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Question Paper Code: R4410

B.E. / B.Tech. DEGREE EXAMINATION, APRIL / MAY 2025

Fourth Semester

Electronics and Communication Engineering

R21UEC410- DATA STRUCTURES AND PROGRAMMING TECHNIQUES

(Regulations R2021)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (5 x 1 = 5 Marks)

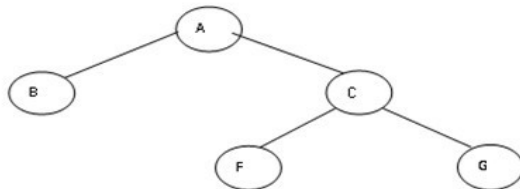
1. Which of the following points is/are true about Linked List data structure when it is compared with array? CO1-U
 - (a) It is easy to insert and delete elements in Linked List.
 - (b) Random access is not allowed in a typical implementation of Linked Lists
 - (c) The size of array has to be pre-decided, linked lists can change their size any time.
 - (d) All the above
2. Choose the correct output for the following sequence of operations CO2-App
PUSH(5), PUSH(8), POP, PUSH(2), PUSH(5), POP, POP, POP, PUSH(1), POP
 - (a) 8 5 2 5 1
 - (b) 8 5 5 2 1
 - (c) 8 2 5 5 1
 - (d) 8 1 2 5 5
3. Number of edges does a tree with N nodes have __. CO1-U
 - (a) N
 - (b) N-1
 - (c) N-2
 - (d) N+1
4. Which of the following operations is performed more efficiently by doubly linked list than by singly linked list? CO1-U
 - (a) Deleting a node whose location is given
 - (b) Searching of an unsorted list for a given item.
 - (c) Inverting a node after the node with given location.
 - (d) Traversing a list to process each node

5. Evaluate the following postfix expression: $4\ 3 + 5 - 2\ 4 + 3 / *$ CO2-App
 (a) 4 (b) 2 (c) 8 (d) None of the above

PART – B (5 x 3= 15 Marks)

6. Define a data structure? CO1-U
 7. Write the routine to push an element into a stack. CO1-U
 8. Traverse the given tree using Preorder traversals. CO3-App

Given tree:



9. How the singly linked lists can be represented? CO1-U
 10. What are applications of stack? CO1-U

PART – C (5 x 16= 80 Marks)

11. (a) Explain the different operations performed on lists using array CO1-U (16)
 implementation, along with their time complexities.
 Or
 (b) Describe how elements can be inserted and deleted in a doubly linked CO1-U (16)
 list.
12. (a) Write a program to check a sequence of brackets is balanced if the CO3-App (16)
 following conditions are met:
 i. It contains no unmatched brackets.
 ii. The subset of brackets enclosed within the confines of a
 matched pair of brackets is also a matched pair of brackets.
 iii. Given n strings of brackets, determine whether each
 sequence of brackets is balanced. If a string is balanced,
 return YES. Otherwise, return NO.

INPUT:

The first line contains a single integer n, the number of strings.

Each of the next n lines contains a single string s, a sequence of brackets.

CONSTRAINTS:

$1 \leq n \leq 10^3$, $1 \leq |s| \leq 10^3$, where |s| is the length of the sequence. All characters in the sequences? { {, }, (,), [,] }.

Or

- (b) Apply enqueue and dequeue operations on Queue using array and Linked list. CO3-App (16)

13. (a) Interpret the tree traversals with algorithms and examples CO1-U (16)

Or

- (b) Explain binary search tree ADT in detail. CO1-U (16)

14. (a) Construct an algorithm and develop the coding for singly linked list for the following operations: CO2-App (16)
- a) Creation of a list
 - b) Display the List
 - c) Insertion of a node
- Deletion of a node and also explain the performance of the operation with neat diagrammatic representation.

Or

- (b) Given two polynomial expressions represented by linked lists, write a function to perform addition and subtraction of these polynomials. consider the following polynomials: Polynomial 1: $5X^4+3X^3+2X+6$, Polynomial 2: $6X^4+3X^3+2X^2+9$ Write a function to calculate: The sum of the polynomials, The difference of the polynomials. CO2-App (16)

15. (a) Illustrate the routines used to insert and delete an element in a circular queue CO1-U (16)

Or

- (b) Describe the insertion and deletion operations performed on queue using array and Linked list. CO1-U (16)

