**Ex.No:1**

**Date:                      STRUCTURED PROGRAMMING**

**AIM:**

To implement the structured programming paradigm using python.

               1a .Write a program to develop a payroll calculator for school using python. The user input starts by asking for your name or "0" to quit the program, hours worked and pay rate. Extra salary will be provided for over time according to the decision of the admin.

**ALGORITHM:**

* Start the program
* Get the input from the user
* Find the regular pay if there is no overtime hours
* Find the overtime hour.
* Find the regular time pay, over time pay and  net pay
* Print the results

**PROGRAM:**

user = str

end = "0"

hours = round(40,2)

print("One Stop Shop Payroll Calculator")

hours = (float(input("Please enter hours worked: ", )))

payrate =(float(input("Please enter your payrate: $", )))

if hours < 40:

print("Employee's name: ", user)

print("Overtime hours: 0")

print("Overtime Pay: $0.00")

regularpay = round(hours \* payrate, 2)

print("Gross Pay: $", regularpay)

elif hours > 40:

overtimehours = round(hours - 40.00,2)

print("Overtime hours: ", overtimehours)

print("Employee's name: ", user)

regularpay = round(hours \* payrate,2)

overtimerate = round(payrate \* 1.5, 2)

overtimepay = round(overtimehours \* overtimerate)

grosspay = round(regularpay+overtimepay,2)

print("Regular Pay: $", regularpay)

print("Overtime Pay: $",overtimepay)

print("Gross Pay: $", grosspay)

while user != end:

print()

user = input("Please enter your name or type '0' to quit: ")

if user == end:

print("End of Report")

**OUTPUT:**

One Stop Shop Payroll Calculator

Please enter hours worked: 5

Please enter your payrate: $35

Employee's name: <class 'str'>

Overtime hours: 0

Overtime Pay: $0.00

Gross Pay: $ 175.0

1b. Write a program to implement Compound Interest

**ALGORITHM :**

* Start the program
* Get the input principle, rate, time  from the user
* Calculate the compound interest
* Print the compound interest
* Stop

**PROGRAM :**

# Program to Calculate compound interest

principle=1000

rate=10.25

time=5

Amount = principle \* (pow((1 + rate / 100), time))

CI = Amount - principle

print("Compound interest is", CI)

**OUTPUT :**

Compound interest is 628.8946267774415

1c. Write a program to reverse a given integer

**ALGORITHM :**

* Start the program
* Assign the input value to the num variable
* Find the reverse number for the given number using while loop
* Print the reversed number
* Stop

**PROGRAM :**

num = 76542

reverse\_number = 0

print("Given Number ", num)

while num > 0:

reminder = num % 10

reverse\_number = (reverse\_number \* 10) + reminder

num = num // 10

print("Revered Number ", reverse\_number)

**OUTPUT :**

The reversed Number 24567

1d. Write a program to display the cube of the number up to a given integer

**ALGORITHM :**

* Start the program
* Assign the input value to the input\_number variable
* Find the the cube of a given number number using for loop
* Print the cube
* Stop

**PROGRAM :**

input\_number = 6

for i in range(1, input\_number + 1):

print("Current Number is :", i, " and the cube is", (i \* i \* i))

**OUTPUT :**

Current Number is : 1  and the cube is 1

Current Number is : 2  and the cube is 8

Current Number is : 3  and the cube is 27

Current Number is : 4  and the cube is 64

Current Number is : 5  and the cube is 125

Current Number is : 6  and the cube is 216

1e.Write a program to find the sum of the series 2 +22 + 222 + 2222 + .. n terms

**ALGORITHM :**

* Start the program
* Initialize the values for number of terms and start
* Find the sum of series using for loop
* Print the sum of series
* Stop

**PROGRAM :**

number\_of\_terms = 5

start = 2

sum = 0

for i in range(0, number\_of\_terms):

print(start, end=" ")

sum += start

start = (start \* 10) + 2

print("\nSum of above series is:", sum)

**OUTPUT :**

**2 22 222 2222 22222**

Sum of the above series: 24690

1f.Write a program to add two matrices using nested loop

**ALGORITHM:**

* Start the program
* Initialize the X,Y and result matrices
* Iterate through rows and columns
* Print the result using for loop
* Stop

**PROGRAM:**

X = [[12,7,3],

        [4 ,5,6],

       [7 ,8,9]]

Y = [[5,8,1],

        [6,7,3],

       [4,5,9]]

result = [[0,0,0],

              [0,0,0],

              [0,0,0]]

