RAYAT SHIKSHAN SANSTHA'S

SHREE SADGURU GANGAGEER MAHARAJ SCINCE, GAUTAM ARTS & SANJIVANI COMMERCE COLLEGE, KOPARGAON DIST AHMEDNAGAR

Program Outcomes, Program Specific Outcomes, Course Outcomes

Department of Mathematics

Program outcome : M.Sc. (Mathematics)	
PO1.	• Inculcate critical thinking to carry out scientific investigation objectively without being biased with preconceived notions.
PO2.	• Equip the student with skills to analyze problems, formulate an hypothesis, evaluate and validate results, and draw reasonable conclusions thereof.
PO3.	• Imbibe effective scientific and/or technical communication in both oral and writing.
PO4.	• Continue to acquire relevant knowledge and skills appropriate to professional activities and demonstrate highest standards of ethical issues in mathematical sciences

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Program Outcomes, Program Specific Outcomes, Course Outcomes

Department of Mathematics

Program Specific outcome : M.Sc. (Mathematics)	
PSO1	• Understanding of the fundamental axioms in mathematics and capability of developing ideas based on them.
PSO2	• Inculcate mathematical reasoning.
PSO3	• Prepare and motivate students for research studies in mathematics and related fields
PSO4	• Provide knowledge of a wide range of mathematical techniques and application of mathematical methods/tools in other scientific and engineering domains.
PSO5	• Nurture problem solving skills, thinking, creativity through assignments, project work
PSO5	• Assist students in preparing (personal guidance, books) for competitive exams e.g.NET, GATE, etc.

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Course Outcomes of MSc (Mathematics)
Department of Mathematics

Class	Course title	Outcome
M.Sc. I (I)	Complex Analysis	• Analyze sequence and series of analytic functions and types of convergence • Represent complex numbers pictorially and geometrically • Apply concept and consequences of analyticity and C-R- equations • Compute complex contour integrals and applying the Cauchy's integral various versions. • Understand geometric interpretations of complex numbers
	General Topology	• Understand various basic topologies • Understand the core ideas of countability and uncountability • Understand the theory of compactness, connectedness and completeness • Understand the heridatory topological properties • Understand the thms on normal spaces, regular spaces and relation between them
	Linear Algebra	• Use the concept of basis and dimension of vector spaces linear dependence and linear independence to solve problems. • Apply the properties of linear transformations to linearity of transformations, kernel and rank of linear transformations, inverse transformations to solve the problems of matrix transformations, change of basis. • Solving linear equations, working with matrices, in particular eigenvalues and eigenvectors, and applying the techniques to real life problems like graph theory, computer science, Electronics and applied Mathematics

Class	Course title	Outcome
M.Sc. I	Ring Theory	• Analyze and demonstrate examples of ideals and quotient rings • Use the concept of isomorphism and homomorphism for rings • Assess properties implied by the definitions of rings and modules • Confidently apply algebraic concept
	Partial Differential Equations	• Solve examples on Charpit‟s and Jacobi‟s method • Solve wave equations, heat equations, boundary value problems, Lapalce equations, Cauchy problem, Dirichlet and Neumann problem for different regions. • Classify the various second order partial differential equations.

Class	Course title	Outcome
M.Sc. I (II)	Complex Analysis	• Understand the basic algebraic properties of complex numbers. • Compute integrals by using Cauchy integral formulae. • Understand the theorems on analytic functions and sufficient conditions for differentiability. • Solve the numerical problems based on Cauchy-Riemann equations. • Identify the convergence of sequences and series.
	General Topology	• Understand various basic topologies. • Understand the core ideas of countability and uncountability. • Understand the theory of compactness, connectedness and completeness. • Understand the heridatory topological properties. • Understand the thms on normal spaces, regular spaces and relation between them.
	Rings and Modules	• Assess properties implied by the definitions of rings and modules. • Generalize the rings on the basis of their binary operations. • Compare two rings on the basis of isomorphism criterion. • Use the concept of isomorphism and homomorphism for rings. • Analyze and demonstrate examples of ideals and quotient rings.
	Numerical Analysis	• The students will not only learn how to use the finite element method, but also how to formulate and code a finite element method for any given set of partial differential equations. Thus, the finite element method is developed as a tool for the numerical solution of partial differential equations, and not confined only to structural mechanics applications the way it is typically taught. • The students will learn how to solve the Ordinary differential equation by various methods. • The students will learn how to find the Integration & Derivative by various methods • The students will learn how to find the roots of the equation by various methods

