B.Sc. Mathematics
Program outcomes listed as follows:

1. Understanding of basic concepts, fundamental principles related to various scientific phenomena and their relevance in day to day life.
2. Development of Research Aptitude.
3. Development of Scientific Temper.
4. Critical thinking and creative ability.

COURSE OBJECTIVES & COURSE OUTCOMES-

S.No.	COURSE OBJECTIVES	COURSE OUTCOMES
1.	**MATHEMATICS : B.A./B.SC IST SEMESTER**	
	Paper: Algebra	
	• To introduce to the students different matrix types, operations and related concepts. • To acquaint the students with the application of matrices. • To let the students know about the different methods of solving cubic and biquadratic equations. • To make the students understand about the nature of roots and transformation of equations.	After the completion of the course, students will be able to • Apply the elementary matrix operations to find the rank, inverse and normal form of a matrix. • Find the eigen values and eigen vectors of a matrix. • Use matrices to solve the system of linear homogeneous and non–homogeneous equations. • Apply Cardon's method, Descartes' method and Ferrari's methodto solve cubic and biquadraticequations. • To transform equations and use this concept in solving them. • Apply Descartes' rule of sign to find the nature of roots.
	Paper : Solid Geometry	
	To get basic knowledge about Circle, Cone, Parabola, Hyperbola, Ellipse etc. To Study the concepts & advance topicsrelated to two & three dimensional geometry. 3. To Study the applications of Conics. To Study the application of Sphere, Cone and Cylinder.	After the completion of the course,Students will be able to • Understand geometrical terminology in three dimensional space. • Use geometrical results to determine unknown angles.

	5. To Study about tracing of Conics. 6. To Study about the Conicoid.		• Understand the geometrical meaningof a Plane. • Understand the applications of Sphere, Cone and Cylinder. • Know applications of Conics.
	Subject: Calculus		
	1. Finding whether the equation of functiongiven is differentiable or continuous at aparticular value of x. 2. Understanding the various types of double points i.e. node, cusp and isolated point 3. Using the fact that the derivative is the slope of the tangent line to the curve at a given point. 4. Tracing the curve in cartesian, parametricand polar coordinates. 5. Computing the integral of some functions by depending on other integrals of similar form 6. Calculating definite integrals that involve logarithmic, exponential, parametric functions etc.		After the completion of the course, students will be able to • Understand the concept of continuous functions, classification of discontinuities and differentiability. • Determine asymptotes in Cartesian and polar coordinates. • Apply the concept of symmetry, origin, asymptotes, point of intersection etc. in tracing of curves. • Determine the nature of double points, species of cusps and point of inflexion. • Compute the area bounded by closed curves and surfaces of solids of revolution.
2.	**MATHEMATICS : B.A./B.SC IIND SEMESTER**		
	Paper: Ordinary Differential Equations		

● To introduce to students the basic concepts related to ordinary differential equations. ● To make the students learn about the different types of ordinary differential equations ● . To acquaint the students with different methods of solving the ordinary differential equations	After the completion of the course, students will be able to ● Solve first order differential equations by identifying them as exact equation, Lagrange's equation and Clairaut's equation etc. ● Find the complete solution of linear differential equation with constant coefficients. ● Apply different methods of solving second order linear differential equations. ● Transform the equations by changing the dependent variable / independent variable. ● Solve the simultaneous differential equations.

		Paper: Number Theory and Trigonometry	
		To Study about the concepts of Divisibility, Congruence, Greatest Common Divisor, and prime-factorization etc. To Study about the applications of Fermat's, Wilson's and Chinese Remainder Theorem etc. To Study about the applications of Euler's function and Residue Systems. To Study about the Law of Quadratic Reciprocity and other methods to classify numbers as primitive roots, quadratic residues, and quadratic non-residues. To Evaluate trigonometric and inverse trigonometric functions. To Solve trigonometric equations and applications. To Study about the applications of De Moivre's Theorem.	After the completion of the course, Students will be able to • Understand the concepts of Divisibility, Congruence, Greatest Common Divisor, and prime-factorization etc. • Learn methods and techniques used in number theory. • Understand the applications of Fermat's, Wilson's and Chinese Remainder Theorem etc. • Use mathematical induction and other types of proof writing techniques. • Evaluate trigonometric and inverse trigonometric functions. • Solve trigonometric equations and applications. • Apply and prove trigonometric identities. • Understand the applications of Euler's function and Residue Systems. • Understand the applications of of De Moivre's Theorem.
		Paper: Vector Calculus	
		1. Finding the volume of parallelepiped and tetrahedron using product of three vectors. 2. Dealing with vector functions involving coordinates (x, y, z) of any point in space and time. 3. Applying orthogonal curvilinear coordinates to cylindrical and sphericalcoordinates. 4. Using the divergence theorem to give physical interpretation of divergence of physical fields. 5. Understanding stoke's theorem to compute line integral along the boundary of a surface	After the completion of the course, Students will be able to • Memorize the concepts of directional derivatives with geometrical interpretations. • Apply gradient to solve problems involving normal vectors to level surfaces. • Explain the concept of vector integration along a plane and in space. • Find out whether the given vector function is solenoidal, irrotational or harmonic. • Apply Guass Divergence Theorem, Stoke's theorem and Green's Theorem to evaluate surface and volume integrals.
3.		**MATHEMATICS : B.A./B.SC IIIRD SEMESTER**	

Paper: Partial Differential Equation	
1. To introduce to students the concept of partial differential equation and its types.	After the completion of the course, students will be able to

