DEPARTMENT OF MATHEMATICS

Programme: M.Sc., Mathematics

PO No.	Programme Outcomes Upon completion of the M.Sc. Degree Programme, the graduate will be able to
PO-1	innovate and design complex Mathematical problems and solutions using Pure and Applied Mathematics
PO-2	equip the students to think in critical and logical manner
PO-3	Analyze the contemporary issues in the field of Mathematics and applied sciences
PO-4	opportunity of employment in schools and colleges as Mathematical Teachers and Professors, Analysts in Software Industries, Research and Development Organizations
PO-5	crack lectureship and fellowship exams approved by CSIR – NET and SET

PSO No.	Programme Specific Outcomes Upon completion of these courses the student would
PSO-1	magnify the logical skills and furnish the students for research with professional and ethical responsibility
PSO-2	enhance the abstract intelligence in solving problems in analysis and algebra
PSO-3	curriculum profound the base for scientific and technological computations
PSO-4	reinforce the mathematical ability and imparting practical knowledge through mathematical software
PSO-5	substantiate the students attitude to evolve new concepts in emerging fields

Course Title	LINEAR ALGEBRA	
CODE	**22MSPC101**	
CO No.	**Course Outcomes**	**Knowledge Level**
CO-1	Understand the concepts of linear transformations and its representation by matrices	K2
CO-2	Discuss the concepts of polynomials and prime factorization of a polynomial	K2
CO-3	Demonstrate the properties of determinants and characteristics values	K3
CO-4	Analyze the concept of triangulation, diagonalization and decomposition	K4
CO-5	Evaluate the concepts of various bilinear forms	K5

Course Title	REAL ANALYSIS	
CODE	**22MSPC102**	
CO No.	**Course Outcomes**	**Knowledge Level**
CO-1	Acquire the knowledge of countable sets, uncountable sets and compact sets in metric spaces	K2
CO-2	Apply the concept of continuity and compactness in metric spaces	K3
CO-3	Demonstrate Riemann Stieltjes integral and examine theproperties of integration and differentiation	K4
CO-4	Analyze the convergence in sequences and series	K4
CO-5	Evaluate the concepts of linear transformation in vector spaces	K5

Course Title	ORDINARY DIFFERENTIAL EQUATIONS	
CODE	**22MSPC103**	
CO No.	**Course Outcomes**	**Knowledge Level**
CO-1	Obtain series solutions for second order ordinary differential equations both at ordinary and regular singular points	K2
CO-2	Construct systems of linear differential equations and identify the uniqueness	K3
CO-3	Demonstrate the solution of non-homogeneous linear systems and the properties linear system with constant and periodic coefficients	K3
CO-4	Analyze the existence and uniqueness solution of initial value problems	K4
CO-5	Determine the oscillations of second order equations	K5

Course Title	NUMBER THEORY	
CODE	**22MSPC104**	
CO No.	**Course Outcomes**	**Knowledge Level**
CO-1	Understand the concepts of divisibility and primes	K2
CO-2	Solve the congruences of different degrees	K2
CO-3	Demonstrate about power residue, multiplicative groups, rings and fields	K3
CO-4	Discuss the ideas about quadratic residues and Jacobi symbol	K4
CO-5	Analyze the concepts of greatest integer function and recurrence functions	K5

Course Title	MATHEMATICAL PROGRAMMING	
CODE	**22MSPC105**	
CO No.	**Course Outcomes**	**Knowledge Level**
CO-1	Understand the concepts of Graphical, Simplex and Dual methods.	K2
CO-2	Obtain solutions for Integer Programming and Gomory cutting plane Algorithm.	K2
CO-3	Solve integer linear programming and dynamic programming problems.	K3
CO-4	Analyze the concepts of constrained and unconstrained problems.	K4
CO-5	Compare the algorithms of constrained and unconstrained in non-linear programming problems.	K5

Course Title	ALGEBRA	
CODE	**22MSPC206**	
CO No.	**Course Outcomes**	**Knowledge Level**
CO-1	Identify the basic ideas of algebra including the concepts of groups and direct products.	K2
CO-2	Understand the concept of a particular Euclidean ring and other forms of polynomial rings.	K2
CO-3	Demonstrate knowledge of the structures of fields and extension fields	K3
CO-4	Appreciate the concept of Galois theory and finite fields	K4
CO-5	Compose clear and accurate proofs using the concepts of linear transformations	K5

