Pu and Amfrom U. Trans-Uranium elements • Comparison of Lanthanides and Actinides • Conclusion of the Unit
3.	**Inorganic Polymer**
	• Introduction to the Unit • **Inorganic Polymer:** Classification, Preparation and Structure of silicones, siliconresin, silicon rubber, silicon fluid, industrial application of silicones • Preparation, properties, substitution reaction and structure of phosphazenes • Conclusion of the Unit.
4.	**Coordination Compounds**
	• Introduction to the Unit • **Coordination Compounds:** Werner's theory, nomenclature, chelates, stereo-chemistry of coordination numbers 4, 5 and 6. • Nomenclature and isomerism in coordination complexes. • Important applications of coordination compounds. • Theories of metal-ligand bonding in transition metal complexes- Sidgwick effectiveatomic number concept, • valence bond theory of coordination compounds • Conclusion of the Unit
5.	**Separation Techniques and Chromatography**
	• Introduction to the Unit • **Separation Techniques:** Principles and process of solvent extraction • the distribution law and partition coefficient, batch extraction, continuous extraction and counter current distribution • Gravimetric methods, theory of precipitation, co-precipitation, post precipitation, theory of purifying the precipitates • **Chromatography:** Classification of chromatographic methods, general principle and application of adsorption, Partition chromatography, Ion-exchange, thin layer and paper chromatography • Conclusion of the Unit

C. RECOMMENDED STUDY MATERIAL:

Sr.No	Reference Book	Author	Edition	Publication
1.	A New Concise Inorganic Chemistry	J. D. Lee	5th Edition	Chapman & Hall, London
2.	Modern Inorganic Chemistry	R. C. Aggarwal	1st Edition	KitabMahal, Allahabad
3.	Basic Inorganic Chemistry	F. A. Cotton, G. Wilkinson, and Paul L. Gaus	3rd Edition	John Wiley & Sons, New York

Code: BSACSA3103 PHYSICAL CHEMISTRY 3.0 Credits [LTP: 3-0-0]

COURSE OUTCOMES: Students will be able to:

CO1: Determine structure of compounds by X ray diffraction methods and compare the chemical behavior and physical properties of common substances.

CO2: Apply the concept of liquid crystals in applications of advanced technologies.

CO3: Differentiate real gases from ideal gases at different temperature and pressure and explain methods of liquefaction of gases.

CO4: Interpret the stability regions using Phase diagrams of one component and two component system and compounds with congruent and incongruent melting point.

CO5: Explain fundamental principle of thermodynamic and thermo chemistry.

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	**2**	**1**	**3**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	**3**	**1**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	**3**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**
CO5	**2**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**

MAPPING OF COURSE OUTCOMES WITH PROGRAMME SPECIFIC OUTCOME

	PSO1	PSO2	PSO3
CO1	3	-	-
CO2	3	-	-
CO3	3	-	-
CO4	3	-	-
CO5	3	-	-

A. OUTLINE OF THE COURSE

Unit No.	Title of the Unit	Time required for the Unit(Hours)
1.	**Solid State**	**7**
2.	**Liquid State**	**7**
3.	**Gaseous State**	**8**
4.	**Phase Equilibrium**	**6**
5.	**Thermodynamics**	**8**

B. DETAILED SYLLABUS

Unit	Unit Details
1	**Solid State**
	• Introduction of the Unit • Solid state: Definition of space lattice, Unit cell. • Laws of crystallography (i) law of constancy of interfacial angles (ii) law of rationality of indices (iii)law of symmetry. • Symmetry elements in crystals. X ray diffraction by crystals • Derivation of Braggs equation • Determination of crystal structure ofNaCl, KCl and CsCl(Laue's method and powder method). • •Conclusion of the Unit

2	**Liquid State**
	• Introduction of the Unit • Liquid State: Surface tension of liquids, capillary action, surface tension and temperature, interfacial tension, surface active agents, the Parachor and chemical constitution (atomic and structural parachors). • Viscosity of liquids, experimental determination of viscosity coefficient, its variation with temperature. • Intermolecular forces, structure of liquids (a qualitative description). • Structural difference between solid, liquid and gases • Liquid crystals: Difference between liquid crystal, solid and liquid. Classification, structure of nematic and cholestric phases. Thermography and seven-segment cell. • •Conclusion of the Unit
3	**Gaseous State**
	• Introduction of the Unit • Gaseous State :Kinetic theory of gases, ideal gas laws • Behavior of real gases - the Vander Waal's equation • Critical phenomena - critical constants of a gas and their determination • PV isotherms of real gases, continuity of state, Vander Waals equation and critical state • Principle 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) •Conclusion of the Unit
4	**Phase Equilibrium**
	• Introduction of the Unit • Phase Equilibrium:Phases, components and degrees of freedom of a system, • Gibbs Phase Rule and its thermodynamic derivation • Phase diagrams of one-component systems (water and sulphur) and two component systems involving eutectics, • Bi-Cd system, Pb- Ag system, desilverisation of Pb • Solid Solutions-congruent and incongruent melting points • Solid solutions-Compound formation with congruent melting point of Mg-Zn and incongruent melting point of NaCl –H_2O system • Freezing Mixtures • •Conclusion of the Unit
5	**Thermodynamics**
	• Introduction to the Unit • **Thermodynamics terms**: systems, surroundings etc. Types of systems, intensive and extensive properties. State and path functions and their differentials. Thermodynamics 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 law-Joule Thomson co-efficient and inversion temperature. • 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. • **Second law of thermodynamics**: Carnot cycle and its efficiency. Carnot theorem. Thermodynamic scale of temperature. • Concept of entropy: Entropy as a state function, entropy as a function of Volume and

	temperature, entropy as a function of pressure and temperature, entropy change in physical change. • **Third law of thermodynamics**: 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, •Conclusion of the Unit

C. RECOMMENDED STUDY MATERIAL:

S.No	Reference Book	Author	Edition	Publication
1.	Physical Chemistry	G.M. Barrow	International student edition	McGraw Hill
2.	Physical Chemistry through problems	SK Dogra& S Dogra	latest	Wiley Eastern Ltd
3.	Physical Chemistry	R.A.Alberty	latest	Wiley Eastern Ltd

Code: BSACSA3104	ANALYTICAL GEOMETRY	3.0 Credits [LTP: 3-0-0]

COURSE OUTCOMES: Students will be able to:

CO1: Analyze the characteristics and properties of planes.
CO2: Develop mathematical arguments about geometric relationships of straight lines.
CO3: Demonstrate working knowledge of three-dimensional structure of sphere.
CO4: Explain the 3-D geometry using cone and cylinder.
CO5: Visualize and represent geometric figures and classify central conicoid geometric solids.

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**1**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	**3**	**2**	**1**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	**1**	**2**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	**3**	**2**	**1**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	**3**	**1**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

MAPPING OF COURSE OUTCOMES WITH PROGRAMME SPECIFIC OUTCOME

	PSO1	PSO2	PSO3
CO1	3	-	-
CO2	3	-	-
CO3	3	-	-
CO4	3	-	-
CO5	3	-	-

A. OUTLINE OF THE COURSE

Unit No.	Title of the Unit	Time required for the Unit(Hours)
1	**Plane**	9
2	**Straight Line**	7
3	**Sphere**	7
4	**Cone and Cylinder**	7
5	**Central Conicoids**	6

B. DETAILED SYLLABUS

Unit	Unit Details
1	**Plane**
	• Introduction of the Unit • System of Coordinates, Direction Cosines, Direction Ratios and Projections, • Angle between two lines, Condition of Perpendicularity and parallelism, • Equation of plane in various forms, Angle between two planes, Distance of a point froma plane,plane through intersection of two planes • Planes bisecting the angle between two planes, Equation of Pair of Planee • Conclusion of the Unit.
2	**Straight Line**

	• Introduction of the Unit • Equation of Straight line, Symmetrical Form, General Form, • Perpendicular distance of a point from a line, angle between plane and line, • General Equation of Plane containing Line, • Conclusion of the Unit
3	**Sphere**
	• Introduction of the Unit • Equation of the sphere in general and standard forms • Equation of a sphere with given ends of a diameter. • Plane section of a sphere. Sphere through a given circle. • Intersection of two spheres, Orthogonality of spheres Tangent Plane,
4	**Cone and Cylinder**
	• Introduction of the Unit • Cone, Enveloping Cone, Tangent plane of a cone, Condition of Tangency, Reciprocal cone, condition of three mutually perpendiculars, Right Circular Cone, Cylinder, Enveloping cylinder, Right Circular Cylinder. • Conclusion of the Unit
5	**Central Conicoids**
	• Introduction of the Unit • Central Conicoids, Standard Equation, • Ellipsoid, Hyperboloid of one and two sheet, • Intersection of line with Conicoid, • Tangent lines and Tangent Planes, • Conclusion of the Unit

C. RECOMMENDED STUDY MATERIAL:

Sr.No	Reference Book	Author	Edition	Publication
1.	A Textbook of Analytical Geometry of Three Dimensions	P.K. Jain and Khalil Ahmad	1999	Wiley Eastern Ltd.
2.	The Elements of Coordinate Geometry	S.L. Loney:	1999	McMillan and Company, London.
3.	Analytical Solid Geometry	P. K. Mittal, Shanti Narayan,	1992	S. Chand &Co.delhi

Code: BSACSA3105 STATISTICS AND PROBABILITY THEORY 3.0 Credits [LTP: 3-0-0]

COURSE OUTCOMES: Students will be able to:

CO1: Explain and represent to the various form of data using statistics.
CO2: Evaluate the statistical data using measures of central tendency and dispersion.
CO3: Analyze the correlation and regression.
CO4: Explain the basic concepts of probability and their properties.
CO5: Determine the probability distribution for discrete and continuous random variable.

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**1**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	**3**	**2**	**1**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	**2**	**1**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	**3**	**1**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	**3**	**2**	**1**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

MAPPING OF COURSE OUTCOMES WITH PROGRAMME SPECIFIC OUTCOME

	PSO1	PSO2	PSO3
CO1	3	-	-
CO2	3	-	-
CO3	3	-	-
CO4	3	-	-
CO5	3	-	-

A OUTLINE OF THE COURSE

Unit No.	Title of the Unit	Time required for the Unit (Hours)
1	**Statistics**	**8**
2	**Central Tendency & Dispersion**	**7**
3	**Correlation and Regression**	**7**
4	**Probability Theory**	**6**
5	**Probability Distribution**	**8**

B DETAILED SYLLABUS

Unit	Unit details
1	**Statistics**
	• Introduction of the Unit. • Introduction of Statistics, Scope of Statistics, • Types of data, Collection, classification and tabulation of data. • Presentation of data: Frequency polygon, frequency curve, Ogive, Bar diagram, Histogram and Pie chart. • Conclusion of the Unit
2	**Central Tendency &Dispersion**

	• Introduction of the Unit. • Measures of Central Tendency: Mean, median, mode, • Quartile deviation, mean deviation, standard deviation ( ), • Coefficient of variation. • Conclusion of the Unit
3	**Correlation and Regression**
	• Introduction of the Unit. • Correlation, Types of correlation, • Karl Pearson Coefficient (r) of correlation, Properties, • Rank correlation coefficient, Regression, • Lines of Regression, Properties of regression coefficients • Conclusion of the Unit
4	**Probability Theory**
	• Introduction of the Unit. • Random Experiment: Trial, Events and their types • Definition of Probability, Sample Point and Sample space. • Axiomatic Approach of probability and its properties. • Addition and multiplication theorems of probability. Conditional probability. Bayes theorem and its applications (Simple problems only) • Conclusion of the Unit
5	**Probability Distribution**
	• Introduction of the Unit. • Random variable and its types • Distribution function, Probability mass function and Probability density function • Discrete probability distribution: Binomial and Poisson's distribution • Continuous probability distribution: Normal distribution • Conclusion of the Unit

C. RECOMMENDED STUDY MATERIAL:

Sr.No	Reference Book	Author	Edition	Publication
1.	Elements of Statistics, Schaum's outline series,	Bernstein, S. & Bernstein, R	**2001**	McGraw-Hill.
2.	Introduction to Probability Models	Sheldon Ross	9th Ed	Academic Press, Indian Reprint
3.	Introduction to the Theory of Statistics	Alexander M. Mood, Franklin A. Graybill and Duane C. Boes	3rd Ed	Tata McGraw- Hill, Reprint 2007.

Code: BSACSA3201	CHEMISTRY LAB-III	1.0 Credit [LTP: 0-0-2]

COURSE OUTCOMES: Students will be able to:

CO1: Understand chemical and molecular processes that take place in inorganic chemical reactions in synthesis.

CO2: Analyze and present experimental results and draw sound conclusions based on experimental evidence.

CO3: Acquire the ability to understand, explain and use instrumental techniques for chemical analysis

CO4 Applying subject knowledge and skill to solve complex problems with defined solutionsCO5: Understand the different factors that contribute to the adsorption.

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**2**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	**2**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	**2**	**3**	**3**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	**2**	**3**	**3**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	**1**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

MAPPING OF COURSE OUTCOMES WITH PROGRAMME SPECIFIC OUTCOME

	PSO1	PSO2	PSO3
CO1	3	-	-
CO2	3	-	-
CO3	3	-	-
CO4	3	-	-
CO5	3	-	-

LIST OF EXPERIMENTS

Inorganic Chemistry	
1	Preparation of sodium trioxalatoferrate(III).
2	Estimation of Nickel complex
3	Preparation of copper tetraammine complex.
4	Separation and estimation of Mg(II) and Zn(II)
5	Preparation of Potassium dioxalatodiaquachromate(III).
6	Colorimetric determination of metal ions. Fe^{3+},
Physical Chemistry	
7	To determine the relative strength of two acids(HCl& H_2SO_4)
8	To verify Beer Lamberts law $KMnO_4$/$K_2Cr_2O_7$ and determine the concentration of the given solution.
9	To determine the strength of Na and K in a given sample by flame photometer.
10	To titrate potentiometrically the given ferrous ammonium sulphate solution using $K_2Cr_2O_7$and calculate the redox potential of Fe^{+2}/Fe^{+3} system
11	To determine the dissociation constant of a weak acid Conductometrically and verify ostwalds dilution law.
12	Adsorption of acetic acid on charcoal

Code: BSACSA3202	PHYSICS LAB-III	1 Credits [LTP: 0-0-2]

COURSE OUTCOMES: Students will be able to:

CO1: Develop a general understanding of different electrical and electronic devices and their characteristics.

CO2: Develop an understanding and assessment of PN junction diode and transistor characteristics

CO3: Understand and apply the phenomenon of bridge rectifier and CRO

CO4: Apply the principle of Seeback effect and study the variation of Thermo-Emf of a Thermocouple

CO5: Understand and operate various electrical and thermal components and verification of physical laws.

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**2**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**3**	**3**
CO2	**3**	**2**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**3**	**2**
CO3	**2**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**2**	**–**
CO4	**3**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**3**	**–**
CO5	**–**	**3**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**3**

MAPPING OF COURSE OUTCOMES WITH PROGRAMME SPECIFIC OUTCOME

	PSO1	PSO2	PSO3
CO1	3	-	-
CO2	3	-	-
CO3	3	-	-
CO4	3	-	-
CO5	3	-	-

LIST OF EXPERIMENTS:

1	Identification, testing and application of Resistors, Inductors, Capacitors, PN-Diode, Zener Diode, LED, LCD, BJT, Photo Diode, Photo Transistor, Analog/Digital Multi- Metres and Function/Signal Generator.
2	Study of characteristics of a P-N junction diode.
3	Study of characteristics of a zener diode.
4	Voltage regulation using zener diode
5	Measure the frequency, voltage, current with the help of CRO.
6	Study half wave rectifier and effects of filters on wave. Also calculate ripple factor.
7	Study bridge rectifier and measure the effect of filter network on D.C. voltage output & ripple factor.
8	To study the variation of Thermo-Emf of a Thermocouple with Difference of Temperature of its Two Junctions.
9	Study the BJT amplifier in common emitter configuration. Measure voltage gain plot gain frequency response and calculate its bandwidth.
10	Experimental verification of first law of thermodynamics by discharging of condenser.
11	Study of variation of total thermal radiation with temperature.

