

NIRMA UNIVERSITY
Integrated B. Tech. (CSE)-MBA programme
Term - III

L	T	P	C
3	1	0	4

Course Code	CSI0304
Course Title	Discrete Mathematics

Course Outcomes:

At the end of the course, students will be able to

1. interpret the preliminaries of discrete mathematics
2. comprehend role of discrete mathematics in theoretical computer science
3. recognize the importance of formal approach for solving computing problems

Syllabus:

Teaching Hours:30

Unit I

3

Sets, Relation and Function: Operations and laws of sets, Cartesian products, binary relation, partial ordering relation, equivalence relation, image of a set, sum and product of functions, bijective functions, inverse and composite function. Basic counting techniques: inclusion and exclusion, pigeon-hole principle.

Unit II

6

Proof Techniques: proof methods and strategies, forward proof, proof by contradiction, principles of mathematical induction, strong induction, the well-ordering principle, recursive definition, proof by contraposition, proof of necessity and sufficiency.

Unit III

6

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.

Unit IV

5

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.

Unit V

6

Graphs and Trees: graphs and their properties, isomorphism, Eulerian and Hamiltonian walks, graph coloring, perfect graph, rooted trees, trees and sorting, weighted trees and prefix codes, shortest path, spanning trees.

Unit VI

4

Recurrence Relations and Recursive Algorithms: Recurrence relations, linear recurrence relations with constant coefficients, use of recurrence relations for analysis of algorithms.

Self-Study:

The self-study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self-study contents.

Tutorial Work:

Tutorial work will be based on the above syllabus with minimum 10 tutorials to be incorporated.

Suggested Readings[^]:

1. C. L. Liu, Elements of Discrete Mathematics, Tata McGraw Hill.
2. Tremblay, J.P. & Manohar, Discrete mathematical structures with application to computer science, McGraw Hill.
3. Rosen, Kenneth L., Discrete Mathematics and its applications, McGraw Hill.
4. Susanna S. Epp, Discrete Mathematics with Applications, Wadsworth Publishing Co. Inc.

L=Lecture, T=Tutorial, P=Practical, C=Credit

[^]this is not an exhaustive list