DEPARTMENT OF MATHEMATICS (UG)

COURSE OUTCOMES

DIFFERENTIAL EQUATIONS

Course Outcomes: Upon completion of the course students will be able to

- Analyze real world scenarios to recognize when ordinary differential equations(ODEs) or system of ODEs are appropriate, formulate problems about the scenarios, creatively model these scenarios (using technology, if appropriate) in order to solve the problems using multi approaches, judge if the results are reasonable and then interpret and clearly communicate the results.
- Construct 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.
- Apply 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.

SOLID GEOMETRY

Course Outcomes: Upon completion of the course students will be able to

- Determine geometrical terminology for angles, triangles, quadrilaterals and circles.
- Calculate angles using a protractor.
- Apply geometrical results to determine unknown angles.
- Calculate line and rotational symmetries.
- Calculate the areas of triangles quadrilaterals and circles and shapes based on these.

ABSTRACT ALGEBRA

Course Outcomes: Upon completion of the course students will be able to

- Assess properties implied by the definitions of groups and rings.
- Classify 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.
- Apply the concepts of isomorphism and homomorphism for groups and rings.
- Compare rigorous proofs of propositions arising in the context of abstract algebra.

REAL ANALYSIS

Course Outcomes: 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.
- Apply the definitions of convergence to sequences, series and functions.
- Determine the continuity, differentiability and integrability of functions defined on subsetsof the real line.
- Apply the Mean Value Theorem and the Fundamental Theorem of Calculus to problems inthe context of real analysis.
- Produce rigorous proofs of results that arise in the context of real analysis.

RING THEORY & VECTOR CALCULUS

Course Outcomes: 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.

- Discuss the various integral domain in ring.
    - Compute the concepts of isomorphism and homomorphism for rings.
    - Compute rigorous proofs of propositions arising in the context of rings.
    - Discuss the Scalar and vector valued functions of 2 and 3 variables and surfaces, and in turn the geometry of surfaces.
    - Calculate gradient vector fields and constructing potentials.
    - Calculate 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.
    - Apply the integral ideas of the functions defined including line, surface and volume integrals – both derivation and calculation in rectangular, cylindrical and spherical coordinate systems.

LINEAR ALGEBRA

Course Outcomes: Upon completion of the course students will be able to

- Solve systems of linear equations.
- Analyze vectors in R^n geometrically and algebraically.
- Apply the concepts of the terms span, linear independence, basis and dimension to variousvector spaces and subspaces.
- Apply matrix algebra and the related matrices to linear transformations.
- Compute the use eigen vectors and eigen values.
- Determine and use orthogonality.

NUMERICAL ANALYSIS (ELECTIVE)

Course Outcomes: Upon completion of the course students will be able to

- Apply numerical methods for approximating the solution of problems of continuous

mathematics.

- Analyze the error incumbent in any such numerical approximation.
- Apply 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.

ADVANCED NUMERICAL ANALYSIS - 8A (CLUSTER ELECTIVE)

Course Outcomes: Upon completion of the course students will be able to

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

SPECIAL FUNCTIONS - 8B (CLUSTER ELECTIVE)

Course Outcomes: Upon completion of the course students will be able to

- Apply 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.
- Interpret purpose and functions of the gamma and beta functions.
- Apply the gamma function, beta function and special functions to evaluate different typesof integral calculus problems.

PROJECT WORK

Outcome:

Design and develop projects in Mathematics to inspire the students to study the fascinating areas of mathematics with the deep understanding. Further it provides knowledge to the students in analyzing mathematical solutions to certain problems.