Continuous Assessment Test I – February 2024

Programme	:	B.Tech	Semester	:	Winter Semester 2023-24
	:	Data Structures and Algorithms	Code	:	BCSE202L
	:	Dr. SENTHIL KUMAR A M	Slot	:	E1+TE1
Time	:	1 1/2Hours	Class Nbr	:	CH2023240502718
			Max. Marks	:	50

Answer ALL the Questions

If an assumptions are required, assume the same and mention those assumptions in the answer script

Q.No		Question Description	Marks
1.			10
	a	Compute the running time of the following algorithm. (5 marks)	

```
Funcion(int B[])
1.      n=length(B)
2.      total = 0
3.      for i = 1 to n
4.          j= 1
5.          while(j<=n)
6.              total = total  + B[j]
7.              j=j*5
8.          end while
9.      end for
10.     return total
```

	b	Is $n^5+2n^2+60 = \Omega(n^6)$? Justify your answer. (5 marks)	
2.		Convert the following infix expression into postfix expression and also evaluate the obtained postfix expression using stack. Display the contents of stack at each step.	10
		7-(2*3+5)*(8-4/2)	
3.		Solve the following recurrence relaions	10
	a	$T(n) = T(n/2) + n^2 / \log n$ (5 marks)	
	b	$T(n) = 2\,T(n/4) + \sqrt{n}$ (5 marks)	
4.		A farmer owns a land comprising different fruit trees such as apples, oranges, mangoes, and peaches. The total number of fruit trees is represented by a large positive integer 'n', and there are 'm' types of fruit trees, where m is a positive integer. Given the integers n and m, design a divide-and-conquer algorithm to help the farmer to maintain only one tree of each type in his land. Compute the running time and time complexity of your algorithm.	10

Given a positive integer array, develop an algorithm to sort and arrange the given numbers in the following order: prime numbers first, followed by odd numbers, and then even numbers. Compute the running time and time complexity of your algorithm. 10

Example

Input=[6, 4, 5, 21, 2, 15, 11, 35, 8, 7, 9]

Output= [2, 5, 7, 11, 9, 15, 21, 35, 4, 6, 8]

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