

3E1202

Roll No. _____

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B. Tech. III - Sem. (Main/Back) Exam., February - 2023

Artificial Intelligence & Data Science

3AID4-05 Data Structures and Algorithms

AID,CAI,CS,IT

Time: 3 Hours

Maximum Marks: 70

Instructions to Candidates:

Attempt all ten questions from Part A, five questions out of seven questions from Part B and three questions out of five from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

*Use of following supporting material is permitted during examination.
(Mentioned in form No. 205)*

1. NIL

2. NIL

PART – A

[10×2=20]

(Answer should be given up to 25 words only)

All questions are compulsory

- Q.1 How stack is represented using dynamic array? Explain with example.
- Q.2 Identify the applications of stack.
- Q.3 Elaborate the disadvantages of Linked List over Arrays.
- Q.4 Justify how circular queue is different from normal queue.
- Q.5 Differentiate between sequential and binary search.

- Q.6 Illustrate different traversal techniques used in binary search tree.
- Q.7 List out best, average and worst case complexity of merge and quick sort.
- Q.8 Examine the relationship between number of nodes and height of AVL tree.
- Q.9 Determine advantages and disadvantages of adjacent matrix representation for graphs.
- Q.10 Explain how quadratic probing is done.

PART – B

[5×4=20]

(Analytical/Problem solving questions)

Attempt any five questions

- Q.1 Convert the following infix expression into postfix expression :
- $$A + B - (C + D) / E * F - (G + H) / I$$
- Q.2 Consider the preorder of a BST :
- Pre-order: 20, 5, 3, 4, 10, 15, 30, 25, 40
- What will be the post-order?
- Q.3 Write an algorithm to enqueue and dequeue an element in a queue.
- Q.4 Sort the following elements using quick sort :
- 28 5 16 36 11 19 25
- Q.5 Write an algorithm for DFS traversal.
- Q.6 What is a MST? Differentiate between Kruskal and Prim's algorithm with their time complexity.
- Q.7 Explain the algorithm for deleting an element from doubly linked list.

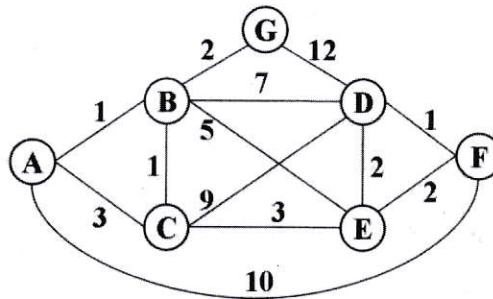
PART – C

[3×10=30]

(Descriptive/Analytical/Problem Solving/Design Questions)

Attempt any three questions

- Q.1 Examine each step involved with Radix sort to sort the given array -
329, 457, 657, 839, 436, 720, 355
- Q.2 Write a C program to add a node with data 'X' before a node with data 'Y' in a singly linked list.
- Q.3 Create an AVL tree using the following nodes 10, 6, 11, 12, 1, 7, 0, 2, 3. What will be the resulting AVL tree if node 12 is deleted from above AVL tree?
- Q.4 Consider the following graph -



Find the minimum spanning tree using Prim's algorithm.

- Q.5 (a) Write a recursive program for towers of Hanoi.
- (b) What is a stack? Calculate the following expression -
 $8 \ 2 \ 3 \wedge / 2 \ 3 * + 5 \ 1 * -$
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