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|                 | <b>Program :</b>   | <b>B.Sc. - Physics, Chemistry, Mathematics (PCM)</b>   |                |   |
|                 | <b>PHYSICS</b>     |  |                |   |
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|                 | <b>PO Code</b>     | <b>Programme Outcomes:</b>   |                |   |
|                 | PO1                | Provide a firm foundation in every aspect of physics and to explain a broad spectrum of modern trends in physics |                |   |
|                 | PO2                | Develop experimental, computational and mathematical skills of students  |                |   |
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| <b>Semester</b> | <b>Course Code</b> | <b>CourseName</b>  | <b>CO Code</b> | <b>Course Outcomes</b>  |
| I               | PHY1A              | Physics I  | CO1            | Significance of mass distribution and axis of rotation in moment of inertia.                    |
|                 |                    |  | CO2            | Appreciation of oscillations to determine acceleration due to gravity.                          |
|                 |                    |  | CO3            | Significance of Kepler's contribution to understand gravitation.                                |
|                 |                    |  | CO4            | Understand elastic properties of solids and identify the materials suitable for different uses. |
|                 |                    |  | CO5            | Understanding motion under various forces.  |
|                 |                    |  | CO6            | Acquire knowledge of basic forces in fluids at rest and in motion.                              |
|                 |                    |  | CO7            | Understand the importance of frames of reference-inertial and non-inertial frames.              |
| II              | PHY2A              | Physics II   | CO1            | Understand the kinetics of transport phenomena in gases .                                       |
|                 |                    |  | CO2            | Create awareness of critical constants and its significance.                                    |
|                 |                    |  | CO3            | Learning the basic principles of heat engines and refrigerators.                                |
|                 |                    |  | CO4            | Learning the thermodynamic relations connecting entropy, enthalpy and free energy.              |
|                 |                    |  | CO5            | Learn the basic principles of statistical mechanics, interpretation of temperature.             |
|                 |                    |  | CO6            | Learn the methods of attaining low temperature.   |

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|     |       |             | CO7 | Basic understanding of different modes of heat transfer and its applications.  |
| III | PHY3A | Physics III | CO1 | Understanding of principles of electrostatics and application in electromagnetism.   |
|     |       |             | CO2 | Application of effect of electrical current in magnetic field and effect of thermo e.m.f.  |
|     |       |             | CO3 | Describe and explain the generation of magnetic fields by electrical currents and vice versa.  |
|     |       |             | CO4 | Use methods of vector calculus to solve problems in electromagnetism   |
|     |       |             | CO5 | Describe and explain electrodynamics, Maxwell's equations, energy density of e.m. waves and their applications. .  |
|     |       |             | CO6 | Determine the transient containing R, L and C components   |
|     |       |             | CO7 | Determine the condition of oscillation in LCR circuit and significance of resonance in LCR circuits.   |
| IV  | PHY4A | Physics IV  | CO1 | Understanding of different aspects of waves and their applications   |
|     |       |             | CO2 | Practical application of ray optics.   |
|     |       |             | CO3 | Study of various interference patterns using coherence sources.  |
|     |       |             | CO4 | Understanding resolving power of optical instruments using the diffraction properties of electromagnetic wave.   |
|     |       |             | CO5 | Understanding the principle and application of LASER   |
|     |       |             | CO6 | Understanding the transeverse nature of electromagnetic waves and application of polarized light.  |
| V   | PHY5A | Physics V   | CO1 | Familiarize with the main aspects of the historical development of quantum mechanics.  |
|     |       |             | CO2 | Discuss and interpret experiments that reveal the wave nature of matter.   |
|     |       |             | CO3 | Understand the concepts of the uncertainty principle   |
|     |       |             | CO4 | Understand the central concepts and principles in quantum mechanics, such as the Schrödinger equation, the wave function and its statistical interpretation. |