12	Plot drain current - drain voltage and drain current – gate bias characteristics of field effect transistor and measure of Idss &Vp

Code: BSAESA3101 THERMODYNAMICS AND STATISTICAL PHYSICS 3.0 Credits [LTP: 3-0-0]

COURSE OUTCOMES: Students will be able to:

CO1: Apply the basic concept of thermodynamics and acquire working knowledge of the zero and first law ofthermodynamics.

CO2: Produce the statistical nature of concepts and laws in thermodynamics, in particular: entropy, temperature,chemical potential, Free energies, and partition functions.

CO3: Acquire working knowledge of the mechanism of production of low temperature and its applications.

CO4: Point out the distribution of molecular velocities and experimental verification of Maxwell velocity distribution.

CO5: Use the statistical physics methods, such as Boltzmann distribution, Gibbs distribution, and Fermi-Dirac andBose-Einstein distributions to solve problems in some physical systems.

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**2**	**2**	—	—	—	—	—	—	—	—
CO2	**3**	**3**	**2**	—	—	—	—	—	—	—	—	—
CO3	**3**	**2**	**3**	**2**	—	—	—	—	—	—	—	—
CO4	**3**	**2**	**3**	**3**	—	—	—	—	—	—	—	—
CO5	**2**	**2**	**3**	**2**	—	—	—	—	—	—	—	—

MAPPING OF COURSE OUTCOMES WITH PROGRAMME SPECIFIC OUTCOME

	PSO1	PSO2	PSO3
CO1	3	-	-
CO2	3	-	-
CO3	3	-	-
CO4	3	-	-
CO5	3	-	-

A. OUTLINE OF THE COURSE

Unit No.	Title of the Unit	Time required for the Unit(Hours)
1.	**Thermal Interaction**	7
2.	**Thermodynamic Relation**	7
3.	**Production of low temperatures and applications**	8
4.	**Distribution Law of Molecular Velocities**	6
5.	**Classical and Quantum Statistics**	8

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Thermal Interaction**
	• Introduction of the Unit • Zeroth law of thermodynamics • Various indicator diagrams (P-V diagram) • First law of thermodynamics,

	• Reversible and irreversible processes • Carnot's engine, • Carnot's cycle and efficiency of Carnot's engine, • Reversibility of Carnot's engine, Carnot's theorem. • Second law of thermodynamics (different statements and their equivalence) • Entropy, Principle of increase of entropy, Thermodynamic scale of temperature, • Thermodynamic scale an absolute scale, • Third law of thermodynamics as Conclusion of the Unit
2.	**Thermodynamic Relation**
	• Introduction of the Unit • Maxwell's thermodynamic relations • Triple point • ClausiusClapyron latent heat equation (Derivation) • Effect of pressure on boiling point of liquids • Helmholtz free energy • Enthalpy and Gibbs function, Internal energy • Thermodynamic potentials • Deduction of Maxwell's relations from thermodynamic potentials. Conclusion of the Unit
3.	**Production of low temperatures and applications**
	• Introduction of the Unit • Joule Thomson expansion and JT coefficient for ideal as well as Vander Waals gas • Porous plug experiment • Temperature of inversion • Regenerative cooling • Cooling by adiabatic expansion and demagnetization • Nernst heat theorem. (Derivation) • Conclusion of the Unit
4.	**Distribution Law of Molecular Velocities**
	• Introduction of the Unit • Distribution law of molecular velocities, • Most probable, Average and RMS velocities, • Energy distribution function (Derivation) • Experimental verification of Maxwell velocity distribution • Principle of equipartition of energy. • Mean free path and collision cross section • Distribution of mean free path (Derivation) • Transport of mass, • Conclusion of the Unit
5.	**Classical and Quantum Statistics**
	• Introduction of the Unit • Phase space • Micro and macro states • Thermodynamic probability • Relation between entropy and thermodynamic probability • Monatomic ideal gas

	• Specific heat capacity of diatomic gas and specific heat of solids • Postulates of quantum statistics, • Bose Einstein statistics and its distribution function (Derivation) • Planck's distribution function and radiation formula (Derivation) • Fermi Dirac statistics and its distribution function. (Derivation) • Conclusion of the Unit

C. RECOMMENDED STUDY MATERIAL:

Sr.No	Reference Book	Author	Edition	Publication
1.	Heat and Thermodynamics	Singhal, Agarwal and Prakash	Latest	PragatiPrakashan.
2.	Heat and Thermodynamics	Brijlal and Subramaniam	Latest	S. Chand & Sons.
3.	Thermodynamics and Statistical Mechanics	S.L.Kakani	Latest	S. Chand & Sons
4.	Kinetic Theory, Thermodynamics & Statistical Physics	H.P. Sinha	Latest	Ram Prasad & Sons, Agra,

Code: BSAESA3102 **MATHEMATICAL MODELLING** **3.0 Credits [LTP: 3-0-0]**

COURSEOUTCOMES: Students will be able to:

CO1 Describe the basic concepts of Mathematical modelling and its terminologies
CO2 Implement the Mathematical modelling procedures of ordinary differential equations
CO3 Apply and testing numerical simulation for ODE and its application
CO4 Apply the concepts of Mathematical modelling in partial differential equations
CO5 Describe the importance of nonlinear dynamics and its application

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3	1	–	–	–	–	–	–	–	–	–
CO2	3	2	1	–	–	–	–	–	–	–	–	1
CO3	2	3	2	–	–	–	–	–	–	–	–	2
CO4	2	2	2	–	–	–	–	–	–	–	–	2
CO5	2	3	1	–	–	–	–	–	–	–	–	1

MAPPING OF COURSE OUTCOMES WITH PROGRAMME SPECIFIC OUTCOME

	PSO1	PSO2	PSO3
CO1	3	–	–
CO2	3	2	–
CO3	3	–	–
CO4	3	–	–
CO5	3	2	–

A. OUTLINE OF THECOURSE:

Unit No.	Title of the Unit	Time required for the Unit (Hours)
1	**Introduction to Mathematical modelling**	**5**
2	**Modelling through ODE-I**	**4**
3	**Modelling through ODE-II**	**5**
4	**Modelling through PDE**	**5**
5	**Nonlinear Dynamics**	**5**

B. DETAILEDSYLLABUS:

Uni	Unit Details
1	**Introduction to Mathematical modelling**
	• Introduction of Unit • Mathematical modelling: Need, techniques, classification, • characteristics of mathematical models, • Limitations of mathematical modelling. • Conclusion of the Unit
2.	**Modelling through ODE-I**

	• Introduction of Unit • Mathematical modelling through ordinary differential equations of first order • System of ordinary differential equations of first order: Linear growth and decay models, • Non-linear growth and decay models • Conclusion of the Unit
3.	**Modelling through ODE-II**
	• Introduction of Unit • Conclusion of the Unit
4	**Modelling through PDE**
	• Introduction of Unit • Mathematical modelling through partial differential equations: • Methods to obtain PDE models • Numerical simulation of PDE models with software • Conclusion of the Unit
5.	**Nonlinear Dynamics**
	• Introduction of Unit • One-dimensional systems and elementary bifurcations. • Two-dimensional systems; phase plane analysis, limit cycles, • Nonlinear Oscillators • Conclusion of the Unit

C. RECOMMENDED STUDYMATERIAL

Sr.No	Reference Book	Author	Edition	Publication
1.	Nonlinear Dynamics and Chaos	Strogatz, Steven H.	9th edition	Westview
2.	Matematical Modelling	J.N. Kapur	Latest	Wiley Eastern Ltd
3.	Mathematical Modelling: Concepts and Case Studies	J. Caldwell and Y.M. Ram,	Latest	Springer
4.	Principles of Mathematical Modelling, Ideas, Methods, Examples	A.A. Samarskii and A.P. Mikhailov	Latest	Taylor and Francis

Code: BULCHU3208 COMMUNICATION SKILLS-I 1.0 Credit [LTP: 0-0-2]

COURSE OUTCOMES: Students will be able to:

CO1: Demonstrate depth of understanding, observing complexity, improve insight and develop independent thought and persuasiveness.

CO2: Determine the main ideas of the text by using key details and compare & contrast the most important points with the help of their perspective.

CO3: Practice the qualities of writing style by applying the concepts of sentence conciseness, accuracy, readability, coherence and by avoiding wordiness or ambiguity.

CO4: Distinguish words and phrases as per their intonation patterns and interpret the audios based on different situations

CO5: Demonstrate the understanding of impactful conversational skills, presentation skills & telephonic conversation by considering the need of the audience.

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	–	–	–	–	–	–	–	–	**1**	-	**3**	**2**
CO2	–	–	–	–	–	–	–	–	**1**	-	**3**	**2**
CO3	–	–	–	–	–	–	–	–	**1**	-	**3**	**2**
CO4	–	–	–	–	–	–	–	–	**1**	-	**3**	**2**
CO5	–	–	–	–	–	–	–	–	**1**	-	**3**	**2**

MAPPING OF COURSE OUTCOMES WITH PROGRAMME SPECIFIC OUTCOME

	PSO1	PSO2	PSO3
CO1	-	–	**3**
CO2	-	–	**3**
CO3	-	–	**3**
CO4	-	–	**3**
CO5	-	–	**3**

A. **OUTLINE OF THE COURSE**

Unit No.	Title of the Unit	Time required for the Unit (Hours)
1	**Intrapersonal/Interpersonal Skills**	**8**
2	**Reading Skills**	**2**
3	**Writing Skills**	**4**
4	**Listening Skills**	**2**
5.	**Speaking Skills**	**8**

B. DETAILED SYLLABUS

	List of Activity
1.	Self – Awareness & Self-Introduction
2.	Goal Setting: Ambition induced, interest induced or environment conditioned
3.	Cultivating Conversational Skills
4.	Role Plays : Selection of varied plots, characters & settings
5.	Reading skills I: Newspaper Reading & General Article Reading
6.	Writing Skills I: Story Making by jumbled words

7.	Understanding and Applying Vocabulary
8.	Listening Skills I: Types and practice by analyzing situational listening
9.	Speaking Skills I: JAM
10.	PowerPoint Presentation Skills-I
11.	Telephonic Etiquettes and Communication
12.	Recognizing, understanding and applying communication style (Verbal/Non-Verbal)

Code: BULCSE3201 SKILL ENHANCEMENT GENERIC COURSES-III 1.0 Credit [LTP: 0-0-2]

COURSEOUTCOMES: Students will be able to:

CO.1: Enhance problem solving skills.
CO.2: Prepare for various public and private sector exams & placement drives
CO.3: Communicate effectively & appropriately in real life situation.
CO.4: Improve verbal ability skill among students.
CO.5: Enrich their knowledge and to develop their logical reasoning thinking ability.

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	–	–	2	–	–	–	–	–	–	2	–	2
CO2	–	–	2	–	–	–	–	–	–	2	–	2
CO3	–	–	2	–	–	–	–	–	–	2	–	2
CO4	–	–	2	–	–	–	–	–	–	2	–	2
CO5	–	–	2	–	–	–	–	–	–	2	–	2

MAPPING OF COURSE OUTCOMES WITH PROGRAMME SPECIFIC OUTCOME

	PSO1	PSO2	PSO3
CO1	–	–	3
CO2	–	–	3
CO3	–	–	3
CO4	–	–	3
CO5	–	–	3

LIST OF EXPERIMENTS:

	LIST OF LABS
1	Objective Building, Parts of speech, Nouns, Numbers & Genders, Importance of soft skills
2	Logarithms, Number Theory
3	Tenses
4	Number system- Fractions & Decimals
5	Stress Management Techniques, Critical Thinking
6	Modal Verbs & Conditional Tense, Working under pressure
7	Boosting brain power for fast learning & unlearning
8	Pronouns, Adverbs & Adjectives
9	Emotional Intelligence, 5 levels of listening
10	Remainder Theoram
11	Points, lines & angles
12	Article Writing

Code: BSACSA4101 ELECTRONICS DEVICES AND CIRCUITS 3.0 Credits [LTP: 3-0-0]

COURSE OUTCOMES: Students will be able to:

CO1: Apply the concepts of power supply and different network systems and apply them in electronics circuits practically.

CO2: Understand the basics of semiconductor Physics and PN junction diode and apply them in electronics.

CO3: Compare the configuration of transistors like CE, CC, CB and implement them into electronics.

CO4: Point out the construction and working principle of Field effect transistor and MOSFET's.

CO5: Explain the construction, operation and characteristics of different types of power amplifier and their efficiencies.

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**2**	**2**	—	—	—	—	—	—	—	—
CO2	**2**	**3**	**2**	**3**	—	—	—	—	—	—	—	—
CO3	**3**	**3**	**2**	—	—	—	—	—	—	—	—	—
CO4	**3**	**2**	**3**	**2**	—	—	—	—	—	—	—	—
CO5	**2**	**3**	**2**	**3**	—	—	—	—	—	—	—	—

MAPPING OF COURSE OUTCOMES WITH PROGRAMME SPECIFIC OUTCOME

	PSO1	**PSO2**	**PSO3**
CO1	3	-	-
CO2	3	2	-
CO3	3	-	-
CO4	3	2	-
CO5	3	-	-

B. OUTLINE OF THE COURSE

Unit No.	**Title of the Unit**	**Time required for the Unit (Hours)**
1.	**Circuit Analysis**	**5**
2.	**Semiconductor and Rectification**	**8**
3.	**Bipolar Junction Transistor (BJT)**	**8**
4.	**Field Effect Transistors (JFET and MOSFETs)**	**8**
5.	**Power Amplifiers**	**7**

C. DETAILED SYLLABUS

Unit	**Unit Details**
1.	**Circuit Analysis**
	• Introduction of the Unit • Important definitions of circuits • Voltage Sources • Voltage and Current divider rules

	• Kirchhoff's Laws • Four Terminal Network • Reduction of complicated network • Network Theorems Conclusion of the Unit
2.	**Semiconductor and Rectification**
	• Introduction of the Unit • Classification of Semiconductors: Intrinsic and Extrinsic • Mass Action Law • Fermi level in an Extrinsic Semiconductor and effect of temperature on Fermi Level • P-N Junction Diode • Characteristic of P-N junction diode • Rectification • Ripple factor and efficiency • Filters: Series Inductor, Shunt capacitor, L and π section • Zener diode and Voltage Regulation • Conclusion of the Unit
3.	**Bipolar Junction Transistor (BJT)**
	• Introduction of the Unit • PNP and NPN transistors • Transistor - CB, CE and CC configurations: Input and Output characteristics • Current gains and their relationship. • Relationship between α and β • Transistor as an amplifier • Transistor load line • Transistor as a diode • Transistor Biasing • Selection of Operating Point • Bias Stabilization • Conclusion of the Unit
4.	**Field Effect Transistors (JFET and MOSFETs)**
	• Introduction of the Unit • Junction Field Effect Transistors (JFET) • Characteristics of JFETs • FET Configurations • DC load line and bias point • FET biasing • FET small signal models • MOSFET: Construction and working, I-V characteristics • Enhancement and depletion modes • Comparison of JFETs and MOSFETs • Conclusion of the Unit
5.	**Power Amplifiers**
	• Introduction of the Unit • Need of power amplifiers • Classification of power amplifiers, Class A, Class B and Class C power amplifiers

	• Efficiencies • Harmonic distortion in power amplifier • Variation of output power in Transformer coupled power amplifier • Introduction of Push-Pull Amplifier • Introduction of Tuned amplifiers • Conclusion of the Unit

D. RECOMMENDED STUDY MATERIAL:

Sr.No	Reference Book	Author	Edition	Publication
1.	Principles of Electronics	V.K. Mehta and R. Mehta	2010	S. Chand and Company
2.	Electronic Devices and Circuits: An Introduction	Allen Mottershead	2005	Prentice-Hall of India
3.	A Textbook of Applied Electronics	R. S. Sedha	1990	S.Chand and Company Ltd.

Code: BSACSA4102 PHYSICAL CHEMISTRY 3.0 Credits [LTP: 3-0-0]

COURSE OUTCOMES: Students will be able to:

CO1: Apply Raoult's law on colligative properties, abnormal molar mass, degree of dissociation/association

CO2: Derive integrated rate expressions for studying kinetics of zero order first order To derive integrated rate expressions for studying kinetics of zero order, first order, second order and third order reaction by differential and integration method and solve numerical problems.

CO3: Identify the order of reaction using conductometric, potentiometric, optical, plarimetry and spectrophotometermethod and explain Arhenius equation, Simple collision theory and Transition state theory.

