

# Data Structures and Applications

Max. Marks: 80

Time: 3 hrs.

Note: Answer any FIVE full questions, choosing one full question from each module.

## Module-1

- 1 a. Define data structures. Give its classification. (06 Marks)  
b. Define structures with example. (04 Marks)  
c. Define pointers. Give advantages and disadvantages of pointers. (06 Marks)

OR

- 2 a. Write a program to (i) reverse a string, (ii) concatenate two strings. (08 Marks)  
b. Explain dynamic memory allocation in detail. (08 Marks)

## Module-2

- 3 a. Define stack. Implement push and pop functions for stack using arrays. (08 Marks)  
b. Write the postfix form of the following expression: (08 Marks)  
(i)  $((6 + (3 - 2) * 4) \uparrow 5 + 7)$  (ii)  $A \$ B \$ C * D$

OR

- 4 a. Define queues. Implement Qinsert and Qdelete function for queues using arrays. (08 Marks)  
b. Define recursion. Write recursive program for (i) factorial of a number, (ii) tower of Hanoi. (08 Marks)

## Module-3

- 5 a. Write the following functions for singly linked list: (i) Reverse the list (ii) Concatenate two lists. (08 Marks)  
b. Write functions insert\_front and delete\_front using doubly linked list. (08 Marks)

OR

- 6 a. Write an algorithm to add two polynomials. (08 Marks)  
b. Define sparse matrix. Give sparse matrix representation of linked list for given matrix. (08 Marks)

$$A = \begin{bmatrix} 0 & 0 & 4 & 0 & 0 \\ 6 & 5 & 0 & 0 & 0 \\ 0 & 3 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 2 \end{bmatrix}$$

## Module-4

- 7 a. What is a tree? Explain : (08 Marks)  
i) Binary tree  
ii) Strictly binary tree  
iii) Complete binary tree  
iv) Skewed binary tree  
b. Given inorder sequence: DJGBHEAFKIC and postorder sequence: JGDHEBKIFCA. Construct binary tree and give preorder traversal. (08 Marks)

1 of 2

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and/or equations written eg, 42-8 = 50, will be treated as malpractice.

OR

- 8 a. Explain threaded binary tree in detail. (08 Marks)  
 b. Write a function to insert an item into an ordered binary search tree (duplicate items are not allowed) (08 Marks)

Module-5

- 9 a. Define graph. Give adjacency matrix and adjacency linked list for the given weighted graph in Fig.Q9(a).

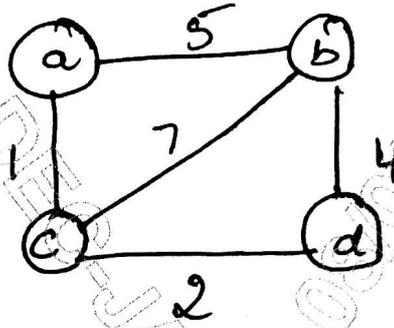


Fig.Q9(a)

- b. Write an algorithm for breadth first search and depth first search.

OR

- 10 a. Write an algorithm for Radix sort.  
 b. Explain Hashing in detail.

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