

DEPARTMENT OF MATHEMATICS
Science College, Konkorada, (Gm.)
Course outcomes /course specific outcomes
B.A. Honours

Core 1 CALCULUS

- Students will be able to use Leibnitz's rule to evaluate derivatives of higher order.
- Able to study the geometry of various types of functions
- Evaluate the area, volume using techniques of integration
- Able to identify the difference between scalar and vector and properties of vector functions

Core 2 DISCRETE MATHEMATICS

- Students will be acquainted with basic counting principles, set theory and logic, matrix theory and graph theory.
- They will be able to learn simple mathematical modeling.

Core 3 - REAL ANALYSIS

- Gain knowledge of fundamental concepts of real numbers.
- Verify the value of the limit of a function at a point using the definition of the limit
- Introduction to sequence and series.
- Learn to check function is continuous understand the consequences of the intermediate value theorem for continuous functions.
- Student will be able to understand differentiation and fundamental theorem in differentiation and various rules.
- Geometrical representation and problem solving on MVT and Rolle's theorem.

Core 4 - Differential equations.

- Student will be able to solve first order differential equations utilizing the standard techniques for separable, exact, linear, homogeneous, or Bernoulli cases.
- To learn methods to solve linear differential equation with constant coefficients.
- To learn methods for solving non-homogeneous differential equation.
- To learn power series solution method using ordinary and singular points.
- To solve system of first order differential equations.

CORE 5 – THEORY OF REAL FUNCTIONS

- How to find limits using L' Hospital's Rule and some knowledge about Taylor's series.

- Understand Integrability and theorems on integrability. To learn Riemann Integral and its properties in detail, leading to fundamental theorem of calculus and Mean value theorems.
- To study different tests for solving improper integrals of first and second kind.
- To study pointwise and uniform convergence of sequences and series of functions. Recognize the difference between point wise and uniform convergence of a sequence of functions. Illustrate the effect of uniform convergence on the limit function with respect to continuity, differentiability, and integrability.

Core 6 - Group Theory

- To learn fundamental properties and mathematical tools such as closure, identity, inverse and generators.
- To study algebraic structure 'Groups' in detail which is useful in study of Rings, Modules, Algebraic topology, Analysis
- To enhance abstract thinking of students. And studying Cosets and Lagrange's theorem.
- To learn to compare two different algebraic structures and study transfer of properties in-between these structures through homomorphism and isomorphism

Core 7 - Partial Differential Equations and system of ODEs.

- To understand the concept of Ordinary differential Equations in more than two variables.
- To learn the heat ,wave,laplace equations along with system of ODEs.
- Introduction of first order Partial Differential Equations.
- Learn methods to solve first order Partial Differential Equationsa along with solving Cauchy problem

Core 8 - Numerical Methods and scientific computing

- To apply appropriate numerical methods to solve the problem with most accuracy.
- To learn to apply the various numerical techniques for solving real life problems.
- Solve the nonlinear equations, system of linear equations and interpolation problems using numerical methods.
- The problems which cannot be solved by usual formulae and methods can be solved approximately by using numerical techniques.
- To fit curve to the data by using 5 different methods of interpolation as well as extrapolation.

- To find approximate solutions to difficult differential equations occurring in engineering sciences.
- Examine the appropriate numerical differentiation and integration methods to solve problems.

Core 9 - Topology of Metric Spaces

- Able to understand the Euclidean distance function on \mathbb{R}^n and appreciate its properties, and state and use the Triangle and
- Reverse Triangle Inequalities for the Euclidean distance function on \mathbb{R}^n
- Explain the definition of continuity for functions from \mathbb{R}^n to \mathbb{R}^m and determine whether a given function from \mathbb{R}^n to \mathbb{R}^m is continuous
- Explain the geometric meaning of each of the metric space
- Distinguish between open and closed balls in a metric space
- Define convergence for sequences in a metric space and
- Determine whether a given sequence in a metric space converges
- On successful completion of the course students will be able to develop conceptual understanding of the following: Convergent sequence, Continuous mappings, sequential criterion of continuity. Uniform continuity, Compactness, Concept of connectedness, Contraction mappings, Banach Fixed point Theorem and its application

Core 10 - Ring Theory

- To study the algebraic structure Ring in detail through various examples.
- To learn the construction of field of quotients of an integral domain.
- To study the Rings of polynomials and its factorization over a field.
- To study the notion of ideals and factor rings with examples.
- To study Unique Factorization domain, Euclidean Domain and related results

CORE 11 – MULTIVARIATE CALCULUS

- Gain Knowledge of fundamental concepts of real numbers in n dimensions.
- verify the value of the limit of a function at a point using the definition of the limit in \mathbb{R}^n
- Find the extreme value in 2 dimensions.
- Study multiple integration.

Core 12 - Linear Algebra

- Understand vector spaces over a field and subspaces and apply their properties.
- Understand linear independence and dependence.
- Find the basis and dimension of a vector space, and understand the change of basis.
- Compute linear transformations, kernel and range, and inverse linear transformations, and find matrices of general linear transformations.
- Find eigenvalues and eigenvectors of a matrix and of linear transformation.
- The Cayley-Hamilton Theorem and its use in finding the inverse of a matrix
- Understand various concepts of Abstract & Linear Algebra covered in details.
- Student will be able to find the complete solution of a nonhomogeneous differential equation as a linear combination of the complementary function and a particular solution.
- Student will have a working knowledge of basic application problems described by second order linear differential equations with constant coefficients.

Core 13 - Complex Analysis

- To learn basic algebraic properties of complex numbers and limit and continuity of Complex functions.
- To learn analytic functions and the C-R equations as its necessary and sufficient conditions.
- To learn tools which are useful in finding integration of Complex valued functions.
- To learn sequences and series of Complex valued functions.
- To learn applications of residues and poles in integrals of complex functions.

CORE PAPER-14

GROUP-THEORY-II

- The knowledge of automorphism helps to study more on field theory.
- Students learn on direct products, group actions, class equations and their applications with
- proof of all results. This course helps to opt for more advanced courses in algebra and linear
- classical groups.

DSE 1 – LINEAR PROGRAMMING

- Students learn conversion of real life problems into mathematical models which enhance their problem solving and decision making abilities.

- Students learn to calculate optimal solution of models through graphical and iterative methods.
- Students study transportation and assignment models and methods to solve them.
- This helps them to get optimum solutions within the given constraints to problems arising in industry.

DSE 2 – PROBABILITY AND STATISTICS

- The students will be able to understand & apply the concepts of probability & statistics covered in the following Units:
- special probability distribution
- expectations
- moments
- sampling distribution.

DSE 3-Differential geometry

- To learn theory of space curves,evolutes and involutes of curve,relation between tangent,normal and binomials.
- Students study theory of surfaces , first and second fundamental forms.
- To learn on geodesics,serret-frenet formulae.
it will be helpful in surface theory and geometry.

GENERIC ELECTIVE 1- Calculus and Differential Equations

- Study about curves and tracing it,along with elementary ideas about sphere,cone and conicoids etc
- Learn about continuity and differentiability,taylor series
- Knowledge about Limit and continuity of functions of several variables, Lagrange's multipliers and multiple integral
- Fundamental idea about Ordinary differential equation

GENERIC ELECTIVE 2- ALGEBRA

- Students get the fundamental knowledge about sets,relations and functions and about logic arguments.
- Students get acquainted with properties of natural numbers like Euclidean algorithm, congruence relation, fundamental theorem of arithmetic etc
- Study about matrices and their properties,system of linear equations, vector spaces, linear transformation,eigenvalues and vectors.

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