Q. Code: 292447

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

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

Fourth Semester

IT18401 – PARADIGMS OF ALGORITHM DESIGN

(Information Technology)

(Regulation 2018 /2018A)

TIME:3 HOURS **MAX. MARKS: 100**

COURSE OUTCOMES	STATEMENT	RBT LEVEL
CO 1	Develop simple and recursive algorithms to different problems.	**4**
CO 2	Investigate the complexity of simple and recursive algorithms to different problems.	**5**
CO 3	Solve computational problems using various algorithm design strategies.	**5**
CO 4	Explore NP Completeness problem.	**4**
CO 5	Implement parallel architecture models and develop parallel algorithms to solve complex problems.	**4**

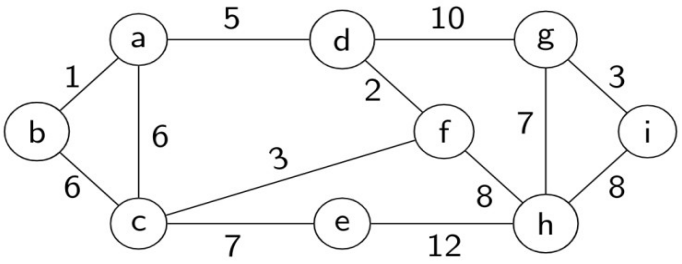
PART- A(10x2=20Marks)

(Answer all Questions)

		CO	RBT LEVEL
1.	Execute the time required to search an element using basic hashing algorithm.	**1**	**3**
2.	Which sorting algorithm is optimal when the list is sorted? Why?	**1**	**2**
3.	Execute the time complexity of searching an element from a set of n elements using Binary search algorithm.	**2**	**3**
4.	Differentiate feasible solution and optimal solution.	**2**	**4**
5.	State Hamiltonian Circuit problem.	**3**	**2**
6.	How Prim's algorithm is better in finding the minimal spanning tree in comparison to the Kruskal's method?	**3**	**3**
7.	Compare NP-hard and NP-completeness.	**4**	**3**
8.	What is Triangular inequality.	**4**	**2**
9.	Differentiate SIMD and MIMD Architecture.	**5**	**4**
10.	What are the variants of the PRAM model designed to manage concurrent memory accesses?	**5**	**2**

PART- B (5x 14=70Marks)

			Marks	CO	RBT LEVEL
11. (a)		Write an algorithm to sort the elements using bubble sort algorithm and analyze it's time complexity in best and worst case.	**(14)**	**1**	**4**
		(OR)			
(b)	**(i)**	Prove that $7n^2+15n+3 \in \theta(n^2)$.	**(7)**	**1**	**4**
	(ii)	Develop an algorithm for determining the uniqueness of an array and determine the time complexity of an algorithm.	**(7)**		

12. (a)	Examine the working of Strassen's matrix multiplication algorithm with the help of divide and conquer method and analyze it's time complexity.	**(14)**	**2**	**4**
	(OR)			
(b)	Solve the all pairs shortest path problem for the following weight matrix using Floyd's algorithm and evaluate it's time complexity. $\begin{bmatrix} 0 & 2 & \infty & 1 & 8 \\ 6 & 0 & 3 & 2 & \infty \\ \infty & \infty & 0 & 4 & \infty \\ \infty & \infty & 2 & 0 & 3 \\ 3 & \infty & \infty & \infty & 0 \end{bmatrix}$	**(14)**	**2**	**4**
13. (a)	Apply the greedy technique to find the minimum spanning tree using Prim's algorithm for the graph. 	**(14)**	**3**	**3**
	(OR)			
(b)	Construct the state space tree of the backtracking algorithm applied to the instance A={3, 5, 6, 7} and d=15 of the subset sum problem.	**(14)**	**3**	**3**
14. (a)	Establish the relationship between Polynomial, NP, NP Complete and NP-Hard problems and demonstrate polynomial time reducibility with example.	**(14)**	**4**	**3**
	(OR)			
(b)	Solve Travelling Salesperson problem with an example using approximation algorithm.	**(14)**	**4**	**3**
15. (a)	Describe various parallel architectures used to implement parallel algorithms.	**(14)**	**5**	**2**
	(OR)			
(b)	Explain the CRCW PRAM computation model with an example to illustrate its functioning.	**(14)**	**5**	**2**

PART- C(1x 10=10Marks)

(Q.No.16 is compulsory)

		Marks	CO	RBT LEVEL
16.	Develop an optimal solution for 0/1 knapsack problem using greedy method for the instances (p1,p2, p3, p4) = (11, 21, 31, 33), (w1, w2, w3, w4) = (2, 11, 22, 15), M=40, n=4.	**(10)**	**3**	**5**

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