

A.S.D.GOVERNMENT DEGREE COLLEGE FOR WOMEN (A)
KAKINADA



DEPARTMENT OF MATHEMATICS

2025-26

COURSE OUTCOMES

SEMISTER - I

Title of the Paper: Differential equations

Course outcomes:

CO1. Solve exact differential equations, linear equations, Bernoulli's equations, and equations reducible to exact form using integrating factors.

2. Analyze and solve first-order differential equations that are solvable for p , x , and y , including Clairaut's equations. 3. Solve homogeneous and non-homogeneous linear differential equations of higher order with constant coefficients using operator methods.

4. Compute particular integrals for non-homogeneous equations when the right-hand side is a polynomial, exponential, or trigonometric function.

5. Solve non-homogeneous differential equations using the method of variation of parameters and other applicable techniques.

Title of the Paper:Solid geometry

Course outcomes

1. Derive and interpret equations of planes and lines in various forms.

2. Compute angles, distances, and intersection conditions between geometric elements (lines, planes, spheres).

3. Determine coplanarity of lines and solve problems involving shortest distances in 3D space.

4. Analyse sphere-related problems, including tangents, intersections, and circle equations in 3D.

5. Apply advanced concepts like polar planes, conjugate points, and orthogonality conditions of spheres.

Course Content

SEMISTER - II

Title of the Paper: Group theory

1. Understand the definition and basic properties of groups, including finite and infinite groups, and construct composition tables.

2. Analyze subgroups and cosets, apply Lagrange's Theorem, and understand the structure of a group through its subgroups.

3. Identify and verify normal subgroups, and understand their role in forming quotient groups.

4. Understand and apply homomorphisms and isomorphisms, including the fundamental homomorphism theorem and its applications.

5. Work with permutations, transpositions, and cyclic groups, and understand their properties and significance in group theory, including Cayley's Theorem.

Title of the Paper:Elementary real analysis

CO1. Understand the real number system, its axioms, and properties, including completeness, supremum, and infimum.

CO2 Apply the Archimedean property, denseness, and concepts of neighborhoods, limit points, and

derived sets in problem-solving.

CO3 Analyze sequences for boundedness and convergence using definitions and the Cauchy criterion.

CO4. Understand the concept of subsequences, apply the Bolzano-Weierstrass theorem, and test convergence using Cauchy's general principle

CO5. Determine the convergence of infinite series using various tests and solve related analytical problems.

SEMESTER - III

Title of the Paper: Group theory

CO 1. Acquire the basic knowledge and structure of groups.

CO 2. Get the significance of the notation of a subgroup and cosets.

CO 3. Understand the concept of normal subgroups and properties of normal subgroup.

CO 4. Study the homomorphisms and isomorphisms with applications.

CO 5. Understand the properties of permutation and cyclic groups.

Title of the Paper: Numerical methods

CO 1. Difference between the operators, Δ , ∇ , E and the relation between them.

CO 2. Know about the Newton – Gregory Forward and backward interpolation.

CO3. Know the Central Difference operators, δ , μ , σ and relation between them.

CO 4. Solve Algebraic and Transcendental equations.

CO 5. Understand the concept of Curve fitting

Title of the Paper: Laplace transforms

CO 1. Understand the definition and properties of Laplace transformations

CO 2. Get an idea about first and second shifting theorems and change of scale property.

CO 3. Understand Laplace transforms of standard functions like Bessel, Error function etc.

CO 4. Know the reverse transformation of Laplace and properties.

CO 5. Get the knowledge of application of convolution theorem

Title of the Paper: Mathematical special functions

CO 1. Understand the Beta and Gamma functions, their properties and relation between these two functions, understand the orthogonal properties of Chebyshev polynomials and recurrence relations.

CO 2. Find power series solutions of ordinary differential equations.

CO 3. Solve Hermite equation and write the Hermite Polynomial of order (degree) n , also Find the generating function for Hermite Polynomials, study the orthogonal properties of Hermite Polynomials and recurrence relations.

CO 4. Solve Legendre equation and write the Legendre equation of first kind, also find the generating function for Legendre Polynomials, understand the orthogonal properties of Legendre Polynomials.

CO 5. Solve Bessel equation and write the Bessel equation of first kind of order n , also find the generating function for Bessel function understand the orthogonal properties of Bessel function.

SEMESTER - IV

Title of the Paper: Ring theory

- CO 1. Acquire the basic knowledge of rings, fields and integral domains.
- CO 2. Get the knowledge of subrings and ideals.
- CO 3. Construct composition tables for finite quotient rings.
- CO 4. Study the homomorphisms and isomorphisms with applications.
- CO 5. Get the idea of division algorithm of polynomials over a field.

Title of the Paper: Introduction to Real analysis

- CO1. Get clear idea about the real numbers and real valued functions.
- CO2. Obtain the skills of analysing the concepts and applying appropriate methods for testing convergence of a sequence/ series.
- CO3. Test the continuity and differentiability and Riemann integration of a function.
- CO4. Know the geometrical interpretation of mean value theorems.
- CO 5. Know about the fundamental theorem of integral calculus.

Title of the Paper: Integral transforms

- CO 1. Understand the application of Laplace transforms to solve ODEs.
- CO 2. Understand the application of Laplace transforms to solve Simultaneous Des.
- CO 3. Understand the application of Laplace transforms to Integral equations.
- CO 4. Basic knowledge of Fourier-Transformations.
- CO 5. Comprehend the properties of Fourier transforms and solve problems related to finite Fourier transforms.

SEMISTER - V

Title of the Paper: Linear algebra

- CO 1. To understand the different concepts of linear algebra.
- CO 2. To analyse the concepts of vector space, subspace and homomorphism between them.
- CO 3. To understand how to solve the system of linear equations and this concept used in balancing of chemical equations.
- CO 4. To analyse the concepts of eigen values, inner product spaces and orthogonality and also gain the problem solving ability on them

Title of the Paper: Multiple integrals and Applications of Vector Calculus

- CO 1. Learn multiple integrals as a natural extension of definite integral to a function of two variables in the case of double integral / three variables in the case of triple integral.
- CO 2. Learn applications in terms of finding surface area by double integral and volume by triple integral.
- CO 3. Determine the gradient, divergence and curl of a vector and vector identities.
- CO 4. Evaluate line, surface and volume integrals.
- CO 5. understand relation between surface and volume integrals (Gauss divergence theorem), relation between line integral and volume integral (Green's theorem), relation between line and surface integral (Stokes theorem).

Title of the Paper:Advanced numerical methods

CO1. find derivatives using various difference formulae

CO2. understand the process of Numerical Integration

CO3. solve Simultaneous Linear systems of Equations

CO4. understand Iterative methods

CO5. find Numerical Solution of Ordinary Differential Equations

Title of the Paper:Number theory

CO 1. Find quotients and remainders from integer division, study divisibility properties of integers and the distribution of primes.

CO 2. Understand Dirichlet multiplication which helps to clarify interrelationship between various arithmetical functions.

CO 3. Comprehend the behaviour of some arithmetical functions for large n .

CO4. Understand the concepts of congruencies, residue classes and complete residues systems.

CO5. Comprehend the concept of quadratic residues mod p and quadratic non residues mod p .