SMTA1302	DISCRETE MATHEMATICS	L	T	P	Credits	Total Marks
		3	*	0	3	100

COURSE OBJECTIVE

- Analytical, logical thinking and conclusions based on quantitative information will be the main objective of learning this subject.

UNIT 1 LOGIC **9 Hrs.**

Statements – Truth tables – Connectives – Equivalent Propositions – Tautological Implications – Normal forms – Predicate Calculus – Inference theory for Propositional Calculus and Predicate Calculus.

UNIT 2 SET THEORY **9 Hrs.**

Basic concepts of Set theory – Laws of Set theory - Partition of set, Relations – Types of Relations: Equivalence relation, Partial ordering relation – Graphs of relation – Hasse diagram – Functions: Injective, Surjective, Bijective functions, Composition of functions, Identity and Inverse functions.

UNIT 3 GROUP THEORY **9 Hrs.**

Groups – Properties of groups – Semi group and Monoid (definition and examples only) – Subgroups, Cosets - Lagranges Theorem.

UNIT 4 COMBINATORICS **9 Hrs.**

Mathematical induction – The basics of counting – The pigeonhole principle – Permutations and combinations – Recurrence relations – Solving linear recurrence relations – Generating functions – Inclusion and exclusion principle and its applications.

UNIT 5 GRAPH THEORY **9 Hrs.**

Introduction to graphs – Types of graphs (directed and undirected) – Basic terminology – Sub graphs – Representing graphs as incidence and adjacency matrix – Graph Isomorphism – Connectedness in Simple graphs, Paths and Cycles in graphs - Euler and Hamiltonian paths (statement only) – Tree – Binary tree (Definition and simple problems).

Max. 45 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 - Apply it in academic problems and industry/real life problems.
CO2 - Define logic and set theory and to list the tautological implications and types of functions.
CO3 - Categorize and implement the properties of groups.
CO4 - Appraise the solution of mathematical induction and pigeonhole principle.
CO5 - Develop the recurrence relation and generating functions.
CO6 - Evaluate Euler and Hamiltonian paths.

TEXT /REFERENCE BOOKS

1. Tremblay J.P. and Manohar R., Discrete Mathematical Structures with applications to Computer Science, Tata McGraw Hill Publishing Co., 35th edition, 2008.
2. Kenneth H. Rosen, Discrete mathematics and its applications, 6th Edition, McGraw Hill, 2007.
3. Veerarajan T., Discrete mathematics with Graph Theory and Combinatorics, Tata McGraw Hill Publishing Co., New Delhi, 2006.
4. Narasingh Deo, Graph Theory with application to Engineering and Computer Science, Prentice Hall India, 2010.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100 **Exam Duration: 3 Hrs.**
PART A: 10 Questions of 2 marks each-No choice **20 Marks**
PART B: 2 Questions from each unit with internal choice, each carrying 16 marks **80 Marks**