

Department of Mathematics (UG)

Course Outcomes

Paper – I : DIFFERENTIAL EQUATIONS

Upon completion of the course students will be able

- To analyze real world scenarios to recognize when ordinary differential equations (ODEs) or systems of ODEs are appropriate, formulate problems about the scenarios, creatively model these scenarios (using technology, if appropriate) in order to solve the problems using multiple approaches, judge if the results are reasonable and then interpret and clearly communicate the results.
- To recognize ODEs and system of ODEs concepts that are encountered in the real world, understand and be able to communicate the underlying mathematics involved to help another person gain insight into the situation.
- To work with ODEs and systems of ODEs in various situations and use correct mathematical terminology, notation and symbolic process in order to engage in work, study and conversation on topics involving ODEs and system of ODEs with colleagues in the field of mathematics, science or engineering.

Paper – II : SOLID GEOMETRY

Upon completion of the course students will be able

- To understand geometrical terminology for angles, triangles, quadrilaterals and circles.
- To measure angles using a protractor.
- To use geometrical results to determine unknown angles.
- To recognize line and rotational symmetries.
- To find the areas of triangles quadrilaterals and circles and shapes based on these.

Paper – III : ABSTRACT ALGEBRA

Upon completion of the course students will be able to

- Assess properties implied by the definitions of groups and rings.
- Use various canonical types of groups (including cyclic groups and groups of permutations)
- Analyze and demonstrate examples of subgroups, normal subgroups and quotient groups.

- Analyze and demonstrate examples of ideals and quotient rings.
- Use the concepts of isomorphism and homomorphism for groups and rings.
- Procedure rigorous proofs of propositions arising in the context of abstract algebra.

Paper – IV : REAL ANALYSIS

Upon completion of the course students will be able to

- Describe the real line as a complete, ordered field.
- Determine the basic topological properties of subsets of the real numbers.
- Use the definitions of convergence as they apply to sequences, series and functions.
- Determine the continuity, differentiability and integrability of functions defined on subsets of the real line.
- Apply the Mean Value Theorem and the Fundamental Theorem of Calculus to problems in the context of real analysis.
- Produce rigorous proofs of results that arise in the context of real analysis.

Paper – V : RING THEORY & VECTOR CALCULUS

Upon completion of the course students will be able to

- Assess properties implied by the definitions of rings.
- Analyze and demonstrate examples of ideals and quotient rings.
- Study of various integral domain in ring
- Use the concepts of isomorphism and homomorphism for rings.
- Procedure rigorous proofs of propositions arising in the context of rings.
- Scalar and vector valued functions of 2 and 3 variables and surfaces, and in turn the geometry of surfaces.
- Gradient vector fields and constructing potentials.
- Integral curves of vector fields and solving differential equations to find such curves.
- The differential ideas of divergence, curl, and the Laplacian along with their physical interpretations, using differential forms or tensors to represent derivative operations.
- The integral ideas of the functions defined including line, surface and volume integrals - both derivation and calculation in rectangular, cylindrical and spherical coordinate systems .

Paper – VI : LINEAR ALGEBRA

Upon completion of the course students will be able to

- Solve systems of linear equations.
- Analyze vectors in \mathbb{R}^n geometrically and algebraically.
- Recognize the concepts of the terms span, linear independence, basis, and dimension, and apply these concepts to various vector spaces and subspaces.
- Use matrix algebra and the related matrices to linear transformations.
- Compute and use determinants.
- Compute and use eigenvectors and eigen values.
- Determine and use orthogonality.

Paper – VII : NUMERICAL ANALYSIS (ELECTIVE)

Upon completion of the course students will be able to

- Derive numerical methods for approximating the solution of problems of continuous mathematics.
- Analyze the error incumbent in any such numerical approximation.
- Implement a variety of numerical algorithms using appropriate technology.
- Compare the viability of different approaches to the numerical solution of problems arising in roots of solution of non-linear equations, interpolation and approximation, numerical differentiation and integration, solution of linear systems.

Paper – VIII (A) : ADVANCED NUMERICAL ANALYSIS (CLUSTER ELECTIVE)

Upon completion of the course students will be able to

- Understand and apply basic numerical methods and the theory behind them, related to numerical differentiation, numerical integration, and solving numerical solutions of first order ordinary differential equations.
- Understand the Least Squares Method to curve fit data using several types of curves (straight line, second degree parabola, power curve, exponential curve).
- To solve the selected class of differential equations using Taylor, Picards, Euler's, Runge Kutta, Adams and Milne's.

