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Reg. No. :

Question Paper Code: U3802

B.E./B.Tech. DEGREE EXAMINATION, NOV 2022

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. Consider the following definition in c programming language. Which of the   CO2- App
    following c code is used to create new node?

    struct node
    {
      int data;
      struct node * next;
    }
    typedef struct node NODE;
    NODE *ptr;
    (a) ptr=(NODE*)malloc (sizeof(NODE));   (b) ptr=(NODE*)malloc(NODE);

    (c) ptr=(NODE*) malloc(sizeof(NODE*));   (d)ptr=(NODE)malloc(sizeof(NODE));

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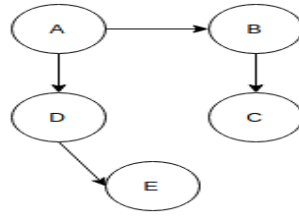
    (a) AEDCB   (b) EDCBA   (c) ADECB   (d) ABCDE

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

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

PART – B (5 x 3= 15 Marks)

6. Mention the routine and also give pictorial representation for creation of a node 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. Find the number of iterations necessary to sort the given numbers using the selection sort {44, 12, 7, 55}.   CO2- App

PART – C (5 x 16= 80Marks)

11. (a) Given a list 10,20,30,40 generalize the steps along with the routine and pictorial representation to insert a node from the beginning of the linked list, deletion of last node in the list, searching the second node in a list and traversing the whole list.   CO2- App   (16)

Or

    (b) Given two polynomial expressions represented by linked lists. You need to write a function that adds these lists, that is, adds the coefficients that have the same variable powers.   CO2- App   (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

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(b) A circular queue has a size of 5 and has 3 elements 10,20 and 40   CO2- App   (16)
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.

13. (a) Create a binary search tree for the following numbers start from an   CO2- App   (16)
empty binary search tree.45,26,10,60,70,30,40 Delete keys 10,60
and 45 one after the other and show the trees at each stage.

Or

(b) Insert the following keys in sequence into an AVL Tree. Find out   CO2- App   (16)
the number of rotations required in each case
6,3,1,2,4,5,9,7,8,11,10,12.

14. (a) The diagram below shows roads connecting places near to   CO2- App   (16)
Rochdale. The numbers on each arc represent the time, in minutes,
required to travel along each road. A person wants to distribute the
college pamphlets to all the places near to Rochdale. Use Minimum
Spanning algorithms to find the minimum time required to distribute
the pamphlets.
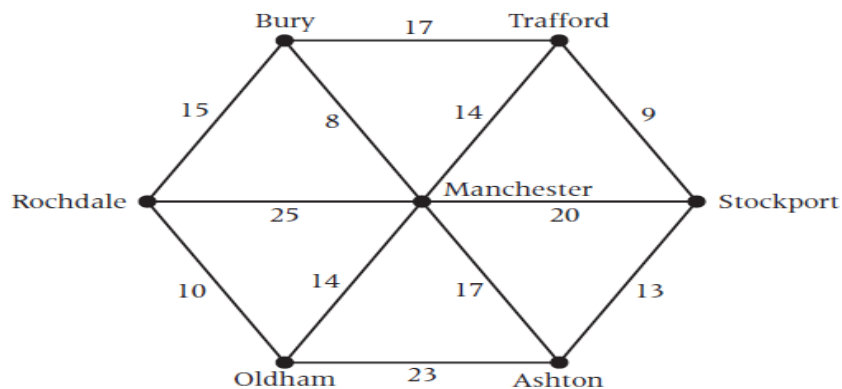
Or

(b) The following diagram shows main roads connecting places near to   CO2- App   (16)
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.

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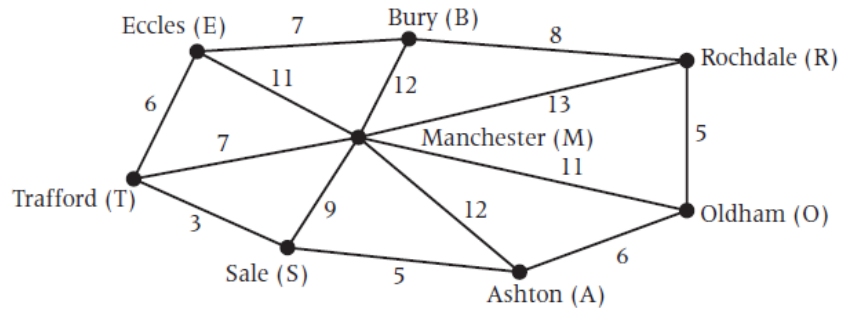
15. (a) Perform linear search and binary search for the following numbers: CO3- Ana   (16)
    55, 75, 15, 60, 35, 45, 25, 95, 85. Write suitable procedure(s). Analyze
    the number of comparisons needed for searching the following key
    values: 75, 50. Based on the analysis, identify the best searching
    technique.

                                    Or

    (b) Use any 2 sorting algorithms to sort the following numbers: 13, 8, 2, 4,   CO3- Ana   (16)
    10, 16, 20, 32. Write suitable procedures. Analyze the time complexity of
    the algorithms and find out the optimal one.

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