PROGRAMME, PROGRAMME SPECIFIC & COURSE OUTCOMES 2016

B. Sc. (Mathematics)

Programme Outcomes (PO)

1. Think in a critical manner
2. 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.
3. Formulate and develop mathematical arguments in a logical manner
4. Acquire good knowledge and understanding in advanced areas of mathematics and statistics, chosen by the student from the given courses.

Programme Specific Outcomes (PSO)

1. Create awareness to become an enlightened citizen with commitment to delivering is one's responsibilities within the scope of bestowed rights and privileges.
2. Imbibe effective scientific and/or technical communication in both oral and writing.
3. Prepare students for pursuing research or careers in industry in mathematical sciences and allied fields.

Course Outcomes (CO)

S.NO	SEMESTER	TITLE	COURSE OUTCOME
1	I	Algebra	• Solve polynomial equations by symbolic methods. • Understand radical expressions, and simplify roots with indices 2 and 3. • Understand rational exponent notations, and simplify expressions.

2	II	Calculus	• Students will be able to productively discuss mathematics in a group setting • Students will be able to write detailed solutions using appropriate mathematical language • Students will be able to identify areas in mathematics and other fields where Calculus is useful • Students will be able to generate solutions to unfamiliar problems
3		Vector analysis	• Carry out line, surface and volume integration as well as differentiation of scalar and vector fields. • Identify the most appropriate coordinate system for a given problem and apply the gradient, the divergence and the curl in the selected coordinate system. • Apply vector algebra and use the gradient of scalar field to solve elementary problems in physics.
4	III	Statics	• Graduates should be able to analyze force systems in plane and also in space • Graduates should be able to solve two and three dimensional rigid body static equilibrium problems • Graduates should be able to determine the centric of planes, center of gravity of masses and evaluate their moments of inertia.
5		Differential Equations	• Solve basic application problem described by second order linear differential equations • Find the transforms of derivatives and Integrals • Find power series solutions about ordinary points and singular points
6		Inferential Statistics	• Students should learn the notation, particularly summation notation • Students should learn how statistical techniques fit intothe general process of science • Students should understand the purpose of measuring central tendency • Students should understand the logic of hypothesis testing
7	IV	Skill based elective course	• Describe to students what is expected of them • Plan appropriate teaching strategies, materials and assessments • Learn from and make changes to curriculum to improve student learning • Assess how the outcomes of a single course align with larger outcomes for an entire program

8		Dynamics	• Understand and use basic terms for the description of the motion of particles, vector functions and the fundamental laws of Newtonian mechanics • Solve mechanics problems in one dimension that involve one or more of the forces of gravity, friction and air resistance • Understand the concept of terminal speed, and use it in solving mechanics problems in one dimension • Apply Newton's second law in vector form to problems in more than one dimension • Solve problems relating to the motion of a projectile in the absence of air resistance.
9	V	Numerical Analysis	• Derive numerical methods for various mathematical operations and tasks such as interpolation, differentiation, integration, the solution of linear and nonlinear equations and the solution of differential equations. • Applying numerical analysis which has enormous application in the field of science and some fields of engineering. • Students Find the Summation of series finite difference
10		Discrete mathematics	• Some fundamental mathematical concepts and terminology. • Students will learn how to use and analyze recursive definitions. • Students will learn how to count some different types of discrete structures. • Techniques for constructing mathematical proofs, illustrated by discrete mathematics examples.
11	V & VI	Algebraic Structures	• Give an account of important concepts and definitions for groups, rings and fields. • Formulate important results and theorems covered by the course. • Describe the main features of the proofs of important theorems. • Use the theory, methods and techniques of the course to solve problems • Demonstrate Knowledge of why the real and complex numbers are each a field, and that particular are not fields.
12		Real Analysis	• Demonstrate an understanding of the theory of sequences and series, continuity, differentiation and integration. • Describe the basic difference between the rational and real numbers • Understand and perform simple proofs • Evaluate the limits of wide class of real sequences • The course pervious the basic for further studies with in function analysis topology and function theory • Students will be able to demonstrate basic knowledge of key topics in classical real analysis.
13		Operations Research	• Operation Research is used for defense capability acquisition decision making. • It is used to find optimal or near optimal solutions to complex decision making • It is used in finding maximum (of profit or yield) and minimum (of loss or cost) in real-world objective.

14		C-language	• Ability to define and manage data structures based on problem subject domain. • Ability to work with textual information, characters and strings. • Ability to work with arrays of complex objects. • Understanding a concept of object thinking within the framework of functional model. • The Purpose of this course is to introduce to students to the field of programming using C language
15	VI	Complex Analysis	• Explain the role in modern mathematics and applied contexts. • Demonstrate capacity for mathematical reasoning through analyzing, proving and explaining concepts from complex analysis. • Demonstrate accurate and efficient use of complex analysis techniques. • Apply problem-solving using complex analysis techniques applied to diverse situations in physics, engineering and other mathematical contexts. • Understand some important classes of graph theoretic problems.
16		Graph theory	• Formulate and prove central theorems about trees, matching, connectivity, coloring and planar graphs. • Describe and apply some basic algorithms for graphs. • Use graph theory as a modeling tool. • Apply Mathematical methods involving arithmetic, algebra, geometry and graphs to solve problems.

