

**C.U.SHAH UNIVERSITY**

WADHWAN CITY

University (Winter) Examination -2013

Subject Name: -Computer Algorithm &amp; Complexity Theory Mark:70

Date : 10/01/2014

Course Name :M.Tech(CE) Sem-I

Duration :- 2:30 Hours

**Instructions:-**

- (1) Attempt all Questions of both sections in same answer book / Supplementary.
- (2) Use of Programmable calculator & any other electronic instrument is prohibited.
- (3) Instructions written on main answer Book are strictly to be obeyed.
- (4) Draw neat diagrams & figures (If necessary) at right places.
- (5) Assume suitable & Perfect data if needed.

**SECTION-I****Q-1 Attempt following Questions.**

- |    |   |   |
|----|---|---|
| a) | Define Algorithm and list out its properties.   | 2 |
| b) | What is relation? Explain types of relation.  | 2 |
| c) | Write an algorithm for insertion sort.  | 2 |
| d) | Suppose computers were infinitely fast and computer memory was free. Would you have any reason to study algorithms? | 1 |

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|-----|----|---|---|
| Q-2 | a) | Explain: Worst Case, Best Case & Average Case Complexity of an algorithm. | 5 |
|     | b) | Solve following recurrences:  | 5 |
|     |    | i) $T(n) = T(n/2) + 2^n$  |   |
|     |    | ii) $T(n) = 16T(n/4) + n!$  |   |
|     | c) | State and prove Master's Theorem for solving recurrence.                  | 4 |

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|-----|----|--|---|
| Q-2 | a) | $\langle 4,6,2,3,8,5,11,9,25,19,55,35 \rangle$ is a given dataset. Apply Quick sort algorithm and analyze. | 5 |
|     | b) | Solve following recurrence using change variable method.<br>$T(n) = 7T(n/2) + 3n^2$                        | 5 |
|     | c) | Analyze Prim's algorithm for finding MST.  | 4 |

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|-----|----|--|---|
| Q-3 | a) | Solve the following Knapsack Problem using Dynamic Method.<br>$n = 5, W = 100$<br>Object: 1 2 3 4 5<br>Weight (w): 10 20 30 40 50<br>Value (v): 20 30 66 40 60 | 7 |
|     | b) | Differentiate following techniques for problem solving:<br>Divide and conquer, Greedy approach, Dynamic programming, Backtracking                              | 7 |

**OR**

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|-----|----|--|---|
| Q-3 | a) | Working modulo $q = 13$ , how many spurious hits does the Rabin-Karp matcher encounter in the text $T = 1122335566889922$ when looking for the pattern $P = 22$ ?                                | 7 |
|     | b) | For the following matrices find the order of parenthesization for the optimal chain multiplication?<br>$A_1 = 15 \times 5$<br>$A_2 = 5 \times 10$<br>$A_3 = 10 \times 20$<br>$A_4 = 20 \times 5$ | 7 |



## SECTION-II

### Q-4 Attempt following Questions.

- a) Explain topological sorting with example. 2
- b) Explain Articulation Point. 2
- c) What is backtracking? Explain in brief. 2
- d) List out applications of graph algorithms. 1

- Q-5
- a) Explain DFS algorithm with examples. 5
  - b) Perform the insertion operation on AVL tree for following sequence: 5  
50, 25, 10, 5, 7, 3, 30, 20, 8, 15
  - c) Find any one Longest Common Subsequence of given two strings using Dynamic Programming. 4  
S1=abbacdcb  
S2=bcdbbcaac

OR

- Q-5
- a) Explain Four queen's problem using backtracking technique. 5
  - b) Explain the methods for traversing the trees. 5
  - c) Explain BFS algorithm with example. 4

- Q-6
- a) What is polynomial reducible problem? Explain with example how problem A can be polynomial reduced to problem B. 7
  - b) Explain properties of binomial heap. Also describe the union of two binomial heaps with example. 7

OR

- Q-6
- a) Explain P, NP, NP-Complete and NP-Hard problems giving examples. 7
  - b) Show the results of inserting the keys in to an empty B-tree. 7  
<7,15,3,16,5,1,18,9,35,28,39,17,14,20,22,25,27> assume order 5.

\*\*\*\*\*10-14\*\*\*\*\*

