MASTER OF SCIENCE (MATHEMATICS)

COURSE OUTCOMES

SEMESTER 1

16MAT21C1 (Abstract Algebra)

CO1: Apply group theoretic reasoning to group actions.

CO2: Learn properties and analysis of solvable & nilpotent groups, Noetherian&Artinian modules and rings.

CO3: Apply Sylow's theorems to describe the structure of some finite abelianand non- abelain groups and use the concepts of isomorphism and homomorphism for groups and rings.

CO4: Use various canonical types of groups and rings- cyclic groups and groups of Permutations, polynomial rings and modular rings.

CO5: Analyze and illustrate examples of composition series, normal series, subnormal series.

16MAT21C2 (Mathematical Analysis)

CO1: Understand Riemann Stieltjes integral, its properties and rectifiable curves.

CO2: Learn about point-wise and uniform convergence of sequence and series of functions and various tests for uniform convergence.

CO3: Find the stationary points and extreme values of implicit functions.

CO4: Be familiar with the chain rule, partial derivatives and concept of derivation in an open subset of Rn.

16MAT21C3 (Ordinary Differential Equations)

CO1: Apply differential equations to variety of problems in diversified fields of life.
CO2: Learn use of differential equations for modeling and solving real life problems.
CO3: Interpret the obtained solutions in terms of the physical quantities involved in the original problem under reference.
CO4: Use various methods of approximation to get qualitative information about the general behaviour of the solutions of various problems.

16MAT21C4 (Complex Analysis)

CO1: Be familiar with complex numbers and their geometrical interpretations.
CO2: Able to determine Analyticity and Differentiability of functions.
CO3: Use Cauchy’s integral theorem or formula to compute integral.

CO4: Able to find Laurent series about isolated singularity and determine residues.
CO5: Use Residue theorem to compute different types of integrals.

16MAT21C5 (Mathematical Statistics)

CO1: Understand the mathematical basis of probability and its applications in various fields of life.
CO2: Create, use and analyse graphical representations of mathematical relationships.
CO3: Have competence in practically applying the discrete and continuous probability distributions along with their properties.
CO4: Decide as to which test of significance is to be applied for any given large sample problem.

SEMESTER 2

16MAT22C1 (Theory of field Extensions)

CO1: Use diverse properties of field extensions in various areas.

CO2: Establish the connection between the concept of field extensions and Galois theory.

CO3: Describe the concept of automorphism, monomorphism and their linear independence in field theory.
CO4: Compute the Galois group for several classical situations.

CO5: Solve polynomial equations by radicals along with the understanding of ruler and compass constructions.

16MAT22C2 (Measure and Integration Theory)

CO1: Describe the shortcomings of Riemann integral and benefits of Lebesgue integral.
CO2: Understand the fundamental concept of measure and Lebesgue measure.
CO3: Learn about the differentiation of monotonic function, indefinite integral, use of the fundamental theorem of calculus.
CO4: Describe the concept of function of bounded variation and its representation.

16MAT22C3 (Integral Equations and Calculus of Variations)

CO1: Understand the methods to reduce Initial value problems associated with linear Differential equations to various integral equations.
CO2: Categorise and solve different integral equations using various techniques.

CO3: Describe importance of Green's function method for solving boundary value problems associated with non-homogeneous ordinary and partial differential equations, especially the Sturm- Liouville boundary value problems.
CO4: Learn Boundary value problem and find eigen value and eigen function for a given strum liouville problem.

16MAT22C4 (Partial Differential Equations)

CO1: Establish a fundamental familiarity with partial differential equations and their Applications.
CO2: Distinguish between linear and nonlinear partial differential equations.
CO3: Solve boundary value problems related to Laplace, heat and wave equations by Various methods.
CO4: Use Green's function method to solve partial differential equations.
CO5: Find complete integrals of Non-linear first order partial differential equations.

16MAT22C5 (Operations Research Techniques)

CO1: Identify and develop operations research model describing a real life problem.
CO2: Understand the mathematical tools that are needed to solve various optimisation problems.
CO3: Solve various linear programming, transportation, assignment, queuing, inventory and game problems related to real life.
CO4: Solve two person zero sum game , Game with saddle points, the rule of Dominance; Algebraic, Graphical and linear Programming methods for solving mixed strategy games.

