Semester	**4**
Course	**MAJOR**
Paper Code	**C2CS230411T**
Paper Title	**DISCRETE STRUCTURES**
No. of Credits	**4**
Theory/ Practical / Composite	**THEORY**
Minimum No. of preparatory hours per week a student has to devote	5
Number of Modules	Two
Syllabus	**Group A** 1. Basic Structures: Sets, Relations, Functions 2. Counting Theory: Pigeonhole Principle; Mathematical Induction, Principle of Inclusion and Exclusion 3. Recurrence Relations: Substitution Method, Linear Recurrence Relations with constant coefficients and their solution, Generating functions, Recurrence Trees, Master Theorem Relation **Group B** 4. Prepositional Logic: Logical Connectives, Well-formed Formulas, Tautologies, Equivalences, Normal Forms. 5. Graph Theory: Definition of Graph, Graph Terminology, Finite and Infinite graphs. Directed and undirected graphs, Degree, Isolated vertex, Pendant vertex. Null graphs. Walks: Paths and circuits. Connected and disconnected graphs, Euler's graphs, Hamiltonian paths and circuits. Planar Graph, Isomorphic graph, Graph Coloring Problem. 6. Graph Algorithms: Graph representation, Floyd's shortest Path algorithm, Trees, Minimal Spanning Tree using Kruskal Algorithm and Prim's Algorithm, Dijkstra's Algorithm, Breadth First Search (BFS), Depth First Search (DFS), Connected components.
Learning Outcomes	On completion of the course, the students will be able to: 1. Students are expected to use mathematical reasoning in order to read, comprehend, and construct mathematical arguments. 2. Students will count or enumerate objects and perform combinatorial analysis and are expected to learn about theories such as the principle of inclusion and exclusion, etc. which will help them solve several problems in the field of Computer Science. 3. Students will learn the basic concepts of sets, permutations, relations, graphs, trees and are expected to learn about recurrence relations which is one of the most important tools needed to analyze algorithms. 4. Students will represent discrete objects and relationships using abstract mathematical structures

	5. Students will learn to implement and simulate counting principles using recurrence relations. 6. Students will formulate and model problems with the concepts and techniques of discrete mathematics in various applications and students will be aware of key topic in the field of Discrete Mathematics such as Relations, Functions, and Partial Orderings
Reading/Reference Lists	1. C.L. Liu , D.P. Mahopatra, Elements of Discrete mathematics, 2nd Edition , Tata McGraw Hill, 1985 2. Kenneth Rosen, Discrete Mathematics and Its Applications, Sixth Edition ,McGraw Hill 2006 3. M. O. Albertson and J. P. Hutchinson, Discrete Mathematics with Algorithms , John wiley Publication, 1988 4. J. L. Hein, Discrete Structures, Logic, and Computability, 3rd Edition, Jones and Bartlett Publishers, 2009 5. D.J. Hunter, Essentials of Discrete Mathematics, Jones and Bartlett Publishers
Evaluation	Theory CIA: 25 Attendance: 5 Semester Exam: 70
Paper Structure for Theory Semester Exam	Answer 5 out of 7 of 14 marks each