Course Title	COMPLEX ANALYSIS	
CODE	**22MSPC207**	
CO No.	**Course Outcomes**	**Knowledge Level**
CO-1	Understand analytic functions, rational functions and elementary Riemann surfaces.	K2
CO-2	Apply Cauchy's theorem for a rectangle and disk.	K2
CO-3	Derive the calculus of residues and harmonic functions.	K3
CO-4	Determine series and product development, partial fractions and factorization.	K4
CO-5	Evaluate Riemann mapping, conformal mapping of polygons and rectangle.	K5

Course Title	PARTIAL DIFFERENTIAL EQUATIONS	
CODE	**22MSPC208**	
CO No.	**Course Outcomes**	**Knowledge Level**
CO-1	Obtain solutions for non-linear partial differential equations using Cauchy's, Charpit's and Jacobi's Method.	K2
CO-2	Understand the concept of differential equations with constant and variable coefficients and solve them.	K2
CO-3	Demonstrate the knowledge of linear hyperbolic equations and the method of integral transforms.	K3
CO-4	Analyze the boundary value problems and solve them by using separation of variables.	K4
CO-5	Compose clear and accurate proofs using the concepts of Partial Differential Equations	K5

Course Title	MATHEMATICAL STATISTICS	
CODE	**22MSPC209**	
CO No.	**Course Outcomes**	**Knowledge Level**
CO-1	Understand the concepts of marginal and conditional distributions	K2
CO-2	Apply the ideas of mathematical expectation and chebyshev's inequality to solve problems	K3
CO-3	Determine the Poisson, Binomial, Normal and Gamma distributions	K4
CO-4	Analyze chi-square, t distributions and their applications	K4
CO-5	Evaluate significance test and theory of estimation	K5

Course Title	PROGRAMMING IN PYTHON	
CODE	**22MSPCP01**	
CO No.	**Course Outcomes**	**Knowledge Level**
CO-1	Solve the given system of equations	K2
CO-2	Find solution of given algebraic equation	K3
CO-3	Reflect given equation with graphs	K4

Course Title	ADVANCED MULTI – SKILL DEVELOPMENT PAPER	
CODE	**22MSPS201**	
CO No.	**Course Outcomes**	**Knowledge Level**
CO-1	Understand the concepts of General Awareness and Scientific Aptitude.	K2
CO-2	Apply Logical Reasoning	K3
CO-3	Analyze Numerical Reasoning and Quantitative Aptitude	K4
CO-4	Identify and improve the skills in PPT, interview, abstract writing and counseling	K3
CO-5	Discuss the movement and gestures to be avoided in Group Discussion and study about online services.	K4

Course Title	MEASURE THEORY AND INTEGRATION	
CODE	**21MSPC310**	
CO No.	**Course Outcomes**	**Knowledge Level**
CO-1	Acquire the Knowledge of Lebesgue measure in measurable sets and non – measurable sets	K2
CO-2	Discuss the concept of lebesgue integral of a bounded measurable function and measurable non negative function	K2
CO-3	Apply differentiation and integration in monotone functions	K3
CO-4	Analyze integration of measurable functions over general measure spaces	K4
CO-5	Evaluate the construction of product measures and Lebegue measure on Euclidean space	K5

Course Title	TOPOLOGY	
CODE	22MSPC311	
CO No.	Course Outcomes	Knowledge Level
CO-1	Learn open basis and open sub basis, weak topologies, the function algebras $C(X, R)$ and $C(X, C)$	K2
CO-2	Apply continuous functions and homeomorphisms to understand the structure of topological spaces	K2
CO-3	Understand countability and separation axioms in Urysohn Metrization and Tietz's extension theorem	K3
CO-4	Discuss Tychonoff's theorem, locally compact spaces, compactness of metric spaces and Ascoli's theorem	K4
CO-5	Analysing a function is metric, verify a given family is a topology and check a given set is open, closed, dense, compact, connected	K5

