



Daffodil International University
Faculty of Science & Information Technology
Department of Computer Science & Engineering
Final Examination, Summer 2025

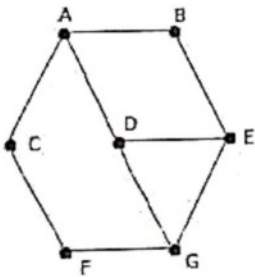
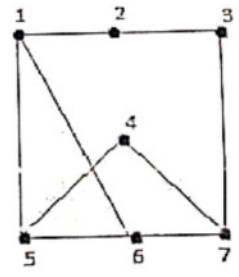
Course Code: CSE212, Course Title: Discrete Mathematics

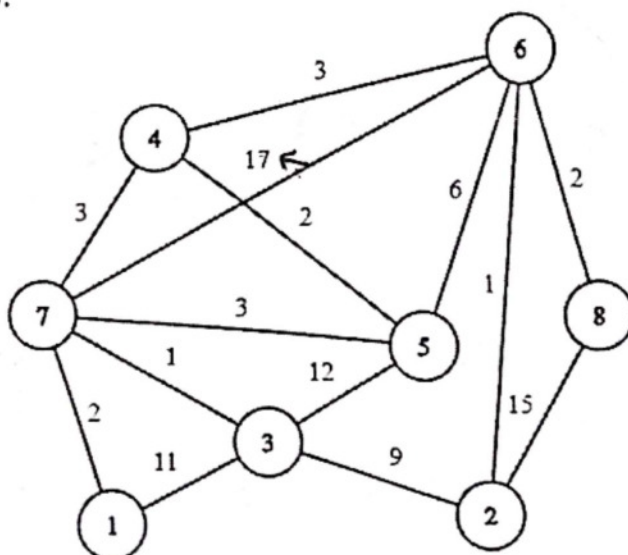
Marks: 40

Time: 2:00 Hrs

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.]

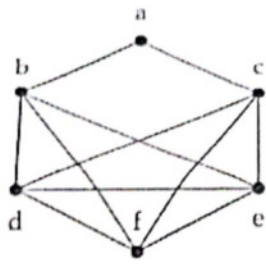
1. a) Determine whether the relation R on the set of all real numbers is reflexive, symmetric, antisymmetric, and/or transitive, where $(x, y) \in R$ if and only if $xy \geq 0$. Justify your answers.	[4]	
b) By using mathematical induction prove that the given equation is true for all positive integers. $1 \times 2 + 3 \times 4 + 5 \times 6 + \dots + (2n - 1) \times 2n = n(n+1)(4n-1)/3$	[6]	[CO2]
2. a) Prove whether the following graphs G and G' are Isomorphic or not.  Graph G  Graph G'	[5]	[CO3]
b) Apply the concept of Dijkstra's algorithm to find the shortest path from Node 1 to Node 8.	[5]	



3. a) Find out if the graph below is Eulerian or Hamiltonian or both. If so, write the sequence of vertices of an Eulerian circuit and/or Hamiltonian cycle. If not, explain why it isn't Eulerian or Hamiltonian.

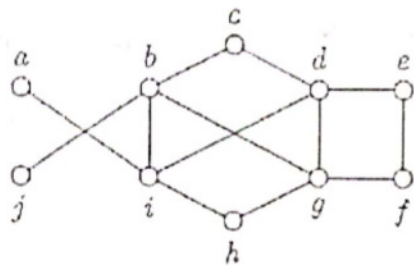
[4]

[CO3]

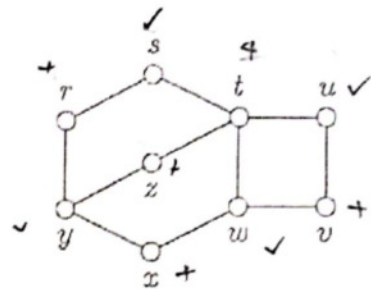


b) Justify whether each of the following graphs are Bipartite or not. If Bipartite, redraw the graph identifying the partite sets. If not, explain why they are not Bipartite.

[6ss]



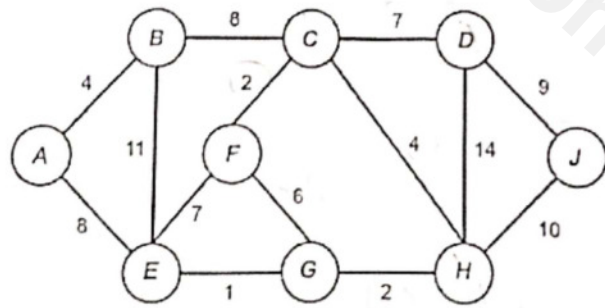
Graph: A



Graph: B

4. a) Apply Prim's algorithm on the following graph starting at Node A to construct a Minimum Spanning Tree (MST) indicating the order in which edges are added to form the tree. and find the weight of the tree.

[7]



[CO3]

b) Draw Graph A from the following adjacency matrix.

[3]

$$A = \begin{pmatrix} 0 & 2 & 3 & 0 & 0 \\ 2 & 0 & 15 & 2 & 0 \\ 3 & 15 & 0 & 0 & 13 \\ 0 & 2 & 0 & 0 & 9 \\ 0 & 0 & 13 & 9 & 0 \end{pmatrix}$$