



[Any examinee found adopting unfair means will be expelled from the trimester/program as per UIU disciplinary rules.]

There are **FIVE** questions. Answer **all** the questions. Marks are indicated in the right margin.

- Q1 a) Implement a function **updateBalance** that takes **four** parameters: an array of floats representing customer balances, an integer representing the customer's unique identifier (which is the index of the array), an integer representing the type of transaction (1 for withdrawal, 2 for deposit), and a float representing the transaction amount. The function should update the customer's balance based on the **transaction type**, ensuring that withdrawals do not result in a **negative balance**. [4]
- i) In the **main** function, **initialize** an array of floats to store the initial balances of **100 customers**. Take the initial balances from user as input.
 - ii) Take **three values**: an integer (customer identifier), an integer (transaction type), and a float (transaction amount) from user.
 - iii) Call the **updateBalance** function passing these values. If the transaction is a withdrawal and the withdrawal amount is exceeding the available balance then print "Not sufficient balance" and do not activate the withdrawal.
 - iv) If transaction is successful in step (iii), print the **updated balance** of the customer.

(b) Find the **output** of the following program (left). Notice the **local and global contexts**. [4]

```
#include <stdio.h>
int ara[5], x = 20;
void change(int p) {
    --p;
    p--;
}
void update(int n) {
    for(int i = n - 1; i >= 0; i--){
        ara[i] -= x;
        change(x);
    }
}
void main() {
    int n = 5;
    for(int i = 0; i < n; i++){
        ara[i] = (i + 5) * 2;
    }
    update(n);
    for(int i = 0; i < n; i++){
        printf("%d, ", ara[i]);
    }
}
```

C Code for 1(b)

```
#include <stdio.h>
#include <string.h>
int main(){
    char str1[50]="CSE is awesome";
    char str2[50]="I am a UIUian";

    int i=strlen(str1) * 0.5 - 2;

    for(int m=0; i+m<strlen(str1); m+=3){
        str1[i+m]=str2[m];
    }

    strcat(str1, str2);

    if(strcmp(str2, str1)>0){
        strcat(str1, "CSE is awesome.",6);
    }
    else{
        strcat(str2, "CSE is awesome.",6);
    }
    return 0;
}
```

C Code for 2(a)

- Q2 a) Show **manual tracing** (every change) of variables **i, m, str1, and str2** of the program above at right. [4]
- b) Write a **C program** that takes a string from the keyboard. The program will **count** (case **insensitively**) the number of different vowels and **display** the statistics as shown below. [4]

| Sample Input | Sample Output |
|---------------------------------|--|
| Owls fly high above the clouds. | A/a: 1 E/e: 2 I/i: 1 O/o: 3 U/u: 1 |

Q.3

Suppose you're developing a program for the **United International University (UIU) Bookshop** to manage customer purchases. Your task is to create a **C program** that can store, manage and manipulate the bookshop's **last 12 months' customer data**. As it is the end of the year, the bookshop is giving a **"best customer award"** to the customers who purchased the most in the past year. Write a C program that will:

1. Store the following information of a customer in a structure:
(i) Name (ii) ID (iii) Number of times shopped, and (iv) An array of spent money in each of the shoppings. Use **appropriate data types and variable names** for all the features.
2. Take input for **100 customers** from the user.
3. Calculate the **average purchase for each customer** (total money spent divided by the total number of shopping).
4. To find the **best customer**, only consider the customers who have shopped **more than 10 times**. Among these selected customers, the customer having the **best average purchase** (calculated from (3)) will win the award. Print the **customer's name** who has won the award.

[4]

Q.4 a) Write a C program that does the following:

- Declare an integer variable **num** and initialize it with any value.
- Declare a **pointer variable** and **assign** the address of **num** to it.
- Use the **pointer** to double the value of **num**.
- Print the value of **num** both before and after the modification.

b) Find the **output** of the code provided below on the left.

```
#include <stdio.h>
void modifyArray(int arr[], int
size){
    for (int i = 0; i < size; i++){
        arr[i] *= 2;
    }
}
void main() {
    int numbers[] = {1, 2, 3, 4, 5};
    int *ptr = numbers;
    modifyArray(ptr, 5);
    for(int i = 0; i < 5; i++){
        *(ptr+i) = *(ptr+i) + i;
        printf("%d ", *(ptr+i));
    }
}
```

C Code for 4(b)

```
#include <stdio.h>
void go(int num){
    printf("How are you?\n");
    if(num==0){
        return;
    }
    num /= 10;
    go(num);
    printf("I am fine\n");
}

int main(void){
    int num = 45633;
    go(num);
    return 0;
}
```

C Code for 5(a)

[4]

[4]

- Q.5 a) Write the **output** of the program provided above on the right.
- b) Write a C program that performs the following tasks:
- 1) Read the following **"in.txt"** file that has integer numbers on separate lines. Find the maximum value of those numbers.
 - 2) Create a new file **"out.txt"** and print the maximum number into the new file.
 - 3) Remember to **display appropriate messages** if the input or the output file couldn't be opened.

| in.txt |
|--------|
| 1 |
| 234 |
| 3 |
| 56 |
| .. |
| .. |
| 61 |
| 10 |