Course Learning Outcomes

Course-I: Differential Equations

After successful completion of this course, the student will be able to;

1. Solve linear differential equations
2. Convertnon-exact homogeneous equations to exact differential equations by using integrating factors.
3. Know the methods of finding solutions of differential equations of the first order but not of the first degree.
4. Solvehigher-order linear differential equations, both homogeneous and non homogeneous, with constant coefficients.
5. Understand the concept and apply appropriate methods for solving differential equations.

Course-II: Three Dimensional Analytical Solid Geometry

After successful completion of this course, the student will be able to;

1. get the knowledge of planes.
2. basic idea of lines, sphere and cones.
3. understand the properties of planes, lines, spheres and cones.
4. express the problems geometrically and then to get the solution.

Course-III: Abstract Algebra

After successful completion of this course, the student will be able to;

1. acquire the basic knowledge and structure of groups, subgroups and cyclic groups.
2. get the significance of the notation of a normal subgroups.
3. get the behavior of permutations and operations on them.
4. study the homomorphisms and isomorphisms with applications.
5. understand the ring theory concepts with the help of knowledge in group theory and to prove the theorems.
6. understand the applications of ring theory in various fields.

Course-IV: Real Analysis

After successful completion of this course, the student will be able to

1. get clear idea about the real numbers and real valued functions.
2. obtain the skills of analyzing the concepts and applying appropriate methods for testing convergence of a sequence/ series.

3. test the continuity and differentiability and Riemann integration of a function.
4. know the geometrical interpretation of mean value theorems.

Course-V: Linear Algebra

After successful completion of this course, the student will be able to

1. understand the concepts of vector spaces, subspaces, basises, dimension and their properties
2. understand the concepts of linear transformations and their properties
3. apply Cayley- Hamilton theorem to problems for finding the inverse of a matrix and higher powers of matrices without using routine methods
4. learn the properties of inner product spaces and determine orthogonality in inner product spaces.

Course-VI A: Numerical Methods

Students after successful completion of the course will be able to

1. understand the subject of various numerical methods that are used to obtain approximate solutions
2. Understand various finite difference concepts and interpolation methods.
3. Work out numerical differentiation and integration whenever and wherever routine methods are not applicable.
4. Find numerical solutions of ordinary differential equations by using various numerical methods.
5. Analyze and evaluate the accuracy of numerical methods.

Course-VI A: Mathematical special functions

Students after successful completion of the course will be able to:

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

Course-VI B: Multiple integrals and applications of Vector Calculus

Students after successful completion of the course will be able to

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.
2. Learn applications in terms of finding surface area by double integral and volume by triple integral.
3. Determine the gradient, divergence and curl of a vector and vector identities.
4. Evaluate line, surface and volume integrals.
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)

Course-VII B: Integral Transforms with applications

Students after successful completion of the course will be able to

1. Evaluate Laplace transforms of certain functions, find Laplace transforms of derivatives and of integrals.
2. Determine properties of Laplace transform which may be solved by application of special functions namely Dirac delta function, error function, Bessel function and periodic function.
3. Understand properties of inverse Laplace transforms, find inverse Laplace transforms of derivatives and of integrals.
4. Solve ordinary differential equations with constant/ variable coefficients by using Laplace transform method.
5. Comprehend the properties of Fourier transforms and solve problems related to finite Fourier transforms.

Course-VI C: Partial Differential Equations & Fourier Series

Students after successful completion of the course will be able to

1. Classify partial differential equations, formation of partial differential equations and solve Cauchy's problem for first order equations.

2. Solve Lagrange's equations by various methods, find integral Surface passing through a given curve and Surfaces orthogonal to a given system of Surfaces.

3. Find solutions of nonlinear partial differential equations of order one by using Char pit's method.

4. Find solutions of nonlinear partial differential equations of order one by using Jacobi's method.

5. Understand Fourier series expansion of a function f(x) and Parseval's theorem.

Course-VII C: Number Theory

Students after successful completion of the course will be able to

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

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

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

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

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