Exam.Code:0916
Sub. Code: 33428

2015

B.E. (Computer Science and Engineering)

Fourth Semester

CS-401: Analysis and Design of Algorithms

Time allowed: 3 Hours **Max. Marks: 50**

NOTE: ***Attempt five questions in all, including Question No. I which is compulsory and selecting two questions from each Section.***

x-x-x

Q 1. (a) Describe Master's Theorem. [5 x 2 = 10]

(b) Explain the complexity of Quick sort algorithm.

(c) What is a minimum Spanning Tree? Give example.

(d) Compare Dynamic Programming and Backtracking.

(e) Explain Reducibility with reference to NP – Completeness.

SECTION – A

Q 2. (a) Solve the following recurrences and justify your answers. Assume that T(n) is constant for $n \leq 2$. 1. $T(n) = 16T(n/4) + n^2$ 2. $T(n) = T(n-1) + n$ [5]

(b) Sort the list 415, 213, 700, 515, 712, 715 using merge-sort algorithm. Explain the time complexity of merge sort algorithm. [5]

Q 3. (a) Explain the general method of divide and conquer. Use it to solve binary search problem. Perform time and complexity analysis of your solution. [2,3,2]

(b) Explain the elements of Greedy strategy in detail. [3]

Q 4. Write and explain Prim's and Kruskal's algorithms for obtaining minimum spanning tree. Explain the same using appropriate examples. [10]

SECTION – B

Q 5. (a) Explain All Pairs Shortest Path problem. Further, with the help of an example solve the same using dynamic programming. [5]

(b) Let w = [5, 7, 10, 12, 15, 18, 20] and m = 35. Write an algorithm for sum of subsets problem and use the same to find all possible subsets of w that sum to m. [5]

P.T.O.

Q 6. (a) Write a note on elements of dynamic programming. [3]

(b) Explain N – Queen's problem. With the help of an example solve the same using backtracking. Also perform the time and space complexity analysis of your solution. [1, 4, 2]

Q 7. Write a short note on the following:

(a) Polynomial time verification [3]

(b) P and NP classes [4]

(c) Approximation Algorithms [3]

x-x-x