SF - 485

Total No. of Pages : 3

Seat No.	

T. E. (IT) (Part -I) (Semester - V) Examination, November - 2017

COMPUTER ALGORITHMS

Sub. Code : 66302

Day and Date :Tuesday, 14 - 11 - 2017 **Total Marks : 100**

Time : 10.00 a.m. to 01.00 p.m.

Instructions : 1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Assume suitble data wherever necessary.**

Q1) Attempt any two questions.

a) Explain space and time complexity of algorithms with suitable examples. [8]

b) How performance of algorithms is measured? [8]

c) Explain Las Vegas and Monte Carlo randomized algorithms with suitable example. [8]

Q2) Attempt any two questions.

a) Solve the following recurrence relation for the choices of a, b and f(n)[8]

$$T(n) = \begin{cases} aT\left(\frac{n}{b}\right) + f(n) & n > 1 \\ T(1) & n = 1 \end{cases}$$

i) a = 2, b = 2, and f(n) = cn

ii) a = 9, b = 3, and f(n) = 4n6

b) Device a ternary search algorithm that first tests the element at position n/3 for some equality with some value x, and then checks the element at position 2n/3 and either discovers x or reduces the set size to one-third the size of the original. Compare this with the binary search. [8]

c) Explain selection algorithm with suitable example. [8]

P.T.O.

3) Attempt any two questions.

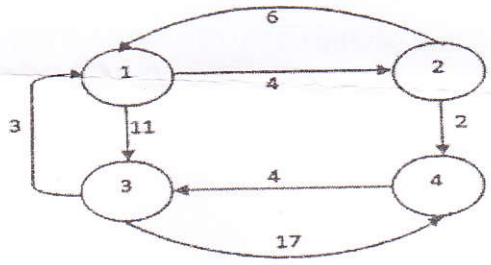
a) What is the solution generated by Greedy solution to job sequencing with deadlines problem when n = 7, $(P_1, P_2, P_3, P_4, P_5, P_6, P_7) = (3, 5, 20, 18, 1, 6, 30)$, $(d_1, d_2, d_3, d_4, d_5, d_6, d_7) = (1, 3, 4, 3, 2, 1, 2)$. [8]

b) Obtain a set of optimal Huffman codes for the messages $(M_1, ..., M_{10})$ with relative frequencies $(q_1, ..., q_{10}) = (28, 32, 12, 5, 84, 53, 91, 35, 3, 11)$. [8]

c) Explain Greedy solution to single source shortest path problem with suitable example. [8]

4) Attempt any two questions.

a) For the following graphs find solution to all pair shortest path problem using dynamic programming. [10]



b) Use dynamic programming solution to compute w(i,j), r(i,j), and c(i,j), $0 <= i < j <= 4$, for the identifier set (a_1, a_2, a_3, a_4) = (do, float, if while) with p(1) = 4, p(2) = 1, p(3) = 2, p(4) = 1, q(0) = 4, q(i) = 4, q(2) = 2, q(3) = 1, and q(4) =1.Using the r(i,j)'s, construct the optimal binary search tree. [10]

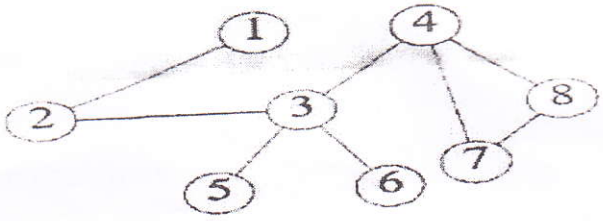
c) Obtain solution to reliability design problem using dynamic programming approach for three stage system with device types D1, D2, and D3. The costs are \$25, \$20, and \$20, respectively. The cost of the system is to be no more than \$105. the reliability of each device type is 0.8, 0.9 and 0.6 respectively. [10]

5) Attempt any two questions.

a) Explain Depth First Search (DFS) with suitable example. [8]

b) What is an articulation point? What is biconnected graph? How to construct biconnected graph from non biconnected graph? [8]

c) For the following graphs identify the articulation points using DFS spanning tree. [8]



6) Attempt any two questions.

a) Explain backtracking solution to sum of subset problem. [8]

b) Explain backtracking solution to Graph colouring problem. [8]

c) List and explain NP-hard graph problems. [8]