

**DEPARTMENT OF  
MATHEMATICS  
P.G.**

# **DEPARTMENT OF MATHEMATICS**

## **Outcome Based Education(OBE)**

**Programme Code: OPM**

**Programme Name: M.Sc. Mathematics**

### **Programme Outcomes**

1. After completing 2 years of M.Sc., program, students obtain knowledge in pure and allied Mathematics.
2. The Mathematical curriculum offers number of practical exposures which equips the students to face the modern challenges in Mathematics.
3. The PG students after the completion of the course will gain knowledge in preparing themselves for CSIR-NET / SET examination.

### **Programme Specific Outcomes**

1. Students enable to apply the concept of statistics, Operation Research and Numerical Analysis in real life problems.
2. Number theory, Fuzzy sets and Fuzzy logic enable the students to face the real time applications.
3. To assimilate complex mathematical idea and arguments.
4. To improve own learning and performance.

# Course Outcomes

## Outcome Based Education(OBE)

### SEMESTER - I

**Subject Code: 21OPM11**

**Course Name: ABSTRACT ALGEBRA**

Upon the Completion of the course, the students will be able to

1. Analyze counting principle and Sylow's theorem and apply them for describing structures of finite groups.
2. Describe polynomial rings and other forms of polynomial rings.
3. Derive and apply Gauss lemma and Eisenstein criterion for irreducibility of polynomials.
4. Learn fundamental theorem of Galois Theory and related results.
5. Understand solvability by radicals and know the application of Galois Theory.

**Subject Code: 21OPM12**

**Course Name: REAL ANALYSIS**

Upon the completion of the course, the students will be able to,

1. Know how continuity of derivatives are generalized from real line
2. Determine the Riemann-Stieltjes integrability of a function, prove a selection of theorems and concerning integration.
3. Illustrate the effect of uniform convergence in the limit function with respect to continuity, differentiability and integrability.
4. To be able to differentiate and integrate power series to obtain new ways to represent functions.
5. To be able to understand the concept of integration of differential forms.

**Subject Code: 21OPM13**

**Course Name: DIFFERENTIAL EQUATION**

Upon the completion of the course, the students will be able to

1. Obtain the solutions of second order homogeneous and non-homogeneous linear differential equation with constant coefficients and understand the utility of Wronskian, linear independence and linear independence solutions.
2. Understand the concepts regular singular points and solve the Bessel equation.
3. Understand the concept of successive approximation, the Lipschitz condition and prove local and Non-local existence theorems.
4. Classify first order partial differential equations and their solutions and solve those using different methods.

5. Solve the first order linear and nonlinear PDE's by using charpits and Jacobi's method respectively.

**Subject Code: 21OPM14**

**Course Name: DIFFERENTIAL GEOMETRY**

Upon the completion of the course, the students will be able to

1. Understand the curvature and torsion of a space curve.
2. Understand the idea of surface of revolution.
3. Illustrate Geodesics on Curves.
4. Identifying the concept of principal curvature and lines of curvature.
5. Demonstrate the concept of developable and minimal surface.

**Subject Code: 21OPME1A**

**Course Name: NUMBER THEORY AND CRYPTOGRAPHY**

Upon the completion of the course, the students will be able to

1. Understand the properties of divisibility and congruence.
2. Use arithmetic functions in area of mathematics
3. Understand and use the theorems, Chinese remainder theorem and Lagrange's theorem.
4. Know the applications of reciprocity law and Diophantine equation.
5. Apply elementary number theory concepts in cryptography.

**Subject Code: 21OPME1B**

**Course Name: FLUID DYNAMICS**

Upon the completion of the course, the students will be able to

1. Describe the principles of motion for fluids.
2. Formulate the motion of fluid element.
3. Use the dimensional analysis and derive dimensional numbers.
4. Understanding of thermo dynamics properties and processes.
5. Be able to analyze shock waves.