CO4: Interpret the equilibrium constant using Le Chatelier's principle, Clapeyron equation and Clausius-Clapeyron equation

CO5: Apply the effect of common ion on solubility equilibria in practical assignments and calculate hydrolysis constant, degree of hydrolysis and pH for different salts.

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**-**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	**3**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	**2**	**3**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	**3**	**2**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

MAPPING OF COURSE OUTCOMES WITH PROGRAMME SPECIFIC OUTCOME

	PSO1	PSO2	PSO3
CO1	3	-	-
CO2	3	-	-
CO3	3	-	-
CO4	3	-	-
CO5	3	-	-

A. **OUTLINE OF THE COURSE**

Unit No.	Title of the Unit	Time required for the Unit (Hours)
1.	**Solutions**	**8**
2.	**Chemical Kinetics-I**	**7**
3.	**Chemical Kinetics-II**	**7**
4.	**Chemical Equilibrium**	**8**

5.	**Ionic Equilibrium**	**6**

B. DETAILED SYLLABUS

Unit	Unit Details
1	**Solutions**
	• Introduction of the Unit • Ideal and non ideal solutions • Methods of expressing concentrations, activity and activity coefficients • Dilute solutions-colligative properties, Raoults law • Relative lowering of vapour pressure, Molecular weight determination • Osmosis, Law of osmotic pressure and its determination, determination of molecular weight fromosmotic pressure • Elevation of boiling point and depression in freezing point • Abnormal molar mass, degree of dissociation and association of molecules • Conclusion of the Unit
2	**Chemical Kinetics I**
	• Introduction of the Unit • **Chemical kinetics and its scope**, rate of a reaction, factors influencing the rate of a reaction-concentrations, temperature, pressure, solvent, light, catalyst, concentration dependence of rates • Mathematical characteristics of simple chemical reaction- zero order, first order, second order,pseudo order, half-life and mean life. • Determinations of the order of reaction- differential method, method of integration, method of half-life period and isolation method • Radioactive decay as a first order phenomenon • Conclusion of the Unit
3	**Chemical Kinetics II**
	• Introduction of the Unit • **Experimental methods of chemical kinetics**: conductometric, potentiometric, optical methods,polarimetry and spectrophotometery. • Theories of chemical kinetics, Effect of temperature on rate of reaction, • Arrhenius Equation, concepts of activation energy • Simple collision theory based on hard sphere model, transition state theory (equilibrium hypothesis) • Expression for the rate constant based on equilibrium constant and thermodynamic aspects • Conclusion of the Unit
4	**Chemical Equilibrium**
	• Introduction of the Unit • **Chemical Equilibrium:** Equilibrium constant and Free energy change • Thermodynamic derivation of the law of mass action • Le Chatelier's principle • Reaction isotherm and reaction isochore

	• Clapeyron equation and Clausius-Clapeyron equation • Applications • Conclusion of the Unit
5	**Ionic Equilibrium**
	• Introduction of the Unit • **Ionic Equilibrium:**Strong, moderate and weak electrolytes • degree of ionization, factors affecting degree of ionization, ionization constant and ionic product ofwater • Ionization of weak acids and bases, pH scale, common ion effect • Salt hydrolysis-calculation of hydrolysis constant, degree of hydrolysis and pH for different salts,Buffer solutions • Solubility and solubility product of sparingly soluble salts – applications of solubility productprinciple • Conclusion of the Unit

C. RECOMMENDED STUDY MATERIAL:

Sr.No	Reference Book	Author	Edition	Publication
1.	Physical Chemistry	Castellan, G.W.	4th Ed.	Narosa (2004).
2.	Physical Chemistry	Barrow, G.M.	latest	Tata McGraw- Hill (2007).

Code: BSACSA4103 ORGANIC CHEMISTRY 3.0 Credits [LTP: 3-0-0]

COURSE OUTCOMES: Students will be able to:

CO1: Describe the nomenclature, structure, bonding and characteristic reactions of Phenols and Ethers

CO2: Analyze chemical behavior of aldehyde and ketones and discuss name reactions of synthesis.

CO3: Explain physical and chemical properties of Carboxylic acids.

CO4: Compare physical and chemical properties of carboxylic acid derivatives.

CO5: Discuss chemical behavior and nucleophilic substitution reactions of amines and diazonium salts.

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**2**	**1**	**1**	-	-	-	-	-	-	-	-
CO2	**3**	**2**	**1**	**1**	-	-	-	-	-	-	-	-
CO3	**3**	**3**	**1**	**1**	-	-	-	-	-	-	-	-
CO4	**2**	**3**	**1**	**2**	-	-	-	-	-	-	-	-
CO5	**2**	**3**	**2**	**2**	-	-	-	-		-	-	-

MAPPING OF COURSE OUTCOMES WITH PROGRAMME SPECIFIC OUTCOME

	PSO1	PSO2	PSO3
CO1	3	-	-
CO2	3	-	-
CO3	3	-	-
CO4	3	-	-
CO5	3	-	-

A. OUTLINE OF THE COURSE

Unit No.	Title of the Unit	Time required for the Unit (Hours)
1.	**Phenols and Ethers**	8
2.	**Aldehydes and Ketones**	7
3.	**Carboxylic Acids**	7
4.	**Carboxylic Acid Derivatives**	7
5.	**Amines and Diazonium Salts**	7

B. DETAILED SYLLABUS

Unit No.	Unit Details
1	**Phenols and Ethers**

	• Introduction of the Unit. • **Phenols:** (Phenol case) Nomenclature, Structure and Bonding, Preparation*:* Cumenehydroperoxide method, from diazonium salts. • Physical Properties and acidic character**.** Comparative acidic Strengths of Alcohols and Phenols.resonance stabilization of phenoxide ion. • Reactions*:* Electrophilic substitution: Nitration, halogenation and sulphonation. Reimer-Tiemann Reaction, Gattermann-Koch Reaction, Houben–Hoesch Condensation, Schotten – Baumann Reaction, Fries Rearrangement,Claisen Rearrangement, Lederer- Manasse Reaction • **Ethers (aliphatic and aromatic):** Cleavage of ethers with HI. • Nomenclature of Ethers, Method of Formation, Chemical Reactions – Cleavage andautooxidation, Ziesel's Method. • Synthesis of epoxide, Acid and base-catalyzed ring opening of Epoxide , orientation of epoxide,reactions of Grignard and organolithium reagents with epoxides • Conclusion of the Unit
2	**Aldehydes and Ketones**
	• Introduction of the Unit. • Nomenclature and Structure of Carbonyl Group. • **Aldehydes and ketones (aliphatic and aromatic):** (Formaldehye, acetaldehyde, acetone and benzaldehyde) • Preparation: from acid chlorides and from nitriles. • Reactions – Reaction with HCN, ROH, $NaHSO_3$, NH2-G derivatives. Iodoform test. Aldol Condensation, Cannizzaro's reaction, Wittig reaction, Benzoin condensation. Clemensen reduction and Wolff Kishner reduction. Meerwein-PondorffVerley reduction, Perkin and KnoevenAgel Condensation, Mannich Reaction. • synthesis of aldehydes and ketones using 1,3-dithianes. syntheses of ketones from carboxylic acids, Oxidation of aldehydes, Baeyer-Villiger oxidation of ketones, Cannizzaro reaction, MPV (Meervein-Pondrof-Verley), Clemmensen, Wolff-Kishner, LiAIH4 and NaBH4 reductions, Useof acetals and 1,3-dithiane as protecting group. • Conclusion of the Unit
3	**Carboxylic acids**
	• Introduction of the Unit. • **Carboxylic acids** (aliphatic and aromatic), Nomenclature. • Carboxylic Acids Structure and bonding, physical properties. acidity of carboxylic acids, effects of substituents on acid strength., mechanism of decarboxylation. Methods of formation and chemical reactions of halo acids. Hydroxy acids - malic, tartaric and citric acids. • *Reactions:* Hell – Vohlard–Zelinsky, reaction, Synthesis of acid chlorides, esters, amides, • *Preparation:* Acidic and Alkaline hydrolysis of esters. • Methods of Formation of alpha, beta unsaturated monocarboxylic acid. • Dicarboxylic acid- Method Formation and effect of heat and dehydrating agents, succinic,glutaric acid and adipic acid.

	• Conclusion of the Unit
4	**Carboxylic acid derivatives**
	• Introduction of the Unit. • **Carboxylic acid derivatives (aliphatic):** (Upto 5 carbons) • Preparation: Acid chlorides, Anhydrides, Esters and Amides from acids and theirinterconversion. • Reactions: Comparative study of nucleophilicity of acyl derivatives. Reformatsky Reaction, Perkin condensation. • Carboxylic Acid Derivatives: nomenclature Relative stability of acyl derivatives.. Preparation of carboxylic acid derivatives. chemical reactions, mechanisms of esterification and hydrolysis(acidic and basic • Conclusion of the Unit
5	**Amines and Diazonium Salts**
	• Introduction of the Unit. • Preparation of nitroalkanes and nitroarencs. Chemical reactions of nitroalkanes. Mechanisms ofnucleophilic substitution in nitroarcncs and their reductions in acidic, neutral and alkaline media.Picric acid.seperation of $1^{0,}$ 2^{0} ,3^{0}. • **Amines:** Amines (Aliphatic and Aromatic): (Upto 5 carbons) • Preparation: from alkyl halides, Gabriel's Phthalimide synthesis, HofmannBromamide reaction. • Reactions: Hofmann vs. Saytzeff elimination, Carbylamine test, Hinsberg test, with HNO_2, Schotten – Baumann Reaction. Electrophilic substitution (case aniline): nitration, bromination, sulphonation • Reactions: conversion to benzene, phenol, dyes • Amines: Structure. nomenclature and preparation of alkyl, and aryl amines (reduction of nitro compounds. nitrites), reductive amination of aldehydic and ketonic compounds.. Structural features effecting basicity of amines. Amine salts as phase-transfer catalysts. Hoffmann brormamide reaction with mechanism. Diazotisation and mechanism. transformations of aryl diazonium salts, azo coupling and its applications • **Diazonium salts**: *Preparation:* from aromatic amines • Conclusion of the Unit

C. RECOMMENDED STUDY MATERIAL:

Sr.No	Reference Book	Author	Edition	Publication
1	Organic Chemistry	Morrison and Boyd	Latest	Prentice Hall
2.	Organic Reaction and Their Mechanisms	P. S. Kalsi	Latest	New Age Science
3.	Organic Chemistry	P. L. Soni	Latest	S. Chand & Sons

Code: BSACSA4104 ABSTRACT ALGEBRA 3.0 Credits [LTP: 3-0-0]

COURSE OUTCOMES: Students will be able to:

CO1: Demonstrate insight into algebraic structure with their axiomatic.

CO2: Identify subgroups of a given group and their properties.

CO3: Explain the fundamental concepts of normal subgroups, homomorphisms and isomorphism.

CO4: Demonstrate knowledge of rings and their properties.

CO5: Demonstrate knowledge of fields and their properties.

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**2**	**1**	**2**	-	-	-	-	-	-	-	-
CO2	**2**	**2**	**3**	**2**	-	-	-	-	-	-	-	-
CO3	**3**	**1**	**2**	**2**	-	-	-	-	-	-	-	-
CO4	**3**	**1**	**2**	**2**	-	-	-	-	-	-	-	-
CO5	**3**	**2**	**1**	**2**	-	-	-	-	-	-	-	-

MAPPING OF COURSE OUTCOMES WITH PROGRAMME SPECIFIC OUTCOME

	PSO1	PSO2	PSO3
CO1	3	-	-
CO2	3	-	-
CO3	3	-	-
CO4	3	-	-
CO5	3	-	-

A. OUTLINE OF THE COURSE

Unit No.	Title of the Unit	Time required for the Unit (Hours)
1	**Group**	**9**
2	**Subgroup**	**6**
3	**Group Morphism**	**6**
4	**Rings and Sub-rings**	**8**
5	**Fields**	**7**

B DETAILED SYLLABUS

Unit	Unit details
1	**Group**

	• Introduction of the Unit. • Binary operation, Algebraic Structure, Groups, • Abelian Group, Cyclic Group, order of element, • Generator of Cyclic Group, Cyclic permutation • Conclusion of the Unit
2	**Subgroup**
	• Introduction of the Unit. • Subgroup, center of a group, • Group Zn of integers under addition modulo n and the • Group U(n) of units under multiplication modulo n, • Conclusion of the Unit
3	**Group Morphism**
	• Introduction of the Unit. • Morphism of groups, Cayley's theorem • Normal subgroups and Quotient groups • Fundamental theorem of Isomorphism. • Conclusion of the Unit
4	**Rings and Sub-rings**
	• Introduction of the Unit. • Definition and simple properties of rings • Commutative and non-commutative rings • Sub-rings, Morphism of Rings • Embedding of a Ring • Conclusion of the Unit
5	**Fields**
	• Introduction of the Unit. • Integral domains and Fields • Characteristics of a Ring and Field • Prime fields • Definition of Vector Spaces, liner combination, liner dependence and liner independent ofvectors • Conclusion of the Unit

C. **RECOMMENDED STUDY MATERIAL:**

Sr.No	Reference Book	Author	Edition	Publication
1.	Elements of Abstract Algebra	B. K. C. Sarangi	**2016**	RBD, Jaipur
2.	Abstract Algebra	M. Artin	2nd Ed	Pearson, 2011
3.	A First Course in Abstract Algebra	John B. Fraleigh	7th Ed	Pearson,India 2002

Code: BSACSA4105 OPTIMIZATION TECHNIQUES 3.0 Credits [LTP: 3-0-0]

COURSE OUTCOMES: Students will be able to:

CO1: Develop mathematical arguments for Linear Programming.

CO2: Evaluate Linear Programming problem using simplex method.

CO3: Analyze the Linear Programming problem using two Phase method, Duality and Transportation Problem, Modified distribution method for finding the optimum solution.

CO4: Analyze the Assignment Problem, Crew assignment and travelling salesman problem.

CO5: Solve the problems of competitive situations between two competitors using Game theory.

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**1**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	**3**	**2**	**1**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	**2**	**3**	**1**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	**3**	**1**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	**3**	**2**	**1**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

MAPPING OF COURSE OUTCOMES WITH PROGRAMME SPECIFIC OUTCOME

	PSO1	PSO2	PSO3
CO1	3	-	-
CO2	3	-	-
CO3	3	-	-
CO4	3	-	-
CO5	3	-	-

A OUTLINE OF THE COURSE

Unit No.	Title of the Unit	Time required for the Unit (Hours)
1	**Linear Programming**	**9**
2	**Simplex Method**	**6**
3	**Transportation Problem**	**6**
4	**Assignment Problem**	**8**
5	**Game Theory**	**7**

B DETAILED SYLLABUS

Unit	Unit details
1	**Linear Programming**

	• Introduction to Unit • Concept of optimization, • Linear Programming: Introduction, Formulation of a Linear Programming Problem (LPP), • Requirements for an LPP, Advantages and limitations of LP. • Graphical solution, Multiple, unbounded and infeasible solutions. • Conclusion of the Unit
2	**Simplex Method**
	• Introduction to Unit • Principle of simplex method: standard form, basic solution, basic feasible solution. • Computational Aspect of Simplex Method: Cases of unique feasible solution, no feasible solution, • Multiple solution and unbounded solution and degeneracy • Two Phase method, Duality in LPP, primal-dual relationship • Conclusion of the Unit
3	**Transportation Problem**
	• Introduction to Unit • Transportation Problem: Methods for finding basic feasible solution of a transportation problem • Modified distribution method for finding the optimum solution • Unbalanced and degenerate transportation problems
4	**Assignment Problem**
	• Introduction to Unit • Assignment Problem: Solution by Hungarian method, • Unbalanced assignment problem, maximization in an assignment problem, • travelling salesman problem. • Conclusion of the Unit
5	**Game Theory**
	• Introduction to Unit • Game Theory: Two Person zero sum game • Game with saddle points, the rule of dominance • Algebraic, graphical and linear programming methods for solving mixed strategy games • Conclusion of the Unit

C. RECOMMENDED STUDY MATERIAL:

Sr.No	Reference Book	Author	Edition	Publication
1.	Operations Research – An Introduction	H.A. Taha	**3rd ed**	Pearson, India
2.	Operations Research	KantiSwarup, P.K. Gupta and Manmohan.	2nd Ed	S. Chand publication Delhi
3.	Operations Research	P.K. Gupta and D.S. Hira	2016	S. Chand & Co. Delhi

Code: BSACSA4201	CHEMISTRY LAB-IV	1.0 Credit [LTP: 0-0-2]

COURSE OUTCOMES: Students will be able to:

CO1: Have an idea of estimation technique of various ions present in a mixture.
CO2: Recognize the basic practical skills for the synthesis and analysis of organic compounds.
CO3: Purify and separate compounds with special techniques.
CO4: Analyze and present experimental results and draw sound conclusions based on experimental evidence.
CO5: Exposed to the different processes used in industries and their applications

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	**2**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	**2**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	**2**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	**1**	**2**	**3**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

MAPPING OF COURSE OUTCOMES WITH PROGRAMME SPECIFIC OUTCOME

	PSO1	PSO2	PSO3
CO1	3	-	-
CO2	3	-	-
CO3	3	-	-
CO4	3	-	-
CO5	3	-	-

LIST OF EXPERIMENTS

Inorganic Chemistry	
1	Estimation of sodium carbonate and sodium hydroxide present in a mixture.
2	Estimation of acetic acid in commercial vinegar using NaOH
3	Estimation of water of crystallization in Mohr's salt by titrating with $KMnO_4$.
4	Estimation of Ferrous and Ferric by dichromate method
5	Estimation of Cu as copper thiocyanate
6	Preparation of Ni- DMG complex
Organic Chemistry	
7	To separate and identify the organic mixture containing two solid components using water and prepare their suitable derivatives.

