Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/M.TECH(CSE)/SEM-2/MTCSE-22/2012

2012
ADVANCED ALGORITHM ANALYSIS

Time Allotted : 3 Hours *Full Marks* : 70

The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable.

GROUP – A

Answer any *five* questions from the following $5 \times 5 = 25$

1. a) Compare and contrast Divide-and-Conquer technique and Dynamic-Programming technique.

   b) Compare and contrast Dynamic programming and greedy method of problem solving. 3 + 2

2. Compute the prefix function π for the pattern ababbabbabbababbabb when the alphabet is $\Sigma = \{a,b\}$. 5

3. Find out the longest common subsequence for "HUMAN" and "CHIMPANZEE" using dynamic programming technique. 5

4. Explain and write Huffman coding algorithm. Discuss the applications of Huffman coding. Construct Huffman codes for the following data :

Data	A	B	C	D	E
Frequency	24	12	10	8	8

2 + 1 + 2

5. Explain that quick sort works as worst case for data which is already sorted. Write the algorithm also. 3 + 2

6. Write a non-deterministic algorithm for sorting data. 5

7. Explain graph traversal techniques. Discuss the applications of DFS and BFS traversals. 3 + 2

GROUP – B

Answer any *three* questions from the following.

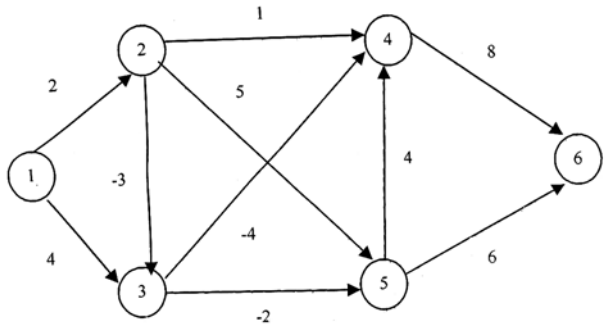
3 × 15 = 45

8. a) What is P, NP and NPC ?

   b) Prove that CNF satisfiability α clique decision problem.

   c) Write a non-deterministic algorithm for clique decision problem. 3 + 6 + 6

9. a) Find the shortest path from node 1 to every other node in the given graph below using Bellman Ford algorithm. Write the algorithm and analyze it.



b) Explain and write the greedy method of solving fractional knapsack problem.

c) Optimize the knapsack of capacity 10 to be filled by 4 objects of following specifications :

	1	2	3	4
Profit	10	40	30	50
Weight	5	4	6	3

(4 + 4) + 4 + 3

10. a) Working modulo q = 11 how many spurious hits does the Rabin-Karp matcher encounter in the text T = 3141592653589793, when looking for the pattern P = 26.

b) Write the Rabin-Karp algorithm for string matching.

5 + 10

11. a) Explain, how the product of two polynomials of degree bound n can be computed in time θ ($n$log$n$) with both the input and output representations in coefficient form.

b) Give a branch and bound schema for 15-Puzzle problem. 7 + 8

12. Write and explain the algorithm for matrix chain multiplication problem. Multiply the sequence of A1(10 X 100), A2 (100 X 5), A3 (5 X 50), A4 (50 X 1) matrix.

8 + 7