16CSAF1 Computer Fundamentals

CO1: Gives overall view of working of computer system and practical application of the subject.
CO2: An ability to identify , formulate and develop solutions to computational challenges.
CO3: Understand the concepts of networking and related technologies.
CO4: An ability to apply knowledge of computing and mathematics appropriate to the discipline.

16ENVO1 Environmental Issues

CO1: Understand and address complex environmental issues from a problem oriented interdisciplinary perspectives.
CO2: Understand primary environmental problems, climate change, water pollution and science behind problems faced and potential solutions.
CO3: Understands the environmental problems and ways of addressing them local to global scale
CO4: Students will contribute to interdisciplinary research and problem solving through independent and collaborative work.

SEMESTER 3

17MAT23C1 (Functional Analysis)

CO1: Discuss various problems in different space: vector space, inner product space and Hilbert Spaces.
CO2: Understand the concepts of bounded linear transformation, equivalent formulation of continuity and spaces of bounded linear transformations.
CO3: Explain the fundamental concepts of functional analysis.
CO4: Understand the approximation of continuous functions.
CO5: Understand the definitions of linear functional and prove the Hahn-Banach theorem, open mapping theorem, uniform boundedness theorem, etc.

17MAT23C2 (Elementary Topology)

CO1: Get familiar with the concepts of topological space and continuous functions.
CO2: Generate new topologies from a given set with bases.
CO3: Describe the concept of homeomorphism and topological invariants.
CO4: Establish connectedness and compactness of topological spaces and proofs of related theorems.
CO5: Have in-depth knowledge of separation axioms and their properties.

17MAT23C3 (Fluid Dynamics)

CO1: Explain the fundamental concepts of fluid dynamics.
CO2: Derive and solve equation of continuity, equations of motion, vorticity equation, equation of moving boundary surface, pressure equation and equation of impulsive action for a moving inviscid fluid.
CO3: Calculate velocity fields and forces on bodies for simple steady and unsteady Flow including those derived from potentials.
CO4: Understand the concepts of velocity potential, stream function and complex potential and their use in solving two-dimensional flow problems applying complex-variable techniques.
CO5: Represent mathematically the potentials of source, sink and doublets in twodimensions as well as three-dimensions, and study their images in impermeable Surfaces.

17MAT23DA1 (Discrete Mathematics) Discipline Specific Elective

CO1: Be familiar with fundamental mathematical concepts and terminology of discrete mathematics and discrete structures.

CO2: Express a logic sentence in terms of predicates quantifiers and logical connectives.

CO3: Write an argument using logical notation and determines if the argument is valid or fallacy.
CO4: Apply the rules of inference and contradiction for proofs of various results.
CO5: Evaluate Boolean functions and simplifies expressions using the properties of Boolean algebra.
CO6: Use finite-state machines to model problem in computer operations.

17MAT23DB1 (Analytical Number Theory)

CO1: Know about the classical results related to prime numbers and get familiar with the irrationality of *e* and *Π*.
CO2: Study the algebraic properties of Un and Qn.

CO3: Learn about the Waring problems and their applicability.

CO4: Learn the definition, examples and simple properties of arithmetic functions and about perfect numbers.
CO5: Understand the representation of numbers by two or four squares and use it to prove the related theorems.

16ENVO2 (Disaster Management)

CO1: Provide knowledge among individuals and groups to take actions to reduce their vulnerability to disasters.
CO2: Present study aimed to review the importance of education and the effect of different method of education on disaster risk reduction.
CO3: learn managing material and spread learning to their families and communication.
CO4: To ensure skills and abilities to analyse effects of disaster and methods to deliver public health and these effects.

SEMESTER IV

17MAT24C1 (Inner Product Spaces and Measure Theory)

CO1: Understand Hilbert spaces and related terms.
CO2: Introduce the concept of projections, measure and outer measure.
CO3: Learn about Hahn, Jordan and Radon-Nikodyn decomposition theorem, Lebesguestieltjes integral, Baire sets and Baire measure.
CO4: Understand Fubini theorem, Continuous functions with compact support.

