5E 5106

5E 5106

B. Tech. V Semester (Main/Back) Examination, Dec., 2014

COMPUTER SCIENCE & ENGINEERING (5)(6)(1)(Y)

(Common for Computer & IT

ADVANCED DATA STRUCTURE

Time : 3 Hours | Min. Passing Marks : 24 | Maximum Marks : 80

Instruction to Candidates :

Attempt any five questions, selecting one question from each unit. All questions carry equal marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.)

Unit-'I'

1. (*a*) Suppose we build the Huffman code tree for the set of letters and frequencies given below :

Character : A B C D E F

Frequency : 1 5 20 30 40 50

What will be the length of the code for the character B? [8]

(*b*) Explain the concept of 2-3 tree. How can keys be inserted into it? Comment on the efficiency of search operations on a 2-3 tree. [8]

OR

1. (*a*) Prove that the insertion of a new node in the red-black tree with n nodes in Q (logn) time in the worst case. [8]

(*b*) What is a dictionary? Give the applications of dictionary or dictionary with duplicates in which sequential access is desired. [8]

Unit-'II'

2. (*a*) Explain the various techniques used in amortized analysis. [8]

(*b*) What is Binomial heap? Explain binomial operations and its applications. [8]

OR

2. (*a*) Show that if only the messageable-heap operations are supported, the maximum degree D (n) in an n-node Fibonacci heap is at most [log n]. [8]

(*b*) Justify the 0(1) amortized time of FIB-HEAP-DECREASE-KEY as an average cost per operation by using aggregate analysis. [8]

Unit-'III'

3. (a) Construct a graph G with the following properties:

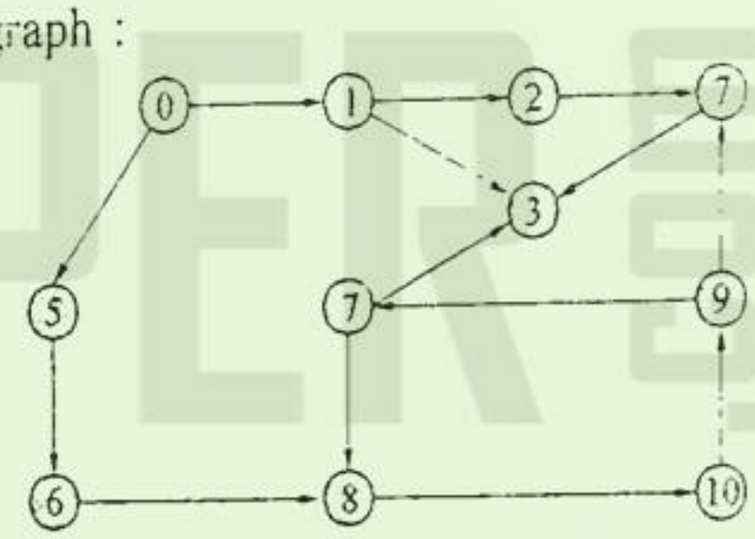
Edge connectivity of G = 4

Vertex connectivity of G = 3 and degree of every vertexes of G > 5. [8]

(b) Prove that let G be 9 non planar graph without Kuratowski graphs of minimal total size $E_G + V_G$, then G is 3-connected. [8]

OR

3. (*a*) Find the BFS Topological sorting of the following graph : [8]



(*b*) State and prove the max-flow min-cut theorem for network flows. Derive Ford-Fulkerson algorithm for finding the maximum flow in a network. [8]

Unit-'IV'

4. (*a*) Prove that the number of comparators in any sorting network is at least Ω (nlgn). [8]

(*b*) Describe how an 0(lgn) depth bitonic sorter can be constructed when the number n of inputs is not an exact power of 2. [8]

OR

4. (*a*) Although up trees are usedto conceptualize is disjoint set, disjoint sets are generally implemented in an Array. Explain how this is possible. [8]

(*b*) Describe priority and concalenable queues using 2-3 trees with an example. [8]

Unit-'V'

5. (*a*) What do you mean by modular Arithmetic? Explain. [8]

(*b*) Which algorithm is used for computing the greatest common divisor of two integers? Prove the supporting recursion theorem. [8]

OR

5. (*a*) Satisfy the following congruence in Chinese remainder theorem. Find x? [8]

P1 : x = 2(mod3), P2 : x = 3(mod5), P3 : x = 2(mod7)

(*b*) Write short notes on : [4×2 = 8]

(i) Primarily Testing

(ii) Integer Factorization