BRIDGE COURSE

INTRODUCTION TO ALGEBRA:

- <u>Set Theory:</u> Union of sets, intersection of sets, difference set, complement, Cartesian product.
- Mapping: Definition of mapping, binary operation, onto, inverse image, one-to-one mapping, composition.
- > <u>The Integer:</u> Greatest common divisor, prime number, relatively prime.
- Groups: Definition of a group, abelian (or) commutative group, examples of groups, sub groups, co-sets, finite groups, relatively prime, normal sub group, cyclic group, permutations, homomorphism, isomorphism, kernel, kernel of homomorphism, fundamental theorem of homomorphism, lagrange's theorem, quotient groups, ideal, maximal ideal, principle ideal, field, integral domain.

BRIDGE COURSE

INTRODUCTION TO REAL ANALYSIS:

- Set, open set, neighbourhood of a point, interior point, interior set, limit points of a set, closed set, function, increasing function, decreasing function, monotonic increasing, real line, real valued function.
- Limit function, continuous function, discontinuous function, uniform continuity, derivability, sequence, convergent of a sequence, series, limit point of a sequence, the limit interior, the limit superior, power series.
- Partitions, refinement of a partitions, upper bound, lower bound, least upper bound, greatest lower bound, upper Riemann sum, lower Riemann sum, lower Riemann integral, upper Riemann integral, Riemann integrable, Darboux's theorem, Rolle's theorem, Lagrange's mean value theorem, Taylor's theorems.

BRIDGE COURSE

INTRODUCTION TO DIFFERENTIAL EQUATIONS:

- Introduction, how differential equation arise, types of differential equations, Wronskain, general solutions, homogeneous & linear equations of first & second order differential equations, variations of parameters
- Qualitative properties of solutions, boundary & initial value problems, eigen values & eigen functions.
- Power series, series solutions of first order equations, system of first order equations, linear systems, homogeneous linear systems, successive approximations, existence & uniqueness of solutions.
- Second order linear differential equations: General solution of the homogeneous equation, use of a known solution to find the another, homogeneous equation with constant coefficients.

BRIDGE COURSE

INTRODUCTION TO TOPOLOGY:

- Injection, onto, bijection, set, proper subset, subset, contains, containing, contained, inclusion, proper inclusion, union of sets, intersection of sets, empty set.
- Contrapositive and converse, the difference of two sets, arbitrary unions and intersections, Cartesian products, infimum, supremum, metric spaces, demorgon's laws.
- Functions, range, restriction, composite, surjective, injective, bijective, inverse function, identity function, inverse function.
- Relations, equivalence relations and partitions, order relations, largest element, bounded above, bounded below, limit point, continuous map, converges, open set, closed set, finite set.

BRIDGE COURSE

INTRODUCTION TO DICRETE MATHEMATICS:

- Relations and ordering: Relations, properties of binary relations in a set, relation matrix and the graph of a relation, partially ordered sets, representation and associated terminology.
- Lattices: Lattices as partially ordered sets, some properties of lattices, lattices as algebraic systems, sub lattices, direct product and homomorphism, some special lattices.
- Boolean Algebra: Sub algebra, Boolean forms and free Boolean algebras, Boolean functions.
- Representations and minimization of Boolean function: Representation of Boolean functions, minimization of Boolean functions.

BRIDGE COURSE

ALGEBRA

- Automorphism, Conjugacy and G-Sets, Normal series solvable groups, Nilpotent groups.
- Structure theorems of groups: Direct product, Finitely generated abelian groups, Invariants of a finite abelian group, Sylows theorems.
- Ideals and homomorphisms,Sum and direct sum of ideals,Maximal and prime ideals,Nilpotent and nil ideals.
- Unique factorization domains,Principle ideal domains,Euclidean domains,Polynomial rings over UFD

BRIDGE COURSE

REAL ANALYSIS

- Basic Topology: Finite, Countable and Uncountable sets, Metric Spaces, Compact Sets, Perfect Sets, Connected Sets.
- Numerical Sequences and Series: Convergence Sequences, Cauchy Sequences, Upper and Lower limits, Absolute Convergece, The Root and Ratio tests, Power series, Addition and Multiplication of series, Some special sequences.
- Continuity: Limits of Functions, Continuous functions, Continuity and Compactness, Continuity and Connectedness, Discontinuities, Monotonic Functions.
- Differentiation: Mean value theorems,L-Hospital's Rule,Taylor's Theorem,Differentiation of vector valued functions.

BRIDGE COURSE

DIFFRENTIAL EQUATIONS

- Second order linear differential equations: General solution of the homogeneous equation, use of a known solution to find the another, Homogeneous equation with constant coefficients.
- Oscillation theory and boundary value problems:Qualitative properties of solutions,The strum comparison theorem Eigen values,Eigen functions and the vibrating string.
- Power series solutions: A review of power series, series solutions of first order equations, second order linear equations, Ordinary points, regular singular points.
- System of first order equations: Linear systems, Homogeneous linear systems with constant coefficients, Existence and Uniqueness of solutions, Successive approximation, Picard's theorem.

BRIDGE COURS

TOPOLOGY

- Sets and Functions:Setsand inclusion,The algebra of sets,Functions, Products of sets Partition and equivalence relations,countable sets,Uncountable sets.
- Metric space: Open sets, Closed sets, Convegence, Completeness and Baire;s theorem Continuous mapping.
- Spaces of continuous functions, Euclidean and unitary spaces, Topological spaces, open bases and open sub bases, Weak topology.
- Compactness: Compact spaces, Product Spaces, Tychonoff's Theorem and locally compact spaces, Compactness for metric spaces, Ascoli theorem.

BRIDGE COURSE

DISCRETE MATHEMATICS

- Relations and ordering: Relations, properties of binary relations in a set, Relation matrix and the graph of a relation, Partially ordered sets, Represention and associated terminology.
- Lattices:Lattices as Partially ordered sets,some properties of lattices,Lattices as algebraic systems,Sub lattices,Direct product and homomorphism some special lattices.
- Boolean Algebra: Sub algebra, Boolean forms and free

Boolean Algebras, Boolean functions.

 Representations and minimization of Boolean function: Representation of Boolean functions, Minimization of Boolean functions.