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MID TERM EXAMINATIONS – July 2024

Programme	:	B.Tech, int.M.Tech	Semester	:	Fall Semester 2024-25
Course Title	:	Data Structures and Algorithms	Course Code	:	CSE2002
Date/Session	:	18 July 2024/ Session I	Slot	:	C11+F11+C12+F12+C13
Time	:	1 ½ hours	Max. Marks	:	50

Answer all the Questions

Q.No.	Sub. Sec.	Question Description	Marks
1	(a)	Suppose a student has to attend at least 75% of classes for a course to be eligible to appear in the examination. There are total 40 Classes for Data Structures and Algorithms. If a student has attended 12 out of 18 classes held so far, write the steps to determine, at least how many more classes to be attended by him to be eligible for appearing in Term End Examination of the course. Also illustrate the steps with a flow chart.	5
	(b)	Write the recursive algorithm to solve Tower of Hanoi problem with 3 pegs. Use this algorithm to illustrate the moves for 3 disks from source peg to destination peg.	5
2		Write recursive algorithm to find the minimum element in an array A[0….n-1]. Use this algorithm to find the minimum element in the following array A = [40,15, 30, 75, 55, 60]. Also, deduce the time complexity for the algorithm.	10
3	(a)	Prove the following equality $\sum_{i=1}^{n} i = \theta(n^2)$	5
	(b)	Write the algorithm for Brute Force approach based algorithm to search an element in a given array. Use this algorithm to search 15 in the following array A = [7, 23, 35, 15, 46, 65]	5
4		Imagine you are maintaining a leader board for a video game, and you have a list of player scores represented as an array of integers. You need to sort this array in descending order to display the top players.	
	(a)	Explain how you would use the Bubble Sort algorithm to sort this array in descending order. Provide the sorted array as the final result for the following input: `[540, 840, 410, 950, 680].` Provide the intermediate state of the array after each pass of the Bubble Sort algorithm. Include both the pass number and the array state.	6
	(b)	Define a C function bubbleSortDescending (int arr[], int n) for the same.	4

6 Write the recursive Binary Search algorithm to search a key in the given array consisting elements in ascending order. Consider the following 7 elements (in ascending order) for an array with their indices. **10**

Index	1	2	3	4	5	6	7
Elements	5	9	18	30	45	60	75

Use the recursive Binary Search algorithm to determine the average number of element comparisons for successful and unsuccessful search.

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