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CSPC 101

M.Tech 1st Semester Regular/Back Examination– 2015
SUBJECT: Analysis and Design of Algorithms
BRANCH(S): Computer Sc. &Eng.
Time: 3 Hours
Max marks: 70
Q.CODE-T904

Answer Question No.1 which is compulsory and any Five from the rest.
The figures in the right hand margin indicate marks.

Q1   **Answer all the following questions:**   (2 x 5)
  a)   **Define the Halving's Lemma?**
  b)   **What do you mean by Convex hull and what is the time complexity of Jarvis's March algorithm?**
  c)   **What do you mean by class P and class NPC?**
  d)   **Write down the Decision and Optimization problem for CNDP and NCDP?**

  e)   **What do you mean by interpolation and evaluation point in FFT?**

  (f)   **Evaluate complexity for the recurrence relation T(n)=T(n-1)+n**

  (g)   **Differentiate between Big 'O' and Little 'o' notation.**

  (h)   **Define State Space Tree?**

  (i)   **What is Reducibility for NP –Problem?**

  (j)   **Write the cases for Master Method?**

Q2   a)   **Write the algorithm for Breadth First Search? How it differs from Depth First Search?**   (5)
     b)   (5)
          Solve the following Activity Selection Problem?
          S$_i$ 0 1 3   2 7 4   5 10 6 1 2
          S$_j$ 4 6   5   7 8 6 9 12 8 7 6

Q3   a)   **What is an optimal Huffman code for the following set of frequencies, based on the first 8**   (5)
          Fibonacci numbers?
          a:1   b:1   c:2   d:3   e:5   f:8   g:13   h:21
          Can you generalize your answer to find the optimal code when the frequencies are the

          first n Fibonacci numbers?

b) **Using Robin Karp Pattern matching algo.For a text T=[2,5,1,8,4,6,1,1,1,4,5,1,8,6,7,6]** (5)

and Pattern P=[5,1,8] .Find how many valid hits and spurious hits found with q=11?

Q4 (a) **Solve the all pair shortest path for a Graph with following weight matrix.** (5)

	a	b	c	d
a	0	∞	3	∞
b	2	0	∞	∞
c	∞	7	0	1
d	6	∞	∞	0

(b) **Write and define step by step the Algorithm of First Fourier Transform?** (5)

Q5 (a) **Define spanning tree? Discuss the design steps in prims algorithm to construct minimum spanning tree with example.** (5)

(b) **Write short notes on (a) Graph coloring (b) 4-Queens problem** (5)

Q6 (a) **Write the algorithm for Quick sort and analyze it's time complexity ?** (5)

(b) **Sort the following array using Heap sort ?** (5)
A[5,8,4,9,12,11,1,40]

Q7 (a) **Find longest Common Subsequence for the following pattern?** (5)
X=<A , E ,B ,C ,D ,E ,G>

Y=<E ,A ,C , B ,C ,D>

(b) **Find the matrix chain order for the following matrix-order?** (5)
< 4,10,3,12,20,7>

Q8 **Write short notes on any two** (2×5)
i)Fractional Knapsack

ii)Graham's Scan

iii)8-Queens Problem

iv)Minimum Spanning Tree