

**END TERM EXAMINATION****THIRD SEMESTER [B.TECH] DECEMBER 2024****Paper Code: CIC-209****Subject: Data Structures****Time: 3 Hours****Maximum Marks: 60**

**Note: Attempt five questions in all including Q. No.1 which is compulsory. Select one question from each unit. Assume missing data, if any.**

**Q1 Attempt any five:-****(4x5=20)**

(a) Differentiate between primitive and non-primitive data structures.

(b) Define complexity? Explain Big(O) notation with the help of an example?

(c) Calculate the address of element at X[4,3] in a 2D array X[1..5][1..4] stored in a row major order. Assume the base address to be 1000 and each element requires 4 words of storage.

(d) Write a program/algorithm to evaluate a postfix expression using stack?. Consider the following:

$$\rightarrow (A+(B*C-(D/E*F)*G)*H)$$

(e) What is a threaded binary tree? Write the advantages of threaded binary tree.

(f) Write Kruskal's Algorithm for finding minimum spanning tree.

**UNIT-I****Q2** (a) What is meant by term Row Major Order and Column Major Order in Array? How do we calculate the address of an element in a row major 2-D array? **(5)**(b) Differentiate between pointer of arrays and array of pointers. **(5)****Q3** (a) How a linked list can be used to represent a polynomial  $5x^3+4x^2+3x+2$ ? Give an algorithm to perform addition of two polynomials using linked list. **(5)**(b) Write an Algorithm/program to insert an element in the beginning into the circular linked list. **(5)****UNIT-II****Q4** (a) Define an AVL tree. What are the different AVL tree rotations? Construct an AVL tree for the following list of numbers: **(7)**  
10 5 8 12 18 22 1 4 6 30(b) What are the properties of B-tree? **(3)****Q5** (a) Draw Binary tree when Preorder and Inorder follows and Write an algorithm for the same. **(5)**  
Pre: 1 2 4 8 5 3 6 7  
In: 4 8 2 5 1 6 3 7(b) Construct a Binary Search Tree by inserting the following sequence of numbers. **(5)**  
10,12,5,4,20,8,7,15 and 13

**UNIT-III**

- Q6 (a) What do you mean by internal and external sorting? Sort the following elements using Bubble sort. (5)  
8,22,7,9,31,19,5,13,58,93,1,45.
- (b) Define Hashing. How do collision happen during hashing? Explain the different techniques resolving of collision. (5)
- Q7 (a) Write algorithm/Program for binary search. (5)
- (b) Using the Binary Search algorithm, search for elements 23 and 47 in the given set of elements [12 23 27 35 39 42 50]. (5)

**UNIT-IV**

- Q8 (a) Draw the directed graph that corresponds to this adjacency matrix: (5)
- |   | A | B | C | D |
|---|---|---|---|---|
| A | 1 | 0 | 1 | 0 |
| B | 1 | 0 | 0 | 0 |
| C | 0 | 0 | 0 | 1 |
| D | 1 | 0 | 1 | 0 |
- (b) Give the algorithm for BFS graph traversal. (5)
- Q9 (a) Describe taking an example linked representation of graph. (5)
- (b) Define In-degree and Out-degree of a node in a graph using suitable example. <https://www.ggsipuonline.com> (5)

\*\*\*\*\*

<https://www.ggsipuonline.com>

Whatsapp @ 9300930012

Send your old paper & get 10/-

अपने पुराने पेपर्स भेजे और 10 रुपये पायें,

Paytm or Google Pay से