

## **EX-1: STRUCTURED PROGRAMMING**

### **QUESTION 1:**

**AIM:** To print the numbers divisible by 8 and are multiples of 5 between 1000 and 2000.

### **CODE:**

```
num=[]  
for i in range(1000, 2000):  
    if (i%8==0) and (i%5==0):  
        num.append(str(i))  
print(','.join(num))
```

### **OUTPUT:**

1000,1040,1080,1120,1160,1200,1240,1280,1320,1360,1400,1440,1480,1520,1560,  
1600,1640,1680,1720,1760,1800,1840,1880,1920,1960

### **RESULT:**

Thus, the given program is executed successfully.

### **QUESTION 2:**

**AIM:** Python program to guess a number between 1 to 9 taking input from the user.

### **CODE:**

```
import random  
t_num, g_num = random.randint(1, 10), 0  
while t_num != g_num:  
    g_num = int(input('Guess a number between 1 and 10 until you get it right : '))  
print('Well guessed!')
```

### **OUTPUT:**

Guess a number between 1 and 10 until you get it right : 5  
Well guessed!

### **RESULT:**

Thus, the given program is executed successfully.

**QUESTION 3:**

**AIM:** To construct the following pattern, using a nested for loop.

**CODE:**

```
n=5
for i in range(n):
    for j in range(i):
        print('*', end=" ")
    print("")
    for i in range(n,0,-1):
        for j in range(i):
            print('*', end=" ")
        print("")
```

**OUTPUT:**

```
*
* *
* * *
* * * *
* * * * *
* * * * *
* * * *
* * *
* *
*
```

**RESULT:**

Thus, the given program is executed successfully

**QUESTION 4:**

**AIM:** To write a program that accepts a word from the user and reverse it.

**CODE:**

```
w = input("Input a word to reverse: ")
for c in range(len(w) - 1, -1, -1):
```

```
print(w[c], end="")
```

```
print("\n")
```

**OUTPUT:**

**Input a word to reverse: python**

**nohtyp**

**RESULT:**

Thus, the given program is executed successfully.

**QUESTION 5:**

**AIM:** To write a program which takes two digits m (row) and n (column) as input and generates a two-dimensional array.

**CODE:**

```
r= int(input("Input number of rows: "))
c= int(input("Input number of columns: "))
mult = [[0 for col in range(col_num)] for row in range(row_num)]
for row in range(r):
for col in range(c):
mult[row][col]= row*col
print(mult)
```

**OUTPUT:**

Test Data : Rows = 3, Columns = 4

Expected Result : [[0, 0, 0, 0], [0, 1, 2, 3], [0, 2, 4, 6]]

**RESULT:**

Thus, the given program is executed successfully.

**QUESTION 6:**

**AIM:** To write a program that accepts a string and calculates the number of digits and letters.

**CODE:**

```
s = input("Input a string")
d=l=0
```

```
for c in s:
    if c.isdigit():
        d=d+1
    elif c.isalpha():
        l=l+1
    else:
        pass
print("Letters", l)
print("Digits", d)
```

**OUTPUT:**

Sample Data: LETTERS 20

Letters 7

Digits 2

**RESULT:**

Thus, the given program is executed successfully.

**QUESTION 7:**

**AIM:** To check the validity of password input by users.

**CODE:**

```
import re
p= input("Input your password")
x = True
while x:
    if (len(p)<6 or len(p)>12):
        break
    elif not re.search("[a-z]",p):
        break
    elif not re.search("[0-9]",p):
        break
    elif not re.search("[A-Z]",p):
```

```

break
elif not re.search("[$#@]",p):
break
elif re.search("\s",p):
break
else:
print("Valid Password")
x=False
break
if x:
print("Not a Valid Password")

```

### **OUTPUT:**

Input your password srmist@2017

Not a Valid Password

Input your password Srmist@2022

Valid Password

### **RESULT:**

Thus, the given program is executed successfully.

### **QUESTION 8:**

**AIM:** To write a Python program to find numbers between 100 and 400 (both included) where each digit of a number is an even number.

### **CODE:**

```

items = []
for i in range(100, 401):
s = str(i)
if (int(s[0])%2==0) and (int(s[1])%2==0) and (int(s[2])%2==0):
items.append(s)
print( " ".join(items))

```

### **OUTPUT:**

200,202,204,206,208,220,222,224,226,228,240,242,244,246,248,260,262,264,266,268,280,282,284,286, 288,400

**RESULT:**

Thus, the given program is executed successfully.

**QUESTION 9:**

**AIM:** To convert month name to a number of days.

**CODE:**

```
print("List of months: January, February, March, April, May, June, July, August,
September, October, November, December")
month_name = input("Input the name of Month: ")
if month_name == "February":
    print("No. of days: 28/29 days")
elif month_name in ("April", "June", "September", "November"):
    print("No. of days: 30 days")
elif month_name in ("January", "March", "May", "July", "August", "October",
"December"):
    print("No. of days: 31 day")
else:
    print("Wrong month name")
```

**OUTPUT:**

```
List of months: January, February, March, April, May, June, July, August,
September, October, November, December
Input the name of Month: May
No. of days: 31 days
```

**RESULT:**

Thus, the given program is executed successfully.

**QUESTION 10:**

**AIM:** To write a Python program to sum of two given integers. However, if the sum is between 105 to 200 it will return 200.

**CODE:**

```
def sum(x, y):
```

```
sum = x + y
if sum in range(105, 200):
    return 200
else:
    return sum
print(sum(10, 6))
print(sum(10, 2))
print(sum(10, 12))
```

**OUTPUT:**

```
20
12
22
```

**RESULT:**

Thus, the given program is executed successfully.

**QUESTION 11:**

**AIM:** To construct the given pattern, using a nested loop number.

**CODE:**

```
for i in range(10):
    print(str(i) * i)
```

**OUTPUT:**

```
999999999
88888888
7777777
666666
55555
4444
333
22
1
```

**RESULT:**

Thus, the given program is executed successfully.

**QUESTION 12:**

**AIM:** To create a histogram from a given list of integers.

**CODE:**

```
def histogram( items ):
```

```
    for n in items:
```

```
        output = "
```

```
        times = n
```

```
        while( times > 0 ):
```

```
            output += '*'
```

```
            times = times - 1
```

```
        print(output)
```

```
    histogram([2, 3, 6, 5])
```

**OUTPUT:**

```
**
```

```
***
```

```
*****
```

```
*****
```

**RESULT:**

Thus, the given program is executed successfully

**QUESTION 13:**

**AIM:** To write a Python program that will return true if the two given integer values are equal or their sum or difference is 5.

**CODE:**

```
def test_number5(x, y):
```

```
    if x == y or abs(x-y) == 5 or (x+y) == 5:
```

```
        return True
```



else:

return False

print(test\_number5(7, 2))

print(test\_number5(3, 2))

print(test\_number5(2, 2))

print(test\_number5(7, 3))

print(test\_number5(27, 53))

**OUTPUT:**

True

True

True

False

False

**RESULT:**

Thus, the given program is executed successfully.

**QUESTION 14:**

**AIM:** To write a Python program to sum of two given integers. However, if the sum is between 105 to 200 it will return 200.

**CODE:**

import math

p1 = [4, 0]

p2 = [6, 6]

distance = math.sqrt( ((p1[0]-p2[0])\*\*2)+((p1[1]-p2[1])\*\*2) )

print(distance)

**RESULT:**

Thus, the given program is executed successfully.

**QUESTION 15:**

**AIM:** To write a Python program to compute the distance between the points (x1, y1) and (x2, y2).

**CODE:**

```
def test_distinct(data):
    if len(data) == len(set(data)):
        return True
    else:
        return False;

print(test_distinct([1,5,7,9]))
print(test_distinct([2,4,5,5,7,9]))
```

**OUTPUT:**

6.324555320336759

**RESULT:**

Thus, the given program is executed successfully.

**QUESTION 17:**

**AIM:** To write a Python program that accept a positive number and subtract from this number the sum of its digits and so on.

**CODE:**

```
def repeat_times(n):
    n_str = str(n)
    while (n > 0):
        n -= sum([int(i) for i in list(n_str)])
        n_str = list(str(n))
    return n

print(repeat_times(9))
print(repeat_times(20))
print(repeat_times(110))
print(repeat_times(5674))
```

**OUTPUT:**

0000

**RESULT:**

Thus, the given program is executed successfully.

**QUESTION 18:**

**AIM:** To write a Python program to find the digits which are absent in a given mobilenumber.

**CODE:**

```
def absent_digits(n):  
    all_nums = set([0,1,2,3,4,5,6,7,8,9])  
    n = set([int(i) for i in n])  
    n = n.symmetric_difference(all_nums)  
    n = sorted(n)  
    return n  
  
print(absent_digits([9,8,3,2,2,0,9,7,6,3]))
```

**OUTPUT:**

[1, 4, 5]

**RESULT:**

Thus, the given program is executed successfully.

**QUESTION 19:**

**AIM:** To write a Python program to reverse the digits of a given number and add it to the original. If the sum is not a palindrome repeat this procedure

**CODE:**

```
def rev_number(n):  
    s = 0  
    while True:  
        k = str(n)  
        if k == k[::-1]:  
            break  
        else:  
            m = int(k[::-1])  
            n += m  
            s += 1  
    return n  
  
print(rev_number(1234))
```

```
print(rev_number(1473))
```

**OUTPUT:**

5555

9339

**RESULT:**

Thus, the given program is executed successfully.

**QUESTION 20:**

**AIM:** To print the length of the series and the series from the given 3rd term, 3rd last term and the sum of a series.

**CODE:**

```
tn = int(input("Input third term of the series:"))
```

```
tltn = int(input("Input 3rd last term:"))
```

```
s_sum = int(input("Sum of the series:"))
```

```
n = int(2*s_sum/(tn+tltn))
```

```
print("Length of the series: ",n)
```

```
if n-5==0:
```

```
    d = (s_sum-3*tn)//6
```

```
else:
```

```
    d = (tltn-tn)/(n-5)
```

```
    a = tn-2*d
```

```
    j = 0
```

```
    print("Series:")
```

```
    for j in range(n-1):
```

```
        print(int(a),end=" ")
```

```
        a+=d
```

```
    print(int(a),end=" ")
```

**OUTPUT:**

Input third term of the series: 3

Input 3rd last term: 6

Sum of the series: 36

Length of the series: 8

Series:

1 2 3 4 5 6 7 8

**RESULT:**

Thus, the given program is executed successfully.

## EX-2: PROCEDURAL PROGRAMMING

### QUESTION 1:

**AIM:** To print the mirror image of a given string

#### CODE:

```
str1=input("Enter a string:")
str2=""
ind=-1
for i in str1:
    str2+=str1[ind]
    ind-=1
print(f"The given string = {str1 }\nThe Reversed string = {str2}")
```

#### OUTPUT:

Enter a string:python

The given string = python

The Reversed string = nohtyp

#### RESULT:

Thus, the given program is executed successfully.

### QUESTION 2:

**AIM:** Python program to check if two strings are rotationally equal.

#### CODE:

```
str1=input("Enter string1:")
str2=input("Enter string2:")
print("String 1 is:"+str(str1))
print("String 2 is:"+str(str2))
res=False
for i in range(len(str1)):
    if str1[i: ]+str1[ :i]==str2:
        res = True
        break
```

if res:

```
    print("Yes,they are rotationally equal")
```

else:

```
    print("No,they are not rotationally equal")
```

**OUTPUT:**

Enter string1:pyi

Enter string2:yip

String 1 is:pyi

String 2 is:yip

Yes,they are rotationally equal

**RESULT:**

Thus, the given program is executed successfully.

**QUESTION 3:**

**AIM:** To generate a random binary string of length n.

**CODE:**

```
import random
```

```
n=int(input("Enter length:"))
```

```
stri=""
```

```
for i in range(n):
```

```
    temp = str(random.randint(0,1))
```

```
    stri+=temp
```

```
print(stri)
```

**OUTPUT:**

Enter length:4

1001

**RESULT:**

Thus, the given program is executed successfully.

**QUESTION 4:**

**AIM:** Given a string, remove punctuation and any special characters

**CODE:**

```
a=input("Enter the string:")
punctuation="!()-[]{};:'\"<>./?@#$$%^&*~_"
for i in a:
    if i in punctuation:
        a=a.replace(i, " ")
print(a)
```

**OUTPUT:**

Enter the string:Hi!Hello#You?

Hi Hello You

**RESULT:**

Thus, the given program is executed successfully.

**QUESTION 5:**

**AIM:** Write a Python program to compute the element-wise sum of given tuples.

**CODE:**

```
tuple1=()
list1=[]
n=int(input("Enter the size of tuple1:"))
for i in range(n):
    ele=int(input("Enter the elements for tuple 1:"))
    list1.append(ele)
tuple1=tuple(list1)
tuple2=()
list2=[]
n=int(input("Enter the size of tuple 2:"))
for i in range(n):
    ele=int(input("Enter the elements for tuple 2:"))
```



```

    list2.append(ele)
tuple2=tuple(list2)
tuple3=()
list3=[]
n=int(input("Enter the size of tuple 3:"))
for i in range(n):
    ele=int(input("Enter the elements for tuple 3:"))
    list3.append(ele)
tuple3=tuple(list3)
res_tuple=tuple(map(sum,zip(tuple1,tuple2,tuple3)))
print(res_tuple)

```

### **OUTPUT:**

```

Enter the size of tuple1:3
Enter the elements for tuple 1:10
Enter the elements for tuple 1:20
Enter the elements for tuple 1:30
Enter the size of tuple 2:3
Enter the elements for tuple 2:40
Enter the elements for tuple 2:50
Enter the elements for tuple 2:60
Enter the size of tuple 3:3
Enter the elements for tuple 3:70
Enter the elements for tuple 3:80
Enter the elements for tuple 3:90
(120, 150, 180)

```

### **RESULT:**

Thus, the given program is executed successfully.

**QUESTION 6:**

**AIM:** Write a Python program to remove an empty tuple(s) from a list of tuples

**CODE:**

```
List1 = [( ), ( ), (' '), ('c', 'd'), ('m', 'n', 'o')]  
List1 = [i for i in List1 if i]  
print(List1)
```

**OUTPUT:**

```
[(' '), ('c', 'd'), ('m', 'n', 'o')]
```

**RESULT:**

Thus, the given program is executed successfully.

