VIT
Vellore Institute of Technology
CHENNAI

Reg. Number:	24MCA1034

Continuous Assessment Test (CAT) – I - AUG 2024

Programme	:	Master of Computer Science and Applications	Semester	:	02
Course Code & Course Title	:	PMCA501L & Data Structures and Algorithms	Slot	:	G1
Faculty	:	Dr. M. Jayasudha	Class Number	:	CH2024250103007
Duration	:	90 Minutes	Max. Mark		50

General Instructions:

- Write only your registration number on the question paper in the box provided and do not write other information.
- Only non-programmable calculator without storage is permitted

Answer all questions

Q. No	Sub Sec.	Description	Marks
1		A bank has a customer service counter where customers line up to receive assistance. The bank can handle a maximum of 5 customers in the queue at any given time. Customers arrive at the bank and are added to the queue in the order they arrive. The bank teller serves the customers one by one in the order they are in the queue. You are tasked with writing an algorithm/pseudocode to manage this queue. The algorithm should: a. Accept the maximum number of customers (max_size) that can be processed, but no more than 5. (3 M) b. Allow customers to be added to the queue up to the specified maximum size. (3 M) c. Dequeue and display the customers in the order they arrived for service.(4 M)	10
2		Udhaya is a dedicated math teacher who wants to simplify the process of solving complex mathematical expressions for her students. She wishes to create a tool that can convert standard mathematical expressions written in infix notation into postfix notation. a) This tool will help her students better understand the order of operations and practice solving equations step-by-step. (3+4) *5-2 / (1+2) (5 M) b) Write an algorithm/pseudocode for the above scenario (5 M)	10
3		Ashiq is developing a basic ticketing system for a small amusement park. The Park issues tickets to visitors in the order they arrive. Each ticket has a unique number associated with it. The system needs to manage the queue of visitors waiting to enter the park. To manage the ticket queue, Ashiq decided to use a data structure concept where each node represents a ticket with a unique number. The system needs to support the following operations: 1. Adding a new ticket to the end of the queue. (4 M) 2. Removing the ticket of the first visitor (at the front of the queue).(3 M) 3. Printing the remaining tickets in the queue. (3 M) Write an algorithm/pseudocode for above operations.	10
4		Sharon is an employee working on developing a student grading system for a school. As part of the system, you need to implement a feature that sorts the student names in alphabetical order based on their names. This feature will allow teachers and administrators to easily organize and manage student records based on their names. Write a pseudocode/algorithm to sort the student names in alphabetical	10

		order. After each iteration of the sort, the algorithm should update student names to reflect the current state of the sorting process.	

5		a) Predict the output of the following code (2.5M)
		#include <stdio.h>
		int main() {
		int count[4] = {-4, -6, -2, 9}, l = 1;
		for (int i = 0; i < 4; i++) {
		if (count[i] % 3 == 0 && count[i] != 0) {
		l *= count[i];
		}
		}
		printf("%d", l);
		return 0;
		}
		b) b)What will be the output of the following code:(2.5M)
		#include <stdio.h>
		int rec(int num) {
		return (num) ? num % 10 + rec(num / 10) : 0;
		}
		int main() {
		printf("%d", rec(4567));
		return 0;
		}
		c) Fill the proper code in the blank (2.5M)
		#include <stdio.h>
		int main(){
		int x[2][3] = {{1, 2, 3}, {4, 5, 6}};
		int r = 0;
		int c = ----;
		if (r >= 0 && ------- && ------ && --------) {
		printf("%d", x[----][----]);
		}
		else {
		printf("Invalid!");
		}
		return 0;
		}
		d) Debug the errors in the following code:(2.5M)
		#include <stdio.h>
		int main()
		{
		int num, LD;
		printf(" Enter a number"4589);
		scanf("%hd", num);
		LD = num / 10;
		printf(" \n The Last Digit of a Given Number = %d", num, LD);
		return 0;
		}
			10

**********All the best **********