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**B.Tech. 6th Semester Computer Science and
Engineering Examination, May-2013**

ANALYSIS AND DESIGN OF ALGORITHM

Paper-CSE-306-F

Time allowed : 3 hours] [Maximum marks : 100

Note : Attempt five questions with atleast one question from each section. Question No. 1 compulsory. All questions carry equal marks.

1. (a) What do you mean by an asymptotic notation ?
Write and explain different types of asymptotic notations with suitable examples. 4×5
- (b) Differentiate Fractional and 0-1 Knapsack problem.
- (c) Define the following associated with algebraic problems : ring, field, indeterminate and extension.
- (d) Explain P, NP, NP hard and NP Complete problems. Also give the relationship between each of the class.

Section-A

2. (a) Write algorithms for Union and Find operations for disjoint sets. 10

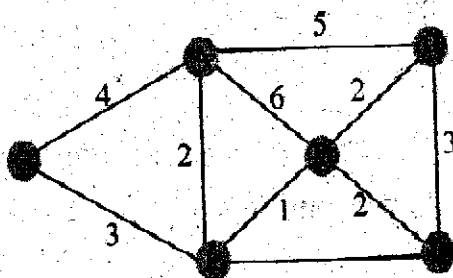
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- (b) What is Divide and Conquer strategy ? Explain Merge sort algorithm with example. Also give its recurrence relation. 10
3. (a) State Matrix chain multiplication problem. How to solve this problem with Dynamic programming? Explain. 10
- (b) What do you understand by best case and worst case behavior of an algorithm ? Discuss their significance with the help of suitable example. 10

Section-B

4. (a) Define all pair shortest path problem. Discuss solution of this problem based on dynamic programming. Give suitable algorithm and find its computing time. 10
- (b) Generate the minimum spanning tree of the following connected graph using Kruskal's algorithm. 10



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5. (a) Consider a Knapsack instance :

Number of objects $n = 4$

Weights $W_i = (15, 10, 9, 5)$

Profits $P_i = (1, 5, 3, 4)$

Knapsack capacity $m = 8$

Use dynamic approach to find the solution. 10

(b) Explain optimal substructure property. Do greedy and dynamic programming strategies differ on this property? If not, where and how do they differ? 10

Section-C

6. (a) Explain Huffman codes to generate the optimal prefix codes. 10

(b) Explain LC branch and bound technique. 10

7. (a) Explain backtracking. Write an algorithm for 8 queens problem. Also compute its complexity. 10

(b) What are Hamiltonian cycles? Write an algorithm that finds all Hamiltonian cycles in a graph using backtracking. 10

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Section-D

8. (a) State and prove Cook's theorem. 10
- (b) What do you mean by NP-scheduling problems ?
Show that the job sequencing with deadline
problem is NP hard. 10
9. (a) What do you mean by Clique decision problem ?
Show that the Clique decision problem is NP
complete. 10
- (b) Prove that the class NP of languages is closed
under union, intersection, concatenation and kleen
star. 10