00419

STUDENT ID: .....

MACHINE NUMBER: .....

Sri Lanka Institute of Information Technology

B.Sc. Honours Degree in Information Technology

Specialized in Information Technology

Final Examination
Year 1, Semester 1 (2022)

IT1010–Introduction to Programming

Session 2

Duration: 3 Hours

December 2022

Instructions to Candidates:

- This paper has 4 questions. Attempt all four questions.
- The total marks for the paper is 100.
- This paper contains 7 pages, including the cover page.
- Save all the programs in the folder given in your desktop with the given file names.
- Include your IT number in all your programs.
- DO NOT TAKE THIS PAPER FROM THE EXAMINATION HALL

Question 1 [20 Marks]

Write a C program to input a 4 digit whole number from the keyboard. If the user enters an invalid number, ask the user to re-enter until he enters a valid number. Next separate the number into digits and find and display whether the number is a palindrom or not.

Sample output

```
Enter a four digit number : 234
Invalid number.
Enter a four digit number: 12345
Invalid number.
Enter a four digit number: 3993
It is a palindrome.
```

Save your program as Q1.c

Question 2 [30 Marks]

You are supposed to implement an application to count user rating about a product. Write a C program to do the following.

a)

i) Create an integer array called **userRating** of size 5.

ii) Allow the user to input any number of user ratings. User can terminate entering data when user enters -99. Rating values should be in the range of 1 to 5. Numbers not in the 1 to 5 range can be ignored.

iii) Store the count of each number in the array (e.g: how many 1s, how many 2s,….entered from the keyboard).

iv) Show the ratings as a histogram.

```
1    ***********
2    ********************
3    *********
4    ****************************
5    ******************
```

Save your program as Q2a.c

b) An image can be represented using a 2D array where each array element represents a gray scale value of a pixel.

i) Create a two dimensional integer array called **image** of size 4 x 4. Allow the user to enter values to the array.

User interface should be as follows:

Values for row1
Enter element 1 :
Enter element 2 :
Enter element 3 :
Enter element 4 :
Values for row2
Enter element 1 :
Enter element 2 :
Enter element 3 :
Enter element 4 :
.....

ii) Convert the gray scale image to a binary image by setting all the array elements above 55 to 1 and below 55 to 0 (zero).

iii) Display the two arrays.

e.g.

45	123	203	67
56	71	222	80
89	90	104	38
90	70	40	44

0	1	1	1
1	1	1	1
1	1	1	0
1	1	0	0

Save your program as Q2b.c

Question 3 [30 Marks]

Weekly allowed fuel quota and the price of the fuel for four vehicles types are given in the below table.

Vehicle type	Weekly allowed fuel quota (litres)	Fuel price (per litre)
1	5	Rs. 370.00
2	20	Rs. 370.00
3	20	Rs. 510.00
4	30	Rs. 370.00

Write a C program to calculate amount spent for fuel and the remaining fuel quota for the week by following the below instructions.

i) Write a function called `calcRemainingFuel()` to return the available fuel quota for the week. Vehicle type and the used fuel quota are the parameters of the function. (remaining fuel quota = allowed fuel quota – used fuel quota)

Function prototype is given below.

```
float calcRemainingFuel(int vehicleType, float
usedFuelQuota)
```

ii) Write another function called calcFuelCost( ) to return the amount spent on fuel for the week. (fuel cost = used fuel quota * price)

Function prototype is given below.

```
float calcFuelCost(int vehicleType, float
usedFuelQuota)
```

iii) Write a function called `dislayDetails()` to display the vehicle type, used fuel quota, remaining fuel quota and the weekly fuel cost according to below format.

```
Vehicle type   Quota used   Quota Remaining   Fuel Cost
------------   ----------   ---------------   ---------
```

Function prototype is given below

```
    void displayDetails(int vType, float usedFuelQuota, float
remainingQuota, float cost)
```

iv) In your main function,

a. Write two assert statements to test `calcRemainingFuel()` function.

b. Allow the user to enter the vehicle type and used fuel quota from the keyboard. Call function calcRemainingFuel() and calcFuelCost() in your main function. Display the vehicle type , quota used, remaning quota and the weekly fuel cost using displayDetails() function.

The program should allow the user to enter details for several vehicle types. Stop reading values from the keyboard when user enters -1 as the vehicle type.

Save your program as Q3.c

Question 4 [20 marks]

Write a C program to input the name and telephone numbers for 5 people and save the data in a file called "Directory.dat"

Sample output

Kishi	772912891
Rasika	768123406
Shini	774129656
Lalani	779834251
Taniya	776921643

In the same program, read a name from the user and display the phone number relevant to the name. If the name does not exists, display an error message. Assume that no duplicate names are in the directory.

Save your program as Q4.c

----------*End of Paper*----------

Grading Sheet

Question 1

Compile correctly	1.0
Execute correctly	
- Inputs	1.0
- Outputs	2.0
Validate the inputs	4.0
Digit separation	5.0
Determine a palindrome or not	5.0
Coding conventions	2.0

Question 2

Compile correctly	1.0
Execute correctly	
- 1D array - input	1.0
- 1D array - display	2.0
- 2D array - input	1.0
- 2D array - display	2.0
1D array	
- creation	1.0
- insert values	2.0
- functionality implementation	6.0
- Display array	1.0
2D array	
- creation	1.0
- insert values	3.0
- functionality implementation	5.0
- Display array	2.0
Coding conventions	2.0

Question 3

Compile correctly	1.0
Execute correctly	
- Inputs	1.0
- Outputs	2.0
Function implementation	
- calcRemainingFuel()	6.0
- calcFuelCost ()	5.0
- displayDetails()	4.0
Calling the function with correct arguments	
- calcRemainingFuel ()	1.0
- calcFuelCost ()	1.0
- displayDetails()	1.0
Entering values from keyboard	1.0
Entering multiple records	3.0
Assert statements	2.0
Coding Conventions	2.0

Question 4

Compile correctly	1.0
Execute correctly	
- Write data	1.0
- Outputs	2.0
File write	
- Open file for writing	1.0
- Take inputs from the keyboard	2.0
- Write to the file	2.0
- Handle multiple records	1.0
File Read	
- Open file for reading	1.0
- Read file as lines	2.0
- Search	3.0
- Handle multiple records	1.0
- Display output	1.0
Coding conventions	2.0