Candidate Seat no............

CHAROTAR UNIVERSITY OF SCIENCE & TECHNOLOGY

Fifth Semester of B. Tech (CE) Examination

November 2017

CE315 Design and Analysis of Algorithm

Date: 23.11.2017, Thursday **Time: 10.00 a.m. To 01.00 p.m.** **Maximum Marks: 70**

Instructions:

1. The question paper comprises two sections.
2. Section I and II must be attempted in separate answer sheets.
3. Make suitable assumptions and draw neat figures wherever required.
4. Use of scientific calculator is allowed.

SECTION – I

Q - 1 **Answer the questions below.**

(i) Write recurrence relation of Quick sort for Best and Worst case. **[02]**

(ii) What is the complexity of two-way and three-way Merge sort? **[02]**

(iii) Define: Average case, Worst case and Best case complexity. **[03]**

Q - 2 (a) **Solve the following using Master's Theorem.(Any two)** **[06]**

(i) $T(n)=4T(n/2)+n^2$

(ii) $T(n)=2T(n/4)+n^{1/2}+42$

(iii) $T(n)=3T(n/2)+3/4n+1$

(b) Write and explain exponential algorithm for x^{27} . **[04]**

(c) Solve the recurrence relation using iteration method: 2T(n-1)+1 **[04]**

OR

(c) Solve the recurrence relation using recurrence tree method: $3T(n/4)+cn^2$ **[04]**

Q – 3 **Answer the questions below.**

(i) Find out complexity of following codes with explanation. **[04]**

(1)
```
for(i=1;i<=n;i++)
{
for(j=1;j<=i;j++)
  {
   for(k=1;k<=100;k++)
    {
      printf("All the best for exam!");
    }
  }
}
```

(2)
```
void summation(int n)
 {
     int i=1,s=1;
    while(s<=n)
    {
        i++;
        s=s+i;
        printf("Find the complexity of this code");
    }
 }
```

(ii) What is feasible and optimal solution? Find the optimal solution for the following knapsack using fractional approach. Capacity of knapsack is 50. [05]

Item No.	Weights	Values
1	10	60
2	20	100
3	30	120

(iii) Compare Kruskal's and Prim's algorithm. [05]

OR

Q – 3 Answer the questions below.

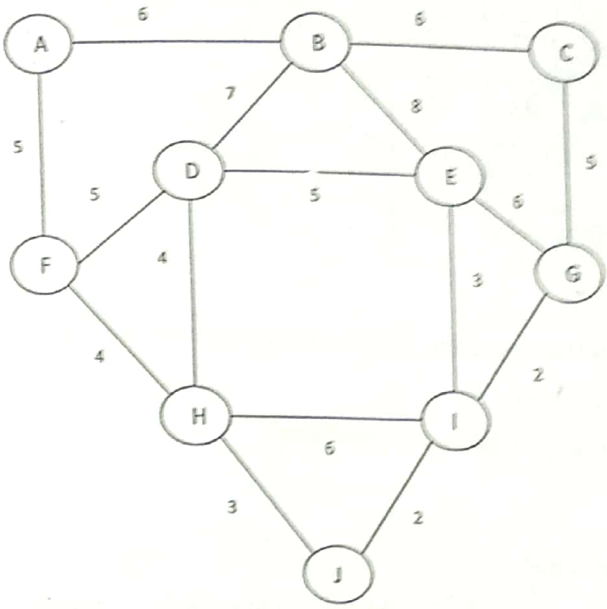
(i) Match the following: [04]

	Problem		**Techniques**
(1)	Minimum spanning trees	(p)	Divide and Conquer
(2)	N-queens problem	(q)	Greedy
(3)	Quick Sort	(r)	Dynamic Programming
(4)	Assembly-line scheduling	(s)	Backtracking

(ii) There are 4 jobs to execute, each of which takes unit time. Job i earns profit $g_i>0$, if it is executed no later than time d_i. Find out optimal sequence of jobs. [05]
Consider the following values:

i	1	2	3	4
g_i	50	10	15	30
d_i	2	1	2	1

(iii) For the given Graph, find at least two sequences in which edges are added to minimum spanning tree using Kruskal's algorithm. [05]



SECTION – II

Q - 4 **Answer the questions below.**

(i) Which graph traversal technique is used by Backtracking approach? [01]

(ii) State True or False: [02]

(i) BFS cannot be used to check for cycles in an undirected graph.
(ii) The time complexity of Dijkstra's algorithm while using array as the data structure is $O(V^2)$.

(iii) What are the drawbacks of Dynamic Programming? [02]

(iv) Define the following terms: (i) Back edge (ii) Articulation Point [02]

Q - 5 (a) Show how DFS is used to find connected components of an undirected graph. [05]

Q - 5 (b) Solve the following using Large Interger Multiplication: 5678*4321 [05]

Q - 5 (c) Define the following: (i) NP Hard problem (ii) NP Complete problem [04]

OR

Q – 5(a) Solve the Assignment Problem with the following cost matrix using Branch & Bound Technique. [05]

	T1	T2	T3	T4
A	11	12	18	40
B	14	15	13	22
C	11	17	19	23
D	17	14	20	28

Q – 5 (b) Find the optimal cost and optimal sequence of parenthesization for the given matrices: [05]

A=13*5, B=5*89, C= 89*3 ,D=3*34

Q – 5 (c) Derive at least two possible solutions for 4-queen problem. [04]

Q – 6 Attempt the following: (Any Two) **[14]**

(i) Compare traditional method of Matrix Multiplication and Strassen's Matrix Multiplication.

(ii) Find the Longest common subsequence from following two strings using Dynamic Programming.

S1= AAACCGTGATG
S2=CACCCCTAGT

(iii) Explain Naive and Rabin Karp String matching algorithms.

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