# iterate through rows

for i in range(len(X)):

   # iterate through columns

   for j in range(len(X[0])):

       result[i][j] = X[i][j] + Y[i][j]

for r in result:

   print(r)

**OUTPUT :**

[17, 15, 4]

[10, 12, 9]

[11, 13, 18]

1g.Write a program to convert kilometer to miles

**ALGORITHM :**

* Start the program
* Get the input  from the user
* Initialize the conversion factor
* Convert to miles
* Stop

**PROGRAM :**

# Taking kilometers input from the user

kilometers = float(input("Enter value in kilometers: "))

conv\_fac = 0.621371

# calculate miles

miles = kilometers \* conv\_fac

print('%0.2f kilometers is equal to %0.2f miles' %(kilometers,miles))

**OUTPUT :**

Enter value in kilometers: 3.5

3.50 kilometers is equal

**RESULT:**

Thus the Python  program to implement payroll calculator, compound interest, to reverse a given integer, to display a cube of a given number, to find the sum of series, to add two matrices and to convert from kilometer to miles  are executed successfully.

**Ex.No:2**

**Date:**

**PROCEDURAL PROGRAMMING**

**AIM:**

To write a Python Programs to implement procedural programming paradigm

2a. Write a program to generate list of random numbers using procedure

**ALGORITHM  :**

* Start the program
* Import the random package
* Get the random numbers
* Append the random numbers to the list
* Print the random numbers
* Stop

**PROGRAM  :**

import random

def Rand(start, end, num):

res = []

for j in range(num):

res.append(random.randint(start, end))

return res

# Driver Code

num = 10

start = 20

end = 40

print(type(Rand))

print(Rand(start, end, num))

**OUTPUT  :**

<class 'function'>

[26, 36, 26, 35, 20, 33, 29, 25, 37, 33]

2b.Write a program to return the largest Fibonacci number smaller than x and the lowest fibonacci number higher than x.

**ALGORITHM  :**

* Start the program
* Get the integer from user
* Find largest Fibonacci Number smaller than x
* Find smallest Fibonacci Number larger than x:
* print largest Fibonacci Number smaller than x
* print smallest Fibonacci Number larger than x
* Stop

**PROGRAM  :**

def fib\_intervall(x):

if x < 0:

return -1

(old,new) = (0,1)

while True:

if new < x:

(old,new) = (new,old+new)

else:

if new == x:

new = old+new

return (old, new)

while True:

x = int(input("Your number: "))

if x <= 0:

break

(lub, sup) = fib\_intervall(x)

print("Largest Fibonacci Number smaller than x: " + str(lub))

print("Smallest Fibonacci Number larger than x: " + str(sup))

**OUTPUT :**

Your number: 5

Largest Fibonacci Number smaller than x: 3

Smallest Fibonacci Number larger than x: 8

Your number: 4

Largest Fibonacci Number smaller than x: 3

Smallest Fibonacci Number larger than x: 5

Your number: 9

Largest Fibonacci Number smaller than x: 8

Smallest Fibonacci Number larger than x: 13

Your number: -1

2c. Write a Python program to make a chain of function decorators (bold, italic, underline etc.).

**ALGORITHM:**

* Define the make\_bold function and wrapped function that is defined inside make\_bold to create bold letters .
* Define the make\_italic function and wrapped function that is defined inside make\_italic to create italic letters .
* Define the make\_underline function and wrapped function that is defined inside make\_underline to create bold letters .
* Call make\_bold, make\_italic and make\_underline functions

**PROGRAM:**

def make\_bold(fn):

    def wrapped():

        return "<b>" + fn() + "</b>"

    return wrapped

def make\_italic(fn):

    def wrapped():

        return "<i>" + fn() + "</i>"

    return wrapped

def make\_underline(fn):

    def wrapped():

        return "<u>" + fn() + "</u>"

    return wrapped

@make\_bold

@make\_italic

@make\_underline

def hello():

    return "hello world"

print(hello()) ## returns "<b><i><u>hello world</u></i></b>"

**OUTPUT:**

"<b><i><u>hello world</u></i></b>"

2d.Write a Python program to access a function inside a function.

**ALGORITHM:**

* Define a test function
* Define add function inside test function
* Perform addition operation
* Return the result
* Call the test function
* Print the result

**PROGRAM:**

def test(a):

        def add(b):

                nonlocal a

                a += 1

                return a+b

        return add

func= test(4)

print(func(4))

**OUTPUT:**

9

2e.Write a Python function that takes a list and returns a new list with unique elements of the first list.

