DEPARTMENT OF MATHEMATICS

Programme: B.Sc., MATHEMATICS

PO No.	Programme Outcomes Upon completion of the B.Sc., Degree Programme, the graduate will be able to
PO-1	Emerge with competency in the subject of Mathematics and apply knowledge to cater to the needsof Society/Employer/Institution/Own Business Enterprise
PO-2	Imbibe analytical/critical/logical/innovative thinking skills in the field of Mathematics and Statistics
PO-3	Acquire distinct traits and ethics with high professionalism to gain a broader insight into the domainconcerned for nation building
PO-4	Communicate mathematical and statistical concepts, models, reasoning, explanation, interpretation and solutions clearly and effectively in multiple ways: orally, visually through FOSS, written reports and physical math models, as appropriate
PO-5	Employ efficient and accurate mathematical programming and computing tools to solve real-life problems

PSO No.	Programme Specific Outcomes Upon completion of these courses the student would
PSO-1	To enhance critical and analytical thinking
PSO-2	To gain in-depth knowledge in the fundamental areas of core mathematics and statistics
PSO-3	To incorporate the recent trends in the curriculum such as Free and Open Source Math Software

Course Title	CLASSICAL ALGEBRA	
CODE	22MSUC101	
CO No.	Course Outcomes	Knowledge Level
CO-1	Find the sum of finite and infinite Binomial, Exponential and Logarithmic series	K1
CO-2	Solve equations using various methods	K2
CO-3	Find the approximate roots of an equation by Newton's method and Horner's method	K3
CO-4	Gain knowledge in number theory	K2
CO-5	Know the concept of congruences and its properties	K2

Course Title	CALCULUS	
CODE	22MSUC102	
CO No.	Course Outcomes	Knowledge Level
CO-1	Understand the meaning of differentiation using limits	K1, K2
CO-2	Construct n^{th} derivatives of different functions	K3
CO-3	Compute radius and center of curvature	K2
CO-4	Evaluate integration of trigonometric functions	K2
CO-5	Apply calculus concepts to solve real-world problems such as finding areas and volumes	K3

Course Title	STATISTICS FOR MATHEMATICS – I	
CODE	**22MSUA101**	
CO No.	**Course Outcomes**	**Knowledge Level**
CO-1	Learn the concept of random variables	K1
CO-2	Exercise the problem solving ability in statistics	K3
CO-3	Study the characteristics of discrete and continuous distributions	K2
CO-4	Acquire knowledge in of bivariate distributions	K2
CO-5	Make use of random variables to find the distributions of functions of random variables	K3

Course Title	ALLIED PRACTICAL - MATHEMATICAL SOFTWARE – I	
CODE	**22MSUAP01**	
CO No.	**Course Outcomes**	**Knowledge Level**
CO-1	Be equipped with the professional competency through learning Free Open Source Software – R	K3
CO-2	Create the database, visualizing and analyzing the data using R	K2
CO-3	Make inferences through the results obtained	K4

Course Title	DIFFERENTIAL EQUATIONS AND LAPLACE TRANSFORMS	
CODE	**22MSUC203**	
CO No.	**Course Outcomes**	**Knowledge Level**
CO-1	Solve the first order differential equations through various techniques	K1 & K2
CO-2	Improve the ability to solve second Order ordinary Differential Equations	K2
CO-3	Evaluate the partial differential equations of first order using different methods	K2
CO-4	Apply Laplace transformation to solve differential equations	K3
CO-5	Make use of inverse Laplace transforms to solve the ordinary differential equations and system of differential	K3

Course Title	TRIGONOMETRY, VECTOR CALCULUS AND FOURIER SERIES	
CODE	**22MSUC204**	
CO No.	**Course Outcomes**	**Knowledge Level**
CO-1	Expand sines and cosines of multiples of theta and powers of theta	K2
CO-2	Find logarithm of a complex number and summation of trigonometric series	K1
CO-3	Understand the relation between directional derivative, gradient, divergence and curl	K1
CO-4	Make use of theorems to study relation between line, surface and volume integrals	K3
CO-5	Evaluate line, surface and volume integrals	K3

Course Title	CORE PRACTICAL - MATHEMATICAL SOFTWARE – II	
CODE	**22MSUCP01**	
CO No.	**Course Outcomes**	**Knowledge Level**
CO-1	Use Geogebra to draw geometrical shapes	K2
CO-2	Use SageMath as a calculator	K3
CO-3	Solve number theory problems	K3
CO-4	Make use of theoretical concepts to solve problems and visualize the output	K3

Course Title	STATISTICS FOR MATHEMATICS – II	
CODE	**22MSUA202**	
CO No.	**Course Outcomes**	**Knowledge Level**
CO-1	Learn the theory of estimation	K1
CO-2	Acquire knowledge about confidence intervals	K2
CO-3	Formulate the statistical hypothesis	K3
CO-4	Enhance the statistical knowledge by applying the techniques learned in testing of statistical hypothesis	K2
CO-5	Analyze and draw inferences based on the results of the testing of hypothesis	K4