Paper – VIII (B) : SPECIAL FUNCTIONS (CLUSTER ELECTIVE)

Upon completion of the course students will be able to

- Understand integral calculus and special functions of various problem and to know the application of some basic mathematical methods via all these special functions.
- Classify and explain the functions of different types of differential equations.
- Understand purpose and functions of the gamma and beta functions.
- Use the gamma function, beta function and special functions to evaluate different types of integral calculus problems

Paper – VIII (C) : PROJECT WORK

Preparation of the writing projects in Mathematics will inspire the students to study the fascinating areas of the mathematics with the deep understanding. Further it provides knowledge to the students in writing a project in Mathematics.

Department of Mathematics (UG)

Program Outcomes

M P C (EM, TM) :

- Graduates attain practical knowledge through hands on training and project experience to meet the industrial needs.
- Graduates develop critical thinking skills to identify, analyze and solve problems of their core areas using modern tools.
- Graduates develop lifelong learning skills with interdisciplinary approach towards sustainable development.
- Ability to communicate effectively the comprehended scientific data and knowledge, write effective reports, design documentation and make effective presentations.
- Apply ethical, moral and social values in personal and professional life leading to highly cultured and civilized society.

M P E :

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MP Cs :

- Acquire knowledge in Physical sciences with a thrust on fundamental principles and theories related to various scientific phenomena and their relevance in day – to – day life.
- Graduates attain practical knowledge through hands on training and project experience to meet the industrial needs.
- Graduates develop critical thinking skills to identify, analyze and solve problems of their core areas using modern tools.
- Graduates develop lifelong learning skills with interdisciplinary approach towards sustainable development.
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Program Specific Outcomes

M P C (EM, TM) :

- Understand the theoretical concepts of physical and chemical properties of materials and the role of mathematics in dealing with them in a quantitative way.
- Analyse the concepts of Mathematics, Physics and Chemistry and understand the relation among them like physical chemistry, mathematical modeling of physics and chemistry problems.
- Skills needed to handle instruments and adopt lab procedures to study physical chemical properties of materials . Mathematical, numerical techniques required to model them.
- Ability to interlink the skills and knowledge in mathematics, physics and chemistry and develop an aptitude to address the problems in biophysics, stock market analysis.

M P E :

- Understand the mechanism behind various electronic and physical systems and quantify them with firm mathematical tools.
- Analyse the physical properties materials, electronic components to develop essential tools for better livelihood.
- Skills to study the optical, thermal, electrical and electronic properties of materials and also to explore the properties of various electronic components. communication systems, micro processor and micro – controller.
- Ability to interlink the skills developed to design tools for internet of things, select proper materials for suitable electronic applications.

M E Cs :

- Students develop problem solving skills and methods and develop logical tools and models used to solve various real life problems.
- Students acquire knowledge of traditional and modern techniques of solving algebraic, transcendental equations, differential and integral equations, which have applications in many disciplines.
- Students attain comprehensive knowledge in electronics that will help to construct, analyze, verify, program and troubleshoot digital and discrete component circuits using appropriate tools and techniques.

- Ability to design and develop software applications to address real time problems using Programming languages, Databases, Operating Systems and Computer Network Concepts.

M P Cs:

- Students develop problem solving skills and methods and develop logical tools and models used to solve various real life problems.
- Students acquire knowledge of traditional and modern techniques of solving algebraic, transcendental equations, differential and integral equations, which have applications in many disciplines.
- The students attain sound knowledge in the areas of Mechanics, Thermal Physics, Waves and Oscillations, Optics, Electromagnetism, Modern Physics, Solid state Physics for pursuing higher education and research.
- Ability to design and develop software applications to address real time problems using Programming languages, Databases, Operating Systems and Computer Network Concepts.

M S Cs :

- Students develop problem solving skills and methods and develop logical tools and models used to solve various real life problems.
- Students acquire knowledge of traditional and modern techniques of solving algebraic, transcendental equations, differential and integral equations, which have applications in many disciplines.
- Apply and analyze data using concepts of probability, statistical models, sampling theory experimental designs, statistical quality control, reliability, optimization techniques, Indian official statistics and vital statistics with modern applied statistical tools and techniques both in learning and research.
- Ability to design and develop software applications to address real time problems using Programming languages, Databases, Operating Systems and Computer Network Concepts.

M C Cs :

- Understand the theoretical concepts of physical and chemical properties of materials and the role of mathematics in dealing with them in a quantitative way.
- Gain the knowledge of Chemistry through theory and practical's.
- To explain nomenclature, stereochemistry, structures, reactivity, and mechanism of the chemical reactions.
- Identify chemical formulae and solve numerical problems.

- Ability to design and develop software applications to address real time problems using Programming languages, Databases, Operating Systems and Computer Network Concepts.