Course Title	NUMERICAL ANALYSIS	
CODE	21MSPC312	
CO No.	Course Outcomes	Knowledge Level
CO-1	Acquire the knowledge numerical differentiation and integration	K2
CO-2	Apply the concept of solution of system of equation and method of iteration	K2 & K4
CO-3	Analyze the boundary value problems and characteristic value problems	K3 & K4
CO-4	Demonstrate Euler and Runge Kutta method and examine the Adams Moulton method	K4
CO-5	Evaluate the concepts Poisson equation, Laplace's equation, explicit method and wave equation by finite differences	K5

Course Title	FUZZY SETS AND THEIR APPLICATIONS	
CODE	**21MSPE311**	
CO No.	**Course Outcomes**	**Knowledge Level**
CO-1	Calculate support, height, normal alpha cuts and strong alpha cuts from the Membership Functions and manipulate standard fuzzy operations such as Complement–norm and t– conforms	K2
CO-2	Compute fuzzy relations for equivalence and compatibility	K2
CO-3	Analyse the concepts of possibility theory and fuzzy logic	K3
CO-4	Construct the membership value for fuzzy sets in direct and indirect methods	K4
CO-5	Apply the applications of fuzzy theory in engineering ,biology, medicine, economics and many other disciplines	K5

Course Title	FLUID DYNAMICS	
CODE	**21MSPE321**	
CO No.	**Course Outcomes**	**Knowledge Level**
CO-1	Understand laws of discrete mechanics to continuous systems	K2
CO-2	Derive basic principles of multi–variable calculus, differential equations and complex variables to fluid dynamic problems	K2
CO-3	Analyze fluid flow problems with the application of the momentum and energy	K3
CO-4	Apply modeling approximations in finding exact solutions	K4&K5
CO-5	Derive boundary layer equations by logical reasoning	K5

Course Title	FUNCTIONAL ANALYSIS	
CODE	**21MSPC413**	
CO No.	**Course Outcomes**	**Knowledge Level**
CO-1	Understand the basic and simple examples in Banach spaces	K2
CO-2	Analyze the Determinants and spectrum of an operator in finite dimensional spectral theory	K3
CO-3	Demonstrate the adjoint of an operator and examine the normal and unitary operators	K4
CO-4	Apply the concept of Hilbert Spaces	K4
CO-5	Evaluate the concepts of Banach algebra and solve its problems	K5

Course Title	MATHEMATICAL METHODS	
CODE	**21MSPC414**	
CO No.	**Course Outcomes**	**Knowledge Level**
CO-1	Understand the concepts of Fourier Transforms and its applications	K2
CO-2	Discuss the properties of Hankel transforms and Dirichlet Problems	K2
CO-3	Analyze the types of integral equations	K3
CO-4	Apply the concepts of initial Value and boundary Value problems	K4
CO-5	Demonstrate the method of variations with fixed Boundaries	K5

Course Title	MECHANICS	
CODE	21MSPC415	
CO No.	Course Outcomes	Knowledge Level
CO-1	Understand the concepts of D'Alembert's principle and Lagrange's equations	K2
CO-2	Discuss the concepts of Lagrange's equations from Hamilton's principle and properties	K2
CO-3	Analyze the canonical equations of Hamilton and conservation theorems	K3
CO-4	Demonstrate the concept of Poisson brackets and other canonical invariants	K4
CO-5	Evaluate the concepts of Hamilton–Jacobi equation	K5

Course Title	GRAPH THEORY	
CODE	21MSPE412	
CO No.	Course Outcomes	Knowledge Level
CO-1	Understand the concepts of graphs and subgraphs	K2
CO-2	Discuss the Euler tours and Hamilton cycles of the graph	K3
CO-3	Discuss about matching and edge coloring of the graph	K3
CO-4	Analyze the ideas of independent sets and vertex coloring	K4
CO-5	Evaluate the concepts of planner graphs and directed graphs	K5

Course Title	DIFFERENTIAL GEOMETRY	
CODE	**21MSPE422**	
CO No.	**Course Outcomes**	**Knowledge Level**
CO-1	Develop arguments in the geometric description of curves and surfaces in order to establish basic properties of geodesics	K1
CO-2	Understand the normal curvature of a surface, its connection with the first and second fundamental form and Euler's theorem	K3
CO-3	Compute the curvature and torsion of space curve	K2
CO-4	Analyze the curvilinear coordinates in space and Gauss and Codazzi Equations	K4
CO-5	Apply the Gauss & Codazzi Equations and geodesics concept in solving the problems	K5