**QUESTION 7:**

**AIM:** Write a Python program to count the elements in a list until an element is a tuple

**CODE:**

```
nums=[3,(101,50),(9,),1]  
c=0  
for i in nums:  
    if isinstance(i,tuple):  
        c+=1  
print(c)
```

**OUTPUT:**

```
2
```

**RESULT:**

Thus, the given program is executed successfully.

**QUESTION 8:**

**AIM:** Write a Python program to Convert Tuple Matrix to Tuple List

**CODE:**

```
test=[[ (9, 51), (7, 9) ], [ (11, 1), (22, 19) ]]  
print("The original list is : " + str(test))
```

```
num = [ele for sub in test for ele in sub]
res = list(zip(*num))
print("The converted tuple list : " + str(res))
```

**OUTPUT:**

The original list is : [[(9, 51), (7, 9)], [(11, 1), (22, 19)]]

The converted tuple list : [(9, 7, 11, 22), (51, 9, 1, 19)]

**RESULT:**

Thus, the given program is executed successfully.

**QUESTION 9:**

**AIM:** Write a python program to count unique values in the list

**CODE:**

```
L = [25,9,0,9,3,0]
print(L)
L1=[]
c=0
for i in L:
    if i not in L1:
        c+=1
        L1.append(i)
print(f"Number of unique items are:{c}",)
```

**OUTPUT:**

[25, 9, 0, 9, 3, 0]

Number of unique items are:4

**RESULT:**

Thus, the given program is executed successfully.

**QUESTION 10:**

**AIM:** Python Program to print all Possible Combinations from the three Digits

**CODE:**

```
def combination(L):
    for i in range(3):
        for j in range(3):
            for k in range(3):
                if (i!=j and j!=k and i!=k):
                    print(L[i], L[j], L[k])
combination([3,5,7])
```

**OUTPUT:**

```
3 5 7
3 7 5
5 3 7
5 7 3
7 3 5
7 5 3
```

**RESULT:**

Thus, the given program is executed successfully.

**QUESTION 11:**

**AIM:** To write a Python program (using function) to print the even numbers from a given list.

**CODE:**

```
L=[8,9,7,80,95,2]
def printeven(l):
    for i in l:
        if i%2==0:
            print(i,end=" ")
printeven(L)
```

**OUTPUT:**

```
8 80 2
```

**RESULT:**

Thus, the given program is executed successfully.

**QUESTION 12:**

**AIM:** Write a Python function (using function) that checks whether a passed string is palindrome or not.

**CODE:**

```
def palin(s):  
    if len(s)<1:  
        return True  
    else:  
        if s[0]==s[-1]:  
            return palin(s[1:-1])  
        else:  
            return False  
a=str(input("Enter string:"))  
if(palin(a)==True):  
    print("String is a palindrome!")  
else:  
    print("String isn't a palindrome!")
```

**OUTPUT:**

Enter string:ava  
String is a palindrome!

**RESULT:**

Thus, the given program is executed successfully.

**QUESTION 13:**

**AIM:** To write a Python function (using function) that checks whether a given number is prime or not.

**CODE:**

```
num=int(input("Enter a number:"))  
def isprime(n):  
    if n>1:
```

```
for i in range(2,int(n/2)+1):
    if(n%i)==0:
        print(n,"is not a prime number")
        break
    else:
        print(n,"is a prime number")
else:
    print(n, "is not a prime number")
isprime(num)
```

**OUTPUT:**

Enter a number:7

7 is a prime number

**RESULT:**

Thus, the given program is executed successfully.

## EX-3: OBJECT ORIENTED PROGRAMMING

### QUESTION 1:

**AIM:** Write a Python class named SRMIST with six attributes school, dept1, dept2, dept2 and dept3. Add a new attribute specialization and display the entire attribute and their values of the said class. Now remove the dept1 and dept2 attribute and display the entire attribute with values.

### CODE:

```
class SRMIST:
    school='SRMIST KTR'
    dept1='CS'
    dept2='CHEM'
    dept3='IOT'
    dept4='ECE'
SRMIST.specialisation='BIG DATA'
var=SRMIST()
print(var.school)
print(var.dept1)
print(var.dept2)
print(var.dept3)
print(var.dept4)
print(var.specialisation)
delattr(SRMIST,'dept1')
delattr(SRMIST,'dept2')
print("After deleting two attributes:")
print(var.school)
print(var.dept3)
print(var.dept4)
print(var.specialisation)
```

### OUTPUT:

SRMIST KTR

CS

CHEM

IOT

ECE

BIG DATA

After deleting two attributes:

SRMIST KTR

IOT

ECE

BIG DATA

**RESULT:**

Thus, the given program is executed successfully.

**QUESTION 2:**

**AIM:** Write a Python program to create four empty classes, CTECH, CINTEL, NWC and DSBS. Now create some instances and check whether they are instances of the said classes or not. Also, check whether the said classes are subclasses of the built-in object class or not.

**CODE:**

```
from ast import Pass
```

```
class CTECH:
```

```
    pass
```

```
class CINTEL:
```

```
    pass
```

```
class NWC:
```

```
    pass
```

```
class DSBS:
```

```
    pass
```

```
o1=CTECH()
```



```
o2=CINTEL()
o3=NWC()
o4=DSBS()
print("Instance:")
print(isinstance(o1,CTECH))
print(isinstance(o2,CINTEL))
print(isinstance(o4,NWC))
print(isinstance(o3,NWC))
print(isinstance(o4,DSBS))
print("Subclass:")
print(issubclass(CTECH,object))
print(issubclass(CINTEL,object))
print(issubclass(NWC,object))
print(issubclass(DSBS,object))
```

#### **OUTPUT:**

Instance:

True

True

False

True

True

Subclass:

True

True

True

True

#### **RESULT:**

Thus, the given program is executed successfully.

**QUESTION 3:**

**AIM:** Write a program to print the names of the departments students by creating a Dept class. If no name is passed while creating an object of the Dept class, then the name should be “SCO”, otherwise the name should be equal to the String value passed while creating the object of the Dept class.

**CODE:**

```
class Dept:
    def __init__(self, *args):
        if len(args) == 1:
            self.dept=args[0]
        elif len(args) == 0:
            self.dept="ECE"
    def deptname(self):
        print(self.dept)
d1=Dept()
d1.deptname()
d2=Dept("EEE")
d2.deptname()
```

**OUTPUT:**

ECE

EEE

**RESULT:**

Thus, the given program is executed successfully.

**QUESTION 4:**

**AIM:** Create a class named ‘Rectangle’ with two data members- length and breadth and a function to calculate the area which is ‘length\*breadth’. The class has three constructors which are:

1 - having no parameter - values of both length and breadth are assigned

zero.

2 - having two numbers as parameters - the two numbers are assigned as length and breadth respectively.

3 - having one number as parameter - both length and breadth are assigned that number.

Now, create objects of the 'Rectangle' class having none, one and two parameters and print their areas.

**CODE:**

```
class rectangle:
    l=0
    b=0
    def __init__(self,*args):
        if len(args)==2:
            self.l=args[0]
            self.b=args[1]
        elif len(args)==1:
            self.l=args[0]
            self.b=args[0]
        else:
            self.l=0
            self.b=0
    def area(self):
        return self.l*self.b;
r1=rectangle(2,1)
print(r1.area())
r2=rectangle(50)
print(r2.area())
r3=rectangle()
print(r3.area())
```

**OUTPUT:**

2

2500

0

### **RESULT:**

Thus, the given program is executed successfully.

### **QUESTION 5:**

**AIM:** Create a class named 'PrintDT' to print various numbers of different datatypes by creating different functions with the same name 'python\_data' having a parameter for each datatype. (example:tuple, list, string)

### **CODE:**

```
class PrintDT:
    def __init__(self,name,age):
        self.name=name
        self.age=age
        print(name,age)
    def python_data(self,hello):
        self.hello=[]
        print(hello)
    def python_data(self,hi):
        self.hi=hi
        print(hi)
    def python_data(self,t):
        self.t=t
        print(t)
    def python_data(self,h):
        self.h=h
        print(h)
bob=PrintDT("Student",18)
```

```
bob.python_data([11,22,33])
bob.python_data("AG")
bob.python_data(("Carrot", "Mango", "Orange"))
```

**OUTPUT:**

```
Student 18
[11, 22, 33]
AG
('Carrot', 'Mango', 'Orange')
```

**RESULT:**

Thus, the given program is executed successfully.

**QUESTION 6:**

**AIM:** A student from SRMIST has his/her money deposited Rs.15000, Rs.30000 and Rs. 40,000 in banks-CUB, HDFC and Indian Bank respectively. We have to print the money deposited by him/her in a particular bank. Create a class named 'Banks\_SRMIST' with a function 'getBalance' which returns 0. Make its three subclasses named 'CUB', 'HDFC' and 'Indian\_Bank' with a function with the same name 'getBalance' which returns the amount deposited in that particular bank. Call the function 'getBalance' by the object of each of the three banks.

**CODE:**

```
class Banks_SRMIST:
    def getBalance():
        return 0
class CUB(Banks_SRMIST):
    def getBalance(balance):
        return balance
class HDFC(Banks_SRMIST):
    def getBalance(balance):
        return balance
class Indian_Bank(Banks_SRMIST):
    def getBalance(balance):
        return balance
Banks_SRMIST()
print(CUB.getBalance(1000))
```

```
print(HDFC.getBalance(2000))
print(Indian_Bank.getBalance(3000))
```

**OUTPUT:**

```
1000
2000
3000
```

**RESULT:**

Thus, the given program is executed successfully.

**QUESTION 7:**

**AIM:** Create a Time class and initialize it with hours and minutes.

1. Make a method addTime which should take two time object and add them. E.g.- (2 hour and 50 min)+(1 hr and 20 min) is (4 hr and 10 min)
2. Make a method displayTime which should print the time.
3. Make a method DisplayMinute which should display the total minutes in the Time. E.g.- (1 hr 2 min) should display 62 minute.

**CODE:**

```
class Time():
    def __init__(self, hours, mins):
        self.hours = hours
        self.mins = mins
    def addTime(t1, t2):
        t3 = Time(0,0)
        if t1.mins+t2.mins > 60:
            t3.hours = (t1.mins+t2.mins)//60
            t3.hours = t3.hours+t1.hours+t2.hours
            t3.mins = (t1.mins + t2.mins) % 60
        return t3
    def displayTime(self):
        print("Time is",self.hours,"hours and",self.mins,"minutes.")
    def displayMinute(self):
        print ((self.hours*60)+self.mins)
```

```
a = Time(1,10)
b = Time(2,20)
c = Time.addTime(a,b)
c.displayTime()
c.displayMinute()
```

**OUTPUT:**

Time is 3 hours and 30 minutes.

210

**RESULT:**

Thus, the given program is executed successfully.

**QUESTION 8:**

**AIM:**Write a program to print the area and perimeter of a triangle having sides of 3, 4 and 5 units by creating a class named 'Triangle' with a function to print the area and perimeter.

**CODE:**

```
class Triangle:
    def findPerimeter(self,s1,s2,s3):
        return (s1+s2+s3)
    def findArea(self,s1,s2,s3):
        s=(s1+s2+s3)/2
        return ((s*(s-s1)*(s-s2)*(s-s3))**0.5)
s1=float(input("Enter first side of the triangle:"))
s2=float(input("Enter second side of the triangle:"))
s3=float(input("Enter third side of the triangle:"))
u=Triangle()
print("Perimeter of the triangle:{0:.2f}".format(u.findPerimeter(s1,s2,s3)))
print("Area of the triangle is: {0:.2f}".format(u.findArea(s1,s2,s3)))
```

**OUTPUT:**

Enter first side of the triangle:4

Enter second side of the triangle:8

Enter third side of the triangle:10

Perimeter of the triangle:22.00

Area of the triangle is:15.20

**RESULT:** Thus, the given program is executed successfully



## EX-4: DECLARATIVE PROGRAMMING

### QUESTION 1:

**AIM:** Create the below table and execute the insert, update and the below select statements.



recipes.recipes
id : int(11)
name : varchar(400)
description : text
category_id : int(11)
chef_id : int(255)
created : datetime

- i) Write a query to display the total number of recipes available with the description “Chinese”
- ii) Write a query to display the id, name of the recipes with chef\_id 'BL000002'.
- iii) Write a query to display the description of the recipes whose name begins with 'P'.

### CODE:

```
import sqlite3

db=sqlite3.connect('recipes.db')

curs=db.cursor()

curs.execute('CREATE TABLE recipes(id int,name varchar(400),description text,category_id int,chef_id int,created datetime)')

print("Table is ready")

curs.execute("""INSERT INTO recipes (id,name,description,category_id,chef_id,created)
              VALUES(1,'Kiami','Chinese',11,'BL000002','2022-4-4'),
              (2,'Caio','Korean',12,'BL000001','2022-4-4'),
              (3,'Chingua','Japanese',13,'BL000003','2022-4-4'),
              (4,'Puniket','Indian',14,'BL000004','2022-4-4'),
              (5,'Shin','Chinese',15,'BL000002','2022-4-4')""")

curs.execute("SELECT count(id) FROM recipes where description='Chinese'")

res=curs.fetchall()

for i in res:

    print(i)
```

```

curs.execute("SELECT id,name FROM recipes where chef_id='BL000002'")
res=curs.fetchall()
for i in res:
    print(i)
curs.execute("SELECT * FROM recipes where name like 'P%'")
res=curs.fetchall()
for i in res:
    print(i)
db.close()

```

### **OUTPUT:**

```

(2,)
(1, 'Kiami')
(5, 'Shin')
(4, 'Puniket', 'Indian', 14, 'BL000004', '2022-4-4')

```

### **RESULT:**

Thus, the given program is executed successfully.

