

Reg. No.: 22BA11266

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VIT

Vellore Institute of Technology
(Deemed to be University under section 3 of UoE Act 1956)

Continuous Assessment Test II – October 2023

Programme	: B. Tech (BRS, BPS, BAI, BCE)	Semester	: Fall Semester 2023-24
Course Title	: Data Structures and Algorithms	Code	: BCSE202L
		Class Nbr(s)	: CH2023240101210, CH2023240100642, CH2023240100647, CH2023240100649, CH2023240100651
Faculty (s)	: Dr. J Uma Maheswari, Dr. Vijayaprabakaran K, Dr. Karthikeyan N, Dr. Sudheer Kumar E, Dr. Avuthu Aninash Reddy	Slot	: A1+TA1
Time	: 90 minutes	Max. Marks	: 50 marks

Answer all the Questions

1. **Double Ended Queue (DEQ)** is a generalized version of the Queue data structure that allows insertion and deletion at both ends.

Write an algorithm on the **DEQ** for the following operations.

(i) Perform insertion of characters at the left end (ii) Perform insertion of characters at the right end, (iii) Perform deletion of characters at the left end. (iv) Perform deletion of characters at the right end (v) To check whether the given sequence of characters (**MADAM or RACER**) is palindrome. If it is palindrome, then your algorithm should display "**Palindrome**" otherwise it should display "**Not a palindrome**".

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2. The ICC's 2023 World Cup series consists of three slots. One of the matches between India and Pakistan was played last week. India won the match by six wickets against Pakistan. The batting score card for the match is given in **Table 1.1**. Write an algorithm (**sortLL(&start)**) to connect all the players based on their scores in the match , where start denotes the first node of the linked list, and display the list of the players using **displayLL(&start)** after successfully implementing the **sortLL(&start)** with the following constraints: i) The node of the list consists of **four parts** that are the name of the player (**char *playerName**), score (**int score**), and two address fields (***front, *back**); ii) The list of players should be connected in **descending order according to their scores**.

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ScoreCard: IND VS PAK Match1, ICC'2023		
S.No.	Name of the Player	Score
1	Sachin	52
2	Sehwag	35
3	Dravid	112
4	Ganguly	87
5	Dhoni	101
6	YuvarajSingh	48

Table. 1.1 ScoreCard: IND VS PAK

3. Let **P1** and **P2** are two polynomials represented in linked lists **L1** and **L2** respectively. Write an algorithm with the following constraints:
- Read two polynomials; if both exponents of **P1**, **P2** are even add their coefficients to the resultant list (**P3**).
 - If both the exponents of **P1** and **P2** are odd, then subtract their coefficients and add it to the resultant list (**P3**).
 - If both exponents of **P1** and **P2** are **not same**, then take the greatest exponent and directly add the node to the resultant list (**P3**).
- Example,**
(P1) $4x^4 + 2x^3 + 2x^2 + 3x^1 = 0$
(P2) $3x^3 + 4x^2 + 2x^1 + 3 = 0$
(P3) $4x^4 - x^3 + 6x^2 + x^1 + 3 = 0$
4. Consider that you were given two binary trees, **T1** and **T2**. Write an algorithm to check whether the leaf nodes of both trees are same or not with minimum level of 3. 10
5. **Write an algorithm** (i) to traverse the **Binary Search Tree (BST)** and check all the nodes of a binary search tree has exactly two children or no children.
(ii) If the tree does not satisfy the condition (i), then find how many nodes are required to insert into the BST to make the tree to satisfy condition (i) .
Apply your procedure discussed in (i) and (ii) for the following data:
A=[25, 12, 60, 8, 4, 76, 20, 85, 35] . 10

