



K. K. Wagh Institute of Engineering Education & Research, Nashik
(An Autonomous Institute From A.Y. 2022-23)

SUMMER-2024	
Exam Seat No.:	
Academic Year:2023-2024	Semester:III
Class:SY	Program:B.Tech
Branch Code:ADS/COM/CSD	Pattern:2022
Name of Course:Discrete Mathematics	Course Code:COM222003
Max. Marks:60	Duration:2.30 Hrs.

Instructions: Candidates should read carefully the instructions printed on the Question Paper and on the cover page of the Answer Book, which is provided for their use.

1. This question paper contains 5 pages.
2. Answer to each new question is to be started on a new page.
3. Assume suitable data wherever required, but justify it.
4. Draw the neat labelled diagrams, wherever necessary.
5. The last columns indicates the Course Outcome and level of Blooms Taxonomy of the Question/sub-question.

Question No. 1 Attempt following Question

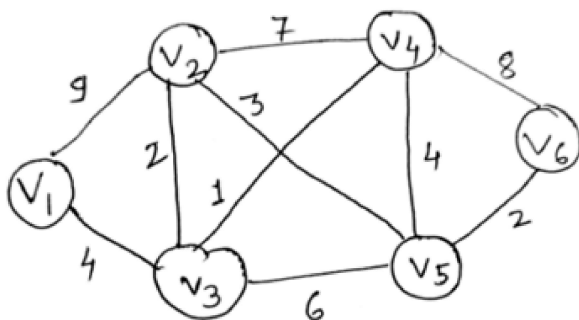
- 1 Make use of truth table to show $(p \rightarrow r) \wedge (q \rightarrow r)$ and $(p \vee q) \rightarrow r$ are logically equivalent. (6) CO1

Question No. 2 Attempt following Question

- 2 Construct the Hasse diagram representing the partial ordering (6) CO2
 $\{(a, b) | a \leq b\}$ on $\{1, 2, 3, 4, 5\}$.

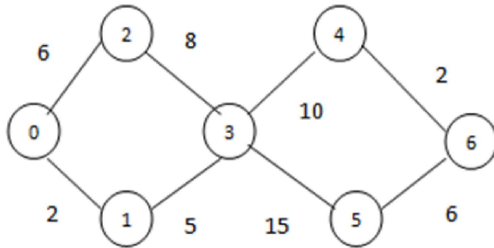
Question No. 3 Attempt following Question

- 3.a) Apply Dijkstra's algorithm to find the length of a shortest path between V_1 and V_6 in the given weighted graph. (6) CO3

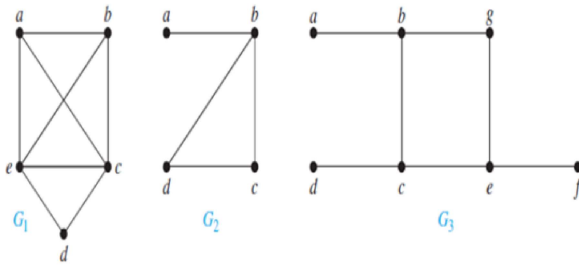


OR

- 3.b) Apply Dijkstra's algorithm and find the length of a shortest path between 0 and 6 in the given weighted graph. (6) CO3

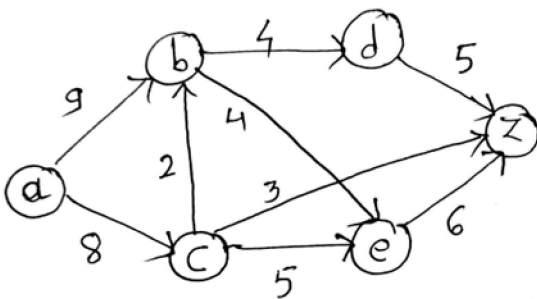


- 3.c) What is meant by Hamilton Paths and Circuits? Identify which of the graphs below have Hamilton path and circuit? (5) CO3



OR

- 3.d) Construct $K_{4,4}$ and $K_{4,3}$ graph. Justify your answer if it is planar graph. (5) CO3
- 3.e) Determine the maximum flow in the transport network shown in following figure (5) CO3



OR

- 3.f) Construct following graph and find the degree sequence of each of the following graphs. (5) CO3

