Course: BTech **Semester:** 3

Prerequisite: Basic Concepts of Set Theory, Function

Rationale: The course provides a mathematical background related to Computer engineering.

Teaching and Examination Scheme

Teaching Scheme					Examination Scheme					Total
					Internal Marks			External Marks		
Lecture Hrs/Week	Tutorial Hrs/Week	Lab Hrs/Week	Hrs/Week	Credit	T	CE	P	T	P	
4	-	-	-	4	20	20	-	60	-	100

SEE - Semester End Examination, **CIA** - Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.)

Course Content

W - Weightage (%) , **T** - Teaching hours

Sr.	Topics	W	T
1	**UNIT 1Sets, Relation and Function:** Cartesian products, Binary relation, Partial ordering relation, Equivalence relation, Size of a set, Finite and infinite sets, Countable and uncountable Sets, Cantor's diagonal argument, The power Set theorem, Schroeder-Bernstein theorem, **Lattices:** Definitions and properties, Hasse diagrams, and examples	11	6
2	**UNIT 2Principles of Mathematical Induction**: The Well-Ordering Principle, Recursive definition, The division algorithm: Prime Numbers, The greatest common Divisor: Euclidean Algorithm, The fundamental theorem of arithmetic. Basic counting techniques-inclusion and exclusion, pigeon-hole principle, permutation and combination.	9	5
3	**UNIT 3Propositional Logic:** Syntax, Semantics, Validity and Satisfiability, Basic Connectives and Truth Tables, Logical Equivalence: the laws of logic, logical implication, Rules of inference, The use of quantifiers **Proof Techniques:** Some terminology, Proof methods and Strategies, Forward Proof, Proof by contradiction, Proof by contraposition, Proof of necessity and sufficiency.	18	11
4	**UNIT 4Algebraic Structures and Morphism:** Algebraic Structures with one binary operation, Semi groups, Monoids, Groups, Congruence relation and Quotient structures, Free and cyclic groups, Permutation groups, Substructures, Normal subgroups, Algebraic structures with two binary operation, Rings, Integral domain and Fields. Boolean algebra and Boolean ring, Identities of boolean algebra, duality, Representation of boolean function, Disjunctive and conjunctive normal form.	40	24
5	**UNIT 5Graphs and Trees:** Graphs and their properties, Degree, connectivity, Path, Cycle, Sub Graph, Isomorphism, Eulerian and Hamiltonian walks, Graph colouring, colouring maps and Planar graphs, colouring vertices, colouring edges, List colouring, Perfect graph, definition properties and example, Rooted trees and sorting, Weighted trees and Prefix codes, Bi-connected component and Articulation Points, Shortest distances.	22	14

Reference Books

1.	**Discrete Mathematics and its Applications (TextBook)** By Kenneth H. Rosen | Tata McGraw – Hill
2.	**Discrete Mathematics** By Norman L. Biggs | Oxford University Press | 2nd Edition
3.	**Discrete Mathematical Structures with Applications to Computer Science (TextBook)** By J.P.Tremblay and R. Manohar | Tata McGraw-Hill
4.	**Discrete Mathematics with Applications (TextBook)** By Susanna S. Epp | Wadsworth Publishing Co. Inc. | 4
5.	**Elements of Discrete Mathematics A Computer Oriented Approach (TextBook)** By C. L. Liu and D P Mohapatra | Tata McGraw – Hill | 3

Course Outcome

After Learning the Course the students shall be able to:
Equivalence relation. • Apply principles of mathematical induction and basic counting techniques to solve problems involving prime numbers, divisibility, and combinatorial analysis. • Evaluate propositional logic statements and proof techniques to construct valid arguments, identify logical equivalences, and apply quantifiers effectively in proofs. • Differentiate algebraic structures and apply congruence relations to solve problems in abstract algebra, including groups, rings, and Boolean algebras. • Analyze graph properties and algorithms (Evaluation level of Bloom's Taxonomy) to solve problems related to connectivity, shortest paths, and tree structures efficiently.