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

B.E./ B.TECH. DEGREE EXAMINATIONS, MAY 2023

Fourth Semester

IT18401 – PARADIGMS OF ALGORITHM DESIGN

(Information Technology)

(Regulation 2018 / 2018A)

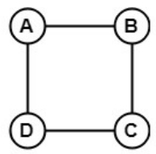
TIME: 3 HOURS **MAX. MARKS: 100**

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

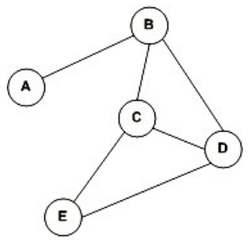
PART- A(10x2=20Marks)

(Answer all Questions)

		CO	RBT LEVEL
1.	How do you measure an algorithm's running time?	1	3
2.	Prove that $2n^2+ 3n + 1= O(n^2)$	1	3
3.	Analyze the time complexity of Binary Search algorithm.	2	4
4.	Differentiate feasible solution and optimal solution.	2	4
5.	State Hamiltonian Circuit problem.	3	1
6.	Apply Graph coloring to color the graph with three colors Red, Blue and Green.	3	3



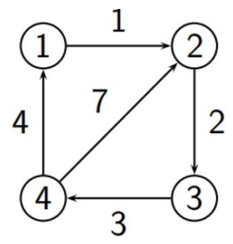
7.	Identify the Vertex cover for the given graph	4	3



8.	When is a problem said to be NP Hard?	4	1
9.	Differentiate SIMD and MIMD Architecture.	5	2
10.	What are the versions of the PRAM model for handling concurrent memory accesses?	5	1

PART- B (5x 14=70Marks)

			Marks	CO	RBT LEVEL
11. (a)	(i)	Determine the best case complexity for finding maximum element in an array.	(7)	1	4
	(ii)	Write an algorithm to search an element using Sequential Search and analyze it's time complexity in average case.	(7)		
		(OR)			
(b)	i)	Solve the following recurrence equation $T(n) = T(\frac{n}{2}) + 1$ where $n=2^K$ for all $k\geq 0$	(7)	1	4
	ii)	Analyze the time complexity of selection sort algorithm with an example.	(7)		
12. (a)		Apply merge sort algorithm to sort the given elements 14, 20, 78, 98, 20, 45and derive it's time complexity.	(14)	2	3
		(OR)			
(b)		Find all pair shortest path using Floyd's Algorithm and derive it's time complexity.	(14)	2	3



13. (a)		Consider weights w = {5, 6, 10, 11, 16} and m=21. Draw the state space tree and determine all the subsets that sums to 21.	(14)	3	3
		(OR)			

Q. Code: 583636

(b) Solve the following instances of the 0/1 knapsack problem given the knapsack capacity W = 5 using dynamic programming. **(14) 3 3**

Items	Weight	Profit
1	2	12
2	1	10
3	3	20
4	2	15

14. (a) Examine the concepts of Polynomial, NP, NP Complete and NP-Hard problems. Illustrate polynomial time reducibility with example. **(14) 4 3**

(OR)

(b) Develop an approximation algorithm to Travelling Salesperson problem with an example. **(14) 4 3**

15. (a) Explain the different parallel architectures available with necessary diagram. **(14) 5 2**

(OR)

(b) Explain the CREW PRAM Computation model with an example. **(14) 5 2**

PART- C(1x 10=10Marks)

(Q.No.16 is compulsory)

Marks CO RBT LEVEL

16. Determine the minimum spanning tree by applying Prim's Algorithm for the following graph and derive it's time complexity. **(10) 3 5**