- K_5
- C_5
- W_5

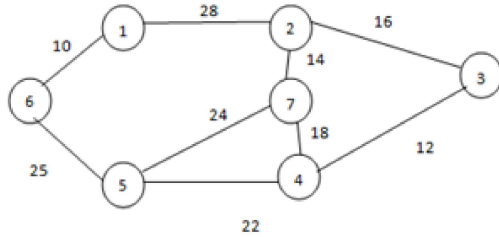
d) K3,2

e) Q2

Question No. 4 Attempt following Question

4.a) Construct the minimum spanning tree (MST) for the given graph using Prim's Algorithm

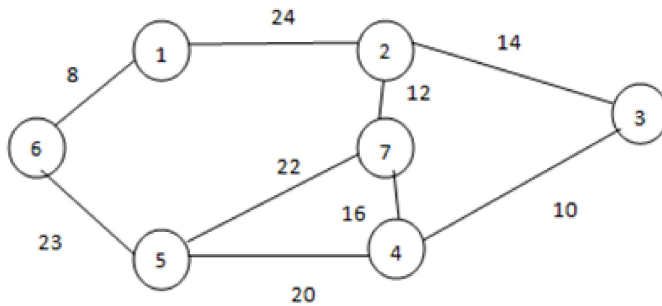
(6) CO4



OR

4.b) Construct the minimum spanning tree (MST) for the given graph Kruskal's algorithm.

(6) CO4



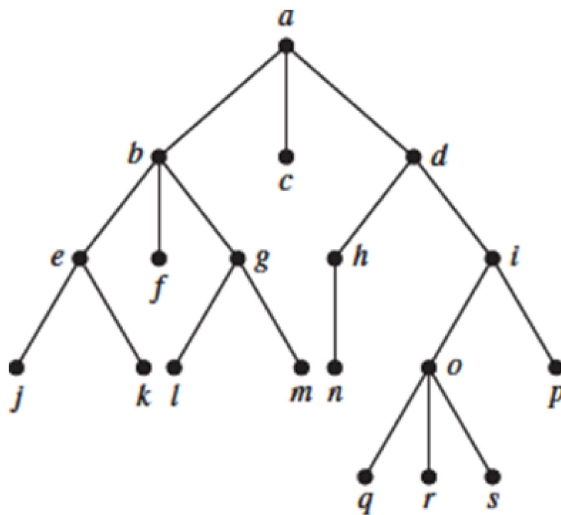
4.c) Construct Huffman tree to encode the following symbols with the frequencies listed: A: 0.20, B: 0.10, C: 0.15, D: 0.25, E: 0.30. What is the average number of bits used to encode a character?

(5) CO4

OR

4.d) Make use of concepts of tree and answer following questions with respect to tree shown below

(5) CO4



a) Which vertex is the root?

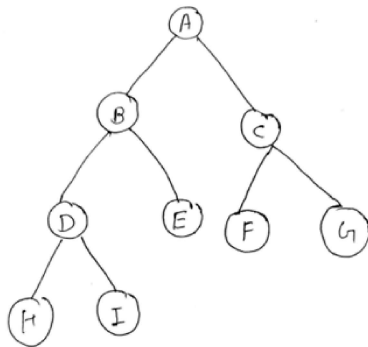
b) Which vertices are internal?

- c) Which vertices are leaves?
- d) Which vertices are children of j ?
- e) Which vertex is the parent of h ?
- f) Which vertices are siblings of o ?
- g) Which vertices are ancestors of m ?
- h) Which vertices are descendants of b ?
- i) What is a level of the tree?
- j) What is a height of the tree?

- 4.e) Construct a binary search tree for input data J ,R ,D,G,W,E,M,H,P,A,F,Q. List a root node , leaf nodes and interior nodes. (5) CO4

OR

- 4.f) Build the preorder, postorder and inorder traversal of the binary tree as (5) CO4



Question No. 5 Attempt following Question

- 5.a) Identify whether $(Z, +5)$ is an abelian group where $Z = \{0,1,2,3,4\}$ (6) CO5

OR

- 5.b) Identify whether the set of all real numbers is a group with respect to multiplication. (6) CO5

- 5.c) Explain the steps to identify the commutative ring with suitable example (5) CO5

OR

- 5.d) Explain the steps to identify field with suitable example. (5) CO5

- 5.e) Make use of $(2,6)$ encoding function e , where $e(00) = 011011$ $e(01) = 110110$ $e(10) = 111011$ $e(11) = 001011$ (5) CO5

- a) Find the minimum distance of e
- b) How many errors will e detect?

OR

5.f) Make use of (2,5) encoding function e , where $e(00) = 01000$ $e(01) = 01010$ $e(10) = 00101$ $e(11) = 11110$ (5) CO5

- a) Find the minimum distance of e
- b) How many errors will e detect?

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