17MAT24C2 (Classical Mechanics)

CO1: Be familiar with the concepts of momental ellipsoid, equipotential systems and general motion of a rigid body.
CO2: Understand ideal constrains, general equation of dynamics and Lagrange's equations for potential forces.
CO3: Describe Hamiltonian function, Poincare-Carton integral invariant and principle of least action.
CO4: Get familiar with canonical transformations, conditions of canonicity of transformation in terms of Lagrange and Poisson brackets.

17MAT24C3 (Viscous Fluid Dynamics)

CO1: Understand about vortex motion and its permanence, rectilinear vertices, vortex Images and specific types of rows of vortices.
CO2: Model mathematically the compressible fluid flow and describe various aspects of gas flow.
CO3: Acquire knowledge of viscosity, relation between shear stress and rates of shear strain for Newtonian fluids, energy dissipation due to viscosity, and laminar and turbulent flows.
CO4: Derive the equations of motion for a viscous fluid flow and use them for study of flow Newtonian fluids in pipes and ducts for laminar flow fields, and their applications in mechanical engineering.
CO5: Get familiar with dimensional analysis and similitude, and understand the common dimensional numbers of fluid dynamics along with their physical and mathematical significance.

17MAT24DA2 (Graph Theory) Discipline Specific Elective

CO1: Able to solve problem using basic graph theory
CO2: Understand graph, subgraphs, connected and disconnected graphs etc.
CO3: Determine whether Hamiltonian or Eulerian graphs.
CO4: Solve problems involving vertex, edge connectivity, planarity and edge colouring.
CO5: Apply tree and graph algorithms to solve problems.
CO6: Model real world problems and solve them using basic Graph Theory.

17MAT24DB1 (Algebraic Number Theory) Discipline Specific Elective

CO1: Learn the arithmetic of algebraic number fields.
CO2: Prove theorems for integral bases and unique factorisation into ideals.
CO3: Factorise an algebraic integer into irreducible.
CO4: Obtain the ideals of an algebraic number ring.
CO5: Understand ramified and unramified extensions and their related results.

PROGRAMME OUTCOMES

The objectives of the program are as follows:

PO1: To cultivate a mathematical aptitude and nurture the interests of the students towards problem solving aptitude. Further, it aims at motivating the young minds for research in mathematical sciences and to train computational scientists who can work on real life challenging problems.

PO2: Professionally inclined Mathematics educators who have sound knowledge of subject matter and specialised in constructivist & alternate pedagogy.

PO3: Contribute as trained work force to provide teaching-learning support to schools

PO4: Equip the student with skills to analyse problems, formulate an hypothesis, evaluate and validate results, and draw reasonable conclusions thereof.

PO5: Provide knowledge of a wide range of mathematical techniques and application of mathematical methods/tools in other scientific and engineering domains.

P06:. Imbibe effective scientific and technical communication in both oral and writing.

P07: Identify, formulate and analyse the complex problems using the principal of Mathematics.

P08: Continue to acquire relevant knowledge and skills appropriate to professional activities and demonstrate highest standards of ethical issues in mathematical sciences.

PROGRAMME SPECIFIC OUTCOMES

PSO1: Understanding of the fundamental axioms in mathematics and capability of developing ideas based on them.

PSO2: Prepare and motivate students for research studies in mathematics and related fields.

PSO3: Provide advanced knowledge on topics in pure mathematics, empowering the students to pursue higher degrees at reputed academic institutions.

PSO4: Strong foundation on algebraic topology and representation theory which have strong links and application in theoretical physics, in particular string theory.

PSO5: Good understanding of number theory which can be used in modern online cryptographic technologies.

PSO6: Nurture problem solving skills, thinking, creativity through assignments, project work.

PSO7: Assist students in preparing (personal guidance, books) for competitive exams e.g. NET, GATE, etc.

PSO8: Students enable to apply the concepts of statistics, Operations Research and Probability theory in real life problems.