



SILVER OAK UNIVERSITY
College of Technology (01)
Degree Engineering Course (CE/IT)
Subject Name: Discrete Structures and Graph Theory
Subject Code: 1010273206
Semester: 4th

Prerequisite: Basic Mathematics

Objective:

1. Cultivate clear thinking and creative problem solving.
2. Thoroughly train in the construction and understanding of mathematical proofs. Exercise common mathematical arguments and proof strategies.
3. To apply graph theory in solving practical problems.
4. Thoroughly prepare for the mathematical aspects of other Computer Engineering courses

Teaching and Examination Scheme:

Teaching Scheme					Evaluation Scheme				Total Marks
L	T	p	Content Hours	Credit	Theory		Practical		
					CIE (TH)	ESE (TH)	CIE (PR)	ESE (PR)	
3	2	0	5	5	40	60	-	-	100

Content:

Unit No.	Course Contents	Teaching Hours	Weightage %
1	Set Theory ➤ Sets, Venn diagrams, Operations on Sets, Laws of set theory, Power set and Products, Partitions of sets, The Principle of Inclusion and Exclusion Logic Propositions and logical operations, Truth tables, Equivalence, Implications, Laws of logic, Normal Forms, Predicates and Quantifiers, Mathematical Induction	08	19%
2	Relations and Functions ➤ Relations: Definition, Types of Relations, Representation of Relations, Closures of Relations, Wars hall's algorithm, Equivalence relations and Equivalence Classes ➤ Functions: Definition, Types of functions, Composition of	06	14%

	functions.		
3	Counting ➤ Basic Counting Principle-Sum Rule, Product Rule, Inclusion Exclusion Principle, Pigeonhole Principle	06	14%
4	Algebraic Structures ➤ Algebraic structures with one binary operation: Semi group, Monoid, Groups, Subgroups, Abelian Group, Cyclic group, Isomorphism, Coset, Lagrange's theorem, Congruence relation and quotient structure. ➤ Algebraic structures with two binary operations: Ring, Integral Domain and field ➤ Coding Theory: Coding, binary information and error detection, decoding and error correction	08	19%
5	Graph Theory ➤ Graphs and Graph Models, Graph Terminology and Special Types of Graphs, Representing Graphs and Graph Isomorphism, Connectivity, Euler and Hamilton Paths, Single source shortest path- Dijkstra's Algorithm, Planar Graphs, Graph Colorings. Case Study- Web Graph, Google map. Trees ➤ Introduction, properties of trees, Binary search tree, decision tree, prefix codes and Huffman coding, cut sets, Spanning Trees and Minimum Spanning Tree, Kruskal's and Prim's algorithms, The Max flow- Min Cut Theorem (Transport network). Case Study- Game Tree, Mini-Max Tree.	14	34%

Course Outcome:

0Sr. No.	CO statement	Unit No
CO-1	Understand the notion of mathematical thinking, mathematical proofs and to apply them in problem solving	1
CO-2	Ability to understand relations, functions.	2
CO-3	Ability to understand and apply concepts of graph theory in solving real world problems	3
CO-4	Understand use of groups and codes in Encoding-Decoding	4
CO-5	Ability to understand and apply concepts of graph theory in solving real world problems	5

Teaching & Learning Methodology:-

- (i) Focus on tricks of the trade and intuitive idea of Concept; use the main theorems as tools, no compromise on rig our, illustrative exercises under each topic, view point of applications
- (ii) Tutorial and Teacher guided Problem solving based pedagogy
- (iii) Topic based seminars, internet based assignments, and teacher guided self-learning activities

List of Experiments/Tutorials:Unit wise/Topic wise Tutorials/Teacher Guided Problem Solving Sets are to be given for Practice and better understanding of Concepts and applications

Major Equipment: NIL

Books Recommended:-

1. Kenneth H. Rosen. "Discrete Mathematics and its Applications", Tata McGraw-Hill.
2. Tremblay, J.P. &Manohar, Discrete mathematical structures with application to computer science, McGraw Hill
3. David Liben-Nowell, "Discrete mathematics for computer science", Wiley Publication, July 2017.
4. Erwin Kreyszig 'Advanced Engineering Mathematics', Tenth edition-Wiley India.
5. D. S. Malik and M. K. Sen, "Discrete Mathematical Structures", Thompson.

List of Open Source Software/learning website:

1. <https://www.edx.org/learn/discrete-mathematics>
2. <https://www.coursera.org/specializations/discrete-mathematics>
3. <https://nptel.ac.in/courses/106/106/106106094/>
4. https://swayam.gov.in/nd1_noc19_cs67/preview