Program: M.Sc. Mathematics

Program Specific Outcomes

PO1. Professionally inclined Mathematics educators who have sound knowledge of subject matter and specialized in constructivist & alternate pedagogy.

PO2. Develop need based Mathematics teaching-learning resources.

PO3. Contribute as trained work force to provide teaching-learning support to schools.

PO4. Contribute as researchers in ploy making, curriculum design and in evaluation reforms to raise the standard of Mathematics Education.

PO5. Understand mathematics education as an academic and research field.

PO6. Communicate mathematical ideas with clarity and coherence, both written and verbally.

PO7. Apply knowledge of Mathematics, in all the fields of learning including higher research and its extensions.

PO8. Innovate, invent and solve complex mathematical problems using the knowledge of pure and applied mathematics.

PO9. Crack lectureship and fellowship exams approved by UGC like CSIR – NET and SET.

PO10. Work effectively as an individual, and also as a member or leader in multi-linguistic and multi-disciplinary teams.

Course Outcomes

Semester-1

Course: Algebra-I

CO1.Demonstrate knowledge of group homomorphism, isomorphism and automorphisim.

CO2.Derive and apply the First Isomorphism Theorem.

CO3. Demonstrate knowledge of conjugates, the Class Equation and Sylow theorems.

CO4.Derive and apply Sylow Theorems.

CO5. Solvable groups and associated properties, finite abelian groups.

CO6. To simplify algebraic expressions, using the commutative, associative and Distributive properties

Course: Mathematical Analysis

CO1. Describe fundamental properties of the real numbers that lead to the formal development of mathematical analysis.

CO2. Construct rigorous mathematical proofs of basic results in Mathematical Analysis.

CO3. Appreciate how abstract ideas and regions methods in mathematical analysis can be applied to important practical problems

CO4. After completing this subject, students will understand the fundamentals of measure theory and be acquainted with the proofs of the fundamental theorems underlying the theory of integration.

CO5. Introduce the concept of Lebesgue measure for bounded subsets of Real numbers. This concept of Lebesgue measure is later used in developing the theory of (Lebesgue) integration which gives stronger (and better) results as compared to the theory of Riemann integration.

Course: Topology-I

CO1. Understand to construct topological spaces from metric spaces and using general properties of neighborhoods, open sets, close sets, basis and sub-basis.

CO2. Apply the properties of open sets, close sets, interior points, accumulation points and derived sets in deriving the proofs of various theorems.

CO3. To understand the concepts of countable spaces and separable spaces.

CO4. Understand the concepts and properties of the compact and connected topological spaces.

Course: Differential Geometry

CO1.The student will be able to compute quantities of geometric interest such as curvature, as well as develop a facility to compute in various specialized systems, such as semi geodesic coordinates or ones representing asymptotic lines or principal curvatures.

CO 2. The student will also be introduced to the method of the moving frame and overdetermined systems of differential equations as they arise in surface theory.

CO3. Students will start being able to develop arguments in the geometric description of curves and surfaces in order to establish basic properties of geodesics, parallel transport, evolutes, minimal surfaces.

CO4: students will able to learn about the theory of surfaces, tangent, normal as well as orientability.

CO5: Students will learn from this 1st and 2nd fundamental form, Euler's formula and Rodrique Formula

CO6: Students will able to learn the concept of Gaussian Curvature and Pseudosphere.

Course: Linear Programming

CO1: Define basic feasible solutions, Slack and Surplus variable.

CO2. Explain simplex method, Big-M method and two phase method

CO3.Interpret dual and dual simplex method.

CO4.Define transportation problem.

CO5.Find a basic feasible solution to the transportation problem by using Northwest corner rule, Vogel's approximation method.

CO6.Apply Modi method to solve transportation problem.

CO7.Illustrate Assignment problem and Travelling salesman problem.

