PROGRAM OUTCOME OF B.SC (MATHEMATICS)

PO-1	Enabling students to develop a positive attitude towards mathematics as an interesting and valuable subject of study.
PO-2	A student should get a relational understanding of mathematical concepts and concerned structures, and should be able to follow the patterns involved, mathematical reasoning.
PO-3	Ability to analyze a problem, identify and define the computing requirements, which may be appropriate to its solution.
PO-4	Introduction to various courses like group theory, ring theory, field theory, metric spaces, number theory.
PO-5	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.
PO-6	Ability to pursue advanced studies and research in pure and applied mathematical science.

Programme Specific Outcomes B.SC (MATHEMATICS)

PSO-1	Understanding of the fundamental axioms in mathematics and capability of developing ideas based on them.
PSO-2	Inculcate mathematical reasoning.
PSO-3	Provide knowledge of mathematical techniques and application of mathematical methods.
PSO-4	Nurture problem solving skills, thinking, creativity
PSO-5	Assist students in preparing (personal guidance, books) for competitive exams for higher studies e.g. JAM,CPET

COURSE OUTCOME OF B.SC (MATHEMATICS)

SEMESTER	COURSE	CO	
SEM-I	CORE-1 (CALCULUS)	CO-1	Able to use Leibnitz's rule to evaluate derivatives of higher orders
		CO-2	Able to study the geometry of various types of functions
		CO-3	Able to evaluate the volumes of solids using cross- sections
		CO-4	Able to calculate the length of an arc of a curve whose equations are given in parametric and polar form
		CO-5	Understand the basic concept of conics, rotation of axes and classification of conics and polar equations of conics
		CO-6	Able to identify the difference between scalar and vector
		CO-7	acquired knowledge on some the basic properties of vector functions
	CORE-2 (DISCRETE MATHEMATICS)	CO-1	To understand logical concepts and to show Logical equivalences by using truth tables and rules in logics.
		CO-2	Understand the results involving divisibility and greatest common divisors and solve systems of linear congruences.
		CO-3	Learn concept related to counting and advanced counting
		CO-4	Use computational techniques and algebraic skills essential for the study of systems of Linear equations .
		CO-5	Evaluate the Eigen values and Eigen Vectors of the matrix.
		CO-6	Assimilate various graph theoretic concepts and familiarize with their applications
SEM-II	CORE-3 (Real Analysis)	CO-1	Understand many properties of the real line $\mathbb{R}$
		CO-2	learn to define sequence in terms of functions from $\mathbb{R}$ to a subset of $\mathbb{R}$.
		CO-3	Recognize bounded, convergent, divergent, Cauchy and monotonic sequences and to calculate their limit superior, limit inferior, and the limit of a bounded sequence

		CO-4	Apply the ratio, root, alternating series and limit comparison tests for convergence and absolute convergence of an infinite series of real numbers
		CO-5	understand limits and their use in sequences, series, differentiation.
		CO-6	Understand the consequences of various mean value theorems for differentiable functions
	CORE-IV (Differential Equation)	CO-1	Able to solve first order differential equations utilizing the standard techniques for separable, exact, linear, homogeneous, or Bernoulli cases
		CO-2	Able to model problems in nature using Ordinary Differential Equations
		CO-3	Able to find the complete solution of a nonhomogeneous differential equation as a linear combination of the complementary function and a particular solution.
		CO-4	Gain the idea of equilibrium points and interpretation of phase plane.
SEM-III	CORE-V (Theory of Real functions)	CO-1	Gain knowledge on indeterminate form and Use of L'Hospital rule
		CO-2	Able to solve problems involving derivative and its application
		CO-3	Geometrical representation and problem solving on MVT and Rolls theorem.
		CO-4	Gain knowledge on Riemann Integral and its properties in detail, leading to fundamental theorem of calculus and Mean value theorems
		CO-5	Able to test convergence of improper integrals of first and second kind.
		CO-6	Understand the concept of pointwise and uniform convergence of sequences and series of functions
		CO-7	Able to test of uniform convergence of sequence and series
		CO-8	Understand Integrability and theorems on integrability
	CORE-VI (Group Theory)	CO-1	Gain knowledge of elementary properties of Group
		CO-2	understands cyclic groups, permutation groups, normal subgroups and related results

		CO-3 Evaluate the order of an element of the group and order of the permutation CO-4 Apply the Lagrange's Theorem to check the given subset is a subgroup of a group or not. CO-5 Understand group homomorphism & Isomorphism and related theorem
	CORE-VII (Partial Differential Equation and System Of ODEs)	CO-1 Understand concept of Partial differential equations and classification, solution by Lagrange's method and Charpit's method CO-2 Able to solve wave and heat equations CO-3 Gain knowledge about Classification of second order linear equations as hyperbolic, parabolic or elliptic CO-4 Able to solve homogeneous linear systems with constant coefficients
SEM-IV	CORE-VIII (Numerical methods and scientific computing)	CO-1 The problems which cannot be solved by usual formulae and methods can be solved approximately by using numerical techniques CO-2 Gain knowledge of fitting curve to the data by using different methods of interpolation as well as extrapolation CO-3 Able to determine approximate value of a integral using Simpson's and Trapezoidal rule. CO-4 Able to find approximate solution of difficult differential equation using numerical technique
	CORE-IX (Topology of metric spaces)	CO-1 Understand of basic mathematical tools such as open & closed sets, continuity, in metric space CO-2 Gain knowledge of the notion of distance, convergent sequence and continuity of functions CO-3 Gain the idea of Countability and Separability CO-4 Understand Contraction mappings and Applications CO-5 Understand the concept of connectedness, Local connectedness, Bounded sets and compactness, other characterization of compactness
	CORE-X (ring theory)	CO-1 Able to define ring and subrings CO-2 Gain knowledge of ideals and concept related to ideal. CO-3 Able to identify an ideal is a prime ideal or

