Course Type	Course Code	Name of Course	L	T	P	Credit
DC4	MCO501	**Discrete Mathematics**	3	0	0	9

Course Objective
The objective of the course is to provide a background of mathematics that will be used in theoretical computer science.
Learning Outcomes
Upon successful completion of this course, students will: • learn about proof techniques; • learn about combinatorics and graph theory; • be able to relate the computer science problems using discrete mathematical structures.

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1	Logic: Propositional and predicate logic, well-formed formulas, tautologies, equivalences, normal forms, rules of inference, Proof Techniques,	09	Students will learn predicate calculus which will help them in converting statements as mathematical statements. They will also learn several proof techniques.
2	Boolean Algebra: Boolean Algebra, Boolean Expressions, Optimization of Boolean Expressions, CNF, DNF, Karnaugh Map, Quine McKluskey Method	03	Students will learn the algebra behind the optimization of circuits.
3	Set Theory: Sets and classes, Relations and functions, Recursive definitions, Posets, Lattices, Zorn's lemma, Cardinal and Ordinal numbers	05	Students will learn the concepts of set theory and their uses.
4	Combinatorics: Permutation and Combinations, Pigeonhole principle, Inclusion-Exclusion Principle, Recurrence relations, Methods for solving recurrence relations, Generating Functions., Master Theorem (without proof), Partitions (Stirling and Bell Numbers),	08	Students will learn combinatorics from this unit.

5	Number theory: Modular Arithmetic, Euclid's Algorithm, primes, Chinese Remainder, Public Key Cryptography, RSA algorithm.	07	This unit will help students in learning basic modular arithmetic which can be used in theoretical computer science.
6	Graph Structures: Graphs and Digraphs, Adjacency and Incidence matrices, Eulerian cycle and Hamiltonian cycle, Trees, Counting Spanning Trees	07	Students will learn about graph structures and their uses in computer science.

Text Books:

1. K. H. Rosen, Discrete Mathematics and its Applications, 6thEdition, Tata McGraw Hill, 2007
2. J. L. Hein, Discrete Structures, Logic, and Computability, 3rdEdition, Jones & Bartlett Learning, 2009.

Reference Books:

1. R. P. Grimaldi, Discrete and Combinatorial Mathematics, 5th Edition, Pearson Education, 2002.
2. J. P. Tremblay, R. Manohar, Discrete Mathematical Structures with Application to Computer Science, McGraw Hill, 1975.