### **QUESTION 2:**

**AIM:** Create a table movie of the below structure and assume data types.Movie\_ID, Movie\_Name, Genre, Language, Rating ,Do the following queries

- a. Update the movies rating by 10% and display it
- b. Delete the movies with movie\_id 102
- c. Select movies whose rating is more than 3

### **CODE:**

```

import sqlite3
db=sqlite3.connect('mydatabase.db')
curs=db.cursor()
curs.execute("""CREATE TABLE IF NOT EXISTS Movie (
    Movie_ID VARCHAR(255),
    Movie_Name VARCHAR(255),

```

```

Genre VARCHAR(255),
Language VARCHAR(255),
Rating FLOAT);""")

curs.execute("""INSERT INTO Movie VALUES ("101","No time to die","Mystery","English","8");""")
curs.execute("""INSERT INTO Movie VALUES ("102","POTC","Adventure","English","9");""")
curs.execute("""INSERT INTO Movie VALUES ("103","Jurassic Park","Thriller","English","9.2");""")
curs.execute("""INSERT INTO Movie VALUES ("107","Mission Impossible","Thriller","English","7.5");""")
curs.execute("""INSERT INTO Movie VALUES ("002","The Flopped","drama","English","2.5");""")

print("Original data")

curs.execute("SELECT * FROM Movie")

res=curs.fetchall()

for i in res:
    print(i)
print("")

curs.execute("""UPDATE Movie SET Rating = ((Rating*110)/100);""")

print("Printing data after updating rating to 10%")

curs.execute("SELECT * FROM Movie")

res=curs.fetchall()

for i in res:
    print(i)
print("")

curs.execute("""DELETE from Movie where Movie_ID = 102 """)

print("Displaying data after deleting 102 Movie_ID")

curs.execute("SELECT * FROM Movie")

res=curs.fetchall()

for i in res:
    print(i)
print("")

print("Displaying data having rating value greater than 3")

curs.execute("SELECT * FROM Movie WHERE Rating>3")

```

```
res=curs.fetchall()
for i in res:
    print(i)
print("")
db.commit()
db.close()
```

## **OUTPUT:**

Original data

```
('101', 'No time to die', 'Mystery', 'English', 8.0)
('102', 'POTC', 'Adventure', 'English', 9.0)
('103', 'Jurassic Park', 'Thriller', 'English', 9.2)
('107', 'Mission Impossible', 'Thriller', 'English', 8.5)
('108', 'The Flopped', 'drama', 'English', 2.5)
```

Printing data after updating rating to 10%

```
('101', 'No time to die', 'Mystery', 'English', 8.8)
('102', 'POTC', 'Adventure', 'English', 9.9)
('103', 'Jurassic Park', 'Thriller', 'English', 10.12)
('107', 'Mission Impossible', 'Thriller', 'English', 9.35)
('108', 'The Flopped', 'drama', 'English', 2.75)
```

Displaying data after deleting 102 Movie\_ID

```
('101', 'No time to die', 'Mystery', 'English', 8.8)
('103', 'Jurassic Park', 'Thriller', 'English', 10.12)
('107', 'Mission Impossible', 'Thriller', 'English', 9.35)
('108', 'The Flopped', 'drama', 'English', 2.75)
```

Displaying data having rating value greater than 3

```
('101', 'No time to die', 'Mystery', 'English', 8.8)
```

('103', 'Jurassic Park', 'Thriller', 'English', 10.12)

('107', 'Mission Impossible', 'Thriller', 'English', 9.35)

### **RESULT:**

Thus, the given program is executed successfully.

### **QUESTION 3:**

**AIM:** Create a course database with the following fields Product(ID, Prod\_name,

Supplier\_id, Unit\_price, Package, OrderID), OrderItem(ID, Order\_id, Product\_id, Unit\_price, Quantity) using Foreign key

- d. Display the total quantity of every product in the stock
- e. Sort the Unit\_price based on the supplier\_id
- f. Display the Product\_name along with order\_id and supplier\_id

### **CODE:**

```
import sqlite3

db=sqlite3.connect("mydatabase1.db")

curs=db.cursor()

db.execute("PRAGMA foreign_keys = ON")

curs.execute("""CREATE TABLE IF NOT EXISTS Product(
            ID VARCHAR(255) PRIMARY KEY,
            Prod_name VARCHAR(255),
            Supplier_id VARCHAR(255),
            Unit_price INT,
            Package INT,
            Order_ID VARCHAR(255)
        );""")

curs.execute("""INSERT OR IGNORE INTO Product VALUES('id1','pid1','1','500','100','Oid1');""")
curs.execute("""INSERT OR IGNORE INTO Product VALUES('id2','pid2','2','1000','200','Oid2');""")
curs.execute("""INSERT OR IGNORE INTO Product VALUES('id3','pid3','3','1500','300','Oid3');""")
curs.execute("""INSERT OR IGNORE INTO Product VALUES('id4','pid4','4','2000','400','Oid4');""")
curs.execute("""CREATE TABLE IF NOT EXISTS OrderItem(
            ID VARCHAR(255),
```

```

Order_id VARCHAR(255),
Product_ID VARCHAR(255),
Unit_price INT ,
Quantity INT,
FOREIGN KEY (ID) REFERENCES Product(ID)
);""")

```

```

curs.execute("""INSERT OR IGNORE INTO OrderItem VALUES('id1','oid1','pid1','500','10');""")
curs.execute("""INSERT OR IGNORE INTO OrderItem VALUES('id2','oid2','pid2','1000','20');""")
curs.execute("""INSERT OR IGNORE INTO OrderItem VALUES('id3','oid3','pid3','1500','30');""")
curs.execute("""INSERT OR IGNORE INTO OrderItem VALUES('id4','oid4','pid4','2000','40');""")
print("Displaying total quantity of each product")
res=curs.execute("SELECT Quantity FROM OrderItem where ID = 'id1'")
for i in res:
    print(i)
res=curs.execute("SELECT Quantity FROM OrderItem where ID = 'id2'")
for i in res:
    print(i)
res=curs.execute("SELECT Quantity FROM OrderItem where ID = 'id3'")
for i in res:
    print(i)
res=curs.execute("SELECT Quantity FROM OrderItem where ID = 'id4'")
for i in res:
    print(i)
print("")
print("Displaying unit price based on supply id")
res=curs.execute("SELECT Unit_price FROM Product")
for i in res:
    print(i)
print("")
print("Displaying Product name along with order id and supplier id")

```

```
res=curs.execute("SELECT Prod_name ,Order_ID ,Supplier_id FROM Product")
```

```
for i in res:
```

```
    print(i)
```

```
db.close()
```

### **OUTPUT:**

Displaying total quantity of each product

```
(10,)
```

```
(20,)
```

```
(30,)
```

```
(40,)
```

Displaying unit price based on supply id

```
(500,)
```

```
(1000,)
```

```
(1500,)
```

```
(2000,)
```

Displaying Product name along with order id and supplier id

```
('pid1', 'Oid1', '1')
```

```
('pid2', 'Oid2', '2')
```

```
('pid3', 'Oid3', '3')
```

```
('pid4', 'Oid4', '4')
```

### **RESULT:**

Thus, the given program is executed successfully.

### **QUESTION 4:**

**AIM:** Write a SQL lite3 statement to create a table named as job including columns job\_id,job\_title,Min-salary,Max\_salary.job\_id column does not contain any duplicate value at the time of insertion.

### **CODE:**

```
import sqlite3
```

```
db=sqlite3.connect('mydatabase2.db')
```

```

curs=db.cursor()
curs.execute("""CREATE TABLE IF NOT EXISTS Job(
    job_id VARCHAR(255),
    job_title VARCHAR(255),
    Min_salary INT,
    Max_salary INT);""")
curs.execute("""INSERT INTO Job VALUES ('fsd01','Full Stack Developer','100000','1000000');""")
curs.execute("""INSERT INTO Job VALUES ('gd02','Game Developer','30000','300000');""")
curs.execute("""INSERT INTO Job VALUES ('an03','Animation Developer','50000','500000');""")
curs.execute("SELECT * FROM Job")
res=curs.fetchall()
for i in res:
    print(i)
print("")

```

#### **OUTPUT:**

```

('fsd01', 'Full Stack Developer', 100000, 1000000)
('gd02', 'Game Developer', 30000, 300000)
('an03', 'Animation Developer', 50000, 500000)

```

#### **RESULT:**

Thus, the given program is executed successfully.

#### **QUESTION 5:**

**AIM:** Write a SQL lite3 statement to create a table names as job\_history including columns employee\_id, start\_date, end\_date, job\_id and department\_id and make sure that, the employee\_id column does not contain any duplicate value at the time of insertion and the foreign key column job\_id contain only those values which are exists in the jobs table.

#### **CODE:**

```

import sqlite3
db=sqlite3.connect("mydatabase3.db")
curs=db.cursor()
db.execute("PRAGMA foreign_keys = ON")
curs.execute("""CREATE TABLE IF NOT EXISTS jobs(

```



```

        Job_id VARCHAR(255) PRIMARY KEY
    );""")
curs.execute("""INSERT OR IGNORE INTO jobs VALUES ('j1');""")
curs.execute("""INSERT OR IGNORE INTO jobs VALUES('j2');""")
curs.execute("""INSERT OR IGNORE INTO jobs VALUES('j3');""")
curs.execute("""CREATE TABLE IF NOT EXISTS job_history(
    employeeid INTEGER NOT NULL,
    startdate DATE NOT NULL,
    enddate DATE NOT NULL,
    job_id VARCHAR(255) NOT NULL,
    departmentid INTEGER NOT NULL,
    FOREIGN KEY (job_id) REFERENCES jobs(Job_id)
);""")
curs.execute("""INSERT OR IGNORE INTO job_history VALUES('1','2000-02-20','2010-02-20','j1','01');""")
curs.execute("""INSERT OR IGNORE INTO job_history VALUES('2','2005-10-09','2016-05-10','j2','02');""")
curs.execute("""INSERT INTO job_history VALUES('5','1990-05-11','1995-06-19','j1','10');""")
curs.execute("""INSERT OR IGNORE INTO job_history VALUES('23','1998-02-15','2011-10-12','j3','05');""")
curs.execute("SELECT * FROM job_history where job_id='j1'")
res=curs.fetchall()
for i in res:
    print(i)
db.close()

```

### **OUTPUT:**

```

(1, '2000-02-20', '2010-02-20', 'j1', 1)
(5, '1990-05-11', '1995-06-19', 'j1', 10)

```

### **RESULT:**

Thus, the given program is executed successfully.

## EX-5: EVENT DRIVEN PROGRAMMING

### QUESTION 1:

**AIM:** To create the given design.

### CODE:

```
from tkinter import *
from tkinter import messagebox
from tkinter.tix import COLUMN
from tkinter.ttk import Combobox
import tkinter as tk
from tkinter import ttk

db=Tk()
db.title('tk')
db.geometry('1000x600')
Label(db,text='First Name ').grid(row=0)
Label(db,text='(max 30 chracters a-z and A-Z)').grid(row=0,column=2)
Label(db,text='Last Name ').grid(row=1)
Label(db,text='(max 30 chracters a-z and A-Z)').grid(row=1,column=2)
Label(db,text='Date of birth').grid(row=2)
Label(db,text='Email ID ').grid(row=3)
Label(db,text='Mobile Number').grid(row=4)
Label(db,text='(10 digit number)').grid(row=4,column=2)
Label(db,text='Gender ').grid(row=5)
Label(db,text='Address ').grid(row=6)
Label(db,text='City ').grid(row=7)
Label(db,text='(max 30 chracters a-z and A-Z)').grid(row=7,column=2)
Label(db,text='Pincode ').grid(row=8)
Label(db,text='(6 digit number)').grid(row=8,column=2)
Label(db,text='State ').grid(row=9)
Label(db,text='(max 30 chracters a-z and A-Z)').grid(row=9,column=2)
Label(db,text='Country ').grid(row=10)
```

```

Label(db,text='Hobbies ').grid(row=11)
Label(db,text='Qualification ').grid(row=12)
Label(db,text='Sl.No').grid(row=12,column=1)
Label(db,text='Examination').grid(row=12,column=2)
Label(db,text='Board').grid(row=12,column=3)
Label(db,text='Percentage').grid(row=12,column=4)
Label(db,text='Year of Passing').grid(row=12,column=5)
Label(db,text='1').grid(row=13,column=1)
Label(db,text='2').grid(row=14,column=1)
Label(db,text='3').grid(row=15,column=1)
Label(db,text='4').grid(row=16,column=1)
Label(db,text='Class X').grid(row=13,column=2)
Label(db,text='Class XII').grid(row=14,column=2)
Label(db,text='Graduation').grid(row=15,column=2)
Label(db,text='Dbs').grid(row=16,column=2)
Label(db,text='Courses Applied').grid(row=17)
t1=Entry(db)
t2=Entry(db)
t3=Entry(db)
t4=Entry(db)
t5=Entry(db)
t6=Entry(db)
t7=Entry(db)
t8=Entry(db)
t9=Entry(db)
t13=Entry(db)
t14=Entry(db)
t15=Entry(db)
t16=Entry(db)
t17=Entry(db)

```

```

t18=Entry(db)
t19=Entry(db)
t20=Entry(db)
t21=Entry(db)
t22=Entry(db)
t23=Entry(db)
t24=Entry(db)
t1.grid(row=0,column=1,ipadx=30)
t2.grid(row=1,column=1,ipadx=30)
t3.grid(row=3,column=1,ipadx=30)
t4.grid(row=4,column=1,ipadx=30)
t5.grid(row=6,column=1,ipadx=30,ipady=30)
t6.grid(row=7,column=1,ipadx=30)
t7.grid(row=8,column=1,ipadx=30)
t8.grid(row=9,column=1,ipadx=30)
t9.grid(row=10,column=1,ipadx=30)
t13.grid(row=13,column=3,ipadx=30)
t14.grid(row=14,column=3,ipadx=30)
t15.grid(row=15,column=3,ipadx=30)
t16.grid(row=16,column=3,ipadx=30)
t17.grid(row=13,column=4,ipadx=30)
t18.grid(row=14,column=4,ipadx=30)
t19.grid(row=15,column=4,ipadx=30)
t20.grid(row=16,column=4,ipadx=30)
t21.grid(row=13,column=5,ipadx=30)
t22.grid(row=14,column=5,ipadx=30)
t23.grid(row=15,column=5,ipadx=30)
t24.grid(row=16,column=5,ipadx=30)
var1=IntVar()
Radiobutton(db, text="Male",variable=var1).grid(row=5, column=1, sticky=W,ipady=10,ipadx=30)

