Candidate Seat no.....

CHAROTAR UNIVERSITY OF SCIENCE & TECHNOLOGY

Fifth Semester of B. Tech (CE) Examination

December 2016

CE315 Design & Analysis of Algorithm (DAA)

Date: 15.12.2016, Thursday **Time: 10.00 a.m. To 01.00 p.m.** **Maximum Marks: 70**

Instructions:

1. The question paper comprises of two sections.
2. Section I and II must be attempted in separate answer sheets.
3. Make suitable assumptions and draw neat figures wherever required.
4. Rough work is to be done in the last page of main supplementary, please don't write anything on the question paper.
5. Indicate clearly, the option(s) you attempt along with its respective question number.
6. Figures to the right indicate marks.

SECTION – I

Q - 1 **Do as directed:** **[07]**

a. Define time complexity and space complexity of an algorithm. **01**

b. What is the time complexity of bubble sort in Best Case and Worst Case? **01**

c. Is $27n^2+16n+25 = \Theta(n^2)$? Prove it. **01**

d. Make a time analysis comparison for factorial iterative & recursive algorithm. **02**

e. Give the recursive algorithm to find Fibonacci sequence. Comment on the complexity of the algorithm. **02**

Q – 2.a What is order of growth? Explain with the help of an example. **[04]**

Q – 2.b **Answer the following questions (Any Two).** **[10]**

(i) What is recurrence? Solve the following recurrence using Master's Theorem.

$T(n) = 4\,T(n/2) + n^3$

(ii) Give and explain Kruskal's algorithm to find Minimum Spanning Tree with illustration.

(iii) Show how DFS works on the graph with an example.

Q - 3 **Answer any two questions.** **[14]**

a. Compare Binary search algorithm with linear search algorithm. Discuss their best case, worst case and average case using an example. Also mention time complexity of both algorithms.

b. Write down an algorithm for *Naïve String Matching Algorithm*. Mention its time complexity. Also show the comparisons the naïve string matcher makes for the pattern P= aabacaab in the text T= aaccaabacaabaccabacc.

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c. Solve the following Assignment Problem such that cost is minimum using Branch & Bound technique.

	1	2	3	4
A	90	12	50	51
B	70	10	58	80
C	16	85	8	70
D	11	37	80	21

SECTION – II **[07]**

Q - 4 Do as directed. **[01]**

a. For which value of n, n-queen problem has no solution? **[01]**

b. How many total ways are there to multiply 5 matrices? **[01]**

c. Justify: "Exhaustive search is not a good method to solve any problem". **[02]**

d. Compare Backtracking & Branch & Bound Method. **[02]**

e. Prove or give counter example for the statement: "*Choice of data structure affects the performance of an algorithm*".

Q – 5.a What is greedy approach? Compare greedy approach with dynamic programming approach. Give two examples, in which greedy algorithm does not give optimal solution. **[04]**

Q – 5.b Answer the following questions (Any Two). **[10]**

(i) Find out longest common subsequence from the given two sequences of characters using dynamic programming.

X=<abcdace>

Y=<badcabe>

(ii) List out the problems which cannot be solved in polynomial time. Is P=NP? Explain with reason.

(iii) Explain working of merge sort with an example of instance size 10. What is the time complexity of this method for instance size n? Give analysis in detail.

Q – 6 Answer any two questions. **[14]**

a. Let 11 activities are given as S = {p, q, r, s, t, u, v, w, x, y, z} starting and finishing

times for proposed activities are (1, 4), (3, 5), (4, 6), (5, 7), (3, 8), (7, 9), (10, 11), (8, 12), (8, 13), (2, 14) and (13, 15). Find the maximum size set of mutually compatible activities using Greedy Activity Selection algorithm.

b. Mention basic four steps of dynamic programming. Find an optimal parenthesization of matrix-chain product whose sequence of dimensions is <5, 10, 3, 5, 6, 2>. Also mention the time complexity and space complexity of matrix chain multiplication algorithm.

c. Describe knapsack problem and its types. Consider the following instance of the Knapsack problem:

Item	Weight	Profit
I1	18	25
I2	15	24
I3	10	15

The capacity of knapsack W=20. Find the solution to the fractional knapsack problem using greedy approach.

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