THIRD SEMESTER								
Sl No	Paper Code	Title of the Paper	CC/HC/SC/FC	Credits	IA	Exam	Total	Teaching Hours /week
1	B21PC3030	Physics-III	HC	3	30	70	100	4
2	B21PC3040	Chemistry-III	HC	3	30	70	100	4
3	B21PC3050	Mathematics-III	HC	3	30	70	100	4
4	B21PC3060	Computational Physics	HC	3	30	70	100	4
5	B21PC3070	Programming Techniques	FC	3	30	70	100	4
6	B21PC3080	Soft Skill Training	FC	2	15	35	50	2
		Practicals						
7	B21PC3090	Physics Lab –III	HC	2	15	35	50	3
8	B21PC3X10	Chemistry Practical-III	HC	2	15	35	50	3
9	B21PC3X20	Mathematics - III Lab	HC	2	15	35	50	3
Total Credits				**23**	**05**	**06**	**700**	**29**

Course Code	Course Title	Course Type	L	T	P	C	Hrs/ Week
B21PC3030	Physics-III	HC	2	1	0	3	4

Course Objectives:

The Objectives of this course are to make students to learn:

- Understanding the concepts of geometry of optics such as optical path Fermat's principle and applications as well as basic concepts of lenses and telescope.
- Explain the concepts of interference and diffraction of light waves by various experimental arrangements.
- Concepts of Fresnel and Fraunhofer diffraction, difference between interference and diffraction.
- Transverse nature of light, concept of plane polarized light, pictorial representation, introduction to plane circularly and elliptically polarized light
- Students will able to understand the basic concepts of electromagnetism in physics for practical application.

Course Outcomes:

After the successful completion of course, students are able to understand:

- Understand the basic concepts of Geometrical optics, lenses and telescopes.
- Concepts of Interference of light, Young's double slit experiment, Fresnel's Biprism, Interference in thin film and Newton's rings in reflected and refracted light.
- Learning the Diffraction of light waves, Fresnel diffraction and Fraunhofer diffraction.
- The concept of theory of Polarization of light waves and Plane circularly and elliptically polarized light.
- Solve the numerical problems related to concepts of physics.

Course Content:

UNIT-I: 12 Hrs

Geometrical optics: Optical path, Fermat's principle of extreme path, applications of Fermat's principle to deduce the law of reflection and refraction, Gauss's general theory of image formation, refraction by spherical surfaces and image formation.

Thick lens, lenses combination and telescopes: Cardinal points of a thick lens, focal length of a thick lens, variation of focal length of thick bi-convex lens, power of a thick lens, telescopes, astronomical telescope, terrestrial telescope, Newtonian reflecting telescope.

UNIT-II: 12 Hrs

Interference of light: Theories explaining properties of light, Huygen's principle, and introduction to interference of light, classification of interference: Young's double slit experiment, Lloyd's Miror (qualitative), Phase change on reflection: Stokes treatment. Fresnel's Biprism- construction, working and determination of wavelength, Fringe shift due to introduction of a thin film.- Problems.

Interference in thin film and Newton's rings: Interference in thin films, wedge shaped film, classification of fringes, fringes of equal thickness, fringes of equal inclination, Newton's rings in reflected and refracted light.

UNIT-III: **12 Hrs**

Diffraction of light waves and Fresnel diffraction: Diffraction of light, difference between interference and diffraction, types of diffraction, Fresnel and Fraunhofer class, Frenel's half period zones, explanation of rectilinear propagation of light.

Fraunhofer diffraction: Condition for Fraunhofer diffraction, Fraunhofer diffraction due to a single slit, Fraunhofer diffraction due to a double slit, Fraunhofer diffraction at circular aperture (qualitative), plane diffraction grating (transmission), diffraction due to a grating of N parallel slits.

UNIT-IV: **12 Hrs**

Polarization of light waves: Introduction of polarization, types of polarization, concept of plane polarized light, pictorial representation of plane polarized light, plane of vibration and plane of polarization of plane polarized light, Malus law, Brewster law.

Plane circularly and elliptically polarized light: Introduction, retardation plates, production and analysis of plane, circularly and elliptically polarized light by retardation plates.

NOTE: In order to enhance the understanding of the subject, numbers of problems are to be worked out in each section.