```

```

var2=IntVar()
Radiobutton(db, text="Female", variable=var2).grid(row=5, column=2, sticky=W,ipady=10,ipadx=10)
var3=IntVar()
Checkbutton(db, text="Drawing",variable=var3).grid(row=11, column=1, sticky=W,ipady=10,ipadx=30)
var4=IntVar()
Checkbutton(db, text="Singing", variable=var4).grid(row=11, column=2, sticky=W,ipady=10,ipadx=10)
var5=IntVar()
Checkbutton(db, text="Dancing",variable=var5).grid(row=11, column=3, sticky=W,ipady=10,ipadx=30)
var6=IntVar()
Checkbutton(db, text="Sketching", variable=var6).grid(row=11, column=4, sticky=W,ipady=10,ipadx=10)
var7=IntVar()
Radiobutton(db, text="BCA",variable=var7).grid(row=17, column=1, sticky=W,ipady=10,ipadx=30)
var8=IntVar()
Radiobutton(db, text="B.Com", variable=var8).grid(row=17, column=2, sticky=W,ipady=10,ipadx=10)
var9=IntVar()
Radiobutton(db, text="B.Sc",variable=var9).grid(row=17, column=3, sticky=W,ipady=10,ipadx=30)
var10=IntVar()
Radiobutton(db, text="B.A", variable=var10).grid(row=17, column=4, sticky=W,ipady=10,ipadx=10)
n=tk.StringVar()
p=tk.StringVar()
q=tk.StringVar()
monthchosen=ttk.Combobox(db,width=27,textvariable=n)
datechosen=ttk.Combobox(db,width=27,textvariable=p)
yearchosen=ttk.Combobox(db,width=27,textvariable = q)
datechosen['values']=("1",
                      "2",
                      "3",
                      "4",
                      "5")
monthchosen['values'] = (' January',

```

```

        ' February',
        ' March',
        ' April',
        ' May',
        ' June',
        ' July',
        ' August',
        ' September',
        ' October',
        ' November',
        ' December')
yearchosen['values']=("2001",
                    "2002",
                    "2003",
                    "2004")
datechosen.grid(column=1,row=2)
datechosen.set("Day:")
monthchoosen.grid(column = 2, row = 2)
monthchoosen.set("Month")
yearchosen.grid(column = 3, row = 2)
yearchosen.set("Year")
butn=Button(db, text='Submit').grid(row=18,column=2)
butn=Button(db, text='Reset').grid(row=18, column=3)
mainloop()

```

**OUTPUT:**

The screenshot shows a Tkinter window titled 'tk' with a light gray background. The form contains the following elements:

- First Name**: Text input field with a hint '(max 30 chracters a-z and A-Z)'.
- Last Name**: Text input field with a hint '(max 30 chracters a-z and A-Z)'.
- Date of birth**: Three dropdown menus for Day, Month, and Year.
- Email ID**: Text input field.
- Mobile Number**: Text input field with a hint '(10 digit number)'.
- Gender**: Two radio buttons labeled 'Male' and 'Female'.
- Address**: A large text area for address input.
- City**: Text input field with a hint '(max 30 chracters a-z and A-Z)'.
- Pincode**: Text input field with a hint '(6 digit number)'.
- State**: Text input field with a hint '(max 30 chracters a-z and A-Z)'.
- Country**: Text input field.
- Hobbies**: Four checkboxes labeled 'Drawing', 'Singing', 'Dancing', and 'Sketching'.
- Qualification Table**:
 

Qualification	Sl.No	Examination	Board	Percentage	Year of Passing
	1	Class X			
	2	Class XII			
	3	Graduation			
	4	Dbs			
- Courses Applied**: Four radio buttons labeled 'BCA', 'B.Com', 'B.Sc', and 'B.A'.
- Buttons**: 'Submit' and 'Reset' buttons at the bottom.

## RESULT:

Thus, the given program is executed successfully.

## QUESTION 2:

**AIM:** To create the given design.

## CODE:

```
from tkinter import *
from tkinter import messagebox
from tkinter import ttk

db=Tk()
db.title('tk')
db.geometry('412x717')

Label(db,text= 'Name ').place(x=0,y=10)
Label(db,text='Email ').place(x=0,y=50)
Label(db,text='Education ').place(x=0,y=90)
Label(db,text='Resume ').place(x=0,y=130)
Label(db,text='Address').place(x=0,y=170)
```

Label(db,text='Phone Number ').place(x=0,y=290)  
 Label(db,text='What are your hobbies?').place(x=0,y=310)  
 Label(db,text='PREVIOUS/CURRENT EMPLOYMENT DETAILS').place(x=0,y=350)  
 Label(db,text='Comapany Name ').place(x=0,y=370)  
 Label(db,text='Job Title ').place(x=0,y=410)  
 Label(db,text='How long were you').place(x=0,y=430)  
 Label(db,text='here? ').place(x=0,y=450)  
 Label(db,text='REFERENCE #1').place(x=0,y=470)  
 Label(db,text='Name ').place(x=0,y=490)  
 Label(db,text='Phone ').place(x=0,y=530)  
 Label(db,text='REFERENCE #2 ').place(x=0,y=550)  
 Label(db,text='Name ').place(x=0,y=570)  
 Label(db,text='Phone ').place(x=0,y=610)  
 t1=Entry(db,width=20).place(x=120,y=10)  
 t18=Entry(db,width=20).place(x=260,y=10)  
 t2=Entry(db,width=40).place(x=120,y=50)  
 t4=Entry(db,width=40).place(x=120,y=130)  
 t5=Entry(db,width=40).place(x=120,y=170)  
 t6=Entry(db,width=18).place(x=120,y=250)  
 t19=Entry(db,width=5).place(x=240,y=250)  
 t20=Entry(db,width=10).place(x=280,y=250)  
 t8=Entry(db,width=30).place(x=160,y=290)  
 t21=Entry(db,width=5).place(x=120,y=290)  
 t9=Entry(db,width=60).place(x=0,y=330)  
 t10=Entry(db,width=40).place(x=120,y=370)  
 t11=Entry(db,width=40).place(x=120,y=410)  
 t12=Entry(db,width=40).place(x=120,y=450)  
 t13=Entry(db,width=40).place(x=120,y=490)  
 t14=Entry(db,width=40).place(x=120,y=530)  
 t15=Entry(db,width=40).place(x=120,y=570)



```

t16=Entry(db,width=40).place(x=120,y=410)
t17=Entry(db,width=40).place(x=120,y=610)
n=StringVar()
monthchoosen=ttk.Combobox(db,text='Please Choose',width=35,textvariable=n)
monthchoosen['values']=(' X',
                        ' XII',
                        'BTech',
                        ' BSc',
                        ' MBBS',
                        ' LLB',
                        ' MSc',
                        ' MTech')
monthchoosen.place(x=120,y=90)
monthchoosen.set('Please Choose')
p=StringVar()
countrychoosen= ttk.Combobox(db,text='Please Choose',width=35,textvariable=p)
countrychoosen['values']=(' India',
                        ' USA',
                        'Australia',
                        ' Canada',
                        ' Denmark',
                        ' Nepal',
                        ' Srilanka',
                        ' Brazil')
countrychoosen.place(x=120,y=210)
countrychoosen.set('Select a Country')
butn=Button(db, text='Apply').place(x=160,y=650)
mainloop()

```

**OUTPUT:**

tk

Name

Email

Education

Resume

Address

Phone Number

What are your hobbies?

PREVIOUS/CURRENT EMPLOYMENT DETAILS

Comapany Name

Job Title

How long were you here?

REFERENCE #1

Name

Phone

REFERENCE #2

Name

Phone

**RESULT:**

Thus, the given program is executed successfully.

### QUESTION 3:

**AIM:** To create the given design.

#### CODE:

```
from cgitb import text
from tkinter import *
from tkinter import messagebox
from tkinter import ttk

db=Tk()
db.title('tk')
db.geometry('800x800')

Label(db,text='Title ').grid(row=0)
Label(db,text='Last Name ').grid(row=1)
Label(db,text='First Name ').grid(row=2)
Label(db,text='Share with ').grid(row=3)
Label(db,text='Business number ').grid(row=4)
Label(db,text='Mobile Number ').grid(row=5)
Label(db,text='Email Address ').grid(row=6)
Label(db,text='Date of Arrival ').grid(row=7)
Label(db,text='Date of Departure ').grid(row=8)
Label(db,text='Name on Credit Number ').grid(row=9)
Label(db,text='Credit Card Number ').grid(row=10)
Label(db,text='Expire Date ').grid(row=11)
Label(db,text='CVV Number ').grid(row=12)
Label(db,text='Payment ').grid(row=13)

for i in range(0,14):
    ei= Entry(db, width=50).grid(row=i,column=1)

var1=IntVar()
Checkbutton(db, text="Credit Card",variable=var1).grid(row=13, column=1, sticky=W,ipady=10, ipadx=10)

var2=IntVar()
Checkbutton(db,text="Direct bank Transfer", variable=var2).grid(row=13, column=2,
sticky=W,ipady=10,ipadx=10)
```

```

Label(db,font=("Arial", 10), text= 'Negotiated Rates: ').grid(row=14,column=0)

var3=IntVar()

Checkbutton(db,text="Deluxe Room Single ", variable=var3).grid(row=15, column=0,
sticky=W,ipady=10,ipadx=10)

Label(db,text='R 1700 ').grid(row=15,column=1)

var4=IntVar()

Checkbutton(db,text="Deluxe Room Double ", variable=var4).grid(row=15, column=2,
sticky=W,ipady=10,ipadx=10)

Label(db,text='R 1700 ').grid(row=15,column=3)

var5=IntVar()

Checkbutton(db,text="Suites Room Single ", variable=var5).grid(row=16, column=0,
sticky=W,ipady=10,ipadx=10)

Label(db,text='R 1700 ').grid(row=16,column=1)

var6=IntVar()

Checkbutton(db,text="Suites Room Double ", variable=var6).grid(row=16, column=2,
sticky=W,ipady=10,ipadx=10)

Label(db,text='R 1700 ').grid(row=16,column=3)

Label(db,font=("Arial", 10), text= 'Room Preference: ').grid(row=17,column=0)

var7=IntVar()

Checkbutton(db,text="King Bed ", variable=var7).grid(row=18, column=0, sticky=W,ipady=10,ipadx=10)

var8=IntVar()

Checkbutton(db,text="Twin-Two Single Beds ", variable=var8).grid(row=18, column=2,
sticky=W,ipady=10,ipadx=10)

Label(db,font=("Arial",10),text= 'The above rates are quoted per room, per night. The rates includes breakfast,
14% vat, and Excludes 1% Tourism Levy ').place(x=0,y=500)

Label(db,font=("Arial",10),text= 'and a voluntary R10 donation to the Ambela Community Trust that will be
levies onto your account.').place(x=0,y=525)

Label(db,font=("Arial",10),text= 'Credit Card will be changed on receipt of this form and details will also be used
to settle all incidentals ').place(x=0,y=550)

Label(db,font=("Arial",10),text= 'not settle on departure. A copy of the final folio will be sent to you should there
be any unsettled changes.').place(x=0,y=575)

Label(db,font=("Arial",10),text= 'In order to qualify for the above rates your booking needs to be made on or
before 15th January 2016').place(x=0,y=600)

Label(db,font=("Arial",10),text= 'Terms and conditions can be found on the next page').place(x=0,y=625)

```

```
Label(db,font=("Arial",10),text= 'The rate is valid for seven days before and after the conference dates. Check in  
time is 14:00 & check out time is 11:00').place(x=0,y=650)
```

```
Label(db,font=("Arial",10),text= 'By your signature hereto, you are accepting all terms and conditions specified  
on this form and confirm that all information').place(x=0,y=675)
```

```
Label(db,font=("Arial",10),text= 'given is current and accurate.').place(x=0,y=700)
```

```
Label(db,font=("Arial",10),text= 'Signature_____').place(x=0,y=740)
```

```
Label(db,font=("Arial",10),text= 'Pointname_____').place(x=400,y=740)
```

```
Label(db,font=("Arial",10),text= 'Date_____').place(x=0,y=765)
```

```
mainloop()
```

## **OUTPUT:**

tk

Title

Last Name

First Name

Share with

Business number

Mobile Number

Email Address

Date of Arrival

Date of Departure

Name on Credit Number

Credit Card Number

Expire Date

CVV Number

Payment

☐ Credit Card

☐ Direct bank Transfer

Negotiated Rates:

☐ Deluxe Room Single

R 1700

☐ Suites Room Single

R 1700

☐ Deluxe Room Double

R 1700

☐ Suites Room Double

R 1700

Room Preference:

☐ King Bed
☐ Twin-Two Single Beds

The above rates are quoted per room, per night. The rates includes breakfast, 14% vat, and Excludes 1% Tourism Levy and a voluntary R10 donation to the Ambela Community Trust that will be levies onto your account.

Credit Card will be changed on receipt of this form and details will also be used to settle all incidentals not settle on departure. A copy of the final folio will be sent to you should there be any unsettled changes.

In order to qualify for the above rates your booking needs to be made on or before 15th January 2016

Terms and conditions can be found on the next page

The rate is valid for seven days before and after the conference dates. Check in time is 14:00 & check out time is 11:00

By your signature hereto, you are accepting all terms and conditions specified on this form and confirm that all information given is current and accurate.

Signature\_\_\_\_\_

Pointname\_\_\_\_\_

Date\_\_\_\_\_

## RESULT:

Thus, the given program is executed successfully.