		maximal ideal
		CO-4 Gain knowledge of polynomial ring over commutative ring
		CO-5 Understand integral domain and related properties
SEM-V	CORE-XI (Multivariate calculus)	CO-1 study functions and several variables.
		CO-2 study the notion of Continuity and Differentiability of multivariate functions
		CO-3 Able find extreme values of multivariable Ffnctions using derivatives
		CO-4 Able to calculate double and triple integration and line integral
		CO-5 gain knowledge of basic vector calculus including green's theorem, divergence theorem.and stokes theorem
	CORE-XII (Linear algebra)	CO-1 Understand the basic concepts of vector space and subspaces
		CO-2 Able to test a given set of vectors is a basis or not.
		CO-3 Calculate the dimension of a vector space
		CO-4 Understand the basic concept of Linear transformations, null space, range, rank and nullity of a linear transformation
		CO-5 Able to find out rank and nullity of a matrix linear of transformation
		CO-6 Gain knowledge of properties of inner product spaces and determine orthogonality in inner product spaces
		CO-7 Construct the orthonormal basis using Gram Schmidt orthogonalisation process
		CO-8 Able to determine minimal solutions to Systems of linear equations
	DSE-I (Linear programming)	CO-1 Able to Solve the LPP using Simplex method
		CO-2 Evaluate minimization problem using Big 'M' Method and formulate the dual problem from primal
		CO-3 Formulate a dual problem and solve it.
		CO-4 Able to Solve the LPP using Dual Simplex method
		CO-5 Gain knowledge about Transportation Problems,Assignment Problems and their Applications

		CO-6 know the application of linear Programming method in Game Theory
	DSE-II (Probability and statistics)	CO-1 Understand the basic principles of probability including probability of events, rules of probability, conditional probability, independent events, Bayes theorem and use these principles in problem solving situations CO-2 Understand the definitions of discrete, continuous, and joint random variables, compute the mean, variance and covariance of random variable CO-3 Know the definition of density and distribution Function of a random variable and be able to find one from the other CO-4 Able to define the binomial, uniform, Poisson, negative binomial, hypergeometric, exponential, Gamma, Beta and normal random variables, know their probability density and distribution functions, compute the mean and variance of these random variables, and use the normal and Poisson distributions to approximate binomial probabilities CO-5 Able to evaluate Moment-generating Function CO-6 Gain knowledge of sampling distribution of mean, Central Limit theorem, Sampling distribution of the mean: finite populations, chi-square, t, F distributions
SEM-VI	CORE-XIII (Complex analysis)	CO-1 Compute sums, products, quotients, conjugate, modulus, and argument of complex numbers CO-2 Define and analyze limits and continuity for complex functions as well as consequences of continuity · CO-3 Able to determine a given function is analytic or not CO-4 Understand the basic methods of complex integration and application in contour integration and evaluation of integral using Cauchy's Theorem & Cauchy's Integral Formula CO-5 Able to evaluate contour integral using residue formula.
	CORE-XIV (Group-theory-II)	CO-1 Understand basic concept of Automorphism, inner automorphism, automorphism groups, automorphism groups of finite and infinite

		cyclic groups CO-2 Gain knowledge of Commutator subgroup and its properties CO-3 Get idea of direct products, group actions , class equations CO-4 Know Sylow's theorems and consequences CO-5 Know Cauchy Theorem and its application	
	DSE-III (Differential geometry)	CO-1 Understand of basic terms ,tangent,principal normal,binormal,curvature & torsion CO-2 Able to find curvature and torsion using Serret-Frenet formula CO-3 Able to derive equation of involute and evolute of a curve CO-4 Calculate E,F,G;L.M,N and write first fundamental and second fundamental form CO-5 Gain knowledge on lines of curvature,Asymptotic line,develpoble surface,minimal surface CO-6 Gain basic knowledge on geodesic and related Properties.	
	DSE-IV (Number theory)	CO-1 Gain Knowledge of divisibility, prime numbers, congruences, Diophantine equations. CO-2 Able to solve problems using Chinese Remainder theorem,Fermat's littletheorem, Wilson's theorem CO-3 Know different Number theoretic functions and their application CO-4 Know the Legendre symbol, Jacobi symbol and their properties and evaluation , quadratic congruences with composite moduli CO-5 Understand basic concept about Affine ciphers, Hill ciphers, p ublickey cryptography, RSA encryption anddecryption	