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|    |       |              | CO5 | Able to solve the Schrödinger equation on your own for simple systems.   |
|    |       |              | CO6 | Analyze and study circuits for regulation, rectification, addition and amplification of voltages.                                      |
|    |       |              | CO7 | Study of cathode ray oscilloscope to analyse waveforms   |
| V  | PHY6A | Physics VI   | CO1 | Understand the three basic statistics .  |
|    |       |              | CO2 | Prove the nonexistence of hypothetical ether, understand the limitations of Newtonian Mechanics and learn special theory of relativity |
|    |       |              | CO3 | Provide in depth study of the atom and atomic spectra  |
|    |       |              | CO4 | Study the effect of magnetic and electric field in atomic spectra  |
|    |       |              | CO5 | Study of molecular spectra to analyse rotation vibration spectra   |
|    |       |              | CO6 | Learn scattering of light  |
|    |       |              | CO7 | Understand Raman effect to analyse Raman spectra   |
| VI | PHY7A | Physics VII  | CO1 | Study of X-ray spectra and X-ray diffraction to analyse crystal structure  |
|    |       |              | CO2 | Understand basic ideas of crystal structure  |
|    |       |              | CO3 | Apply free electron theory to study conductivity of metals   |
|    |       |              | CO4 | Understand Fermi level and Fermi energy in semiconductors  |
|    |       |              | CO5 | Familiarise with properties and applications of superconducting materials  |
|    |       |              | CO6 | Study of preparation methods, characterisation and properties of thin films  |
|    |       |              | CO7 | Understand the applications and uses of nano and smart materials   |
| VI | PHY8A | Physics VIII | CO1 | Understand the basic nucleus and nuclear properties  |
|    |       |              | CO2 | Describe the properties of strong and weak interaction   |
|    |       |              | CO3 | Calculate the kinematics of various nuclear reactions and decay processes  |
|    |       |              | CO4 | Explain the different processes by which ionising radiation interacts with matter  |
|    |       |              | CO5 | The functionality of detectors and the accelerators for radioactivity  |

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|                 |                    |  | CO6            | Understanding of solid-state devices whose properties are affected by light and its applications   |
|                 |                    |  | CO7            | Understanding of the properties and life cycle of stars.   |
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|                 | <b>CHEMISTRY</b>   |  |                |  |
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|                 | <b>PO Code</b>     | <b>Programme Outcomes</b>  |                |  |
|                 | PO1                | To provide a sound understanding of the various concepts and a strong foundation in all branches of chemistry. |                |  |
|                 | PO2                | To give an insight into the application of chemistry.  |                |  |
|                 | PO3                | To sensitize the students about the chemistry related environmental issues.                                    |                |  |
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| <b>Semester</b> | <b>Course Code</b> | <b>CourseName</b>  | <b>CO Code</b> | <b>Course Outcomes</b>   |
| I               | CHEM1H             | Chemistry1   | CO1            | Explain the basic concepts of mathematics for efficient learning and application in chemistry  |
|                 |                    |  | CO2            | Apply appropriate techniques of analytical chemistry, conduct experiments, analyze data and interpret results with an understanding of the limitations                               |
|                 |                    |  | CO3            | Recall the basic concepts of atomic structure and identify patterns in molecular bonding and relate to their chemical properties   |
|                 |                    |  | CO4            | Analyze, interpret and identify crystal systems using X-ray crystallography.   |
|                 |                    |  | CO5            | Explain HSAB concepts, its applications in different areas and its limitations. Discuss the importance of different non-aqueous solvents, their chemical reactions and applications. |
|                 |                    |  | CO6            | Categorize the different binary solutions and deduce their behavior with change in external parameters.  |