Course Title	ANALYTICAL GEOMETRY	
CODE	**21MSUC305**	
CO No.	**Course Outcomes**	**Knowledge Level**
CO-1	Develop the polar form of straight lines, circle and conic sections and also to understand their properties	K2
CO-2	Gain profound knowledge on straight lines	K2
CO-3	Analyze the characteristics of sphere	K4
CO-4	Demonstrate the fundamental concepts of cone and cylinder	K1
CO-5	Integrate the concepts of cone and straight line	K3

Course Title	FOUNDATION COURSE IN MATHEMATICS	
CODE	**21MSUC306**	
CO No.	**Course Outcomes**	**Knowledge Level**
CO-1	Acquire the knowledge of Quantifier Statements, Compound statements and some proofs in mathematics	K1, K2, K3
CO-2	Apply the concept of basic terminologies, family of sets, power sets and Cartesian product of sets	K1, K2, K3
CO-3	Demonstrate the basic definitions of functions, composition of functions and inverse image of subsets under functions	K1, K2, K3
CO-4	Analyze the relations on sets and types of relations	K1, K2, K3
CO-5	Evaluate the concepts of induction principles, well-ordering principle and equivalence of the three principles	K1, K2, K3

Course Title	LINEAR ALGEBRA	
CODE	21MSUC407	
CO No.	Course Outcomes	Knowledge Level
CO-1	Understand the basic concept of vector spaces	K1
CO-2	Identify the linear transformation and integrate it with matrices	K2
CO-3	Take a look at isomorphism, invertibility and dual spaces	K2
CO-4	Apply the ideology of matrices into systems of linear equations	K3
CO-5	Get aware of the concepts of inner product spaces	K1

Course Title	SEQUENCES AND SERIES OF REAL NUMBERS	
CODE	21MSUC408	
CO No.	Course Outcomes	Knowledge Level
CO-1	Determine the real number system concept, LUB, Absolute value and Triangle inequality	K1,K2,K3
CO-2	Analyze the sequences and their convergence, Cauchy and monotone sequences and sandwich lemma	K1,K2,K3
CO-3	Evaluate some important limits and diverging sequence	K1,K2,K3
CO-4	Analyze the series and their convergence	K1,K2,K3,K4
CO-5	Understand the concept of Cauchy Product of Two Infinite series	K5

Course Title	SINGLE AND MULTIVARIABLE DIFFERENTIAL CALCULUS	
CODE	21MSUC509	
CO No.	Course Outcomes	Knowledge Level
CO-1	Understand the concept of limits and uniform continuity	K2
CO-2	Apply the concept of continuity	K3
CO-3	Analyze the derivatives of higher orders	K4
CO-4	Understand the concept of Taylor's and Cauchy's Theorem	K4
CO-5	Analyze the concept of total derivatives , partial derivatives	K5

Course Title	GROUP THEORY	
CODE	21MSUC510/ 21MCUC512	
CO No.	Course Outcomes	Knowledge Level
CO-1	Gain knowledge in the concept of groups	K1&K2
CO-2	Solve the problems on the mathematical objects, known as subgroups	K2
CO-3	Classify the groups into normal, cyclic and permutation Groups	K3
CO-4	Apply the concept of functions in groups as isomorphisms	K3
CO-5	Generalize the idea of isomorphism as homomorphisms	K2

Course Title	MECHANICS	
CODE	21MSUC511/ 21MCUC306	
CO No.	Course Outcomes	Knowledge Level
CO-1	Find Resolution of a force	K1
CO-2	Evaluate like and unlike forces	K2
CO-3	Illustrate couples and coplanar forces	K3
CO-4	Find relative velocity and relative angular velocity	K3
CO-5	Analyze the concept of range on an inclined plane	K4

Course Title	PYTHON PROGRAMMING (Theory)	
CODE	21MSUC512/21MCUC513	
CO No.	Course Outcomes	Knowledge Level
CO-1	Understand the Constants, Variables , Identifiers and Data Types	K1,K2
CO-2	Study about the Operators and Expressions, Type Conversion.	K3
CO-3	Develop algorithms using Decision Control Statements, Basic Loop Structures, Iterative Statements	K4
CO-4	Analyze the Functions and Modules, Concatenating, Appending and Multiplying Strings	K2
CO-5	Determine the Sequence, Lists, Tuple and acquire the knowledge about the Dictionaries	K3

Course Title	OPERATIONS RESEARCH – I	
CODE	**21MSUE511/21MCUE511**	
CO No.	**Course Outcomes**	**Knowledge Level**
CO-1	Understand Linear Programming Problems (LPPs)	K1
CO-2	Solve LPP through various techniques	K2
CO-3	Demonstrate the inventory model with optimum EOQ	K3
CO-4	Plan and schedule the sequence of activities, find the critical path and duration/probability of completing the project	K2
CO-5	Determine the optimal strategies using Game theory	K2