Reference Books:

1. Undergarduate Physics, Vol-I, Thermal Physics, radiation and optics, Niruta Publications Bangalore.
2. A Text book of Optics (I-Edition) – Brijlal & Subramanyam - S. Chand & Company Ltd., New-Delhi, 2006.
3. Fundamentals of Optics (V-Edition) – Khanna & Bedi – R. Chand & Co., New-Delhi, 1971.
4. Principles of Optics (I-Edition) – B.K.Mathur – New Gopal Printing Press, 1962.
5. Optics (IV-Edition) – Ajay Ghatak –Tata Mc Graw-Hill, New-Delhi, 2006.
6. Geometrical Optics (I-Edition) – D.P.Acharya – Oxford & IBH Pub. Co., New-Delhi,1970.
7. Optics & Spectroscopy (VI-Edition) – Murugeshan, Kirutiga & Shivaprasath - S. Chand & Company Ltd., New-Delhi, 2006.
8. Fundamentals of optics- Khanna and Gulati.

Course Code	Course Title	Course Type	L	T	P	C	Hrs/Week
B21PC3040	**Chemistry-III**	**HC**	**2**	**1**	**0**	**3**	**4**

Course Objectives:

1. Students will understand various interactions in liquid mixtures and their effect on mixture properties.
2. Students will know the effect of temperature on the behavior of miscible and immiscible liquids.
3. Students will get to know the principle of Rault's law its significance.

4. Students will study the principles of fractional distillation, its principles and its applications.
5. Students able to understand various physical properties of solute and solvent mixture and their interactions.
6. Basic concepts of chemical bonding, Ionic bonding, Covalent Bonding etc.
7. Aromaticity of hydrocarbons, their hydrogenation with aromatic compounds.
8. Basic concepts of electrochemistry and conductance etc.

Course Outcomes:

After successful completion of this coursethe students shall be able to:

1. Know various properties of liquids and interpret their behaviour, along with understanding the concept of ideality of solutions based on Rault's law.
2. Predict the behaviour of binary mixtures with temperature and the effect of solute on temperature.
3. Understand the vapour pressure concept with the help of Rault's law and study the deviation from ideality.
4. Appreciate the significance of fractional distillation principle and its applications in the separation of various fractions in a given mixture.
5. Understand the effect of salt addition on boiling and freezing points of solvents and its significance.
6. Explain methods for the determination of depression in freezing point and elevation of boiling point.
7. Appreciate the understanding of membrane preparation and its application in separation technology.
8. Really understand, the influence of osmosis in separation process of mixture of gases / liquids and also realize its wide applications in chemistry and medical field.
9. Have firm foundations in the nature of chemical bonding and its properties.
10. Identify the electrophilic substitution reactions mechanism and other effects on electron donating groups, different reactions and mechanism.
11. Analyze different applications of mixtures and their types in various Industries.
12. Paraphrase the concepts of vapour pressure, molar mass, osmotic pressure and their relations.

Course Content:

UNIT-I **12 hrs**

Coordination Chemistry

Introduction to Coordination compounds. Complex ion, ligands, co-ordination number, oxidation state of metal. IUPAC system of nomenclature. Valence Bond Theory (VBT): Inner and outer orbital complexes of Cr, Fe, Co, Ni and Cu (coordination numbers 4 and 6). Structural and stereoisomerism in complexes with coordination numbers 4 and 6. Drawbacks of VBT.

Crystal Field Theory Postulates, Crystal field effect, octahedral symmetry. Crystal field stabilization energy (CFSE), Crystal field effects for weak and strong fields. Tetrahedral symmetry.Factors affecting the magnitude of Δ. Spectrochemical series.Comparison of CFSE for Oh and Td complexes, Tetragonal distortion of octahedral geometry. Jahn-Teller distortion, Square planar coordination.

Color of transition metal complexes Electronic spectra of transition metal complexes having d1 and d2 system. Magnetic properties of low spin and high spin complexes of Fe, Co and Ni. Ligand filed theory. Introduction and evidences for covalency in M-L bond

UNIT-II **12 hrs**

Functional group approach for the following reactions (preparations & reactions) to be studied in context to their structure.

Aldehydes and Ketones:

Nomenclature, Preparation (Rosenmund reduction, Vilsmeyer and Etards reactions). Chemical reactions: Nucleophilic addition (addition of water, bisulphite, HCN, alcohol) - Addition-elimination reactions (hydroxyl amine, hydrazines, semicarbazide, 2, 4 - DNP and ammonia) - Oxidation (with KMnO4, Tollen's reagent, Fehling's solution, Benedict's reagent, Oppenauer oxidation) – Reduction (Wolf Kishner, Clemmenson, MPV reduction) –- Aldol condensation with mechanism - Claisen Schmidt, Knoevenagel and Perkin's reactions - Mechanism of Acetal formation, Cannizarro reaction and Beckmann rearrangement, Benzoin condensation.

