DEPARTMENT OF MATHEMATICS

M.Sc. Mathematics

Course Outcomes

On the successful completion of the course, students will be able to

Course Code	Course Name	Course Outcome
20PMAC1	Core I – Algebra	CO1: Understand Sylow's theorem and its applications
		CO2: Acquire knowledge on extension fields and roots of polynomials
		CO3: Analyze the elements of Galois theory and Galois Groups over the rationals
		CO4: Explain Wedderburn's Theorem on Finite Division Rings and a theorem of Frobenius
		CO5: Understand the basic concepts of modules
20PMAC2	Core -II Real Analysis	CO1: Acquire sufficient knowledge of functions of bounded variation
		CO2: Develop Proficiency in the analysis of properties of Riemann – Stieltjes integral
		CO3: Applying Reimann – Stieltjes integral to Mean value theorem, Fundamental Theorem of Calculus
		CO4: Distinguish the role of directional derivative, total derivative and the partial derivative
		CO5: Appraise the requisite of Inverse and Implicit function theorems.
20PMAC3	Core - III Ordinary	CO1: Acquire adequate knowledge about linear dependence and independence of the solutions of

	Differential Equations	differential equations based on Wronskian value.
		CO2: Solve numerous initial value problems of homogenous and non-homogenous equations of n-th order.
		CO3: Gain understanding on the reduction of order of a homogenous equation, nature of the same with analytic coefficients and relate them on a Legendre equation.
		CO4: Examine the computations of Euler equations, equations with regular singular points along with the exception – The Bessel equation.
		CO5: Conclude the idea of Convergence of the successive approximations employing the Lipschitz condition.
20PMAC4	Core IV-Classical Dynamics	CO1: Understand the basic concepts of the mechanical system, generalized coordinates, work, energy and momentum
		CO2: Solve and analyze the Lagrange's equations and integrals of motion with examples
		CO3: Understand the Hamilton's Principle and other variational principles and gain ability to analyze those principles to the problems arising in practical situations
		CO4: gain knowledge about the differential forms and generating functions in canonical transformations, the bilinear covariant and compare the Lagrange's and Poisson brackets
		CO5: understand and develop the Hamilton's Principal function and Hamilton Jacobi equation
20PMAEC1	Elective-I: Numerical	CO1: Acquire knowledge about solving algebraic and transcendental equations

	Analysis	CO2: Understand and apply direct and iterative methods to obtain solutions of linear systems
		CO3: Apply different methods and solve ordinary differential equations
		CO4: Determine the solutions of boundary and eigen value problems
		CO5: Evaluate the solutions of Partial differential equations using numerical methods
20PMAESC1	Elective I - Calculus of Variations and Integral Equations	CO1: Understand underlying notions behind types of boundary conditions and Sturm-Liouville problems
		CO2: Acquire a comprehension on Hamilton's principle, Lagrange's equation and Rayleigh-Rietz method along with problems on disparity for deformable bodies
		CO3: Implement various problems on differential and integral equations with special reference to Fredholm equations
		CO4: Resolve the utilisation of Hilbert-schmidt theory, Neumann series and Fredholm theory on various integral equations
		CO5: Evaluate approximation problems through sets of algebraic equations
20PMAC5	Core V – Linear Algebra	CO1: Understand the basic concepts of Linear transformations, characteristic roots and matrices of linear transformation and its applications.
		CO2: Explain about the algebra of polynomials, polynomial ideals and prime factorization of a polynomial.
		CO3: Understand the basic concepts of determinents and its additional properties.

		CO4: Analyse canonical Form, Jordan Form and Rational canonical Form.
		CO5: Acquire the knowledge on Hermitian, Unitary and Normal Transformations.
20PMAC6	Core VI - Measure and Integration	CO1: Gain knowledge about Measurable sets and Lebesgue measure
		CO2: Acquire knowledge on Lebesgue Integral
		CO3: Understand the concepts of differentiation of monotone functions and absolute continuity
		CO4: Analyse Measure and Integration and applying in the Radon-Nikodym Theorem
		CO5: Extending the concept of measurability
20PMAC7	Core VII - Partial Differential Equations	CO1: Understand the fundamental concepts of classification of second order Partial differential equations, canonical forms, adjoint operators and Riemann's method
		CO2: Determine the occurrence of the laplace and poisson equations, Boundary value problems and develop the properties of harmonic functions and apply the concept of separation of variables
		CO3: Analyse the Dirichlet problem, interior and exterior Dirichlet problem, Neumann problems and find the solutions of some types of laplace equations
		CO4: Develop the knowledge about some kinds of parabolic differential equations. Create and solve the biological problems using the partial differential equations
		CO5: Acquire the knowledge about Green's function for the differential equations and gain the ability to evaluate some real life mathematical problems.

