

# CHAPTER 4

## FLOW OF CONTROL

### Learning Objective:

*After Having Studied this Chapter, You will be able to Understand : -*

- *The Control Flow-Sequence, Selection and Iteration.*
- *If el if in Python.*
- *For Range*

### 4.1 THE FLOW CONTROL

Control Structure refers to the program segment which controls the flow of program execution. In any programming language, there are 3 control structures: **Sequence**, **Selection** and **Iteration**.

#### 4.1.1 SEQUENCE

**Sequence** refers to the execution when statements are executed one after another. This construct specifies the normal flow of control in a program in which all the statements are executed as they appear. This represents the default flow of execution. So far whichever lines of coding you have written represent sequence flow of control.

#### 4.1.2 SELECTION

**Selection** refers to execution of a set of statement depending on a condition. If condition is true, one set of statements is executed otherwise another set of statement will be executed. This control structure is controlled by conditional statement or decision construct as it helps in making decision on a course of action.

#### 4.1.3 ITERATION

**Iteration** refers to repeated execution of a set of statement depending on a condition. Till the time a particular condition is true, a set of statements are repeated again and again. As soon as the condition becomes False, the repetition stops. Iterative control structure is controlled by looping statement.

### 4.2 THE IF AND ELIF STATEMENT

Often, you need to execute some statements only if some condition holds, or choose statements to execute depending on several mutually exclusive conditions. The Python compound statement `if`, which uses `if`, `elif`, and `else` clauses, lets you conditionally execute blocks of statements. Here's the syntax for the `if` statement:

```
if expression:
    statement(s)
elif expression:
    statement(s)
elif expression:
    statement(s)
...
else:
    statement(s)
```

The elif and else clauses are optional. Note that unlike some languages, Python does not have a switch statement, so you must use if, elif, and else for all conditional processing.

### 4.3 PYTHON NESTED IF STATEMENTS

We can have a if...elif...else statement inside another if...elif...else statement. This is called nesting in computer programming.

Any number of these statements can be nested inside one another. Indentation is the only way to figure out the level of nesting. This can get confusing, so must be avoided if we can.

```
# In this program, we input a number and check if the number is
# positive or negative or zero and display an appropriate message using
# nested if.

num = float(input("Enter a number: "))
if num >= 0:
    if num == 0:
```

```
        print("Zero")
    else:
        print("Positive number")
else:
    print("Negative number")
```

#### **4.4 SOLVED PROGRAMS USING IF ELIF**

**1. WAPS (Write a python script) to accept a number and check if it is positive or negative.**

**Solution:**

```
a=int(input("enter a number"))
if a>0:
    print(a,"is positive")
else:
    print(a,"is negative")
```

**2. WAPS (Write a python script) to accept a number and check if it is positive negative or zero.**

**Solution:**

```
a=float(input("enter a number "))
if a>0:
    print("it is positive")
elif a<0:
    print("it is negative")
else:
    print("the number is 0")
```

**3. WAPS (Write a Python Script) to accept the Physics, Chemistry and Mathematics and Computer marks of a student. Calculate percentage. (Assume marks are out of 100.)**

display the remarks accordingly.

Percentage	Grade
> 90	Outstanding
81 to 90	High Achiever
71 to 80	Good
< 70	Average

**Solution:**

```
a=int(input("Please enter the maths marks"))
b=int(input("Please enter the chemistry marks"))
c=int(input("Please enter the physics marks"))
d=int(input("Please enter the computers marks"))
```

```
av=(a+b+c+d)/4
```

```
if av>90:
```

```
    print("Outstanding")
```

```
elif av>80 and av<=90:
```

```
    print("High Achiever")
```

```
elif av>70 and av<=80:
```

```
    print("Good")
```

```
else:
```

```
    print("Average")
```

#### **4.5 UNSOLVED PROGRAMS USING IF ELIF**

1. Write a program to check if the number entered is even or odd.
2. Write a program to print the square if the number entered is even, otherwise print its cube.
3. Accept a day(Sunday, Monday..)If the entered day is Saturday or Sunday display "Holiday" otherwise "Working day"
4. Write a program to accept the 2 sides of a rectangle and display if its area is greater than its perimeter.
5. Write a program to print the largest of three numbers.
6. Write the code to accept three marks and find the sum of best two.
7. WAP check whether entered char is a vowel or consonant.
8. Welcome shop deals in purses and belts.WAPS to accept item and amount from the user and calculate total amount to be paid. GST is added according to the below table.

Item	GST rate
BELT<=500	5%
BELT>500	18%
PURSE<=1000	5%
PURSE>1000	12%

## 4.6 FOR LOOP IN PYTHON

**For loop in python is used to repeat certain statements in Python.**

A **for** loop is used for iterating over a sequence.

