(Please Write your roll No. Immediately) Roll No.:

First Term Examination, September-2018 (Odd Sem. 2018-19)

B.Tech. (V sem) CSE/IT

Paper Code :ETCS-301 Subject: Algorithms Design & Analysis

Time : 1.5 hours Max. Marks:30

Note:

1. Attempt Q. No. 1 which is compulsory and any two other questions from remaining questions. Each question carries 10 marks.
2. Necessary Data may be assumed wherever necessary and same may be clearly indicated.

Q.1 a) Solve the recurrence relation of Stassen's algorithm for matrix multiplication.

b) Differentiate between Big-Oh and Small-Oh notations.

c) List the applications for disjoint sets.

d) Compare Dynamic Programming with divide and conquer

e) Discuss the ingredients of dynamic programming. [2*5=10]

Q.2. Solve the following recurrence relations (Provide proper explanation)

a. $T(n)=3T(n-2)+n^2$

b. $T(n)=3T(n/2)+O(n)$

c. $T(n)=4T(n/2)+O(n^2)$

d. Worst case of Quick sort

e. Tower of Hanoi [2*5=10]

Q.3

a. Design an efficient algorithm to find maximum and minimum number, out of given n numbers simultaneously. Also calculate its time complexity. [5]

b. Find the optimal way to multiply following matrices A1=2*5, A2=5*3, A3=3*4 and A4=4*6 using dynamic programming. [5]

Q.3. Demonstrate the optimal substructure of Longest Common Sub-Sequence problem. Find the longest common subsequence of the following two substrings using dynamic programming: A=*abcbbac* , B=*bcbaab* [10]

Complete University Roll No. ....

G G S I P University, Delhi

Odd Semester 2017 – 18

First Class Test

Computer Science & Engineering / Information Technology

5th Semester

Subject: Algorithms Design and Analysis *Paper Code: ETCS301*

Paper ID: 27301

Time: 1 hour 30 Minutes *M.Marks : 30*

Instructions:

1. **Write down your Roll No. at the top of question paper in space provided.**
2. **Question No. 1 is compulsory.**
3. **Attempt any TWO from remaining three questions.**

1. **Answer followings in brief** 5×2=10
   a. Define *Problem statement, Problem Instance* and *Problem Space* with reference to algorithm with an example.
   b. Define algorithm and asymptotic notations.
   c. List out approaches to design an algorithms known to you.
   d. How correctness of an algorithm is checked?
   e. State master method to solve a recurrence relation with all cases.
2. **Answer followings** 2×5=10
   a. Can master method solve the recurrence relation $T(n) = 3T(^n/_4) + nlgn$? If "no" explain, if "yes" solve it.
   b. Can master method solve the recurrence relation $T(n) = 2T(^n/_2) + nlgn$? If "no" explain, if "yes" solve it.
3. **Answer followings** 2×5=10
   a. Discuss the essence of Dynamic Programming.
   b. Give the optimal parenthesis for *Matrix chain multiplication problem* with input of 6 matrix of size : 25, 20, 10, 5, 15, 35, 30
4. **Answer followings** 2×5=10
   a. Give the problem statement for 0/1 knapsack problem. Consider following input instance of 0/1 Knapsack problem ;
      3 items with weight 20, 30, and 40 units and profit associated with them 10, 20, and 50 units respectively with knapsack of capacity 60 units.
      Solve it using dynamic programming approach.
   b. Write down pseudo code of *Insertion Sort* and analyze its complexity in all cases of input instance.

(Please write your Roll No. immediately) Roll No. ____________

First-Term Examination
September, 2016

V Semester [B.Tech.]
Paper code: ETCS 301

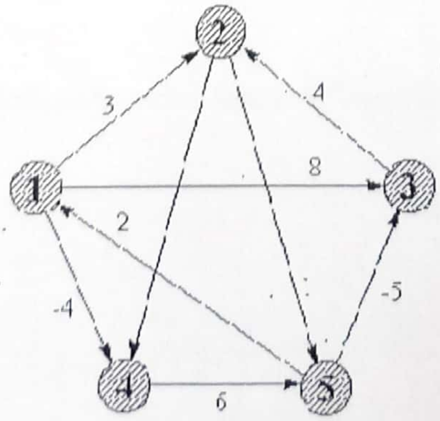
Sub: Algorithm Design and Analysis
Time : 1.5 Hours
Maximum Marks: 30

Note: 1. Attempt three questions in total
2. Q. No. 1 is compulsory. Attempt any two more questions from the remaining.

Q 1. (a) Distinguish between O(Big Oh) and o(little Oh) notations. (5 x 2)
(b) Define subtract and conquer Master Theorem.
(c) Prove that $(n+a)^b = O(n^b)$
(d) Explain Overlapping subproblems.
(e) What are the key features of Dynamic Programming?

Q 2. Solve the following recurrence relations: (4 x 2.5)
(a) $T(n)=T(n/3) + T(2n/3) +n$ (using recursion tree)
(b) $T(n)= 4T(n/2) + n^3$ (using Master method.)
(c) $T(n)= 2T(\lfloor n/2 \rfloor) +n$ (using substitution method).
(d) $T(n) = \begin{cases} 1 & \text{if } n=1 \\ 2T(n/2) +n & \text{if } n>1 \end{cases}$ (using iteration method)

Q. 3 (a) Write Insertion sort algorithm. Explain best case and worst case time complexity of Insertion sort algorithm (6)
(b) Find all pairs shortest path for the following graph using Floyd Warshall Algorithm (4)



(5x2)

Q. 4 (a) Find the optimal parenthesization of a matrix chain product whose sequence of dimensions are <40, 30, 20, 10>.
(b) Determine LCS of <1,0,0,1,0,1,0,1> and <0,1,0,1,1,0,1,1,0>.

(Please write your Roll No. immediately) **Roll No. ________________**

First-Term Examination

September 2015

5th Semester [B.Tech.] **Sub: Algorithm Analysis and Design**
Paper code: ETCS 301 **Time : 1.5 Hours**
Maximum Marks: 30

Note: 1. Attempt three questions in total
2. Q. No. 1 is compulsory. Attempt any two more questions from the remaining.

Q 1. (a) Define Big Omega (Ω) notation. **(5 x 2)**

(b) Define memoizaton.

(c) $f(n)= \frac{1}{2} n^2-3n$, find Θ

(d) Differentiate Dynamic Programming and Divide and conquer approach.

(e) Prove following:

(i) $n!=O(n^m)$

(ii) $1^k + 2^k +3^k.......+n^k=O(n^{k+1})$

Q 2. (a) Solve the following recurrence relations: **(3 x 2)**

i. $T(n) = 2T(\sqrt{n}) +1$ (using substitution method)

ii. $T(n) = 4T(\lfloor n/2 \rfloor) + n$ (using iteration method)

iii. $T(n) = \begin{cases} 5T(n-3)+O(n^2) & \text{when } n>0 \\ 1 & \text{otherwise} \end{cases}$

(using subtract and conquer master theorem)

(b) Write Floyd Warshall Algorithm. **(4)**

Or

Explain Strassen matrix multiplication with example.

Q. 3 (a) Explain Quicksort algorithm and explain worst case time complexity of the algorithm. **(5 x 2)**

(b) Sort the following numbers using Quicksort algorithm:

12 34 25 40 19 10 30 8

Q. 4 (a) Find the optimal parenthesization of a matrix chain product whose sequence of dimensions are <2,3,4,5,6>. **(5 x 2)**

(b) Determine LCS of X= <B, D, C, A, B, A>and Y=<A, B, C, B, D, A, B>
