B.Tech. Degree IV Semester Special Supplementary Examination February 2020

CS/IT 15-1405 DATA STRUCTURES AND ALGORITHMS
(*2015 Scheme*)

Time : 3 Hours   Maximum Marks : 60

PART A
(Answer *ALL* questions)

(10 × 2 = 20)

I. (a) What is the concept of associative arrays?

   (b) Define a heap? Insert the following numbers one by one to build a min heap. 70, 50, 60, 35, 80, 30, 25.

   (c) Write code for both traversals in a doubly linked list.

   (d) Evaluate the following prefix expression.
   - + - AB * C + DE + FG, with given values A = 7, B = 6, C = 5, D = 4, E = 3, F = 2, G = 1.

   (e) What is strictly binary tree and full binary tree?

   (f) Given the inorder sequence : DGJBHEAFKIC and postorder sequence JGDHEBKIFCA , Construct the binary tree and give its preorder sequence.

   (g) Differentiate between B trees and B+ trees.

   (h) Give the graph representation using adjacency matrix.

   (i) What are k-d trees?

   (j) Form an expression tree for the following arithmetic expression. Also,   find the postfix form of it using the tree. (5+9) * 2 – 8 / (3+6) + 7
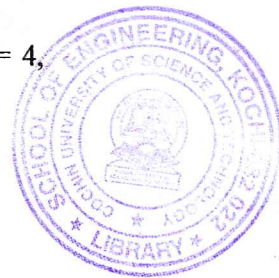
PART B

(4 × 10 = 40)

II. (a) Write an algorithm for insertion sort, Apply insertion sort, showing the various passes to sort the array A, where A = [77,33,44,11,88,22,66,55].   (5)

   (b) Compare and contrast between the approaches followed by Bubble sort and Selection sort.   (5)

OR

III. (a) Give the algorithm for Quick sort. Mention its complexity. Explain with an example.   (6)

   (b) Explain Hashing technique. How to deal with collisions if one occur?   (4)

IV. (a) Create a singly linked list of integers, and write code sequence to perform the following tasks. (i) Insert a node with value 50 between the nodes with values 10 and 20. (ii) Delete the middle node from the list.   (4)

   (b) Write the algorithm for infix to prefix conversion. Using the algorithm, convert the following expression to prefix form, showing the stack status at each time. ((A-B)+C*(D+E))-(F+G)   (6)

OR

V. (a) Write the code for performing the following operations in singly liked list (6)
representing a set.
(i) To create a new list which represents the intersection of two sets,(A∩B).
(ii) To create a new list which represents the difference of the two sets,(A-B).

   (b) Differentiate between normal queues and priority queues. Implement an ascending (4)
priority queue using arrays.

VI. (a) Give the non recursive traversal algorithm for in order traversal. Illustrate with a (5)
suitable example.

   (b) What is an AVL search tree? Create an AVL tree with following set of numbers (5)
inputted in order. 17,14,11,7,12,13,15,3.

OR

VII. (a) How do threads make the traversal faster? Write the procedure for construction of a (6)
threaded tree.

   (b) Write the recursive algorithms for post order and pre order traversals. (4)

VIII. (a) Explain the graph traversal methods with examples. (5)

    (b) Explain Dijkstra's shortest path algorithm with an example. (5)

OR

IX. (a) Explain and illustrate the Kruskal's algorithm for minimum spanning tree. (5)

   (b) Give the definition for a B-Tree and its application area. Show an insertion situation (5)
where tree height is increasing.

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