Q. Code:122601

Reg. No. | | | | | | | | | | | | | |

B.E. / B. TECH DEGREE EXAMINATIONS, MAY 2024

Fourth Semester

IT22408 – PARADIGMS OF ALGORITHM DESIGN: THEORY AND PRACTICE

(Information Technology)

(Regulation 2022)

TIME: 1 HOUR 30 MINUTES **MAX. MARKS: 50**

COURSE OUTCOMES	STATEMENT	RBT LEVEL
CO1	Articulate the process of problem solving and writing algorithms.	**3**
CO2	Analyze recursive and non-recursive algorithms.	**4**
CO3	Apply different algorithmic design techniques to solve computational problems.	**3**
CO4	Evaluate the effectiveness of a solution by comparing the various approaches.	**5**
CO5	Explain the limitations of computing power and solve problems using Approximation and randomized algorithms.	**3**

PART- A(10x2=20Marks)

(Answer all Questions)

		CO	RBT LEVEL
1.	Justify the need of analyzing the algorithm.	**1**	**3**
2.	Write an algorithm of your choice with $\Theta(1)$ complexity.	**1**	**2**
3.	Write a recursive algorithm to calculate the factorial of a number.	**2**	**3**
4.	Solve the recursive equation: $T(n) = 2T(n/2) + c$; $T(1) = 0$	**2**	**3**
5.	Compare and contrast Greedy and Dynamic Programming.	**3**	**2**
6.	List two scenarios where Greedy design technique would not able to produce optimal solutions.	**3**	**2**

7.	Calculate the time complexity of the following snippet:
	`For (i = 1; i<= n; i=i++)`
	`{`
	`Print("Welcome");`
	`Break;`
	`}`
		2	**3**

8.	Evaluate the effectiveness of selecting the pivot element in quick sort.	**3**	**4**
9.	Give two examples of Class P and NP problems each.	**5**	**2**
10.	What do you mean by randomized algorithms? Give example.	**5**	**3**

PART- B (2x 10=20Marks)

		Marks	CO	RBT LEVEL
11. (a)	Given the weights and profits of **N** items, in the form of **{profit, weight}**, place these items in a knapsack of capacity **W** to get the maximum total profit, not exceeding the maximum capacity **W.** Deduce algorithm and analyze its time complexity, also apply algorithm for the given instance W=8kgs.	**(10)**	**3**	**3**

Item	Weight	Profits
A	5	35
B	1	10
C	3	18
D	3	12

(OR)

(b)	Explain how divide and conquer methodology is applied on sorting algorithm so that the performance of the algorithm is O(nlog(n)). Explain the sorting algorithm and compute its time complexity.	**(10)**	**3**	**3**
12. (a)	Demonstrate Backtracking design technique and explain with state space tree "m-coloring graph problem". Analyze its time complexity	**(10)**	**4**	**3**

(OR)

(b)	Justify why Single source shortest path does not use Dynamic programming whereas All pair shortest path uses Dynamic programming. Demonstrate the All pair shortest path algorithm using Dynamic programming and analyze its time complexity.	**(10)**	**4**	**3**

PART- C (1x 10=10Marks)

(Q.No.13 is compulsory)

		Marks	CO	RBT LEVEL
13.	Demonstrate the necessity of approximation and explain how it is applied to TSP problem.	**(10)**	**5**	**5**

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