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|    |            |             | CO7 | Predict the reactivity of an organic compound based on its structure, justify the mechanism based on chemical effects and develop systematic methods for the preparation of different compounds  |
|    |            |             | CO8 | Recall the basic knowledge of organic chemistry to name new compounds and formulate their conformations.   |
| II | CHEM2<br>H | Chemistry 2 | CO1 | Apply the law of thermodynamics to thermal cycles, understand the significance of state variables, thermodynamic functions, illustrate their roles in determining equilibrium under different conditions and solve related problems.                               |
|    |            |             | CO2 | Explain the terms in phase rule and interpret the phase diagrams in unary and binary systems   |
|    |            |             | CO3 | Explanation of radioactivity, its measurement, major components of a nuclear reactor and applications of tracer techniques   |
|    |            |             | CO4 | Illustrate methods to determine the molecular weight of inorganic polymers and discuss some commercially important polymers  |
|    |            |             | CO5 | Understand the properties of coordination compounds, their structures and stability. Apply Crystal Field Theory to understand the magnetic properties and describe the stability of metal complexes using stepwise formation constant and thermodynamic parameters |
|    |            |             | CO6 | Create interest in different magnetic properties and functional properties of structural materials and smart materials   |
|    |            |             | CO7 | Apply various rules to understand the stability of alkenes and reactions of dienes and alkynes   |
|    |            |             | CO8 | Elaborate electrophilic substitution reactions of benzene under the influence of activating and deactivating groups. Predict aromaticity based on Huckel's rule and illustrate the molecular orbital picture of benzene.   |

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| III | CHEM3<br>H | Chemistry 3 | CO1 | Identify the challenges in the conservation of water and design feasible solutions to overcome the limitations . Formulating and implementing green solutions to some of the reactions which are hazardous to the bio-system and sensitizing the younger generation chemists to design, produce and generate greener products. |
|     |            |             | CO2 | Interpret the basic concepts involved in inorganic analysis. Infer the knowledge of buffers and their biological applications.   |
|     |            |             | CO3 | Explain the use of various industrial materials and their applications. Upgrade the conventional methods to design latest technologies for the economical and smarter production.  |
|     |            |             | CO4 | Explore the dynamic world of nano materials, interpret their unique properties and discover the plethora of possibilities of their applications in various fields for a better and smarter life.   |
|     |            |             | CO5 | Relate and examine the theories and concepts of electrochemistry. Develop deep knowledge of the application of measurements useful in analytical estimations.  |
|     |            |             | CO6 | Enumerate the fundamentals of the kinetics of chemical reactions followed by a detailed study of catalysis.  |
|     |            |             | CO7 | Understand the mechanisms to predict the outcome of various reactions. Relate elimination or substitution reactions to their energy profile diagrams   |
|     |            |             | CO8 | Discuss in detail alcohols, phenols and epoxides. Understand and recall mechanisms of aromatic electrophilic substitution reactions. Describe the synthetic application of Grignard reagents.  |
| IV  | CHEM4<br>H | Chemistry 4 | CO1 | Recall and integrate the characteristic properties of the lanthanoides and monitor their applications in revolutionizing industry and medical field. Identify and summarize the  |

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|   |              |             |     | significance of organometallic compounds in the catalytic industry.  |
|   |              |             | CO2 | Utilize the knowledge of the latest technology, skills and tools in the production field to generate smarter and economical products   |
|   |              |             | CO3 | Compose and formulate ideas to create the much required energy harvesting sources like solar cells and fuel cells with the fundamental knowledge of the working of the electrochemical cells.                |
|   |              |             | CO4 | Illustrate the effect of absorption of light by matter. Application of the photochemical processes in different fields   |
|   |              |             | CO5 | Explain the principles and working of various instruments and application of these instruments for qualitative and quantitative analysis   |
|   |              |             | CO6 | Classify polymers and explain the mechanism of polymerization. Differentiate thermosetting and thermosoftening polymers with special mention to commercially important polymers                              |
|   |              |             | CO7 | Recall the IUPAC nomenclatures. Detailed discussion of aldehydes and ketones   |
|   |              |             | CO8 | Predict the mechanisms and compare the reactivity of different carboxylic acids and their derivatives. Understanding amines in detail and studying the various applications of biologically important amines |
| V | CHEM5<br>BPH | Chemistry 5 | CO1 | Outline and exemplify the classification, reactions, properties and biological significance of proteins.   |
|   |              |             | CO2 | Explain and understand the chemical structure, reactions, properties, function and use of broad range of food carbohydrates and various components of nucleic acids  |
|   |              |             | CO3 | Contrast the structure of fats, phospholipids, steroids and explain various properties of the above macromolecules. Interpret the  |

