BTS–VI(R)–04–22–0293 Reg. No. | | | | | | | | |

A

B.Tech. Degree VI Semester Regular Examination April 2022

CS 19-202-0603 ANALYSIS AND DESIGN OF ALGORITHMS

(2019 Scheme)

Time: 3 Hours Maximum Marks: 60

Course Outcome

On successful completion of the course, the students will be able to:

CO1: Analyse a given algorithm and express its worst, best and average time and space complexities in asymptotic notations.

CO2: Solve recurrence equations using Substitution Method, Changing Variables, Recursion Tree and Masters Theorem.

CO3: Understand the dynamic programming paradigm and its algorithmic design solutions.

CO4: Familiarise optimization problems using Greedy Method.

CO5: Design efficient algorithms using Backtracking and Branch and Bound Techniques for solving problems.

CO6: Familiarize some approximation algorithms and the benefit of using them.

CO7: Classify computational problems into P, NP, NP-Hard and NP-Complete complexity classes.

Bloom's Taxonomy Levels (BL): L1 – Remember, L2 – Understand, L3 – Apply, L4 –Analyze, L5 – Evaluate, L6 – Create

PO – Programme Outcome

PART A

(Answer *ALL* questions)

			Marks	BL	CO	PO
I.		(8 × 3 = 24)				
	(a)	What are the different asymptotic notations?	3	L1	1	1,2,3
	(b)	Estimate worst case, best case and average case complexity of linear search.	3	L2	1	1,2,3
	(c)	Give the analysis of Insertion sort.	3	L1	2	1,2,3
	(d)	Differentiate between Binomial heap and Fibonacci heap.	3	L2	1	1,2,3
	(e)	Discuss the properties of RBT.	3	L1	1	1,2,3
	(f)	What are Minimum Spanning Tree? Differentiate between Prim's and Kruskal's algorithms.	3	L1	4	3
	(g)	Write short notes on the P, NP, NP hard and NP complete complexity classes.	3	L1	7	4,5
	(h)	What are PRAM models? Give an example.	3	L1	6	3,10

PART B

(4 × 12 = 48)

II.	(a)	Solve the following equations by Masters theorem.	6	L3	2	1,2,3
		(i) $T(n)=2T\left(\frac{n}{2}\right)+n$				
		(ii) $T(n)=T\left(\frac{n}{2}\right)+n^3$				
	(b)	Solve the given equations using iterative method.	6	L3	2	1,2,3
		$T(n)=3T\left(\frac{n}{4}\right)+n$				

OR

(P.T.O)

III.	(a)	Solve the given equations using recursive tree method. (i) $T(n)=2T\left(\frac{n}{2}\right)+n^2$ (ii) $T(n)=T\left(\frac{n}{2}\right)+T\left(\frac{n}{4}\right)+T\left(\frac{n}{8}\right)+n$	6	L3	2	1,2,3
	(b)	Differentiate between greedy and dynamic programming.	6	L2	4	3
IV.		Explain the analysis of Quick sort algorithm with an example and analyze its best case and worst case complexity.	12	L4	3	3
		OR				
V.		Explain the analysis of Heap sort algorithm with an example analyze its best case and worst case complexity.	12	L4	3	3
VI.		Explain backtracking with an example.	12	L1	5	3
		OR				
VII.		Given a chain of four matrices. The matrices have size 5 × 4, 4 × 6, 6 × 2, 2 × 7. Evaluate M [1, 4] using dynamic programming approach of Matrix chain multiplication.	12	L3	3	3
VIII.		Discuss the approximation algorithm for Graph coloring.	12	L1	6	3,10
		OR				
IX.		Discuss the approximation algorithm for TSP in detail with an example.	12	L1	6	3,10

Bloom's Taxonomy Levels
L1 = 50%, L2 = 17%, L3 = 22%, L4 = 11%

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