

## Unit II: Computational Thinking and Programming - I

- Flow of Control: introduction, use of indentation, sequential flow, conditional and iterative flow
- Conditional statements: if, if-else, if-elif-else, flowcharts, simple programs: e.g.: absolute value, sort 3 numbers and divisibility of a number.
- Iterative Statement: for loop, range(), while loop, flowcharts, break and continue statements, nested loops, suggested programs: generating pattern, summation of series, finding the factorial of a positive number, etc.

### Main point

- The **order of execution** of the statements in a program is known as **flow of control**
- Python supports **two** types of **control structures**—selection and repetition

### Selection

- A **decision** involves **selecting one** of the **two or more** possible options
- Selection is **implemented with** the help of **if..else** statement
- The syntax of if statement is:  
if **condition**:  
    statement(s)
- If the **condition** is **true**, then the indented **statement(s)** are **executed**
- **if..else** statement **allows** us to write **two alternative paths** and the control **condition** determines which path gets executed.
- The syntax for if..else statement is as follows.  
if condition:  
    statement(s)  
else:  
    statement(s)
- if..elif (elif means else..if) help to **check multiple conditions** that leads to **many alternative paths**
- an **if..else** condition **within** the **if /else / elif block** is called **nested if**.

### Indentation

- **Leading whitespace** (spaces and tabs) at the **beginning of a statement** is called indentation
- Python **uses** indentation **for block** as well as **for nested block** structures
- The interpreter **checks indentation** levels very strictly and **throws up syntax errors if** indentation is **not correct**

### Repetition

- **Repeat a task** again and again. This kind of **repetition is** also called **iteration**.
- **Repetition** of a set of statements **is done** by **using looping constructs**.

- The **statements in a loop** are **executed again and again** as long as particular logical condition remains true. When the **condition** becomes **false**, the **loop terminates**.
- **Condition** eventually does become **false** so that it does not become an infinite loop
- There are **two looping constructs** in Python - **for and while**.

### The 'For' Loop

- **for** statement is used to **iterate over a range** of values **or a sequence**.
- for loop is **executed for each** of the **items in** the **sequence or** in the **range**.
- Syntax of the for Loop for sequence  
**for** <control-variable> **in** <sequence/items in range>:  
     <statements inside body of the loop>
- The range() Function
- The **range()** is a **built-in function** in Python. Syntax of range() function is:  
**range([start], stop[, step])**  
 All **parameters** of range() function must be **integers**, **step cannot** be equal to **zero**
- **range()** function **create a sequence** of integers **from** the given **start** value **upto stop value (excluding stop value)**, with a **difference of** the given **step** value

The **default** value of **start** is **0**, if start is not specified

The **default** value of **step** is **1**, if step is not specified

### The 'While' Loop

- The while statement **executes** a block of **code repeatedly** as long as the control **condition** of the loop **is true**
- If the **condition** of the while loop **is initially false**, the body is **not** executed **even once**

### Break Statement

- The break statement alters the normal flow of execution
- It terminates the current loop and resumes execution of the statement following loop

### Continue Statement

When a **continue** statement is encountered, the **control skips** the execution of **remaining statements** inside the body of the loop **for the current iteration** jumps to the **beginning** of the loop for the **next iteration**

### Nested Loops

A **loop** may **contain** another loop **inside** it. A **loop inside** another **loop** is called a **nested loop**.

### Question based on flow of control

2023

1. Ravi, a Python programmer, is working on a project in which he wants to write a function to count the number of even and odd values in the list. He has written the following code but his code is having errors. Rewrite the correct code and underline the corrections made.

| GIVEN CODE                                                                                                                            | AFTER CORRECTION |
|---------------------------------------------------------------------------------------------------------------------------------------|------------------|
| <pre>def max_num (L) :<br/>    max=L(0)<br/>    for a in L :<br/>        if a &gt; max<br/>            max=a<br/>    return max</pre> |                  |

2023-main

19. Atharva is a Python programmer working on a program to find and return the maximum value from the list. The code written below has syntactical errors. Rewrite the correct code and underline the corrections made.

| GIVEN CODE                                                                                                                                                                                                              | AFTER CORRECTION |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|
| <pre>define EOCOUNT(L) :<br/>    even_no=odd_no=0<br/>    for i in range(0,len(L))<br/>        if L[i]%2=0:<br/>            even_no+=1<br/>        Else:<br/>            odd_no+=1<br/>    print(even_no, odd_no)</pre> |                  |

2021-comp

1. Rewrite the following code in Python after removing all syntax error(s) : 2  
Underline each correction done in the code.

| GIVEN CODE                                                                                                                                    | AFTER CORRECTION |
|-----------------------------------------------------------------------------------------------------------------------------------------------|------------------|
| <pre>Runs = ( 10, 5, 0, 2, 4, 3 )<br/>for I in Runs:<br/>    if I=0:<br/>        print (Maiden Over)<br/>else<br/>    print(Not Maiden)</pre> |                  |

2020-comp

1. Rewrite the following code in Python after removing all syntax error(s). Underline each correction done in the code.

| GIVEN CODE                                                                                                  | AFTER CORRECTION |
|-------------------------------------------------------------------------------------------------------------|------------------|
| <pre>input('Enter a word',W)<br/>if W = 'Hello'<br/>    print('Ok')<br/>else:<br/>    print('Not Ok')</pre> |                  |

2. Write the output of the following Python code :

| GIVEN CODE                                            | Output |
|-------------------------------------------------------|--------|
| <pre>for i in range(2,7,2):     print(i * '\$')</pre> |        |

