Total No. of Questions : 10]

SEAT No. :

PE3919

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S.E. (Computer Engineering/Computer Science and Engineering)

PCC-201-COM-CSE : DATA STRUCTURES

(2024 Pattern) (Semester-III)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of electronic pocket calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Explain different Asymptotic notations with graph of order of growth. **[6]**

b) Define ADT and Explain Types of Data structures Compare Linear and Non-linear Data Structures. **[8]**

OR

Q2) a) Compare Static and Dynamic Data Structures. Discuss the significance of Persistent and Ephemeral Data Structures. **[6]**

b) Apply step count method to evaluate time complexity of the following python code **[8]**

```
def oddEven (n=100):
    for num in range (1, n):
        if num % 2 ==0:
            print (num, 'is Even')
        else:
        print (num, 'is Odd')
```

Justify that the above algorithm is having linear, non-linear, quadratic time complexity. List various Algorithmic Strategies and explain any one with suitable example.

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Q3) a) Define the terms **[6]**

i) Sparse Matrix

ii) Sorting Stability

iii) Internal and External Sort

b) Apply Binary Search algorithm on the following numbers stored in array from A [0] to A [09] as 9, 17, 23, 38, 45, 50, 57, 76, 90, 100 to search numbers 23 and 90. Also note on the time complexity of each search. **[8]**

OR

Q4) a) Define ADT for Arrays and discuss at least 4 operations that are performed on arrays. **[6]**

b) Explain Bubble sort algorithm and sort the given list using bubble sort: 7, 4, 10, 6, 3, 12, 1, 8, 2, 15 Enlist the number of passes required to complete the sort. **[8]**

Q5) a) Explain with neat diagram: **[6]**

i) SLL

ii) DLL

iii) CLL

b) Explain Stack as an ADT and Convert the infix expressions (A+B)*D+E/(F+A*D)+C into postfix representation using stack, Show the status after every step in tabular form. **[8]**

OR

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Q6) a) Define and Draw diagram for **[6]**

i) Queue

ii) Circular Queue

iii) Dequeue

b) Write a pseudo code for Stack implementation using Linked List for the following operations **[8]**

i) Create

ii) Push

iii) Pop

iv) Display

Q7) a) Explain characteristics of Good Hash function and Explain any four types of Hash Functions. **[6]**

b) Represent the following key in memory using Linear probing without replacement. Use modulo 10 as your hashing function. 24, 13, 16, 15, 19, 20, 22, 14, 17, 26 Estimate average search time for any element in Hash Table. **[8]**

OR

Q8) a) Write a short note on any three hashing techniques. **[6]**

b) Given the Inputs: 4371, 1323, 6173, 4199, 4344, 9679, 1989} Hash table size = 10 and Hash function = key mod 10. Show the results for the following: **[8]**

i) Open addressing hash table using Linear Probing

ii) Open addressing hash table using Quadratic Probing

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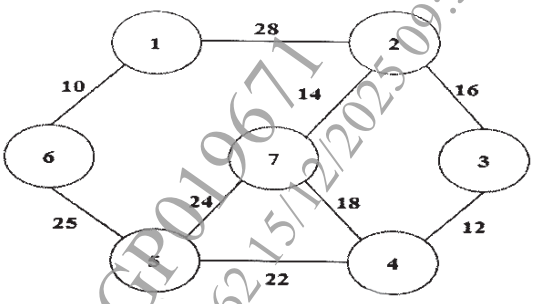
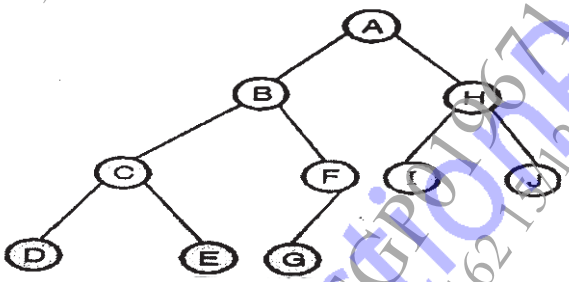
Q9) a) Compare Tree and Graph, Enlist at least two real time applications of each. **[6]**

b) Write Prime's algorithm and apply it on given graph to find Minimum Spanning Tree. Estimate the cost of MST **[8]**

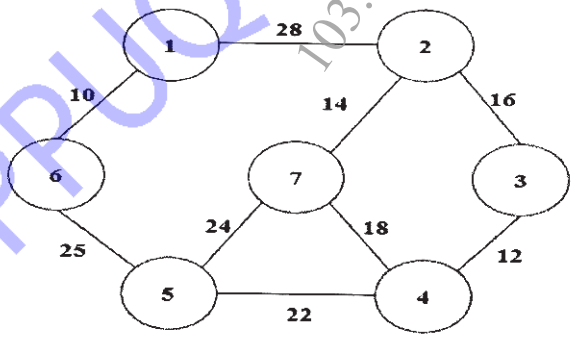


OR

Q10)a) Apply Tree traversal techniques and find in-order, pre-order and post-order traversal sequence of given binary tree. **[6]**



b) Write Kruskal's algorithm and apply it on given graph to find Minimum Spanning Tree. Estimate the cost of MST **[8]**



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