PARUL UNIVERSITY - FACULTY OF ENGINEERING AND TECHNOLOGY
B. TECH. PROGRAMME (3rd SEM) (CSE/ IT)
DISCRETE MATHEMATICS (303191202)
ACADEMIC YEAR 2023-24

Type of Course: Engineering Mathematics

Prerequisite: Basic Concepts of Set Theory, Function

Rationale: The course provides mathematical background related to Computer engineering
Teaching and Examination Scheme:

Teaching Scheme (Hrs/Week)			Credit	Examination Scheme					Total
				External		Internal			
L	T	P		Theory	Practical	Theory	*C.E.	Practical	
4	0	0	4	60	0	00	40	00	100

L- Lectures; **T-** Tutorial; **P-** Practical; **C.E.** -Continuous Evaluation

Contents:

Sr. No.	Topic	Weightage	Teaching Hrs.
1	**Sets, 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 and The Power Set theorem, Schroeder-Bernstein theorem	11%	6
2	**Principles 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	**Propositional 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	**Algebraic Structures and Morphism:** Algebraic Structures with one Binary Operation, Semi Groups, Monoids, Groups, Congruence Relation and Quotient Structures, Free and Cyclic Monoids and 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	**Graphs 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, trees and sorting, weighted trees and prefix codes, Bi-connected component and Articulation Points, Shortest distances.	22%	14

Text books:
1. Kenneth H. Rosen, Discrete Mathematics and its Applications, Tata McGraw – Hill
2. J.P. Tremblay and R. Manohar, Discrete Mathematical Structure and It's Application to Computer Science", TMG Edition, TataMcgraw-Hill
3. Susanna S. Epp, Discrete Mathematics with Applications,4th edition, Wadsworth Publishing Co. Inc.
4. C. L. Liu and D P Mohapatra, Elements of Discrete Mathematics A Computer Oriented Approach, 3rd Edition by, Tata McGraw – Hill.

Reference books:
1. Norman L. Biggs, Discrete Mathematics, 2nd Edition, Oxford University Press.

Course Outcomes

After learning the course the students can be able to:

1. Express logical sentences in terms of predicates, quantifiers, and logical connectives.
2. Derive the solution of a given problem using deductive logic and prove the solution based on logical inference.
3. Classify an algebraic structure of any mathematical problem.
4. Evaluate Boolean functions and simplify expressions using the properties of Boolean algebra.
5. Develop the given problem as graph networks and solve with techniques of graph theory.