**ALGORITHM:**

* Define unique\_list function
* Cheeck the uniqueness of a each value
* return the unique value
* print the unique list

**PROGRAM**:

def unique\_list(l):

x = []

for a in l:

if a not in x:

x.append(a)

return x

print(unique\_list([1,2,3,3,3,3,4,5]))

**OUTPUT:**

[1, 2, 3, 4, 5]

2f.Write a Python function to check whether a string is a pangram or not.

**ALGORITHM:**

* Import string and sys packages
* Define a function ispangram
* Check every letter of alphabet is present
* Call  the function and check with the quick brown fox jumps over the lazy dog
* Print the result

**PROGRAM:**

import string, sys

def ispangram(str1, alphabet=string.ascii\_lowercase):

alphaset = set(alphabet)

return alphaset<= set(str1.lower())

print ( ispangram('The quick brown fox jumps over the lazy dog'))

**OUTPUT:**

True

**RESULT:**

Thus the Python program to generate list of random numbers, to return the largest Fibonacci number smaller than x and the lowest fibonacci number higher than x, to create chain of function decorators, to access function inside the function, to return unique elements of list from existing list have been executed successfully.

**Ex.No:3**

**Date:**

**OBJECT ORIENTED PROGRAMMING**

**AIM:**

To Write a Python Programs to implement Object Oriented Programming Paradigm

3a. Write a program to create bank account and to perform deposit and withdraw operations using class and objects

**ALGORITHM:**

* Start the program
* Create class named Bank Account
* Initialize the constructor to make the balance zero
* Define and implement the withdraw operation.
* Define and implement the deposit operation.
* Create  the  object
* Call the withdraw and deposit function using object
* Stop

**PROGRAM:**

class BankAccount:

def \_\_init\_\_(self):

self.balance = 0

def withdraw(self, amount):

self.balance -= amount

return self.balance

def deposit(self, amount):

self.balance += amount

return self.balance

a = BankAccount()

b = BankAccount()

print(a.deposit(100))

print(b.deposit(50))

print(b.withdraw(10))

print(a.withdraw(10))

**OUTPUT :**

100

50

40

90

3b.Write a program to create employee class using constructor and destructor and  to get ID, name, gender , city and salary

**ALGORITHM:**

* Start the program
* Initialize all the values using constructor.
* Initialize the destructor
* Get the input from user.
* Display the data
* Create the object for the employee class
* Call functions using class
* Stop

**PROGRAM :**

class Employee:

def \_\_init\_\_(self): #Constructor

self.\_\_id = 0

self.\_\_name = ""

self.\_\_gender = ""

self.\_\_city = ""

self.\_\_salary = 0

print("Object Initialized.")

def \_\_del\_\_(self): #Destructor

print("Object Destroyed.")

def setData(self):

self.\_\_id=int(input("Enter Id\t:"))

self.\_\_name = input("Enter Name\t:")

self.\_\_gender = input("Enter Gender:")

self.\_\_city = input("Enter City\t:")

self.\_\_salary = int(input("Enter Salary:"))

def \_\_str\_\_(self):

data = "["+str(self.\_\_id)+","+self.\_\_name+","+self.\_\_gender+","+self.\_\_city+","+str(self.\_\_salary)+"]"

return data

def showData(self):

print("Id\t\t:",self.\_\_id)

print("Name\t:", self.\_\_name)

print("Gender\t:", self.\_\_gender)

print("City\t:", self.\_\_city)

print("Salary\t:", self.\_\_salary)

def main():

#Employee Object

emp=Employee()

emp.setData()

emp.showData()

print(emp)

if \_\_name\_\_=="\_\_main\_\_":

main()

**OUTPUT :**

Object Initialized.

Enter Id        :101

Enter Name      :Pankaj

Enter Gender:Male

Enter City      :Delhi

Enter Salary:70000

Id              : 101

Name    : Pankaj

Gender  : Male

City    : Delhi

Salary  : 70000

[101,Pankaj,Male,Delhi,70000]

Object Destroyed.

3c.To create the student class that consists of name, id and age attribute and to create the object of the student, to print attribute name of the object, to reset the value of the age, to print the modified value of age  , to print true if the student contains the attribute with name and  to delete the attribute age.

