

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 : B.Sc. (Mathematics)	
PO1	<ul style="list-style-type: none">• Solve and an understanding of concepts in all disciplines of Mathematics
PO2	<ul style="list-style-type: none">• Solve the problem and also think methodically, independently and draw a logical conclusion
PO3	<ul style="list-style-type: none">• Be well grounded in the basic manipulative skills level of algebra, geometry, trigonometry and beginning level calculus
PO4	<ul style="list-style-type: none">• Be able to transmit mathematics ideas both orally and in writing.
PO5	<ul style="list-style-type: none">• Apply the underlying unifying structures of mathematics (i.e. sets, relations and functions, logical structure) and the relationships among them
PO6	<ul style="list-style-type: none">• Gain experience investigating the real world problems and learn to how to apply Mathematical ideas and models to those problems.

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Program Outcomes, Program Specific Outcomes, Course Outcomes
Department of Mathematics

Program Specific outcome : B.Sc. (Mathematics)	
PSO1	<ul style="list-style-type: none">• Think in a critical manner.
PSO2	<ul style="list-style-type: none">• Know when there is a need for information, to be able to identify, locate, evaluate, and effectively use that information for the issue or problem at hand.
PSO3	<ul style="list-style-type: none">• Formulate and develop mathematical arguments in a logical manner
PSO4	<ul style="list-style-type: none">• Acquire good knowledge and understanding in advanced areas of mathematics and statistics, chosen by the student from the given courses.
PSO5	<ul style="list-style-type: none">• Understand, formulate and use quantitative models arising in social science, business and other contexts.

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**Course Outcomes of BSc (Mathematics)
Department of Mathematics**

Class	Course title	Outcome
F.Y.B.Sc. (Paper-I)	Algebra and Geometry	<ul style="list-style-type: none"> • Solve various problems on properties of integers and use the basic concepts of divisibility, congruence and their applications in basic algebra. • Apply factor theorem, remainder theorem to solve problems on polynomials and by using given relations between roots he will find the roots of polynomials • Solve the system of homogeneous and non-homogeneous linear of m equations in n variables by using concept of rank of matrix, finding eigen values and eigen vectors. • Solve the problems of lines in three dimension, planes, spheres, and cylinders and how geometry is related to algebra by using their algebraic equations
F.Y.B.Sc. (Paper-II)	Calculus and Differential Equations	<ul style="list-style-type: none"> • Identify algebraic and order properties of real numbers. • Identify and apply the function properties of real numbers system such as the completeness property • Verify the values of limit of a function at a point using the definition of a limit • Students will be familiar with the techniques of integration and differentiation of function with real variables • Identify and apply the intermediate value thm, Mean value thm and L'Hospital's rule • Identify types of differential equations and solve differential equations such as Exact, homogeneous, non-homogeneous, and linear and Bernoulli differential equations etc.

Class	Course title	Outcome
S.Y.B.Sc. (Paper-I) (I)	Multivariable Calculus I	<ul style="list-style-type: none"> • Students learn analysis of multivariable functions, continuity, and differentiability. • learn the concepts of multiple integrals and their application to area and volumes
S.Y.B.Sc. (Paper-II) (I)	Laplace Transforms and Fourier Series	<ul style="list-style-type: none"> • Learn the methods and properties of Laplace transform and Inverse Laplace Transforms, apply them to solve Linear Differential equations. • Apply the fundamental concepts of Fourier series, Fourier Sine series, Fourier Cosine series to find series Representation of irrational numbers.
	Discrete Mathematics	<ul style="list-style-type: none"> • 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
S.Y.B.Sc. (Paper-I) (II)	Linear Algebra	<ul style="list-style-type: none"> • Use the concept of basis and dimension of vector spaces linear dependence and linear independence, to solve problems. • Use the concept of inner product spaces to find norm of vectors, distance between vectors, check the orthogonality of vectors, to find the orthogonal and orthonormal basis. • 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.
S.Y.B.Sc. (Paper-II)	Multivariable Calculus II	<ul style="list-style-type: none"> • Students develop knowledge in the limit, continuity, differentiation of vector functions. • Use the various techniques of solving Integral problems of vector valued functions.