Let's understand For Loop with the help of an example.

```
for x in range(0,6):
```

```
    print(x)
```

output will be

0

1

2

3

4

5

Notice that 6 is not included in the list.

The above loop will be processed as follows.

- a) First the loop variable which is x, is given the initial value of the list, i.e., 0 and the statements in the body of the loop will be executed. Hence 0 will be printed.
- b) Then the loop variable will be assigned the next the value in the list, i.e., 1 and the statements in the body of the loop will be executed. Hence 1 will be printed. This above procedure will repeat for 2, 3, 4 and 5.
- c) When the value of x becomes 6, the loop ends and hence 6 is not printed.

## 4.7 FOR RANGE-SOME SOLVED EXAMPLES

<b>1. WAPS to print “Computer Science” 4 times.</b>	
<b>Solution:</b> <pre>for a in range(1,5):     print("Computer Science")</pre>	<b>Output</b> Computer Science Computer Science Computer Science Computer Science
<b>2. WAPS to print first 5 natural numbers.</b>	
<b>Solution:</b> <pre>for a in range(1,6):     print(a)</pre>	<b>Output</b> 1 2 3 4 5
<b>3. WAPS to print numbers between 6 and 10.</b>	
<b>Solution:</b> <pre>for a in range(6,11):</pre>	<b>Output</b> 6 7

<code>print(a)</code>	8 9 10
<b>4. WAPS to print odd numbers between 1 and n.(include n)</b>	
<b>Solution:</b>  <code>n=int(input("enter the value of n : "))</code> <code>for i in range(1,n+1,2):</code> <code>    print(i)</code>	<b>Output</b>  enter the value of n : 5  1 3 5
<b>5. WAPS to print even numbers between 1 and n.(include n)</b>	
<b>Solution:</b>  <code>n=int(input("enter the value of n : "))</code> <code>for i in range(2,n+1,2):</code> <code>    print(i)</code>	<b>Output</b>  enter the value of n : 5  2 4

#### 4.25 SOLVED QUESTIONS

1. Give the looping statement to generate the following series.

1, 9, 25, 49, 81

**Ans** for i in range (1,11):

`print(i*i,end=' ')`

2. Give the looping statement to generate the following series.

1,4,7,3,12,21.....15 terms

**Ans** a,b,c=1,4,7

```
for i in range (1,6):  
    print(a, b, c,end=' ')  
    a=a*3  
    b=b*3  
    c=c*3
```

7. for i in range(100,29,-10):

```
    print(i,end=' ')  
  
print(i)
```

Ans 100 90 80 70 60 50 40 30 30

11 Correct the errors in the following code. Underline each correction.

```
w = "Raining"  
if w = "sunny" :  
    print("Wear Sun Block")  
elif w= "snow":  
    print("Going Skiing")
```



```
else:  
    print(Weather)
```

Ans    w = "Raining"

```
if w == "sunny" :  
    print("Wear Sun Block")  
  
elif w== "snow":  
    print("Going Skiing")  
  
else:  
    print("Weather")
```

13    Write the output of the following code:

```
v=5  
if(v+5==11):  
    print((v+5==11)+1)  
else:  
    print((v+5==11)+2)  
print(v+5<=10)
```

Ans    2

True

17.    Give the output

```
x=30
if x>30:
    print("hi")
elif x>20:
    print("hello")
print("bye")
```

Ans Hello

bye

### **Try these Questions**

1. What is the output produced by the following code?

```
x=1
if x>3:
    if x>4:
        print ("A", end=' ')
    else:
        print ("B", end=' ')
elif x<2:
    if(x!=0):
        print ("C", end=' ')
print ("D")
```

2. **What is the following code doing? What would it print for input as 3?**

```
n=int (input("Enter an integer:"))  
  
if n<1:  
    print("invalid value")  
  
else:  
    for i in range(1, n+1):  
        print(i*i)
```

UNSOLVED  
Questions –  
FOR LOOP

1. **Write a short program to print the following series:**

- i. 1 4 7 10 ..... 40
- ii. 1 -4 7 -10 ..... -40

2. Write a program to input 3 sides of a triangle and print whether it is an equilateral, scalene or isosceles triangle.
3. Write a short program to find largest number of a list of numbers entered through keyboard.
4. Write a program to input N numbers and then print the second largest number.
5. Write Python programs to sum the given sentences:

- a)  $2/9 - 5/3 + 8/17 \dots\dots\dots$  (print 7 terms)
- b)  $1^2 + 3^2 + 5^2 + \dots\dots\dots + n^2$  (input n)

