Candidate Seat No: _____

Charotar University of Science and Technology

Devang Patel Institute of Advance Technology and Research

Department of Computer Engineering

Subject: CE355 Design and Analysis of Algorithms

University Examination

Semester: 5th (B.tech) **Maximum Marks: 70**
Date: 25/11/2021, Thursday **Time: 10:00 AM to 01:00 PM**

Instructions:

(i) Attempt all the questions
(ii) Figures to the right indicates full marks
(iii) Give appropriate example whenever if required

Section -1

	Answer the question below	**Marks [20]**	**CO**	**BL**
Q -1	The running time of Strassen's algorithm for matrix multiplication is. a) ɵ(n) b) ɵ(1) c) ɵ(n3) d) ɵ(n2.81)	1	2	R
Q -2	Dynamic programming does not work if the sub problems a. Share resources and thus are not independent b. Cannot be divided in half c. Overlap d. Have to be divided too many times to fit into memory	2	3	U

Q -3	Backtracking algorithm is implemented by constructing a tree of choices called as a) State-space tree b) State-chart tree c) Node tree d) Backtracking tree	1	3	R
Q -4	Time complexity of Quick sort algorithm mainly depend upon: a) Type of item b) Arrangement of item c) Selection of the Pivot d) Selection of data structure	1	2	U
Q -5	Given a pattern of length- 5 window, find the spurious hit in the given text string.Pattern: 3 1 4 1 5Modulus: 13Text: 2 3 5 9 0 2 3 1 4 1 5 2 6 7 3 9 9 2 1 3 9 a) 1 b) 2 c) 3 d) 4	2	3	A
Q-6	The average time required to perform a successful sequential search for an element in an array A(1:n) is given by a) (n+1)/2 b) n2 c) n d) log n	2	2	R
Q-7	The number of operations in Matrix multiplications M1, M2, M3, M4 and M5 of sizes 5X10, 10X100, 100X2, 2X20 and 20X50 a) 5830 b) 4600 c) 6900 d) 12890	2	3	A
Q-8	The running time of quick sort depends on selection of, Select one: a) Selection of pivot elements b) Number of input	1	3	R

	c) Number of passes d) Arrangements of the elements			
Q-9	Which case of Master's theorem is applicable in the recurrence relation T(n)=0.5*T(n/2)+1/n? a) Case 3 b) Case 1 c) Master's theorem is not applicable d) Case 2	1	3	R
Q-10	Which of the following is not the algorithm design approach? a) Dynamic Programming b) Branch and Bound c) Backtrack d) Recursive	1	3	R
Q-11	Suppose t1(n) =O(f(n)) and t2(n)=O(f(n)), then which one is true a) t1(n)+t2(n) b) t1(n)=O(t2(n)) c) t1(n)/t2(n)=O(1) d) All of the above	1	2	R
Q-12	Assembly line scheduling and Longest Common Subsequence problems are an example of_____. a) Dynamic Programming b) Greedy Algorithm c) Greedy Algorithm and Dynamic Programming respectively d) Dynamic Programming and Greedy Algorithm respectively	1	3	R
Q-13	The problems 3-SAT and 2-SAT are a) NP only b) Class P c) NP Complete and in P respectively d) Undecidable and NP Compete respectively	1	6	R
Q-14	Always Divide and Conquer based algorithm's recurrence relation can be solved using master theorem. a) True b) False	1	3	E
Q-15	If f(x)=O(g(x)) and g(x)= O(f(x)) then f(x)=theta(g(x)).Relational a) True b) False	2	2	E

Section -2

Answer the question below		Marks [50]	CO	BL
Q -1	Derive time recurrence relation of Merge Sort in worst case and solve the recurrence by substitution method. OR Solve the given recurrence using suitable method: T(n)= T(n1/2) + 1	5	3	A
Q -2	Explain Multiplication of large Integers using divide and conquer approach. Apply process on 26*13	5	3	U
Q -3	There are seven jobs to execute, each of which takes unit time. Job ai pay penalty wi>0, if it is executed later than time di. Find out optimal sequence of jobs and total penalty to pay. Consider the following values. ai 1 2 3 4 5 6 7 di 4 2 4 3 1 4 6 wi 70 60 50 40 30 20 10	5	3	R
Q -4	Apply activity selection process of greedy approach to get maximum activities to be conducted for given activities (i) with start time (Si) and finish time (Fi). i 1 2 3 4 5 6 7 8 9 10 11 Si 1 3 0 5 3 5 6 8 8 2 12 Fi 4 5 6 7 8 9 10 11 12 13 14	5	3	A
Q -5	Compare Prims and Kruskal algorithm to find MST for a given graph using an appropriate example.Or Write short note on NP- Completeness and NP- Hard.	5	4	A
Q -6	Explain role of asymptotic notation in recurrence relation. OR What is input size for any algorithm? How input size and its nature impact algorithm complexity?	5	2	U
Q -7	Find the longest common subsequence from following two strings using Dynamic programming. S1 = ABCBDAB, S2 = BDCABA	5	3	R
Q - 8	Draw state space tree for 4-queen problem using Backtrack. How many solutions are possible for 4-queen problem? OR Solve 0/1 Knapsack problem using backtrack and draw state space tree. Knapsack capacity is 8	5	3	A
Q –9	Find the binomial coefficient C(9,4) using dynamic programming.	5	3	R
Q-10	What do you know by recurrence relation? List out the methods to solve any recurrence relations.	5	3	R