COURSE CODE (CREDITS): 22M11CI111 (4)(3)   MAX. MARKS: 15

COURSE NAME: Advance Data Structures

COURSE INSTRUCTORS: Dr. Avani Vyas   MAX. TIME: 1 Hour

Note: All questions are compulsory. Marks are indicated against each question in square brackets.

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1. **Attempt all questions in sequence.**

Q1. Following questions are related to Heapsort: CO2 [4 marks]

   1. Write Heapsort algorithm.   (1)

   2. How many arguments does Heapsort algorithm accepts.   (0.5)

   3. Write the time complexity of every step of Heapsort algorithm with a single line explanation.   (2)

   4. Write and explain the runtime complexity of Heapsort algorithm. (0.5)

Q2. Two stacks, S1 and S2, are implemented in one array A[1, 2, ..., n] in such a way that neither stack overflows unless the total number of elements in both stacks together is n. Write operations PUSH(S1), POP(S1), PUSH(S2), and POP(S2). The operations should run in O(1) time.   CO4[2 marks]

Q3. Suppose, in a linked list location LOC of node to be deleted is given and LOCP is the location of the node preceding node at LOC is also given. What will be the tightest upper bound of time complexity required to delete the element present at location LOC.   CO4[1 marks]

Q4. Following questions are related to AVL trees.   CO1[4 marks]

   1. Where can you find the node with the maximum value in a AVL tree.

   2. Construct the AVL tree when 64, 1, 44, 26, 13,110 nodes are inserted sequentially.

   3. Prove that AVL tree with n nodes has height O(log n).

Q5. Derive the minimum height of k-ary tree.   CO1[2 marks]

Q6. Given inorder and postorder construct the binary tree. And find the preorder.   CO3[2 marks]

Inorder: D B E A F C

Postorder: A B D E C F