

17 FEB 2023

Reg. No.

Question Paper Code

11724

B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV/DEC 2022

Third Semester

Electronics and Instrumentation Engineering

(Common to Instrumentation and Control Engineering)

20ESIT301 - DATA STRUCTURES AND ALGORITHMS

(Regulations 2020)

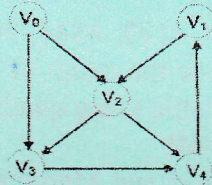
Duration: 3 Hours

Max. Marks: 100

PART - A (10 × 2 = 20 Marks)

Answer ALL Questions

- |  | <i>Marks,<br/>K-Level,CO</i> |
|--|------------------------------|
| 1. What do you mean by abstract data type?   | 2,K1,CO1                     |
| 2. Differentiate the array based implementation and linked listed based implementation of data structures.   | 2,K2,CO1                     |
| 3. Convert the following expression to post-fix: (A+B)*C.  | 2,K3,CO2                     |
| 4. Compare and contrast the differences between Stack and Queue ADTs.  | 2,K2,CO2                     |
| 5. In a binary tree with n nodes, every node has an odd number of descendants. Every node is considered to be its own descendant. What is the number of nodes in the tree that have exactly one child? | 2,K2,CO3                     |
| 6. While inserting the elements 71, 65, 84, 69, 67, 83 in an empty Binary Search Tree (BST) in the sequence shown, what will be the element in the lowest level.                                       | 2,K2,CO3                     |
| 7. Draw the adjacency list representation following Graph.   | 2,K2,CO4                     |



- |  |          |
|--|----------|
| 8. What is the maximum number of edges in an acyclic undirected graph with n vertices? | 2,K2,CO4 |
| 9. Mention the significance using the hash function in hashing operations.             | 2,K2,CO5 |
| 10. Write short notes on the complexity analysis of the quick sort algorithm           | 2,K2,CO5 |

PART - B (5 × 13 = 65 Marks)

Answer ALL Questions

- |  |           |
|--|-----------|
| 11. a) Write an algorithm to perform insertion and deletion of elements in a doubly circular linked list and algorithm for the displaying the contents of the list from the tail node. | 13,K3,CO1 |
|--|-----------|

OR

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create

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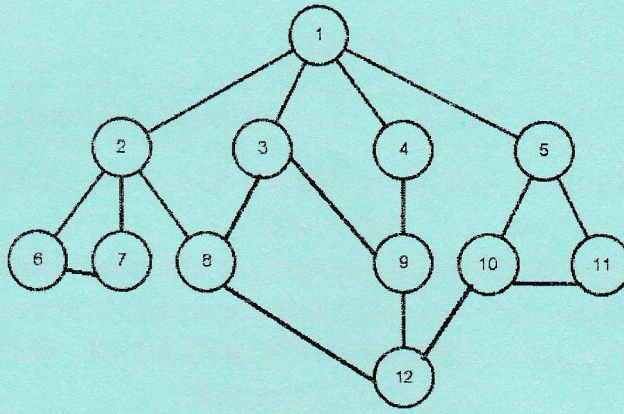


- b) Write an algorithm to perform insertion at the end and deletion of elements at first in a singly circular linked list and algorithm for the displaying the contents of the list from the tail node. 13,K3,CO1
12. a) Validate the following expression using stack by checking whether the parenthesis is balanced using relevant diagram and explanation. 13,K3,CO2  
 $\{ 1+(2*a)/3\} + [ \{ 4*(b+c)/(5-d-e) \} / f]$ .
- OR**
- b) Convert the given  $((A-B)+((C+D)+(E*F)))$  expression in to postfix expression using stack and evaluate that post fix expression using stack with  $A=80, B=3, C=10, D = E=2, F =4$ . Represent by proper diagram the state of stack after each step. 13,K3,CO2
13. a) Make a Binary Search Tree for the following sequence of numbers 45,32,90,34,68,72,15,24,30,66,11,50,10 Traverse the Binary Search Tree created in Preorder, Inorder and Postorder. 13,K3,CO3
- OR**
- b) Write an algorithm for constructing an expression tree and explain how the given expression is converted to an expression tree. 13,K3,CO3  
 $((a*b) + (c*d)) - (e/f^i)$
14. a) Explain disjoint set with appropriate pseudo code and its implementation of find, makeset and union algorithms. 13,K2,CO4
- OR**
- b) Explain in detail about the graph data structure and its application, and list its different types with examples and also illustrate the different representation of graphs. 13,K2,CO4
15. a) Given input  $\{4371, 1323, 6173, 4199, 4344, 9679, 1989\}$  and a hash function  $h(x) = X(\text{mod } 10)$ , show the result of separate chaining hash table and open addressing hash table using quadratic probing. 13,K3,CO5
- OR**
- b) Write an algorithm for Quick Sort and Merge sort. Sort the following list of characters using that algorithm G, H, J, A, Z, O, N, M. 13,K3,CO5

**PART - C (1 × 15 = 15 Marks)**

16. a) Apply the Depth First Search and Breadth First Search Algorithm on the following graph and write the possible sequence of traversal using visual illustration for 15,K3,CO4
- i) '8' as the source vertex and
  - ii) '5' as the source vertex





OR

- b) Explain the algorithms for finding minimum spanning tree  
 (i) Kruskal's algorithm.  
 (ii) Prim's algorithm.

8,K3,CO4

7,K3,CO4