M.Sc. Mathematics

Programme Specific Outcomes

At the time of post graduation, the students will be able to-

PSO1: Acquire advanced knowledge in Mathematics

PSO2: Able to solve complex mathematical problems effectively

PSO3: Equip knowledge in various concepts involved in Algebra, Real analysis, Complex analysis, discrete Mathematics, Mechanics, Functional analysis and Difference equations

PSO4: Acquire a breadth and depth of understanding of advances in Mathematics

PSO5: Able to solve differential and difference equations

PSO6: Acquire the knowledge of stereographic projections in complex analysis

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Course Outcomes

Semester I

Advanced Abstract Algebra- I

At the time of post graduation, the students will be able to-

CO1: Describe binary relation, binary operation, group, subgroup, cyclic group

CO2: Describe Lagrange's theorem, Fermat's and Euler's Theorem

CO3: Explain in detail Normal subgroup, quotient group, fundamental theorem of group homomorphism, automorphism

CO4: Explain permutation group, centre, Normaliser, derived group, Cayles Theorem

CO5: Describe Normal series, solvable and Nilpotent group, alternating group

CO6: State Fundamental theorem of finitely generated abelian group, Sylow theorems and applications

Real Analysis- I

At the time of post graduation, the students will be able to-

CO1: Explain Riemann Stielties integrals and its properties

CO2: Describe sequence and series of functions and learn their tests for Convergence

CO3: State Weierstrass theorem, Abel's and Taylor's Theorem

CO4: Explain functions of several variables, chain rule

CO5: Describe inverse function theorem, implicit function theorem

Topology-I

At the time of post graduation, the students will be able to-

CO1: Explain countable, uncountable sets, principle of induction, metric spaces, open sets, closed sets

CO2: Describe Closure of a set, interior of a set and their properties

CO3: Describe bases and subbases, product space, weak topology

CO4: Describe evaluation map and related results

CO5: Describe directed sets, net, cluster point, subnet, ultranet, filter

Complex Analysis- I

At the time of post graduation, the students will be able to-

CO1: Describe complex number system

CO2: Describe metric spaces, connectedness, compactness, uniform Convergence

CO3: Explain elementary properties of exponential function, trigonometric and hyperbolic functions, roots of unity, Cauchy-Riemann equations, harmonic functions

CO4: Explain analytic functions as a mapping, Mobius transformations, bilinear transformation

CO5: Define the index of a closed curve, Cauchy's theorem, Gaursat's theorem, singularities

Advanced Discrete Mathematics- I

At the time of post graduation, the students will be able to-

CO1: Explain tautologies, equivalence and implication of statements

CO2: Describe semi groups and monoids and their related theorems

CO3: Find Lattices and sublattices, direct product and homomorphism

CO4: Explain Boolean algebra and various Boolean identities

CO5: Determine sum of products and product of sum, canonical form of given Boolean expressions

Semester II

Advanced Abstract Algebra- II

At the time of post graduation, the students will be able to-

CO1: Describe Ring, Ideals and their properties

CO2: Define Vector spaces, Linear dependence and independence, Basis and Modules

CO3: Explain linear transformation, characteristic roots and triangular form

CO4: Describe Extension field, irreducible polynomial and finite fields

CO5: Describe automorphism of group, Galois Theory, polynomial solvable by radicals

Real Analysis-II

At the time of post graduation, the students will be able to-

CO1: Explain measure, measurable sets, Borel and Lebegue measurability

CO2: Explain integration of functions of real variable and Integration of series

CO3: Describe Riemann and Lebeque integral and functions of bounded variations

CO4: Describe abstract measure spaces and integration with respective to a Measure

CO5: Explain LP spaces, convex functions, Jensen's inequality and almost uniform convergence

Topology-II

At the time of post graduation, the students will be able to-

CO1: Describe Separation axioms, T0, T1, T2 spaces, their properties and characterizations

CO2: Define Normal spaces, T4 spaces, Urysorn's lemma, second countable spaces and Lindelof spaces

CO3: Define compactness, sequentially and countably compact spaces

CO4: Describe Lebesgue covering lemma, Urysohn's metrization theorem and metrizability of T0 spaces

CO5: Explain connected spaces, components, simple chain, path wise and Locally connected

Complex Analysis- II

At the time of post graduation, the students will be able to-

CO1: Explain compactness and convergence in the space of Analytic functions, Factorization of the sine function, the gamma function

CO2: Describe Harmonic functions, basic properties of harmonic function, Poisson integral formula

CO3: Describe entire functions, Jensen's formulae, the genus and Order of an entire function, Wadamard Factorization theorem

CO4: Describe Univalent function CO5: Explain Analytic continuation, special functions

Elective course

Advanced Discrete Mathematics- II

At the time of post graduation, the students will be able to-

CO1: Define graphs, subgraphs and fundamental concepts, operations on graph

CO2: Define degree, Paths, Cycles, connectedness of graph

CO3: Describe Eulerian paths and cycles of graphs

CO4: Explain planar graphs and Euler formula for planer graphs

CO5: Describe digraph, directed paths, cycles and Matrix representation of graph

S.Y. M.Sc.