Carboxylic acids and their derivatives

Carboxylic acids (aliphatic and aromatic): Preparation: Acidic and Alkaline hydrolysis of esters. Reactions: Acidity (effect of substituent on acidity of aliphatic and aromatic carboxylic acids) Hell – Vohlard - Zelinsky Reaction, Decarboxylation, Hunsdiecker reaction

UNIT-III **12 hrs**

Conductance

Conductivity,equivalent and molar conductivity and their variation with dilution for weak and strong electrolytes. Kohlrausch law of independent migration of ions. Transference number and its experimental determination using Hittorf and Moving boundary methods. Ionic mobility. Applications of conductance measurements: determination of degree of ionization of weak electrolyte, solubility and solubility products of sparingly soluble salts, ionic product of water, hydrolysis constant of a salt. Conductometric titrations (only acid-base).

Electrochemistry

Reversible cells – Types of reversible electrodes. Concept of EMF of a cell, Nernst equation (Derivation). Nernst theory of single electrode potential. Measurement of EMF of a cell. Concentration cell and its types. Types of electrodes. Primary reference electrode, Secondary Reference electrode, glass electrode Standard electrode potential. Determination of thermodynamic properties: G, H and S from EMF data.

UNIT-IV **12 hrs**

Chemical Kinetics

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

Reference Books:

• Barrow, G.M. Physical Chemistry Tata McGraw-Hill (2007).

• Castellan, G.W. Physical Chemistry 4th Ed. Narosa (2004).

•Kotz, J.C., Treichel, P.M. & Townsend, J.R. General Chemistry, Cengage Learning India Pvt. Ltd.: New Delhi (2009).

• Mahan, B.H. University Chemistry, 3rd Ed. Narosa (1998).

• Petrucci, R.H. General Chemistry, 5th Ed., Macmillan Publishing Co.: New York (1985).

• Morrison, R. T. & Boyd, R. N. Organic Chemistry, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education). •Finar, I. L. Organic Chemistry (Volume 1), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).

•Finar, I. L. Organic Chemistry (Volume 2), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).

• Nelson, D. L. & Cox, M. M. Lehninger's Principles of Biochemistry 7 thEd., W. H. Freeman.

• Berg, J.M., Tymoczko, J.L. &Stryer, L. Biochemistry, W.H. Freeman, 2002.

Course Code	Course Title	Course Type	L	T	P	C	Hrs/Week
B21PC3050	**Mathematics-III**	**HC**	**2**	**1**	**0**	**3**	**4**

Course Objectives:

1. Explain the concept of Limits and Continuity, Normal subgroups and Homomorphisms, Laplace Transforms and Fourier Transforms for applying it appropriately in solving problems.
2. Explain how to analyze the problems by making use of the concepts of Limits and Continuity, Normal subgroups and Homomorphisms, Laplace Transforms and Fourier Transforms

3. Explain the usage of modern tools to understand the concepts of Limits and Continuity, Normal subgroups and Homomorphisms, Laplace Transforms and Fourier Transforms

Course Outcomes:
After successful completion of the courses students shall be able to:
1. Understand the basic concepts of Limits and Continuity, Normal subgroups and Homomorphisms, Laplace Transforms and Fourier Transforms
2. Apply the concept of Limits and Continuity, Normal subgroups and Homomorphisms, Laplace Transforms and Fourier Transforms to solve the problems.
3. Analyze the solutions of problems using the concepts of Limits and Continuity, Normal subgroups and Homomorphisms, Laplace Transforms and Fourier Transforms
4. Using modern tool to solve/analyze problems from the concepts of Limits and Continuity, Normal subgroups and Homomorphisms, Laplace Transforms and Fourier Transforms

Unit I: Limits and Continuity **12 Hrs**
Real line, Function, real valued function, limit of a function – properties and problems, Continuity of functions – properties and problems – Infimum and supremum of a function – Theorems on continuity – Intermediate value theorem.

Unit-II: Normal Subgroups and Homomorphism **12 Hrs**
Normal Subgroups, Quotient groups Homomorphism.–Kernel of homomorphism – Isomorphism - Automorphism – Fundamental theorem of homomorphism.

