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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 at least 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

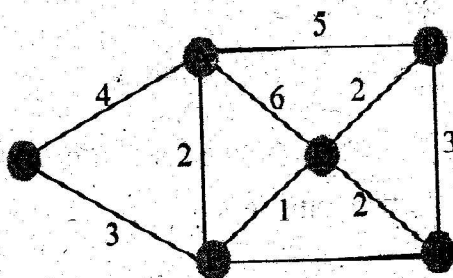
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- (b) What is Divide and Conquer strategy ? Explain Merge sort algorithm with example. Also give its recurrence relation. 10
3. (a) State Matrix chain multiplication problem. How to solve this problem with Dynamic programming? Explain. 10
- (b) What 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