MID TERM EXAMINATIONS – July 2024

Programme	:	**B.Tech.**	Semester	:	**Fall Semester 2024-2025**
Course Title	:	**DATA STRUCTURES AND ANALYSIS OF ALGORITHMS**	Course Code	:	**CSD3009**
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. What do you mean by an algorithm's best-case, average-case, and worst-case behaviour? What does it mean when we say that algorithm X is asymptotically more efficient than Y? Justify with a suitable example.	5
		B. Find the time complexity of the given below hypothetical code:	5

```
main( ){
 int a = 0,N;
 for (i = 0; i < N; i++)
 {
  while (i > 0)
   {
   a += i;
   i /= 2;
  }
 }
}
```

Note: 'N' denotes the number entered by the user.

2	(a)	Write a program for insertion of new node into doubly link list: A. Before the first node B. After the last node Also, analyse the time complexity for insertion in the above cases a and b.	10
3	(a)	Consider a two dimensional array, A [-9 ... +20][20 ... 70], base address is 1000, size of each element is 2bytes. Find the address of A[1][40] by using row major order array representation.	5

3 (b) What is a queue data structure? What are the basic operations that can be performed on a queue? Write a program that adds an element to the queue (enqueue operation). 5

4 Consider the postfix expression 823^/23^+51*+48^+. Evaluate the given expression using the stack method. What will be the maximum stack size while evaluating the given expression? 10

5 Given the sequence of data elements: 14, 11, 45, 8, 9, 22, 15, 79, 99, 67, 2, 55, 12, 17, 7, 13. Explain the step-by-step process of inserting each element into the Binary Search Tree. Also find how many elements are in the left sub-tree and right sub-tree. 10

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