Unit-III: Fourier series **12 Hrs**
Introduction – Periodic functions – Fourier series and Euler formulae (statement only) – Even and odd functions – Half range series.

Unit-IV: Laplace Transforms **12Hrs**
Definition and basic properties – Laplace transforms of , cos kt, sin kt, a^t, t^n, coshkt and sinhkt – Laplace transform of e^{at} F(t), t^n F(t), F(t)/t – problems – Laplace transform of derivatives of functions – Laplace transforms of integrals of functions – Laplace transforms of αfunctions – Inverse Laplace transforms – problems.

Reference Books:

1. Serge Lang – First Course in Calculus.
2. Lipman Bers- Calculus Volumes 1 and 2.
3. I N Herstien- Topics in Algebra.
4. J B Fraleigh – A First course in Abstract Algebra.
5. Murray R speigel – Laplace Transforms.
6. E Kreyszig – Advanced Engineering Mathematics, Wiley India Pvt.Ltd.
7. M D Raisinghania, Laplace and Fourier Transforms S. Chand publications.

Course Code	Course Title	Course Type	L	T	P	C	Hrs/ Week
B21PC3060	Computational Physics	HC	2	1	0	3	4

Course Objectives:

This is a very hands-on course which will involve a lot of programming assignments. The main aims of the course are twofold:

- Impart knowledge of origin and structure of atmosphere.
- Concepts of sun's radiation and atmospheric motions.
- Learning basic methods, tools and techniques of computational physics.
- Developing practical computational problem solving skills.

Course Outcomes:

After the successful completion of course, students are able to understand:

- The numerical methods using differentiation, Lagrange's formula for interpolation
- Concepts of Taylor series method, Euler method, Runge Kutta method.
- Solving problems using Eigen values and Eigen vectors of matrix.
- The concept of C Language.
- Basic concepts of program structure in C, Constants and variables, Input and output statements, Arithmetic and conditional operations.
- Solve the numerical problems related to concepts of Differentiation, Integration and Ordinary Differential equation.

Course Content:

UNIT I **(12 hrs)**

Differentiation: Numerical methods, forward difference and backward difference methods, Lagrange's formula for interpolation and inverse interpolation method.

Solution of differential equations: Taylor series method, Euler method, Runge Kutta method.

UNIT II **(12 hrs)**

Solution of simultaneous equations: Elimination method for solving simultaneous linear equations, Gauss elimination method, pivotal condensation method, Gauss-seidal iteration method, Gauss Jordan method, matrix inversion method.

Eigen values and Eigen vectors of matrix: Determinant of a matrix, characteristic equation of a matrix, eigen values and eigen vectors of a matrix, power method.

UNIT III **(12 hrs)**

Basics of C Language: Program structure in C, Constants and variables, Input and output statements, Arithmetic and conditional operations, conditional structure, Looping structures, one dimensional arrays, programs to solve linear and quadratic equations. Program in C.

Roots of an equation: Newton-Raphson method and Bisection method.

UNIT IV **(12 hrs)**

Numerical Integration: Simpson's 1/3 rule, Simpson's 3/8 rule, Applications - calculation of time period of a simple pendulum, rms current of ac, work done by variable force.

Ordinary Differential equation: Runge – Kutta II and IV order methods. Applications: Free falling body in a resistive medium with resistance proportional to velocity, Projectile motion, and solution to Schrödinger wave equation for Harmonic potential (plotting wave function only).

Reference books:

1. Rubin H Landau & Manuel Jose Paez Mejia, Computational Physics, John Wiley & Sons.
2. Computational Physics, An Introduction by R C Verma, Ahluwalia, Sharma
3. A first Course in Computational Physics by Paul L. DeVries, Javier E. Hasbun.
4. Numerical Methods for Engineers by Steven C. Chapra, Raymond P Canale
5. C-Programming Language, Balaguruswamy E, Tata McGraw Hill (1999).
6. C-Programming Language, Xavier C, New Age International (2000).
7. Computer Programming in C, V RajaRaman, PHI Learning Pvt. Ltd. (2004).

Course Code	**Course Title**	**Course Type**	**L**	**T**	**P**	**C**	**Hrs/ Week**
B21PC3070	Programming Techniques	HC	2	1	0	3	4

Course Outcomes:

After the successful completion of course, students are able to understand:

- The programming languages using C Programming, Java, Python, and Artificial Intelligenc (AI).
- Introduction to Java and AI.
- The concept of C Language.
- Basic concepts of program structure in C, Constants and variables, Input and output statements, Arithmetic and conditional operations.
- Basic concepts of Intelligent Agents, nature of environment, structure of agents and Problem solving agents
- Writing programs using C, Java and Python programming languages.

