

MATHEMATICAL FOUNDATIONS OF CS – SYLLABUS

Text Books :

1. Discrete Mathematics for Computer Scientists and Mathematicians: J.L. Mott, A.Kandel, T.P. Baker, PHI
2. Discrete Mathematics for Computer Science : John Truss, Pearson International, 2001
3. Introduction to Discrete Mathematical Structures with Applications to Computer Science, McGraw Hill, 1975
4. Computer Science: Mathematical Introduction: Liu, PHI

Objectives: To provide basic mathematical foundations required for various computer science courses.

Sets, Relations and Functions: Sets, relations and functions; Methods of proof; Equivalence relations; Cardinality; Countable and uncountable sets

Introductory Logic: Fundamentals of Logic; Logic operators such as AND, OR etc., Truth tables; Logical inferences; Methods of proofs of an implication; First order logic; Predicate calculus Predicates and Quantifiers; Rules of inference for quantified propositions

Recurrence Relations: Recursion, Forming and solving recurrence relations by substitution method and generating functions; Method of characteristic roots; Solving inhomogenous recurrence relations

Boolean Algebra: Partial order relations; Lattices; Boolean algebra; Combinatorial circuits; Minimization of boolean functions using Karnaugh maps

Theory of Graphs: Graphs, subgraphs, isomorphism, proofs; Types of graphs; paths and cycles; Adjacency matrices; Transitive closure; Connectivity; Directed acyclic graphs; Planar graphs and Euler's formula; Dual of a graph; Hamiltonian and Eulerian graphs; Applications like matching and colouring graphs; Graph traversals (BFS and DFS); Trees; Spanning trees.

Evaluation:

Internal (40 Marks):

Best of 3 Minors: Minor 1, Minor 2, Minor 3 (Each for 20 Marks)
and Assignments (run throughout the semester) : (Evaluated for 20 Marks)

Major Examination : 60 Marks

Tentative Schedule for MFCS Jan- April 2015

	Date	Topic	Remarks
January	5	Review: Sets	
	8	Review: Relations; Equivalence relation	
	12	Examples	
	15	Countable, Uncountable	
	19	Introduction to Logic	
	22	Laws in Logic: proofs	
	26	Holiday	
	31	Minor-1	Saturday :
	29	Logical inferences	
February	2	Methods of Proof of Implication	
	5		Minor 1 Rescheduled
	9	Quantifiers; Proof for Mathematical Induction	
	12	Normal Forms: PCNF and PDFN	
	16	Pigeon hole principle	
	19	Recurrence Relations	
	23	Generating Functions	
	26	Recurrence Relations	
March	2	Partial order relation Lattice	
	5	Boolean Algebra	
	7	Minor-2	Saturday
	9	Minimization: Karanugh Maps	
	12	Graphs: Terminology and Representation	
	16	Types of Graphs	
	19	Isomorphism	
	23	Planar graphs	
	26	Eulerian	
	30	Hamiltonian	
April	2	Minor-3	Holiday
	6	Colouring	
	9	Graph Traversals	

13	Graph Traversals	
16	Applications	