## QUESTION 4:

**AIM:** To create the given design.

## CODE:

```
from tkinter import *
from tkinter import messagebox
```

```

from tkinter import ttk

db=Tk()

db.title('tk')

Label(db,text='CAR RENTAL RECEIPT').grid(row=0,column=2)

Label(db,text='Date').grid(row=2)

Label(db,text='Receipt#').grid(row=3)

Label(db,text='Rental Company Info ').grid(row=4)

Label(db,text='Company:').grid(row=5)

Label(db,text='Representatives:').grid(row=6)

Label(db,text='Location:').grid(row=7)

Label(db,text='City State/ZIP:').grid(row=8)

Label(db,text='Phone:').grid(row=9)

Label(db,text='Lessee Info ').grid(row=4,column=2)

Label(db,text='Name:').grid(row=5,column=2)

Label(db,text='License #: ').grid(row=6,column=2)

Label(db,text='Address:').grid(row=7,column=2)

Label(db,text='City/state/ZIP:').grid(column=2,row=8)

Label(db,text='Phone: ').grid(column=2,row=9)

Label(db,text='VEHICLE INFORMATION').grid(row=10,column=2)

Label(db,text='VIN: ').grid(row=11)

Label(db,text='Make:').grid(row=12)

Label(db,text='Year:').grid(row=13)

Label(db,text='Color:').grid(row=14)

Label(db,text='Registration #').grid(row=11,column=2)

Label(db,text='Model:').grid(row=12,column=2)

Label(db,text='Mileage:').grid(row=13,column=2)

Label(db,text='VIN').grid(row=15,column=0)

Label(db,text='Cost/Day').grid(row=15,column=1)

Label(db,text='# ofDays').grid(row=15,column=2)

Label(db,text='Additional Costs').grid(row=15,column=3)

```

```

Label(db,text='Line Total').grid(row=15,column=4)
Label(db,text='Subtotal:').grid(row=19,column=3)
Label(db,text='Tax { % } :').grid(row=20,column=3)
Label(db,text='Total:').grid(row=21,column=3)
Label(db,text='Amount Paid:').grid(row=22,column=3)
Label(db,text='Payment Method:').grid(row=19,column=0)
Label(db,text='Authorized Signature:').grid(row=25,column=3)
Label(db,text='Representative Name:').grid(row=26,column=3)
t1=Entry(db).grid(row=2,column=1)
t12=Entry(db).grid(row=3,column=1)
t2=Entry(db).grid(row=5,column=1)
t3=Entry(db).grid(row=6,column=1)
t4=Entry(db).grid(row=7,column=1)
t5=Entry(db).grid(row=8,column=1)
t6=Entry(db).grid(row=9,column=1)
t7=Entry(db).grid(row=5,column=3)
t8=Entry(db).grid(row=6,column=3)
t9=Entry(db).grid(row=7,column=3)
t10=Entry(db).grid(row=8,column=3)
t11=Entry(db).grid(row=9,column=3)
t12=Entry(db).grid(row=11,column=1)
t13=Entry(db).grid(row=12,column=1)
t14=Entry(db).grid(row=13,column=1)
t15=Entry(db).grid(row=14,column=1)
t16=Entry(db).grid(row=11,column=3)
t17=Entry(db).grid(row=12,column=3)
t18=Entry(db).grid(row=13,column=3)
t19=Entry(db).grid(row=16,column=0)
t20=Entry(db).grid(row=16,column=1)
t21=Entry(db).grid(row=16,column=2)

```



```

t22=Entry(db).grid(row=16,column=3)
t23=Entry(db).grid(row=16,column=4)
t24=Entry(db).grid(row=17,column=0)
t25=Entry(db).grid(row=17,column=1)
t26=Entry(db).grid(row=17,column=2)
t27=Entry(db).grid(row=17,column=3)
t28=Entry(db).grid(row=17,column=4)
t29=Entry(db).grid(row=18,column=0)
t30=Entry(db).grid(row=18,column=1)
t31=Entry(db).grid(row=18,column=2)
t32=Entry(db).grid(row=18,column=3)
t33=Entry(db).grid(row=18,column=4)
t34=Entry(db).grid(row=19,column=4)
t35=Entry(db).grid(row=20,column=4)
t36=Entry(db).grid(row=21,column=4)
t37=Entry(db).grid(row=22,column=4)
t38=Entry(db).grid(row=20,column=2)
t39=Entry(db).grid(row=21,column=1)
t40=Entry(db).grid(row=22,column=1)
t41=Entry(db).grid(row=25,column=4)
t42=Entry(db).grid(row=26,column=4)
var3=IntVar()
Checkbutton(db,text="Cash:",variable=var3).grid(row=20, column=0)
var4=IntVar()
Checkbutton(db,text="Check No:",variable=var4).grid(row=20, column=1)
var5=IntVar()
Checkbutton(db,text="Credit No:",variable=var5).grid(row=21, column=0)
var6=IntVar()
Checkbutton(db,text="Other:",variable=var6).grid(row=22, column=0)
mainloop()

```

CAR RENTAL RECEIPT				
Date				
Receipt#				
Rental Company Info		Lessee Info		
Company:		Name:		
Representatives:		License #:		
Location:		Address:		
City State/ZIP:		City/state/ZIP:		
Phone:		Phone:		
VEHICLE INFORMATION				
VIN:		Registration #		
Make:		Model:		
Year:		Mileage:		
Color:				
VIN	Cost/Day	# ofDays	Additional Costs	Line Total
Payment Method:			Subtotal:	
<input type="checkbox"/> Cash:	<input type="checkbox"/> Check No:		Tax{ %}:	
<input type="checkbox"/> Credit No:			Total:	
<input type="checkbox"/> Other:			Amount Paid:	
			Authorized Signature:	
			Representative Name:	

Thus, the given program is executed successfully.

## EX-6: NETWORK PROGRAMMING

### QUESTION 1:

Create Simple Client Server Application using TCP Socket where server issue a command which will be executed at the client side as a process of remote command execution.

### CODE:

#TCP Server

```
import socket
```

```
if __name__ == "__main__":
```

```
    ip = "127.0.0.1"
```

```
    port = 1234
```

```
    server = socket.socket(socket.AF_INET,socket.SOCK_STREAM)
```

```
    server.bind((ip,port))
```

```
    server.listen(5)
```

```
    while True:
```

```
        client,address = server.accept()
```

```
        print("Got connection from",address)
```

```
        string = input("Enter String: ")
```

```
        client.send(bytes(string, "utf-8"))
```

```
        client.close()
```

#TCP Client

```
import socket
```

```
if __name__ == "__main__":
```

```
    ip = "127.0.0.1"
```

```
    port = 1234
```

```
    server = socket.socket(socket.AF_INET,socket.SOCK_STREAM)
```

```
    server.connect((ip,port))
```

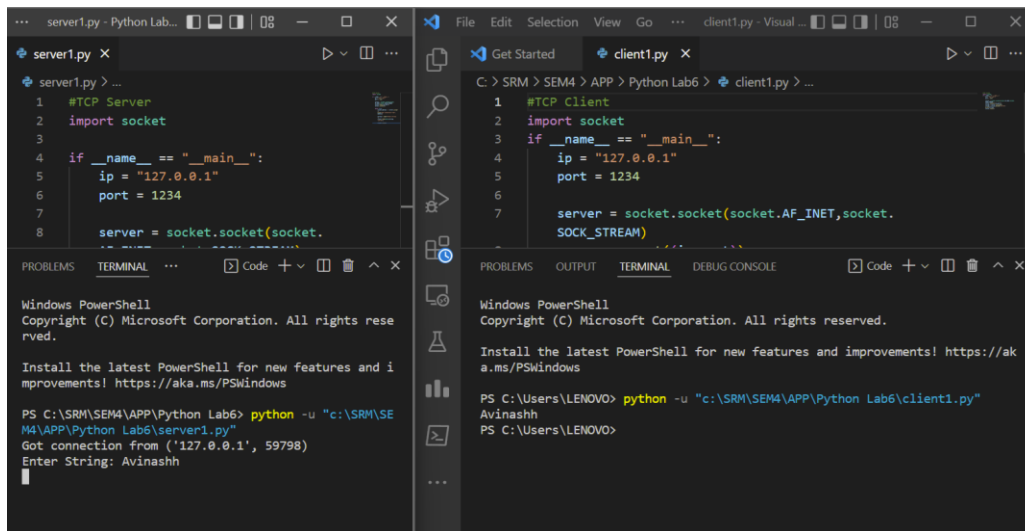
```
    string = server.recv(1024)
```

```
    string = string.decode("utf-8")
```

```
    print(string)
```

```
    server.close()
```

## OUTPUT:



```
server1.py
1 #TCP Server
2 import socket
3
4 if __name__ == "__main__":
5     ip = "127.0.0.1"
6     port = 1234
7
8     server = socket.socket(socket.AF_INET, socket.SOCK_STREAM)
9
10    server.bind((ip, port))
11    server.listen(5)
12
13    while True:
14        client, address = server.accept()
15        print("Got connection from", address)
16        string = client.recv(1024)
17        string = string.decode("utf-8")
18        print(string)
19        client.send(string.upper().encode("utf-8"))
20        client.close()

client1.py
1 #TCP Client
2 import socket
3
4 if __name__ == "__main__":
5     ip = "127.0.0.1"
6     port = 1234
7
8     server = socket.socket(socket.AF_INET, socket.SOCK_STREAM)
9
10    server.connect((ip, port))
11    message = "Avinashh"
12    server.send(message.encode("utf-8"))
13    response = server.recv(1024)
14    response = response.decode("utf-8")
15    print(response)
```

```
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Install the latest PowerShell for new features and improvements! https://aka.ms/PSWindows

PS C:\SRM\SEM4\APP\Python Lab6> python -u "c:\SRM\SEM4\APP\Python Lab6\server1.py"
Got connection from ('127.0.0.1', 59798)
Enter String: Avinashh
```

## QUESTION 2:

Write a Socket-based Python server program that responds to client messages as follows:

When it receives a message from a client, it simply converts the message into all uppercase letters and sends back the same to the client. Write both client and server programs demonstrating this.

## CODE:

#simple TCP Server

```
import socket
```

```
if __name__ == "__main__":
```

```
    ip = "127.0.0.1"
```

```
    port = 1234
```

```
    server = socket.socket(socket.AF_INET, socket.SOCK_STREAM)
```

```
    server.bind((ip, port))
```

```
    server.listen(5)
```

```
    while True:
```

```
        client, address = server.accept()
```

```
        print("Got connection from", address)
```

```
        string = client.recv(1024)
```

```
        string = string.decode("utf-8")
```

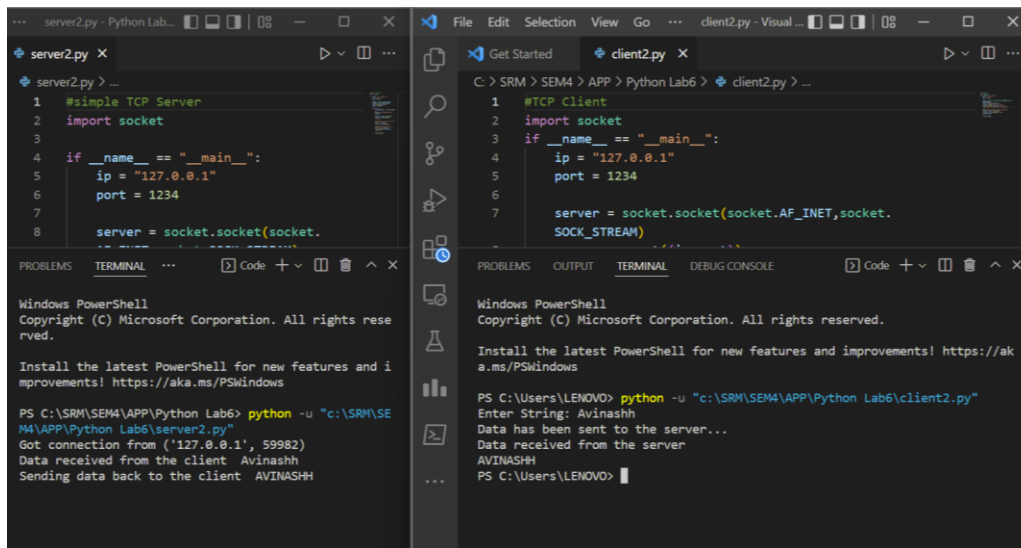
```

    print("Data received from the client ",string)
    string = string.upper()
    print("Sending data back to the client ",string)
    client.send(bytes(string, "utf-8"))
    client.close()

#TCP Client
import socket
if __name__ == "__main__":
    ip = "127.0.0.1"
    port = 1234
    server = socket.socket(socket.AF_INET,socket.SOCK_STREAM)
    server.connect((ip,port))
    string = input("Enter String: ")
    server.send(bytes(string, "utf-8"))
    print("Data has been sent to the server... ")
    print("Data received from the server")
    string = server.recv(1024)
    string = string.decode("utf-8")
    print(string)
    server.close()

```

## OUTPUT:



The image shows two side-by-side Visual Studio Code windows. The left window, titled 'server2.py', contains the code for a simple TCP server. The right window, titled 'client2.py', contains the code for a TCP client. Both windows have a terminal at the bottom showing the execution of the programs.

```
server2.py
1 #simple TCP Server
2 import socket
3
4 if __name__ == "__main__":
5     ip = "127.0.0.1"
6     port = 1234
7
8     server = socket.socket(socket.AF_INET, socket.SOCK_STREAM)
```

```
client2.py
1 #TCP Client
2 import socket
3 if __name__ == "__main__":
4     ip = "127.0.0.1"
5     port = 1234
6
7     server = socket.socket(socket.AF_INET, socket.SOCK_STREAM)
```

**Terminal Output (Left Window):**

```
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Install the latest PowerShell for new features and improvements! https://aka.ms/PSWindows

PS C:\SRM\SEM4\APP\Python Lab6> python -u "c:\SRM\SEM4\APP\Python Lab6\server2.py"
Got connection from ('127.0.0.1', 59982)
Data received from the client  Avinashh
Sending data back to the client  AVINASHH
```

**Terminal Output (Right Window):**

```
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Install the latest PowerShell for new features and improvements! https://aka.ms/PSWindows

PS C:\Users\LENOVO> python -u "c:\SRM\SEM4\APP\Python Lab6\client2.py"
Enter String: Avinashh
Data has been sent to the server...
Data received from the server
AVINASHH
PS C:\Users\LENOVO>
```

## EX-7: CONCURRENT PROGRAMMING

### QUESTION 1:

In computing, the producer-consumer problem (also known as the bounded-buffer problem) is a classic example of a multi-process synchronization problem. The problem describes two processes, the producer and the consumer, which share a common, fixed-size buffer used as a queue.

