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Reg. No. : | | | | | | | | | | | | |

**Question Paper Code: U3802**

B.E./B.Tech. DEGREE EXAMINATION, APRIL 2024

Third Semester

Computer Science Engineering

21UIT302 - DATA STRUCTURES

(Common to IT, CSD and AI&DS Engineering branches)

(Regulations 2021)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (5 x 1 = 5 Marks)

1. What kind of linked list is best to answer question like "What is the item at position n?" CO2- App

   (a) Singly linked list (b) Doubly linked list

   (c) Circular linked list (d) Array implementation of linked list

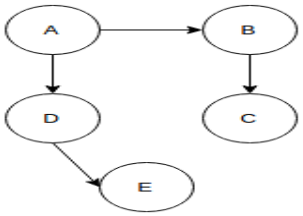
2. Evaluate the following postfix expression: 4 3 + 5 – 2 4 + 3 / * CO2- App

   (a) 4 (b) 2 (c) 8 (d) None of the above

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. What would be the DFS traversal of the given Graph? CO2- App




   (a) AEDCB (b) EDCBA (c) ADECB (d) ABCDE

5. The given array is arr = {1, 2, 4, 3}. Bubble sort is used to sort the array elements. How many iterations will be done to sort the array? CO2- App

   (a) 4 (b) 2 (c) 1 (d) 0

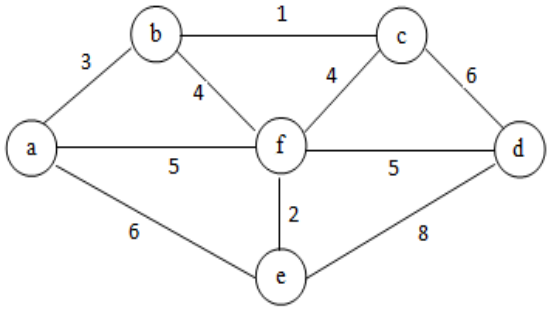
PART – B (5 x 3= 15 Marks)

| | | | | |
|---|---|---|---|---|
| 6. | | Give the syntax of node creation in single linked list? | CO1- U | |
| 7. | | Write down the operations that can be done with Stack data structure? | CO1- U | |
| 8. | | Draw a 2-3 tree with the keys 1, 2 3, 4, 5. | CO2- App | |
| 9. | | Differentiate adjacency list and adjacency matrix. | CO1- U | |
| 10. | | What do you mean by the divide and conquer strategy? | CO1- U | |

PART – C (5 x 16= 80Marks)

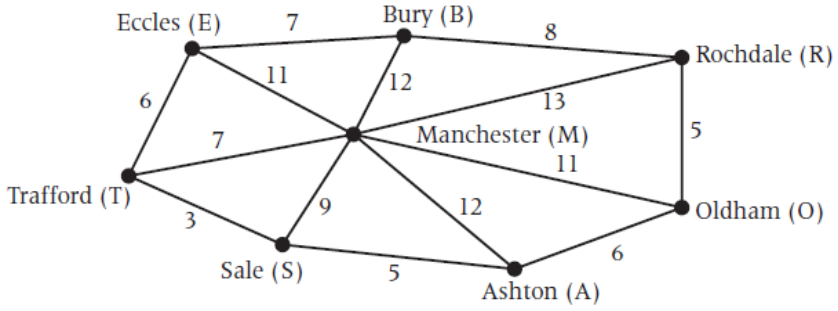
| | | | | |
|---|---|---|---|---|
| 11. | (a) | Analyze any 4 operations of the Singly linked list with Routines and examples. | CO3- Ana | (16) |
| | | Or | | |
| | (b) | Analyze doubly linked list and circular linked list with examples. Mention its advantages and disadvantages. | CO3- Ana | (16) |
| 12. | (a) | Write an ADT to implement QUEUE of size N using an array. The elements in the queue are to be integers. The operations to be supported are Enqueue, Dequeue and DISPLAY. Take into account the exceptions of queue overflow and queue Underflow. | CO2- App | (16) |
| | | Or | | |
| | (b) | A circular queue has a size of 5 and has 3 elements 10,20 and 40 where F=2 and R=4.After inserting 50 and 60,what is the value of F and R.Trying to insert 30 at this stage what happens? Delete 2 elements from the queue and insert 70, 80 & 90.Assess the sequence of steps with necessary diagrams with the value of F & R. | CO2- App | (16) |
| 13. | (a) | Construct a binary tree if the preorder and inorder outputs are given.<br>Preorder traversal: A B D G H E I C F J K<br>Inorder traversal: G D H B I E A C J F K<br>Also, find the post order traversal output. | CO2- App | (16) |
| | | Or | | |
| | (b) | Draw a binary search tree with the input given below.<br>45, 56, 78, 54, 39, 67, 12, 34, 89, 32, 81, 10.<br>Consider the above drawn binary search tree do the following operations<br>a. Find in-order, Pre-order, Post-order traversal<br>b. Show the deletion of root node.<br>c. Insert 11, 22, 33, 44 | CO2- App | (16) |

14. (a) Apply Kruskal's algorithm to find the minimum spanning tree for the following graph and write the complexity of Kruskal's Algorithm — CO2- App (16)




Or

(b) The following diagram shows main roads connecting places near to Manchester, where the values shown represent the distances in miles. Mark lives in Rochdale and works in Trafford.
(a) Use Dijkstra's algorithm to find the shortest distance from Rochdale to Trafford. Write down the corresponding route. — CO2- App (16)




15. (a) Write an algorithm to find the occurrences of the A & J strings in a given set of strings using binary search.
"ABVFDAAJRYPVJJVBJSPJAJA" — CO2- App (16)

Or

(b) Show the result of inserting the keys 10111101, 00000010, 10011011, 10111110, 01111111, 01010001, 10010110, 00001011, 11001111, 10011110, 11011011, 00101011, 01100001, 11110000, 01101111 into an initially empty extendible hashing data structure with M=4. — CO2- App (16)