B

APJ Abdul Kalam Technological University

Ernakulam II Cluster

First Semester M.Tech Degree Examination December 2017
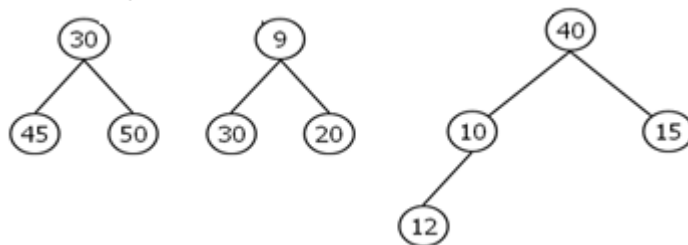
05CS6003-ADVANCED DATA STRUCTURES AND ALGORITHMS

Time: 3 Hours   Max Marks: 60

I.
   a) Find resultant binary tree for the given forest. Illustrate the method also.

(5 marks)

   b) Explain rebalancing methods of red-black tree insertion.   (4 marks)

   c) Insert the following elements in the given order into an empty red black tree.

2, 60, 22, 10, 25, 55, 30   (3 marks)

II.

   a) Discuss the algorithm for weight balanced leftist tree for constructing max heap.

(4 marks)

   b) Insert following elements in to SMMH. Draw the resultant SMMH after each insert.

40, 50, 70, 30, 42, 15, 20, 25, 27, 90   (8 marks)

III.

   a) State and prove master's theorem for all the cases.   (9 marks)

b) Solve the recurrence relation by recursion tree method and verify using substitution method.

$$T(n) = 2T(n/2) + n^3$$ (9 marks)

OR

IV.

a) Discuss memoized dynamic method for optimal parenthesization of a matrix chain multiplication. (7 marks)

b) Write and analyse dynamic algorithm for longest common subsequence problem. (5 marks)

c) Find LCS of following sequences using the above method.

   X = (1,0,0,1,0,1,0,1)   Y = (0,1,0,1,1,0,1,1,0)   (6 marks)

V.

a) Given a flow network graph G with corresponding flow f in the following figure.
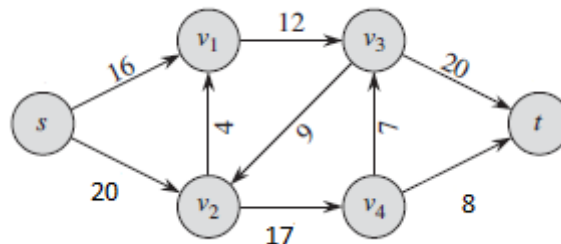
Design residual networks of the above graph and find the maximum flow in the given flow network by using Ford Fulkerson algorithm. (12 marks)

b) Given a graph G = (V, E) write and analyze algorithm for maximum bipartite matching. (6 marks)

OR

VI.

a) Interpret the cross product of two vectors P1 and P2. (4 marks)

b) Explain the method to determine whether two line segments intersect. (5 marks)

c) Given two points P1 and P2 in the plane, the D_L – distance between them is given by max ($| x_1 - x_2|$, $|y_1 - y_2|$). Modify the closest-pair algorithm to find D_L. (9 marks)