8	To separate and identify the organic mixture containing two solid components using NaOH.
9	To prepare Iodoform from ethanol and acetone
10	Estimation of glucose by Fehling's solution.
11	Isolation of caffeine from tea leaves.
12	Synthesis of methyl orange

Code: BSACSA4202 PHYSICS LAB-IV 1 Credit [LTP: 0-0-2]

COURSE OUTCOMES: Students will be able to:

CO1: Understand the operation and perform the various integrated circuits
CO2: Verify and analyze the truth table of various logic gates and designing a counter using flip-flop.
CO3: Analyze and apply the concept of converter from A to D and D to A types of circuits.
CO4: Understand the concept of various multivibrator
CO5: Understand and analyze the frequency of various oscillators

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**2**	**2**	-	-	-	-	-	-	-	-	**2**	**2**
CO2	**3**	**2**	-	-	-	-	-	-	-	-	**3**	**2**
CO3	-	-	-	-	-	-	-	-	-	-	-	-
CO4	**3**	-	-	-	-	-	-	-	-	-	**3**	-
CO5	**2**	**3**	-	-	-	-	-	-	-	-	**2**	**3**

MAPPING OF COURSE OUTCOMES WITH PROGRAMME SPECIFIC OUTCOME

	PSO1	PSO2	PSO3
CO1	3	-	-
CO2	3	-	-
CO3	3	-	-
CO4	3	-	-
CO5	3	-	-

LIST OF EXPERIMENTS:

1.	To study and perform the following experiments. (a) Operation of digital multiplexer and demultiplexer. (b) Binary to decimal encoder. (c) Characteristics of CMOS integrated circuits.
2.	To study and perform experiment- Compound logic functions and various combinational circuits based on AND/NAND and OR/NOR Logic blocks.
3.	To study and perform experiment - Digital to analog and analog to digital converters.
4.	To study and perform experiment- Various types of counters and shift registers.
5.	To study and perform experiment - Interfacing of CMOS to TTL and TTL to CMOS ICs.
6.	To study and perform experiment- BCD to binary conversion on digital IC trainer.
7.	To study and perform experiment - (a) Astable (b) Monostable (c) BistableMultivibrators and the frequency variation with different parameters, observe voltage waveforms at different points of transistor.
8.	To study and perform experiment -Voltage comparator circuit using IC-710.
9.	To study and perform experiment- Schmitt transistor binary circuit.
10.	Design 2 bit binary up/down binary counter on bread board.
11.	Study of operation of Colpitt's Oscillator and Hartley Oscillator

12.	Study transistor phase shift oscillator and observe the effect of variation in R & C on oscillator frequency and compare with theoretical value.

Code: BSAESA4101 ANALOG AND DIGITAL ELECTRONICS 3.0 Credits [LTP: 3-0-0]

COURSE OUTCOMES: Students will be able to:

CO1: Acquire knowledge of the different types of number systems and De-Morgan Theorem.
CO2: Point out the mechanism of the combinational circuits and flip-flop.
CO3: Judge the concepts and potential applications of feedback systems and their frequency responses.
CO4: Identify the configuration of different types of sinusoidal oscillators.
CO5: Understand the mechanism of operational amplifier and its different applications.

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	-	-	1	-	-	-	1	-	-	-	-
CO2	2	1	1	-	-	1	-	-	-	-	-	1
CO3	3	-	-	3	-	-	-	3	-	-	-	-
CO4	2	-	2	-	1	-	-	-	1	-	-	2
CO5							-			-	-	

MAPPING OF COURSE OUTCOMES WITH PROGRAMME SPECIFIC OUTCOME

	PSO1	PSO2	PSO3
CO1	3	-	-
CO2	3	-	-
CO3	3	-	-
CO4	3	-	-
CO5	3	-	-

A. OUTLINE OF THE COURSE

Unit No.	Title of the Unit	Time required for the Unit(Hours)
1.	Number System & Boolean Algebra	7
2.	Sequential & Combinational Logic Circuits	6
3.	Feedback Amplifier	8
4.	Sinusoidal & Non Sinusoidal Oscillators	8
5.	OPAMP and its Basic Applications	7

B. DETAILED SYLLABUS

Unit	Unit Details
1.	Number System & Boolean Algebra

	• Introduction of the Unit • Decimal and Binary number system • **Octal** and Hexadecimal number system • Inter conversion • Character codes • ASCII, BCD, Gray code • Logical operations • Boolean algebra • Simplification of boolean expression, • Gates: NOT, AND, OR, NAND, NOR and XOR gates • De-Morgans theorems • Universal gates • Logic circuits for boolean expressions • Conclusion of the Unit
2.	**Sequential & Combinational logic circuits**
	• Introduction of the Unit • Half adder • Full adder • Parallel adder • Half subtractor • Full subtractor • Parallel subtractor, • Flipflops; RS, D, JK • Clocked and edge triggered • PRESET and CLEAR • Counters: Synchronous and Asynchronous counter • Conclusion of the Unit
3.	**Feedback Amplifier**
	• Introduction of the Unit • Feedback concept • Positive and negative feedbacks and their properties • Sampling and mixing • Feedback topology: Voltage series, Voltage shunt, Current series, Current shunt • Effect of positive and negative feedback on gain of amplifier • Frequency response • Gain-stability • Noise, Distortions • Effect of negative feedback on input and output impedances of an amplifier • CE amplifier with current series feedback • Conclusion of the Unit
4.	**Sinusoidal & Non sinusoidal Oscillators**

	• Introduction of the Unit • Operation of oscillator • Classification of oscillators • Barkhausen criterion for sustained oscillations • L-C oscillator • R-C Phase shift oscillator • Hartley oscillator • Colpitt's oscillators. • Non Sinusoidal Oscillators: Transistor as a switch • Introduction of multivibrator • Conclusion of the Unit
5.	**OPAMP and its Basic Applications**
	• Introduction of the Unit • OPAMP and its Basic Applications • Differential Amplifier: Common mode and difference mode signals and their gains • CMRR, Emitter- Coupled differential amplifier • Basic Operational Amplifier (Op-Amp) • Ideal operational amplifier • Concept of virtual ground • Inverting and non-inverting OPAMP • Applications of Op-Amp • Inverting Op-Amp as constant multiplier • Sign-Changer • Adder or summing amplifier • Integrator • Differentiator • Conclusion of the Unit

C .

Sr.No	Reference Book	Author	Edition	Publication
1.	Principles of Electronics	**V.K. Mehta and R. Mehta**	2005	S. Chand and Company
2.	Electronic Devices and Circuits	**Allen Mottershead**	2002	Prentice-Hall of India
3.	Basic Electronics and Linear Circuits	**N.N. Bhargava, D.C. Kulshrestha and S.C. Gupta**	1984	Tata McGraw-Hill Publishing Company Ltd., New Delhi

Code: BSAESA4102 PARTIAL DIFFERENTIAL EQUATIONS 3.0 Credits [LTP: 3-0-0]

Course Outcome:

Students will be able to:

CO1 Describe the basic concepts of partial differential equation terminologies and its uses.

CO2 Implement the methods of partial differential equation

CO3 Apply methods on second order partial differential equation and its application

CO4 Apply the concepts of boundary values problems in partial differential equation for solving problems

CO5 Describe the Calculus of Variations and its application for solving PDE problems

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3	1	–	–	–	–	–	–	–	–	–
CO2	3	2	1	–	–	–	–	–	–	–	–	1
CO3	2	3	2	–	–	–	–	–	–	–	–	2
CO4	2	2	2	–	–	–	–	–	–	–	–	2
CO5	2	3	1	–	–	–	–	–	–	–	–	1

MAPPING OF COURSE OUTCOMES WITH PROGRAMME SPECIFIC OUTCOME

	PSO1	PSO2	PSO3
CO1	3	–	–
CO2	3	2	–
CO3	3	–	–
CO4	3	–	–
CO5	3	2	–

A. OUTLINE OF THE COURSE

Unit No.	Title of the Unit	Time required for the Unit(Hours)
1.	**First Order PDE**	**8**
2.	**Methods of first order PDE**	**7**
3.	**Second Order Linear PDE**	**7**
4.	**Boundary Value Problems**	**7**
5.	**Calculus of Variations**	**7**

B. **DETAILED SYLLABUS**

Unit	Unit Details
1.	**First Order PDE**
	• Introduction to the Unit • Introduction to Partial differential equation, • Classification, Construction and geometrical interpretation of first order partial differential equations (PDE) Introduction, • Classification, Construction and geometrical interpretation of first order partial differential equations (PDE) • Conclusion & real life application
2	**Methods of first order PDE**
	• Introduction to the Unit • Method of characteristic and general solution of first order PDE, • Canonical form of first order PDE, • Method of separation of variables for first order PDE. • Conclusion & real life application
3	**Second Order Linear PDE**
	• Introduction to the Unit • Classification of second order PDE, • Reduction to canonical forms, Equations with constant coefficients, • General solution. • Conclusion &real life application
4.	**Boundary Value Problems**
	• Introduction to the Unit • Heat Equation – Fundamental solution, Mean value formula, Properties of solutions, • Wave Equation – Solution by spherical means, • Conclusion &real life application
5.	**Calculus of Variations**
	• Introduction To Unit • Euler's equation for functionals containing first-order derivative and one independent variable. • Extremals. Functionals dependent on higher order derivatives. • Conclusion &real life application

C RECOMMENDED STUDY MATERIAL:

Sr.No	Reference Book	Author	Edition	Publication
1.	A course of Ordinary and Partial differential equation	J. Sinha Roy and S Padhy	Latest	Kalyani Publishers,New Delhi.
2.	Elements of Partial Differential Equations	I.N. Sneddon,	Latest	McGraw Hill, New York
3	A First Course in Partial Differential Equations	H.F. Weinberger	Latest	John Wiley & Sons, 1965

Code: BULCHU4212	COMMUNICATION SKILLS-II	1 Credit [LTP: 0-0-2]

COURSEOUTCOMES: Students will be able to:

CO1: Develop the ability to identify difficult sounds, words and phrases to strengthen listening and applying these improved skills in spoken communication.

CO2: Cultivating knack for reading and writing by understanding the nuances of sentence structure and presentation style.

CO3: Understand negotiation and Identify steps for proper negotiation preparation & learn bargaining techniques and strategies of inventing options for mutual gain and move negotiations from bargaining to closing.

CO4: Develop a heightened awareness of the potential of digital communication and apply their knowledge in creating documents considering the needs of the netizens.

CO5: Propose their outlook through exposure to new and different experiences and ideas and enrich their understanding of the issues under discussion.

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	–	–	-	–	**1**	–	**3**	**2**
CO2	-	-	-	-	–	–	-	–	**1**	–	**3**	**2**
CO3	-	-	-	-	–	–	-	–	**1**	–	**3**	**2**
CO4	-	-	-	-	–	–	-	–	**1**	–	**3**	**2**
CO5	-	-	-	-	–	–	-	–	**1**	–	**3**	**2**

MAPPING OF COURSE OUTCOMES WITH PROGRAMME SPECIFIC OUTCOME

	PSO1	PSO2	PSO3
CO1	-	–	**3**
CO2	-	–	**3**
CO3	-	–	**3**
CO4	-	–	**3**
CO5	-	–	**3**

A. OUTLINE OF THE COURSE

Unit No.	Title of the Unit	Time required for the Unit (Hours)
1	**Advanced Listening & Speaking Skills**	**12**
2	**Advanced Reading & Writing Skills**	**6**
3	**Art of Negotiation Skills**	**2**
4	**Email Etiquettes**	**2**
5	**Group Discussion**	**2**

B. DETAILED SYLLABUS

LIST OF LABS	
1.	Listening Skills II: Analysis of videos/audios by famous personalities

2.	Speaking Skills II: Extempore, Debate etc.
3.	Public Speaking: Key Concepts, Overcoming Stage Fear
4.	Story-Telling Skills: Techniques of Story Telling, Prompts for story creation
5.	Situational Conversational Skills
6.	PowerPoint Presentation Skills-II
7.	Reading Skills II: Technical Writings, Research Papers& Articles
8.	Writing Skills II: Blog Writing &Review Writing
9.	Picture Perception & Discussion
10.	Art of Negotiation: Identify the qualities of successful and unsuccessful negotiators. Identify different negotiation situations to practice during class.
11.	Email Etiquettes
12.	Group Discussion: Dos &Don'ts, Informal GD

Code: BULCSE4201 DOCUMENT PREPARATION AND PRESENTATION 2.0 Credits [LTP: 0-0-2]

COURSEOUTCOMES: Students will be able to:

CO1: Navigate the options and create a text document using LaTeX using a standard template.

CO2: Incorporate well-formatted mathematical equations, algorithms, figures, tables and references in a document.

CO3: Use Zotero for reference management.

CO4: Handle basic aspects of document structure, including Format text, including alignment, emphasis and fonts, sections, subsections, paragraphs, and bulleted and enumerated lists and Page setup.

CO5: Make a presentation.

:

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	–	–	2	–	–	–	–	–	–	2	–	2
CO2	–	–	2	–	–	–	–	–	–	2	–	2
CO3	–	–	2	–	–	–	–	–	–	2	–	2
CO4	–	–	2	–	–	–	–	–	–	2	–	2
CO5	–	–	2	–	–	–	–	–	–	2	–	2

MAPPING OF COURSE OUTCOMES WITH PROGRAMME SPECIFIC OUTCOME

	PSO1	PSO2	PSO3
CO1	–	–	3
CO2	–	–	3
CO3	–	–	3
CO4	–	–	3
CO5	–	–	3

LIST OF EXPERIMENTS:

LIST OF LABS	
1	Downloading, Installing and Accessing LaTex / LibreOffice / MS Office
2	Using Software Specific Features and Menu Options
3	Creating a LaTeX/ LibreOffice/MS Office document
4	Setting Up the Document
5	Formatting the document content
6	Adding Tables and Figures to the document
7	Incorporating Algorithms and Equations in the documents
8	Using the Referencing and Indexing options
9	Using Zotero for referencing
10	Making Presentations in LibreOffice / MS Office

Code: BSACSA5101 NUCLEAR PHYSICS 3.0 Credits [LTP: 3-0-0]

COURSE OUTCOMES: Student will be able to:

CO1: Point out the basic terms of the nucleus, Rutherford scattering and Rutherford's scattering formula.
CO2: Apply the basic mechanism of nuclear fusion and fission.
CO3: Classify the classification of elementary particles.
CO4: Understand the need for accelerators and different types of accelerators.
CO5: Compare the different types of nuclear radiation detectors.

