Roll No ....

MCTA-102

M.E/M.Tech., I Semester

Examination, December 2014

Programming System

Time : Three Hours

Maximum Marks : 70

Note: Attempt any five questions. All questions carry equal marks.

1. a) Let A = {7, 2, 4, 17, 1, 11, 68, 15, 10, 20}. Draw a binomial Heap whose keys are elements of A. And insert a new element with key 5 into this Heap?   7

   b) What is the height of a B-Tree, if there are n nodes in it? What is the maximum height of a B-Tree with 10,00,000 keys and having minimum degree 10?   7

2. Explain the Master theorem and solve the following: 14

   i) $T(n)=T(\sqrt{n})+1$

   ii) $T(n)=2T(n/4)+\sqrt{n}$

   iii) $T(n)=2T(n^2)+n^2$

3. a) Apply Backtracking techniques to solve the following instance of the subset sum problem.

   [S = (1, 3, 4, 5) and d = 11]   7

[2]

   b) What are the two different types of recurrence? Solve the recurrence relation $T(n)=3T\left(n^{1/3}\right)+\log 3^n$.   7

4. Discusses the classes P, NP, NP complete and NP Hard with examples. How can we show that a problem is NP Complete?   14

5. Explain following Term: 14

   i)   Set algorithms

   ii) Hard problems

   iii) Combinatorial Algorithm

6. a) Explain in detail about Approximation algorithm for NP Hard problem with example.   7

   b) Discuss Travelling salesman problem with help of suitable example?   7

7. a) Assume that m = 30 and n = 3. While weights are (10, 20, 30) and profits are (12, 20, 24) then find the optimal solution using knap-sack techniques?   7

   b) Discuss the best, worst, average case efficiency of Binary Search Algorithm?   7

8. Write a short notes (Any Four):   14

   a) Priority queues   b) Internal sorting

   c) Hash functions   d) Radix sort

   e) Space complexity   f) Dynamic programming.