



Rayat Shikshan Sanstha's

Radhabai Kale Mahila Mahavidyalaya, Ahmednagar

An ISO 9001:2015 Certified College

Affiliated to Savitribai Phule Pune University, Pune (PU/AN/ASC/034)

Programme Outcomes (POs)

Department of Mathematics

Programme Outcomes (Name of the Programme B.Sc.)	
PO1	Gain sound knowledge on fundamental principles and concepts of Mathematics and computing with their applications related to Industrial, Engineering, Biological and Ecological problems.
PO2	Get a relational understanding of mathematical concepts and concerned structures, and should be able to follow the patterns involved, mathematical reasoning.
PO3	Exhibit in depth the analytical and critical thinking to identify, formulate and solve real world problems of science and engineering.
PO4	A student should get adequate exposure to global and local concerns that explore them many aspects of Mathematical Sciences.
PO5	Apply their skills and knowledge, that is, translate information presented verbally into mathematical form, select and use appropriate mathematical formulae or techniques in order to process the information and draw the relevant conclusion.
PO6	Develop written and oral communications skills in order to effectively communicate design, analysis and research results.
PO7	Demonstrate appropriate inter-personal skills to function effectively as an individual, as a member or as a leader of a team and in a multi-disciplinary setting.
PO8	Be capable of undertaking suitable experiments/research methods while solving the real-life problem and would arrive at valid conclusions based on appropriate interpretations of data and experimental results.
PO9	Acquire competent positions in industry and academia as well.



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Programme Specific Outcomes (PSOs) Department of Mathematics

Programme Specific Outcomes (Name of the Programme B.Sc.)	
PSO1	Give the students a sufficient knowledge of fundamental principles, methods and a clear perception of innumerable power of mathematical ideas and tools and know how to use them by modeling, solving and interpreting.
PSO2	To equip the students sufficiently in both analytical and computational skills in Mathematical Sciences.
PSO3	To develop a competitive attitude for building a strong academic - industrial collaboration, with focus on continuous learning skills.
PSO4	Enhancing students overall development and to equip them with mathematical modeling abilities, problem solving skills, creative talent and power of communication necessary for various kinds of employment.
PSO5	Enabling students to develop a positive attitude towards mathematics as an interesting and valuable subject of study.
PSO6	Enabling students to Gauge the hypothesis, theories, techniques and proofs provisionally.



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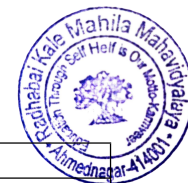
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Course Outcomes (COs) Department of Mathematics

Sr.No.	Class with Semester	Name of the Course	Course Code	Course Outcomes
01	F.Y. Sem.- I	Algebra & Calculus-I	MTS-101	CO1: To know the concept of divisibility in integers.
				CO2: To find Greatest Common Divisor of integers using the Euclidean algorithm
				CO3: To understand the concept of Fermat's theorem and Euler's phi function
				CO4: To understand the method of finding roots of polynomials and relationship between roots and coefficients of a polynomial.
				CO5: To classify real numbers and recognize various properties of real numbers.
				CO6: To understand the concept of limit and continuity.
				CO7: To draw the graphs of algebraic and transcendental functions considering limits and continuity.
				CO8: To apply the concept of limit and continuity for advanced study of different mathematics courses, and in physical, chemical and biological sciences
02	F.Y. Sem.- I	Python-I	SEC-101 MTS	CO1: To write python programs and develop a small application.
				CO2: To develop logic for problem solving.
				CO3: To be familiar about the basic constructs of programming such as data, operations, conditions, loops, functions etc.
				CO4: To be familiar with string and its operation.
				CO5: To develop basic concepts of function and terminology.
				CO6: To determine the methods to create and develop Python programs by utilizing the data structures like lists and tuples.
03	F.Y. Sem.- I	Basic Mathematics-I	OE-101 MTS	CO1: To understand the concepts of numbers and integers and able to develop skills in basic