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**2**	**2**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**
CO2	**3**	**3**	**2**	**2**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**
CO3	**2**	**2**	**3**	**3**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**
CO4	**3**	**3**	**2**	**2**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**
CO5	**3**	**2**	**2**	**3**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**

MAPPING OF COURSE OUTCOMES WITH PROGRAMME SPECIFIC OUTCOME

	PSO1	PSO2	PSO3
CO1	3	-	-
CO2	3	-	-
CO3	3	-	-
CO4	3	-	-
CO5	3	-	-

A. OUTLINE OF THE COURSE

Unit No.	Title of the Unit	Time required for the Unit (Hours)
1.	**Structure of Nuclei**	**7**
2.	**Nuclear Fission and Fusion**	**8**
3.	**Particle Physics**	**7**
4.	**Accelerators**	**7**
5.	**Radiation Detectors**	**7**

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Structure of Nuclei**

	• Introduction of the Unit • Basic Properties of Nuclei: (1) Mass, (2) Radii, (3) Charge, (4) Angular Momentum, (5) Spin, (5) Magnetic Moment (μ), (6) Stability • Rutherford scattering and Rutherford's scattering formula • Constituents of nucleus • Magnetic dipole moment of nuclei • Basic idea about quadruple moment of nucleus • Nuclear spin and parity • Orbital angular momentum • Nuclear mass, Mass Defect and Binding energy • Theory of Nuclear forces. • Packing fraction and binding energy of nucleus • Liquid drop model of nucleus • Semi-empirical mass formula (Volume, Surface, Coulomb, Asymmetry and Pairing energy terms) • Conclusion of the Unit
2.	**Nuclear Fission and Fusion**
	• Introduction of the Unit • The Discovery of Nuclear Fission • The Energy Release in Fission • Fission cross Section and threshold, Neutron emission in fission • The prompt neutron and delayed neutrons • Mechanism for the emission of delayed neutrons • Energy of fission Neutrons • Barrier Penetration-Theory of Spontaneous fission • Nuclear Energy Sources • Nuclear Fission as a source of Energy • The Nuclear Chain Reaction • Condition of controlled chain Reaction, Nuclear Reactors • Energy release in fusion • Fusion reactions in stars: carbon and pp cycle. • Conclusion of the Unit
3.	**Particle Physics**
	• Introduction of the Unit • Classification of elementary particles • Properties of particles. • Fundamental interactions, • **Conservation laws** : Energy ,momentum, angular momentum, charge, lepton number, Baryon number, isospin, strangeness, Invariance under charge, parity, C.P., time and C.P.T.,(Qualitative discussion). • **Cosmic rays:** Properties of cosmic rays ,properties of secondary radiation, electronic showers ,geomagnetic effects, cosmic ray stars, the origin of cosmic rays • Conclusion of the Unit
4.	**Accelerators**

	• Introduction of the Unit • Need for accelerators • Ion sources, Van De graff generator • Drift tube • Linear accelerator • Wave guide accelerator • Cyclotron ,synchrocyclotron • Electron synchrotron, Proton synchrotron • Conclusion of the Unit
5.	**Radiation Detectors**
	• Introduction of various methods used in detection of nuclear radiation • Principle and working of (i) Ionization chamber (ii) Proportional counter (iii) Geiger- Muller counter; Dead time, Recovery time and paralysis time • Scintillation counter • Cloud chamber • Bubble chamber • Spark chamber • Solid state detectors • Basic components of mass spectroscope • Conclusion of the Unit

C. RECOMMENDED STUDY MATERIAL:

Sr.No	Reference Book	Author	Edition	Publication
1.	Nuclear Physics	S.N. Ghoshal	2012	S. Chand Publication, Delhi
2.	Nuclear Physics	D.C. Tayal	1982	Himalaya Publishing House
3.	The Atomic Nucleus	R.D. Evans	1955	Mc-Graw Hill

Code: BSACSA5102 ATOMIC AND MOLECULAR SPECTROSCOPY 3.0 Credits [LTP: 3-0-0]

COURSE OUTCOMES: Student will be able to:

CO1: Review the basic theory of atomic and molecular spectra.
CO2: Role-play the concept of vector model of atom and Stern Gerlach experiment.
CO3: Learn and realize the effect of magnetic and electric field on spectral lines.
CO4: Point out the theory of energy levels, molecular distance, Raman Effect and its characteristics.
CO5: Judge the origin and characteristics of X-rays.

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**2**	**2**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**
CO2	**2**	**3**	**2**	**3**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**
CO3	**3**	**–**	**2**	**2**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**
CO4	**3**	**3**	**2**	**2**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**
CO5	**2**	**2**	**3**	**3**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**

MAPPING OF COURSE OUTCOMES WITH PROGRAMME SPECIFIC OUTCOME

	PSO1	PSO2	PSO3
CO1	3	-	-
CO2	3	-	-
CO3	3	-	-
CO4	3	-	-
CO5	3	-	-

A. OUTLINE OF THE COURSE

Unit No.	Title of the Unit	Time required for the Unit (Hours)
1.	**Bohr's Theory of Spectra**	**7**
2.	**Vector Model of Atom and Stern-Gerlach Experiment**	**7**
3.	**Effect of Magnetic and Electric Field on Spectral Lines**	**7**
4.	**Molecular Spectra**	**8**
5.	**X-rays**	**7**

B.DETAILED SYLLABUS

Unit	Unit Details
1.	**Bohr's Theory of Spectra**
	• Introduction to the Unit • Bohr's theory of spectra of hydrogen like atoms • Origin of spectral series • Ritz combination rule

	• Effect of finite mass of the nucleus on the spectrum • Bohr's correspondence principle • Wilson-Sommerfield's quantum condition • Sommerfield's theory of elliptic orbit (qualitative idea) • Relativistic correction • Frank and Hertz principle • Limitations of Bohr's theory • Conclusion of the Unit
2.	**Vector Model of Atom and Stern-Gerlach Experiment**
	• Introduction to the Unit • Angular momentum of electron • Stern–Gerlach experiment and its consequence • Space quantization • Spin orbit interaction energy • Total angular momentum • Coupling schemes • Fine structure of a spectral line • Selection rules, Spectral term and their notations • Conclusion of the Unit
3.	**Effect of Magnetic and Electric Field on Spectral Lines**
	• Introduction to the Unit • Angular momentum and magnetic moment • Zeeman Effect: Normal Zeeman effect and its selection rules • Anomalous Zeeman effect and its selection rules • Paschen back effect and selection rules • Stark effect: Linear Stark effect • Conclusion of the Unit
4.	**Molecular Spectra**
	• Introduction to the Unit • Rotational Energy levels • Selection Rules and Pure Rotational Spectra of a Molecule • Vibrational Energy Levels • Selection Rules and Vibration Spectra • Rotation- Vibration Energy Levels • Selection Rules and Rotation-Vibration Spectra • Determination of Internuclear Distance • Quantum Theory of Raman Effect • Characteristics of Raman Lines. Stoke's and Anti-Stoke's Lines • Complimentary Character of Raman and infrared Spectra • Conclusion of the Unit
5.	**X-rays**
	• Introduction to the Unit • Origin of continuous and characteristic X-Rays • Absorption and emission spectrum • Energy levels and Moseley's law • Fine structure of X-ray levels • Auger effect • Comparison of optical and X-ray spectra • Classification of molecular spectra,

	• Rotational spectra and Rotational-Vibrational spectra and selection rules • Conclusion of the Unit

C. RECOMMENDED STUDY MATERIAL:

Sr.No	Reference Book	Author	Edition	Publication
1.	Atomic physics	J. B. Rajam	2007	S. Chand & Company
2.	Elements of Spectroscopy	S.L. Gupta, V. Kumar and R.C. Sharma	2005	Prentice-Hall of India
3.	Fundamentals of Molecular Spectroscopy	Colin N. Banwell and Elaine M. Mccash	1995	Tata McGraw-Hill, New Delhi,

Code: BSACSA5102	ORGANIC CHEMISTRY	3.0 Credits [LTP: 3-0-0]

COURSE OUTCOMES: Students will be able to:

CO1: Familiarize basic concepts of structure elucidation of organic compounds using UV, IR and NMR spectroscopy.

CO2: Demonstrate comprehensive knowledge about Nuclear Magnetic Resonance spectroscopy and PMR spectra of organic compounds.

CO3: Apply mechanism of action of heterocyclic compounds in pharmaceutics/drugs.

CO4: Categories carbohydrates and structure determination of carbohydrates with conversion.

CO5: Explain the chemical nature of Amino Acids, Peptides and Proteins.

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**2**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	**2**	**3**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**--**	**-**	**-**
CO4	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

MAPPING OF COURSE OUTCOMES WITH PROGRAMME SPECIFIC OUTCOME

	PSO1	PSO2	PSO3
CO1	3	-	-
CO2	3	-	-
CO3	3	-	-
CO4	3	-	-
CO5	3	-	-

A. OUTLINE OF THE COURSE

Unit No.	Title of the Unit	Time required for the Unit (Hours)
1.	**Electromagnetic Spectrum**	**8**
2.	**Nuclear Magnetic Resonance (NMR) spectroscopy**	**7**
3.	**Heterocyclic Compounds**	**7**
4.	**Carbohydrates**	**7**
5.	**Amino Acids, Peptides and Proteins**	**7**

B. DETAILED SYLLABUS

Unit	Unit Details
1	**Electromagnetic Spectrum**

	• Introduction to the Unit • **Electromagnnetic Radiation** • Origin of organic spectra, Types of energy changes, Types of molecular spectra, General instrumentation, absorbance and transmittance, line width. • **Ultraviolet Absorption Spectroscopy**- absorption laws (Beer-Lambert Law) molar absorptivity, presentation and analysis of UV spectra, types of electronic transitions, • Effect of solvents on transitions, effect of conjugation, concept of chromophore and auxochrome, bathochromic, hypsochromic and hyperchromic and hypochromic shifts • UV spectra of conjugated enes and enones. • **Infrared Absorption Spectroscopy** – Theory-Absorption of infra radiation Molecular vibrations, Hookes law, selection rules, intensity and position of IR bands measurement of IR spectrum, finger print region, characteristic absorptions of various functional groups and interpretation of IR spectra of simple organic compounds. • Conclusion of the Unit.
2	**Nuclear Magnetic Resonance (NMR) Spectroscopy**
	• Introduction to the Unit. • **Nuclear Magnetic Resonance (NMR) spectroscopy**: Principles of NMR spectroscopy, Larmor precession, chemical shift and low resolution spectra different • scales, spin-spin coupling and high resolution spectra, interpretation of PMR spectra of organic molecules • Proton magnetic resonance (^{1}H-NMR) spectroscopy, nuclear shielding and deshielding, chemical shift and molecular structure, spin-spin splitting and coupling constants, areas of signals. Interpretation of NMR spectra of simple organic molecules such as ethyl bromide, ethanol, acetaldehyde, I,1,2-tribromoethane, ethyl acetate, toluene and acetophenone. Conclusion of the Unit
3	**Heterocyclic Compounds**
	• Introduction to the Unit. • **Heterocylic Compounds :** 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 • Introduction to condensed five and six-membered heterocyclic compounds • Preparation and reactions of indole, quauinoline and isoquinoline • Mechanism of electrophilic substitution reactions of indole, quinoline and isoquionoline • Preparation and reactions of indole, quinoline and isoquinoline with special reference to Fisher-indole synthesis, Skraup synthesis and Bischler-Napieralski synthesis. • Conclusion of the Unit.
4	**Carbohydrates**

	• Introduction to the Unit • **Carbohydrates**: Classification, and General Properties • Glucose and Fructose (open chain and cyclic structure) • Determination of configuration of monosaccharides, absolute configuration of Glucose and Fructose, Mutarotation, ascending and descending in monosaccharides • Structure of disacharrides (sucrose, cellobiose, maltose, lactose) and polysaccharides (starch and cellulose) excluding their structure elucidation • Mechanism of osazone formation. Epimers, anomers. Interconversion of glucose and fructose, chain lengthening and chain, shortening of aldoses. Erythro and threodiastereomers. Conversion of glucose into mannose.. Determination of ring size of monosaccharides. Formation of glycosides, ethers and esters. Cyclic structure of D (+)-glucose and fructose. Structures of ribose and deoxyribose. • Conclusion of the Unit.
5	**Amino Acids, Peptides and Proteins**
	• Introduction to the Unit • **Amino Acids: Preparation** by Strecker synthesis using Gabriel's phthalimide synthesis. Zwitterion, Isoelectric point and Electrophoresis • Reactions of Amino acids: ester of –COOH group, acetylation of $–NH_2$ group, complexation with Cu^{2+} ions, ninhydrin test • Overview of Primary, Secondary, Tertiary and Quaternary Structure of proteins. • Determination of Primary structure of Peptides by degradation- Edmann degradation (N terminal and C terminal) thiohydantoin and with carboxy peptidase enzyme • Synthesis of simple peptides (upto dipeptides) by N-protection (t- butyloxycarbonyl and phthaloyl) &C activating groups and Merrifield solid-phase synthesis • Amino Acids, Peptides, Proteins and its classification, structure and stereochemistry of amino acids. acid-basebehaviour, isoelectric point and electrophoresis. Preparation and reactions of alpha-amino acids. • Nucleic acids — Introduction, constituents of nucleic acids - nucleosides and nucleotides • Conclusion of the Unit.

C. RECOMMENDED STUDY MATERIAL:

Sr.No	Reference Book	Author	Edition	Publication
1.	A Text Book of Organic Chemistry	O. P. Agarwal	Vol. I & II	Goyal Publication
2.	A Text Book of Organic Chemistry	B. S. Bahl and ArunBahl	Latest	S. Chand & Company Ltd.
3.	Organic Chemistry	S. M. Mukherji, S. P. Singh and R. P. Kapoor	Vol. I, II & III	Wiley Eastern Ltd. (New Age International)
4	Organic Chemistry	I.L. Finar	Vol.-I & II	Pearson Education, Asia

Code: BSACSA5104	REAL ANALYSIS	3.0 Credits [LTP: 3-0-0]

COURSE OUTCOMES: Students will be able to:

CO1: Fundamental definitions of sets, Axioms, Real number, complete ordered field, Interval, Neighborhood of a point.

CO2: Explain the Boundedness, supremum, Infimum of sequence, various types of sequence, limits, Cauchy's theorem.

CO3: Evaluate the limits & Continuity of functions, Heine's definition of continuity, Types of Discontinuity, Boundedness theorem, Intermediate Value theorem.

CO4: Analyze the derivative, Darboux's Theorem, Rolles's Theorem, Lagranges mean value theorem, Cauchy mean value theorem, Taylor's Theorem, Maclaurin's theorem.

CO5: Evaluate the upper and Lower Darboux sums, Riemann Integral, Properties of R-Integrable function, Mean value theorem of Integral Calculus, Fundamental theorem of Integral Calculus.

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**2**	**1**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	**3**	**1**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	**3**	**2**	**1**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	**2**	**1**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	**2**	**2**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

MAPPING OF COURSE OUTCOMES WITH PROGRAMME SPECIFIC OUTCOME

	PSO1	PSO2	PSO3
CO1	3	-	-
CO2	3	-	-
CO3	3	-	-
CO4	3	-	-
CO5	3	-	-

A OUTLINE OF THE COURSE

Unit No.	Title of the Unit	Time required for the Unit (Hours)
1	**Real Field**	**9**
2	**Real Sequences**	**6**
3	**Limit and Continuity of Function**	**6**
4	**Mean value theorem**	**8**
5	**Riemann Integration**	**7**

B DETAILED SYLLABUS

Unit	Unit details

1	**Real Field**
	• Introduction to the Unit • Introduction-ordered sets, The Field Axioms, Order axioms • Completeness axioms, Real number as a complete ordered field • Interval, neighborhood of a point • Heine Borel Theorem • Conclusion of the Unit
2	**Real Sequences**
	• Introduction to the Unit • Boundedness, supremum, Infimum of sequence, Limit of sequence, Convergent sequences • Divergent sequence, Theorems on convergent sequence and limits • Cauchy's first theorem on limits, Subsequences, Cauchy sequence, Cauchy's general principle • Cauchy Convergence test, Ratio Comparison test, Hyperharmonic series test, Raabe's Test, Logarithmic ratio test, De Morgan's test • Conclusion of the Unit
3	**Limit and Continuity of Function**
	• Introduction to the Unit • Limits of functions, Continuity • Heine's definition of continuity, Discontinuity • Types of Discontinuity • Intermediate Value theorem, Uniform continuity • Conclusion of the Unit
4	**Mean value theorem**
	• Introduction to the Unit • Derivative, necessary condition, Properties of derivatives • Darboux's Theorem, Rolles's Theorem • Lagranges mean value theorem, Cauchy mean value theorem • Taylor's Theorem, Maclaurin's theorem • Conclusion of the Unit
5	**Riemann Integration**
	• Introduction to the Unit • Upper and Lower Darboux sums, Upper and Lower Riemann Integral • Necessary and sufficiency condition of R- Integrability, Properties of R- Integrable function • Conclusion of the Unit

C. RECOMMENDED STUDY MATERIAL:

Sr. No	Reference Book	Author	Edition	Publication
1.	Principles of Mathematical Analysis	Walter Rudin	**3rd ed**	McGraw–Hill International Editions, Singapore
2.	Mathematical Analysis	Tom M. Apostol	2nd Ed	Pearson, India
3.	Real Analysis	K. C. Sarangi	2016	RBD Jaipur

Code: BSACSA5201 CHEMISTRY LAB-V 1.0 Credit [LTP: 0-0-2]

COURSE OUTCOMES: Students will be able to:

CO1: Understand chemical and molecular processes that take place in organic chemical reactions in synthesis.

