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BICS-014

B.Tech. COMPUTER SCIENCE AND ENGINEERING (BTCSVI)

Term-End Examination

December, 2013

BICS-014 : DESIGN AND ANALYSIS OF ALGORITHM

Time : 3 Hours *Maximum Marks : 70*

Note : *Attempt **any seven** questions. All questions carry **equal** marks.*

1. (a) Show that for any real constants a and b, where $a > 0$, $(n+a)b = \theta(n^b)$ **6**

(b) Define binary search. **4**

2. (a) Define analysis of Merge Sort. **4**

(b) Solve recurrence relation using Master's Method. **6**

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

(ii) $T(n) = 2T\left(\frac{n}{4}\right) + \sqrt{n}$

3. (a) Show that in the recurrence **5**

$T(n) = \max\ (T(q) + T(n-q-1) + \theta(n)$

$0 \le q \le n - 1$

$T(n) = \Omega(n^2)$

(b) Write Knuth-Morris-Prott algorithm and also write down the algorithm for compute prefix funtion(p). **5**

4. (a) Explain dynamic programing procedure in detail. 5

(b) Find an optimal parenthesization of a Matrix Chain product whose sequence of dimension is (5, 10, 3, 12, 5, 50, 6). 5

5. (a) Generalize Huffman's algorithm turnary code words (i.e, codewords using the symbol 0, 1 and 2), and prove that it yields optimal turnary codes. 5

(b) What are the elements of greedy strategy ? Define in detail. 5

6. (a) Suppose that the Graph G=(V,E) is represented as an adjacency matrix. Give a simple implementation of prim's algorithm for this case that runs in $0(V^2)$ times. 5

(b) Define Set covering problem. 5

7. (a) Define N.P complete problem. 5

(b) Show that the subset-sum problem is solvable in polynomial time if the target value t is expressed in unary. 5

8. (a) Show that the hamiltonian-path problem is NP-complete. 5

(b) Suppose that a complete undirected graph G = (V,E), with at least 3 vertices has a cost function C that satisfies the triangle in equality. Prove that $C(u,v) \geq 0$ for all μ, $v \epsilon V$. 5

9. (a) Define probablistic counting problem. 5

(b) Define Miller rabin test. 5

10. Attempt **any two** from the following : **2x5=10**

(a) Define randomized algorithm.

(b) Define fractional knapsock problem.

(c) Define Dixon's Integer factorization algorithm.