**ALGORITHM :**

* Start the program
* Create the student class with name , id and age.
* Create the object of the student class.
* Print attribute name of the object.
* Reset the value of attribute age to 23
* Prints the modified value of age
* Delete the attribute’s age.
* Stop

**PROGRAM :**

class Student:

def \_\_init\_\_(self, name, id, age):

self.name = name

self.id = id

self.age = age

# creates the object of the class Student

s = Student("John", 101, 22)

# prints the attribute name of the objects

print(getattr(s, 'name'))

# reset the value of attribute age to 23

setattr(s, "age", 23)

# prints the modified value of age

print(getattr(s, 'age'))

print(hasattr(s, 'id'))

# deletes the attribute age

delattr(s, 'age')

**OUTPUT  :**

John

23

True

AttributeError: 'Student' object has no attribute 'age'

3d.To implement the object oriented concepts.There are 258 computers available in computer programming lab where each computers are used eight hours per day. Write a Python  program using classes and objects that contain getDetail() for getting input from  user,calculatesecondperDay() for calculating the usage of each computer in seconds per day, calculateminutesperWeek() for calculating the usage of each computer in minutes per week ,calculatehourperMonth() for calculating usage of each computer in hour per month and calculatedayperYear() for calculating usage of each computer in day per yearList all the Components of structured programming language.

**ALGORITHM  :**

* Start the program
* Create the  calc class with getdetail() to get hours.
* Define calcultesecondsperday() function  to calculate seconds peer day.
* Define calculateminutesperweek() function to calculate minutes in a week.
* Create calculatedaysperyear() function to calculate no. of days in a year.
* Define calculatehourspermonth() function  to compute hours per month.
* Define an object and call the functions
* Stop

**PROGRAM :**

class calc:

def getDetail(self):

self.total\_computer=258

self.total\_hour=6

def calculatesecondsperDay(self):

Second\_per\_Day=self.total\_hour\*60\*60

print('Total Seconds per Day:',Second\_per\_Day)

def calculateminutesperWeek(self):

Minutes\_per\_Week=self.total\_hour\*60\*7

print("Total Minutes per Week:",Minutes\_per\_Week)

def calculatehourperMonth(self):

Hour\_per\_Month=self.total\_hour\*30

print("Total Hour per Month:",Hour\_per\_Month)

def calculatedayperyear(self):

Day\_per\_Year=(self.total\_hour\*365)/24

print("Total Day per Year:",Day\_per\_Year)

to=calc()

to.getDetail()

to.calculatesecondsperDay()

to.calculateminutesperWeek()

to.calculatehourperMonth()

to.calculatedayperyear()

**OUTPUT  :**

Total Seconds per Day: 28800

Total Minutes per Week: 3360

Total Hour per Month: 240

Total Day per Year: 121.66666666666667

**Ex no 4 Implementation of Event Driven Programming Paradigm**

**Aim:**

To implement mouse click and keyboard click events in python.

**5a.Program to implement mouse click event**

**Algorithm:**

* Import the package tkinter
* Define the right click event
* Print the right click event detail.
* Define the left click event
* Print the left click event detail.
* Define the middle click event
* Print the middle click event detail.
* Binding the event with buttons
* Create object and run main loop.
* Stop

**Program:**

import tkinter as tk

from tkinter import \*

root=tk.Tk()

def rightclick(event):

print("rightclick")

def leftclick(event):

print("leftclick")

def middleclick(event):

print("middleclick")

frame=Frame(root,width=300,height=200)

frame.bind('<Button-1>',leftclick)

frame.bind('<Button-2>',middleclick)

frame.bind('<Button-3>',rightclick)

frame.pack()

root.mainloop()

**Output:**

**OUTPUT :**

leftclick

rightclick

leftclick

rightclick

leftclick

leftclick

**4b.Program to implement mouse events**

**ALGORITHM :**

* Import tkinter package
* Create class App
* Initialize the constructor
* Set the frame with green color
* Bind button, double button and button release events
* Bind motion ,enter and leave events
* Create object and run main loop.
* Stop

**PROGRAM :**

from tkinter import \*

import tkinter as tk

class App(tk.Tk):

def \_\_init\_\_(self):

super().\_\_init\_\_()

frame = tk.Frame(self, bg="green", height=100, width=100)

frame.bind("<Button-1>", self.print\_event)

frame.bind("<Double-Button-1>", self.print\_event)

frame.bind("<ButtonRelease-1>", self.print\_event)

frame.bind("<B1-Motion>", self.print\_event)

frame.bind("<Enter>", self.print\_event)

frame.bind("<Leave>", self.print\_event)

frame.pack(padx=50, pady=50)

def print\_event(self, event):

position = "(x={}, y={})".format(event.x, event.y)

print(event.type, "event", position)

if \_\_name\_\_ == "\_\_main\_\_":

app = App()

app.mainloop()