2019

1. Rewrite the following code in python after removing all syntax error(s). Underline each correction done in the code.

| GIVEN CODE                                                                                                                                                                    | AFTER CORRECTION |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|
| <pre>250 = Number WHILE Number&lt;=1000:     if Number=&gt;750:         print Number         Number=Number+100     else         print Number*2         Number=Number+50</pre> |                  |

2019-

1. Rewrite the following code in Python after removing all syntax error(s). Underline each correction done in the code.

| GIVEN CODE:- a                                                                                           | AFTER CORRECTION |
|----------------------------------------------------------------------------------------------------------|------------------|
| <pre>25=Val for I in the range(0,Val)     if I%2==0:         print I+1     Else:         print I-1</pre> |                  |

2. Write a Python method/function Count(Start,End,Step) to display natural numbers from Start. End in equal intervals of Step For example : If the values of Start as 14, End as 35 and Step as 6 The method should be displayed as

| Given output           | code |
|------------------------|------|
| <pre>14 20 26 32</pre> |      |

2018 -comp

1. Write definition of a Method COUNTNOW(PLACES) to find and display those place names, in which there are more than 5 characters.

For example:

If the list PLACES contains ["DELHI","LONDON","PARIS","NEW YORK","DUBAI"]

| The following should get displayed | code |
|------------------------------------|------|
| <pre>LONDON NEW YORK</pre>         |      |

|  |  |
|--|--|
|  |  |
|--|--|

2. Rewrite the following code in python after removing all syntax error(s). Underline each correction done in the code.

| GIVEN CODE                                                                                                                                                    | AFTER CORRECTION |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|
| <pre> Num = int(rawinput("Number:")) Sum = 0 for i in range(10,Num,3)     Sum+=i     if i%2=0:         print i*2     Else:         print i*3 print Sum </pre> |                  |

Note:- in old versions print without () allowed but now it will give following error  
SyntaxError: Missing parentheses in call to 'print'

2017

1. Rewrite the following code in python after removing all syntax error(s). Underline each correction done in the code.

| GIVEN CODE                                                                                   | AFTER CORRECTION |
|----------------------------------------------------------------------------------------------|------------------|
| <pre> STRING=""WELCOME NOTE"" for S in range[0,8]:     print STRING(S) print S+STRING </pre> |                  |

2016

1. Rewrite the following code in python after removing all syntax error(s). Underline each correction done in the code.

| GIVEN CODE                                                                             | AFTER CORRECTION |
|----------------------------------------------------------------------------------------|------------------|
| <pre> for Name in [Amar, Shveta, Parag]     IF Name[0]='S':         print(Name) </pre> |                  |

2015

1. Rewrite the following code in python after removing all syntax error(s). Underline each correction done in the code.

| GIVEN CODE                                                                                                                                                 | AFTER CORRECTION |
|------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|
| <pre> def Sum(Count) #Method to find sum     S=0     for I in Range(1,Count+1):         S+=I     RETURN S  print Sum[2] #Function Call print Sum[5] </pre> |                  |

2. Find and write the output of the following python code :

| Given code                                                                                                                                                     | output |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|
| <pre>for Name in ['John', 'Garima', 'Seema', 'Karan']:     print Name     if Name[0]== 'S':         break else :     print 'Completed!' print 'Weldone!'</pre> |        |

SQP-2024

1. State True or False:

“In a Python program, if a break statement is given in a nested loop, it terminates the execution of all loops in one go.”

Ans:-

2. The code given below accepts a number as an argument and returns the reverse number. Observe the following code carefully and rewrite it after removing all syntax and logical errors. Underline all the corrections made.

| GIVEN CODE                                                                                                                                                                                      | AFTER CORRECTION |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|
| <pre>def revNumber(num):     rev = 0     rem = 0     While num &gt; 0:         rem ==num %10         rev = rev*10 + rem         num = num//10         return rev print (revNumber (1234))</pre> |                  |

SQP -2023

1. Rao has written a code to input a number and check whether it is prime or not. His code is having errors. Rewrite the correct code and underline the corrections made.

| GIVEN CODE                                                                                                                                                                                                                                | AFTER CORRECTION |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|
| <pre>def prime():     n=int(input("Enter number to check :: "))     for i in range (2, n//2):         if n%i=0:             print("Number is not prime \n")             break         else:             print("Number is prime \n')</pre> |                  |

SQP-2022

1. Identify the output of the following Python statements.

```
x = 2
```

```
while x < 9:
```

```
    print(x, end="")
```

```
    x = x + 1
```

a. 12345678      b. 123456789      c. 2345678      d. 23456789

Ans:-

2. Identify the output of the following Python statements.

```
b = 1
```

```
for a in range(1, 10, 2):
```

```
    b += a + 2
```

```
print(b)
```

a. 31      b. 33      c. 36      d. 39

Ans:-

SQP-2021

1. Rewrite the following code in Python after removing all syntax error(s). Underline each correction done in the code.

| GIVEN CODE                                                                                                                                                     | AFTER CORRECTION |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|
| <pre>Value=30 for VAL in range(0,Value)     If val%4==0:         print (VAL*4)     Elseif val%5==0:         print (VAL+3)     else         print(VAL+10)</pre> |                  |

SQP-2020

1. Rewrite the following code in python after removing all syntax error(s).

Underline each correction done in the code.

| GIVEN CODE                                                                                             | AFTER CORRECTION |
|--------------------------------------------------------------------------------------------------------|------------------|
| <pre>30=To for K in range(0,To)     IF k%4==0:         print (K*4)     Else:         print (K+3)</pre> |                  |