Course: Introduction to Computer and Programming Using C

CO1. Recognize and understand the purpose of basic computer components

CO2. Implement of simple 'C' program, data types and operators and console I/O function

CO3. Understand decision control statements, loop control statements and case control structures.

CO4. Understand the declaration and implementation of arrays, pointers, functions and structures.

CO5. To understand the file operations, character I/O, String I/O, file pointers and importance of pre-processor directives.

Semester-II

Course: Algebra-II (Rings and Modules)

CO1. Solving polynomial equations using formulas for roots

CO2. How to test if a polynomial is irreducible Finite Field (Galois Fields)

CO3. Applying the concept of a field extension to various mathematical problems including geometric constructions and perfect division of a circle into n parts.

Course: Topology-II

CO1. Student will understand the regular,completely regular spaces and T2 spaces

CO2. Student will understand urysohns lemma and the tietze extension theorem

CO3. Student will undertand the product of first countable,regular , completely regular spaces and compactification

CO4. Student will learn filter base,convergence and clustering,filter characterization of closure

CO5. Student will understand filter characterization of compactness, tychonoff theorem and identification topology ,map

CO6. Student will learn transitive spaces,quotient spaces and Functors,duality.homotopy as congruence in top

Course: Differential Equations-I

CO1. Learn how the differential equations are used to study various physical problems such as mass attached to spring and electric circuit problem etc.

CO2. Understand the Sturm-Liouville problem and analyze stability of linear and non-linear systems.

CO3. Determine the solutions of linear PDE's of second with constant coefficients.

CO4. Classify second order PDE and solve standard PDE using separation of variable method

Course: Functional Analysis

CO1. Concept of normed linear spaces and inner product spaces

CO2. Concept of the dual space of a normed linear space.

CO3. Concept of the spectrum of a bounded linear operator

CO4. Concept of compact, self-adjoint and normal operators.

Course: Complex Analysis

CO1. Represent complex numbers algebraically and geometrically,

CO2. Understand about the Cauchy-Riemann equations, analytic functions, entire functions including the fundamental theorem of algebra,

CO3. Evaluate complex contour integrals and apply the cauchy integral theorem in its various versions, and the cauchy integral formula,

CO4. Represent functions as Taylor and Laurent series, classify singularities and poles, find residues and evaluate complex integrals using the residue theorem' and understand the conformal mapping

Semester III

Course: Differentiable Manifolds

CO1: The candidate will be able to manipulate with ease the basic operations on tangent vectors, differential forms and tensors both in a local coordinate description and a global coordinate-free one.

CO2: Students will able to learn about Differentiable Map , tangent Vector , Normal Vector and Normal Space.

CO3: Students will learn the concept of Lie Bracket and Properties of lie bracket

CO4: Student will able to learn the concept of Lie derivative and some of its main properties.

Course: Field Theory

CO1. Explain the fundamental concepts of field extensions and Galois theory and their role in modern mathematics and applied contexts

CO2. Demonstrate accurate and efficient use of field extensions and Galois theory

CO3. Demonstrate capacity for mathematical reasoning through analyzing, proving and explaining concepts from field extensions and Galois theory.

CO4. Learn about algebraic and transcendental elements

Course: Optimization Techniques-I

CO1: Understand and apply the concept of optimality criteria for various type of

CO2. Optimization problems

CO3.Solve various constrained and unconstrained problems in single variable as well as multivariable;

CO4. Apply the methods of optimization in real life situation.

CO5.Identify strategic situations and represent them as games

CO6. Solve simple games using various techniques

CO7. Analyze economic situations using game theoretic techniques

Course: Fuzzy Sets and Applications

CO1: Be able to distinguish between the crisp set and fuzzy set concepts through the learned differences between the crisp set characteristic function and the fuzzy set membership function.

CO2. Be able to drawa parallelism between crisp set operations and fuzzy set operations through the use of characteristic and membership functions respectively.

CO3. Decide the difference between crips set and fuzzy set theory.

CO4. get theory of the statistics fuzzy logic theory together.