	Numerical Analysis	<ul style="list-style-type: none"> • 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
T.Y.B.Sc. (Paper-I) (I)	Metric Spaces	<ul style="list-style-type: none"> • Learn the basic abstract ideas of analysis • Learn the basic ideas open sets, closed sets, limit point, isolated points, boundary points, subspace, product metric spaces, and apply them to study the nature of sets.
T.Y.B.Sc. (Paper-II)	Real Analysis-I	<ul style="list-style-type: none"> • Learn the theorems on completeness, compactness, connectedness, and use them to solve the problems. • Identify the continuity of a function which is defined on metric spaces, at a given point and identify the set of points on which a function is continuous by using different theorems. • Know sequence and series of real numbers and their convergence and divergence.
T.Y.B.Sc. (Paper-III)	Group Theory	<ul style="list-style-type: none"> • Identify the various algebraic structures with their corresponding binary operations. • Generalize the groups on the basis of their orders, elements, order of elements and group relations • Compare two groups of same orders on the basis of isomorphism Criteria. • Compute the possible subgroups of given group of specific orders and will recognize them.
T.Y.B.Sc. (Paper-IV)	Ordinary Differential Equations	<ul style="list-style-type: none"> • Solve linear differential equations with constant coefficients, non-homogeneous differential equations, system of first order equations, solution of differentialequations by Power series method

T.Y.B.Sc. (Paper-V)	Operations Research	<ul style="list-style-type: none"> • Formulate and model a LPP from a word problem and solve them graphically in 2-D. • Modify a primal problem and use the LPP to identify the new solution • Understand basic notions like feasibility, infeasibility, basic solutions, unbounded solutions etc.
T.Y.B.Sc. (Paper-I) (II)	Complex Analysis	<ul style="list-style-type: none"> • Solve problems on basic concepts of modulus, argument of a complex number, de Moivre's theorem and use them to find roots of an algebraic equation. • Define continuity and differentiability for complex functions • Prove the Cauchy-Riemann equations and apply them to complex functions in order to determine whether a given continuous function is complex differentiable • Evaluate integrals along a path - directly from the definition and also via the Fundamental Theorem of Contour Integration and Cauchy's Theorem, • Compute the Taylor and Laurent expansions of simple functions, determining the nature of the singularities and calculating residues • Prove the Cauchy Residue Theorem and use it to evaluate integrals
T.Y.B.Sc. (Paper-II)	Real Analysis- II	<ul style="list-style-type: none"> • Know convergence of sequence and series of functions, Riemann integrals, Improper integrals and its applications,
T.Y.B.Sc. (Paper- III)	Ring Theory	<ul style="list-style-type: none"> • Assess properties implied by the definitions of rings • Use various canonical types of rings • Analyze and demonstrate examples of ideals and quotient rings • Use the concept of isomorphism and homomorphism for rings
T.Y.B.Sc. (Paper- IV)	Partial Differential Equations	<ul style="list-style-type: none"> • Form the partial differential equations and Solve the problems on Pfaffian differential equations. • Solve the problems on first order and higher degree partial differential equations and its applications.

T.Y.B.Sc. (Paper-V)	Optimization Techniques	<ul style="list-style-type: none"> • Solve the project management related problems by using the concepts of CPM, PERT so as to find out the project completion time • Find the optimal solutions of Game theory problems, optimal solution of two person zero sum game, Solution of mixed strategy games, graphical solution of games, linear programming solution of game. • Solve the problems on Replacement policy after failure, how to process the n jobs on two machines or three machines in minimum time so that the machines remain idle for short time. • Solve the optimization unconstrained the optimization problems and constrained optimization problems of Multivariable functions.
T.Y.B.Sc. (Paper-VI)	Computational Geometry	<ul style="list-style-type: none"> • Design, analyze and develop algorithm and method for solving geometric problems efficiently • Assess theoretical and practical problems that involves geometry • Generalize basic notions of reflection, rotation, projection with real life examples