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 1

Duration: 3 Hours

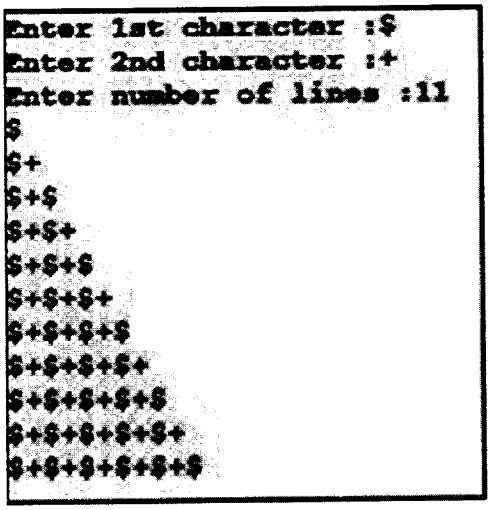
December 2022

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 given folder 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 any two characters and a number (number of lines) from the keyboard display a triangle as shown in below figure. The two characters should fill the triangle in every other place.



Save your program as Q1.c

Question 2 [30 Marks]

Implement a C program to do the following.

a)

i) Create an integer array called **numArr** of size 8 and allow the user to enter values from the keyboard.

ii) Display the array elements.

iii) Move all the elements in the array **n** positions to right. **n** can be any positive number greater than zero and but less than maximum size of the array.

iv) Display the new order of array elements.

Original Array:

5	2	8	1	6	2	4	7

If n= 2, after moving all the 2 positions to right

4	7	5	2	8	1	6	2

Save your program as Q2a.c

b) Identity matrix is a square matrix in which all the elements of the principle diagonal are ones and all other elements are zero.

e.g.
1 0 0 0
0 1 0 0
0 0 1 0
0 0 0 1

i) Create a two dimensional integer array called **identityArr** of size 4 x 4 and allow the user to enter values from the keyboard.

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) Display the contents of **identityArr** array and check whether it is an identity matrix or not and display an appropriate message.

Save your program as Q2b.c

Question 3 [30 Marks]

A bank has announced new fixed deposit interest rates for different fixed deposit types. The interest is paid annually and the bank deducts a 5% withholding tax on the interest. Write a C program to calculate the interest amount received after deducting the withholding tax by following the below instructions.

Types of fixed deposts available and their interest rates are given below.

Fixed Deposit Type	Description	Annual Interest rate
1	12 months FD	16.0 %
2	24 months FD	15.0 %
3	36 months FD	15.5 %
4	48 months FD	17.5%

i) Write a function called `calcInterest( )` to calculate and return the annual interest paid for the above fixed deposit types. Fixed deposit type and the deposit amount are the parameters of the function. (annual interest = deposit amount * Annual Interest rate)

Function prototype is given below

```
float calcInterest(int FDType,float depositAmount)
```

ii) The bank deducts a 5% withholding tax on the interest. Write a function called `calcTax()` to return the withholding tax amount when the annual interest is passed as a parameter.

Function prototype is given below

```
float calcTax(float annualInterest)
```

iii) Write a function called `dislayDetails()` to display the annual interest, withholding tax amount and the amount payable annually according to below format. (amount payable = annual interest – tax amount)

```
Annual Interest     Tax amount     Amount Payable
-------------------  -----------------  ----------------------
```

Function prototype is given below

```
void displayDetails(float interest, float taxAmount)
```

iv) In your main function,

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

b. Allow the user to enter the fixed deposit type and deposit amount from the keyboard. Call function `calcInterest()` and `calcTax()` in your main function. Display the interest, tax amount and amount payable using `displayDetails()` function. Display the given details accoring to the below format. Allow the user to enter several deposit types and amounts. Stop reading values from the keyboard when user enters -1 as the deposit type.

Fixed Deposit Type : .....
Deposit Amount : .....

Annual Interest	Tax amount	Amount Payable

Fixed Deposit Type : .....
Deposit Amount : .....

Annual Interest	Tax amount	Amount Payable

Save your program as Q3.c

Question 4 [20 Marks]

You are supposed to write a C program to automate the marking of student answers of a given class test. This test has 4 Multiple Choice Questions (MCQs). Your program should prompt the user to enter the student ID (ITXXXXXX) and answers of 4 questions (a number between 1 to 5) for five students and save in a text file called "answers.dat".

```
IT220102    1 4 2 5
IT221029    2 3 1 4
IT229010    1 3 2 4
IT228012    2 5 1 3
IT221229    1 4 2 3
```

If the correct answers are 1, 4, 2 and 3, display the student ID and number of correct answers for each student stored in the *answers.dat*

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
Printing correct number of lines	4.0
Filling triangle with characters	4.0
Filling tringle with correct pattern	6.0
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	1.0
- functionality implementation	6.0
- Display array	1.0
2D array	
- creation	1.0
- insert values	3.0
- functionality implementation	6.0
- Display array	2.0
Coding conventions	2.0

Question 3

Compile correctly	1.0
Execute correctly	
- Inputs	1.0
- Outputs	2.0
Function implementation	
- calcInterest()	5.0
- calcTax()	3.0
- displayDetails()	4.0
Calling the function with correct arguments	
- calcInterest()	2.0
- calcTax()	2.0
- displayDetails()	2.0
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
- Calculation	3.0
- Handle multiple records	1.0
- Display output	1.0
Coding conventions	2.0