MASTER OF SCIENCE(MATHS)

M.SC. MATHS

PROGRAMME OUTCOMES

PO1: Core Mathematical Principles- Effectively apply fundamental concepts from pure and applied mathematics, including algebra, calculus, differential equations, discrete mathematics, geometry, analysis, numerical analysis, probability and statistics etc.

PO2: Analytical Problem-Solving- Build strong analytical and abstract thinking skills to solve problems effectively using a range of mathematical techniques.

PO3: Applied Quantitative Modeling- Construct and critically analyze mathematical models to address real-world challenges across various domains like physics, engineering, and biology.

PO4: Bridging Disciplines- Seamlessly integrate mathematical principles with other disciplines, such as Computer Science and Statistics, to solve complex problems.

PO5: Spatial & Structural Insight- Analyze intricate geometric structures and thoroughly explore the properties of topological spaces.

PO6: Practical Problem Solving- Translate practical business and industrial problems into robust mathematical models and derive effective solutions.

PO7: Technology Fluency- Demonstrate broad proficiency with key technologies, including SQL, C/ C++ Language, MATLAB, Data Communication and Networking, Data Structure and Computer Graphics.

PO8: Continuous Learning & Professional Development- Actively engage in continuous learning to stay current with advancements in mathematical sciences and related fields.

PO9: Computational Proficiency- Proficiently use modern software tools, such as MATLAB and Python, for the effective computation and resolution of mathematical problems.

PO10: Research & Project Skills- Conduct independent research and projects, effectively interpreting and clearly communicating complex

MASTER OF SCIENCE(MATHS)

M.SC. MATHS

1st SEMESTER

MAJOR	SKILL ENHANCEMENT COURSE
Abstract Algebra, Mathematical Analysis, Complex Analysis, Mathematical Statistics, Analytical Number Theory	Advanced Discrete Mathematics

Name of the Course- Abstract Algebra
Course Code- 24MAT201DS01

Course Outcomes-

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 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

Name of the Course- Mathematical Analysis
Course Code- 24MAT201DS02

Course Outcomes-

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

CO2: Learn about pointwise and uniform convergence of sequence and series of functions and various tests for uniform convergence.

CO3: Examine the impact of uniform convergence on continuity and differentiability of limit functions.

CO4: Work with power series, convergence theorems and functions of several variables, apply concepts like partial derivatives, linear tansformation and differential mappings in R^n

CO5: Apply Taylor's theorem, implicit/explicit differential and optimization techniques including Lagrange multipliers and Jacobian for functions of several variables.

Name of the Course- Complex Analysis
Course Code - 24MAT201DS03

Course Outcomes-

CO1: Be familiar with complex numbers and their geometrical interpretations.

CO2: Understand the concept of complex numbers as an extension of the real numbers.

CO3: Represent the sum function of a power series as an analytic function.

CO4: Demonstrate the ideas of complex differentiation and integration for solving related problems and establishing theoretical results.

CO5: Understand concept of residues, evaluate contour integrals and solve polynomial equations.

Name of the Course- Mathematical Statistics
Course Code - 24MAT201DS04

Course Outcomes-

CO1: Understand the mathematical basis of probability and its applications in various fields of life.

CO2: Use and apply the concepts of probability mass/density functions for the problems involving single/bivariate random variables.

CO3: Have competence in practically applying the discrete and continuous probability distributions along with their properties.

CO4: Formulate hypothesis tests by defining null and alternative hypotheses, specifying critical regions, and distinguishing types of errors.

CO5: Decide as to which test of significance is to be applied for any given large sample problem.

Name of the Course- Analytical Number Theory
Course Code - 24MAT201DS05

Course Outcomes-

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: Explore concepts of Diophantine equations.
CO5: Understand the representation of numbers by two or four squares. Apply the theoretical knowledge of number theory to solve real-world problems.

Name of the Course- Advanced Discrete Mathematics
SKILL ENHANCEMENT COURSE
Course Code - 24MAT201SE01

Course Outcomes-

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: Use finite-state machines to model computer operations.
CO4: Apply the rules of inference and contradiction for proofs of various results.
CO5: Evaluate boolean functions and simplify expressions using the properties of boolean algebra.

MASTER OF SCIENCE(MATHS)

M.SC. MATHS

2nd SEMESTER

MAJOR	SKILL ENHANCEMENT COURSE
Theory of Field Extensions, Measure and Integration Theory, Integral Equations and Calculation of Variations, Operations Research Techniques, Algebraic Number Theory	Python Programming

Name of the Course- Theory of Field Extensions
Course Code- 24MAT202DS01

Course Outcomes-

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.

Name of the Course- Measure and Integration Theory
Course Code- 24MAT202DS02

Course Outcomes-

CO1: Understand the fundamental concept of measure and Lebesgue measure.
CO2: Characterize measurable functions, discussing equivalent definitions and foundational properties.
CO3: Distinguish convergence modes (pointwise, almost uniform, in measure) and apply convergence theorems (e.g., Riesz's theorem).

CO4: Describe the shortcomings of Riemann integral and benefits of Lebesgue integral.
CO5: Learn about the differentiation of monotonic function, indefinite integral, use of the fundamental theorem of calculus.

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Name of the Course- Integral Equations and Calculation of Variations
Course Code- 24MAT202DS03

Course Outcomes-

CO1: Understand and apply the concepts of Integral Equations including Abel's, Fredholm and Volterra equations.
CO2: Solve integral equations by various methods such as successive approximations, Neumann series and resolvent kernel.
CO3: Demonstrate the knowledge of Euler-Lagrange equations for different forms of functionals.
CO4: Familiar with isoperimetric problem and its solutions.
CO5: Apply these concepts to solve engineering and other applied problems.

Name of the Course- Operations Research Techniques
Course Code- 24MAT202DS04

Course Outcomes-

CO1: Formulate and solve Linear Programming Problems using various techniques such as graphical method, simplex method, and dual simplex method.
CO2: Understand and apply the concepts of transportation and assignment problems.
CO3: Learn about game theory and its applications in decision-making.
CO4: Apply the knowledge of queuing theory to model and analyze waiting lines.
CO5: Solve real-world problems in various fields using operations research techniques.

Name of the Course- Algebraic Number Theory
Course Code- 24MAT202DS05

Course Outcomes-

CO1: Understand number fields, algebraic integers, and integral bases.
CO2: Describe units in quadratic and cyclotomic fields and demonstrate their properties.
CO3: Analyze the factorization of ideals and Dedekind domains.
CO4: Understand the concepts of unique factorization, class group, and class number.
CO5: Understand ramified and unramified extensions and their related results.

Name of the Course- Python Programming
SKILL ENHANCEMENT COURSE
Course Code - 24MAT202SE02

Course Outcomes-

CO1: Demonstrate proficiency in handling of operators, expressions, I/O statements and control structures.
CO2: Identify the methods to create and manipulate lists, tuples and dictionaries.
CO3: Demonstrate proficiency in handling strings, creating functions.
CO4: Implement file handling operations and python graphics.
CO5: Link computational thinking with problem solving to accomplish useful goals.