				<p>operations of integers to cultivate the right understanding and regain numerical aptitude.</p> <p>CO2: To understand concepts of H.C.F. and L.C.M. of numbers, square root and cube Root and ability to apply in real-world problems.</p> <p>CO3: To understand concepts of ratio, proportion, percentage and be able to cultivate the right understanding regaining numerical aptitude.</p> <p>CO4: To understand concepts of average, profit and loss develop a logical approach toward analytical approach to real-world problems</p> <p>CO5: To provide a platform for the students to build the fundamentals of Basic Mathematics for competitive examination preparation strategy</p> <p>CO6: To establish a framework for the students to help acquire the knowledge and expertise necessary to secure employment opportunities in the government sector</p>
04	F.Y. Sem.- II	Algebra & Calculus-II	MTS-151	<p>CO1: Understand the various types of matrices, their properties, and how to convert matrices to echelon form using elementary row operations.</p> <p>CO2: Learn methods to solve systems of linear equations, understand the concept of determinants, evaluate determinants by different methods, and solve problems using properties of determinants.</p> <p>CO3: Apply the concept of matrices and determinant to the problems in chemistry, electronics, cryptography, etc.</p> <p>CO4: Understand differentiation and fundamental theorem in differentiation</p> <p>CO5: Apply Mean Value Theorems and it's applications</p> <p>CO6: Explore the combined application of algebra and calculus to various mathematical problems.</p>
05		Python-II	SEC-151 MTS	<p>CO1: To write python program and develop maps using dictionary</p> <p>CO2: To develop logic for 2D graphics.</p> <p>CO3: Demonstrate the use of Python in mathematics such as matrix algebra</p> <p>CO4: o be familiar about basic math built in functions such as sine, cosine, etc</p> <p>CO5: To be familiar with complex numbers</p> <p>CO6: To write Python programs to handle matrices and vectors using NumPy</p>
06		Applied Mathematics - II	OE-152 MTS	<p>CO1: Create, save and print worksheets</p> <p>CO2: Create formulas</p> <p>CO3: Use functions for SUM, AVERAGE, MIN, and MAX</p>



				CO4: Use the function for IF
				CO5 Format cells using many of the formatting tools
				CO6: Present the Data Graphically.
07	SY Sem-III	Calculus of Several Variables	MT 231	CO1: Sketch graphs and level curves of two variables.
				CO2: Students will be able to differentiable function and differentials.
				CO3: To discuss the chain rule, Homogenous functions and Euler's theorem..
				CO4: Solve problems involving maxima and minima.
08	SY Sem-III	Numerical Methods and Its Applications	MT 232A	CO1: Derive numerical methods for various mathematical operations and tasks, such as interpolation, differentiation, integration
				CO2: Apply numerical methods to obtain approximate solutions to mathematical problems.
				CO3: Students will be able to Taylor's series method, Picard's method and Modified Euler's method
09	SY Sem-III	Mathematics Practical based on MT - 231 and MT - 232	MT 233	CO1: To demonstrates Double, triple Integration of various problems.
				CO2: To discusses the methods like Newton's Raphson Method, Euler's Method, and Bisections method.
				CO3: To solves various equations using Maxima Software.
10	SY Sem-IV	Linear Algebra	MT 241	CO1: Apply the matrix calculus for solving a system of linear equations.
				CO2: Define basic terms and concepts of matrices, vector spaces.
11		Vector Calculus	MT 242A	CO1: To demonstrates Double, triple Integration of various problems.
				CO2: To understand the Vector Fields, Gradient Fields, Line Integral of Vector Fields.
12	SY Sem-IV	Mathematics Practical based on MT - 241 and MT-242	MT 243	CO1: Demonstrate the Linear independent and Linear Dependant vectors.
				CO2: Apply Green's Theorem and Stokes' Theorem to vector fields.
				CO3: To solves various equations using Maxima Software.
13	TY Sem-V	Metric Spaces	MT 351	CO1: Understand the introductory concepts of metric spaces
				CO2: Attain background for advanced courses in real analysis, functional analysis, and topology
				CO3: correlate these concepts to their counter parts in modern analysis by studying examples;