20PMAC8	Core VIII - Differential Geometry	CO1: Define and understand basic notions of the theory of curves and surfaces.
		CO2: Interpret the notions of surface of revolution and direction coefficients.
		CO3: Possess adequate knowledge about isometric correspondence between curves and the underlying notions about geodesics.
		CO4: Apprehend the role of geodesics and it is emphasized on Gauss-Bonnet theorem.
		CO5: Assess a thorough grounding in Principal Curvatures impact on developable of a curve and minimal surface.
20PMAEC2	Elective II - Fuzzy Sets And Their Applications	CO1: Gain knowledge about the basic types of fuzzy sets and the difference between crisp sets and fuzzy sets
		CO2: Understand the concept of operations on fuzzy sets
		CO3: Acquire knowledge about the concepts of fuzzy arithmetic and gain knowledge to solve the related problems
		CO4: Discriminate relations and fuzzy relations
		CO5: Create a fuzzy model and solve social, environmental and biological problems
20PMAESC2	Elective II - Difference Equations	CO1: Evoke the basic concepts behind the theory of difference operators
		CO2: Interpret the notion of solving linear difference equations of first order

		CO3: Perceive the idea of converting nonlinear equations into linear and their applications on z-transform
		CO4: Resolve various initial value problems for linear systems
		CO5: Appraise the methods of Asymptotic analysis and non-linear equations
19PMAC9	Core IX - Complex Analysis	CO1: Know to apply Cauchy's Integral Formula and to know the General form of Cauchy's Theorem
		CO2: To provide a bird's eye view of Calculus of Residues and Harmonic Functions
		CO3: Analyse Power Series Expansion, Partial Fractions and Factorizations
		CO4: Analyse the concepts of Entire functions, Riemann Zeta Functions and Riemann Mapping Theorem
		CO5: Discuss and analyse the Simple Periodic Functions and Doubly Periodic Functions, Weierstrass Theory
19PMAC10	Core -X Topology	CO1: Obtain the basic knowledge in topology
		CO2: Understand the concepts of continuous functions and construct the topology by using the metric
		CO3: Examine the connectedness of topological space
		CO4: Demonstrate fundamental outcomes about compactness within topological structures
		CO5: Characterize; categorize and compare the separation axioms and create a model and solve biological problems
19PMAC11	Core XI - Number Theory	CO1: Know the concepts of primes and congruences
		CO2: Solve the problems of congruences of higher

		degree
		CO3: Gain knowledge and analyze the concepts of quadratic residues, the Jacobi symbol and greatest integer function
		CO4: Understand the notion of Arithmetic function and evaluate the positive division, the sum of positive divisions and the sum of the k^{th} power of the positive divisions of a positive integer
		CO5: Develop a deeper conceptual understanding to solve the equations $x^2 + y^2 = z^2$ and $x^4 + y^4 = z^2$
19PMAC12	Core XII - Mathematical Statistics	CO1: Recall the concepts of Random events, axioms of probability and Independent events
		CO2: Gain knowledge about the Marginal distributions, Conditional distributions, Moments, Regressions
		CO3: Understand the concepts of characteristic functions and Probability generating functions
		CO4: Analyse about the one-point, two-point distributions, Binomial distribution, Poisson distribution, Uniform distribution and Normal distribution
		CO5: Analyze about the stochastic convergence
19PMAEC3	Elective III - Fluid Dynamics	CO1: Gain knowledge about real fluids, equations of continuity and vorticity vector
		CO2: Understand the notions of fluid pressure and derive Euler's equations of motion
		CO3: Know and apply the concepts of sources, sinks and doublets
		CO4: Examine the force and moment of the given flow

