Department of Mathematics

Course Outcomes.

F Y B Sc.

Semester -1

MTH-111: Theory of Matrices	- Understand various elementary operations on matrices. - Understand the properties of inverse of a matrix. - Understand the concept of Elementary matrices and rank of matrix. - Understand the concepts on skew symmetric, orthogonal matrix, Eigen values, Eigen vector and workout problems related to it.
MTH-112: Calculus of one variable	- Understand the concept of differentiation & Integrations. - Understand the Concept of limits using L-Hospital rules - Solve problems on successive differentiation and Leibnitz theorem. - Solve the problems using Taylor's & maclaurin's Theorem.
MTH-113: (A) Geometry	Learn about various conic sections. - Find the equation of sphere and its intersection with the plane. - Find the equation of cone and cylinder

Semester -2

MTH-121: Ordinary Differential Equations	Understand the necessity of differential equations - Learn about forming differential equations from physical situations. - Know various types of differential equations. - Practice methods of solution for various types of differential equations.
MTH-122: Theory of number & Equations	- Recapitulate the properties of sets, integers, integers including mathematical induction. - Learn division algorithm and its application. - Know about congruence classes. - Understand the Fermat's theorem& examples on it. - Learn how to solve various types of equations.
MTH-123: (A) Laplace Transforms	- Find Laplace transform for various functions, properties of Laplace Transform. Find Laplace for periodic functions. - Properties of inverse Laplace transform, find inverse Laplace transform using the properties and Convolution theorem. - Application of Laplace Transform to ordinary and partial differential equations, initial and boundary value problem.

S Y B Sc.

Semester -1

MTH-231: Calculus of Several variables	- Understand Schwarz's and Young's theorem. - Understand the importance of Taylor's and Maclaurin's series. - Understand Mean value theorem. - Find the area of curved surfaces, change the variables and integrate. - Find volume by triple integration. - Learn to check the behavior of curve
MTH-232: (A) Algebra	- Understand and solve problems on groups and Lagrange's theorem. - Apply the concept of subgroups and get a clear idea about homomorphism and automorphism. - Understand the structure of ring and integral domain.

Semester -2

MTH-241: Complex Variables	- Develop the basic algebraic and geometric properties of the complex number system C and the concept of analyticity, Cauchy –Riemann relations. - Gain knowledge of singularities and residues.

	• Develop the theory of integration for complex functions and prove Cauchy fundamental Theorem and study the various consequences of this theorem. • Represent a given function as a power series. Also understanding the concept of singular points of a function and classify the singular points and discuss the behavior of the function in the neighborhood of a singularity. • Introduction of residue of a function at an isolated singular point and cauchy's residue theorem. Also evaluation of certain types of real definite integrals
MTH-242(A): Differential Equations	• Understand existence and uniqueness about solutions. • Learn about the simultaneous differential equations. • Understand the methods of solution for total differential equations. • Define beta and gamma functions, derive their properties and apply them in evaluating integrals.

- **T Y B Sc.**

- **Semester -1**

MTH-351: Topics in Metric Spaces	• Learn about metric space defined on a set. • Understand the concept connected metric spaces. • Acquire knowledge bounded sets, totally bounded sets, complete metric space, Compact metric space,
MTH-352: Integral Calculus	• Determine the Riemann integrability of a bounded function. • Apply the Mean Value Theorem and the Fundamental Theorem of Calculus to problems in the context of real analysis. • Learn how to solve improper integrals. • Understand the importance of Legendre polynomials
MTH-353: Modern Algebra	• Apply the concept of normal sub groups and quotient sub groups and get a clear idea about homomorphism and automorphism. • Solve problems on Cayley's theorem and permutation groups. • Apply the concept of homomorphism of rings, ideal and quotient rings and solve related problems. • Find the field of quotients of an integral domain. • To know about polynomial rings.
MTH-354: Lattice theory	• Understand the concept of posets and chains. • Learn how to define lattices. • Understand various types of lattices. • Learn about ideals and homomorphism. • Understand the concept of modular and distributive lattices.
MTH-355(B): Elementary Number theory	• Define and interpret the concepts of divisibility, greatest common divisor, prime, and prime-factorization. • Understand the congruence modulo concept, Fermat's and Wilson's theorems. • Learn about perfect numbers and Fermat's numbers. • Understanding Fibonacci numbers and Finite Continued Fractions.
MTH-356: (A) Vector Analysis	• Scalar and cross product of vectors in 2 and 3 dimensions represented as differential forms. • Learn about differentiation and integration of vectors.

	• The differential ideas of divergence, curl, and the Laplacian along with their physical interpretations, using differential forms. • To know the importance of Stokes theorem and Gauss divergence theorem.
	• **Semester -2**
MTH-361: **Measure &** **Integration Theory**	• Learn measurable sets. Learn the concept of Sets of measure zero. • Understand why a more sophisticated theory of integration and measure is needed. • Show that certain functions are measurable. • Understand properties of the Lebesgue integrals. • Learn Fatou's lemma, and some inequalities.
MTH-362: **Method of Real** **Analysis**	• Understand the different types of sequences such as convergent, divergent, monotone and its properties. • 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, and illustrate the convergence properties of power series • Know the concept of Fourier series and half range series.
MTH-363: **Linear Algebra**	• Analyze finite and infinite dimensional vector spaces and subspaces over a field and their properties, including the basis structure of vector spaces. • Use the definition and properties of linear transformations and matrices of linear transformations and change of basis, including kernel, range and isomorphism. • Compute with the characteristic polynomial, eigenvectors, Eigen values and Eigen spaces, as well as the geometric and the algebraic multiplicities of an eigen value and apply the basic diagonalization result.
MTH-364: **Ordinary and** **Partial** **Differential** **Equations**	• Learn to find solutions of exact equations and various types. • Learn about second order linear differential equations. • Find power series solutions of differential equations. • Form partial differential equations by eliminating the arbitrary constants and functions, find different types of solutions like complete integral and general integral. Solve Lagrange's equation.
MTH-365: (A) **Optimization** **Techniques**	• Formulate and model a linear programming problem from a word problem and solve them graphically in 2 dimensions, while employing some convex analysis. • Place a Primal linear programming problem into standard form and use the Simplex Method to solve it. • Solve Transportation problem and Assignment problem. • Understand the concept of Game theory.
MTH-366: (B) **Differential** **Geometry**	• Understand the concept of Curves in Spaces. • Understand Osculating plane & Sphere. • Learn the concept of Envelop and Developable Surfaces.

Job opportunities for B.Sc. (Mathematics) students
- Understand the foundations of Mathematics.
- Be able to perform basic computations in Higher Mathematics
- Be able to write and understand basic proofs
- Develop and maintain problem solving skills
- Use mathematical ideas to model real-world problems
- Acquire knowledge of the History of Mathematics
- Be able to communicate mathematical ideas with others
- Students are trained in an effective manner to attend the competitive exams in order to brighten their future