[Total No. of Questions: 09] B. Tech. (Sem. 5th) [Total No. of Pages: 01]

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CS-14503 Design and Analysis of Algorithms

Note: 1. Section A is compulsory.
2. Attempt any four questions from Section B and any two from Section C.
3. Any missing data may be assumed appropriately

Section A **[Marks: 02 each]**

Q1:

a) Explain linear inequality and equations.
b) Explain P and NP Problems giving examples.
c) Arrange following rate of growth in increasing order.
n, $n \log n$, n^2, 1 , n, $\log n$, $n!$, n^3
d) What do you mean by Asymptotic Notations? Explain.
e) Derive the time complexity of selection sort algorithm for n numbers.
f) Explain Binary search algorithm with example.
g) Explain Euclid's Algorithm to find the GCD of two integers with an example.
h) What is time space tradeoff complexity?
i) Define Worst case, Average case and Best case efficiencies.
j) Differentiate between Bipartite and Isomorphism Graph.

Section B **[Marks: 05 each]**

Q2: Give the recursive algorithm to find Fibonacci sequence. Comment on the complexity of the algorithm.

Q3: Explain string matching with finite automata.

Q4: Write selection sort algorithm. And compute running time of algorithm.

Q5: Using greedy algorithm find an optimal solution for knapsack instance n=7, M =15 (P1, P2, P3, P4, P5, P6, P7) = (10, 5, 15, 7, 6, 18, 3) and (w1, w2, w3, w4, w5, w6, w7) = (2, 3, 5, 7, 1, 4, 1)

Q6: Explain the use of Backtracking method for solving Eight Queens Problem giving its algorithm.

Section C **[Marks: 10 each]**

Q7: Using algorithm determine an Longest Common Sequence of (A,B,C,D,B,A,C,D,F)and (C,B,A,F)(use dynamic programming).

Q8: Using algorithm find an optimal parenthesization of a matrix chain product whose sequence of dimension is (5, 10, 3, 12, 5, 50, 6).

Q9: Explain why the Heap sort method is called an efficient sorting algorithm. Sort the following data using Heap sort method.
65, 77, 5, 25, 32, 45, 99, 83, 69, 81