M.S.c (Mathematics)

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Course Outcomes (CO)

S.NO	SEMESTER	TITLE	COURSE OUTCOME
1	I	Linear Algebra	• Represent mathematical information and communicate mathematical reasoning symbolically and verbally. • Interpret and analyze numerical data, mathematical concepts and identify patterns to formulate and validate reasoning. • Demonstrate skills in communicating mathematics.
2		Advanced Real Analysis	• After completing the course ,the student should be able to recognize, understand and apply concepts and methods in advanced real analysis • The students should be able to apply this knowledge to solve Mathematical problems. • Evaluate the limits of wide class of real sequences

3		Mechanics	• The students will be able to formulate and solve problems in quantum mechanics. • Apply laws of mechanics to determine efficiency of simple machines with consideration of friction. • Students will lean to visualize and manipulate odes in graphical, numerical and symbolic form.
4		Ordinary Differential Equation	• Students will be introduced the concepts of existence and uniqueness of solutions. • Students will be introduced to the concept of the Laplace transform and the application of the Laplace transform in the solution of constant coefficient, linear odes. • Understanding existence, uniqueness, and other properties of a solution of differential equations.
5		Numerical Methods	• Apply numerical methods to obtain approximate solutions to mathematical problems. • Implement numerical methods in Mat lab. • Explain the fundamental concepts of advanced algebra and their role in modern
6	II	Advanced Algebra	• mathematics and applied contexts. • Explain Demonstrate accurate and efficient use of advanced algebraic techniques. • Demonstrate capacity for mathematical reasoning through analyzing, Proving • and explaining concepts from advanced algebra. • Apply problem-solving using advanced algebraic techniques applied to • Derive situations in physics, engineering and other mathematical. • Students can perform operations on rational expressions and solve rational equations.
7		Partial Differential equations	• Solving differential equations with series method, Green's function method, Laplace transform method and Fourier transform method. • Understand partial differential equations of first order (linear and nonlinear), second and higher order. • Apply various analytic methods for computing solutions of various pdes. • Determine integral surfaces passing through a curve, characteristic curves of second order PDE and compatible systems. • Understand formation and solution of some significant pdes like wave equation, heat equation and diffusion equation. • Apply the knowledge of pdes and their solutions in order to understand physical phenomena.

			• Use knowledge of formulate physical problems as PDEs using convervation laws.
8		Discrete Mathematics	• Demonstrate different traversal methods for trees and graphs • Write model problems in computer science using trees and graphs • Write an argument using logical notation and determine if the argument is or is not valid • Apply Liouville's theorem in fundamental theorem of algebra.
9	III	Complex Analysis	• .Understand the convergence, term by term integration and differentiation of a power series. • Find residues and evaluate complex integrals, real integrals using the residue theorem. • Understand the concepts of topological spaces and the basic definitions of open sets, neighborhood, interior, exterior, closure and their axioms for defining topological space.
10		Topology	• Understand the concepts of countable and separable spaces. • Understand the concepts and properties of compact and connected topological spaces. • Apply the properties of open sets, closed sets, interior points, accumulation points and derived sets in deriving the proofs of various theorems. • Understand the concept of Bases and sub bases, create new topological spaces by using subspace. • Understand continuity, compactness, connectedness, homeomorphism and topological properties. • Understand how points of space are separated by open sets, Hausdorff spaces and their important. • Understand the concepts of Connected and Disconnected.
11		Measure Theory and Integration	• Understand the concepts of countable and separable spaces. • Understand the integration of non negative function Lebesgue monotone convergence theorem and properties of comparison with Riemann integral • Apply the properties of open sets, closed sets, interior points, accumulation points and derived sets in deriving the proofs of various theorems. • Understand the concept of Bases and sub bases, create new topological spaces by using subspace. • Understand continuity, compactness, connectedness, homeomorphism and topological properties. • Prove basic results about completeness, Compactness, connectedness and convergence. • Singed measure , the Hahn and the Jordan decomposition theory space Radon Nikodiyam theorem.

12		Calculus of variation	• Students will able to study of modern optimal control Theory. • Understand the formula that determines stationary paths of a functional to deduce the differential equations for stationary paths in simple cases • Apply the properties of open sets, closed sets, interior points, accumulation points and derived sets in deriving the proofs of various theorems. • Understand the Euler Lagrange equation or its first integral to find differential equation for stationary paths • Solve the differential equation for stationary paths, subject to boundary conditions in straight forward cases. • Appreciate the role of completeness through the Baire category theorem and its consequences for operators on Banach spaces.
13	IV	Functional Analysis	• Demonstrable knowledge of the properties of a Hilbert space, including orthogonal complements, orthonormal sets, complete orthonormal sets together with related identities and inequalities. • Familiar with the theory of linear operators on a Hilbert space, including adjoint operators, self-adjoin and unitary operators with their spectra. • Aware of the classical theory of Fourier series and other orthogonal expansions. • Students has knowledge of central concepts from functional analysis Including dual spaces and self adjoin operators.
14		Graph theory	• Use mathematical definitions to identify and construct examples and to distinguish examples from non-examples. • Use a combination of theoretical knowledge and independent mathematical thinking in creative investigation of questions in graph theory. • Write about graph theory in a coherent and technically accurate manner. • Students will be able to formally understand and prove theorems relevant results in graph theory.
15		Probability Theory	• Identify an appropriate probability distribution for a given discrete or continuous random variable and use its properties to calculate probabilities. Calculate probabilities for joint distributions including marginal and conditional probabilities. • Derive probability distributions of functions of random variables. • Derive expressions for measures such as the mean and variance of common probability distributions using calculus and algebra.