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|   |              |             |     | biological roles of diverse hormones and to study their mode of action  |
|   |              |             | CO4 | Categorize enzymes based on their action and understand the kinetic parameters of enzymatic reactions. Illustrate the coenzyme function of water soluble vitamins and select appropriate methods to control harmful effects of synthetic vitamins   |
|   |              |             | CO5 | Evaluate the basic theory and instrumentation of microwave, IR and UV/Vis spectroscopy as a qualitative and quantitative method.  |
|   |              |             | CO6 | Understand the symmetry elements and the corresponding symmetry operations that lead to the classification of molecules into point groups   |
| V | CHEM5<br>OIH | Chemistry 6 | CO1 | Apply principles of coordination chemistry to explain how nature tailors properties of metal centers for specific applications in biochemical systems.  |
|   |              |             | CO2 | Outline the types of catalysis and applications of certain well known and industrially important reaction-specific catalysts used globally.   |
|   |              |             | CO3 | Imagine the structural formulae of organic compounds in a 3D perspective. Understand the importance of stereochemistry in organic chemistry and apply the knowledge gained in this course to a variety of chemical problems. Apply the knowledge in the synthesis, enantiomeric separation and characterisation of a range of chiral compounds in the laboratory for further research |
|   |              |             | CO4 | Examine the enantiomers, diastereomers and epimers of simple sugars. Understand how the ring structures of aldehyde and ketone sugars are formed. Construct the ring structure of any 5 or 6 carbon containing monosaccharide from its corresponding straight chain structure.  |

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|    |                |             | CO5 | Outline various reaction mechanisms of heterocyclic compounds. Illustrate different methods for the synthesis of 5- and 6-membered heterocyclic compounds and summarise their properties, and biological importance.  |
|    |                |             | CO6 | Distinguish and characterize various classes of natural products by their structures. Identify pharmaceutically active products of natural origin.  |
| VI | CHEM6<br>BOPCH | Chemistry 7 | CO1 | Understand complex biochemical pathways within living cells. Elaborate the importance of ATP.   |
|    |                |             | CO2 | Solution to various disorders caused due to impairment of various metabolic pathways in the living system.  |
|    |                |             | CO3 | Discuss the role of active methylene compounds in various organic syntheses, illustrate the mechanisms involved and propose the synthesis. Identify the importance of coupling reaction in dye industry. Apply organometallics in synthetic organic chemistry   |
|    |                |             | CO4 | Understand and compare the principle and theory of various spectroscopic techniques. Determine the effect of conjugation on UV-Visible absorption spectrum. Interpret the spectra of compounds, determine functional groups and propose structures for compounds. Apply the knowledge in the characterisation of organic compounds in research and chemical industry. |
|    |                |             | CO5 | Explain the principle of Raman and ESR spectroscopy and their application to simple molecules   |
|    |                |             | CO6 | Understand the working principle, experimentation and applications of Fluorescence Spectrometry, GC, HPLC, ion-exchange chromatography, CV, and thermogravimetric analysis  |

