SYMBIOSIS INTERNATIONAL (DEEMED UNIVERSITY)

(Established under section 3 of the UGC Act, 1956)

Re-accredited by NAAC with 'A++' Grade | Awarded Category – I by UGC

Founder: Prof. Dr. S. B. Mujumdar, M. Sc., Ph. D. (Awarded Padma Bhushan and Padma Shri by President of India)

Course Name: Discrete Mathematics and Graph Theory

Course Code: TE7675

Faculty: Engineering

Course Credit: 4

Course Level: 1

Sub-Committee (Specialization):   Applied Sciences

Learning Objectives:

The students will be able to:

1. Understand the knowledge of mathematical logic and use different techniques to prove mathematical statements.
2. Construct the argument with the help of logical notations to check validity of the statement.
3. Understand the principles of sets and relations and apply them in solving the problems.
4. Explain the concepts of permutations and combinations, and understand the concept of pigeonhole principle.
5. Understand the fundamentals of graphs and use these in finding shortest paths.

Books Recommended:

Book	Author	Publisher
Discrete and Combinatorial Mathematics	Ralph P. Grimaldi	Pearson; 5th edition (17 July 2003)
Discrete Mathematical Structures	B. Kolman, R. Busby and S. Ross	4th Edition, Pearson Education, 2002
Discrete Mathematics	Seymour Lipschutz, Marc Laras Lipson and Varsha H. Patil	McGraw Hill Education; Revised Third edition (1 July 2017)
Elements of Discrete Mathematics	C. LIU	2nd Edition, Tata McGraw-Hill, 2002
Graph theory with application to Engineering and Computer Science	Deo and Narsingh	Prentice Hall India Learning Private Limited; New edition (1 January 1979)

Course Outline:

Sr. No.	Topic	Actual Teaching Hours	Contact Hours Equivalence
1	**Mathematical Logic:** Statements, Propositions, Connectives, Truth tables, Tautology, Satisfiability, Contradiction, Logical equivalence, Logic gates, Algebra of propositions, Normal forms, Theory of inference for statement, consistency of premises, Mathematical induction, Proof by contradiction, Stable marriage problem.	8	8
2	**Sets and Relations:** Introduction of sets, Types of sets, Algebra of sets, Venn diagram, Cardinality, Principle of inclusion and exclusion, Relations, Binary relation, Types of relations, Partially ordered set, Hasse diagram, Euclid's Algorithm, Multiplicative inverse, Congruence relation, recurrence relations.	8	8

3	**Elementary Combinatorics:**		6	6
	Permutations, Permutations with repetitions, Circular permutations, Restricted permutations, Combinations, Restricted combinations, Combinations with repetitions, Pigeonhole principle, Generalized pigeonhole principle.			
4	**Basics of Graph Theory:**		12	12
	Definition of graph, Types of graphs, Terminology of graphs, Sub graphs, Degree, walks, Paths, Circuits, Matrix representation of graphs, Isomorphism, Planar graphs, Bipartite graphs, Eulerian and Hamiltonian graphs, Multigraphs, Euler's formula, Graph colouring and covering, Graph theoretic model of the LAN problem.			
5	**Graph Algorithms:**		11	11
	Shortest paths, Weighted graphs, The traveling salesman problem, The maximum flow problem, Dijkstra's shortest path algorithm, Floyd-Warshall shortest path algorithm, DFS and BFS algorithm.			
6	**Tutorial:**		15	15
	Tutorials will be conducted for all topics.			
	Total		**60**	**60**

Pre Requisites:

None

Evaluation:

A. Continuous Assessment

1. Unit Test

2. Tutorial

3. Class test

4. Assignment

B. End Semester Examination

1. Written Examination

Pedagogy:

1. Interactive sessions

2. Class room teaching

3. Tutorials

4. Assignment

Expert:

Dr. Arundhati Warke,Professor and Deputy Director Academics,SIT

Dr. Ramesh Katta,Assistant Professor,SIT