	Partial Differential Equations	• Solve examples on Charpit's and Jacobi's method • Solve wave equations, heat equations, boundary value problems, Lapalce equations, Cauchy problem, Dirichlet and Neumann problem for different regions. • Classify the various second order partial differential equations. • Know the Families of Equipotential Surfaces.

Class	**Course title**	**Outcome**
M.Sc. II (III)	Combinatorics	• Understand the ideas of permutations and combinations • Understand the addition and multiplication principles for counting • Understand how to apply combinatorial ideas to real life problems • Use generating functions to solve variety of combinatorial problems
	Field Theory	• Understand basic notions in the theory of field extensions • Apply the thms of algebraic extensions, splitting fields, separable and insepa. Extensions to find the various examples of extensions. • Relate the group theory and Galois theory in finding the Galois extension and Galois group. • Understand basic theory of composite extensions, simple extensions and cyclotomic extensions
	Functional Analysis	• Student learns the basics of functional analysis. • They learn to treat the vector spaces which have the additional property of being topological spaces. • Blending of these two structures brings them an exposure to higher mathematics. Important theorems like the Hahn- Banach theorem are taught here. These theorems stand a student in good stead throughout his mathematical life. • The student having seen basic analysis and linear algebra is expected to learn how these topics play a significant role, first in multi-variate calculus which then naturally leads to calculus on manifolds. • The intimate relationship between analysis and geometry should become apparent at the end of this course.

M.Sc. II	Topics in Analysis -I	• Explain the Fundamental concepts of the Theory of Integral Equation. • Distinguish the difference between Differential Equations and Integral Equations,singular integral equation. Convert he differential equation into an integral equation and vice versa. • Solve the problems on Fredholm integral equations by Adomian decomposition memthod, direct computation method and on Volterra integral equations equations by Adomian decomposition methodseries solution method successive approximation method. • Find the solution of the problems on Fredholm Integro differential equation, Volterra Integro differential equation. • Learn the methods and properties of Laplace transform and Inverse Laplace Transform; apply them to solve Linear Differential equations. • Apply the fundamental concepts of Fourier transform,Fourier Sine Transform, Fourier Cosine Transform to Evaluate Improper Integrals.
	Topics in Algebra	• Understand various basic topologies • Understand the core ideas of countability and uncountability • Understand the theory of compactness, connectednessand completeness • Understand the heridatory topological properties • Understand the thms on normal spaces, regular spaces andrelation between them

Class	Course title	Outcome
M.Sc. II (IV)	Number Theory	• Solve various problems on properties of integers and use the basic concepts of divisibility, congruence and their applications in basic algebra. • The students are able to Free Open Learn course, Introduction to number theory, as well as becoming proficient at modular arithmetic, you should find that you are increasingly able to communicate mathematical ideas and apply your knowledge and understanding to mathematics in everyday life, in particular to applications, such as the prevention of errors in ID numbers
	Differential Geometry	• Recognize different types of graphs and its level sets • Understand basic notions related vector fields, tangentspaces and surfaces • Understand core ideas of orientation, geodesics, paralleltransport, Weingarten map and Curvatures • Solve examples on curvatures, arc lengths and line integrals, curvature of surfaces

M.Sc. II (IV)	Fourier Analysis and Boundary Value Problems	• Find the Fourier series representation of a function of onevariable • Find the solution of Wave equation, Lapalce equation.Heat equation using the fourier series
	Discrete Mathematics	• Understand the language of graphs and model • Understand the use of graphs as model