DEPARTMENT OF MATHEMATICS

COURSE OUTCOMES OF POST GRADUATE PROGRAMMES

(2016 – 2017 onwards)

Name of the Programme: M. Sc., Mathematics			**Semester – I**
Course Code	**Name of the Course**	**Course Outcomes**	
P16MA11	**ALGEBRA**	**CO 1**	Gain expertise in the basic concepts of group theory with the help of numerous examples
		CO 2	Understand permutation groups and Normal subgroups and discuss on counting tricks in algebra.
		CO 3	Bring out the key steps involved in proving Sylow theorems and use Sylow's theorems to classify groups of finite order upto 120
		CO 4	Learn the fundamental concept in field theory of field extensions and would see the idea of generating new fields.
		CO 5	Have clear cut idea in the notions of Galois groups, normal extensions and separable extensions and illustrate them with various examples
P16MA12	**REAL ANALYSIS**	**CO 1**	Describe fundamental properties of the real numbers that lead to the formal development of real analysis
		CO 2	Demonstrate an understanding of limits ad how that are used in sequences
		CO 3	Demonstrate an understanding of limits ad how that are used in series
		CO 4	Demonstrate an understanding of limits ad how that are used in sequences Examine and recognize the continuity of real functions.
		CO 5	Demonstrate an intuitive and computational understanding of set theory, Continuity and solving application problems. This will be assessed through homework, class quizzes and tests, and a final exam.
P16MA13	**ORDINARY DIFFERENTIAL EQUATIONS**	**CO 1**	The general solution of the first order linear homogeneous equations
		CO 2	Understand the utility of the theory of power series which is studied in Real Analysis course through solving various second order differential equations.
		CO 3	Get introduced to the Hyper geometric functions which arises in connection with solutions of the second order ordinary differential equations with regular singular points.
		CO 4	The problems arises in Mathematical physics using properties of special functions.
		CO 5	Understand the importance of studying well-posedness of the problem namely existence, uniqueness and continuous dependence of first order differential equations through Picard's theorem

P16MA14	**GRAPH THEORY**	**CO 1**	Understand and work on the fundamental concepts of graphs
		CO 2	Understand the graph theory-based tools in solving practical problems
		CO 3	Understand basic concepts in Trees and discuss matching problems and its applications elsewhere.
		CO 4	Comprehend and work on the concepts of planarity and discuss the dual of a plane graph.
		CO 5	The concepts of K- colouring graphs
P16MA15	**INTEGRAL EQUATIONS, CALCULUS OF VARIATIONS AND TRANSFORMS**	**CO 1**	Understand concept of calculus of variations and integral equations and their applications
		CO 2	To understand the different types of transforms and their properties.
		CO 3	Described the Hankel Transform equations
		CO 4	Understand the Fredholm's equations
		CO 5	The Fredholm's equations

Name of the Programme: M. Sc., Mathematics			Semester – II
Course Code	**Name of the Course**	**Course Outcomes**	
P16MA21	**COMPLEX ANALYSIS**	**CO 1**	Understand the complex number system from geometric view point. Will gain mastery in arguments on C* and logarithms.
		CO 2	Workout the path integrals on the complex plane.
		CO 3	Understand the central theme of Cauchy theory, viz., existence of local primitives and local power series Expansion
		CO 4	Get acquainted with various techniques of proving fundamental theorem of algebra, open mapping theorem, maximum modulus theorem and Liouville's theorem.
		CO 5	Classify singularities, compute poles and residues and understand the Laurent series expansion.
P16MA22	**LINEAR ALGEBRA**	**CO 1**	Realize that the subject evolves as a generalization of solving a system of linear equations
		CO 2	Discuss in detail the basic concepts of Linear dependence, basis and dimension of a vector space. The students will be able to demonstrate how the geometric ideas turn into rigorous proofs.
		CO 3	Master the dimension formula and rank and nullity theorem which are often exploited.
		CO 4	Having got trained in numerous examples the student realizes the isomorphic theory of linear transformations and matrices.
		CO 5	Learn the theory of determinants and put them in practice
P16MA23	**PARTIAL DIFFERENTIAL EQUATIONS**	**CO 1**	Classify first order partial differential equations and their solutions.
		CO 2	The first order equations and nonlinear partial differential equations using
		CO 3	Use the method of characteristics to solve first order partial differential equations.
		CO 4	Identify and solve the three main classes of second order equations, elliptic, parabolic and hyperbolic.
		CO 5	Understand one dimensional wave equations using method of separation of variables.
P16MAE1B	**MATHEMATICAL MODELING**	**CO 1**	Understand the concept of a mathematical model and explain the series of steps involved in mathematical modeling.
		CO 2	Classify different classes of mathematical models.
		CO 3	Features of a good model and the benefits of using a mathematical model
		CO 4	Identify some simple real-life problems that can be solved using mathematical models.
		CO 5	Convert the physical problems as differential equations through mathematical modeling

