53 (CS 304) DTST

2017

DATA STRUCTURES

Paper : CS-304 (Back)

Full Marks : 100

Time : Three hours

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

*Answer **any five** questions.*

1. *(a)* Write down the algorithm / pseudocode for Binary Search technique. Derive its time complexity. 8+2=10

   (b) Write algorithm / pseudocode for insert and delete operations for a queue. 5+5=10

2. *(a)* Insert 65 and then 15 into the following AVL search tree : 15

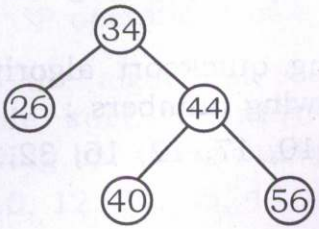

Fig : 1 : *Initial AVL search tree*

(b) Represent the array $B(2,3,4)$ in three dimensional space, showing the individual elements. Also show in memory representation. 5

3. (a) Consider the following list of 10 numbers :

14, 10, 17, 12, 16, 32, 18, 25, 8, 11.

Construct a binary search tree by inserting the above numbers in order.

Differentiate between a binary search tree and a regular binary tree.

7+3=10

(b) Discuss various asymptotic notations for complexity. 10

4. (a) Evaluate the following postfix notation using stack :

5, 8, 6, +, 7, *, 10, 5, 1, –, 7, +, 2, –, +) 6

(b) Define tree, spanning tree and minimum spanning tree. 6

(c) Using quicksort algorithm, sort the following numbers : 8

14, 10, 17, 12, 16, 32, 18.

5. *(a)* Describe the structure of a linear linked list. Explain pointers. 4+4=8

(b) What do you mean by balance factor of a binary tree ? Write down algorithms for preorder, inorder and postorder traversals of binary tree. 2+10=12

6. *(a)* Using Prim's algorithm, determine the minimum spanning tree of the following graph : 10

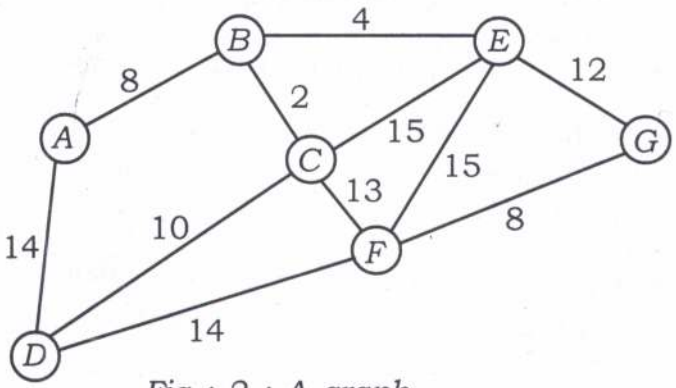

Fig : 2 : A graph

(b) Write algorithm / pseudo code for PUSH and POP operations of a stack. 10

7. *(a)* Write the algorithm/pseudocode for bubble sort technique. Sort the following list using bubble sort :

40, 10, 12, 20, 35, 43. 10+6=16

(b) Convert the following infix expression into postfix notation 4

$(6+4)\uparrow 2-10*(2+3)$