PG COURSE OUTCOMES (MATHS WITH COMPUTER SCIENCE)

SEMESTER-I

COURSETITLE: ABSTRACT ALGEBRA PAPER-I

After completion of this course, students will be able

- Concept of group action.
- Class equation and its applications
- Sylow's Theorems and their applications.
- Ideal of a ring, Polynomial rings
- Euclidean Domains, Principle Ideal Domains, & Unique Fraction Domains and relations among them.
- Ability to understand the various Principle Ideal Domains whose common example is the ring of integers $\mathbb{Z}$.

SEMESTER- I

COURSETITLE: MATHEMATICAL ANALYSIS PAPER-II

After completion of this course, students will be able to

- **Concept of extended real numbers,**
- **Lebesgue and Borel measures on real line.**
- **Measurability of real sets.**
- **Measurability of extended real valued functions.**
- **Foundation of extension to abstract spaces.**
- **Solving problems relating to determinations of measures of finite, infinite sets.**
- **Ability of constructing measurable, non-measurable sets and functions.**

SEMESTER- I

COURSE TITLE: DISCRETEMATHEMATICS PAPER-III

Upon successful completion of this course, the student will be able to:

- Understand the basic principles of sets and operations insets
- Apply counting principles to determine probabilities
- Demonstrate different traversal methods for trees and graphs
- Write model problems in computer science using trees and graphs
- Write an argument using logical notation and determine if the argument is or is not valid
- Determine when a function is one- one and onto.
- Prove basic set equalities.
- Demonstrate the ability to write and evaluate a proof.

SEMESTER- II

COURSE TITLE: LINEAR ALGEBRA PAPER-I

- **Upon successful completion of this course, the student will be able to**

- Construct, or give examples of, mathematical expressions that involve vectors, matrices, and linear systems of linear equations
- Finding eigen values and eigenvectors of a matrix or a linear transformation,and using them to diagonalize a matrix
- Demonstrate understanding of linear independence, span, and basis
- Apply principles of Matrix Algebra to linear transformations
- Characterize homogeneous linear systems using the concepts of free variables, span, pivots, linear combinations, and echelon forms
- Characterize linear transforms using the concepts of existence and uniqueness

SEMESTER- II

COURSETITLE: ORDINARY DIFFERENTIAL & PARTIAL DIFFERENTIALEQUATIONS PAPER-II

After studying this course, you should be able to

- Solution methods for first and second order equations.
- Power series solutions.
- Properties of Bessel functions and Legendre polynomials.
- Existence and uniqueness of initial value problems.
- Picard's and Peano's theorems, Gronwall's inequality.
- Maximal interval of existence, continuous dependence
- Higher order linear equations and linear systems, fundamental solutions,
- Wronskian, matrix exponential equations. Boundary value problems for second order equations, Green functions,

SEMESTER- II

COURSETITLE: COMPLEX ANALYSIS PAPER-III

Upon successful completion of this course, the student will be able to:

- Justify the need for a Complex Number System and explain how is relatedto other existing number systems
- Define a function of complex variable and carry out basic mathematical operations with complex numbers.
- know the condition(s) for a complex variable function to be analytic and/or harmonic
- State and prove the Cauchy Riemann Equation and use it to show that a function is analytic.
- define singularities of a function, know the different types of singularities, and be able to determine the points of singularities of a function
- Explain the concept of transformation in a complex space (linear and non-linear) and sketch associated diagrams.
- Understand the concept of sequences and series with respect to the complex numbers system and establish whether a given series/ sequences is convergent/ divergent at a specified point or interval.

SEMESTER- III

COURSE TITLE: ELEMENTARY NUMBER THEORY PAPER- I

Objective: Elementary Number Theory is the study of the basic structure and properties of integers. Learning Number Theory helps improving one's ability of mathematical thinking. **Successful completion of this course will enable you to:**

- Prove results involving divisibility and greatest common divisors.
- Solve systems of linear congruence's.
- Find integral solutions to specified linear Diophantine Equations.
- Apply Euler-Fermat's Theorem to prove relations involving prime numbers.
- Apply the Wilson's theorem.

SEMESTER- III

COURSE TITLE: OPERATION RESEARCH PAPER-IV

Upon successful completion of this course, the student will be able to:

- Operation Research is used for defence capability acquisition decision making.
- It is used to find optimal or near optimal solutions to complex decision making problems.
- It is used in finding maximum (of profit or yield) in real-world objective.
- It is used in finding minimum (of loss or cost) in real-world objective.
- It is used in data envelopment.
- It has strong ties to computer science and analytics.

SEMESTER- IV

TITLE: INTEGRAL EQUATIONS AND CALCULUS OF VARIATION PAPER-I

Upon successful completion of this course, the student will be able to:

- Learn variation principles
- Develop the knowledge in the path of the rocket trajectory, optimal economic growth
- Gain the vast knowledge by using the applications of calculus of variations in biological and medical field.
  Ex: Spread of a contagious disease, pest control cancer

Chemo therapyand immune system, etc.

- Learn easier & systematic way to ordinary and differential equations and partial differential equations
- Develop the skills while doing/solving the various problems by using integral equations in all engineering sciences andetc.

SEMESTER- IV

COURSE TITLE: NUMERICAL ANALYSIS PAPER-IV

Upon successful completion of this course, the student will be able to:

- Apply numerical methods to obtain approximate solutions to mathematical problems.
- To learn how to interpolate the given set of values
- Derive numerical methods for various mathematical operations and tasks, such as interpolation, differentiation, integration, the solution of linear and nonlinear equations, and the solution of differential equations.
- Work out numerical differentiation and integration whenever and wherever routine methods are not applicable.
- Work numerically on the ordinary differential equations using different methods through the theory of finite differences.
- Demonstrate understanding of common numerical methods and how they are used to obtain approximate solutions to otherwise intractable mathematical problems.