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Roll No. 045

4TH TH SEMESTER

[B.TECH. – CO/SE]

END SEM EXAM

(MAY- 2016)

CO/SE-214 ALGORITHMS DESIGN AND ANALYSIS

Time: 3 Hours **Max. Marks: 70**

Note: Attempt any 5 Questions.
Each Question Carry Equal Marks.
Assume suitable missing data, if any.

Q1

a) For each of the following recurrence sole them with the help of master theorem? (4X2=8)

(i) $T(n) = 3T\left(\frac{n}{2}\right) + n^2$

(ii) $T(n) = 16T\left(\frac{n}{4}\right) + n$

(iii) $T(n) = 3T\left(\frac{n}{3}\right) + n/2$

(iv) $T(n) = 2T(n/2) + \Theta(n)$

b) Solve $T(n) = 7T\left(\frac{n}{3}\right) + n^2$ with the help of recursion tree method. Show each and every step involved (6)

Q2

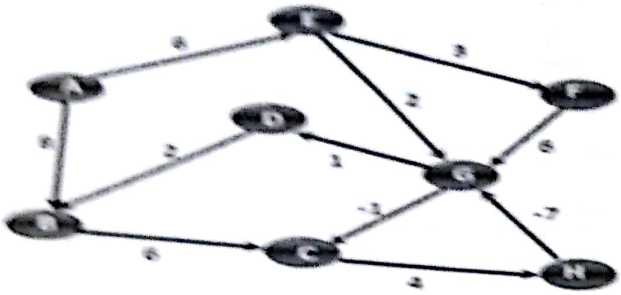
a) Write quick sort algorithm. Drive worst case complexity for this algorithm. Also explain in detail what special incite does average-case gives to us? (2+2+4)

b) Discuss optimal substructure and overlapping sub problem in detail w.r.t Matrix Chain Multiplication problem. Also write the memoized solution for the same. (4+3)

Q3

a) Write down Bellman Fort algorithm. Show step by step implementation of the same algorithm on the given graph with A as the source node. (2+4)

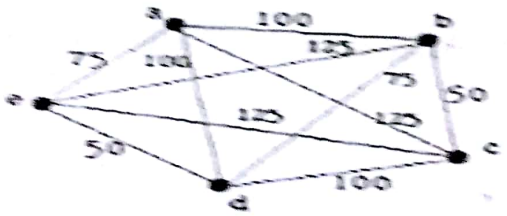
P.T.O.



b) Support your reason for solving fractional knapsack problem with greedy approach by identifying ingredients of greedy strategy in it. Write the appropriate pseudo code that would have solved the fractional knapsack with greedy choice. Also analyze your code in two perspective, when V_i/W_i ratios is maintained as an array and when the same is maintained as a heap. (3+2+3)

Q4

a) State and describe Travelling salesman problem. Solve TSP using branch and bound by constructing state space diagram for the given graph. (2+7)



b) Write Longest Common subsequence Algorithm. Apply the same to find the Longest Common subsequence for input Sequences "AGGTAB" and "GXTXAYB". (2+3)

Q5

a) Draw the full state space for 4-queen problem. Explain each of the below mentioned terminologies and then draw the new state space for the same problem in each of the mentioned case. Don't bother about the feasibility of bound function. A bound function for each case is given and just show its effect if it would have been there. (3X3 = 9)

(i) LIFO branch and bound, For an node Y which is child of node X let the bound function is maximization function and the bound value of any Y is always greater than the bound value its corresponding X

(ii) FIFO branch and bound, For an node x it could be the level number of node *X*

(iii) LC branch and bound, For any node *X* it could be the number of levels the nearest answer node (in the sub tree X) is from *X*

b) Define backtracking phenomenon? Write the pseudo code for solving n-queen problem with the help of back tracking (2+3)

Q6

a) Explain the following terms: (2x3=6)

(i) Big-oh

(ii) Big-omega

(iii) Big-theta

b) For the array: 15, 19, 10, 7, 17, 6 perform Heap-Sort operation on it. Write all the algorithms involved in it. (4+4)

Q7

a) Write short notes on (3x2=6)

(i) P class

(ii) NP class

(iii) NP compete class

b) Describe vertex cover problem? Prove that the vertex cover problem is NP-complete. Also design an approximate solution for the same? (2+5+3)