Course Title	AN INTRODUCTION TO NUMBER THEORY	
CODE	**21MSUE521 / 21MCUE521**	
CO No.	**Course Outcomes**	**Knowledge Level**
CO-1	Understand the basics of Recursion and polygonal numbers	K1,K2
CO-2	Learn the concepts of divisibility and primes	K2
CO-3	Acquire knowledge in the system of Diophantine Equations using Euclidean Algorithm	K3
CO-4	Analyze the concepts of Congruence and solve problems	K4
CO-5	Apply Congruence to solve tests and puzzle	K4

Course Title	REAL ANALYSIS	
CODE	**21MSUC613**	
CO No.	**Course Outcomes**	**Knowledge Level**
CO-1	Understanding the elements of point set topology	K1,K2,K3
CO-2	Series Knowing the concept of pointwise convergence	K1,K2,K3
CO-3	Analyze the concept of power series and radius of convergence	K1,K2,K3
CO-4	Acquire the knowledge of Darboux Integrability and fundamental theorems of calculus	K1,K2,K3,K4
CO-5	Evaluate Riemann integration of infinite series	K1,K2,K3

Course Title	COMPLEX ANALYSIS	
CODE	**21MSUC614 / 21MCUC614**	
CO No.	**Course Outcomes**	**Knowledge Level**
CO-1	Understand Elementary Transformations, Invariance of Cross – Ratio and Stereographic Projection.	K2
CO-2	Analyze Cauchy – Riemann Equation in Polar Coordinates and Harmonic Functions	K2
CO-3	Derive Cauchy's fundamental theorem, Cauchy's Integral formula, formula for derivatives and Related Integral Theorems.	K3
CO-4	Determine Taylor's series, Laurent's series and to find singularities	K4
CO-5	Evaluate Real definite integrals using calculus of residues	K4

Course Title	RING THEORY & MATRIX THEORY	
CODE	**21MSUC615/21MCUC615**	
CO No.	**Course Outcomes**	**Knowledge Level**
CO-1	Understand the idea of rings	K1
CO-2	Extend the concept of rings to integral domains	K2
CO-3	Apply the notion of homomorphisms in rings and understand the division algorithm	K1,K3
CO-4	Familiarize about Eigen values and Eigen vectors	K2
CO-5	Apply the Eigen values and Eigen vectors in diagonalizing the matrices	K3
Course Title	**DISCRETE MATHEMATICS**	
CODE	**21MSUE612**	
CO No.	**Course Outcomes**	**Knowledge Level**
CO-1	Understand the statements & notations, Connectives, tautological implications and other connectives	K1,K2
CO-2	Find about the Normal forms, the theory of inference for the statement and predicate calculus	K3
CO-3	Demonstrate the fundamental concepts of Trees, spanning trees, Rooted and binary trees	K4
CO-4	Analyse about Grammars and languages and discuss about computability theory	K2
CO-5	Evaluate the concepts of Lattices and Boolean algebra with their properties and the representation and minimization of Boolean functions	K3

Course Title	FOURIER AND Z - TRANSFORMS	
CODE	21MSUE622	
CO No.	Course Outcomes	Knowledge Level
CO-1	Understand the definition and properties of Fourier transforms	K1,K2
CO-2	Study about the relation between Laplace transforms and Fourier transforms	K3
CO-3	Know the concept of Z-Transforms and to understand Damping and Shifting rule	K3
CO-4	Learn about inverse Z-Transforms and its Properties	K2
CO-5	Apply the knowledge of Fourier transforms and Z-Transforms in finding the solutions of difference equations and boundary value problems	K3

Course Title	ELECTIVE PRACTICAL - MATHEMATICAL SOFTWARE – III	
CODE	21MSUEP01	
CO No.	Course Outcomes	Knowledge Level
CO-1	Increase the problem solving ability	K2
CO-2	Visualize the geometrical structure of Stereographic projection	K3
CO-3	Analyze the zeros and analyticity of a function	K3
CO-4	Find the solution of ordinary differential equations and system of equations	K3

Course Title	OPERATIONS RESEARCH – II	
CODE	21MSUE613 / 21MCUE613	
CO No.	Course Outcomes	Knowledge Level
CO-1	Solve the IPP using Gomory's All IPP and mixed IPP method	K2
CO-2	Obtain the solution of multistage decision process using DPP	K3
CO-3	Solve the transportation problems through various techniques	K2
CO-4	Apply Lagrangian Multipliers Solve non-linear programming problems	K3
CO-5	Classify the queues and solve them to provide necessary service and suggestions	K3

Course Title	FUZZY SETS AND FUZZY LOGIC	
CODE	21MSUE623/ 21MCUE623	
CO No.	Course Outcomes	Knowledge Level
CO-1	Calculate support, height, normal alpha cuts and strong alpha cuts from the Membership Functions	K2
CO-2	Manipulate standard fuzzy operations such as complements, *t* – norms and *t*– conorms	K2
CO-3	Analyze the concepts of fuzzy numbers and linguistic variables	K3
CO-4	Compute fuzzy relations for equivalence and compatibility	K4
CO-5	Apply the concepts of fuzzy logic, fuzzy propositions and quantified propositions to mathematical modeling in uncertain situation	K5