B.Tech. COMPUTER SCIENCE AND ENGINEERING (BTCSVI)

Term-End Examination

December, 2012

BICS-014 : DESIGN AND ANALYSIS OF ALGORITHM

Time : 3 Hours   *Maximum Marks : 70*

Note : *Seven questions are required to be answered.*

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1. (a) Describe two methods to solve recurrence relations.   **5+5=10**

   (b) What is potential method of amortized analysis ? Explain with suitable example.

2. (a) Describe an algorithm to check whether an array A [0..... n-1] is a min - heap or not. What is time complexity of this algorithm ?

   (b) Write merge sort algorithm to sort an array in ascending order.   **5+5=10**

3. Explain dynamic programming solution for Matrix Chain Multiplication.   **10**

4. (a) Solve the following 0/1 Knapsack problem using dynamic programming   **5+5=10**

   $m = 6$, $n = 3$, $(\omega_1, \omega_2, \omega_3) = (2, 3, 3)$
   $$(P_1, P_2, P_3) = (1, 2, 4)$$

   (b) Differentiate between dynamic Knapsack and Branch-and-Bound Knapsack algorithms.

5. (a) Explain the classes of P, NP, and NP - complete. **5+5=10**

   (b) Describe structure and algorithm for generating optimal binary search tree.

6. (a) Describe Miller - Rabin test for primality testing. **5+5=10**

   (b) Find the minimum number of operations required for the following chain Matrix Multiplication using dynamic programming A(30x40) x B(40x5) x C(5x15) x D(15x6)

7. (a) What is Cook's theorem ? Explain NP - completeness reduction for subset sum problem.

   (b) What is Universal Hashing ? **7+3=10**

8. Write Prim's algorithm for minimum Spanning **10** Tree. Apply Prim's algorithm to find MST of the following graph. Source Vertex is 'a'.
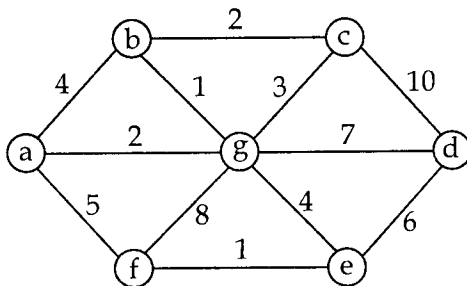
9. (a) Define eight queen problem. Discuss ranmdomized solution for eight - queen problem.

   (b) What is Pollard's rho heuristic. **7+3=10**

10. Write short notes on *any two*   5+5=10

(a)   LOS - Vegas Algorithm.

(b)   ND - Hard

(c)   CYK algorithm

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