Postgraduate Department of Mathematics

M.Sc. Mathematics

Programme Outcomes

PO1	Acquire a deep sense of Mathematical, Logical and Analytical thinking
PO2	Create a strong base in theoretical methodologies
PO3	Explore new areas in applications of Mathematics.
PO4	Generate research aptitude and culture that leads to new theories.
PO5	Ability to create mathematical models of real world situations and finding sustainable solutions.
PO6	Develop scientific temper and integrity that ensures possible contributions to the subject
PO7	Become intellectually competent and to become a human being committed to development of society

Programme Specific Outcomes

PSO1	Acquire real insight into Advanced Mathematics.
PSO2	Build up a strong foundation in classical areas like Analysis, Abstract Algebra, and Measure theory.
PSO3	Create interest and confidence to pursue higher studies in Mathematics.
PSO4	Inculcate research aptitude among students.
PSO5	Understand different areas of Applied Mathematics.
PSO6	Develop Mathematical models of real-world problems and their solutions.

Course Outcomes

SEMESTER 1				
1	ME010101	**Abstract Algebra**	CO1	Analyze the structure of finitely generated abelian groups and factor groups.
			CO2	Apply Group Theory to problems in Combinatorics and other areas.
			CO3	Apply Sylow's theorems and isomorphism theorems.
			CO4	Apply the concepts of rings and ideals in polynomial factorization.
2	ME010102	**Linear Algebra**	CO1	Analyze the theory of Vector spaces
			CO2	Understand the algebra of linear transformations and linear functionals.
			CO3	Apply the properties of determinants
			CO4	Apply elementary canonical forms, characteristic values and annihilating polynomials.
3	ME010103	**Basic Topology**	CO1	Understand various types of topological spaces.
			CO2	Analyze topological spaces using some basic concepts like neighborhoods, interiors, accumulation points and continuity.
			CO3	Applying the concept of connectedness in various topological spaces
			CO4	Understand the hierarchy of separation axioms.
4	ME010104	**Real Analysis**	CO1	Analyze functions of bounded variation and rectifiable curves.
			CO2	Evaluate Riemann - Stieltjes integrability of

				functions
			CO3	Evaluate uniform convergence of Sequence and Series of Functions
			CO4	Analyze some special functions of real variables
5	ME010105	**Graph Theory**	CO1	Understand basic concepts and properties of graphs.
			CO2	Apply the concept of Connectivity and theorems on Trees to solve everyday life problems.
			CO3	Analyze vertex coloring and face coloring.
			CO4	Analyze plane graphs and Dual of plane graphs.
SEMESTER 2				
6	ME010201	**Advanced Abstract Algebra**	CO1	Apply the concepts of extension fields to geometric constructions.
			CO2	Apply the concept of division algorithm in integral domains.
			CO3	Apply field extension to polynomial factorization.
			CO4	Analyze the structure of groups and fields using Galois theory.
7	ME010202	**Advanced Topology**	CO1	Understand and apply the Urysohn Characterization of normality and Tietze Characterization of normality
			CO2	Apply the various topological properties on product spaces.
			CO3	Understand and apply embedding lemma, Tychonoff Embedding and The UrysohnMetrisation Theorem
			CO4	Understanding the concept of Net , its convergence and familiarize the idea of Homotopy of paths.
		Numerical	CO1	Understand Symbols and Symbolic Operations in Python
			CO2	Apply the techniques of differentiation and

