Advanced Data Structures and Algorithms (CSPC-31)

B.Tech, 5th Semester (Computer Engineering)

MM.50

Note: Attempt any five questions.

Q1.a) Explain how AVL tree can be used to sort the sequence of n elements in O(n logn) time.(4)

b) Write down the algorithm for extracting the minimum node from the Fibonacci heap. Calculate the amortized cost of it. (4, 2)

Q2. a) What are Splay Trees? Discuss Splay operation. Start with a Splay tree that is a 15-node full binary tree. The keys are 1-15. Remove the keys in order 11, 14, 13, 15, 9, 12, 2, 3 and 1. (4, 3)

b) Explain the advantages of splay tree in representation of dictionaries. (3)

3. a) Start with an empty Red-Black tree and insert the following keys in the given order: 40,10, 30, 35, 25, 27, 26, 60, 55,61,80. Draw figures depicting the tree immediately after each insertion and following the rebalancing. Further, delete the key 55 from the same. (4, 3)

b) Under what conditions would you use a red-black tree instead of hashing with chaining? (3)

Q4. a) What is suffix trie? Give their applications. (4)

b) Explain the procedure of calculating the prefix function in KMP algorithm. Compute the prefix function for the pattern P=abababcaab. Further, explain the complexity of finding the prefix function. (4,2)

Q5.a) Corresponding to undirected graph G=(V,E). Prove that vertex cover problem is NP Complete. (5)

b) Give an efficient greedy algorithm to find the optimal vertex cover for a tree in linear time. (5)

Q6. a) What is the ρ approximation? Write down the 2-approximate solution for finding the minimum spanning tree. (2, 5)

b) Give the definition of a polynomial time approximation scheme (PTAS) for a maximization problem. (3)