



Daffodil International University

Faculty of Science & Information Technology

Department of Computer Science & Engineering

Final Semester Examination, Fall 2024

Course Code: CSE212, Course Title: Discrete Mathematics

Level: 2 Term: 1 Batch: 65

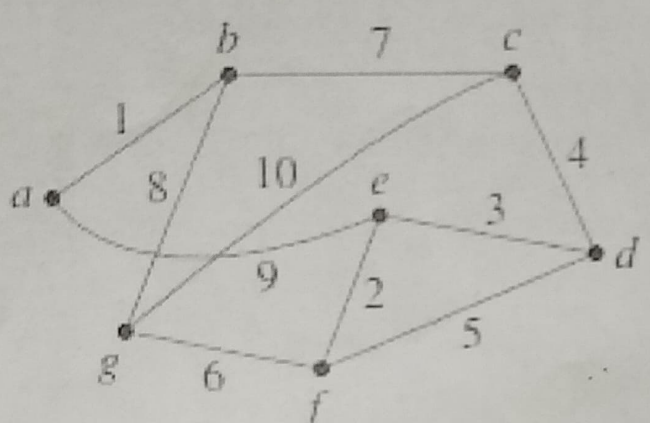
Time: 2:00 Hrs

Marks: 40

Answer ALL Questions

[The figures in the right margin indicate the full marks and corresponding course outcomes. All portions of each question must be answered sequentially.]

1.	<p>a) Determine whether the given relation is reflexive, symmetric, transitive, or none of these. Justify your answers.</p> <p>i. C is the circle relation on the set of real numbers: For every $x, y \in \mathbb{R}$, $x C y \Leftrightarrow x^2 + y^2 = 1$.</p> <p>ii. D is the "divides" relation on \mathbb{Z}^+: For all positive integers m and n, $m D n \Leftrightarrow m \mid n$</p>	[4]	[CO2]
	<p>b) Use mathematical induction to prove that for all non-negative integers n.</p> $1 + \frac{1}{2} + \frac{1}{2^2} + \frac{1}{2^3} + \dots + \frac{1}{2^n} = 2 - \frac{1}{2^n}$	[6]	
2.	<p>a) Prove whether the following graphs G and G' are isomorphic or not?</p> <div style="display: flex; justify-content: space-around; align-items: center;"> </div> <p style="text-align: center;">G G'</p>	[4]	
	<p>b) Apply the concept of Dijkstra's algorithm to find the shortest path from a to z.</p>	[6]	[CO3]
3.	<p>a) Justify whether the following graphs are bipartite or not.</p> <div style="display: flex; justify-content: space-around; align-items: center;"> </div> <p style="text-align: center;">Graph: A Graph: B</p>	[7]	[CO3]

	b) Draw these Graphs- i. C_5 ii. $K_{4,3}$ iii. W_7	[3]	
4.	a) Apply Prim's algorithm on the following graph starting at node a to construct a minimum spanning tree indicating the order in which edges are added to form each tree. and find the weight of the tree. 	[7]	[CO3]
	b) Draw a graph from the following adjacency matrix. $\begin{bmatrix} 0 & 0 & 0 & 1 & 2 \\ 0 & 0 & 0 & 1 & 1 \\ 0 & 0 & 0 & 2 & 1 \\ 1 & 1 & 2 & 0 & 0 \\ 2 & 1 & 1 & 0 & 0 \end{bmatrix}$	[3]	