Course Content:

UNIT I **(12 hrs)**

Programming in C: Overview, Features, Structure, Compilation and Execution of C Program, Identifiers, Variables, Expression, Keywords, Data Types, Constants, Scope and Life of Variables, Operators, Precedence and Associativity of Operators, Types Conversion in Expression, Library Functions: Input / Output statements. Branching, Looping, Go to, Break, Continue, Arrays, String and String standard function, The Need of a Function, User Defined and Library Function, Prototype of a Function, Calling of a Function, Function Argument, Call by Value, Call by Reference.

UNIT II **(12 hrs)**

Introduction to Java: Introduction, Classes, Inheritance, Exceptions: Classes: Classes in Java; Declaring a class; Class name; Super classes; Constructors; Creating instances of class; Inner classes. Inheritance: Simple, multiple, and multilevel inheritance; Overriding, overloading. Exception handling: Exception handling in Java.

UNIT III **(12 hrs)**

Introduction to AI: What is AI? Intelligent Agents: Agents and environment; Rationality; the nature of environment; the structure of agents. Problem- solving: Problem-solving agents; Example problems; Searching for solution; Uninformed search strategies.

UNIT IV **(12 hrs)**

Programming in Python: Introduction; Types and operations: Numbers, strings, lists and dictionaries, tuples, files; Statements: Assignment, Control flow; Functions: scope and arguments; Modules. Array Computing in Python, Implementing Numerical tools in Python: Solution of linear systems, root finding, interpolation and least square polynomial approximation, Numerical integration.

References

1. V Rajaraman: Computer programming in C , Prentice hall of India ltd , New Delhi
2. Schaum series: Programming with C.
3. Kereniningham and Ritchie: C programming Language.
4. Yeshwanth Kanitkar: Let us JAVA
5. Lutz M. and Ascher D., Learning python, Second edition, O'Reilly, USA, 2003.
6.Swaroop C.H., A byte of python, (freeonline book), http://www.swaroopch.com/notes/Python.

Course Code	**Course Title**	**Course Type**	**L**	**T**	**P**	**C**	**Hrs/ Week**
B21PC3080	Soft Skill Training	FC	2	0	0	2	2

Programme Objectives

- Aims to increase learner's computer knowledge and unique soft skills so as to develop attributes that enhance an individual's interactions, earning power and job performance.
- The objective of the programme is to inculcate potential skills in the learners to prepare them to deal with the external world in a collaborative manner, communicate effectively, take initiative, solve problems, and demonstrate a positive work ethic so as to hold a good impression and positive impact.

Course Content

UNIT I **(6 hrs)**

Public Speaking: The power of Public Speaking, Developing confidence, Planning, Preparation, Successful and effective delivery of speech.

UNIT II **(6 hrs)**

Group Discussion: What is group discussion, why are group discussions held, Preparation for a group discussion, Skills for effective participation, Traits tested in a group discussion, initiating a group discussion, Non-verbal communication in group discussion, types of group discussions.

UNIT III **(6 hrs)**

Interviews: Interviewing in the 21st century, developing an Interview Strategy, Taking Care of the Details, Practicing for the Interview, During the Interview, Stress Interviews, and Traditional Interviews.

UNIT IV **(6 hrs)**

Computer Skills: Basics of Computer and Word Processing, Spreadsheets, Presentations, Databases, Internet and Email features

Writing Skills: Basics of writing, writing paragraphs, writing research articles, report writing, writing a CV.

Note: All Units require practical exposure

Reference books:

1. Bridging the Soft Skills Gap: How to Teach the Missing Basics to Today's Young Talent – by Bruce Tulgan.
2. Soft Skills Training: A Workbook to Develop Skills for Employment – by Frederick H. Wentz.
3. Teamwork 101: What Every Leader Needs to Know – by John C. Maxwell.
4. Computing Fundamentals: Introduction to Computers by Faithe Wempen.
5. Basic Computer Skills Made Simple, Jackie Sherman.

