3E1202

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3E1202

B.Tech. III-Semester (Main/Back) Examination, January - 2025

Artificial Intelligence and 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 questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing 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)

PART - A

(Answer should be given up to 25 words only)

All questions are compulsory. **(10×2=20)**

1. Define Stack
2. What are various operations possible on stacks.
3. What is queue?
4. Define priority queue
5. What is hash table.
6. What is sorting?
7. What an header nodes?
8. Define Thread.
9. What is graph traversel.
10. Define Adjacency representation of a matrix

PART - B

(Analytical/Problem solving questions)

Attempt any Five questions. **(5×4=20)**

1. Write a program to generate fibonacci numbers.

2. Implement a deque with the help of an array.

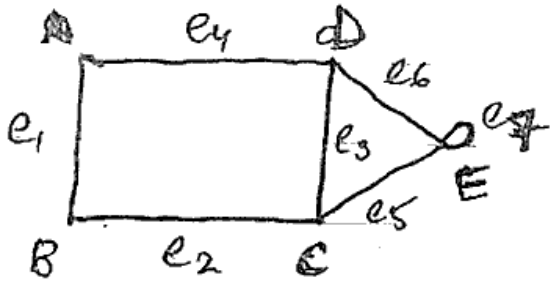
3. Write and explain an Algorithm for sequential search.

4. What is a doubly linked list ? Explain with suitable example.

5. Construct a binary tree with the following expression $(2x+5)\ (3x-y+8)$

6. a) Consider the graph below using adjacency matrix and path matrix

   b) Starting from vertex 'a'. Find the depth first search and breadth first search.



7. Explain directed and undirected graph and give their differences.

PART - C

(Descriptive/Analytical/Problem Solving/Design question)

Attempt any Three questions. **(3×10=30)**

1. Write an Algorithm to convert a postfix expression to Infix expression also convert Portfix to Infix for the 100, 8, 3, * ,50 , 2 , - , + , - **(10)**

2. a) Write a program for implementing queue with the help of Arrays . **(6)**

b) Write short note on Header linked list. **(4)**

3. Give the performence Analysis of the following types of sorting techniques **(10)**

a) Bubble sort

b) Insertion sort

c) Radix sort

d) Heap sort

4. What is tree traversal? Explain preorder, Postorder and Inorder traversal with the help of appropriate example. **(10)**

5. a) Explain various operations for a graph with example. **(6)**

b) Write and explain warshall's modified Algorithm. **(4)**