

**BACHELOR OF TECHNOLOGY (CBCS) (2021-COURSE)**  
**B. Tech. Sem - III Computer Science & Engineering : WINTER: 2025**  
**SUBJECT: NON-LINEAR DATA STRUCTURES**

Day : Tuesday  
 Date : 09/12/2025

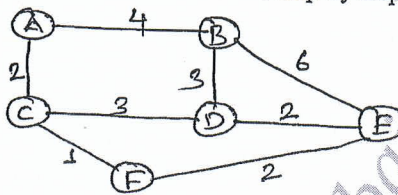
**W-25310-2025**

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) Assume suitable data **WHEREVER** necessary.
- 4) Draw neat diagrams **WHEREVER** necessary.

**Q.1** Given the following weighted graph. Apply Dijkstra's algorithm to find the shortest path from node A to all other nodes. Show the step-by-step process. (10)



**OR**

- Q.1** Explain the Minimum Spanning Tree with example. Also Compare Prim's and Kruskal's algorithms in terms of their approach and efficiency. (10)
- Q.2** Construct a Binary Search Tree (BST) for the following sequence of numbers: 50,30,70,20,40,60,80, perform an Inorder Traversal and verify if the output is sorted. (10)

**OR**

**Q.2** Given the character frequencies below, construct the Huffman Tree and determine the Huffman Codes for each character: (10)

Character	Frequency
A	5
B	9
C	12
D	13
E	16
F	45

**Q.3** Construct an AVL Tree by inserting the following sequence of numbers: 10,20,30,40,50,25, Show the rotations step-by-step. (10)

**OR**

**Q.3** Define AVL Tree? Also explain the concept of rotations (LL,RR,LR,RL) used to maintain balance in an AVL tree with examples. (10)

**Q.4** Construct a Max Heap by inserting the following elements one by one: 10,20,15,30,40,50,25. Show the heap after each insertion and then delete the maximum element step by step. (10)

**OR**

**Q.4** Sort the following list using Heapsort: 25,10,30,50,20,40,35 Show the heap construction and sorting process step by step. (10)

**Q.5** Construct a hash table of size 10 using Linear Probing with the hash function:  $h(k)=k \text{ mod } 10$ . Insert the following keys: 23,43,13,27,37 and show the final table. (10)

**OR**

**Q.5** Comment on Bloom Filter, and also explain how does it use hashing? (10)

**Q.6** Compare the Boyer-Moore Algorithm, Knuth-Morris-Pratt (KMP) Algorithm, and Brute-Force Pattern Matching in terms of time complexity and efficiency. (10)

**OR**

**Q.6** Given the text "AABAACAADAABAAABAA" and the pattern "AABA". Demonstrate the KMP Algorithm step by step. (10)

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