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| VI | CHEM6<br>EPCH | Chemistry 8 | CO1 | Understand the basic principles of pharmacology, pharmacodynamics and pharmacokinetics. Outline the various stages and practical application of pharmacokinetics . Describe the various phases of clinical studies. Explain the rationale for the complete development plan (pharmaceutical, pre-clinical and clinical) according to the proposed therapeutic indication   |
|    |               |             | CO2 | Relate the concepts of active principles and lead compounds in drug discovery; Outline and critically appraise the principal steps in drug discovery Describe the technologies available and those in development of new drugs; Explore the therapeutic opportunities that might arise from the technology(gene therapy)   |
|    |               |             | CO3 | Apply the basic concepts of buffers, acid-base theories and Henderson's equations in buffer preparations and evaluating their functions in pharmacy. Develop analytical skills in predicting the buffer concentrations and develop practical skills in preparing buffers required for an assay of drug. Asses the use of antioxidants in pharmacy. Discuss the role of radio pharmaceuticals in drug industry. Create an awareness about the factors involved in quality control of drugs. |
|    |               |             | CO4 | Categorise the drugs based on pharmacological-application and interpret their mode of action with suitable illustration. Underrstand and compare the mechanisn of action of each class of drug; relate drug-drug interaction and its impact in patient safety  |
|    |               |             | CO5 | Apply the concepts of enzyme inhibition, drug-receptor interaction, working of proton pumps and ion channel pathways in drug action with suitable illustrations. Relate the factors that modify the effect of drug action. Distinguish drug potency and efficacy. Construct dose-response  |

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|    |                    |             |     | curves to predict the safety margin of the drug  |
|    |                    |             | CO6 | Outline the process of drug development and identify the critical factors and decision points in QSAR approach. Evaluate the advantages of combinatorial organic synthesis in scaling up production of drugs to meet increasing demand                             |
| VI | CHEM6<br>EECH      | Chemistry 8 | CO1 | Understand the concept and importance of entrepreneurship and entrepreneur in relation to the characteristics, functions, challenges and types of entrepreneurs.   |
|    |                    |             | CO2 | Outline the functioning of the cosmetic industry in terms of raw materials used, Indian standard specifications for production, formulation of cosmetics and quality assurance.  |
|    |                    |             | CO3 | Mention the salient features of various rules and acts related to food, cosmetics and drug   |
|    |                    |             | CO4 | Describe the importance of nanomaterials for various applications in daily life, based their properties of various nanomaterials   |
|    |                    |             | CO5 | Evaluate the importance of the given soil / water / plant through analysis of the physical and chemical properties of the given soil / water and plants.   |
|    |                    |             | CO6 | Understand the drugs in terms of WHO definition, nomenclature, dosage forms, formulations, quality analysis, adulteration and toxicology.  |
|    |                    |             | CO7 | Evaluate the nutritional requirements for different age groups, sex, and health conditions through understanding the concept of nutritional value. Explain food production in terms of processing, preservation, additives, qualitative analysis and adulteration. |
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|    | <b>MATHEMATICS</b> |             |     |  |

|                 | <b>PO Code</b>     | <b>Programme Outcomes</b>  |                |  |
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|                 | PO1                | Enables the students to take up advanced studies in the core subjects and enable them to find opportunities in careers in Science and Technology and Management where a high level of competence and dependence on many of the science subjects is demanded. |                |  |
|                 | PO2                | Know when there is a need for information, to be able to identify, locate, evaluate, and effectively use that information for the issue or problem at hand.  |                |  |
|                 | PO3                | Formulate and develop mathematical arguments in a logical manner.  |                |  |
|                 | PO4                | Acquire good knowledge and understanding in advanced areas of mathematics and statistics, chosen by the student from the given courses.  |                |  |
|                 | PO5                | Understand, formulate and use quantitative models arising in physical sciences, business and other contexts.   |                |  |
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| <b>Semester</b> | <b>Course Code</b> | <b>CourseName</b>  | <b>CO Code</b> | <b>Course Outcomes</b>   |
| I               | MAT1M<br>AI        | Mathematical Analysis-I  | CO1            | Define and recognize the basic properties of the field of real numbers. Define and recognize the basic properties of the field of real numbers |
|                 |                    |  | CO2            | Improve and outline the logical thinking.  |
|                 |                    |  | CO3            | Have the knowledge of the series of real numbers and convergence.  |