8	ME010203	**Analysis with Python**		integration to solve problems
			CO3	Create Program to verify the continuity of a function at a point, area between two curves and finding the length of a curve
			CO4	Apply Gauss Elimination Method, Doolittle's Decomposition Method to solve problems
9	ME010204	**Complex Analysis**	CO1	Understand Riemann Sphere and Stereographic projection
			CO2	Apply theorems on convergence of the power series
			CO3	Analyze problems related to analytic functions in regions, conformal mappings and linear transformations
			CO4	Apply the theory and techniques of complex integration
10	ME010205	**Measure Theory and Integration**	CO1	Evaluate Lebesgue outer measure and Lebesgue measurability of sets
			CO2	Analyze the concept of Lebesgue measurability of functions and Lebesgue Integrals
			CO3	Apply the concepts of Integration over General Measure Space
			CO4	Understand Product measure and related theorems
SEMESTER 3				
11	ME010301	**Advanced Complex Analysis**	CO1	Analyze Harmonic Functions and its basic properties
			CO2	Understand and apply the Mean-Value Property, Poisson's Formula, Schwarz's theorem and the Reflection Principle
			CO3	Understand the Riemann Zeta Function and its properties.
			CO4	Understand the Riemann Mapping Theorem, Boundary behaviour and the Reflection Principle
12	ME010302	**Partial**	CO1	Apply methods of solution for differential equations.

		Differential Equations	CO2	Apply methods of solution for linear and nonlinear partial differential equations.
			CO3	Analyze various types of partial differential equations.
			CO4	Analyze solutions of Laplace equations and apply Logarithmic potential to theory of functions.
13	ME010303	**Multivariate Calculus and Integral Transforms**	CO1	Understand integral transforms and with special focus on Fourier Transforms
			CO2	Analyze differentiability of multivariate functions
			CO3	Apply the concepts of higher order derivatives and finding extrema of functions
			CO4	Understand differentiation in higher dimensions and differential forms
14	ME010304	**Functional Analysis**	CO1	Analyze Normed Spaces and their properties.
			CO2	Analyze Linear Operators, Bounded and Continuous Linear Operators and Linear Functionals
			CO3	Analyze Inner Product Space, Hilbert space and further properties.
			CO4	Understand Zorn's lemma, Hahn-Banach theorem, Hahn-Banach theorem for Complex Vector Spaces and Normed Spaces
15	ME010305	**Optimization Techniques**	CO1	Apply different simplex methods to optimize linear programming problems
			CO2	Evaluate cutting plane method and branch and bound method for optimizing general integer linear programming problems.
			CO3	Apply the concept of Networks in optimization.
			CO4	Apply algorithms to optimize non-linear programming problems.

SEMESTER 4				
16	ME010401	**Spectral Theory**	CO1	Apply category theorem and Uniform Boundedness theorem
			CO2	Analyze Open Mapping Theorem and Closed Graph Theorem
			CO3	Understand compact Linear Operators on Normed spaces and their spectral properties
			CO4	Understand Spectral Properties of Bounded Self adjoint linear operators
17	ME010402	**Analytic Number Theory**	CO1	Understand various arithmetic functions
			CO2	Understand some elementary theorems on the distribution of prime numbers.
			CO3	Applying the concept of congruence by using the Euler-Fermat theorem, the Lagrange's theorem and the Chinese remainder theorem.
			CO4	Analyze the relationship between primitive roots and quadratic residues.

Elective Courses

SEMESTER 4				
1	ME800401	**Differential Geometry**	CO1	Apply the basics of Differential Geometry.
			CO2	Analyze Gauss map, geodesics and parallel transport.
			CO3	Apply the theory of Weingarten map, curvature of plane curves and surfaces, arc length and line

				integrals
			CO4	Understanding the theory of differential geometry in higher dimensions.
2	ME800402	**Algorithmic Graph Theory**	CO1	Evaluate Algorithms and its complexity to develop a feel for the concept of an efficient algorithm.
			CO2	Apply basic properties of trees and their usefulness in algorithmic techniques.
			CO3	Evaluate concepts of Networks in max-flow min-cut algorithm
			CO4	Analyze matchings and factorizations of graphs.
3	ME800403	**Combinatorics**	CO1	Apply algebraic concepts to solve basic problems in real life using permutations and combinations
			CO2	Analyze Ramsey type problems and Ramsey numbers
			CO3	Apply the Generalized Principle of Inclusion and Exclusion to solve real life problems.
			CO4	Understand generating functions and recurrence relations.