SWARNANDHRA
COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous)
SEETHARAMAPURAM, NARSAPUR-534280 W.G.DT. AP

DEPARTMENT OF BASIC SCIENCES AND HUMANITIES

TEACHING PLAN

Course Code	Course Title	Year/Sem	Branch	Contact hr/week	Academic Year
24BC2T01	DISCRETE MATHEMATICS	I/II	BCA (Honours)	5	2024-2025

Course Objectives:

The main objectives of the course are

- To learn the mathematical foundations for Computer Science.
- Topics covered essential for understanding various courses

Course Outcomes (CO's): At the end of the course, student will be able to:

CO No.	Course Outcome	Knowledge Level (K)#
CO1	Understand and apply propositional and predicate calculus, including logical connectives, truth tables, and inference rules.	K2
CO2	Understand and apply basics theory concepts, including relations, functions, and the principle of inclusion and exclusion.	K2
CO3	Apply combinatorial techniques (permutations, combinations) and solve recurrence relations using generating functions.	K3
CO4	Understand and apply fundamental graph theory concepts, including graph representations, connectivity, and traversal algorithms.	K3
CO5	Understand and apply finite state machines, including DFA, NFA, and the pumping lemma for regular languages.	K2

Week No	Outcome	Blooms Level		Topic / Activity	Text Books	Contact Hours	Delivery Method
UNIT-I (Mathematical Logic)							
1,2	Understand and apply propositional and predicate calculus, including logical connectives, truth tables and inference rules.	K2	1.1	**Propositional Calculus:** Statements and Notations	T_1& T_2	1	Chalk & Board, PPT , Interactive Whiteboarding
			1.2	Connectives	T_1& T_2	1	
			1.3	Well Formed Formulas	T_1& T_2	1	
			1.4	Tautologies	T_1& T_2	1	
			1.5	Equivalence of formulae	T_1& T_2	1	
			1.6	Duality law	T_1& T_2	1	
			1.7	Tautological implications	T_1& T_2	1	
			1.8	Normal Forms	T_1& T_2	2	
			1.9	Theory of Inference for Statement Calculus	T_1& T_2	2	
			1.10	Consistency of Premises	T_1& T_2	1	
			1.11	Indirect Method of Proof	T_1& T_2	1	
			1.12	**Predicate Calculus:** Predicates, Predicative Logic	T_1& T_2	2	
			1.13	Statement Functions	T_1& T_2	1	
			1.14	Variables and Quantifiers,	T_1& T_2	2	
			1.15	Free and Bound Variables	T_1& T_2	2	
			1.16	Inference Theory for Predicate Calculus	T_1& T_2	1	
UNIT-II (Sets and Functions)							
3,4	Understand and apply basic set	K2	2.1	Sets, Relations	T_1& T_2	1	Chalk & Board, PPT ,
			2.2	Functions	T_1& T_2	1	
			2.3	Closures of	T_1& T_2	1	

	theory concepts, including relations , functions and the principles of inclusion and exclusion.			Equivalence Relations			Interactive Whiteboard ing
			2.4	Partial ordering well ordering	T_1& T_2	1	
			2.5	Lattice	T_1& T_2	1	
			2.6	Sum of products and product of sums	T_1& T_2	2	
			2.7	principle of Inclusions and Exclusions	T_1& T_2	2	
Mid I Exam							
UNIT-III (Combinatory)							
5, 6	Apply combinatorial techniques (permutations ,combinations) and solve recurrence relations using generating functions.	K3	3.1	Permutations	T_1& T_2	1	Chalk & Board, PPT , Interactive Whiteboard ing
			3.2	Combinations	T_1& T_2	1	
			3.3	Pigeonhole principle	T_1& T_2	1	
			3.4	**Recurrence Relation:** Linear Recurrence Relations	T_1& T_2	2	
			3.5	Non-linear Recurrence Relations	T_1& T_2	1	
			3.6	Solving Recurrence Relation using Generating Functions.	T_1& T_2	2	
UNIT-IV (Graphs)							
7,8	Understand and apply fundamental graph theory concepts, including graph representation s, connectivity and traversal algorithms.	K3	4.1	Introduction to graphs	T_1& T_2	1	Chalk & Board, PPT , Interactive Whiteboard ing
			4.2	Graphs terminologies	T_1& T_2	1	
			4.3	Representation of graphs	T_1& T_2	1	
			4.4	Isomorphism	T_1& T_2	2	
			4.5	**Connectivity & Paths:** Connectivity	T_1& T_2	2	
			4.6	Euler and Hamiltonian Paths	T_1& T_2	2	
			4.7	Introduction to tree	T_1& T_2	2	
			4.8	Tree traversals	T_1& T_2	1	

			4.9	spanning tree and tree searches	T_1& T_2	2	
			4.10	Breadth first search, Depth first search	T_1& T_2	2	
			4.11	cut- set, cut-vertex.	T_1& T_2	1	
UNIT-V (Modeling Computation)							
9, 10	Understand and apply finite state machines, including DFA, NFA and the pumping lemma for regular languages.	K2	5.1	Finite State Machine	T_1& T_2	1	Chalk & Board, PPT , Interactive Whiteboard ing
			5.2	Deterministic Finite Automata (DFA)	T_1& T_2	1	
			5.3	Non-Deterministic Finite Automata Lemma for Regular Language (NFA)	T_1& T_2	1	
			5.4	Grammars and Language,	T_1& T_2	1	
			5.5	Application of Pumping	T_1& T_2	1	
Mid II Exam							
Total No. of Classes						60	

Recommended Text Books for Reading:

1. T_1: Discrete Mathematics and its Applications with Combinatory and Graph Theory, 7th edition by Kenneth H. Rosen.
2. T_2: Discrete Mathematical Structures with Applications to Computer Science, J.P Tremblay, R. Manohar, TMH, 1997.
3. T_3: Elements of Discrete Mathematics -A Computer Oriented Approach, C. L. Liu P. Mohapatra, 3rdEdition, Tata Mc Graw Hill.
4. T_4: Discrete Mathematics, Anopen Introduction, Oscar Levin, 3rd edition.

Reference Text Books:

1. Elements of Discrete Mathematics by C.L. Liuand D.P. Mohapatra, TMH,2012.
2. A Modern Approach to Discrete Mathematics and Structure by J.K. Mantri &T. K Tripathy, Laxmi Publication.

Web Resources:

1. https://onlinecourses.nptel.ac.in/noc22_cs123/preview
2. https://discrete.openmathbooks.org/preview/
3. https://mathworld.wolfram.com/topics/DiscreteMathematics.html
4. https://www.csie.ntu.edu.tw/~sylee/courses/dm/resources.htm

Faculty Head of the Department Principal