**Subject Code: Subject Code: 21OPMNM1**

**Course Name: TEACHING & RESEARCH APTITUDE PAPER –I**

Upon the completion of the course, the students will be able to

1. Able to do verbal reasoning problems.
2. Able to do non verbal reasoning problems
3. Understand and practice assertions and presumption problems.
4. Understand and practice classification of figures and Venn diagram.
5. Able to do critical thinking and decision making ability

## SEMESTER - II

**Subject Code: 21OPM21**

**Course Name: LINEAR ALGEBRA**

Upon the completion of the course, the students will be able to

1. Understand the relationship between a linear transformation and its matrix representation.
2. Understand the idea of algebra of polynomials.
3. Understand the concept of Determinants and matrix with various conditions.
4. Decompose a vector space into a sum of invariant subspaces and a linear transformation into a direct sum of induced operators.
5. Compute the cyclic subspace generators by a vector and to construct the rational and Jordan form of linear transformation.

**Subject Code: 21OPM22**

**Course Name: MEASURE AND INTEGRATION**

Upon the completion of the course, the students will be able to

1. Understand and analyze outer measure and measurable sets.
2. Be able to understand, the requirement and the concept of the Lebesgue integral along its properties.
3. Be able to extend the concept of outer measure in an abstract space and integration with respect to a measure.
4. Be able to learn and apply Holder and Minkowski inequalities in  $L_p$ -spaces.
5. Do decomposition

**Subject Code: 21OPM23**

**Course Name: GRAPH THEORY WITH APPLICATIONS**

Upon the completion of the course, the students will be able to,

1. Examine the Graphs and Subgraphs.
2. Understand the Connectivity
3. Investigating the relationship between Euler Tours and Hamilton Cycles.
4. Explain the Directed Graphs.
5. Compute the Analysis of Networks.

**Subject Code: 21OPM24**

**Course Name: ADVANCED STATISTICS-1**

Upon the completion of the course, the students will be able to

1. Investigating the relationship between Probability and Distributions.
2. Identify the multivariate Distributions.
3. Resolve the test of some special distributions.
4. Analyze the concept of distributions of functions of Random variables.
5. Apply knowledge to the limiting distributions

**Subject Code: 21OPME2A**

**Course Name: FUZZY SETS AND LOGIC**

Upon the completion of the course, the students will be able to

1. Understand to Examine the Basic Concepts of Crisp sets and Fuzzy sets
2. Describe Fuzzy Operation
3. Understand the concept of Fuzzy Arithmetic
4. Determine the difference between Crisp and Fuzzy Relation.
5. Use Fuzzy Relation as tools to Visualize and Simplify

**Subject Code: 21OPME2B**

**Course Name: AUTOMATA THEORY AND FORMAL LANGUAGES**

Upon the completion of the course, the students will be able to

1. Understanding the basic properties of formal languages.
2. Utilize the two way finite Automata.
3. Analyze the properties of regular sets.
4. Present the context free grammars.
5. Build the algorithm of DFA's

**Subject Code: 21OPMNM2**

**Course Name: TEACHING & RESEARCH APTITUDE PAPER – II**

Upon the completion of the course, the students will be able to

1. Understand the concept of Data Interpretations.
2. Classify the interpretations of data.
3. Learn the Information and Communication Technology.
4. Identify the classification of Structure of Modern Computer.
5. To know about the value Education.

# Non-Outcome Based Education

## SEMESTER - III

**Subject Code: 17PM31**

**Course Name: ADVANCED STATISTICS**

Upon the completion of the course, the students will be able to

1. Recognize the binomial, Poisson, geometric, hyper geometric probability distribution and apply it appropriately.
2. Classify discrete, continuous word problems by their distributions.
3. Recognize and understand continuous, uniform, exponential probability density functions in general and central limit theorem problems normal probability distribution and apply it appropriately.

**Subject Code: 17PM32**

**Course Name: COMPLEX ANALYSIS**

Upon the completion of the course, the students will be able to

1. Analyze Power series to construct the function.
2. Apply Cauchy integral theorem and also Laurent's series about isolated singularities.
3. Understand a sequence of analytic function and its application.

