

## **PG COURSE OUTCOMES**

### **SEMESTER- I**

#### **COURSE TITLE: ALGEBRA PAPER- I**

**After completion of this course, students will be able**

- To classify numbers into number sets.
- To combine polynomial by addition or subtraction.
- To solve problems of simple Inequalities
- Interpret basic absolute value expression
- To simplify algebraic expressions, using the commutative, associative and Distributive properties.

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### **SEMESTER- I**

#### **COURSE TITLE: ANALYSIS PAPER- II**

**After completion of this course, students will be able to**

- Describe fundamental properties of the real numbers that lead to the formal development of real analysis.
- Comprehend regions arguments developing the theory underpinning real analysis
- Demonstrate an understanding of limits ad how that are used in sequences, series and differentiation.
- Construct rigorous mathematical proofs of basic results in real analysis.
- Appreciate how abstract ideas and regions methods in mathematical analysis can be applied to important practical problems.

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### **SEMESTER- I**

#### **COURSE TITLE: MATHEMATICAL METHODS PAPER- III**

**After studying this course, you should be able to**

- Demonstrate familiarity with emerging mathematical techniques appropriate in banks and other financial institutions.
- Demonstrate an ability to select and apply numerical methods appropriate for the solution of financial problems.

- The principles of mathematical reasoning and their use in understanding analyzing and developing formal arguments.
- The connections between the mathematical series and other scientific and humoristic disciplines.
- Undertake a piece of directed in mathematical finance.

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### SEMESTER- I

#### **COURSE TITLE: ELEMENTARY NUMBER THEORY PAPER- IV**

**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 congruences;
- Find integral solutions to specified linear Diophantine Equations;
- Apply Euler-Fermat's Theorem to prove relations involving prime numbers;
- Apply the Wilson's theorem.

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### SEMESTER- II

#### **COURSE TITLE: ADVANCED ALGEBRA PAPER- I**

- **On satisfying the requirements of this course, students will have the knowledge and skills to:**
- Explain the fundamental concepts of advanced algebra and their role in modern mathematics and applied contexts.
- Explain Demonstrate accurate and efficient use of advanced algebraic techniques.
- Demonstrate capacity for mathematical reasoning through analyzing, Proving and explaining concepts from advanced algebra.
- Apply problem-solving using advanced algebraic techniques applied to diverse situations in physics, engineering and other mathematical

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### SEMESTER- II

#### **COURSE TITLE: ADVANCED ANALYSIS PAPER- II**

**After completion of this course, students will be able to**

- Read analyze and write logical arguments to prove mathematical concepts
- Communicate mathematical ideas with clarity and coherence both written and verbally
- Fundamental objects ,techniques and theorems in the mathematical sciences including the fields of analysis
- Master the object material in the four required core course that form the academic pillars of the program
- Demonstrate a competence in formulating , analysing and solving problems in several core areas of mathematics at a detailed level , including analysis

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## SEMESTER- II

### **TITLE: THEORY OF ORDINARY DIFFERENTIAL EQUATION PAPER- III**

**After completion of this course, students will be able to:**

- The study of Differential focuses on the existence and uniqueness of solutions and also emphasizes the rigorous justification of methods for approximating solutions in pure and applied mathematics.
- It plays an important role in modelling virtually every physically technical or biological process from celestial motion to bridge design to interactions between neurons.
- Theory of differential equations is widely used in formulating many fundamental laws of physics and chemistry.
- Theory of differential equation is used in economics and biology to model the behaviour of complex systems.
- Differential equations have a remarkable ability to predicts the world around us. They can describe exponential growth and decay population growth of species or change in investment return over time.

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## SEMESTER- II

### **COURSE TITLE: TOPOLOGY PAPER- IV**

**After completion of this course, students will be able to:**

- Topology uses to analyze complex networks

Ex: Social networks, Biological networks, Internet etc.

- It applies Differential Topology to probability to identify multivariate interactions. This was used in neuro science recently to deduce how neurons are interacting.
- This paper discusses using cell phones to actually map out the topology of indoor spaces.
- Another cool application is in the world of chemistry where one can discuss the shape of molecules by an analysis of the topology of a related graph.
- There is also an application for medical imaging software and technology.

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### SEMESTER- III

**COURSE TITLE: ANALYSIS**

**PAPER- I**

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

- Justify the need for a Complex Number System and explain how is related to 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.

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### SEMESTER- III

**COURSE TITLE: ANALYSIS**

**PAPER-II**

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

- Explain the fundamental concepts of functional analysis and their role in modern mathematics and applied contexts
- Demonstrate accurate and efficient use of functional analysis techniques.
- Demonstrate capacity for mathematical reasoning through analysing proving and explaining concepts from functional analysis.
- Apply problem-solving using functional analysis technique applied to diverse situations in physics, engineering and other mathematical context.

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### SEMESTER- III

**COURSE TITLE: DISCRETE MATHEMATICS**

**PAPER-III**

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

- Understand the basic principles of sets and operations in sets
- 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.

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### 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.

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### SEMESTER- IV

**COURSE TITLE: ADVANCED COMPLEX ANALYSIS      PAPER-I**

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

- Perform basic algebraic manipulation with complex numbers
- Understand the geometric interpretation of complex numbers
- Know methods of finding the nth roots of complex numbers and the solutions of simple polynomial equations.
- Use analytical functions and conformal mappings;
- Compute definite integrals using residue calculus;
- Appreciate the existence of special functions and their use in a range of contexts.

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### SEMESTER- IV

**COURSE TITLE: GENERAL MEASURE THEORY      PAPER-II**

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

- Students will understand the fundamentals of measure theory and be acquainted with the proofs of the fundamental theorems underlying the theory of integration.
- They will also have an understanding of how these underpin the use of mathematical concepts such as volume, area, and integration and
- They will develop a perspective on the broader impact of measure theory in ergodic theory and have the ability to pursue further studies in this and related area.
- The students will learn about measure theory random variables, independence, expectations and conditional expectations, product measures and discrete parameter martingales.
- Explain the concept of length, area, volume using lebesgue's theory.
- Apply the general principles of measure theory and integration in such concrete subjects as the theory of probability or financial mathematics.

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**SEMESTER- IV**

**TITLE: INTEGRAL CALCULUS AND CALCULUS OF VARIATION PAPER-III**

**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 chemotherapy and 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 and etc.

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**SEMESTER- IV**

**COURSE TITLE: ADVANCED OPERATION RESEARCH PAPER-IV**

**After studying this course, you should be able to:**

- Give an appreciation of strategic importance of operations and supply chain management in a global business environment.
- Understand how an operation relates to other business function.
- Develop a working knowledge of concepts and methods related to designing and managing operations and supply chains.
- Develop a skill set for quality and process improvement.
- Develops how to manage and control the resource allocation.

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