Course Outcomes (COs) of M. Sc. Mathematics Programme

COURSE OUTCOMES (COs)

SEMESTER I

ME010101: LINEAR ALGEBRA

CO1 - Identify the basic definitions of Vector spaces, basis and dimension of vector spaces, subspaces and linear transformations.

CO2- Discuss the knowledge of linear functional, dual spaces, double dual spaces and transpose of a linear transformation.

CO3 -Describe basic theorems such as Rank- Nullity theorem and Annihilator theorem.

CO4 - Explain Eigen values and Eigen vectors, Cayley Hamilton Theorem and diagonalizable and triangulable properties of a linear operator.

CO5- Discuss the concept of Hyper spaces and its dimension.

CO6 - Identify the properties of determinants.

ME010102 -ABSTRACT ALGEBRA

CO1 -To use the basic concepts in groups, rings and fields

CO2 -To describe about cyclic groups, normal subgroups and homomorphism

CO3 -To explain about isomorphism theorems and sylows theorems

CO4 -Identifies various applications of sylows theorems

CO5 -To synthesize new ideas in the fields of quotients of an integral domain

CO6 -To describe various properties about rings of polynomials

ME010103 - BASIC TOPOLOGY

CO1- Analyze the transition from metric spaces to topological spaces.

CO2- Investigate whether a given family of subsets is a topology or not.

CO3- To apply the relationship between base and sub base of a topology.

CO4- Discuss various problems related to quotient topology and suggest solutions.

CO5- Explain the concept of separation axioms.

ME010104 - REALANALYSIS

CO 1 - Discuss functions of bounded variation and rectifiable curves.

CO 2 - Explain Riemann-Stieljes Integral and its properties.

CO 3 - Describe Uniform convergence of sequence and series of functions.

CO 4 - Describe some special functions like exponential function and logarithmic.

CO 5 - Equips the students to abstract thinking.

ME010105- GRAPH THEORY

CO1- To discuss the basic definitions namely, graph, cut vertex, bridge, block and Automorphism group of a graph.

CO2 – Explain the properties of trees and connectivity.

CO3 - Identify Eulerian graphs and apply results to identify Hamiltonian graphs.

CO4 – To describe the concepts Planarity including Euler identity, non-planarity of celebrated graphs and its practical applications.

CO5 – Explain major theorems and inventions in the history of graph theory and understand how it made the subject to develop to the present state.

SEMESTER II

ME010201: ADVANCED ABSTRACT ALGEBRA

CO1 - Identify extension fields, algebraic extensions, geometric constructions and finite fields.

CO2 - Explain theorems on Unique factorization domains, Euclidean domains, and Gaussian integers

CO3 - Describe the properties of Automorphism of fields, Splitting fields, Separable Extensions and Normal Extensions.

CO4 - Explain the major theorems such as Isomorphism Extension theorem and Splitting field theorems.

CO5 - Discuss the concept of Galois Theory.

CO6- Identify and explain Main Galois Theorem and the illustrations of Galois Theory and Cyclotomic extensions.

ME010202 - ADVANCED TOPOLOGY

CO1 - Understanding of topological spaces and having a grasp on basic results and the separation axioms

CO2 – Explain the product space and its pointwise relevance

CO3 – Understand classical theorems in Topology such as Urysohns lemma and Urysohns metrization theorem.

CO4 – Formulate variations of compactness and explain their equivalence in certain constraints.

CO5 – Differentiate paths in topological spaces according to the homotopy relation among their class

CO6 – Understand the concepts and applications of Topology in medical field such as muscle formulation, simulations and especially in pharmaceutical science fields

ME010203- NUMERICAL ANALYSIS WITH PYTHON 3

CO1 – Able to solve numerical problems both manually and using Python 3 programming.

CO2 – To find the mathematical concepts in algebra and calculus using Python such as root of an equation, limit and derivatives of functions, continuity of a function at a point, etc.

CO3 – To find the area between two curves and the length of a curve easily by programming in Python

CO4– Able to construct programs for finding the roots of equations using bisection method, Newton-Raphson method, etc.

CO5 – Able to apply the techniques of solving set of linear equations using Gauss Elimination method , LU decomposition method, Doolittle method, etc.

CO6 – Able to design programs for numerical methods such as interpolation, curve fitting, numerical integration, etc.

ME010204 - COMPLEX ANALYSIS

CO1 -To explain about the various basic ideas in complex analysis like analytic functions, harmonic functions etc.

CO2 - Identifies various applications of complex integration

CO3 -To explain about different versions of Cauchy theorems

CO4 - To describe Taylor's theorem , types of singularities and Schwarz lemma

CO5 -Apply the concepts to derive the theorems of Cauchy, argument principles etc.

ME010205 -MEASURE THEORY AND INTEGRATION

CO 1 - Explain Lebesgue Measure.

