H-5/2051 5413/MJ

Advanced data structure and Applications-202

Sem-II

Time: 3hrs M.M.-50

Attempt Seven questions in all, Selecting any three questions from each of the Sections A & B. Section-C is Compulsory.

Section-A

1. Order the following functions by growth rate: N, $N^{1.5}$, N^2, N log log N, N $\log^2$ N, N log (N^2), 2/N, 2^N, $2^{N/2}$, 37, N^2 log N, N^3. Indicate which functions grow at the same rate. (5)
2. Prove that $f(n) = a_m n^m + a_{m-1} n^{m-1} + \ldots + a_1 n + a_0$ then $f(n) = O(n^m)$. (5)
3. Distinguish between P, NP and NP- complete problems. (5)
4. Construct a 2-3 tree for the list <9, 5, 8, 3, 2, 4> by successive insertion. (5)
5. Explain insertion and deletion algorithms in Red-Black trees with examples (5)

Section-B

6. Modify Dijkastra's algorithm to solve all-pairs-shortest-path problem. (5)
7. What are articulation points? How are they worked out? Explain with example. (5)
8. How the growth of the Minimal spanning tree differs in Kruskal's and Prim's algorithms. (5)
9. Explain the Huffman coding in detail. (5)
10. Explain the method for Set representation? Explain Find and union Operations in detail. (5)

Section-C

11(a) How is the time complexity measured? (2)

(b) What is a deterministic algorithm? (2)

(c) What is topological sort? Explain. (2)

(d) What is a sparse matrix? How it may be represented in the memory of a computer? (2)

(e) What is garbage collection? (2)

(f) What are leftist heaps? Show with a diagram. (2)

(g) What are strongly connected components in a graph? (2)

(h) What is the minimal spanning tree? What are its advantages? (2)

(i) For the following list of elements, create an AVL tree (2)

(i) L= <5,4,3,2,1,6,7,8,9,10>

(ii) L =< J,H,F,D,B,A,C,E,G,I,K>

(j) What is a recurrence relation? (2)