COURSE OUTCOMES

2019 ONWARDS

DEPARTMENT: MATHEMATICS

PROGRAMME: M.Sc. MATHEMATICS

SEMESTER 1

1) ABSTRACT ALGEBRA

- Analyse finite fields
- Establish the application of sylow theory
- Identify polynomials over a field and factorise them in certain extension fields
- Distinguish prime ideals and maximal ideals

2) LINEAR ALGEBRA

- Prove results in linear algebra using appropriate proof writing process
- Diagonalize and orthogonolly diagonalize symmetric matrices
- Find Eigen values and Eigen vectors and use them in applications

3) BASIC TOPOLOGY

- Interpret the basic concepts of topology
- Analyse the concept of continuity in topological spaces
- Distinguishes various topological properties

4) REAL ANALYSIS

- Analysis of the function of bounded variation
- Able tp find and understand mean value theorems for Riemann-Stieltjes integrals
- To find infinite series, infinite products and power series

5) GRAPH THEORY

- State the technical definitions of all terms related to graph
- Formulate graph theoretic models to solve real world problems
- Apply theorems and result to construct solutions to problems

SEMESTER 2

1) ADAVNCED ABSTRACT ALGEBRA

- ❖ Exhibit in depth the analysis and critical thinking to identify, formulate and solve problems related to extension fields
- ❖ Demonstrate understanding of the idea of automorphism of fields
- ❖ Illustrate the theory of Galois and Demonstrate the relationship between roots of Galois group

2) NUMERICAL ANALYSIS WITH PYTHON3

- ❖ Develop conditional and iterative statements to write Python programs
- ❖ Program the numerical methods to create simple and efficient python codes that output the numerical solutions at the required degree of accuracy
- ❖ Use the plotting functions of Matplotlib to present the result graphically

3) COMPLEX ANALYSIS

- ❖ Demonstrate understanding of the basic concepts underlying complex analysis
- ❖ Apply methods of complex analysis to evaluate definite integrals and infinite series
- ❖ Prove basic results in complex analysis & applying the results

4) ADVANCED TOPOLOGY

- ❖ Interpret various characterization of normality
- ❖ Analyse the concept of convergence in topology
- ❖ Understand equivalence of paths using homotopy concept

5) MEASURE THEORY AND INTEGRATION

- Able to analyse the fundamentals of measure theory especially Lebesgue outer measure, measurable functions, outer and inner measures etc.
- Aply the general principles of measure theory for decomposition of a measurable set using Hahns and Jordans theorems of Decomposition
- Introduce integration of non-negative measurable functions and general measurable functions.

SEMESTER 3

1) ADVANCED COMPLEX ANALYSIS

- Exhibit in depth the analytical and critical thinking to identify, formulate and solve problems related to harmonic functions
- Compute and solve power series related problems and demonstrate understanding of the idea of canonical product
- Internet Riemann zeta function and illustrate its applications

2) PARTIAL DIFFERENTIAL EQUATIONS

- Methods to solve linear and nonlinear partial differential equations of first and second order
- Classify partial differential equations and transform it into canonical form
- Apply partial differential equations to predict the behavior of certain phenomena

3) MULTIVARIATE CALCULUS AND INTEGRAL TRANSFORMS

- To understand Weirstrass theorem and several forms of Fourier transforms
- Describe derivative concept for a general infinite dimensional space
- Applying inverse function theorems and implicit function theorem for finding the extremes of functions

4) FUNCTIONAL ANALYSIS

- To understand the basic concepts of normed spaces, banach spaces.
- To get introduced to the theory of linear operators and linear functional bounded and unbounded
- To get familiarized with orthogonal complements, orthonormal sets, projection mappings and applying the concepts to represent functional in terms of inner products

5) OPTIMIZATION TECHNIQUES

- To understand the basic concepts of linear programming
- Describe the basics of different evolutionary algorithms

- ❖ Enumerate fundamentals of linear programming techniques and apply different techniques to solve various optimization problems.

SEMESTER 4

1) SPECTRAL THEORY

- ❖ Demonstrate accurate and efficient use of spectral theoretic concepts
- ❖ Obtain an overview of spectral properties of bounded linear operators
- ❖ Distinguishes various types of operators on Hilbert spaces

2) ANALYTIC NUMBER THEORY

- ❖ Masters the basic concepts of analytic number theory
- ❖ Obtain an overview of Dirichlet products
- ❖ Analysis of equivalent conditions of Prime Number theorem

3) COMBINATORICS

- ❖ Conceptualise arrangement and derangement
- ❖ Practical application of Pigeonhole principle
- ❖ Analysis of Pascals Triangle

4) ALGORITHMIC GRAPH THEORY

- ❖ Understand the various types of algorithms and its complexity
- ❖ Distinguishes the features of various trees and graph algorithms
- ❖ Appreciate the applications of digraph, matching and graph flow

5) DIFFERENTIAL GEOMETRY

- ❖ Analyse problems in geometry using the techniques of differential calculus, integral calculus and linear algebra
- ❖ Introduce the concept of parameterized curves
- ❖ Enhance the skill to sketch graphs, level sets and vector fields