

Core Course

CC-111 Mathematical Foundation of Computer Science

Course Introduction:

This course introduces students to become reasonably good at problem solving and algorithm development. Students also enhance their ability to think logically and mathematically.

Objectives:

The objective of this course is to present the foundations of many basic computer related concepts and provide a coherent development to the students for the courses like Fundamentals of Computer Organization, RDBMS, Data Structures, Analysis of Algorithms, Artificial Intelligence, Computer Graphics and others.

No. of Credits: 3

Theory Sessions per week: 4

Teaching Hours: 40 hours

UNIT	TOPICS / SUBTOPICS	TEACHING HOURS
1	Group Theory	10 hours
	<ul style="list-style-type: none"> • Binary Operations • Algebraic Structure • Group • Order of a Group 	2 hrs
	<ul style="list-style-type: none"> • Abelian Group • Cyclic Group • Order of an element • Sub-group 	4 hrs
	<ul style="list-style-type: none"> • Lagrange's Theorem (with out proof) • Permutation group • $\langle Z_n, +_n \rangle$ & $\langle Z_p, *_p \rangle$ 	4 hrs
2	Relation and Ordering	10 hours
	<ul style="list-style-type: none"> • Introduction to relations • Binary relation on a set • Total no. of distinct Relation from a set A to B • Graph of relations and relation matrix 	2 hrs
	<ul style="list-style-type: none"> • Property of relations • Equivalence relations • Equivalence classes (sets) • Partition of a set • Partial ordering and partial ordered set 	4 hrs
	<ul style="list-style-type: none"> • Comparable elements • Chain • Cover of an element • Hasse diagram • Least, Greatest, Maximal, Minimal elements • Upper and lower bounds of Posets 	4 hrs

3	Lattice and Boolean algebra	10 hours
	<ul style="list-style-type: none"> • Introduction to lattice • Definition of lattice as a Posets • Properties of lattice • Sub-lattice 	2 hrs
	<ul style="list-style-type: none"> • Complete lattice • Bounded lattice • Distributive lattice • Complemented lattice 	2 hrs
	<ul style="list-style-type: none"> • Definition and important properties of a Boolean algebra • Sub-Boolean algebra 	2 hrs
	<ul style="list-style-type: none"> • Isomorphic Boolean algebras (graphically) • Atoms and anti-atoms • Boolean expressions and their equivalence • Min terms and max terms • Canonical forms 	4 hrs
4	Graph theory	10 hours
	<ul style="list-style-type: none"> • Introduction • Abstract definition of Graph and Basic Terminology 	1 hrs
	<ul style="list-style-type: none"> • Simple Graph, Multi Graph • Degree of a Vertex • Types of Graphs • Sub-graph and Isomorphic Graphs 	2 hrs
	<ul style="list-style-type: none"> • Path and Reachability 	2 hrs
	<ul style="list-style-type: none"> • Node Base • Matrix Representation of Graphs 	2 hrs
	<ul style="list-style-type: none"> • Tree and Basic Terminology • Binary and Complete Binary Tree • m-ary Tree, Different representations of Tree 	3 hrs

Textbook:

- 1) Discrete Mathematics
Publisher: Oxford University Press
By Swapankumar Chakaborty, Bikas Kanti Sarkar

Reference Books:

- 1) Discrete Mathematics
Publisher: Cengage Learning
By D.S. Malik, M.K.Sen
- 2) Discrete Mathematics & its Application
Publisher: Tata McGraw Hill

- By Kenneth H. Rosen,
- 3) Discrete Mathematics
Publisher: Tata McGraw Hill
By J.P. Trembaly, R. Manohar

 - 4) A Text book of the Discrete Mathematics
Publisher: S. Chand Publication
By Swapan Kumar, Sarkar

 - 5) Discrete Mathematical Structure (Latest Edition)
Publisher: Prentice Hall of India Pvt. Ltd.
By Bernard Kolman, Robert C Busby, Sharon Roass