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AE—72—2010

FACULTY OF ENGINEERING

S.E. (CSE) EXAMINATION

NOVEMBER/DECEMBER, 2010

(New Course)

COMPUTER ALGORITHM

(Saturday, 18-12-2010) **Time : 10.00 a.m. to 1.00 p.m.**

Time—Three Hours *Maximum Marks*—80

N.B. :—(*i*) *All* questions are compulsory.

(*ii*) Figures to the right indicate full marks.

Section A

1. Solve any *two* : 6×2=12

(*a*) Write an algorithm of insertion sort and sort the given arrays :

A = {9, 6, 8, 10, 5, 7}.

(*b*) State and explain master theorem.

(*c*) Write a short notes on role of algorithm in computing.

P.T.O.

2. Solve any *two* : 7×2=14

(*a*) Determine asymptotic tight bound for :

$$T(n) = 3T(n/4) + n \log n$$

verify solution using the substitution method.

(*b*) Illustrate the operation of Build-MAX-HEAP on the array :

$$A = \{4, 1, 3, 2, 16, 9, 10, 14, 8, 7\}$$

(*c*) Explain the elements of dynamic programming.

3. Solve any *two* : 7×2=14

(*a*) Define time and space complexity. Show that for any real constants a and b where $b > 0$:

$$(n + a)^b = \Theta(n^b).$$

(*b*) Write an algorithm for HEAP-INCREASE-KEY, MAX_HEAP_INSERT.

(*c*) Find Huffman codes for the following set of frequencies :

$a : 45$, $b : 13$, $c : 12$, $d : 16$, $e : 9$, $f : 5$.

Section B

4. Solve any *two* : 6×2=12

(*a*) Explain elements of Greedy strategy.

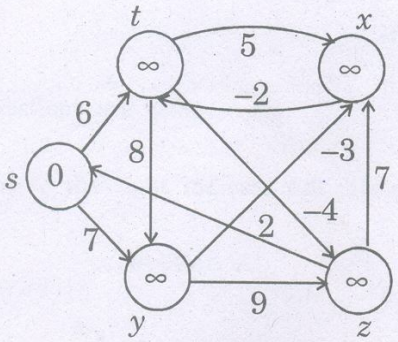
(*b*) Write an algorithm for Kruskal's method.

(*c*) Find an optimal parenthesization of matrix chain product whose sequence of dimension is :

$< 5, 10, 3, 12, 5, 50, 6 >$.

5. Solve any *two* : 7×2=14

(*a*) Find single source shortest path using Bellman-Ford algorithm for the following graph :



(*b*) Explain linked list representation of disjoint sets, with example.

(*c*) Find out the time complexity of insertion sort in :

(*i*) Best case;

(*ii*) Worst case;

(*iii*) Average case.

P.T.O.

6. Solve any *two* : 7×2=14

(*a*) Explain class P, NP and HP hard problem.

(*b*) Write an algorithm for Dijkstra's.

(*c*) Write a short note on priority queue.