- The producer's job is to generate data, put it into the buffer, and start again.
- At the same time, the consumer is consuming the data (i.e. removing it from the buffer), one piece at a time.

#### Problem

To make sure that the producer won't try to add data into the buffer if it's full and that the consumer won't try to remove data from an empty buffer.

#### Solution

The producer is to either go to sleep or discard data if the buffer is full. The next time the consumer removes an item from the buffer, it notifies the producer, who starts to fill the buffer again. In the same way, the consumer can go to sleep if it finds the buffer to be empty. The next time the producer puts data into the buffer, it wakes up the sleeping consumer.

### CODE:

```
import threading
import time
items=[]
items_cv=threading.Condition()
def prod():
    print("I'm the producer")
    for i in range(30):
        with items_cv:
            items.append(i)
            items_cv.notify()
            time.sleep(1)
def consumer():
```

```

print("I'm a consumer",threading.current_thread().name)
while True:
    with items_cv:
        while not items:
            items_cv.wait()
        x = items.pop(0)
        print(threading.current_thread().name,"got",x)
        time.sleep(5)
con=[threading.Thread(target=consumer)
     for i in range(10)]
for co in con:
    co.daemon=True
    co.start()
prod()

```

### **OUTPUT:**

```

I'm a consumer I'm a consumerThread-1 (consumer)
I'm a consumer Thread-2 (consumer)
I'm a consumerI'm a consumerThread-3 (consumer)
Thread-5 (consumer)I'm a consumerI'm a consumer Thread-4 (consumer)Thread-7 (consumer)
I'm a consumer

Thread-10 (consumer) got 9
Thread-1 (consumer) got 10
Thread-2 (consumer) got 11
Thread-3 (consumer) got 12
Thread-5 (consumer) got 13
Thread-7 (consumer) got 14
Thread-4 (consumer) got 15
Thread-6 (consumer) got 16
Thread-8 (consumer) got 17

```



Thread-9 (consumer) got 18  
Thread-10 (consumer) got 19  
Thread-1 (consumer) got 20  
Thread-2 (consumer) got 21  
Thread-3 (consumer) got 22  
Thread-5 (consumer) got 23  
Thread-7 (consumer) got 24  
Thread-4 (consumer) got 25  
Thread-6 (consumer) got 26  
Thread-8 (consumer) got 27  
Thread-9 (consumer) got 28  
Thread-10 (consumer) got 29

**RESULT:**

Thus, the given program is executed successfully.

**QUESTION 2:**

Problem Statement – We have a buffer of fixed size. A producer can produce an item and can place in the buffer. A consumer can pick items and can consume them. We need to ensure that when a producer is placing an item in the buffer, then at the same time consumer should not consume any item. In this problem, buffer is the critical section.

To solve this problem, we need two counting semaphores – Full and Empty. “Full” keeps track of number of items in the buffer at any given time and “Empty” keeps track of number of unoccupied slots.

**CODE:**

```
import threading
import time
Cap=10
buf=[-1 for i in range(Cap)]
inind=0
outind=0
```

```

mutex=threading.Semaphore()
empty=threading.Semaphore(Cap)
full=threading.Semaphore(0)
class Producer(threading.Thread):
    def run(self):
        global Cap, buf, inind, outind
        global mutex, empty, full
        items_produced = 0
        counter = 0
        while items_produced < 20:
            empty.acquire()
            mutex.acquire()
            counter += 1
            buf[inind] = counter
            inind = (inind + 1)%Cap
            print(f"Producer produced:{counter}")
            mutex.release()
            full.release()
            time.sleep(1)
            items_produced += 1
class Consumer(threading.Thread):
    def run(self):
        global Cap, buf, inind, outind, counter
        global mutex, empty, full
        items_consumed = 0
        while items_consumed < 20:
            full.acquire()
            mutex.acquire()
            item = buf[outind]
            outind = (outind + 1)%Cap

```

```
print(f"Consumer consumed item:{item}")
mutex.release()
empty.release()
time.sleep(2.5)
items_consumed += 1
producer=Producer()
consumer=Consumer()
consumer.start()
producer.start()
producer.join()
consumer.join()
```

### **OUTPUT:**

```
Producer produced:1
Consumer consumed item:1
Producer produced:2
Producer produced:3
Consumer consumed item:2
Producer produced:4
Producer produced:5
Consumer consumed item:3
Producer produced:6
Producer produced:7
Producer produced:8
Consumer consumed item:4
Producer produced:9
Producer produced:10
Consumer consumed item:5
Producer produced:11
Producer produced:12
Producer produced:13
```

Consumer consumed item:6  
Producer produced:14  
Producer produced:15  
Consumer consumed item:7  
Producer produced:16  
Producer produced:17  
Consumer consumed item:8  
Producer produced:18  
Consumer consumed item:9  
Producer produced:19  
Consumer consumed item:10  
Producer produced:20  
Consumer consumed item:11  
Consumer consumed item:12  
Consumer consumed item:13  
Consumer consumed item:14  
Consumer consumed item:15  
Consumer consumed item:16  
Consumer consumed item:17  
Consumer consumed item:18  
Consumer consumed item:19  
Consumer consumed item:20

**RESULT:**

Thus, the given program is executed successfully.

## EX-8: PARALLEL PROGRAMMING

### QUESTION 1:

The Dining Philosopher Problem – The Dining Philosopher Problem states that K philosophers seated around a circular table with one chopstick between each pair of philosophers. There is one chopstick between each philosopher. A philosopher may eat if he can pick up the two chopsticks adjacent to him. One chopstick may be picked up by any one of its adjacent followers but not both.

There are three states of philosopher: THINKING, HUNGRY and EATING. Here there are two semaphores: Mutex and a semaphore array for the philosophers. Mutex is used such that no two philosophers may access the pickup or putdown at the same time. The array is used to control the behavior of each philosopher. But semaphores can result in deadlock due to programming errors.

### CODE:

```
import threading
import random
import time

class Philosopher(threading.Thread):
    running = True

    def __init__(self, index, forkOnLeft, forkOnRight):
        threading.Thread.__init__(self)
        self.index = index
        self.forkOnLeft = forkOnLeft
        self.forkOnRight = forkOnRight

    def run(self):
        while(self.running):
            time.sleep(30)
            print (f'Philosopher {self.index} is hungry.')
            self.dine()

    def dine(self):
        fork1, fork2 = self.forkOnLeft, self.forkOnRight
```

```

while self.running:
    fork1.acquire()
    locked = fork2.acquire(False)
    if locked: break
    fork1.release()

    print (f'Philosopher {self.index} swaps forks.')
    fork1, fork2 = fork2, fork1
else:
    return

self.dining()
fork2.release()
fork1.release()
def dining(self):
    print (f'Philosopher {self.index} starts eating.')
    time.sleep(30)

    print (f'Philosopher {self.index} finishes eating and leaves to think.')
def main():
    forks = [threading.Semaphore() for n in range(5)]
    philosophers= [Philosopher(i, forks[i%5], forks[(i+1)%5])
                    for i in range(5)]
    Philosopher.running = True
    for p in philosophers: p.start()
    time.sleep(100)
    Philosopher.running = False
    print ("Now we are finishing.")
if __name__ == "__main__":
    main()

```

### OUTPUT:

Philosopher 3 is hungry.Philosopher 0 is hungry.Philosopher 2 is hungry.  
Philosopher 1 is hungry.

Philosopher 4 is hungry.

Philosopher 1 swaps forks.

Philosopher 2 starts eating.Philosopher 4 swaps forks.

Philosopher 0 starts eating.

Philosopher 2 finishes eating and leaves to think.

Philosopher 0 finishes eating and leaves to think.Philosopher 3 starts eating.

Philosopher 1 swaps forks.

Philosopher 4 swaps forks.

Philosopher 1 starts eating.

Philosopher 0 is hungry.

Philosopher 3 finishes eating and leaves to think.Philosopher 2 is hungry.Philosopher 1 finishes eating and leaves to think.

Philosopher 0 swaps forks.

Philosopher 4 starts eating.

Philosopher 2 starts eating.

Philosopher 0 swaps forks.

Now we are finishing.

Philosopher 1 is hungry.

Philosopher 3 is hungry.

Philosopher 4 finishes eating and leaves to think.Philosopher 2 finishes eating and leaves to think.

Philosopher 0 starts eating.

Philosopher 0 finishes eating and leaves to think.

### **RESULT:**

Thus, the given program is executed successfully.

## QUESTION 2:

Consider a situation where we have a file shared between many people.

- If one of the people tries editing the file, no other person should be reading or writing at the same time, otherwise changes will not be visible to him/her.
- However if some person is reading the file, then others may read it at the same time.

Precisely in OS we call this situation as the readers-writers problem

Problem parameters:

- One set of data is shared among a number of processes
- Once a writer is ready, it performs its write. Only one writer may write at a time
- If a process is writing, no other process can read it
- If at least one reader is reading, no other process can write
- Readers may not write and only read

## CODE:

```
import threading as thread
import random

global x
x = 0

lock = thread.Lock()

def Reader():
    global x
    print("\nReader is Reading!")
    lock.acquire()
    print(f"\nShared Data: {x}")
    lock.release()
    print()

def Writer():
    global x
    print("\nWriter is Writing!")
    lock.acquire()
```



```

x += 1
print('Writer is Releasing the lock!')
lock.release()
print()
if __name__ == '__main__':
    for i in range(0, 10):
        randomNumber = random.randint(0, 100)
        if(randomNumber > 50):
            t1 = thread.Thread(target = Reader)
            t1.start()
        else:
            t2 = thread.Thread(target = Writer)
            t2.start()
t1.join()
t2.join()

```

### **OUTPUT:**

Reader is Reading!

Shared Data:0

Reader is Reading!

Writer is Writing!

Writer is Releasing the lock!

Reader is Reading!

Reader is Reading!

Writer is Writing!

Reader is Reading!

Shared Data:1

Writer is Writing!

Reader is Reading!

Reader is Reading!

Shared Data:1

Shared Data:1

Shared Data:1

Writer is Releasing the lock!

Writer is Releasing the lock!

Shared Data:3

Shared Data:3

### **RESULT:**

Thus, the given program is executed successfully.

## EX-9: FUNCTIONAL PROGRAMMING

### QUESTION 1:

Write a Python program to create Fibonacci series up to n using Lambda.

#### CODE:

```
def fibonacci(count):  
    listA=[0,1]  
    any(map(lambda _:listA.append(sum(listA[-2:])),range(2, count)))  
    return listA[:count]  
  
n=int(input())  
print(fibonacci(n))
```

#### OUTPUT:

```
5  
[0, 1, 1, 2, 3]
```

#### RESULT:

Thus, the given program is executed successfully.

### QUESTION 2:

Write a Python program to find the numbers of a given string and store them in a list, display the numbers which are bigger than the length of the list in sorted form. Use lambda function to solve the problem.

#### CODE:

```
str1 = "SOC 23 CTech 5 DSBS8 NWC 56 CINtel 20 5"  
print("Original string:",str1)  
str_num=[i for i in str1.split(' ')]  
length=len(str_num)  
numbers=sorted([int(x) for x in str_num if x.isdigit()])  
print('Numbers in sorted form:')  
for i in ((filter(lambda x:x>length,numbers))):  
    print(i,end=' ')
```

#### OUTPUT:

Original string: SOC 23 CTech 5 DSBS8 NWC 56 CINtel 20 5

Numbers in sorted form:

20 23 56

**RESULT:**

Thus, the given program is executed successfully.

**QUESTION 3:**

Write a Python program to sort a given list of strings(numbers) numerically using lambda.

**CODE:**

```
def sort_numeric_strings(nums_str):  
    result = sorted(nums_str, key=lambda el: int(el))  
    return result  
  
nums_str=['40','20','50','47','30','-10','-20','115','100']  
print("Original list:")  
print(nums_str)  
print("Sort the said list of strings(numbers) numerically:")  
print(sort_numeric_strings(nums_str))
```

**OUTPUT:**

Original list:

['40', '20', '50', '47', '30', '-10', '-20', '115', '100']

Sort the said list of strings(numbers) numerically:

['-20', '-10', '20', '30', '40', '47', '50', '100', '115']

**RESULT:**

Thus, the given program is executed successfully.

**QUESTION 4:**

Write a Python program to calculate the average value of the numbers in a given tuple of tuples using lambda.

**CODE:**

```

def average_tuple(nums):
    result = tuple(map(lambda x: sum(x) / float(len(x)), zip(*nums)))
    return result

nums = ((1,1,1),(3,4,5),(8,7,9),(10,20,30))
print("Original Tuple:")
print(nums)
print("Average value of the numbers of the said tuple of tuples:\n",average_tuple(nums))

```

### **OUTPUT:**

Original Tuple:

((1, 1, 1), (3, 4, 5), (8, 7, 9), (10, 20, 30))

Average value of the numbers of the said tuple of tuples:

(5.5, 8.0, 11.25)

### **RESULT:**

Thus, the given program is executed successfully.

### **QUESTION 5:**

Write a Python program to find the nested lists elements, which are present in another list using lambda.

### **CODE:**

```

def intersection_nested_lists(l1, l2):
    result = [list(filter(lambda x: x in l1, sublist)) for sublist in l2]
    return result

nums1 = [1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14]
nums2 = [[12, 18, 23, 25, 45], [7, 11, 19, 24, 28], [1, 5, 8, 18, 15, 16]]
print("Original lists:")
print(nums1)
print(nums2)
print("Intersection of said nested lists:")
print(intersection_nested_lists(nums1, nums2))

```

**OUTPUT:**

Original lists:

```
[1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14]
```

```
[[12, 18, 23, 25, 45], [7, 11, 19, 24, 28], [1, 5, 8, 18, 15, 16]]
```

Intersection of said nested lists:

```
[[12], [7, 11], [1, 5, 8]]
```

**RESULT:**

Thus, the given program is executed successfully.

**QUESTION 6:**

Write a Python program to convert a given list of strings into list of lists using map function.

**CODE:**

```
def strings_to_listOflists(str):  
    result=map(list, str)  
    return list(result)  
colors=["Red","Blue","Orange"]  
print('Original list of strings:')  
print(colors)  
print("Convert the said list of strings into list of lists:")  
print(strings_to_listOflists(colors))
```

**OUTPUT:**

Original list of strings:

```
['Red', 'Blue', 'Orange']
```

Convert the said list of strings into list of lists:

```
[['R', 'e', 'd'], ['B', 'l', 'u', 'e'], ['O', 'r', 'a', 'n', 'g', 'e']]
```

**RESULT:**

Thus, the given program is executed successfully.