**OUTPUT :**

Enter event (x=86, y=1)

Leave event (x=46, y=100)

Enter event (x=48, y=95)

Leave event (x=7, y=100)

Enter event (x=50, y=98)

Leave event (x=47, y=103)

Enter event (x=56, y=95)

Leave event (x=115, y=122)

**4c. Program to capture keyboard events**

**ALGORITHM :**

* Import tkinter package
* Define Key press and click events
* Bind the keypress and button events
* Create object and run main loop.
* Stop

**PROGRAM :**

from tkinter import \*

import tkinter as tk

import tkinter as event

root = Tk()

def key(event):

print("pressed", repr(event.char))

def callback(event):

frame.focus\_set()

print("clicked at", event.x, event.y)

frame = Frame(root, width=100, height=100)

frame.bind("<Key>", key)

frame.bind("<Button-1>", callback)

frame.pack()

root.mainloop()

**OUTPUT :**

clicked at 61 21

pressed 'w'

pressed 'w'

pressed 'b'

pressed 'b'

pressed 'b'

pressed 'b'

pressed 'b'

clicked at 47 54

clicked at 47 54

clicked at 47 54

**4d**. Program to implement the keypress event

**ALGORITHM :**

* Import tkinter package
* Define class App
* Define focus in and key events
* Bind the events
* Create object and run main loop.
* Stop

**PROGRAM :**

import tkinter as tk

class App(tk.Tk):

def \_\_init\_\_(self):

super().\_\_init\_\_()

entry = tk.Entry(self)

entry.bind("<FocusIn>", self.print\_type)

entry.bind("<Key>", self.print\_key)

entry.pack(padx=20, pady=20)

def print\_type(self, event):

print(event.type)

def print\_key(self, event):

args = event.keysym, event.keycode, event.char

print("Symbol: {}, Code: {}, Char: {}".format(\*args))

if \_\_name\_\_ == "\_\_main\_\_":

app = App()

app.mainloop()

**OUTPUT :**

FocusIn

Symbol: s, Code: 83, Char: sty

Symbol: d, Code: 68, Char: d

Symbol: a, Code: 65, Char: a

Symbol: Caps\_Lock, Code: 20, Char:

Symbol: Caps\_Lock, Code: 20, Char:

Symbol: v, Code: 86, Char: v

Symbol: c, Code: 67, Char: c

**RESULT:**

Thus the Python program to implement various mouse click and keyboard events have been executed successfully

**Ex no: 5** **Implementation on Declarative Programming Paradigm**

**Aim:**

To implement Declarative programming in python

6a. **To demonstrate table creation and perform insert with SQL Using Python code (SQLite)**

**Algorithm:**

* Start the program
* Connect to the database using connect function in sqlite3.
* Create the cursor object
* Create the table
* Insert the records into the table
* Display the data from table
* Stop

**PROGRAM:**

#import the required packages

import sqlite3

#create a connection

con = sqlite3.connect('Students.db')

#create a cursor object

c=con.cursor()

#Create a table:

c.execute('''CREATE TABLE student(roll\_no INTEGER,name TEXT,age INTEGER);''')

#now to insert data:

c.execute('''INSERT INTO student VALUES(49,'Aman Bhai Patel',19)''')

#commit the changes to the database

con.commit()

#to see the data

for row in c.execute('''SELECT \* FROM student'''):

print(row)

Output



6b. Create two table using SQlite and have id as one of the column attribute and compare id with two table and if the same id is present in the two tables, print all the following information present with the id in two tables one by one.

**Algorithm:**

1. Start the program
2. Connect to the database using connect function in sqlite3.
3. Create two tables
4. Insert the records into the table
5. Display the data from table
6. Select needed field using where clause
7. Stop

PROGRAM:

# Import required packages

import sqlite3

# create a connection and cursor

con = sqlite3.connect("file3.db")

c = con.cursor()

# create the 2 tables and insert some random data

c.execute('''CREATE TABLE t1(id INTEGER,name TEXT);''')

c.execute('''CREATE TABLE t2(id INTEGER,job TEXT);''')

c.execute('''INSERT INTO t1 VALUES(1,'Aman'),(2,'Aviraj'),(1,'Nithish'),(2,'Venkat');''')

c.execute('''INSERT INTO t2 VALUES(1,'Job1'),(2,'Job2');''')

