

## **DEPARTMENT OF PG MATHEMATICS**

### **COURSE OUTCOMES**

#### **SEMESTER - I**

#### **ALGEBRA - 1**

<b>CO#</b>	<b>Course Outcome</b>
<b>C01</b>	Describe the definitions of Automorphism, Conjugacy and G- sets with it's examples.
<b>C02</b>	Discuss finitely generated abelian groups and invariants of finite abelian groups.
<b>C03</b>	Explain Sylow's first theorem, Sylow's second theorem and Sylow's third theorem with it's examples.
<b>C04</b>	Discuss ideals and homomorphism, Maximal ideal and prime ideal, Nilpotent ideal and nil ideal.
<b>C05</b>	Simply explain Zorn's lemma.
<b>C06</b>	Learn the unique factorization domain, principal ideal domain and Euclidean domain.

#### **REAL ANALYSIS - 1**

<b>CO#</b>	<b>Course Outcome</b>
<b>C01</b>	Describe the finite countable and uncountable sets, Metric spaces and Compact sets.
<b>C02</b>	Explain the convergent sequences & Cauchy sequences & some special sequences.
<b>C03</b>	Solve the problems to using ratio and root tests and analyze power series.
<b>C04</b>	Understand the limits of functions & continuity and compactness and Monotonic functions.
<b>C05</b>	Learn the Mean value theorems, L- Hospital's Rule and Taylor's theorem.

#### **DIFFERENTIAL EQUATIONS**

<b>CO#</b>	<b>Course Outcome</b>
<b>C01</b>	Applications of second order linear differential equations will be studied.
<b>C02</b>	Solve Homogeneous equations and use of a known solution to find another.
<b>C03</b>	Recognise differential equations that can be solved by each of three methods.
<b>C04</b>	Solve the boundary value problems and by Sturm Comparison theorem solved Eigenvalues, Eigen functions.
<b>C05</b>	Review of Power Series and solved first and second order linear equations to verify ordinary, regular singular points.
<b>C06</b>	Understand the linear system and solved homogeneous linear system with constant Co-efficients.

## TOPOLOGY

CO#	Course Outcome
C01	Gain an understanding the algebra of sets, functions, Product of sets , Partitions andequivalence relations.
C02	Learn the basic concepts of open set and closed sets and apply these two sets in real lifeexamples.
C03	Develop the Knowledge on Topological spaces through the participating in a Quiz.
C04	Know the Weak Topologies.
C05	Understand the Tychonoff's theorem and Ascoli's theorem.

## DISCRETE MATHEMATICS

CO#	Course Outcome
C01	Discuss relations, properties of binary relations in a set, Relation matrix and graph of a relation, partition and covering of a set, equivalence relations, compatibility relation, composition of binary relations.
C02	Discuss lattices as partially ordered sets, some properties of lattices, lattices as algebraic systems.
C03	Explain Boolean algebra, sub algebra, direct product and homomorphism.
C04	Acquire the knowledge from Boolean forms and free Boolean algebras, values of Boolean expressions.
C05	Describe representations and minimizations of Boolean functions.
C06	Explain finite state machines, Introductory sequential circuits, equivalence of Finite State Machines.

## SEMESTER - II

## ALGEBRA - II

CO#	Course Outcome
C01	Discuss the definitions of Irreducible polynomials and Eisenstein criterion, Algebraicextensions and algebraically closed fields with it's examples.
C02	Explain splitting fields and normal extensions, multiple roots, finite fields and Separable extensions.
C03	Simply explain fundamental theorem of Galois theory and fundamental theorem of algebra.
C04	Explain applications of Galois theory to classical problems.
C05	Solve the problems by using radicals, ruler and compass construction.

## REAL ANALYSIS - II

CO#	Course Outcome
C01	Learn the definition and existence of the Riemann stieltjes Integral.
C02	Acquire the Knowledge of uniform convergence and uniform convergence & continuity and Integration.
C03	Apply the stone wierstrass theorem for obtain results von the function of algebra.
C04	Understand the Linear Transformations and the contraction principle.
C05	Give seminars on the implicit function theorem, the Rank theorem & Derivatives of higher order for improving subject.

## COMPLEX ANALYSIS – I

CO#	Course Outcome
C01	Discuss the elementary properties and solved the examples of Analytic functions.
C02	Understand the mobius transformations.
C03	Know the fundamentals of Analytic functions, to studied Riemann Stieltjes integrals and Analyze Power Series representation of Analytic function.
C04	Learn the Cauchy's theorem and the homotopic version of Cauchy's theorem.
C05	Examine functions are analytic in a punctured disk.

## LINEAR ALGEBRA

CO#	Course Outcome
C01	Explain elementary canonical forms, annihilating polynomials, invariant subspaces.
C02	Discuss Simultaneous triangulation and simultaneous diagonalization.
C03	Describe direct –sum decompositions, invariant direct-sums.
C04	Discuss the primary decomposition theorem, cyclic subspaces and Annihilators. Learned cyclic decompositions and the rational forms.
C05	Acquire the knowledge in the Jordan forms, computation of invariant factors, semi simple operators.
C06	Discuss Bilinear forms, symmetric bilinear forms and skew symmetric Bilinear forms.

