IT110 Lab Assignment 2

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

I. if statement and if blocks
II. else statement and else blocks
III. if-else statements
IV. nested if-else statements
V. if-else ladder
VI. Relational operators: <, >, <=, >=, ==, !=
VII. Logical operators &&, ||, !
VIII. Conditional operators or ternary operators: ?: 

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

If statement

1. Sample program to print a statement when value of variable num is smaller than or equal to 10

```
#include <stdio.h>
void main( )
{
    int num ;
    printf ( "Enter a number less than 10" ) ;
    scanf ( "%d", &num ) ;
    if ( num <= 10 )
        printf ( "What an obedient servant you are !" ) ;
}
```
**If-else statement**

2. Program to print a statement when the value of variable num is smaller than or equal to 10 and to print another statement when the value of num is greater than 10

```c
#include <stdio.h>
void main( )
{
    int num;
    printf ( "Enter a number less than 10" ) ;
    scanf ( "%d", &num ) ;
    if ( num <= 10 )
        printf ( "What an obedient servant you are !" ) ;
    else
        printf ( "You are not so obedient !" ) ;
}
```

**If-else blocks**

3. Program to print multiple statements using if and else blocks

```c
#include <stdio.h>
void main( )
{
    int num;
    printf ( "Enter a number less than 10" ) ;
    scanf ( "%d", &num ) ;
    if ( num <= 10 )
    {
        printf ( "What an obedient servant you are !" ) ;
        printf(" You should continue to do that");
    }
    else
    {
        printf ( "You are not so obedient !" ) ;
        printf("You only go for big numbers");
    }
}
```
If-else ladder

The marks obtained by a student in 5 different subjects are input through the keyboard. The student gets a division as per the following rules:
Percentage above or equal to 60 - First division
Percentage between 50 and 59 - Second division
Percentage between 40 and 49 - Third division
Percentage less than 40 - Fail
Write a program to calculate the division obtained by the student.

```c
main()
{
    int m1, m2, m3, m4, m5, per;
    per = ( m1 + m2 + m3 + m4 + m5 ) / per;
    if ( per >= 60 )
        printf ( "First division" ) ;
    else if ( per >= 50 )
        printf ( "Second division" ) ;
            else if ( per >= 40 )
                printf ( "Third division" ) ;
                else
                    printf ( "fail" ) ;
}
```

Nested if-else

```c
if ( condition )
    do this ;
else
{
    if ( condition )
        do this ;
    else
    {
        do this ;
        and this ;
    }
}
```

```c
if ( condition )
{
    if ( condition )
        do this ;
    else
    {
        do this ;
        and this ;
    }
}
else
    do this ;
```
**Assignment questions**

1. Take two integer numbers (x and y) as input from the user
   a. If x is greater than y, print “x is greater than y”
   b. If x is smaller than y, print “x is smaller than y”
   c. If x is equal to y, print “x is equal to y”
   d. If x is not equal to y, print “x is not equal to y”
   
   Hint: use relational operators
   
   Example: Input : x = 5, y=100
   
   Output: 5 is smaller than 100
   
   5 is not equal to 100

2. Take three integer numbers as input from the user (x, y, z)
   a. If x is greater than z and y is greater than z, print the sum of x and y
   b. If x is greater than z or y is greater than z, print the value of x multiplied by y
   c. If sum of x and y is greater than z and difference of x and y is negative, print the value of x mod y.
   d. If both x and y are positive or all x, y and z are negative, print sum of squares of x, y and z
   
   Hint: use relational and logical operators

3. For each of the following code snippets, write your expected output in your notebook and the output after running the following C code

```c
#include <stdio.h>

void main()
{
    int flag = 0;
    float FLAG = 2.5;
    // This is a comment. Replace it with the if statements in the table
}
```

