



School of Information Technology and Engineering

Fall Semester 2022-2023

Continuous Assessment Test – II

Programme Name & Branch: MCA

Course Name & Code: ITA5002 – Problem Solving with Data Structures and Algorithms.

Class Number (s): VL2022230105092, VL2022230105099, VL2022230105106.

Slot: C2+TC2

Faculty Name(s): Dr. Chandra Mouliwaran S, Dr. Gaarmendra Singh Rajput, Dr. Krishnamoorthy N.

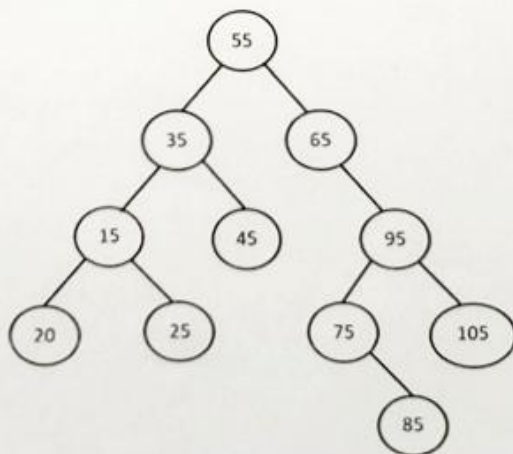
Exam Duration: 90 Min.

Maximum Marks: 50

General instruction(s):

- (i) Write the concrete and crisp answers instead of writing the answer in general.
- (ii) Draw Diagrams and Tables wherever necessary.
- (iii) Provide every step and iteration clearly while solving problems and deriving your solutions.

1. (i) Consider the splay tree given below and perform the operations such as **Insert 32**, **Search 75** and **Delete 65** in sequence. Display your rotations and their status while performing the above operations. (8)



- (ii) How many bits are required per node to store the height of a node in an "N" node AVL Tree? (2)

2. Construct a heap (MIN HEAP) for the following array structure. Check whether the heap property is maintained. If, it is violated, rearrange the heap so as to maintain the heap property. Sort the following elements using heap sort. (10)

24	18	17	36	72	54	11	44	45	33
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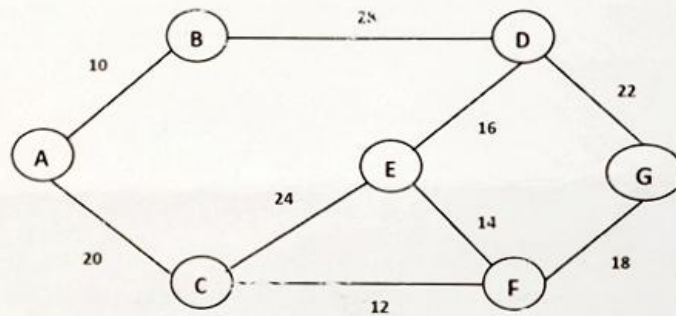
Here, each and every step in all of the iteration is needed to be illustrated clearly.

3. (i) Apply the Insertion Sort to sort the below elements in ascending order. Here, each and every step in all of the iteration is needed to be illustrated clearly (7)

63	23	53	73	43	83	13	93	33
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(ii) Find the minimum number of comparison required to sort 5 elements? Among the various sorting techniques known to you, which sorting technique provide it? Justify your answer with an example. (3)

4. (i) Develop the weighted matrix for the graph given below. (2)



(ii) Construct the Minimum Spanning Tree for the above Graph using Prim's and Kruskal's Algorithms and compare their results. (8)

5. By applying the Dijkstra's algorithm, illustrate how to find the shortest path from the node or vertex "P" to all other nodes or vertices in the below Graph. Provide the status of graph in each and every step clearly. (10)

