



# INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal-500043, Hyderabad

B.Tech III SEMESTER END EXAMINATIONS (REGULAR/ SUPPLEMENTARY) - FEBRUARY 2024

Regulation: UG20

DATA STRUCTURES

Time: 3 Hours

(COMMON TO ALL BRANCHES)

Max Marks: 70

Answer ALL questions in Module I and II

Answer ONE out of two questions in Modules III, IV and V

All Questions Carry Equal Marks

All parts of the question must be answered in one place only

## MODULE – I

1. (a) Summarize about asymptotic notations. Describe briefly Big oh notation, Theta notation with suitable diagram. [BL: Understand| CO: 1|Marks: 7]
- (b) Write selection sort algorithm. Consider an array of elements {23, 12, 18, 42, 29, 37, 15, 10}, perform sorting using selection sort technique. [BL: Apply| CO: 1|Marks: 7]

## MODULE – II

2. (a) Outline the insert and delete operations that can be performed on a deque with an algorithm. Justify with suitable example. [BL: Understand| CO: 2|Marks: 7]
- (b) Convert given infix expression:  $(a + b * c) * (e + f/g)$  to postfix expression using stack and show the details of stack at each step of conversion. [BL: Apply| CO: 2|Marks: 7]

## MODULE – III

3. (a) Implement a circular queue of integer of user specified size and write the functions for initialize(), enqueue() and dequeue(). [BL: Understand| CO: 3|Marks: 7]
- (b) Singly linked list contain the following values: 33, 44, 55, 66, 77, 88. Write the pseudocode for following operations:
  - i) Insert a new value 50 before 55.
  - ii) Print the list in reverse order like 88, 77, 66, 55, 50, 44, 33 and display the result. [BL: Apply| CO: 3|Marks: 7]
4. (a) Write the insert operations in front, middle and end position in doubly-linked list with example and neat diagram [BL: Understand| CO: 4|Marks: 7]
- (b) Construct the circular doubly linked list in given elements 5, 11, 9, 4. Compute the following operation.
  - i) Insertion of node 6 at the beginning.
  - ii) Deleting the first node from a circular doubly linked list. [BL: Apply| CO: 4|Marks: 7]

## MODULE – IV

5. (a) What do you mean by graph traversal? Illustrate the depth first search traversal of a graph with an example. [BL: Understand| CO: 5|Marks: 7]
- (b) For the following graph shown in Figure 1, find the graph traversal using BFS technique, starting at node A. Explain the step by step procedure for traversal. [BL: Apply| CO: 5|Marks: 7].

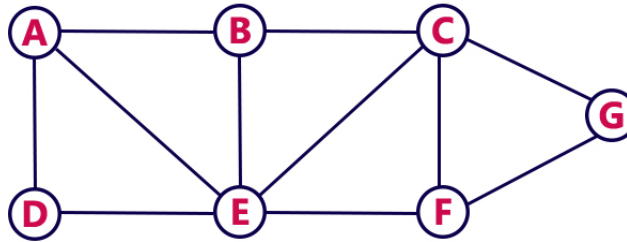


Figure 1

6. (a) Summarize about preorder, inorder and postorder traversal of a binary tree with an algorithm and provide suitable example. [BL: Understand| CO: 5|Marks: 7]
- (b) Construct minimum spanning tree for the graph shown in Figure 2 using Prim's algorithm and find the cost of minimum spanning tree (MST). [BL: Apply| CO: 5|Marks: 7]

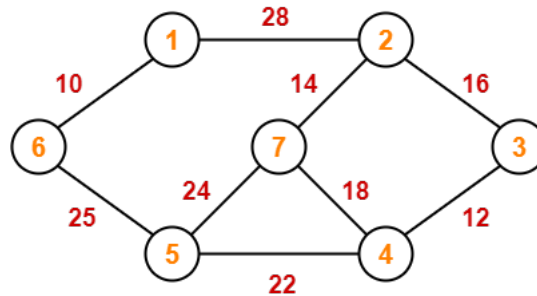


Figure 2

## MODULE – V

7. (a) Illustrate the properties of binary search tree (BST). Demonstrate the AVL tree rotation techniques with example and with suitable diagram. [BL: Understand| CO: 6|Marks: 7]
- (b) Show each step of the AVL tree built from a sequence of insertions corresponding to the following key : 10 15 9 12 13 79 45 36 22. [BL: Apply| CO: 6|Marks: 7]
8. (a) Summarize about hashing. Outline the following collision resolution techniques with suitable examples: i) Separate chaining ii) Open addressing. [BL: Understand| CO: 6|Marks: 7]
- (b) Insert the following sequence of elements into a binary search tree, starting with an empty tree: 50, 30, 60, 38, 55, 22, 59, 94, 13, 98. Perform the following operations and show all the steps. [BL: Apply| CO: 6|Marks: 7]
- i) Delete 30 and display the tree
  - ii) Delete 50 and display the tree

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