Course Code	Course Title	Course Type	L	T	P	C	Hrs/Week
B21PC3090	**Physics Lab - III**	HC	0	0	2	2	3

Course Objectives:

1. Impart knowledge about various laws of optics through experiments
2. Facilitate with the concepts of interference, diffraction and polarization of light through experiments
3. Familiarise with the various experiments of light waves
4. Impart knowledge about determination of physical constant through experiments

Course Outcomes:

After successful completion of this course the students shall be able to:

1. Verify various laws of optics through experiments.
2. Analyse the concepts of interference, diffraction and polarization of light waves through experiments.
3. Demonstrate the various experiments in optics.
4. Determination of physical constant through experiments.

Course Content:

Any **Eight** of the following Experiments are conducted:

1. Dispersive power of a prism.
2. Dispersive power of a grating.
3. Zone plate experiment.
4. Verification of Cauchy's dispersion formula.

5. Planck's constant by photocell.
6. Study of Malus Law.
7. Newton's rings - Determination of radius of curvature of a Plano convex lens.
8. Air wedge - Determination of thickness of a thin paper/diameter of a thin wire.
9. Diffraction at a straight wire - Determination of diameter of a wire.
10. Cauchy's constants using spectrometer.

Course Code	Course Title	Course Type	L	T	P	C	Hrs/Week
B21PC3X10	**Chemistry Lab - III**	HC	0	0	2	2	3

Course Objectives:

1. To learn the effect of hydrogen ion concentration and the preparation of standard buffer solution.
2. Impart knowledge about preparation of organic compounds.
3. Emphasizes the importance of organized and systematic approach in carrying out experiments.

Course Outcomes:

After successful completion of this course students shall be able to:

Role of pH metre and to know the pH range for different acid and base solutions

Course Content:

1. Measurement of pH of different solutions like aerated drinks, fruit juices, shampoos and soaps (use dilute solutions of soaps and shampoos to prevent damage to the glass electrode) using pH-meter.
2. Preparation of buffer solutions:
   (i) Sodium acetate-acetic acid
   (ii) Ammonium chloride-ammonium hydroxide
   (iii) Measurement of the pH of buffer solutions and comparison of the values with theoretical values.
3. Purification of organic compounds by crystallization (from water and alcohol) and distillation.
4. Preparations: (Mechanism of various reactions involved to be discussed. Recrystallisation, determination of melting point and calculation of quantitative yields to be done).
5. Oxime and 2,4-dinitrophenylhydrazone of aldehyde/ketone

Reference Books for Practicals:

1. Vogel, A.I., Tatchell, A.R., Furnis, B.S., Hannaford, A.J. & Smith, P.W.G., *Textbook of Practical Organic Chemistry*, Prentice-Hall, 5th edition, 1996.
2. Mann, F.G. & Saunders, B.C. *Practical Organic Chemistry* Orient-Longman, 1960.
3. Pandey, O.P., Bajpai D. N. &Giri S. *Practical Chemistry, Revised Edition*, (For BSc. I, II, III Year Students of All Indian Universities) S. Chand Company Pvt Limited, 2014.
4. Khosla, B. D.; Garg, V. C. & Gulati, A. *Senior Practical Physical Chemistry,* R. Chand &

Co.: NewDelhi(2011).

Course Code	Course Title	Course Type	L	T	P	C	Hrs/Week
B21PC3X20	**Mathematics lab-III**	**HC**	**0**	**0**	**2**	**2**	**3**

Course Learning Objectives:
The objective of this course is to
1. Impart knowledge of concepts of subgroups, laplace transformation and its applications in various fields.
2. Facilitate understanding of the concepts of solid geometry and its applications.
3. Facilitate understanding of the concepts of differential calculus and its applications.
4. Familiarize with the concepts of integral calculus and its applications.

Course outcomes: Students will able to
1. Apply continuity and differentiability of a function at a point
2. Find Fourier series expansions for given functions
3. Find cosine and sine series expansions for given function
4. Solve the problems using Scilab
5. Apply the properties of Laplace transformation to solve ordinary differential equation

Course contents:
Programs using scilab / maxima/ Python:
1. Solving problems in limits and continuity
2. Solving problems in differentiability
3. Verification of subgroup of a given subset of a group
4. Verification of normality of a given subgroup of a group
5. Illustrating homomorphism and isomorphism of group
6. Finding the Laplace transformation of some standard functions
7. Finding the inverse Laplace transform of simple functions
8. To finding the half-range sine-cosine series of simple functions
9. To plot periodic functions with period 2π and $2l$
10. Plotting of functions in half range and including their even and odd extensions