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|     |               |                          | CO4 | Application of Integral Calculus by solving the problem of standard curves .   |
|     |               |                          | CO5 | Shown the ability of working independently and with groups.  |
|     |               |                          | CO6 | Studying Leibnitz theorem – Roll’s theorem, Langrange’s Mean Value theorem, Taylor’s theorem Maclarurin’s expansion Theorem and Cauchy criteria.   |
|     |               |                          | CO7 | Skill of solving integral calculus like reduction formulae.  |
| II  | MAT2M<br>AIIA | Mathematical Analysis-II | CO1 | Define and recognize the differentiability of real functions and its related theorems  |
|     |               |                          | CO2 | Have the knowledge of real functions- limits of functions and their properties. Interpret how to Know the differentiability and related theorems.  |
|     |               |                          | CO3 | Define and recognize the basic topological properties of R Define and recognize the continuity of real functions   |
|     |               |                          | CO4 | Interpret how to Know the continuity using the internet.   |
|     |               |                          | CO5 | Studying the differentiability of real functions and related theorems .  |
|     |               |                          | CO6 | Skill of solving problems on Fourier series.   |
| III | MAT3D<br>E    | Differential Equations   | CO1 | Apply the concepts of Ordinary Differential Equations and Partial Differential Equations for their resolution and developed the knowledge to solve problems in higher order ordinary linear differential equations, Methods of finding Complementary function and Particular integral. |
|     |               |                          | CO2 | Understand the difficulty of solving problems analytically and capable to formulate and solve problems in concepts like simultaneous differential equations, Legendre’s linear differential equation and Cauchy’s linear differential equation.  |
|     |               |                          | CO3 | Recognize and work with problems in Second Order Ordinary Differential Equations with variable coefficient with various methods and developed  |

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|    |             |                            |     | skills to understand concepts like Special functions.   |
|    |             |                            | CO4 | Able to work and apply concepts in Second order linear partial differential equations, canonical form for parabolic, elliptic and hyperbolic equations.   |
|    |             |                            | CO5 | Use computational tools to formulate and solve problems of one-dimensional heat and wave equation and two-dimensional Laplace equation using Fourier series   |
|    |             |                            | CO6 | Analyze real world problems and recognize when partial differential equations are appropriate, formulate problems about them, creatively model these (using technology, if appropriate) to solve the problems using multiple approaches, judge if the results are reasonable, and then interpret and clearly communicate the results. |
| IV | MAT4A<br>GR | Algebra - Groups and Rings | CO1 | Assess properties implied by the definitions of groups and rings.   |
|    |             |                            | CO2 | Use various canonical types of groups (including cyclic groups) and canonical types of rings (including Quotient rings).  |
|    |             |                            | CO3 | Analyze and demonstrate examples and theorems of subgroups, normal subgroups and quotient groups.   |
|    |             |                            | CO4 | Analyze and demonstrate examples of Subring, Integral domains, Ideals, Maximal Ideals and quotient rings.   |
|    |             |                            | CO5 | Use the concepts of isomorphism and homomorphism for groups and rings.  |
|    |             |                            | CO6 | Produce rigorous proofs of propositions arising in Fundamental theorem of homomorphism in groups and rings.   |
|    |             |                            | CO7 | Apply problem-solving using advanced algebraic techniques applied to diverse situations in physics, engineering and other mathematical contexts.  |
| V  | MAT5C<br>AA | Complex Analysis           | CO1 | The student realizes the importance of fundamental concepts of complex analysis and their role in modern mathematics and applied contexts   |