**QUESTION 7:**

Write a Python program to convert all the characters in uppercase and lowercase and eliminate duplicate letters from a given sequence. Use map() function.

**CODE:**

```
def change_cases(s):  
    return str(s).upper(), str(s).lower()  
chrars={'a','b','C','d','a','e','f','G','a'}  
print("Original Characters:\n",chrars)  
result=map(change_cases, chrars)  
print("After converting above characters in upper and lower cases\nand eliminating duplicate letters:")  
print(set(result))
```

**OUTPUT:**

Original Characters:

```
{'C', 'a', 'e', 'G', 'd', 'b', 'f'}
```

After converting above characters in upper and lower cases

and eliminating duplicate letters:

```
{('B', 'b'), ('C', 'c'), ('F', 'f'), ('G', 'g'), ('E', 'e'), ('A', 'a'), ('D', 'd')}
```

**RESULT:**

Thus, the given program is executed successfully.

**QUESTION 8:**

Write a Python program to add two given lists and find the difference between lists.

Use map() function.

**CODE:**

```
def addition_subtrction(x, y):  
    return x + y, x - y  
nums1=[80,70,60,50]  
nums2=[40,30,20,10]  
print("Original lists:")  
print(nums1)
```

```
print(nums2)
result=map(addition_subtrction, nums1, nums2)
print("Result:")
print(list(result))
```

**OUTPUT:**

Original lists:

[80, 70, 60, 50]

[40, 30, 20, 10]

Result:

[(120, 40), (100, 40), (80, 40), (60, 40)]

**RESULT:**

Thus, the given program is executed successfully.

**QUESTION 9:**

Write a Python program to add two given lists and find the difference between lists.

Use map() function.

**CODE:**

```
def addition_subtrction(x, y):
    return x + y, x - y
nums1=[80,70,60,50]
nums2=[40,30,20,10]
print("Original lists:")
print(nums1)
print(nums2)
result=map(addition_subtrction, nums1, nums2)
print("Result:")
print(list(result))
```

**OUTPUT:**

Original lists:

[80, 70, 60, 50]



[40, 30, 20, 10]

Result:

[(120, 40), (100, 40), (80, 40), (60, 40)]

**RESULT:**

Thus, the given program is executed successfully.

**QUESTION 10:**

Filter the array, and return a new array with only the values equal to or above 18 (consider filter function)

**CODE:**

```
def fun(variable):
```

```
    letters = ['a', 'e', 'i', 'o', 'u']
```

```
    if (variable in letters):
```

```
        return True
```

```
    else:
```

```
        return False
```

```
sequence = ['g', 'e', 'e', 'j', 'k', 's', 'p', 'r']
```

```
filtered=filter(fun, sequence)
```

```
print("The filtered letters are:")
```

```
for s in filtered:
```

```
    print(s)
```

**OUTPUT:**

The filtered letters are:

e

e

**RESULT:**

Thus, the given program is executed successfully.

**QUESTION 11:**

Write a Python program to filter only vowels from given sequence.

**CODE:**

```
def vowel(c):  
    newstr = c  
    vowels = ['a', 'e', 'i', 'o', 'u']  
    for x in c.lower():  
        if x not in vowels:  
            newstr = newstr.replace(x, "")  
    return newstr  
seq='geejkspr'  
print(vowel(seq))
```

**OUTPUT:**

ee

**RESULT:**

Thus, the given program is executed successfully.

**QUESTION 12:**

Write a Python program to calculate sum of numbers from the list and maximum element from the list (use reduce function)

**CODE:**

```
from functools import reduce  
def sum(a, b):  
    print(f"a={a},b={b},{a}+{b}={a+b}")  
    return a + b  
scores = [75, 65, 80, 95, 50]  
total = reduce(sum, scores)  
print(total)
```

**OUTPUT:**

a=75,b=65,75+65=140

a=140,b=80,140+80=220

a=220,b=95,220+95=315

a=315,b=50,315+50=365

365

**RESULT:**

Thus, the given program is executed successfully.

**QUESTION 13:**

Write a python program to calculate factorial of given number (use reduce function)

**CODE:**

```
import functools

def mult(x,y):
    print(f"x={x} y={y}")
    return x*y

fact=functools.reduce(mult, range(1, 4))
print(f'Factorial of 3:{fact}')
```

**OUTPUT:**

x=1 y=2

x=2 y=3

Factorial of 3:6

**RESULT:**

Thus, the given program is executed successfully.

## EX-10: SYMBOLIC PROGRAMMING

### QUESTION 1:

Solve the following using symbolic paradigm:

- i. Calculate  $\sqrt{2}$  with 100 decimals.

#### CODE:

```
from sympy import *
print(N(sqrt(2),100))
```

#### OUTPUT:

```
1.41421356237309504880168872420969807856967187537694807317667973799073247846210703885038753
4327641573
```

- ii. Calculate  $(1/2 + 1/3)$  in rational arithmetic.

#### CODE:

```
import sympy as sym
a = (sym.Rational(1, 2)+sym.Rational(1,3))
print(sym.simplify(a))
```

#### OUTPUT:

```
5/6
```

- iii. Calculate the expanded form of  $(x+y)^6$ .

#### CODE:

```
import sympy as sym
x = sym.Symbol('x')
y = sym.Symbol('y')
a = sym.expand((x+y)**6)
print(a)
```

#### OUTPUT:

```
x**6 + 6*x**5*y + 15*x**4*y**2 + 20*x**3*y**3 + 15*x**2*y**4 + 6*x*y**5 + y**6
```

- iv. Simplify the trigonometric expression  $\sin(x) / \cos(x)$

#### CODE:

```
from sympy import *
x = symbols('x')

a = (sin(x)/(cos(x)))
s=simplify(a)
print(format(s))
```

#### OUTPUT:

$\tan(x)$

v. Calculate  $\sin x - x^{3n}$

**CODE:**

```
from sympy import *
x,n=symbols('x n')
exp= sin(x)-x*x**3*n
s=trigsimp(exp)
print(s)
```

**OUTPUT:**

$-n*x**4 + \sin(x)$

**RESULT:**

Thus, the given program is executed successfully.

**QUESTION 2:**

Develop a python code for to carry out the operations on the given algebraic manipulation for the given expression  $a^2 - ab + ab - b^2 = a^2 - b^2$  by using the symbolic programming paradigms principles.

**CODE:**

```
import sympy as sym
a = sym.Symbol('a')
b = sym.Symbol('b')
lhs=sym.simplify(a**2-a*b+a*b-b**2)
rhs=sym.simplify(a**2-b**2)
print('lhs is ',lhs)
print('rhs is ',rhs)
```

**OUTPUT:**

lhsis  $a**2 - b**2$

rhsis  $a**2 - b**2$

**RESULT:**

Thus, the given program is executed successfully.

**QUESTION 3:**

Give the Symbolic program for the expression given below:

a.  $\iint a^2 da$

**CODE:**

```

from sympy import *
import functools
import operator
import random
a=symbols('a')
g=a**2
j=integrate(g,a)
print('before integration a**2')
print('after integration '+str(j))

```

**OUTPUT:**

before integration a\*\*2

after integration a\*\*3/3

b.  $2x+y^2$

**CODE:**

```

import sympy as sym
x = sym.Symbol('x')
y = sym.Symbol('y')
a = sym.simplify(2*x+y**2)
print(a)

```

**OUTPUT:**

$2x + y^2$

c.  $1/10 + 1/5$

**CODE:**

```

import sympy as sym
a = (sym.Rational(1, 10)+sym.Rational(1,5))
print(sym.simplify(a))

```

**OUTPUT:**

$3/10$

d.  $d/dx(\sin(x))$

**CODE:**

```

from sympy import *
import functools
import operator
import random
a=symbols('a')
x=symbols('x')
g=sin(x)
j=diff(g,a)

```

```
print('before differentiation sin(x)')  
print('after differentiation '+str(j))
```

**OUTPUT:**

```
before differentiation sin(x)  
after differentiation 0
```

**RESULT:**

Thus, the given program is executed successfully.

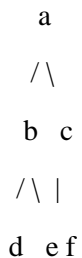
## EX-11: LOGICAL PROGRAMMING

### QUESTION 1:

Implement using pyDatalog:

Assume given a set of facts of the form `father(name1,name2)` (`name1` is the father of `name2`).

- Define a predicate `brother(X,Y)` which holds iff `X` and `Y` are brothers.
- Define a predicate `cousin(X,Y)` which holds iff `X` and `Y` are cousins.
- Define a predicate `grandson(X,Y)` which holds iff `X` is a grandson of `Y`.
- Define a predicate `descendent(X,Y)` which holds iff `X` is a descendent of `Y`.
- Consider the following genealogical tree:



What are the answers generated by your definitions for the queries:

```
brother(X,Y)
cousin(X,Y)
grandson(X,Y)
descendent(X,Y)
```

### CODE:

```
from pyDatalog import pyDatalog

pyDatalog.create_terms('a,b,c,d,e,f,brother,cousin,grandson,descendent,X,Y')

+brother('b','c')
+brother('d','e')
+cousin('d','f')
+cousin('e','f')
+grandson('d','a')
+grandson('e','a')
+grandson('f','a')
```



```

+descendent('b','a')
+descendent('c','a')
+descendent('d','b')
+descendent('f','c')
print(pyDatalog.ask('brother(X,Y)'))
print(pyDatalog.ask('cousin(X,Y)'))
print(pyDatalog.ask('grandson(X,Y)'))
print(pyDatalog.ask('descendent(X,Y)'))

```

### OUTPUT:

```

{('d', 'e'), ('b', 'c')}
{('d', 'f'), ('e', 'f')}
{('e', 'a'), ('d', 'a'), ('f', 'a')}
{('f', 'c'), ('b', 'a'), ('c', 'a'), ('d', 'b')}

```

### RESULT:

Thus, the given program is executed successfully.

### QUESTION 2:

Encode the following facts and rules in pyDatalog:

- ☐ Bear is big
- ☐ Elephant is big
- ☐ Cat is small
- ☐ Bear is brown
- ☐ Cat is black
- ☐ Elephant is gray
- ☐ An animal is dark if it is black
- ☐ An animal is dark if it is brown

Write a query to find which animal is dark and big.

### CODE:

```

pyDatalog.create_terms('X,Y,Z,bear,elephant,cat,small,big,brown,black,gray,dark')
+big('elephant')

```

```
+big('bear')
+small('cat')
+black('cat')
+brown('bear')
+gray('elephant')
dark(X)<=black(X) or brown(X)
print(big(X),dark(X))
```

**OUTPUT:**

```
X
-----
bear
elephant X
---
cat
```

**RESULT:**

Thus, the given program is executed successfully.

**QUESTION 3:**

The following are the marks scored by 5 students.

Student Name	Mark
--------------	------

Ram	90
-----	----

Raju	45
------	----

Priya	85
-------	----

Carol	70
-------	----

Shyam	80
-------	----

Enter the above data using pyDatalog.

Write queries for the following:

- Print Student name and mark of all students.
- Who has scored 80 marks?
- What mark has been scored by Priya?

- d. Write a rule 'passm' denoting that pass mark is greater than 50. Use the rule to print all students who failed.
- e. Write rules for finding grade letters for a marks and use the rule to find the grade letter of a given mark.

**CODE:**

```
from pyDatalog import pyDatalog
pyDatalog.create_terms('X,Y,Z,student,marks,passm,grades')
+student('ram')
+student('raju')
+student('priya')
+student('carol')
+student('shyam')
+marks('90','ram')
+marks('45','raju')
+marks('85','priya')
+marks('70','carol')
+marks('80','shyam')
+grades('ram','O')
+grades('priya','A')
+grades('shyam','A')
+grades('carol','B')
+grades('raju','E')
print(marks(X,Y))
print(marks('80',X))
print(marks(X,'priya'))
passm(X)<=grades(X,'E')
print(passm(X))
```

**OUTPUT:**

```
X | Y
---|-----
```

80 | shyam

70 | carol

85 | priya

45 | raju

90 | ram

X

-----

shyam

X

--

85

X

----

raju

#### **RESULT:**

Thus, the given program is executed successfully.

#### **QUESTION 4:**

Solve the set of queries in the previous question using imperative programming paradigm in Python. Store the data in a dictionary.

#### **CODE:**

```
marks={90:'ram', 85: 'priya', 80: 'shyam', 70: 'carol',45: 'raju'}
```

```
for i in marks:
```

```
    print(i,marks[i])
```

```
print(marks [80])
```

```
for i in marks:
```

```
    if marks[i]=='priya':
```

```
        print(i)
```

```
for i in marks:
```

```
    if i<50:
```

```
        print(marks[i])
for i in marks:
    if i>=90:
        print (marks[i], 'O')
    elif i<90 and i>=80:
        print (marks[i], 'A')
    elif i<80 and i>=70:
        print(marks[i], 'B')
    elif i<70 and i>=60:
        print (marks[i], 'C')
    elif i<60 and i>=50:
        print (marks[i], 'D')
    else:
        print(marks[i], 'E')
```

**OUTPUT:**

```
90 ram
85 priya
80 shyam
70 carol
45 raju
shyam
85
raju
ram O
priya A
shyam A
carol B
raju E
```

**RESULT:**

Thus, the given program is executed successfully.

**QUESTION 5:**

Write a recursive program to find factorial of a number using pyDatalog.

**CODE:**

```
from pyDatalog import pyDatalog
pyDatalog.create_terms('factorial, N')
num=int(input('Enter any number:'))
factorial[N] = N*factorial[N-1]
factorial[1] = 1
print(factorial[num]==N)
```

**OUTPUT:**

Enter any number:3

N

-

6

**RESULT:**

Thus, the given program is executed successfully.

## FUNCTIONAL PROGRAMMING

### QUESTION 1:

Calculate the following using Lambda calculus:

a. T AND F

b.  $3 * 4$

#### CODE:

```
y=lambda s: s and False
print("T AND F = ",y(True))
x = lambda a : a*4
print("3*4= ",x(3))
```

#### OUTPUT:

```
T AND F = False
3*4= 12
```

#### RESULT:

Thus, the given program is executed successfully.