				CO4: Learn to analyze mappings between spaces. CO5: Appreciate the abstractness of the concepts such as open balls, closed balls, compactness, connectedness etc. beyond their geometrical imaginations
14	TY Sem-V	Real Analysis- I	MT 352	CO1: The students to learn the basic facts in logic and set theory . CO2: Recognize bounded, convergent, divergent, Cauchy and monotonic sequences and to calculate their limit superior, limit inferior, and the limit of a bounded sequence. CO3: Learn to define sequence in terms of functions from \mathbb{N} to a subset of \mathbb{R} and to understand several properties of the real line. CO4: Use the ratio, root, alternating series and limit comparison tests for convergence and absolute convergence of an infinite series of real numbers.
15		Group Theory	MT 353	CO1: Recognize the mathematical objects that are groups, and classify them as abelian, cyclic and permutation groups CO2: Explain the significance of the notion of cosets, normal subgroups, and factor groups. CO3: Analyze consequences of Lagrange's theorem CO4: Learn about structure preserving maps between groups and their consequences.
16		Ordinary Differential Equations	MT 354	CO1: Understand the genesis of ordinary differential equations. CO2: To learn various techniques of getting exact solutions of solvable first order differential equations and linear differential equations of higher order. CO3: The concept of a general solution of a linear differential equation of an arbitrary order and learn a few methods to obtain the general solution of such equations.
17		Operations Research	MT 355(A)	CO1: Analyze and solve linear programming models of real-life situations. CO2: The graphical solution of LPP with only two variables, and illustrate the concept of convex set and extreme points. The theory of the simplex method is developed. CO3: The relationships between the primal and dual problems and their solutions with applications to transportation, assignment and two-person zero-sum game problem
18		Machine Learning -I	MT 356(A)	CO1: Gain knowledge about basic concepts of Machine Learning. CO2: Identify machine learning techniques



				<p>suitable for a given problem.</p> <p>CO3: Solve the problem using various machine learning techniques.</p>
19		Programming in Python- I	MT 3511	<p>CO1: The student will be able to explain basic principles of Python programming language.</p> <p>CO2: The student will implement object oriented concepts.</p>
20		LaTeX for Scientific Writing	MT 3511	<p>CO1: Write a simple LaTeX input document based on the article class.</p> <p>CO2: Turn the input document into pdf with the pdflatex program.</p> <p>CO3: Format Words, Lines and Paragraphs.</p> <p>CO4: Understand how to present data using tables.</p>
21	TY Sem-VI	Complex Analysis	MT 361	<p>CO1: Understand the significance of differentiability of complex functions leading to the understanding of Cauchy-Riemann equations.</p>
<p>CO2: The students will be able to represent functions as Taylor, power and Laurent series, classify singularities and poles, find residues and evaluate complex integrals using the residue theorem.</p>				
<p>CO3: Evaluate the contour integrals and understand the role of Cauchy-Goursat theorem and the Cauchy integral formula.</p>				
<p>CO4: Expand some simple functions as their Taylor and Laurent series, classify the nature of singularities, find residues and apply Cauchy Residue theorem to evaluate integrals.</p>				
<p>CO1: The students will be able to properties of Riemann integrable functions, and the applications of the fundamental theorems of integration.</p>				
22		Real Analysis- II	MT 362	<p>CO2: Illustrate the effect of uniform convergence on the limit function with respect to continuity, differentiability, and inerrability.</p> <p>CO3: Recognize the difference between point wise and uniform convergence of a sequence of functions.</p>
23		Ring Theory	MT 363	<p>CO1: The fundamental concept of Rings, Fields, sub rings, integral domains and the corresponding morphisms.</p> <p>CO2: Appreciate the significance of unique factorization in rings and integral domains.</p> <p>CO3: Learn in detail about polynomial rings, fundamental properties of finite field extensions, and classification of finite fields.</p>
24		Partial Differential Equations	MT 364	<p>CO1: Solve linear partial differential equations using various methods and apply these methods in solving some physical problems.</p>



				CO2: Solve Laplace equations using various analytical methods demonstrate uniqueness of solutions of certain kinds of these equations.
				CO3: Understand formulate, classify and transform partial differential equations into canonical form.
25		Optimization Techniques	MT 365(A)	CO1: Understand fundamentals of Network Analysis using CPM and PERT.
				CO2: Solve a sequencing Problem for various jobs and machines.
26		Computational Geometry	MT 366 (B)	CO1: Construct algorithms for simple geometrical problems.
				CO2: Describe and construct basic geometric shapes and concepts by computational means.
				CO3: Characterize invariance properties of Euclidean geometry by groups of transformations.
27		Programming in Python-II	MT 3610	CO1: Demonstrate the use of Python in Mathematics such as operations research and computational Geometry etc.
				CO2: Study graphics and design and implement a program to solve a real world problem.
				CO3: The students will implement the concepts of data with python and database connectivity.
28		Mathematics into LaTeX	MT-3611	CO1: The student will be able to typeset mathematical formulas, use nested list, tabular and array environments.
				CO2: The student will be able to import figures and pictures that are stored in external files.