THAKUR COLLEGE OF ENGINEERING AND TECHNOLOGY
S. T. SEMESTER IV (CBCGS-HME 2020) MAY 2022

Subject: Design and Analysis of Algorithms

Q.P. Code: B-46002

Branch: ST AIML

Total Marks: 60

(Time: 2hours)

Instructions:
1. All Sections are compulsory.
2. Figures to the right indicate full marks.
3. Assume suitable data if necessary and state the assumptions clearly.

Que No	Section-I (08 Marks) Multiple choice question(Answer any 08 questions out of 10)	Marks
1	If $f(n) = 2 \times n + 5$, then $f(n)$ is (a) $O(n)$ (c) $O(n^3)$ (b) $O(n^2)$ (d) All of the above	1
2	If $f(n) = 3 \times \log n + 7n + 3$, then $f(n)$ is (a) $O(2^n)$ (c) $O(n)$ (b) $O(\log n)$ (d) All of the above	1
3	If $f(n) = 2 \times n^2 + 5 \times n + 3$, then $O(n)$ (a) $O(n)$ (c) $O(n^3)$ (b) $O(n^2)$ (d) All of the above	1
4	If $f(n) = 3 \times n + 7$, then $f(n)$ is (a) $\Omega(n)$ (c) $\Omega(n^3)$ (b) $\Omega(n^2)$ (d) All of the above	1
5	Which of the following cannot be solved via divide and conquer? (a) Matrix chain multiplication (b) Merge sort (c) Quick sort (d) None	1
6	Which of the following is best taking into consideration both time and memory? (a) Bubble sort (b) Selection sort (c) Quick sort (d) Merge sort	1
7	Which of the following has best 'worst-case complexity'? (a) Merge sort (b) Quick sort (c) Bubble sort (d) None of the following	1
8	Which of the following can be used to solve recursive equations? (a) Substitution (b) Master theorem (c) Tree method (d) All of the above	1
9	Which of the following techniques use recursion? (a) Divide and conquer (b) Backtracking (c) Both (d) None of the above	1
10	If the sub-problems are such that each solution can be used at a later point (the sub-problems need not to be homogeneous), which strategy can be used? (a) Dynamic (b) Divide and conquer (c) Backtracking (d) None of the above	1

P.T.O.

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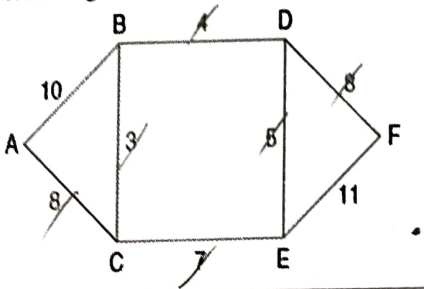
	Section-II (12 Marks)	
	Objective questions(Answer any 4)	
1	Differentiate between Algorithm, Pseudo code and program	3
2	List the types of Time function or complexity	3
3	Explain the criteria to analyze and algorithm.	3
4	Explain the concept of Job sequencing with deadlines.	3
5	Describe Master's algorithm with a suitable example.	3
6	Describe the analysis of Selection sort.	3
	Section-III (20 Marks)	
	Short Answer question(Answer any 04)	
1	List and explain the steps to Design an algorithm with the help of a suitable diagram.	5
2	List the properties of Asymptotic Notations	5
3	Trace the steps of Krushkal's algorithm for the graph given below: 	5
4	Demonstrate the Rabin-Karp algorithm and calculate its time complexity	5
5	Consider the recurrence T(n) = 2T(n/2) + n. Using Substitution method obtain the solution to the above.	5
6	Demonstrate the Longest common subsequence of 'ACGT' and 'AGCTA'.	5
	Section-IV (20 Marks)	
	Long Answer question (answer any 2)	
1	Illustrate the concept of Merge Sort with its algorithm. Also explain how Divide and Conquer Method is used in Merge Sort.	10
2	Illustrate the Time Complexity of Simple Linear Search and Divide and Conquer method for finding Maximum and minimum of an array.	10
3	Calculate the optical knapsack for the following data: • n = 4 (# of elements) • W = 5 (max weight) • Elements (weight, value): (2,3), (3,4), (4,5), (5,6)	10

02