### QUESTION 2:

Lambda functions

a. Write a lambda function to convert measurements from meters to feet.

#### CODE:

```
x=lambda x:3.281*x
print("Answer is: ",x(91))
```

#### OUTPUT:

```
Answer is: 298.571
```

#### RESULT:

Thus, the given program is executed successfully.

### QUESTION 3:

Passing and returning a function as an argument

Define a function 'square' for squaring a number. Define a function named 'twice' that takes a function f as an argument and returns f(f(x)). Using 'twice' and 'square' create a function 'quad' that takes n as an argument and returns  $n^4$ . 'quad' should not be defined explicitly. It should only be created as a variable which is then assigned a function.

**CODE:**

```
def square(number):  
    value=number*number  
    return value  
  
    def twice(func,num):  
        return func(func(num))  
a=int(input('enter a number:'))  
b=twice(square,a)  
print(b)
```

**OUTPUT:**

```
enter a number:9  
6561
```

**RESULT:**

Thus, the given program is executed successfully.

**QUESTION 4:**

Closure

A Closure is a function object that remembers values in enclosing scopes even if they are not present in memory. We have a closure in Python when a nested function references a value in its enclosing scope.

**CODE:**

```
def smart(fun):  
  
    def inner(a,b):  
  
        if a<b:  
  
a,b=b,a  
  
        return fun(a,b)  
  
    return inner  
  
@smart
```

```
def div(a,b):  
  
    print(a/b)  
  
div(2,4)
```

**OUTPUT:**

```
2.0
```



**RESULT:**

Thus, the given program is executed successfully.

**QUESTION 5:**

a. Study the following program by executing it:

**CODE:**

```
def multiplier_of(n):  
    def multiplier(number):  
        return number*n  
    return multiplier  
multiplywith5 = multiplier_of(5)  
print(multiplywith5(9))
```

**OUTPUT:**

45

b. In a lottery system, random number is chosen by retrieving the number from a random index from a list of random numbers. Write a program to choose a random number in this way. You must use nested functions – the inner function chooses a number from a random index and the outer function generates a random list of numbers. The outer function takes n as a parameter where is the maximum number that can be put in the random list. (Your code should be similar to the program in 5a)

**CODE:**

```
import random  
  
m=10  
print("Let the maximum Limit for generating random numbers be "+str(m))  
lst=[]  
for i in range(m):  
  
    lst.append(random.randint(1,m))  
  
for j in range(1):  
  
    d1=random.randrange(0,m,1)  
  
print("Index of the random number is ",lst[d1])
```

**OUTPUT:**

Let the maximum Limit for generating random numbers be 10

Index of the random number is 7

**RESULT:**

Thus, the given program is executed successfully.

**QUESTION 6:**

Map

A secret message needs to be sent. Use the map function to encrypt the message using Caesar cipher.

**CODE:**

```
def encrypt(text,s):
    result=""
    for i in range(len(text)):
        char=text[i]
    if(char.isupper()):
        result+=chr((ord(char)+s-65)%26+65)
    else:
        result+=chr((ord(char)+s-97)%26+97)
    return result
text="ATTACKATONCE"
s=4
print("Text: "+text)
print('shift: '+str(s))
print('cipher: '+encrypt(text,s))
```

**OUTPUT:**

```
Text: ATTACKATONCE
shift: 4
cipher: EXXEGOEXSRGI
```

**RESULT:**

Thus, the given program is executed successfully.

**QUESTION 7:**

Reduce

Given runs scored by 2 players in a series of matches, write a Python program using reduce function to find who is the better player of the two in terms of maintaining consistency. (You need to find SD).

**CODE:**

```
import functools
import operator
```

```
p1=[45,81,39]
p2=[24,89,12]
av1=functools.reduce(operator.add,p1)
av2=functools.reduce(operator.add,p2)
av1=av1/2
av2=av2/2
print("Player1 " if av1>av2 else "player2")
print("\n")
```

**OUTPUT:**

Player1

**RESULT:**

Thus, the given program is executed successfully.

**QUESTION 8:**

Map+reduce+filter

Given two trending topics and a bunch of tweets, write a Python program to count the number of tweets that contain each topic. You need to do this by putting together map(), reduce() and filter() functions.

**CODE:**

```
import functools
q=functools.reduce(lambda x,y: x+y, map(lambda x: x+x, filter (lambda x: (x<=4),[1,2,3,4 ,7])))
print(q)
```

**OUTPUT:**

20

**RESULT:**

Thus, the given program is executed successfully.

## EX-12: AUTOMATA PROGRAMMING

### DFA:

#### QUESTION 1:

Write a automata code for the Language that accepts all and only those strings that contain 001

#### CODE:

```
from automata.fa.dfa import DFA
dfa = DFA(
    states={'q0', 'q1', 'q2', 'q3'},
    input_symbols={'0', '1'},
    transitions={
        'q0': {'0': 'q1', '1': 'q0'},
        'q1': {'0': 'q2', '1': 'q0'},
        'q2': {'0': 'q2', '1': 'q3'},
        'q3': {'0': 'q3', '1': 'q3'}
    },
    initial_state='q0',
    final_states={'q3'}
)
for i in range(1,4):
    num = input("Enter the string :")
    if(dfa.accepts_input(num)):
        print("Accepted")
    else:
        print("Rejected")
```

#### OUTPUT:

Enter the string :1001

Accepted

Enter the string :010101

Rejected

#### RESULT:

Thus, the given program is executed successfully.

#### QUESTION 2:

Write a automata code for  $L(M) = \{ w \mid w \text{ has an even number of 1s} \}$

#### CODE:

```
from automata.fa.dfa import DFA
dfa = DFA(
```

```

    states={'q0', 'q1', 'q2'},
    input_symbols={'0', '1'},
    transitions={
        'q0': {'0': 'q0', '1': 'q1'},
        'q1': {'0': 'q1', '1': 'q2'},
        'q2': {'0': 'q2', '1': 'q1'}
    },
    initial_state='q0',
    final_states={'q2'}
)
for i in range(1,4):
    num = input("Enter the string :")
    if(dfa.accepts_input(num)):
        print("Accepted")
    else:
        print("Rejected")

```

### OUTPUT:

```

Enter the string :10101
Rejected
Enter the string :10010
Accepted

```

### RESULT:

Thus, the given program is executed successfully.

### QUESTION 3:

Write a automata code for  $L(M) = \{0,1\}^*$

### CODE:

```

from automata.fa.dfa import DFA
dfa = DFA(
    states={'q0'},
    input_symbols={'0', '1'},
    transitions={
        'q0': {'0': 'q0', '1': 'q0'}
    },
    initial_state='q0',
    final_states={'q0'}
)
for i in range(1,8):
    num = input("Enter the string :")
    if(dfa.accepts_input(num)):
        print("Accepted")
    else:
        print("Rejected")

```

**OUTPUT:**

Enter the string :101

Accepted

Enter the string :001

Accepted

Enter the string :720

Rejected

**RESULT:**

Thus, the given program is executed successfully.

**QUESTION 4:**

Write a automata code for  $L(M)=a + aa*b$ .

**CODE:**

```
from automata.fa.dfa import DFA
dfa = DFA(
    states={'q0', 'q1', 'q2','q3','q4','q5'},
    input_symbols={'a', 'b'},
    transitions={
        'q0': {'a': 'q1', 'b': 'q5'},
        'q1': {'a': 'q2', 'b': 'q5'},
        'q2': {'a': 'q3', 'b': 'q4'},
        'q3': {'a': 'q2', 'b': 'q5'},
        'q4': {'a': 'q5', 'b': 'q5'},
        'q5': {'a': 'q5', 'b': 'q5'}
    },
    initial_state='q0',
    final_states={'q1','q4'}
)
for i in range(1,6):
    num = input("Enter the string :")
    if(dfa.accepts_input(num)):
        print("Accepted")
    else:
        print("Rejected")
```

**OUTPUT:**

Enter the string :a

Accepted

Enter the string :aab

Accepted

Enter the string :aaab

Rejected  
Enter the string :abab  
Rejected

**RESULT:**

Thus, the given program is executed successfully.

**QUESTION 5:**

Write a automata code for  $L(M) = \{(ab)^n \mid n \in \mathbb{N}\}$

**CODE:**

```
from automata.fa.dfa import DFA
dfa = DFA(
    states={'q0', 'q1', 'q2', 'q3'},
    input_symbols={'a', 'b'},
    transitions={
        'q0': {'a': 'q1', 'b': 'q3'},
        'q1': {'a': 'q3', 'b': 'q2'},
        'q2': {'a': 'q1', 'b': 'q3'},
        'q3': {'a': 'q3', 'b': 'q3'},
    },
    initial_state='q0',
    final_states={'q2'}
)
for i in range(1,6):
    num = input("Enter the string :")
    if(dfa.accepts_input(num)):
        print("Accepted")
    else:
        print("Rejected")
```

**OUTPUT:**

Enter the string :ab  
Accepted  
Enter the string :baba  
Rejected  
Enter the string :aaabbb  
Rejected  
Enter the string :abab  
Accepted

**RESULT:**

Thus, the given program is executed successfully.

**QUESTION 6:**

Write a automata code for Let  $\Sigma = \{0, 1\}$ .

Given DFAs for  $\{\}$ ,  $\{\varepsilon\}$ ,  $\Sigma^*$ , and  $\Sigma^+$ .

6.1  $\{\}$  -- (null set):

**CODE:**

```
from automata.fa.dfa import DFA

# DFA which does not accept any input

dfa = DFA(
    states={'q0', 'q1'},
    in
    input_symbols={'0',
    '1'}, transitions={
        'q0': {'0': 'q0', '1': 'q0'},
        'q1': {'0': 'q1', '1': 'q1'}
    },
    initial_state='q0'
    ,
    final_states={'q
    1'}
)

for i in range(1,8):
    num = input("Enter the string
    :")
    if(nfa.accepts_input(num)):
        print("Accepted
    ") else:
        print("Rejected")
```



**OUTPUT:**

Enter the string :101

Rejected

Enter the string :100

6.3 Rejected

. {  $\epsilon$  } -- Accepts only null character:

**CODE:**

```

from automata.fa.dfa import DFA

# DFA which does not accept any input

dfa = DFA(
    states={'q0', 'q1'},
    input_symbols={'0',
'1'}, transitions={
        'q0': {'0': 'q1', '1': 'q1'},
        'q1': {'0': 'q1', '1': 'q1'}
    },
    initial_state='q0'
    ,
    final_states={'q
0'}
)

for i in range(1,6):
    num = input("Enter the string :")
    if(dfa.accepts_input(num)):
        print("Accepted")
    else:
        print("Rejected")

```

**OUTPUT:**

Enter the string :10

Rejected

Enter the string :111

Rejected

Enter the string :

Accepted

## RESULT:

Thus, the given program is executed successfully.

1.  $\Sigma^*$  -- accepts all combinations of '1' and '0' including nullstring:

### CODE:

```
from automata.fa.dfa import DFA

# DFA which does not accept any input

dfa = DFA(
    states={'q0'},
    input_symbols={'0',
    '1'}, transitions={
        'q0': {'0': 'q0', '1': 'q0'}
    },
    initial_state='q0
    ',
    final_states={'q0
    '}
)

for i in range(1,8):
    num = input("Enter the string
    :")
    if(dfa.accepts_input(num)):
        print("Accepted
    ") else:
        print("Rejected")
```

**OUTPUT:**

Enter the string :101

Accepted

Enter the string :1111

Accepted

Enter the string :34

Rejected

**RESULT:**

Thus, the given program is executed successfull

6.4.  $\Sigma^+$  accepts all combinations of '1' and '0' excluding null string:

**CODE:**

```
from automata.fa.dfa import DFA

# DFA which does not accept any input
dfa = DFA(
    states={'q0', 'q1'},
    input_symbols={'0',
    '1'}, transitions={
        'q0': {'0': 'q1', '1': 'q1'},
        'q1': {'0': 'q1', '1': 'q1'}
    },
    initial_state='q0'
    ,
    final_states={'q
    1'}
)

for i in range(1,8):
    num = input("Enter the string
    :")
    if(dfa.accepts_input(num)):
        print("Accepted
        ") else:
            print("Rejected")
```

**OUTPUT:**

Enter the string :101

Accepted

Enter the string :111

Accepted

Enter the string :

Rejected

**NFA:****QUESTION 1:**

Write a automata code for the Language that accepts all end with 01

**CODE:**

```
from automata.fa.nfa import NFA

# NFA which accepts strings that ends with '01'

nfa = NFA(

states={'q0', 'q1', 'q2'},

input_symbols={'0', '1'},

transitions={
'q0': {'0': {'q1', 'q0'}, '1': {'q0'}},
'q1': {'1': {'q2'}},
'q2': {}
},
initial_state='q0',
final_states={'q2'}
)

for i in range(1,4):

num = input("Enter the string :")

    if (nfa.accepts_input(num)):
        print("Accepted")

    else:

        print("Rejected")
```

**OUTPUT:**

Enter the string :1001

Accepted

Enter the string :1010

Rejected

**RESULT:**

Thus, the given program is executed successfully.

## QUESTION 2:

Write a automata code for  $L(M) = a + aa^*b + a^*b$ .

### CODE:

```
from automata.fa.nfa import NFA

# NFA which accepts strings that ends with '01'

nfa = NFA(

states={'q0', 'q1', 'q2','q3','q4'},

input_symbols={'a', 'b'},

transitions={
'q0': {'a': {'q1', 'q2'}},
'q1': {'a': {'q2','q4'},'b':{'q4'}},
'q2': {'a': {'q2'},'b':{'q3'}},
'q3': {},
'q4': {}
},
initial_state='q0',
final_states={'q1','q3'}
)

for i in range(1,6):

num = input("Enter the string :")

    if (nfa.accepts_input(num)):
        print("Accepted")

    else:

        print("Rejected")
```

### OUTPUT:

```
Enter the string :a
Accepted
Enter the string :aab
Accepted
Enter the string :baba
Rejected
```

### RESULT:

Thus, the given program is executed successfully.