	● To make the students understand the difference between ordinary and partial differential equations ● To make the students learn about the formation of partial differential equations. ● To acquaint the students with different methods of solving the partial differential equations.	● Establish a fundamental familiarity with partial differential equations ● Solve linear and nonlinear partial differential equations. ● Classify partial differential equations into hyperbolic, parabolic and elliptic types and transform them into canonical form ● Solve boundary value problems related to Laplace, heat and wave equations.
	Paper: Advanced Calculus	
	1. To Study Different indeterminate forms. 2. To Study about Mean Value theorems. 3. To Study the behavior of curve in space. . To Study about and Limits, Continuity and Differentiability of functions of two variables. . To Study about Continuous and Uniformly Continuous functions. . To Study about the maximum and minimum behavior of a function of two variables.	After the completion of the course, Students will be able to Learn about the basic principles of multi-variable calculus withproofs. Have knowledge of calculus involvingthe fundamental tools such as Limits, Continuity and Differentiability of functions of two variables. Follow abstract mathematical arguments and write their own proofs. Effectively communicate mathematics: reading, writing, listening, and speaking.
	Paper : Statics	
	1. Understanding the principles of statics. 2. Understanding the concept of like and unlike parallel forces. 3. Analyzing the various types of motion produced by the forces acting on the rigid body. 4. Explaining the difference between the actual work and virtual work done by a rigid body. 5. Enhancing the knowledge of equilibrium condition of a static body.	● Construct free body diagrams and calculate the reactions necessary to ensure static equilibrium. ● Determine the resultant of two like parallel forces and two unequal unlike parallel forces acting on a rigid body. ● Compute the position of centre and moments of force about a point on a rigid body. ● Explain the equilibrium of rough bodies resting in contact with one another. ● Apply the concept of centre of gravity to uniform rod, uniform lamina, triangular lamina etc.
4.	**MATHEMATICS : B.A./B.SC IVTH SEMESTER**	

	Paper: Special Function & Integral Transforms	
	● To give the students an idea of power series solution of differential equations.	After the completion of the course, students will be able to
	● To let them know about the special functions and their origin. To make the students learn the concept of integral transforms and related applications	● To solve differential equations by power series solution method. ● Define the special functions like Bessel's function, Legendre polynomial, Hermite polynomials and explain their properties. ● Apply Laplace and Fourier transforms to solve differential equations.
	Subject: Sequences and Series	
	To Study about the real numbers, least upper bounds, greatest lower bound, Neighbourhood of a point, Interior point of a set, Open sets, Closed sets, Limit point of a set, Closure of a set etc. 2. To Study about sequences and series. To Study the applications of infinite sequence. 4. To Study the applications of infinite series. To discuss about an infinite sequences are convergent or divergent. To Study about the geometric series are convergent or divergent. To find the sum of a convergent geometric series.	After the completion of the course, Students will be able to ● Understand the applications of infinite sequence. ● Understand the applications of infinite series. ● Determine if an infinite sequence is convergent or divergent. ● Find the sequence of partial sums of an infinite series. ● Determine if a geometric series are convergent or divergent. ● Find the sum of a convergent geometric series. ● Determine if an infinite series is convergent or divergent by selecting the appropriate test from the following: (a) test for divergence (b) integral test (c)p-series test (d) the comparison tests (e) alternating series test (f) absolute convergence test (g) ratio test and (h) root test.
	Paper : Programming in C & Numerical Analysis	

	1. Developing programming skills using the fundamentals and basics of C language. 2. Using user defined data types to provide flexibility for application development. 3. Effective usage of arrays, structures, functions and pointers. 4. Deriving appropriate numerical methods to solve algebraic and transcendental equations. 5. solving simultaneous linear algebraic equations containing more than two variables	● Write an algorithm and flowchart for the given problem. ● Write and execute the programs in C language. ● Solve an expression containing different operators used in C language. ● Find the approximate roots of algebraic and transcendental equations. ● Solve linear system of equationsusing an appropriate numerical method.

5.	MATHEMATICS: B.A./B.SC. VTH SEMESTER	
	Paper: Groups & Rings	
	● To acquaint the students with the concept of internal binary operations and algebraic structures. ● To present the abstract algebraic structures as generalisation of familiar numbersystem and operations. ● To give the students an idea of the structure - preserving mappings.	After the completion of the course, students will be able to ●Understand and analyse algebraic structures like group, ring and field and their properties. ●Construct substructures. ●Compare different structures. ●Define and explain the properties of homomorphism on different algebraic structures.
	Subject: Real Analysis	
	1. To Study the real numbers, least upper bounds and the triangle inequality. 2. To define functions between sets; equivalent sets; finite, countable and uncountable sets. Recognize convergent, divergent, bounded, Cauchy and monotone sequences. 3. To Calculate the limit superior, limit inferior, and the limit of a sequence. 4. To Recognize alternating, convergent, conditionally and absolutely convergent series. 5. Determine if subsets of a metric space are open, closed, connected, bounded, totally bounded and or compact.	After the completion of the course, Students will be able to 1. Learn fundamental properties of the real numbers that lead to the formal development of real analysis. 2. Understand applications of Riemann Integral and Improper Integral. 3. Understanding of limits and how they are used in sequences, series, differentiation and integration. 4. Understand how we generalize a space. 5. Understand how sequences are convergent and divergent in a Metric Space.
	Paper : Numerical Analysis	

1. Numerical Approach of Solution of Various problems. 2. Interpolation Techniques. 3. Numerical Approach for integration and differentiation. 4. Numerical Solution of Differential Equations. 5. Selecting an appropriate probability distribution for discrete and continuous random variables.	1. Explain the theoretical and practical aspects of the use of numerical analysis. 2. Establish the limitations, advantages and disadvantages of numerical analysis. 3. Apply the numerical methods for various mathematical operations and tasks, such as solution of linear and nonlinear equations, differential equations etc. 4. obtain the approximate solution to otherwise intractable mathematical problems 5. implement numerical methods for a variety of multidisciplinary applications