<table>
<thead>
<tr>
<th>Expression</th>
<th>Expected output</th>
<th>Result</th>
</tr>
</thead>
</table>
| a. if (flag)  
  print(“India”);  
  else  
  print (“World”); | | |
| b. if (!flag)  
  print (“India”) | | |
<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>else</td>
<td>print (&quot;World&quot;);</td>
</tr>
<tr>
<td>c.</td>
<td>if (!flag + 2)</td>
<td>print (&quot;India&quot;);</td>
</tr>
<tr>
<td></td>
<td>else</td>
<td>print (&quot;World&quot;);</td>
</tr>
<tr>
<td>d.</td>
<td>if (!(flag + 2))</td>
<td>print (&quot;India&quot;);</td>
</tr>
<tr>
<td></td>
<td>else</td>
<td>print (&quot;World&quot;);</td>
</tr>
<tr>
<td>e.</td>
<td>if (!flag - 2)</td>
<td>print (&quot;India&quot;);</td>
</tr>
<tr>
<td></td>
<td>else</td>
<td>print (&quot;World&quot;);</td>
</tr>
<tr>
<td>f.</td>
<td>if (!(flag - 2))</td>
<td>print (&quot;India&quot;);</td>
</tr>
<tr>
<td></td>
<td>else</td>
<td>print (&quot;World&quot;);</td>
</tr>
<tr>
<td>g.</td>
<td>if (1)</td>
<td>print (&quot;India&quot;);</td>
</tr>
<tr>
<td></td>
<td>else</td>
<td>print (&quot;World&quot;);</td>
</tr>
<tr>
<td>h.</td>
<td>if (FLAG)</td>
<td>print(&quot;India&quot;);</td>
</tr>
<tr>
<td></td>
<td>else</td>
<td>print (&quot;World&quot;);</td>
</tr>
<tr>
<td>i.</td>
<td>if (FLAG*flag)</td>
<td>print(&quot;India&quot;);</td>
</tr>
<tr>
<td></td>
<td>else</td>
<td>print (&quot;World&quot;);</td>
</tr>
<tr>
<td>j.</td>
<td>if (FLAG = 1.5)</td>
<td>print(&quot;India&quot;);</td>
</tr>
<tr>
<td></td>
<td>else</td>
<td>print (&quot;World&quot;);</td>
</tr>
<tr>
<td>k.</td>
<td>if (flag==FLAG ==1)</td>
<td>print(&quot;India&quot;);</td>
</tr>
<tr>
<td></td>
<td>else</td>
<td>print (&quot;World&quot;);</td>
</tr>
</tbody>
</table>
4. Take two integer numbers (x and y) from the user. If x is a multiple of y (example 6 is a multiple of 3 but 8 is not a multiple of 3), double the values of x and y and print the new values else half the values of x and y and print them. Hint: use modulus operator and if-else blocks.

5. Take an integer as input through the keyboard. Write a program to find out and print whether it is an odd number or even number using if-else statement. Hint: use modulus operator.

6. If the cost price and selling price of an item are input through a keyboard, write a program to determine whether the seller has made profit or incurred loss.

7. Given the length and breadth of a rectangle, write a program to find whether the area of the rectangle is greater than its perimeter. For example, the area of the rectangle with length = 5 and breadth = 4 is greater than its perimeter.

8. Given the coordinates (x,y) of a center of a circle and its radius, write a program which will determine whether a point lies inside the circle, on the circle or outside the circle.

9. Take an integer as input through the keyboard. Write a program to find out and print whether it is an odd number or even number using the conditional operator. (Hint: condition ? expression1 : expression2).

10. Write a program using if-else statement to determine whether a year entered through the keyboard is a leap year or not. Hint: A leap year is divisible by 4 and if a year is divisible by 100 it should also be divisible by 400. Example: the years 1600, 2000 and 2400 are leap years, while 1700, 1800, 1900, 2100, 2200 and 2300 are not leap years.

11. If the ages of Ram, Shyam and Ajay are input through the keyboard, write a program to determine the youngest of the three.

12. A character is entered through the keyboard, write a program to determine whether the character entered is a capital letter, a small case letter, a digit or a special symbol. The following table shows the range of ASCII values for
various characters. (ASCII stands for American standard code for information interchange)

<table>
<thead>
<tr>
<th>Characters</th>
<th>ASCII values</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-Z</td>
<td>65-90</td>
</tr>
<tr>
<td>a-z</td>
<td>97-122</td>
</tr>
<tr>
<td>0-9</td>
<td>48-57</td>
</tr>
<tr>
<td>Special symbols</td>
<td>0 - 47, 58 - 64, 91 - 96, 123 - 127</td>
</tr>
</tbody>
</table>

Hint: ASCII values of characters can also be compared using relational operators. Example: assume a character ch

```c
if (ch >= 65 && ch <= 90)
    printf("%c is a capital letter", ch);
```

13. A certain grade of steel is graded according to the following conditions:
   (i) Hardness must be greater than 50
   (ii) Carbon content must be less than 0.7
   (iii) Tensile strength must be greater than 5600
   The grades are as follows:
   Grade is 10 if all three conditions are met
   Grade is 9 if conditions (i) and (ii) are met
   Grade is 8 if conditions (ii) and (iii) are met
   Grade is 7 if conditions (i) and (iii) are met
   Grade is 6 if only one condition is met
   Grade is 5 if none of the conditions are met
   Write a program, which will require the user to give values of hardness, carbon content and tensile strength of the steel under consideration and output the grade of the steel.

14. A company insures its drivers in the following cases:
   − If the driver is married.
   − If the driver is unmarried, male & above 30 years of age.
   − If the driver is unmarried, female & above 25 years of age.
   In all other cases the driver is not insured. If the marital status, sex and age of the driver are the inputs, write a program to determine whether the driver is to be insured or not.