Total No. of printed pages = 4

19/3rd Sem/UCSE306

2021

# DATA STRUCTURE USING C

Full Marks – 100

Time – Three hours

The figures in the margin indicate full marks
for the questions.

Answer any *five* questions.

1. (a) Define the average case time complexity ?
Also, draw the graph of the average case
time complexity.   3+2=5

(b) What is left right rotation of an AVL tree ?
Illustrate with an example.   2+3=5

(c) Define the following terms in brief :
                                       2×5=10

(i) Pre-order traversal

(ii) Binary search tree

(iii) Spanning tree

(iv) Depth first search traversal

(v) AVL tree

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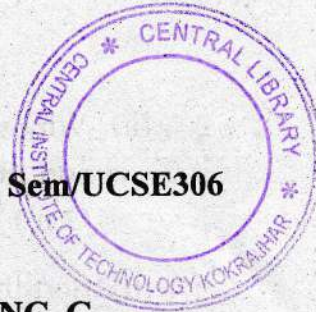
2. (a) Why worst case time complexity of insertion sort for sorting an array of n elements is $O(n^2)$? Explain. 6

(b) Sort the following data using bubble sort and write the intermediate steps only : 7

80 20 50 30 60 70 35 55 25

(c) Write an algorithm for a queue to perform its operations circularly. 7

3. (a) Write the intermediate steps for quick sort while sorting the following data : 8

70 35 25 45 15 20 40 55 65

(b) Write an algorithm for linear search technique. 6

(c) Why worst case time complexity of binary search is $O(\log n)$? 6

4. (a) Write the algorithmic steps for selection sort algorithm. 7

(b) Apply selection sort to sort the following data and show the intermediate steps only during sorting : 6

75 35 25 85 80 40 50 20 45

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(c) Apply depth first search traversal to the following graph showing the status of the stack for each step :   7
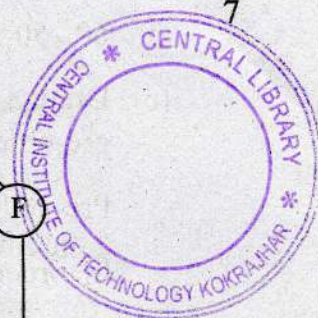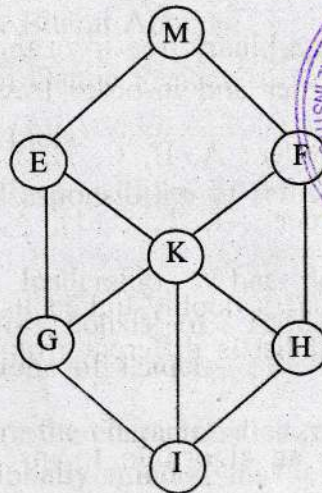
5. (a) What is minimum spanning tree ? Find the minimum spanning tree for the following graph :   2+5=7
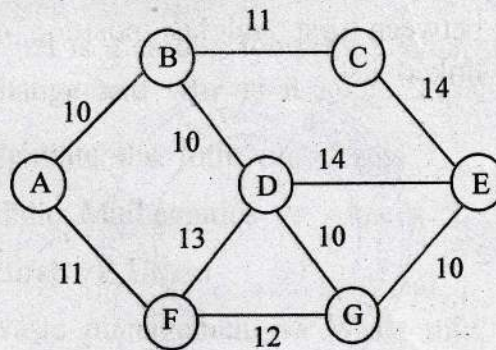
(b) Build a binary search tree from the following data : 5

60 50 30 25 15 75 40 35 10 20 45

(c) Draw a binary tree from the following given pre-order and in-order traversals : 8

Pre order : A, B, C, H, I, G, D, K, F, E

In order : I, F, D, H, A, E, B, C, G, K

6. (a) What is a doubly linked list ? How a singly linked list is different from a doubly linked list ? 2+2=4

(b) Write an algorithm to insert an element in the first position of a singly linked list. 5

(c) Write an algorithm to insert an element in the last position of a singly linked list. 6

(d) Write an algorithm to delete an element between first and last position of a singly linked list. 5