CO2: Explain the principles of the chromatographic techniques.

CO3: Acquire the ability to understand, explain and use instrumental techniques for chemical analysis.

CO4: Prepare water quality assessment report.

CO5: Apply subject knowledge and skill to solve complex problems with defined solutions.

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**2**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	**2**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	**2**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	**2**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	**3**	**3**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

MAPPING OF COURSE OUTCOMES WITH PROGRAMME SPECIFIC OUTCOME

	PSO1	PSO2	PSO3
CO1	3	-	-
CO2	3	-	-
CO3	3	-	-
CO4	3	-	-
CO5	3	-	-

LIST OF EXPERIMENTS:

1	Synthesis of p bromoacetanalide
2	Synthesis of p-nitroacetanalide
3	Benzolytation of Aniline
4	Paper chromatographic separation of compounds in Spinach plant
5	To separate a mixture of sugar by paper chromatography
6	Synthesis of Aspirin
Physical Chemistry	
7	To determine the heat of neutralization for strong acid and strong base
8	Potentiometric measurements-Strong acid with strong base.
9	To study the saponification of ethyl acetate conductmetrically
10	Study the variation of surface tension with different concentration of detergent solutions. Determine CMC.

11	To separate mixture of organic compounds by solvent extraction.
12	Determination of conductivity, molar conductivity, degree of dissociation and dissociation constant of a weak acid.

Code: BSACSA5202 PHYSICS LAB-V 1 Credit [LTP: 0-0-2]

COURSE OUTCOMES: Students will be able to:

CO1: Learn the concept of RC and LC transmission lines at various frequencies. CO2: Learn the concept of inverse square law and characteristics of GM counter CO3: Learn the concept of Plank's and Stefan's constant using solar and photo cell

CO4: Learn the concept of LCR meter and determine the velocity of sound by standing wave method

CO5: Learn the concept of the magnetic susceptibility of solids and Hall coefficients of a semiconductor.

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**3**	**3**
CO2	**2**	**1**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**2**	**1**
CO3	**1**	**2**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**1**	**2**
CO4	**2**	**1**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**2**	**1**
CO5	**3**	**3**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**3**	**3**

MAPPING OF COURSE OUTCOMES WITH PROGRAMME SPECIFIC OUTCOME

	PSO1	**PSO2**	**PSO3**
CO1	3	-	-
CO2	3	-	-
CO3	3	-	-
CO4	3	-	-
CO5	3	-	-

LIST OF EXPERIMENTS:

1.	Study of a R-C transmission line at 50 Hz.
2.	Study of a L-C transmission line (i) at fixed frequency (ii) at variable frequency.
3.	Study the characteristics of a GM counter and verification of inverse square law for the same strength of a radioactive source.
4.	Study of β- absorption in Al foil using GM counter.
5.	Determination of Planck constant using solar cell.
6.	Determination of Stefan's constant using photocell.
7.	Determination of e/m by helical method.
8.	Determination of velocity of sound in air by standing wave method using speaker, microphone and CRO.

9.	Study of electromagnetic damping in LCR circuit using metal plate.
10.	Study the Iodine spectrum with the help of grating, spectrometer and ordinary bulb.
11.	To measure the Magnetic susceptibility of Solids.
12.	To determine the Hall coefficient of a semiconductor sample.

Code: BSAESA501 INORGANIC CHEMISTRY 3 Credit [LTP: 3-0-0]

COURSE OUTCOMES: Students will be able to:

CO1: Demonstrate different Acid Base theories and Solvent system concept.

CO2: Analyze metal ligand bonding in transition metal complexes with the help of Valence Bond Theory and Crystal field Theory.

CO3: Outline magnetic &spectral properties, thermodynamic and kinetic aspects of metal complexes.

CO4: Summarize synthesis, properties and applications of organometallic compounds.

CO5: Evaluate redox potential, redox cycle and disproportionation using Frost, Latemar andRoubaix diagram.

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**2**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	**2**	**3**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	**3**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	**3**	**3**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	**2**	**3**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

MAPPING OF COURSE OUTCOMES WITH PROGRAMME SPECIFIC OUTCOME

	PSO1	**PSO2**	**PSO3**
CO1	3	-	-
CO2	3	-	-
CO3	3	-	-
CO4	3	-	-
CO5	3	-	-

A. OUTLINE OF THE COURSE

Unit No.	**Title of the Unit**	**Time required for the Unit (Hours)**
1.	**Acids & Bases and Non-aqueous Solvents**	**8**
2.	**Metal Ligand bonding in Transition Metal Complexes**	**7**
3.	**Magnetic and Spectral properties of Transition Metal Complexes**	**7**
4.	**Organometallic Chemistry**	**8**
5.	**Oxidation & Reduction**	**6**

B. DETAILED SYLLABUS

Unit	**Unit Details**

1.	**Acids & Bases and Non-aqueous Solvents**
	• Introduction of the Unit • **Acids and bases:** Theories ofArrhenius, Bronsted-Lowry, Lux-Flood • Solvent system concept and Lewis concept of acids and bases • Hard and Soft Acids and Bases (HSAB): Classification of acids and bases as hard and soft. • Pearson's HSAB concept, acid-base strength and hardness and softness. Symbiosis, theoreticalbasis of hardness and softness, electronegativity and hardness and softness • **Non-aqueous solvents :**Physical properties of solvent, types of solvent and their generalcharacteristics • reactions in non-aqueous solventswith reference to liq. NH_3 and liq. SO_2, HF • Conclusion of the Unit
2.	**Metal Ligand bonding in Transition Metal Complexes**
	• Introduction of the Unit • **Transition Metals:** Characteristic properties transition elements – ionic radii, oxidation states,complexation tendency, magnetic behavior and electronic spectral properties. • Metal ligands bonding in transition metal complexes • Limatation of VBT, Elementary idea of CFT, Crystal field splitting in Octahederal ,Tetrahederaland Square planer complexes ,Factors affecting the crystal field parameter Conclusion of the Unit
3	**Magnetic and Spectral properties of Transition Metal Complexes**
	• **Magnetic Properties of Transition Metal Complexes:**Types of magnetic behavior, methods of determining magnetic susceptibility, L-S and J-J coupling, orbital contribution to magnetic moments. Correlation of magnetic moment data and stereochemistry of Co (II) and Ni (II) complexes; anomalous magnetic moments • **Spectral properties of transition metal complexes:** Types of electronic transitions, selectionrules for d-d transitions, spectroscopic ground states and Spectoscopic terms (L-S Coupling) , spectrochemical series, orgelenergy level diagram for d^1 and d^9 states, the electronic spectrum of $[Ti(H_2O)_6]^{+3}$ complex ion. • Thermodynamic and Kinetic Aspects of Metal Complexes: A brief outline of thermodynamic stability of metal complexes and factors affecting the stability, substitution reactions of square planar complexes Conclusion of the Unit
4	**Organometallic Chemistry**
	• Introduction of the Unit • **Organometallic chemistry:** Definition, nomenclature and classification of organometallic compounds, • Preparation, properties, bonding and applications of alkyls and aryls of Li, Al, Hg, Sn and Ti, abrief account of metal – ethylenic complexes and homogenous hydrogenation, mononuclear carbonyls and the nature of bonding in metal carbonyls.

	• Conclusion of the Unit
5	**Oxidation & Reduction**
	• Introduction of the Unit • Use of Redox potential data • Analysis of redox cycle • Redox stability in water • Disproportnation • Diagrammatical presentation of potential data-Frost, Latimar and pourbaix diagram • Principle involved in the extraction of elements • Conclusion of the Unit

C. RECOMMENDED STUDY MATERIAL:

Sr.No	Reference Book	Author	Edition	Publication
1.	Selected Topics in Inorganic Chemistry	Malik Tuli,Madan	Latest	S. Chand & Sons
2.	Advanced Inorganic Chemistry	S. K Agarwal, Keemtil	Latest	PragatiPrakashan

Code: BSAESA5102 **ANALOG AND DIGITAL CIRCUITS** **3.0 Credits [LTP: 3-0-0]**

COURSEOUTCOMES: Students will be able to-

CO1 Study theory and applications of Electronics Devices.

CO2 Apply concepts of Transistor Amplifier and Operational Amplifier and their applications in engineeringand technology.

CO3 Develop Feedback and oscillator Circuits in electrical and electronics engineering field.

CO4 Define Number System and Boolean algebra

CO5 Design Combinational Logics.

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2	-	-	-	-	-	-	-	-
CO2	2	3	2	2	-	-	-	-	-	-	-	-
CO3	3	3	3	3	-	-	-	-	-	-	-	-
CO4	2	2	3	3	-	-	-	-	-	-	-	-
CO5	3	3	3	2	-	-	-	-	-	-	-	-

MAPPING OF COURSE OUTCOMES WITH PROGRAMME SPECIFIC OUTCOME

	PSO1	**PSO2**	**PSO3**
CO1	3	-	-
CO2	3	-	-
CO3	3	-	-
CO4	3	-	-
CO5	3	-	-

A. OUTLINE OF THECOURSE

Unit No.	Title of the Unit	Time required for the Unit (Hours)
1.	**Electronics Devices**	8
2.	**Transistor Amplifier and Operational Amplifier**	9
3.	**Feedback and Oscillator Circuits**	9
4.	**Number System and Boolean Algebra**	9
5.	**Analysis & Design of Combinational Logic**	9

B. DETAILEDSYLLABUS

Unit	Unit Details
1.	**Electronics Devices**
	• Introduction of Unit • P-N Junctions: Diode theory, Bipolar Junction Transistors (BJT): Transistor fundamentals,transistor Analog Electronics configurations, DC operating point, BJT characteristics & parameters, fixed bias, emitter bias with and without emitter resistance,

	analysis of above circuits and their design, variation of operating point and its stability. • Field-Effect Transistors (FET): JFET-current-voltage characteristics, effects in real devices,high-frequency and high-speed issues. Conclusion and Summary of Unit
2.	**Transistor Amplifier and Operational Amplifier**
	• Introduction of Unit • Transistors Amplifier: Small Signal BJT amplifiers: AC equivalent circuit, hybrid, re model andtheir use in a mp l i f i er design. Multistage amplifiers, frequency response of basic & compound configuration, Power amplifiers: Class A, B, AB, C and D stages, IC output stages. • Operational Amplifiers: Op-AmpBasics,practicalOp-Ampcircuits,differentialandcommonmodeoperation,Inverting & Non Inverting Amplifier, differential and cascade amplifier, Op-Amp applications .
3.	**Feedback and oscillator Circuits**
	• Introduction of Unit • Feedback & Oscillator Circuits Effect of positive and negative feedbacks, feedbacks, basic feedback topologies & their properties, properties, Analysis of practical feedback amplifiers, Sinusoidal Oscillators (RC, LC and Crystal), Multi-vibrators, The 555timer. • Conclusion and Summary of Unit
4.	**Number System and Boolean Algebra**
	• Introduction of Unit • NumberSystems:Decimal,binary,octal,hexadecimalnumbersystemandconversion,binaryweigh tedcodes,signed numbers, 1s and 2s complement codes, Binary arithmetic • BooleanAlgebra:Binarylogicfunctions,Booleanlaws,truthtables,associativeanddistributive p roperties,De-Morgans theorems, realization of switching functions using logic gates • Conclusion and Summary of Unit
5.	**Analysis & Design of Combinational Logic**
	• Introduction of Unit • Combinational Logic: Switching equations, canonical logic forms, sum of product & product of sums, Karnaugh maps, two, three and four variable Karnaugh maps, simplification of expressions, Quine-Mc Cluskey minimization technique, mixed logic combinational circuits, multiple output functions. • Analysis & design of Combinational Logic: Introduction to combinational circuits, code conversions, decoder, encoder, priority encoder, multiplexers as function generators, binary adder, subs tractor, BCD adder, Binary comparator, arithmetic logic units • Sequential Logic, Sequential Circuits, Programmable Logic, Digital integrated circuits. • Conclusion and Summary of Unit

C. **RECOMMENDED STUDYMATERIAL:**

Sr. No	Reference Book	Author	Editio	Publication
1.	Microelectronics Circuits	A.S. Sedra & K.C.Smith	Latest	Oxford University Press
2.	Electronic Principles	A.P.Malvino	Latest	TMH

3.	Electronic Devices & Circuit	RobertL.Boylestad&LouisNashelsky	Latest	Pearson
4.	Electronic devices and circuits	JacobMillman,andC.C.Halkias	Latest	TMH
5.	Digital Electronics	WilliamKleitz	Latest	PHI

Code: BUACHU5115 ENTREPRENEURIAL & MANAGERIAL SKILLS 2.0 Credits [LTP: 2-0-0]

COURSE OUTCOMES: Students would be able to:

CO1: Demonstrate an integrated awareness of Entrepreneurship and its link to professional life.

CO2: Understand and analyze the concepts of Entrepreneurship Development and various Entrepreneurship models.

CO3: Understand the role of effective leadership in organizational strategy & propose appropriate leadership styles and approaches through evaluation of dynamic leadership

CO4: Comprehend the behaviors and issues relating to leadership.

CO5: Develop practical, ethically-informed leadership skills that can be applied in a range of situations.

