IT110 Lab Assignment 3

Objective: by the end of this lab session, you should have reasonable understanding of the following:

I. If-else statements
II. Switch case statement
III. For loop
IV. while loop
V. do-while loop

Note:

i. Every program that you write should have an accompanying comment specifying what the program does.
ii. Before implementing a program, create a flowchart for that program in your notebook.
iii. Indent your code for better readability.
iv. Give meaningful names to the variables and functions.

Sample programs

**Switch – case –default**

```c
main( )
{
    int i = 2 ;
    switch ( i )
    {
        case 1 :
            printf ( "I am in case 1 \n" ) ;
            break ;
        case 2 :
            printf ( "I am in case 2 \n" ) ;
            break ;
        case 3 :
            printf ( "I am in case 3 \n" ) ;
```
break;
default:
    printf ("I am in default \n") ;
}
}

For loop

main( )
{
    int p, n, count ;
    float r, si ;
    for ( count=1; count <= 3, count=count+1)
    {
        printf ("\nEnter values of p, n and r ");
        scanf ("%d %d %f", &p, &n, &r );
        si = n * r / 100 ;
        printf ("Simple interest = Rs. %f", si ) ;
    }
}

While loop

main( )
{
    int p, n, count ;
    float r, si ;
    count =1;
    while ( count <= 3 )
{ 
    printf ( "\nEnter values of p, n and r " ) ;
    scanf ("%d %d %f", &p, &n, &r ) ;
    si = n * r / 100 ;
    printf ( "Simple interest = Rs. %f", si ) ;
    count = count + 1;
}

Do-while loop

main( )
{
    do
    {
        printf ( "Hello there \n") ;
    } while ( 4 < 1 ) ;
}
Assignment questions

1. Write a C program to calculate the roots of a quadratic equation. Assume the equation to be of the form $ax^2 + bx + c = 0$, Take float input values $a$, $b$ and $c$ from the user.

   *Expected Output* (depending on the discriminant, $b^2 - 4ac$):
   - Roots are distinct: Root1 and root2
   - Roots are imaginary: Root1 and Root2
   - Roots are equal: Root
   - No solution.

Some useful functions

<table>
<thead>
<tr>
<th>Function</th>
<th>Header file</th>
<th>Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>sqrt()</td>
<td>#include &lt;math.h&gt;</td>
<td><code>double result, value =4; result = sqrt(value); // result = 2.000000</code></td>
</tr>
<tr>
<td>pow()</td>
<td>#include &lt;math.h&gt;</td>
<td><code>double result, x=4, y=2; result = pow(x, y); // result = 16.000000</code></td>
</tr>
<tr>
<td>abs()</td>
<td>#include &lt;stdlib.h&gt;</td>
<td><code>int result, value= -4; result = abs(value); // result = 4</code></td>
</tr>
<tr>
<td>fabs()</td>
<td>#include &lt;math.h&gt;</td>
<td><code>float result, value = -2.1 result=fabs(value); //result =2.1</code></td>
</tr>
</tbody>
</table>

2. Write a program to input three sides of a triangle and check whether the triangle is equilateral, isosceles or scalene triangle (Equilateral: all three sides equal; isosceles: any two sides equal; scalene: all sides are of unequal length)

3. Write a C program to input any alphabet and check whether it is vowel or consonant. (Vowels are: a, e, i, o, u. Others are consonants)
4. Write a program to read any day number in integer and display day name in words. 
   Example : 4, Expected Output : Thursday

5. Write a program using switch-case-default statement to accept a grade and declare the equivalent description :

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>E or e</td>
<td>Excellent</td>
</tr>
<tr>
<td>V or v</td>
<td>Very Good</td>
</tr>
<tr>
<td>G or g</td>
<td>Good</td>
</tr>
<tr>
<td>A or a</td>
<td>Average</td>
</tr>
<tr>
<td>F or f</td>
<td>Fail</td>
</tr>
<tr>
<td>others</td>
<td>Invalid grade</td>
</tr>
</tbody>
</table>

6. Write a C program to check whether a number is even or odd using switch-case-default statement.

7. Write a C program to check whether a number is positive, negative or zero using switch case.

8. Write a Menu-Driven Program to compute the area of the following geometrical shapes:
   1. Circle
   2. Rectangle
   3. Square
   4. Semi-circle
   5. Triangle
(Use switch-case-default. Ask for user input as required. For instance, for circle $\rightarrow$ radius, rectangle $\rightarrow$ length and breadth, square $\rightarrow$ side, semi-circle $\rightarrow$ radius, triangle $\rightarrow$ length and breadth)

9. Write a menu driven program which has following options (use do-while loop):
   1. Sum of first n numbers
   2. Prime or not
   3. Odd or even
   4. Exit

<table>
<thead>
<tr>
<th>Function</th>
<th>Header file</th>
<th>Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exit ()</td>
<td>#include &lt;stdlib.h&gt;</td>
<td>exit();</td>
</tr>
<tr>
<td>This will terminate the program</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

10. Write a program to display the first 20 natural numbers using the while loop.

11. Write a program to display the first 15 natural numbers using the for loop.

12. Write a program to display even natural numbers between 21 and 80 not including 21 and 80. (Use for loop).

13. Write a program to input marks of 4 subjects of five students and display the sum and average of marks for each student using a while loop.

14. Write a program to display characters followed by their ASCII values from A to Z Using a for loop.
   Example
   A 65
   B 66

15. Write a program to display the multiplication table of a given integer.
   Example:
   15 x 1 = 15
   15  2 = 30

16. Write a program to calculate the factorial of a given number.
17. Write a program in C to display the n terms of harmonic series and their sum up to n terms (Use float datatype): 1 + 1/2 + 1/3 + 1/4 + 1/5 ... 1/n terms

18. Write a program to take a number as input from the user and write it in words. Example: 1234 → one two three four

19. Write a program in C to display any integer number in reverse order. Example: 560 → 65, 41907 → 70914

20. Write a program to take a number N between 0 and 27 from user and display the following pattern having N rows.
   A
   A B
   A B C
   A B C D
   A B C D E
   A B C D E F
   A B C D E F G

21. Write a program to print the Floyd's Triangle.

   1
   2  3
   4  5  6
   7  8  9  10
   11 12 13 14 15