## PROBABILITY THEORY AND STATISTICS

CO#	Course Outcome
C01	Discuss Sample spaces, events and the axioms of Probability.
C02	Learn some elementary theorems and Boole's inequality.
C03	Give brief explanation on Conditional probability and studied Bayes theorem.
C04	Discuss Discrete and Continuous Random variables and studied Binomial, Poisson, Normal and uniform distributions.
C05	Learn meaning of Correlation, Scatter diagram Karl Pearson's coefficient of Correlation, Rank Correlation.
C06	Know types of sampling, parameters and solved some problems on tests of significance.

### SEMESTER - III

## LEBESGUE THEORY

CO#	Course Outcome
C01	Explain algebra of sets, Lebesgue measure, outer measure, measurable set and Lebesgue measure.
C02	Discuss non-measurable set, measurable function, Littlewood's three principles
C03	Describe the Riemann integral, the Lebesgue integral of a bounded function over a set of finite measures.
C04	Explain the integral of a non-negative function, the general Lebesgue integral convergence in measure.
C05	Acquire the knowledge in differentiation of monotonic functions, functions of bounded variation, differentiation of an integral.
C06	Learn $L_p$ -spaces, the Hölder's and Minkowski inequalities, convergence and completeness.

## PARTIAL DIFFERENTIAL EQUATIONS

CO#	Course Outcome
C01	Recall the basic concepts of Partial Differential Equations.
C02	Explain the Pfaffian Differential forms and equations and some exercises.
C03	Solve the problems on Cauchy's Method of characteristics & compatible system of first order equations.
C04	Know the Partial Differential Equations of the second order and solve the linear hyperbolic equations.
C05	Understand the elementary solutions, and Method of separation of variables of solving Laplace equation and the wave equation.

## COMMUTATIVE ALGEBRA

CO#	Course Outcome
C01	Review the definition and elementary properties of rings.
C02	Discuss the prime and maximal ideals and explain the various elementary operations performed on ideals.
C03	Give the definition and elementary properties of modules and gave brief treatment of tensor products.
C04	Discuss how tensor products behave for exact sequences.
C05	To educate the definitions and simple properties of the formation of fractions.
C06	Discuss the decomposition of an ideal into Primary ideals and establish the uniqueness theorems.

## SEMESTER - IV

## MEASURE THEORY

CO#	Course Outcome
C01	Explain convergence and completeness in measure spaces.
C02	Discuss measurable functions, integration, general convergence theorems.
C03	Describe signed measures, the Raydon- Nikodym theorem, the LPspaces.
C04	Explain outer measures and measurability, the Extension theorem.
C05	Discuss the Lebesgue- stieltjes integral, product measures.
C06	Acquire the knowledge in integral operators, inner measure, extension by sets of measure 0, caratheodory outer measure.

## NUMERICAL ANALYSIS

CO#	Course Outcome
C01	Determine the roots of a polynomial equation and obtain the initial approximations to the roots by solved some problems in different methods.
C02	To find the roots of the equations by some of the iteration methods.
C03	Discuss the methods to construct the interpolating polynomials to a function and interpolate the indicated points.
C04	To evaluate the derivative of a function in the closed form by Numerical methods.

## GRAPH THEORY

CO#	Course Outcome
<b>C01</b>	Learn the basic concepts of graphs and trees and fundamental circuits.
<b>C02</b>	Know the cutsets and connectivity and separability.
<b>C03</b>	Acquire the Knowledge of Planar graphs and Dual graphs.
<b>C04</b>	Explain the Matrix representation of graphs and Application to a switching network in real life.
<b>C05</b>	Describe the coloring, covering and Partitioning and further Operation Research.

## LINEAR PROGRAMMING

CO#	Course Outcome
<b>C01</b>	Discuss the formulation of linear programming problems, graphical solution and general solution of linear programming problem.
<b>C02</b>	Describe simplex method and two- phase method, Big- M method and to resolve degeneracy in linear programming problem, solved problems in simplex method.
<b>C03</b>	Explain the concept of duality in linear programming and comparison of the solution of the dual and primal.
<b>C04</b>	Learn the formulation of assignment problem, Reduction theorem and Hungarian assignment method, traveling salesman problems.
<b>C05</b>	Explain formation of transportation problem, methods to find initial basic feasible solution and north- West corner rule, lowest cost entry method and Vogel's approximation method.
<b>C06</b>	Discuss optimality test, degeneracy in transportation problems and unbalanced transportation problem.

## DISCRETE DYNAMICAL SYSTEMS

CO#	Course Outcome
<b>C01</b>	Discuss Phase portrait, periodic points and stable sets, differentiability and its implications.
<b>C02</b>	Explain the Sarkovskii's theorem and some basic problems.
<b>C03</b>	Learn the definitions of parameterized families of functions and bifurcations Cantor set's, symbolic dynamics and chaos.
<b>C04</b>	Describe topological Conjugacy, period doubling cascade, Newton method.
<b>C05</b>	Solve the problems on Numerical solutions of differential equations on Newton's method in complex plane.