

END TERM EXAMINATION

SIXTH SEMESTER [B.TECH./M.TECH.] MAY-JUNE-2015

Paper Code: IT306

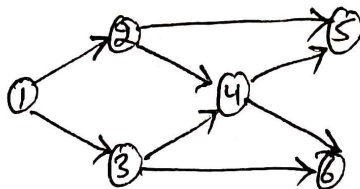
Subject: Algorithm Analysis & Design

Time : 3 Hours

Maximum Marks :60

Note: Attempt any five questions including Q.no.1 which is compulsory.
Select one question from each unit.

- Q1 Attempt **any five** of the following:- (4x5=20)
- (a) Is $2^{n+1} = O(2^n)$? Is $2^{2n} = O(2^n)$? and Solve this: $T(n) = c$ if $n=1$, $2T(n/2) + cn$, if $n > 1$.
 - (b) Explain the Master Theorem. Can we solve this $T(n) = 2T(n/2) + n \log n$ by Master Theorem. Justify your answer.
 - (c) Explain various algorithm design paradigms. Differentiate between Greedy approach and Dynamic approach of algorithm design.
 - (d) What do you mean by stable sort and inplace sort? Briefly explain working of Radix sort.
 - (e) Define Topological ordering. Consider the given Directed acyclic graph. Find Topological ordering.



- (f) Define P problem, NP problem, NP-Hard problem and NP-Complete problems.
- (g) Write short note on Bellman ford Algorithm.

UNIT-I

- Q2 What is an Algorithm? How do you determine complexity of an algorithm, explain with a simple algorithm of computing sum of digits as an example. (10)
- Q3 (a) What do you understand by Disjoint sets? Explain various Disjoint set operation with example. (5)
- (b) What do you understand by liner time sorting? Sort array $A = \{15, 20, 0, 21, 20, 5, 0, 1\}$ using any stable linear sorting algorithm. (5)

UNIT-II

- Q4 (a) Determine the cost and structure of an optimal Binary Search Tree for asset of $n=7$ keys with the following probabilities:- (6)

i	0	1	2	3	4	5	6	7
p(i)		0.04	0.06	0.08	0.02	0.10	0.12	0.14
q(i)	0.06	0.06	0.06	0.06	0.05	0.05	0.05	0.05

- (b) Find an optimal solution to the 0/1 Knapsack instance, where $n=7$, $m=15$, $(P_1, P_2, \dots, P_7) = (10, 5, 15, 7, 6, 18, 3)$ and $(w_1, w_2, \dots, w_7) = (2, 3, 5, 7, 1, 4, 1)$ (4)

P.T.O.

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P_{1/2}

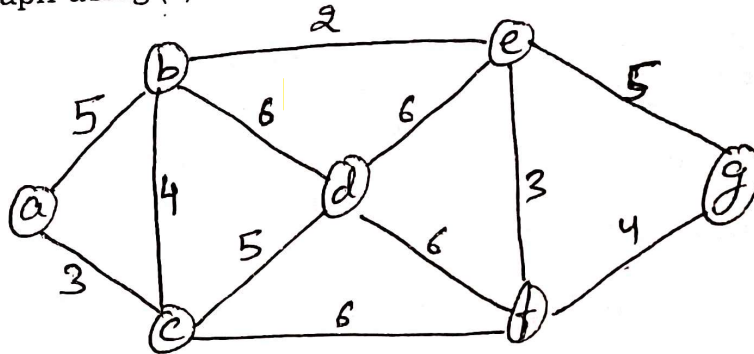
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- Q5 (a) Why Huffman codes are so widely used?; Write an algorithm for construction of Huffman tree. What is an Huffman codes for the following set of frequencies: (character: frequency) (6)
A:1, b:1, c:2, d:3, e:5, f:8, g:13, h:21
(b) Find an optimal parenthesis of matrix chain product, whose sequence of dimensions is as follows: 2×5 5×3 3×10 10×5 (4)

UNIT-III

- Q6 Write algorithm for Prim's Algorithm. Find Minimum spanning tree for the given graph using (a) Prim's algorithm (b) Kruskal's algorithm. (10)



- Q7 Explain Flyod Warshall algorithm through an example and compute time complexity for the same. (10)

UNIT-IV

- Q8 Working module $q=11$, how many spurious hits does Rabin-Karp matcher encounters in the text $T=2141592653589793$ when looking for the pattern $P=26$. (10)
- Q9 What is string matching problem? Explain naïve string matching algorithm and show the comparison the algorithm makes for the pattern $P=010$ in the text $T=000010001010001$. (10)