		of incompressible fluid using the theorem of Blasius
		CO5: Evaluate pressure of a viscous fluid by using Navier-Stokes's equations of motion of a viscous fluid and create a fluid dynamics model and solve the problems in Physics, Biology and Engineering
19PMAESC3	Elective-III - Graph Theory	CO1: Know the basic definitions and concepts of Graphs and Subgraphs.
		CO2: Get acquainted with the concepts of Trees, Connectivity and to study its applications.
		CO3: Recognize the concepts and properties of Euler Tours, Matchings and to study its applications.
		CO4: Assimilate the knowledge about many different Coloring Problems for Graphs, formulate applied problems as coloring problems and understand the notations of Independent Sets.
		CO5: Acquire the knowledge about the concepts of Vertex Colorings and model in the real life problem.
19PMAEDC	Quantitative Aptitude For Competitive Examinations	CO1: Perform basic computations in numbers, HCF and LCM of numbers, decimal fractions and square and cubic roots
		CO2: Analyze the real world scenarios to recognize and solve the problems on averages, problems on numbers and ages, surds and indices
		CO3: Acquire knowledge about the problems of profit and loss, ratio and proposition, Partnership and chain rule and gain ability to solve them
		CO4: Relate ideas and concepts of problems on trains,

		boats streams and logarthims
		CO5: Understand the concepts of permutations and combinations, probability, height and distances and odd man out and series and gain ability to evaluate the related problems
19PMAC13	Core XIII - Functional Analysis	CO1: Learn and analyse the central concepts of Banach Space, Continuous Linear Transformation, Hahn-Banach Theorem and its Applications.
		CO2: Know about Natural Imbedding, Open Mapping Theorem and analyse its properties.
		CO3: Analyse axiomatic knowledge of the properties of a Hilbert Space, including Orthogonal Complements, Orthonormal Sets, Complete Orthonormal Sets together with related identities and inequalities.
		CO4: Master the relevance of Operator Theory.
		CO5: Discuss and analyse about preliminaries on Banach Algebras and Spectrum of an Operator
19PMAC14	Core XIV - Mathematical Modeling	CO1: Understand the classification and characteristics of mathematical models
		CO2: Apply mathematical models in differential equations to solve real world problems
		CO3: Analyze the planetary and circular motion of satellites through mathematical modeling
		CO4: Analyze the fluid dynamics of blood flows through mathematical models.
		CO5: Evaluate the solution for reducing pollution through mathematical models

19PMAEC4	Elective IV- Optimization Techniques	CO1: Understand the different decision making criterions and their applications
		CO2: Acquire knowledge about solving real world problems by applying minimal spanning tree, shortest route and maximal flow algorithms
		CO3: Analyse the deterministic and probabilistic inventory models
		CO4: Evaluate the optimum solution of multivariable problems and study some selected DP applications.
		CO5: Formulate different queuing systems and emphasize the implementation of the queuing results in practice.
19PMAESC4	Elective IV - Representation Theory	CO1: Recall the basic properties of groups and gain the knowledge of group representations, FG modules and reducibility and group algebras
		CO2: Understand the concepts of FG- homomorphisms, Maschike's theorem, Schur's lemma and irreducible modules
		CO3: Understand the notions of inner product of characters and the number of irreducible characters
		CO4: Analyse the dimensions and characters of representations of symmetric groups, dihedral groups and conjugacy classes
		CO5: Create the character tables and orthogonality relations and gain knowledge about some elementary character table

19PMAQC	Core Practical – MATLAB Practicals	CO1: Get acquainted with fundamental operations in Matlab, Solving Linear Systems and Gauss Elimination
		CO2: Familiar with performing Statistical Data Analysis, Data Interpolation, Polynomial Curve Fitting and Least Square Curve Fitting by Matlab
		CO3: Apply Matlab to solve Ordinary Differential Equations and Non-Linear System of Equations
		CO4: Apply Matlab to solve Partial Differential Equations and Non-Linear System of Equations
		CO5: Create Fuzzy Model using Fuzzy Relations and apply in practical situations.