FACULTY OF ENGINEERING
B.E. 3/4 (CSE) I – Semester (Main) Examination, November 2013

Subject : Design and Analysis of Algorithms

**Time : 3 hours**   **Max. Marks : 75**

Note: Answer all questions from Part-A. Answer any FIVE questions from Part-B.

PART – A (25 Marks)

1. Write the control abstraction for Divide and Conquer technique.   (2)

2. Solve : $T(n) = 3T\left(\dfrac{n}{3}\right) + \sqrt{n}$.   (3)

3. Explain set representation and write algorithm for 'FIND'.   (3)
4. What is Hamiltonian cycle? How is it different from the tour of travelling salesperson problem?   (2)
5. Explain optimal merge pattern with an example.   (3)
6. Differentiate between Greedy and Dynamic programming approaches.   (2)
7. Explain graph coloring problem.   (3)
8. What is meant by lower bound theory.   (2)
9. Solve the fractional knapsack problem by considering the instance : Weights are, W : {1, 3, 5, 6, 7} , Profits, P : {3, 9, 7, 11, 18}. The knapsack capacity is 15.   (3)
10. Explain what are explicit and implicit constraints of 8-Queens problem.   (2)

PART – B (50 Marks)

11.a) Draw the 11 entry hash table for hashing the keys 12, 44, 13, 88, 23, 94, 11, 39, 20 using the function (2i+5) mod 11, using linear probing.   (5)
  b) Write an algorithm to form a heap using 'Heapify' and discuss about its time complexity.   (5)

12.a) Define spanning tree and explain Prim's algorithm for finding minimum spanning (5) tree of the graph using the graph given below

                                                                                       (5)
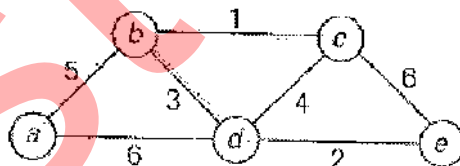
  b) Write an algorithm for merge sort and write the time complexities.   (5)

13. What is Multistage graph? Find the shortest path in the graph given below dynamic programming.   (10)
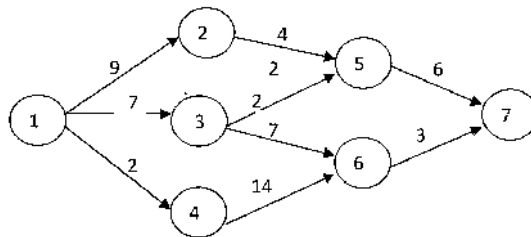
14.a) Explain solution of graph coloring problem using backtracking.   (5)
  b) What is Branch and bound strategy? Explain.   (5)

15.a) State Cook's theorem. Explain its significance in NP-complete theory.   (5)
  b) Discuss NP-Hard code generation problems.   (5)

16. Define biconnected component of a graph. Identify articulation point and draw biconnercted components of.   (10)

17. Write short notes on :
  a) Reliability Design   (5)
  b) Job scheduling with deadlines using Greedy approach   (5)

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