**Subject Code: 17PM33**

**Course Name: MECHANICS**

Upon the completion of the course, the students will to able to

1. Describe behavior related to D'Alembert's Principle, Lagrange's equation and Hamilton's Principle
2. Apply the extension of Hamilton's principle conservation theorem and symmetry properties.
3. Solve reduction to the equivalent one body problem and the equivalent one dimensional problem and To know how to find the solution of the Kepler's problem.

**Subject Code: 17PM34**

**Course Name: TOPOLOGY**

Upon the completion of the course, the students will be able to

1. Analyze topology on a space is determined by the collection of open sets, closed sets or by a basis of neighbourhoods at each point.
2. Understand the ideas of connected spaces and compact spaces.

3. Learn a Metric space to be Complete, Urysohn lemma and Metrizable spaces.

**Subject Code: 17PME3A**

**Course Name: FUZZY SETS & LOGIC**

Upon the completion of the course, the students will be able to

1. Learn the concepts of crisp sets and fuzzy sets and apply the fuzzy logic in real life application.
2. Analyze difference between crisp set and fuzzy set theory.
3. Know fuzzy relations and understand the concept of Compatibility or tolerance relations, orderings.

**Subject Code: 17PME3B**

**Course Name: STOCHASTIC PROCESSES**

Upon the completion of the course, the students will be able to

1. Analyze generating function and classification of distribution
2. Acquire knowledge on Markov chain and non homogeneous chains
3. Understand the poisson process and birth death process

### SEMESTER - I

**Subject Code: 17PM41**

**Course Name: ADVANCED TOPOLOGY**

Upon the completion of the course, the students will be able to

1. Gain knowledge of the local compactness.
2. Analyze properties of local finiteness.
3. Understand Baire Spaces, point wise and compact convergent.

**Subject Code: 17PM42**

**Course Name: COMBINATORIAL MATHEMATICS**

Upon the completion of the course, the students will be able to

1. Describe the rules of sum and product for permutation and combination with examples.
2. Discuss the enumerators for permutation and Recurrence relation.
3. Derive the theorem for Polya's theory of counting of function and to have the knowledge about orthogonal latin squares.

**Subject Code: 17PM43**

**Course Name: FUNCTIONAL ANALYSIS**

Upon the completion of the course, the students will be able to

1. Identify duals of inner product space and Banach space.
2. Understand the notion of orthogonal complement and orthogonal sets.



3. Explain main theorem for normed spaces and topological spaces.

**Subject Code: 17PM44**

**Course Name: OPERATIONS RESEARCH**

Upon the completion of the course, the students will be able to

1. Develop mathematical models associated with network flows and related real life applications.
2. Perform Critical analysis of project schedule and analyzing the cost-time trade-offs in the context of a project network.
3. Comprehend several non-linear programming algorithms such as, separable programming algorithm, quadratic programming algorithm, geometric programming algorithm and queuing system

**Subject Code: 17PMR**

**Course Name: PROJECT**

Upon the completion of the course, the students will be able to

1. Apply knowledge of Mathematics, in all the fields of learning including higher research and its extensions.
2. Innovate, invent and solve complex mathematical problems using the knowledge of pure and applied mathematics.
3. Explain the knowledge of contemporary issues in the field of Mathematics and applied sciences. Work effectively as an individual, and also as a member or leader in multi-linguistic and multi-disciplinary teams.

## Course Outcomes

### Outcome Based Education(OBE)

**Programme Code: OMC**

**Programme Name: MCA**

**Subject Code: 21OMC11**

**Course Name: MATHEMATICAL FOUNDATION OF COMPUTER APPLICATION**

Upon the completion of the course, the students will be able to,

1. Understand the basic principles of sets and operation.
2. Verify the connectness of argument using logical connectives.
3. To understand lattices an algebraic structure. Perform minimization of Boolean functions.
4. Demonstrate the ability to solve problems using discrete probability.
5. Use graphs and trees as tools to visualize and simplify situations

**Subject Code: 21OMC31**

**Course Name: OPTIMIZATION TECHNIQUES**

Upon the completion of the course, the students will be able to,

1. Remember the concept of linear programming problem using Simplex Method.
2. Make out the rules of game theory for solving games and summarize the concept of inventory control.
3. Apply the notions of linear programming in solving transportation problems and Assignment Problem.