



GIET UNIVERSITY, GUNUPUR - 765022

B. Tech (Second Semester Regular) Examinations, May - 2024 23BBSES12003 - Data Structures & Algorithms (Common to all Branches)

Time: 3 hrs

Maximum: 60 Marks

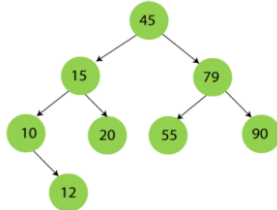
(The figures in the right hand margin indicate marks)

PART - A

(2 x 5 = 10 Marks)

Q.1. Answer **ALL** questions

- | | CO # | Blooms Level |
|---|------|--------------|
| a. A matrix R [10] [10] has elements given input. How to check whether the matrix is sparse or not? | CO2 | K2 |
| b. List out the overflow and underflow conditions in an array of elements that follow the First In First Out Concept. | CO1 | K1 |
| c. A double linked list has 10 nodes, where the pointer PTR2 points to the 4 th node and pointer PTR3 points to the 6 th node. Now write the piece of statements which allows you to insert a new node pointed by PTR1. | CO3 | K3 |
| d. Given a Binary Tree below: | CO4 | K2 |



Find the in-order, post-order sequence of nodes during traversal.

- | | | |
|--|-----|----|
| e. Define Terms: | CO1 | K3 |
| (i) Weighted Graph (ii) Self-Loop | | |

PART - B

(10 x 5 = 50 Marks)

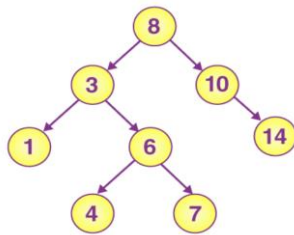
Answer **ALL** questions

- | | Marks | CO # | Blooms Level |
|---|-------|------|--------------|
| 2. a. Define row major order and column major order. Given a matrix W [10] [10] with elements having a base address of 10000. If the size of each memory is 10 bytes, then find the address of W[5][5] in row major order and also in column major order. | 5 | CO2 | K3 |
| b. Given a stack implemented using an array, write down the algorithms for the operations performed on it, such as:
(i) Push (ii) pop | 5 | CO3 | K3 |
| (OR) | | | |
| c. Given an infix expression $X = Q + W / E - R * T + Y - U$
Find its equivalent postfix expression using Stack. | 5 | CO4 | K2 |
| d. Briefly elaborate the evaluation process of given postfix expression $P = 2, 3, 15, 10, 2, /, -, *, +, 4, +$ using Stack | 5 | CO3 | K3 |
| 3.a. Given a list of elements: 70, 40, 50, 30, 35, 25, 45. Write down the algorithm for applying insertion sort to the elements to sort them in ascending order. | 5 | CO4 | K3 |
| b. Write down the algorithm for implementing binary search on a sorted list of elements present in an array. | 5 | CO3 | K3 |
| (OR) | | | |
| c. Write down the algorithms for implementing queue concepts on a single linked list and perform the operations:
(i) insertion of a node at the rear-end (ii) deletion of a node from the front-end | 5 | CO4 | K2 |

- d. Write down the algorithm from implementing the deletion of a node from the end of a double linked list. 5 CO3 K3
- 4.a. Construct a binary tree using the traversal sequence of nodes given below: 5 CO2 K3
 In-order sequence: F D B E I G J A C H
 Pre-order sequence: F D I J G E B H C A
 Write down the three recursive traversal algorithms to traverse all the nodes of a binary tree.
- b. Given a sequence of numbers: 40, 30, 50, 80, 90, 20, 10, 60, 70, 100 5 CO3 K3
 Construct a Binary Search Tree and then write down the algorithm for applying searching operations to it.

(OR)

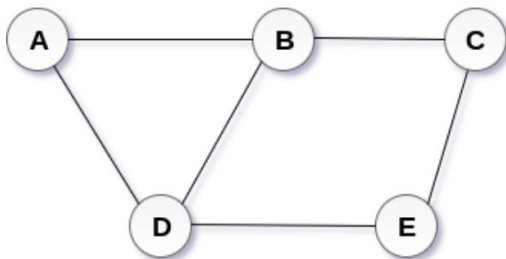
- c. Write down the non-recursive in-order traversal method for traversing all the nodes of a binary tree. 5 CO4 K2
- d. Briefly explain the sequential representation and linked representation of the given binary tree below. 5 CO1 K3



- 5.a. Construct an AVL Tree on the given a sequence of elements: 5 CO5 K3
 90, 80, 70, 60, 50, 10, 20, 30, 40, 55
- b. Construct a Max-Heap Tree on the given sequence of elements: 5 CO3 K3
 71, 61, 91, 31, 41, 61, 81, 51

(OR)

- c. Given a graph below: 5 CO2 K3
 Represent the graph using an adjacency matrix and an incidence matrix.



- d. Write down the algorithm to traverse all the nodes of a graph using a queue. 5 CO2 K3
- 6.a. Given a list of 6 elements: 30, 32, 45, 65, 57, 99 5 CO4 K3
 Explain the three different hash functions and find the hash addresses using all the hash functions.
- b. Write down the algorithm for applying bubble sort to a list of numbers given input in an array. 5 CO5 K2

(OR)

- c. Write down the algorithm for evaluating postfix expression using stack. 5 CO4 K3
- d. Write down the algorithms to perform the operations on a double linked list: 5 CO6 K2
 (i) count the total no. of nodes (ii) find the sum of all the node values.

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