

**BACHELOR OF TECHNOLOGY (CBCS - 2023)**  
**B. Tech. Sem-III Computer Science & Engineering : WINTER: 2025**  
**SUBJECT: NON-LINEAR DATA STRUCTURES**

Day : Tuesday  
 Date : 09/12/2025

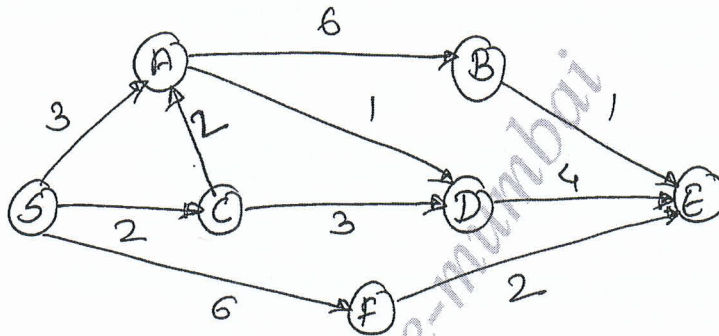
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Time : 10:00 AM-01:00 PM  
 Max. Marks : 60

**N.B :**

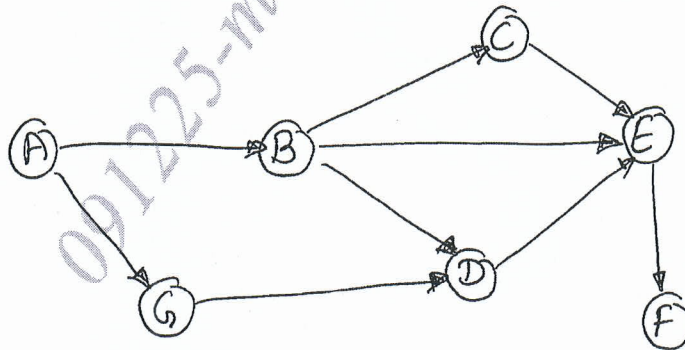
- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.
- 3) Draw neat and labeled diagrams **WHEREVER** necessary.
- 4) Use of non programmable **CALCULATOR** is allowed.
- 5) Assume suitable data if necessary.

- Q.1** Run Dijkstra algorithm on the following directed graph, starting at vertex S. (10)  
 What is the order in which vertices get removed from priority queue? What is resulting shortest path tree?



OR

- Q.1** Discuss what type of data structure used in DFS. Traverse the given graph starting from node A using DFS. (10)



- Q.2** Write a program to perform following operations on binary search tree (BST). (10)  
 i. insert      ii. Create      iii. display

OR

- Q.2** What is threaded binary tree? Write an algorithm for inserting a node in threaded binary tree. (10)

- Q.3** What is Red-Black tree? What are the properties of Red-Black tree? Create a Red-Black tree by inserting the following sequence of numbers 8, 18, 5, 15, 17, 25, 40 and 10. (10)

OR

- Q.3** Explain B and B+ tree with example. Differentiate between B and B+ tree. (10)

P.T.O.

Q.4 Arrange following elements in ascending order using heap sort. (10)  
35, 33, 42, 10, 14, 19, 27, 44, 26, 31

OR

Q.4 Which heap is used in Huffman coding? What is time complexity of Huffman coding? Draw Huffman tree for (10)

Character	Frequency
a	5
b	9
c	12
d	13
e	16
f	45

Q.5 Write short note on collision resolution techniques along with advantages and disadvantages. (10)

OR

Q.5 Explain quadratic probing. Construct hash table of size 10 using quadratic probing without replacement strategy for collision resolution. (10)  
31, 3, 4, 21, 61, 6, 71, 8, 9, 25

Q.6 Write Brute force pattern matching algorithm. Explain with example. (10)

OR

Q.6 Explain Boyer Moore algorithm. (10)

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