CO5. Understand the concept of fuzziness involved in various systems and fuzzy set theory.

CO6. Analyze the application of fuzzy logic control to real time systems.

Course: Category Theory-I

CO1.Students will have developed a thorough understanding of the basic concepts and methods of category theory.

CO2. They will be able to work with commutative diagrams, naturality and universality properties, and to apply categorical ideas and methods in a wide range of areas of mathematics.

CO3. Student understand about who we work om object and arrows by diagrams.

CO4. Student understand about the functor, category generated by graphs.

CO5. Student understand duality.

Course: Numerical Analysis-I

CO1. Student will able to solve differential equations using numerical methods as Tayler's series, Euler's method, Improved Euler method,Modified Euler method, and Runge-Kutta methods

CO2. Student will learn Predictor Corrector methods. Stability and convergence of Runge-Kutta and Predictor Corrector Methods

CO3. Student will learn Explicit and Implicit schemes for solution of one dimensional parabolic equations and also study Crank-Nicolson, Du fort and Frankel schemes for one dimension equations.

CO4. student will able to find compatibility, stability and convergence of the above methods and also study Peaceman-Rachford A.D.I. scheme for two dimensional equations.

CO5. Student will learn Finite difference replacement and reduction to block tridiagonal form and its solution; DIrichlet and Neumann boundary conditions in elliptic equations

CO7. Students will able to solve Hyperbolic equations using finite difference methods on rectangular and characteristics grids and their stability

Semester- IV

Course: Theory of Linear Operators

CO1: Spectral theory in normed linear spaces and also learn the Spectral properties of bounded linear operator.

CO2: They will be able to find spectral radius of bounded linear operator on a complex Banach space and General properties of compact linear operators.

CO3: They will learn Spectral properties of compact linear operators on normed space and will study Fredholm type theorems and Fredholm alternative theorems.

CO4: They will learn Spectral properties of bounded self-adjoint linear operators on a complex Hilbert space.

CO5: They will understand the concept of Positive operators and will also study some useful theorems like Monotone sequence theorem for bounded self-adjoint operators on a complex Hilbertspace.

CO6: They will understand the concept of Spectral family of a bounded self-adjoint linear operator and its properties

Course: Algebraic Coding Theory

CO1. Learn about basic techniques of algebraic coding theory like matrix encoding, polynomial encoding, and decoding by coset leaders etc.

CO2. Different types of codes like linear, BCH, cyclic and MDS codes.

CO3. Learn how algebraic coding theory is applicable in real world problems.

Course: Commutative Algebra

CO1: Students will learn the concept of Nil radical and Jacobson radical of Ring and will be able to apply different operations on ideals.

CO2: They will be able to find Extension and Contraction of Ideals and learn the concept of Zairiski Topology.

CO3: Students will learn about Exact sequence of Modules and Tensor product of modules also learn the concept of Restriction, Extension of Scalars and Tensor product of Algebras.

CO4: Students will learn about Rings and Modules of Fractions and study the Local properties of Modules and Extended and Contracted ideals in rings of Fractions

CO5: They will be able to find Primary decomposition of ideals and will be able to explain Primary ideals, Decomposable Ideals.

Course: Operation Research

CO1. Learn the constructions of networks of a project and optimal scheduling using CPM and PERT.

CO2. Learn the concept of inventory theory and its models.

CO3. Learn the concept of queuing system and its models

Course: Mathematical Methods

CO1. Laplace Transformation to solve initial and boundary value problems.;

CO2. To learn Fourier transformation and their applications to relevant problems.;

CO3. Find solutions of linear integral equations of first and second type (Volterra and Fredhlom)

CO4. Understand theory of calculus of variations to solve initial and boundary value problems.

Course: Analytic Number Theory

CO1. Basic congruence results and Quadratic reciprocity

CO2. Diophantine approximation and transcendental numbers.

CO3. Arithmetical functions and Distribution of primes.