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	–	–	-	–	**1**	–	**3**	**2**
CO2	-	-	-	-	–	–	-	–	**1**	–	**3**	**2**
CO3	-	-	-	-	–	–	-	–	**1**	–	**3**	**2**
CO4	-	-	-	-	–	–	-	–	**1**	–	**3**	**2**
CO5	-	-	-	-	–	–	-	–	**1**	–	**3**	**2**

MAPPING OF COURSE OUTCOMES WITH PROGRAMME SPECIFIC OUTCOME

	PSO1	**PSO2**	**PSO3**
CO1	–	–	3
CO2	–	–	3
CO3	–	–	3
CO4	–	–	3
CO5	–	–	3

A. OUTLINE OF THE COURSE

Unit No.	**Title of the Unit**	**Time required for the Unit (Hours)**
1.	**Entrepreneurship**	**7**
2.	**Entrepreneurship Development**	**8**
3.	**Leadership Styles: Effective Vs Successful Managers.**	**7**
4.	**Behavioral Theory of Leadership.**	**5**
5.	**Leadership Styles: Case Study and Adaptation.**	**8**

B. DETAILED SYLLABUS

Unit	**Unit Details**
1.	**Entrepreneurship**

	● Introduction to the Unit ● Concept of Entrepreneur. Intrapreneur, Entrepreneurship and Manager ● Difference between Entrepreneur and Intrapreneur, Entrepreneur and Entrepreneurship. Attributes and Characteristics of successful entrepreneurs. Functions of an Entrepreneur ● Classification of Entrepreneurs. Role of Entrepreneur in Indian Economy, Developing entrepreneurial culture, Factors influencing Entrepreneurship Growth - Economic, Non-Economic Factors, For profit or Not for profit entrepreneurs, Constraints for the Growth of Entrepreneurial Culture, Entrepreneurship as a career ● Entrepreneurship as a style of management, Emerging Models of Corporate Entrepreneurship, India's start up revolution–Trends, Imperatives, benefits; the players involved in the ecosystem, Business Incubators-Rural ● entrepreneurship, social entrepreneurship, women entrepreneurs, Cases of Tata, Birlas, Kirloskar and new generation entrepreneurs in India. ● Conclusion of the Unit
2.	**Entrepreneurship development**
	● Introduction to the Unit ● Entrepreneurial Competencies, Developing Competencies. ● Concept of entrepreneurship development, Entrepreneur Training and developing, Role of Entrepreneur Development Programs (EDP) ● Objectives – contents – methods - execution. Role of Mentors ● Innovation and Entrepreneurship, Design Thinking Process. Role of consultancy organizations in promoting Entrepreneurs ● Problems and difficulties of Entrepreneurs - Marketing Finance, Human Resource, Production; Research - external problems ● Mobility of Entrepreneurs, Entrepreneurial change, occupational mobility - factors in mobility ● Conclusion of the Unit
3.	**Leadership Styles: Effective Vs. Successful Managers**
	● Introduction to the Unit ● Types of Leadership Style ● Types of Management Styles ● Distinction between Effective Leadership and Effective Management ● Conclusion of the Unit
4.	**Behavioral theory of Leadership**
	● Introduction to the Unit ● Definition of Behavioral Theory ● Classification of Behavioral theory ● Conclusion of the Unit
5.	**Leadership Styles: Case Study and Adaptation**
	● Introduction to the Unit ● Peter Weaver Case Study ● Dealing with Crisis: Case Study ● Arsenic and Old Lace Case Study ● Conclusion of the Unit

C. RECOMMENDED STUDY MATERIAL:

Sr. No	Reference Book	Author	Edition	Publication
1	Leadership Development	John Mitchell	*2012*	Mitchell Leadership Consulting
2.	Leading Minds: An Anatomy of Leadership	Howard E. Gardner and Emma Laskin	*2011*	Kogan Page
3.	Start with Why: How Great Leaders Inspire Everyone to Take Action,	Simon Sinek	2011	Portfolio
4.	Strengths-Based Leadership	Tom Rath and Barry Conchie	2009	Gallup Press

CODE: BSACCE5201 OFFICE AUTOMATION TOOL 2 Credit [0-0-2]

COURSE OUTCOMES

Students would be able to:

CO1: Understand the concepts of hardware and software components of computers.
CO2: Acquire the knowledge of basics of computer and data representation.
CO3: Create ms-word document and use of different key in that document.
CO4: Understand the use of mathematical tool and hyperlink.
CO5: Create a mail id and write an e-mail.

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**2**	**-**	**-**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**1**
CO2	**2**	**-**	**-**	**2**	**2**		**-**	**-**	**-**	**-**	**-**	**1**
CO3	**2**	**-**	**-**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**1**
CO4	**2**	**-**	**-**	**2**	**2**	**-**		**-**	**-**	**-**	**-**	**1**
CO5	**2**	**-**	**-**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**1**

MAPPING OF COURSE OUTCOMES WITH PROGRAMME SPECIFIC OUTCOME

	PSO1	**PSO2**	**PSO3**
CO1	3	-	-
CO2	3	-	-
CO3	3	-	-
CO4	3	-	-
CO5	3	-	-

LIST OF EXPERIMENTS:

1	Prepare a document about any tourist destination of your choice with appropriatepictures and editing features.
2	Prepare a News Paper Layout. Insert appropriate pictures wherever necessary. Usethe following Features:Three Column and Four Column settingSet One or Two Advertisements. Use Bullets and Numbering
3	Create a Document consisting of Bio-data. It includes A table giving yourqualification and/or experience of work. Table should be Bordered and Shaded. AMultilevel list giving your areas of interest and further areas of interest. The subareas should be numbered as „a‟, „b‟, etc. while the areas should be numbered as„1‟, „2‟, etc. The information should be divided in “General” and “Academic”sections. The header should contain “BIO-DATA” while the footer should have page numbers in the format Page 1 of 10. Assign a password for the document toprotect it from unauthorized access.
4	Assume that you are coordinating a seminar in your organization. Write a letter to10 different IT companies asking them to participate in the seminar using mail merge facility.
5	Prepare a document which contains template of marks card of students. Assume that thereare 10 students. The footer for the document should be, Poornima University Jaipur
6	Prepare a document about any topic In mathematics which uses mathematicalsymbols.

	(At least 5 mathematical symbols should be used). Assign a password forthe document to protect it from unauthorized access. Demonstrate the use ofHyperlink Option. Sets margins to your document, a font of size and double spaceddocument.
7	Open a new workbook, save it as JavaCoffeeBar.xls. In sheet1 write followingsales data for Java Coffee bar to show their First 6 months sales. Select cellB4:D4 and change the horizontal alignment to center and text to 90 degree. Alltitles should be in bold Format all cells numbers to currency style and adjustwidth as necessary. Add border to data. Select the cell range A1:H1, merge andcenter these cells. Apply same format to A2:H2. Give border, shading and pattern to data in sheet Apply different font settings for all titles in sheet Apply greencolor and bold setting to sales above 10000 (use conditional formatting) Renamecurrent worksheet as First Half Sales
8	Prepare a worksheet to maintain student information. The work sheet should contain Roll Number, Name and marks in 5 subjects. (Max Marks is 100).Validate the marks. Calculate the total marks. Assign the grade according to the following.Poornima University, JaipurAssign grade „A" if the total marks is above 450. From 401 to 449 assign the gradeas "B". From 351 to 400 assign the Grade as C. From 300 to 350 the grade to beassigned is „D". For the total marks less than 300No grade is assigned. A student eligible to get a grade only when he gets 40 and above in all the subjects. In suchcases the grade is "FAIL". (Assume that there are 10 students).
9	Prepare a pay-bill using a worksheet. The work sheet should contain Employee Id, Name, Designation, Experience and Basic Salary and Job ID.If Job Id is 1 then DAis 40% of the basic salary. HRA is Rs. 4500. If Job Id is 2 then DA is 35% of thebasic salary. HRA is Rs. 3500. If Job Id is 3 then DA is 30% of the basic salary.HRA is Rs. 2500. If Job Id is 4 then DA is 25% of the basic salary and HRA isRS.2500. For all the other Job ids DA is 20% of the basic salary and HRA is Rs.1500. For all the above Job ids PF to be deducted is 4%. For the job ids between 1-4Rs. 100 to be deducted as Professional Tax. Find the net pay.
10	For the above employee worksheet perform the following operations 1. Use filter to display the details of employees whose salary is greater than 10,000. 2. Sort the employees on the basis of their net pay 3. Use advance filter to display the details of employees whose designation is "Programmer" and Net Pay is greater than 20,000 with experience greater than 2 yrs.
11	Using Excel project the Product sales for any five products for five years.Compute the total sales of each product in the five years.Compute the total sales of all the products in five year.Compute the total sales of all products for each year.Represent annual sale of all the products using Pie-Chart.Represent annual sales of all products using Bar Chart.Represent sale of a product for five years using Pie-Chart.Label and format the graphs
12	Assume that you are going to give a presentation about Information Technology. (Choose some latest technologies). The presentation should have minimum 10slides. Insert appropriate images wherever necessary. Use proper formattingDiagrams and tables. Show the usage of action buttons, hyperlinks, and animations.

Code:BUVCHU5101	GANDHI AND EDUCATION	2.0 Credits [LTP: 2 -0-0]

COURSE OUTCOMES

Students would be able to:

CO1: Value Gandhian perspective on education

CO2: Appreciate the significance of education in Indian languages.

CO3: Evaluate the application of Gandhian thoughts in NEP 2020

CO4: Realise the principles of NEP 2020 in vocational and skill oriented education.

CO5: Seek inspiration from Gandhi's thoughts on education.

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	2	-	3	-	-	-	2
CO2	-	-	-	-	-	2	-	3	-	-	-	2
CO3	-	-	-	-	-	2	-	3	-	-	-	2
CO4	-	-	-	-	-	2	-	3	-	-	-	2
CO5	-	-	-	-	-	2	-	3	-	-	-	2

MAPPING OF COURSE OUTCOMES WITH PROGRAMME SPECIFIC OUTCOME

	PSO1	PSO2	PSO3
CO1	-	**1**	-
CO2	-	**1**	-
CO3	-	**1**	-
CO4	-	**1**	-
CO5	-	**1**	-

A. OUTLINE OF THE COURSE

Unit No.	Title of the unit	Time required for the unit (Hours)
1.	**Gandhi's Philosophy and education**	**5**
2.	**Gandhi's Experiment in Education**	**5**
3.	**Gandhi's Educational Thought on Skill**	**5**
4.	**Vocational Education**	**5**
5.	**Experiential Learning - Gandhian Approach**	**4**

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Gandhi's Philosophy and education**
	• Introduction of the Unit • Gandhi's Philosophy on education • Education for character building and moral development • Education relating to health, hygiene, heritage, and handicraft • Conclusion of the Unit
2.	**Gandhi's Experiment in Education**

	• Introduction of the Unit • Gandhi's educational ideas on use of Indian Language as a medium of Instruction, TextBook and Teacher. • Gandhi's educational thought on Elementary and Adult Education. • Gandhi's vision on Higher Education • Conclusion of the Unit
3.	**Gandhi's Educational Thought on Skill**
	• Introduction of the Unit • Rural development through Skill and Local Need Based education • Skill education in NEP 2020 and Gandhi • Conclusion of the Unit
4.	**Vocational Education**
	• Introduction of the Unit • Gandhi's Idea on Self-reliance (Swavalambi Shiksha) • Reflection in contemporary educational policy. • Conclusion of the Unit
5.	**Experiential Learning - Gandhian Approach**
	• Introduction of the Unit • Wardha Education Conference • Experiential Learning and Work Education • Education through Craft and Development of Crafts • Rural reconstruction • Conclusion of the Unit

C. RECOMMENDED STUDY MATERIAL:

Sr. No.	Reference Book	Author	Edition	Publication
1.	Art and Swadeshi.	Coomaraswamy, Anand K.	1910	Munshi Ram Manoharalal, Delhi
2.	Gandhian Thought	Joseph, C. Mukalel	2003	Discovery Publishing House, New Delhi
3.	Educational thoughts of Mahamtha Gandhi	Joshi, Sudharma	2008	Crescent Publishing CorporationNew Delhi
4.	The Relevance of Gandhian Thought	Singh, Ramji	1983	Claasical Publishing Company, New Delhi

Code: BSACSA5401 INDUSTRIAL TRAINING & SEMINAR 1 Credit [LTP: 0-0-2]

COURSE OUTCOMES: Students will be able to:

CO1: Develop advanced and lifelong learning skills.

CO2: Extend the boundaries of knowledge through research and development.

CO3: Write formatted report for explaining the work during industrial training and describing the experience.

CO4: Understand basis of professional practice, administrative functions and company culture.

CO5: Develop greater clarity about academic & career goals and explore options in career plans.

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	**3**	-	-	-	-	-	-	-	-	**3**
CO2	-	-	**3**	-	-	-	-	-	-	-	-	**3**
CO3	-	**3**	**2**	-	-	-	-	-	-	-	-	**2**
CO4	--	-	**2**	-	-	-	-	-	**3**	-	-	**2**
CO5	-	-	**3**	-	-	-	-	-	**3**	-	-	**3**

MAPPING OF COURSE OUTCOMES WITH PROGRAMME SPECIFIC OUTCOME

	PSO1	**PSO2**	**PSO3**
CO1	3	-	-
CO2	3	-	-
CO3	3	-	-
CO4	3	-	-
CO5	3	-	-

A. **OUTLINE OF THE COURSE**

1	At the end of the Fourth Semester, each student would undergo Industrial Training in an Industry/ Professional Organization / Research Laboratory with the prior approval of the Head of Department and Training & Placement Officer for two months.
2	Students shall be required to submit logbook and certificate from the organization and power point presentation based on the training.
3	Students shall be required to submit a written typed report and power point presentation based on the training.
4	Students shall be required to give the presentations in the allotted period about the training attended after 4th Semester.
5	The evaluation shall be done as per continuous evaluation process during V^{th} semester by the respective department and the marks/result shall be notified accordingly. A department specific panel comprising of **HOD/Sr. Faculty/ Project Coordinators** shall judge each individual student for the above-mentioned work. The departmental panel shall display the proper schedule for the class/ one to one interaction/presentation for all the students.

Code: BSACSA6101	QUANTUM MECHANICS	3.0 Credits [LTP: 3-0-0]

COURSE OUTCOMES: Students will be able to:

CO1: Apply the basic concepts of Quantum Mechanics and Heisenberg uncertainty principle.

CO2: Point out the mechanism and importance of Schrodinger equation in Quantum Mechanics.

CO3: Role-plays of Operators in Quantum Mechanics and their Applications

CO4: Compare the theory of potential barrier and apply this in the decay of alpha particle from the nucleus.

CO5: Solve the concept of simple harmonic oscillator at atomic level.

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**2**	**2**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**
CO2	**2**	**2**	**3**	**2**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**
CO3	**3**	**3**	**2**	**2**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**
CO4	**3**	**2**	**2**	**3**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**
CO5	**3**	**3**	**2**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**

MAPPING OF COURSE OUTCOMES WITH PROGRAMME SPECIFIC OUTCOME

	PSO1	**PSO2**	**PSO3**
CO1	3	-	-
CO2	3	-	-
CO3	3	-	-
CO4	3	-	-
CO5	3	-	-

A. OUTLINE OF THE COURSE

Unit No.	**Title of the Unit**	**Time required for the Unit(Hours)**
1.	**Development of Quantum Mechanics**	**8**
2.	**Schrodinger Equations**	**7**
3.	**Operators in Quantum Mechanics and their Applications**	**7**
4.	**Bound State Problems**	**7**
5.	**Simple Harmonic Oscillator (1-D Case)**	**7**

B. DETAILED SYLLABUS

Unit No.	Unit Details
1.	**Development of Quantum Mechanics**
	• Introduction of the Unit • Black body radiation spectrum • Classical theory and its failure • Planck quantum hypothesis • Matter Waves: De Broglie hypothesis • Wave packet, Phase velocity and group velocity • Davison Germer experiment. • Heisenberg Uncertainty Principaland its application such as (i) Non existence of electron in nucleus, (ii) Ground state energy of H–atom, (iii) Ground state energy of harmonic oscillator (iv) Natural width of spectral line • Compton effect • Conclusion of the Unit
2.	**Schrodinger Equations**
	• Introduction of the Unit • Wave function and its interpretation, • Schrödinger time dependent and time independent one-dimensional equation, • Three-dimensional Schrödinger wave equation, • Probability current density, • Physical meaning of ψ, • Conditions to be satisfied by ψ. • particle in one dimensional box • Eigen function and eigen values • Discrete energy levels • Extension of results for three dimensional case and degeneracy of level. • Conclusion of the Unit
3.	**Operators in Quantum Mechanics and their Applications**
	• Introduction of the Unit • Definition of operator in quantum mechanics • Eigen function • Eigen value and Eigen value equation • Hermition operator • Parity operator • Exchange operator • Expected value • Normalization of wave function • Orthogonally of wave function • Stationary states • Commutation relations • Ehrenfest's theorem • Bohr's principle of complementarity

	• principle of superposition • Conclusion of the Unit
4.	**Bound State Problems**
	• Introduction of the Unit • Potential step • Rectangular potential barrier • Calculation of reflection and transmission coefficient • Qualitative discussion of the application to alpha decay (tunnel effect) • square well potential problem, • calculation of transmission coefficient • Resonant scattering • Conclusion of the Unit
5.	**Simple Harmonic Oscillator (1-D Case)**
	• Introduction of the Unit • Schrödinger equation and its solutions, • Eigen function, • Energy eigen values. • Zero point energy, • Parity, • Symmetric and anti-symmetric wave functions with graphical representation. • **Rigid rotator**: Schrodinger equation and its solution. • Conclusion of the Unit

C. RECOMMENDED STUDY MATERIAL:

Sr.No	Reference Book	Author	Edition	Publication
1.	Quantum Mechanics: A Textbook for Undergraduates students	**Mahesh C. Joshi**	2009	PHI
2.	Quantum Physics of Atoms, Molecules, Solid, Nuclei and Particles	**R. Eisberg and R. Resnick**	1985	John Wiley & Sons, Singapore
3.	Quantum Mechanics & Modern Physics	**Mahipal Singh**	2008	Ram Prasad & Sons, Agra

Code: BSACSA6102	PHYSICAL CHEMISTRY	3.0 Credits [LTP: 3-0-0]

COURSE OUTCOMES: Students will be able to:

CO1: Evaluate photochemical and photophysical processes using Jablonski diagram and their quantum yield expressions.