Semester III

Functional Analysis

At the time of post graduation, the students will be able to-

CO1: Explain normed linear space, Banach spaces and Examples

CO2: Describe bounded linear transformations, Hahn- Banach Theorem, Reflexive spaces.

CO3: Explain open mapping theorem, closed graph theorem, inner product Spaces

CO4: Describe Hilbert spaces and its properties, Bessel's inequality, Parseval's Identity

CO5: Explain self Adjoint operator, eigen values and eigen spaces of an operator on a normal space, finite dimensional spectral theorem

Partial differential equation

At the time of post graduation, the students will be able to-

CO1: Give classification of second order partial differential equation, Laplace Equations and Poisson's equation

CO2: Describe harmonic functions, Green's function, Energy method and uniqueness

CO3: Explain fundamental solution of heat equation, Initial value problem, Mean value formula

CO4: Describe non-linear first order complete integral

CO5: Explain transformation method, Fourier transform and Laplace transform, arabolic partial differential equation with quadratic number linearity, Burger's equation with viscosity

Elective course

Numerical Analysis

At the time of post graduation, the students will be able to-

CO1: Determine solution of algebraic and transcendental equation by various methods

CO2: Determine solution of system of linear equation by Gauss Elimination method, iteration method, Gauss Seidal method, SOR method

CO3: Explain finite differences, Lagranges and Newton interpolation, piecewise and spleen interpolation

CO4: Explain differentiation and integration

CO5: Determine solution of ordinary differential equation by Taylor's series, Picard method, Euler method, Runge- Kutta method

Elective course

Lattice Theory

At the time of post graduation, the students will be able to-

CO1: Describe partially order set, lattice as a poset, lattice as a algebra, Hasse Diagram, Meet and join tables

CO2: Describe Isotone maps, sublattites, ideals, complete lattice and their Properties

CO3: Describe distributive and modular lattice, Demorgan's identities, Boolean algebra, Dedikinds modularity criterion

CO4: Describe Stone theorem, distributive lattices with pseudo Complementation.

CO5: Define join infinite distributive identity, distributive Standard and neutral elements

Elective course

Difference Equations-I

At the time of post graduation, the students will be able to-

CO1: Define difference operator, summation generating functions

CO2: Calculate the solution of linear difference equation of first order, general Results for linear equations

CO3: Determine solution of nonlinear equation with variable coefficient, the Z transforms applications

CO4: Explain stability theory, initial value problem for linear system CO5: Explain Asymptotic methods

Semester IV

Core course

Linear Integral Equations

At the time of post graduation, the students will be able to-

CO1: Describe linear integral equations types of linear integral equations, Symmetrical kernel

CO2: Find solution of linear integral equations, verification of solution of Linear integral equations

CO3: Describe the differential method of finding the solution of Fredholm Integral equation and Volterra integral equations

CO4: Describe symmetric kernel, trace of kernel, Hilbert –schmidth Theorem

CO5: Describe integral transform methods, Fourier transform, applications to Volterra integral equations, Green's function, approach for ordinary Differential equations

Mechanics

At the time of post graduation, the students will be able to

CO1: Describe D'alemberts principal and Lagrange's equation of motion

CO2: Explain Functional, Euler's equations and Motivating problems of calculus of variations

CO3: Explain the fixed end point problem for n unknown functions and variational problems in parametric form

CO4: Describe Hamilton principle and applications of Hamilton's formulation, Cyclic coordinates, conservation theorem

CO5: Describe two dimensional motion of rigid bodies Cayle- Klein parameters and related quantities

Elective course

Fuzzy Mathematics

At the time of post graduation, the students will be able to-

CO1: Describe theory of Fuzzy sets as measure of uncertainty and ambiguidy Fuzzy logic.

CO2: Describe basic concepts in fuzzy sets, convex fuzzy sets

CO3: Give properties of α-cuts, Decomposition theorem, operations on fuzzy sets

CO4: Describe fuzzy arithmetic, fuzzy numbers, arithmetic operations on fuzzy numbers

CO5: Explain fuzzy relations, fuzzy prepositions and their interpretation in terms of fuzzy sets, fuzzy rules

Elective course

Linear Algebra

At the time of post graduation, the students will be able to-

CO1: Explain vector spaces, subspaces, linear dependence Independence, basis and dimension of a vector space

CO2: Find rank of matrix, rank of linear transformation

CO3: Describe algebra of linear transformation, dual spaces

CO4: Determine Eigen values and Eigen vectors

CO5: State Cayle-Hamilton theorem and explain minimal polynomial

CO6: Describe canonical forms, diagonal form, triangular form, Jordan form

Elective course

Difference Equations-II

At the time of post graduation, the students will be able to-

CO1: Describe self adjoint second order linear equations, Green's function, the Riccati equations, oscillations

CO2: Explain Sturm-liouville problem, finite fourier analysis

CO3: Explain discrete calculation of variations

CO4: Find the solution of BVP for nonlinear equations, Lipschitz condition

CO5: Describe discrimination of partial differential equations

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