Sem III (DSE) R-2019 C Scheme "ECS" Feb' 2023

01/02/2023

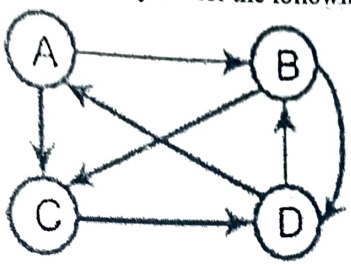
Duration: 3hrs **[Max Marks: 80]**

N.B. : (1) Question No 1 is Compulsory.
(2) Attempt any three questions out of the remaining five.
(3) All questions carry equal marks.
(4) Assume suitable data, if required, and state it clearly.

1 Attempt any FOUR **[20]**

a Define data structure. Differentiate linear and non-linear data structure with example.

b Find adjacency matrix A and adjacency list for the following directed graph.

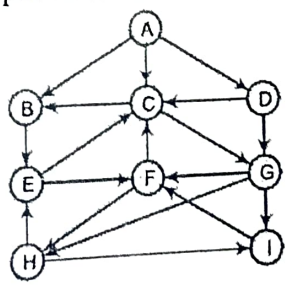


c Compare Arrays and Linked Lists with their advantages and disadvantages.

d Given the inorder and postorder traversal of a binary tree, construct the original tree:
In–order Traversal: D B H E I A F J C G
Post order Traversal: D H I E B J F G C A

e Compare between Bubble sort and insertion sort with an example.

2 a Consider the graph G given in Figure. The adjacency list of G is also given. Print all the nodes that can be reached from the node H (including H itself) using depth-first search algorithm (depth-first search of G starting at node H). **[10]**



Adjacency lists
A: B, C, D
B: E
C: B, G
D: C, G
E: C, F
F: C, H
G: F, H, I
H: E, I
I: F

Graph G and its adjacency list

b Explain the properties of Binary Search Tree. Create a binary search tree using the following data elements: **[10]**
45, 39, 56, 12, 34, 78, 32, 10, 89, 54, 67, 81.

3 a Convert the following infix expression to postfix equivalent and evaluate postfix expression. **[10]**
$9 - ((3 * 4) + 8) / 4)$

b Sort the following array using each of the two sorting algorithms [10]
40, 10, 50, 20, 30, 90
i) Insertion sort
ii) Merge sort

4 a Write a program in C to implement linear queue using array. [10]

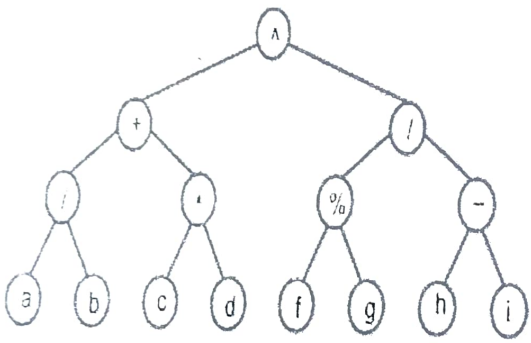
b Explain Singly linked list? State advantages and applications of Linked List? [10]

5 a Explain how element 29 can be searched in the given array using the Binary search algorithm. Write algorithm for the same. [10]
5, 9, 11, 15, 25, 29, 30, 35, 40.

b Write a C program to implement a singly linked list. The program should be able to perform the following operations: [10]
i) Insert a node in the end
ii) Delete the last node
iii) Display the node.

6 **Attempt ALL** [20]

a Write down the expression that it represented by following binary tree.



b Compare between Binary search and linear search techniques.

c Explain different graph traversal techniques.

d Differentiate between static arrays and dynamic arrays.

****

21312

0DBE0B671456B0D417D032710AD6633D