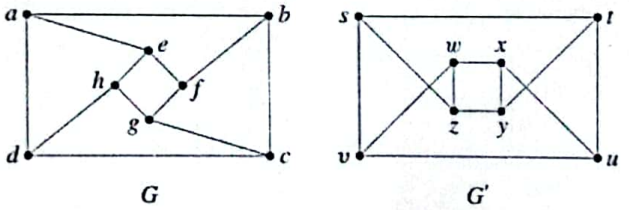
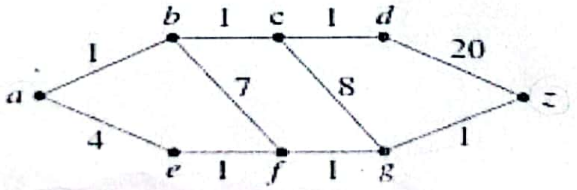
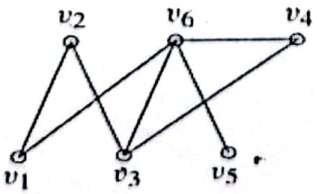
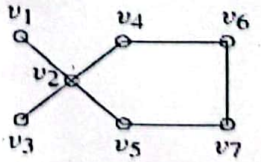
Daffodil International University

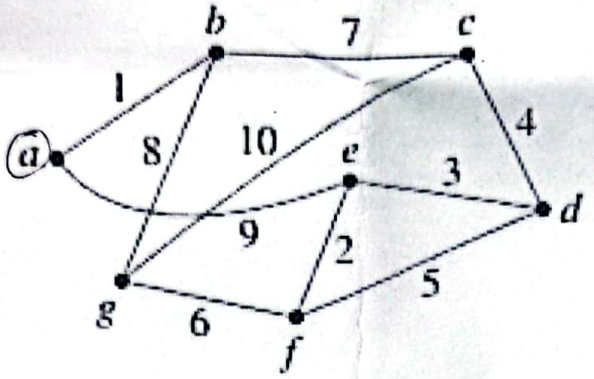
Faculty of Science & Information Technology
Department of Computer Science & Engineering
Final Semester Examination, Fall 2024
Course Code: CSE212, Course Title: Discrete Mathematics
Level: 2 Term: 1 Batch: 65

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.	**a)** Determine whether the given relation is reflexive, symmetric, transitive, or none of these. Justify your answers. i. C is the circle relation on the set of real numbers: For every x, y ∈ ℝ, x C y ⇔ $x^2 + y^2 = 1$. ii. D is the "divides" relation on $\mathbb{Z}^+$: For all positive integers m and n, m D n ⇔ m | n	[4]	[CO2]
	b) Use mathematical induction to prove that for all non-negative integers n. $1 + \frac{1}{2} + \frac{1}{2^2} + \frac{1}{2^3} + \cdots + \frac{1}{2^n} = 2 - \frac{1}{2^n}$	[6]	
2.	**a)** Prove whether the following graphs G and G' are isomorphic or not?  G G'	[4]	[CO3]
	b) Apply the concept of Dijkstra's algorithm to find the shortest path from a to z.  	[6]	
3.	**a)** Justify whether the following graphs are bipartite or not.  Graph: A  Graph: B	[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]	