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|  |             |                | CO2 | The student will be able to analyze the ideas of complex differentiation and complex integration in a coherent and meaningful manner and use appropriate techniques for solving related problems and for establishing theoretical results.   |
|  |             |                | CO3 | The student gains knowledge about Complex Number System and understands the relation to other existing number systems  |
|  |             |                | CO4 | The student will develop the critical thinking ability by proving mathematical conjectures and establishing theorems   |
|  |             |                | CO5 | The student gains competence to understand the operations with complex numbers, use the complex derivatives function, use and operate analytic functions, demonstrate knowledge of integration in the complex plane, use the Cauchy integral theorem and Cauchy integral formula, manipulate and use power series, understand residues and their use in integration, demonstrate the understanding of conformal mappings |
|  |             |                | CO6 | The student will be able to appreciate the significance of differentiability for complex functions and be familiar with the Cauchy-Riemann equations   |
|  | MAT5L<br>AA | Linear Algebra | CO1 | Use computational techniques and algebraic skills essential for the study of systems of linear equations, matrix algebra, vector spaces, Eigenvalues and eigenvectors, orthogonality and diagonalization. (Computational and Algebraic Skills).  |
|  |             |                | CO2 | Use visualization, spatial reasoning, as well as geometric properties and strategies to model, solve problems, and view solutions, especially in $R^2$ and $R^3$ , as well as conceptually extend these results to higher dimensions. (Geometric Skills).  |
|  |             |                | CO3 | Critically analyze and construct mathematical arguments that relate to the study of introductory linear algebra. (Proof and Reasoning).  |

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|    |              |                                  | CO4 | Use technology, where appropriate, to enhance and facilitate mathematical understanding, as well as an aid in solving problems and presenting solutions (Technological Skills).  |
|    |              |                                  | CO5 | Communicate and understand mathematical statements, ideas and results, both verbally and in writing, with the correct use of mathematical definitions, terminology and symbolism (Communication Skills).   |
|    |              |                                  | CO6 | Work collaboratively with peers and instructors to acquire mathematical understanding and to formulate and solve problems and present solutions (Collaborative Skills).  |
| VI | MAT6E<br>EDG | Elementary Differential Geometry | CO1 | Compute the curvature and torsion of space curves.   |
|    |              |                                  | CO2 | Understand the notion of Serret-Frenet frame for space curves.   |
|    |              |                                  | CO3 | Understand definition of directional derivative and gradient and illustrate geometric meanings with the aid of sketches.   |
|    |              |                                  | CO4 | Calculate directional derivatives and gradients and apply gradient to solve problems involving steepest ascent and normal vectors to level curves.   |
|    |              |                                  | CO5 | Compute double integrals and triple integrals and change of variables. Can compute triple integrals in rectangular, cylindrical and spherical coordinates and illustrate its geometric meaning with the aid of sketches, and apply it to compute integrals over regions. |
|    |              |                                  | CO6 | Understand the integral theorems: Green's , Gauss divergence and Stoke's and also its applications.  |
|    | MAT6E<br>OTC | Optimization Techniques          | CO1 | The student will understand the importance of optimization of industrial process management  |
|    |              |                                  | CO2 | The student will be able to apply basic concepts of mathematics to formulate an optimization problem   |
|    |              |                                  | CO3 | The student will analyze and appreciate variety of performance measures for various optimization problems  |

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|    |             |                    | CO4 | The student can develop and promote research interest in applying optimization techniques in problems of Engineering and Technology          |
|    |             |                    | CO5 | The student will be able to solve a multi-objective problem through weighted and constrained methods   |
| VI | MAT6N<br>AA | Numerical Analysis | CO1 | Understand the importance of computers and the role of approximations and errors in the implementation and development of numerical methods. |
|    |             |                    | CO2 | Gain sufficient information to successfully approach a wide variety of problems dealing with roots of equations                              |
|    |             |                    | CO3 | Solve problems involving linear algebraic equations and appreciate the application of these equations in many fields.                        |
|    |             |                    | CO4 | Approach a wide variety of engineering problems dealing with optimization.   |
|    |             |                    | CO5 | Enhance their capability to fit curves to data.  |
|    |             |                    | CO6 | Solve ordinary differential equations and eigenvalue problems  |