NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI-15

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

II YEAR B.TECH , CYCLE TEST 2

CSPC32 DATA STRUCTURES

DATE: 06-11-2023 ANSWER ALL QUESTIONS Max Marks: 20

1. Construct the binary tree for the infix expression : a-b+c*d+e/f-g+h*i-j (3)
2. The preorder and inorder traversal of AVL tree are given below. In this AVL tree, the elements 2, 3, 10, 18, 4, 9, 14, 7 and 15 have to be deleted in the given order. Draw the resultant pre-threaded AVL tree.

   Preorder: 14, 4, 3, 2, 9, 7, 10, 21, 15, 18, 28, 26, 30

   Inorder: 2, 3, 4, 7, 9, 10, 14, 15, 18, 21, 26, 28 (1+2+1)
3. Assume that the node y (in black color) is the physically deleted node and it is the left child of its parent in the red-black tree. With the neat and clear diagrams, illustrate any four possible imbalance conditions and their solutions. (4)
4. Consider the string abbccddeee. Each letter in the string must be assigned a binary code satisfying the following properties:
   a. For any two letters, the code assigned to one letter must not be a prefix of the code assigned to the other letters.
   b. For any two letters of the same frequency, the letter which occurs earlier in the dictionary order is assigned a code whose length is at most the length of the code assigned to the other letter.

   Among the set of all binary code assignments which satisfy the above two properties, what is the minimum length of the encoded string?

   (i) 23 (ii) 21 (iii) 25 (iv) 30 (3)
5. Comment on the following statement with suitable examples: Prims and Kruskal will work for a directed graph? (3)
6. Consider the directed graph shown in the figure below. There are multiple shortest paths between vertices S and T. Which one will be reported by Dijkstra's shortest path algorithm? (3)