CO 2 - Describe concept of integration of non – negative functions.

CO 3 -Explain Lebesgue's differentiation theorem.

CO 4 –Illustrate signed measure and related theorems.

CO 5 - Explain Measure spaces, Measurable functions.

CO 6 - Explain measurability in a product space and the product measure.

CO 7 - Compare integration and differentiation in the aspect of measure.

SEMESTER III

ME010301 - FUNCTIONAL ANALYSIS

CO1 - Understand how functional analysis uses and unifies ideas from vector spaces and the theory of metrics

CO2 – Explain the fundamental properties of normed spaces and of the transformations between them

CO3 - Understand the notions of dot product and Hilbert space

CO4- Understand and apply fundamental theorems from the theory of normed and Banach spaces, including the Hahn-Banach theorem, the open mapping theorem and the closed graph theorem

CO5 – Apply the spectral theorem to the resolution of integral equations

ME010302 - PARTIAL DIFFERENTIAL EQUATIONS

CO1 – Able to solve linear partial differential equations using various techniques

CO2 – To describe orthogonal trajectories of a system of curves on a surface

CO3 – To apply methods such as Charpit‟s method, Jacobi‟s method, etc.

CO4 – To discuss non linear equations of second order.

CO5 – Able to describe families of equipotential surfaces and relation of logarithmic potential to the theory of functions.

CO6 – Able to solve Laplace equation.

ME010303 - MULTIVARIATE CALCULUS AND INTEGRALTRANSFORMS

CO 1- Transition from elementary analysis to advanced analysis.

CO 2 - Describe other forms of Fourier Series.

CO 3 - Discuss multivariable differential Calculus.

CO 4 - Describe application of complex valued function.

CO 5 - Explain the matrix of a linear transformation.

CO 6 - Explains integrations of differential forms.

ME010304- ADVANCED COMPLEX ANALYSIS

CO1-To examine the concepts of analytic functions, conformal mapping, homology etc.

CO2 -To describe various properties of harmonic functions

CO3 - To illustrate various series representations of analytic function

CO4 - To discuss Riemann zeta functions, Weirstrars zeta functions, p-functions etc.

CO5 - Identify the relevance of Riemann mapping theorem

CO6- Compare and contrast between harmonic and sub harmonic functions.

ME010305-OPTIMIZATION TECHNIQUES

CO1- To describe the basics of Integer programming.
CO2- Apply the concept of LPP to solve problems.
CO3- Evaluate optimal measures related to flow and potentials in networks.
CO4- To describe the basics of game theory.
CO5- To use the basic concepts of Non linear programming for optimization.

SEMESTER IV

ME010401 – SPECTRAL THORY

CO1- To learn the fundamental theorems of normed spaces - the open mapping theorem, closed graph theorem.
CO2-Develop the fundamentals of spectral theory of operators .
CO3- Apply fundamental theorems from the theory of Compact linear operators and their spectrum.
CO4-Able to apply the basic theory of Banach algebras.

ME010402 - ANALYTIC NUMBER THEORY

CO1-Introduce Different types of Arithmetic Functions and Identify their properties.

CO2- Explain Dirichlet product of Arithmetical Functions, and the Average Order of Arithmetical functions.

CO3- Introduce Chebyshev‟s Functions and describes equivalent forms of Prime Number Theorems.

CO4- Discuss and explain congruences, Chinese Reminder Theorem, Lagranges Theorem and its Applications.

CO5- Describe the concept of Quadratic Residues ,Primitive Roots , Legendre‟s symbol , Gauss‟ Lemma and the Quadratic Reciprocity law.

ME800401 - DIFFERENTIAL GEOMETRY

CO 1 - Able to Calculate and work with principal, Gaussian and mean curvatures for surfaces in R^3 and deduce general features of the surface from these functions

CO 2 - Analyse Gauss map, Weingarten map

CO 3 - Discuss geodesics

CO 4 -Explains curvature of surfaces

CO 5 -Identify different types of surfaces

ME800402 - ALGORITHMIC GRAPH THEORY

CO1 – To recall the basic definitions and ideas of graph theory such as vertex, isomorphic graphs, subgraphs, etc.

CO2 – To compose algorithms for searching, sorting, etc.

CO3 – To create graphs in a computer

CO4 – To outline activity digraphs and critical paths.

CO5 – To design algorithms for networks, matchings, etc.

ME800403 - COMBINATORICS

CO1 – To differentiate between basic counting principles and apply them to solve practical problems of counting

CO2 – To design solution to logical questions of practical importance

CO3 – To illustrate the existence of certain true observations regarding societal problems

CO4 – To justify the need of application of generalized principle of inclusion and exclusion in solving practical problems

CO5 – To examine end explain the use of recurrence relation and generating functions in complex counting problems