CO2: Rationalize the selection rules in rotational and vibrational spectra.

CO3: Describe the fundamental concepts of electrochemistry and relate the conductivity of an electrolyte with its concentration.

CO4: Outline the mechanisms of unimolecular and bimolecular reactions at surfaces using Gibbs, Freundlich and Langmuir isotherm.

CO5: Differentiate between classical and quantum mechanics and solve the Schroedinger equation to obtain wave functions for some basic, physically important types of potential in one dimension, and estimate the shape of the wave function.

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	**3**	**2**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	**3**	**2**	**3**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	**2**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	**2**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

MAPPING OF COURSE OUTCOMES WITH PROGRAMME SPECIFIC OUTCOME

	PSO1	**PSO2**	**PSO3**
CO1	3	-	-
CO2	3	-	-
CO3	3	-	-
CO4	3	-	-
CO5	3	-	-

A. OUTLINE OF THE COURSE

Unit No.	Title of the unit	Time required for the Unit (Hours)
1.	**Photochemistry**	**7**
2.	**Spectroscopy**	**8**
3.	**Electrochemistry**	**7**
4.	**Adsorption**	**6**
5.	**Quantum Mechanics**	**8**

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Photochemistry**

	• Introduction to the Unit. • **Photochemistry:** Interaction of radiation with matter, difference between thermal and photochemical processes. • Laws of photochemistry: Grothus-Drapper law, Stark-Einstien law • Jablonski diagram depicting various processes occurring in the excited state, qualitative description of fluorescence, phosphorescence, non radiative process (internal conversion, inter system crossing) quantum yield, photosensitized reaction-energy transfer process (simple examples) • Conclusion of the Unit
2.	**Spectroscopy**
	• Introduction to the Unit. • **Spectroscopy I:** Electromagnetic radiation of the spectrum, basic features of different spectrometers, statement of the Born Oppenheimer approximation, degree of freedom. • Rotational spectrum: Diatomic molecules, Energy levels of rigid rotator, (semiclassical principles) selection rules, spectral intensity, distribution using population distribution (Maxwell Boltzmann distribution), determination of bond length, qualitative description of non-rigid rotator, isotope effect. • Vibrational spectrum: Energy levels of simple harmonic oscillator, selection rules, pure vibrational spectrum, intensity, determination of force constant, qualitative relations of force constants and bond energy, effect of anharmonic motion and isotopes on the spectrum, idea of vibrational frequencies of different functional groups. • Conclusion of the Unit
3.	**Electrochemistry**
	• 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 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. • Types of reversible electrodes, gas metal ion, metal-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 convention, electrochemical series and its significance. • EMF of a cell and its measurements. Computation of cells EMF. Calculation of thermodynamic quantities of cell reactions (ΔG, ΔH and K), • Conclusion of the Unit
4.	**Adsorption**

	• Introduction to the Unit. • **Adsorption:** Difference between adsorption, absorption and sorption, Chemisorption, adsorbent and adsorbate, reversible and irreversible adsorption, • Characteristics of adsorption ,adsorption of gases by solids, factors affecting adsorption, types of adsorption • Types of adsorption isotherms;Freundlich and Langmuir adsorption isotherms, Adsorption Techniques, Some important adsorbents used in industries, Application of adsorption. • Conclusion of the Unit
5.	**Quantum Mechanics**
	• Introduction to the Unit • **Quantum Mechanics I:** Black body radiation, Planck`s radiation law, photoelectric effect, heat capacity of solids, Bohr's model of hydrogen atom (no derivation) and its defects. Compton Effect. De Broglie hypothesis, Heisenberg's uncertainty principle, Sinusoidal wave equation, Hamiltonian operator, Schrodinger wave equation and its importance, physical interpretation of the wave function, postulates of quantum mechanics, particle in a one dimensional box. • Schrodinger wave equation for H-atom, separation into three equations (without derivation), quantum numbers and their importance, hydrogen like wave functions, radial wave functions, angular wave functions. • Conclusion of the Unit

C. **RECOMMENDED STUDY MATERIAL:**

Sr.No	Reference Book	Author	Edition	Publication
1.	Fundamentals of Molecular Spectroscopy	C. M. Banwell and E. McCash	4th Edition	Tata McGraw Hill
2.	Spectrometric Identification of Organic Compounds	Robert M. Silverstein, Francis X. Webster, David Kiemle	7th Edition	Wiley
3.	Applications of spectroscopic techniques in Organic Chemistry	P.S. Kalsi	6th Edition	New Age International
4	Physical Chemistry	Bahl and Tuli	Latest	S. Chand

Code: BSACSA6103	COMPLEX ANALYSIS	3.0 Credits [LTP: 3-0-0]

COURSE OUTCOMES: Students will be able to:

CO1: Investigate complex functions, concept of limit, continuity and differentiability of complex functions.

CO2: Evaluate the analytic functions using Cauchy-Riemann equations (Cartesian and polar form), sufficient conditions for differentiability, Harmonic Function.

CO3: Evaluate the Complex integration by using Cauchy integral formula, Cauchy theorem and Liouville's theorem

CO4: Analyze the Taylor's Theorem, Laurent's theorem, Power series, Taylor series, Laurent series, Absolute convergence, Abel's theorem, Circle and radius of Convergence.

CO5: Explain the conformal mapping. Bilinear transformation and its properties.

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**1**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	**3**	**2**	**1**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	**3**	**2**	**1**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	**3**	**1**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	**2**	**3**	**1**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

MAPPING OF COURSE OUTCOMES WITH PROGRAMME SPECIFIC OUTCOME

	PSO1	**PSO2**	**PSO3**
CO1	3	-	-
CO2	3	-	-
CO3	3	-	-
CO4	3	-	-
CO5	3	-	-

A. OUTLINE OF THE COURSE

Unit No.	Title of the unit	Time required for the Unit (Hours)
1	**Continuity and Differentiability**	**9**
2	**Analytic Functions**	**6**
3	**Complex Integration**	**6**
4	**Taylor's and Laurent's Theorem**	**8**
5	**Residues Integration**	**7**

B. DETAILED SYLLABUS

Unit	Unit details
1	**Continuity and Differentiability**

	• Introduction to the Unit • Complex plane, Connected and Compact sets, Curves and regions in complex plane, • Jordan Curve theorem (Statement only), Complex valued function, • Limits, Limits involving the point at infinity, continuity and differentiability • Conclusion of the Unit
2	**Analytic Functions**
	• Introduction to the Unit • Analytic functions, Cauchy-Riemann equations (Cartesian And polar form), • Sufficient conditions for differentiability, • Harmonic Function, • Construction of an analytic function. • Conclusion of the Unit
3	**Complex Integration**
	• Introduction to the Unit • Complex integration, Complex line integral, • Cauchy integral theorem, • fundamental theorem of integral calculus for complex functions, • Cauchy integral formula, Liouville's theorem
4	**Taylor's and Laurent's Theorem**
	• Introduction to the Unit • Taylor's Theorem, Laurent's theorem, • Power series, Taylor series, Laurent series, • Absolute convergence, Abel's theorem, Circle and radius of Convergence, • Conclusion of the Unit
5	**Residues Integration**
	• Introduction to the Unit • Residues theorem, • Singular point, Poles • Application of residues to evaluate real integral • Evaluation of real definite integral by contour integration (Simple problems only) • Conclusion of the Unit

C. RECOMMENDED STUDY MATERIAL:

Sr.No	Reference Book	Author	Edition	Publication
1.	Complex Variables and Applications	James Ward Brown and Ruel V. Churchill,	8th Ed.	McGraw – Hill International Edition, 2009.
2.	Complex analysis,	Joseph Bak and Donald J. Newman	2nd Ed	Springer-Verlag New York,
3.	Complex Analysis	Purohit and Goyal	2016	Jaipur Publishing House

Code: BSACSA6201	TECHNICAL SEMINAR	1Credit [LTP: 0-0-2]

COURSE OUTCOMES: Students will be able to:

CO1: Identify literature for review and research methods.

CO2: Apply knowledge and understanding in relation to the agreed area of study.

CO3: Communicate in written form by integrating, analyzing and applying key texts and practices.

CO4: Develop responses on the basis of the evaluation and analysis undertake.

CO5: Demonstrate advanced critical research skills in relation to career development or work-related learning studies.

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**2**	**1**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	**3**	**1**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	**3**	**2**	**1**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	**2**	**1**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	**2**	**2**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

MAPPING OF COURSE OUTCOMES WITH PROGRAMME SPECIFIC OUTCOME

	PSO1	**PSO2**	**PSO3**
CO1	3	-	-
CO2	3	-	-
CO3	3	-	-
CO4	3	-	-
CO5	3	-	-

A. OUTLINE OF THE COURSE

1	Dissertation consist of finalization of thesis based on literature review carried out during semester break of third year.
2	Objective finalization & presentation
3	Design & experimentation/survey details
4	Thesis preparation and submission
5	Final presentation

Code: BUACHU6120 PRESENTATION & INTERVIEW SKILLS 2.0 Credit [LTP: 2-0-0]

COURSE OUTCOMES: The students will be able to:

CO2: Compare the professional and personal approaches to any task and demonstrate their understanding by displaying a professional attitude in the assigned tasks.

C03: Recognize, explain, and use the formal elements of specific genres of organizational communication: reports, proposals, memorandums, web pages, wikis, blogs, business letters, promotional documents, etc.

CO4: Prepare and deliver a clear and fluent demonstrative, informative, and persuasive presentation and enlarge their vocabulary by keeping a vocabulary journal.

C05: Demonstrate preparedness for any type of interview from classic one-on-one interviews to panel interviews, Phone/Skype interviews, Behavioral/Situational, etc. along with sharpening the ability to critically analyze a given piece of information and collectively work in a group to arrive at a solution or develop a perspective.

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	–	–	-	–	**1**	–	**3**	**2**
CO2	-	-	-	-	–	–	-	–	**1**	–	**3**	**2**
CO3	-	-	-	-	–	–	-	–	**1**	–	**3**	**2**
CO4	-	-	-	-	–	–	-	–	**1**	–	**3**	**2**
CO5	-	-	-	-	–	–	-	–	**1**	–	**3**	**2**

MAPPING OF COURSE OUTCOMES WITH PROGRAMME SPECIFIC OUTCOME

	PSO1	**PSO2**	**PSO3**
CO1			
CO2			
CO3			
CO4			
CO5			

A. OUTLINE OF THE COURSE

UNIT NO.	**UNIT NAME**	**Time required for the Unit (Hours)**
1	**Professional Attitude & Approach**	**4**
2	**Professional Writing-I**	**6**
3	**Presentation Skills: Structure Study**	**4**
4	**Interview Skills & Group Discussion**	**6**
5	**Negotiation Skills & Time Management**	**5**

B. DETAILED SYLLABUS

UNIT	**UNIT NAME**
1	**Professional Attitude & Approach**
	• Introduction to the Unit • Understanding Human behavior

	• Relationships between truth and beliefs • Positive Thinking • Adaptability and resilience • Adaptability in the workplace • Self -Awareness • Conclusion & Real-Life Application
2	**Professional Writing**
	• Introduction to the Unit • Technical Writing • Formal Letter Writing • Job applications • Notice Agenda and Minutes of Meeting • CV preparation (differences between Bio-Data, CV, and Resume) • Report Writing (Business Reports, Memo Reports) • Email Communication • Conclusion & Real-Life Application
3	Presentation Skills: Structure Study
	• Introduction to the Unit • Oral Presentation: Voice modulation, tone, describing a process • Presentation Skills: Oral presentation and public speaking skills • Business presentations • Preparation: organizing the material, Self-Introduction, introducing the topic, answering questions, individual presentation practice, and presenting visuals effectively. • Conclusion & Real-Life Application
4	**Interview Skills & Group Discussion**
	• Introduction to the Unit • Interview Skills: types of interviews, successful interviews, • Interview etiquette, dress code, body language • Online Job Interview: Telephone/online (skype) interviews • Offline Job Interviews: One-to-one interviews & panel interviews • Mock Interviews • Introduction to Group Discussion (GD) • Differences between GD and debate • Participating in GD, understanding GD, brainstorming the topic, questioning and clarifying • GD strategies • Conclusion & Real-Life Application
5	**Negotiation Skills & Time Management**
	• Introduction to the Unit • Recognizing differences between groups and teams • Time Management • Stress Management • Networking professionally • Respecting social protocols • Understanding career management • Develop a long-term career plan • Points of view • Agreement-Disagreement

	• Discussion techniques • Situations and negotiators • Difficulties in negotiation and reaching an agreement • Conclusion & Real-Life Application

C. RECOMMENDED STUDY MATERIAL:

Sr. No	Reference Book	Author	Edition	Publication
1.	English for Engineers and Technologists	Rod Ellis	(Combined edition, Vol. 1 and 2)	1. Orient Blackswan 2010.
2.	The Elements of Style	William Strunk Jr. & E.B. White	4th Edition	Pearson, 1999.
3.	Technical Communications	Raman Sharma	London, 2004	Oxford Publication
4.	Success in Interview	Anand Ganguly	5 Edition, 2016	RPH

Code: BULCSE6201 **COMPUTER HARDWARE AND TROUBLESHOOTING LABORATORY** **2 Credit [LTP: 0-0-2]**

COURSE OUTCOMES: Students will be able to:

CO1: Understand the components on the motherboard.
CO2: Perform system administration tasks.
CO3: Understand different storage media and manage network connection.
CO4: Install, upgrade and configure operating system.
CO5: Understand system related problems and methods of troubleshooting.

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	-	-	-	-	-	-	**3**
CO2	-	-	-	-	-		-	-	-	-	-	**3**
CO3	-	-	-	-	-	-	-	-	-	-	-	**3**
CO4	-	-	-	-	-	-		-	-	-	-	**3**
CO5	-	-	-	-	-	-	-	-	-	-	-	**3**

MAPPING OF COURSE OUTCOMES WITH PROGRAMME SPECIFIC OUTCOME

	PSO1	**PSO2**	**PSO3**
CO1	**3**	-	-
CO2	**3**	-	-
CO3	**3**	-	-
CO4	**3**	-	-
CO5	**3**	-	-

LIST OF EXPERIMENTS:

1.	Study and identification of standard desktop personal computer.
2.	Understanding of Motherboard and its interfacing components
3.	Install and configure computer drivers and system components.
4.	Disk formatting, partitioning and Disk operating system commands
5.	Install,upgrade and configure Windows operating systems.
6.	Remote desktop connections and file sharing.
7.	Identify, install and manage network connections Configuring IP address and Domain name system
8.	Install, upgrade and configure Linux operating systems.
9.	Installation Antivirus and configure the antivirus.
10.	Installation of printer and scanner software.
11.	Disassembly and Reassembly of hardware.
12.	Troubleshooting and Managing System.

Code: BSACSA6401	DISSERTATION	6 Credits [LTP: 0-0-12]

COURSE OUTCOMES: Students will be able to:
CO1: Identify literature for review and research methods.
CO2: Apply knowledge and understanding in relation to the agreed area of study.
CO3: Communicate in written form by integrating, analysing and applying key texts and practices.
CO4: Develop responses on the basis of the evaluation and analysis undertake.
CO5: Demonstrate advanced critical research skills in relation to career development or work-related learning studies.

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	**3**	-	-	-	-	-	-	-	**2**	**3**
CO2	-	-	**2**	-	-	-	-	-	-	-	-	**2**
CO3	-	-	**3**	-	-	-	-	-	-	-	-	**1**
CO4	-	-	**3**	**2**	-	-	-	-	-	-	-	**3**
CO5	-	-	**3**	**2**	-	-	-	-	-	-	-	**3**

MAPPING OF COURSE OUTCOMES WITH PROGRAMME SPECIFIC OUTCOME

	PSO1	**PSO2**	**PSO3**
CO1	3	-	-
CO2	3	-	-
CO3	3	-	-
CO4	3	-	-
CO5	3	-	-

A. OUTLINE OF THE COURSE

1	Dissertation consist of finalization of thesis based on literature review carried out during semester break of third year.
2	Objective finalization & presentation
3	Design & experimentation/survey details
4	Thesis preparation and submission
5	Final presentation