P16MAE2C	**NON-LINEAR DIFFERENTIAL EQUATIONS**	**CO 1**	Linear approximation at equilibrium points
		CO 2	Described simple non-linear differential equation using averaging methods.
		CO 3	Described some non-linear differential equation using perturbation methods.
		CO 4	The oscillation and stability properties of the solutions
		CO 5	Non-linear Differential Equation and its properties

Name of the Programme: M. Sc., Mathematics **Semester – III**

Course Code	Name of the Course	Course Outcomes	
P16MA31	CLASSICAL DYNAMICS	CO 1	Understand the important definitions and introductory concepts like the ideas of virtual work and d'Alembert's principle
		CO 2	The Lagrange's equations of motion using d'Alembert's principle.
		CO 3	Understand the nature of equations of motion for holonomic and nonholonomic systems.
		CO 4	Understand the idea of impulsive constraints
		CO 5	Compared the dissipative systems and velocity dependent potentials
P16MA32	MEASURE AND INTEGRATION	CO 1	Understand the concept of integration using measures
		CO 2	Understand the concept of integration using measures
		CO 3	Analyze measurable sets and Lebesgue's measure
		CO 4	Categorize differentiation and integration of monotonic functions
		CO 5	Understand measurable function
P16MA33	TOPOLOGY	CO 1	Understand the concepts of topological spaces
		CO 2	The concepts of metric topology
		CO 3	Discuss connected spaces, the components of a space
		CO 4	Explain compact spaces
		CO 5	Distinguish Urysohn's lemmab and Tietze extension theorem
P16MAE3B	DISCRETE MATHEMATICS	CO 1	The concepts like Boolean algebra, coding theory
		CO 2	Introduce the different notions grammar
		CO 3	The concepts of Lattices
		CO 4	Learned the concepts of Boolean Algebra
		CO 5	Understand the concepts phrase structure grammars.
P16MAE4B	ADVANCED OPERATIONS RESEARCH	CO 1	The LPP by Dynamic programming methods
		CO 2	Formulate simulation models
		CO 3	Determine solutions for Non-linear programming problems
		CO 4	Determine the Inventory models
		CO 5	The concepts of game theory

Name of the Programme: M. Sc., Mathematics **Semester – IV**

Course Code	Name of the Course	Course Outcomes	
P16MA41	FUNCTIONAL ANALYSIS	CO 1	The three structure theorems of Functional Analysis viz.,
		CO 2	Hahn-Banach theorem, Open mapping theorem and Uniform boundedness principle.
		CO 3	Hilbert spaces and operator theory leading to the spectral theory of operators on a Hilbert space.
		CO 4	Estimate Hahn Banach theorem and its consequences
		CO 5	Understand the closed graph theorem and its properties
P16MA42	DIFFERENTIAL GEOMETRY	CO 1	Described the tangent,normal,and binormal.
		CO 2	Understanding the concepts of osculating circle, sphere
		CO 3	The fundamental forms and its application
		CO 4	Appraise fundamental forms and its applications
		CO 5	Determine the geodesic, gauss equation
P16MA43	ADVANCED NUMERICAL ANALYSIS	CO 1	Determine the theory behind various numerical methods
		CO 2	Understand these methods to solve mathematical problems.
		CO 3	Understand the concepts of Interpolation
		CO 4	Understand the concepts of Gauss Legendre Integration method and Lobatto Integration Methods only.
		CO 5	The concepts of R-K method
P16MAE5C	ALGEBRIC NUMBER THEORY	CO 1	The students to the charm, niceties and nuances in the world of numbers.
		CO 2	Highlight some of the Applications of the Theory of Numbers
		CO 3	Understand the concept of The Legendre symbols
		CO 4	The concept Combinatorial number theory
		CO 5	Applications of Diophantine Equations