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Total Number of Pages: 02

MCA
MCC301

3rd Semester Regular / Back Examination 2016-17
ANALYSIS AND DESIGN OF ALGORITHMS

BRANCH: MCA

Time: 3 Hours

Max Marks: 70

Q.CODE: Y507

Answer Question No.1 which is compulsory and any five from the rest.
The figures in the right hand margin indicate marks.

Q1 Answer the following questions: (2 x 10)

- What do you mean by order of growth function? Arrange the following functions in increasing order $n \log n$, n^2 , $n!$, 2^n , $\log n$.
- What is a priority queue? Give one example.
- Find the longest common subsequence between $X = \{bbcbdbbca\}$ and $Y = \{cbcbdbccccba\}$.
- How the time complexity of quick sort is $O(n \log n)$? Explain
- Define the term 'Relaxation'. Give one example.
- What is 0-1 Knapsack problem?
- Solve the recurrence equation $T(n) = 9T(n/3) + n$
- Define P and NP problems.
- Differentiate greedy method and dynamic programming. Give two examples from each greedy and dynamic approach.
- Define FFT.

Q2 Define dynamic programming approach. Write LCS algorithm and using it find LCS of the sequences $X = \{B A C D B\}$ and $Y = \{B D C B\}$. (2+8)

Q3 a) Write the matrix chain multiplication algorithm by using dynamic programming approach. Find the optimal sequence of matrix multiplication for the dimension of matrices $\langle 5, 4, 6, 2, 7 \rangle$. (5)

b) Write Heap sort algorithm and give a suitable example for sorting the list of elements. (5)

Q4 a) What is the optimal Huffman code for the following set of frequencies based on the first 8 fibonacci numbers? A:1 b:1 c:2 d:3 e:5 f:8 g:13 h:21 (5)

b) Explain Dijkstra's shortest path algorithm with a suitable example. Find the time complexity for it. (5)

Q5 a) Write an approximation algorithm for Travelling Salesman Problem (TSP). (5)

b) Given a set $S = \{1, 4, 5, 6, 7, 3\}$ and $W = 12$. Obtain the sum of subset using backtracking approach. **(5)**

Q6 a) Explain the general method of Branch and Bound. **(5)**

b) Define Flow Network and write an iterative Ford-Fulkerson's method for solving Max-Flow problem. **(5)**

Q7 What is mean by minimum spanning tree? Explain how prime's algorithm can be used to find a spanning tree of a connected weighted graph with an example. **(10)**

Q8 Write short answer on any TWO: **(5 x 2)**

- a) NP-complete and NP-hard problems
- b) Masters method for solving recurrences
- c) N-Queen problem using backtracking
- d) Floyd's and Washall's Algorithm