# commit changes

con.commit()

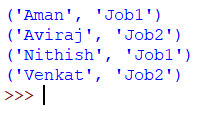
# send the select command to the sqlite3 backend:

task = '''SELECT t1.name,t2.job FROM t1,t2 WHERE t1.id = t2.id;'''

for row in c.execute(task):

print(row)

Output:



6c. Create a table and perform select and insert, delete, update, modify with SQL Using Python code (SQLite)

**Algorithm:**

* Start the program
* Connect to the database using connect function in sqlite3.
* Create the company table
* Insert the records into the table
* Display the data from table
* Display the all columns from the table
* Update the table
* Delete the records from the database
* Stop

**Program:**

# import required packages

import sqlite3

# Create a connection anf cursor

con = sqlite3.connect('file4.db')

c = con.cursor()

# create a function to print the whole table:

def printall():

global c

for row in c.execute("SELECT \* FROM datatable"):

print(row)

# Create a sample table and insert data into it:

c.execute("CREATE TABLE datatable(ID INTEGER,Name TEXT);")

# INSERT

namelist = [(1,'Aman'),(2,'Aviraj'),(3,'Venkat')]

c.executemany("INSERT INTO datatable VALUES(?,?)",namelist)

con.commit()

print("\nInitial table: ")

printall()

# DELETE

print("\nDeleting an enrty : (3,Venkat)")

c.execute("DELETE FROM datatable WHERE Name = 'Venkat';")

print("\nTable is now: ")

printall()

# UPDATE

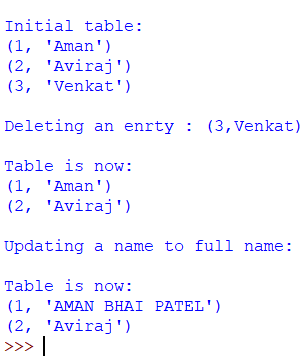
print("\nUpdating a name to full name:")

print("\nTable is now: ")

c.execute("UPDATE datatable SET Name='AMAN BHAI PATEL' WHERE ID=1;")

printall()

Output:



5d. Write a Python Program to create a company table that consists of name, age,address and salary attributes using sqlite3 and to insert five records into the table and to perform select, display, update and delete operations.

**ALGORITHM:**

* Start the program
* Connect to the database using connect function in sqlite3.
* Create the company table
* Insert the records into the table
* Display the data from table
* Display the all columns from the table
* Update the table
* Delete the records from the database
* Stop

**PROGRAM:**

import sqlite3

# connect to a database

conn = sqlite3.connect('test.db')

print ("Opened database successfully");

# To Create a table

import sqlite3

conn = sqlite3.connect('test.db')

print ("Opened database successfully")

conn.execute('''CREATE TABLE COMPANY (ID INT PRIMARY KEY NOT NULL,

NAME TEXT NOT NULL,

AGE INT NOT NULL,

ADDRESS CHAR(50),

SALARY REAL);''')

print("Table created successfully")

conn.close()

# To insert records into a table

import sqlite3

conn = sqlite3.connect('test.db')

print ("Opened database successfully")

conn.execute("INSERT INTO COMPANY (ID,NAME,AGE,ADDRESS,SALARY) \

VALUES (1, 'Paul', 32, 'California', 20000.00 )");

conn.execute("INSERT INTO COMPANY (ID,NAME,AGE,ADDRESS,SALARY) \

VALUES (2, 'Allen', 25, 'Texas', 15000.00 )");

conn.execute("INSERT INTO COMPANY (ID,NAME,AGE,ADDRESS,SALARY) \

VALUES (3, 'Teddy', 23, 'Norway', 20000.00 )");

conn.execute("INSERT INTO COMPANY (ID,NAME,AGE,ADDRESS,SALARY) \

VALUES (4, 'Mark', 25, 'Rich-Mond ', 65000.00 )");

conn.commit()

print ("Records created successfully")

conn.close()

# To display the data from the table

import sqlite3

conn = sqlite3.connect('test.db')

print("Opened database successfully")

cursor = conn.execute("SELECT id, name, address, salary from COMPANY")

for row in cursor:

print ("ID = ", row[0])

print ("NAME = ", row[1])

print ("ADDRESS = ", row[2])

print ("SALARY = ", row[3], "\n")

print("Operation done successfully")

conn.close()

# To display all columns from a database

import sqlite3

conn = sqlite3.connect('test.db')

print("Opened database successfully")

conn.execute('''CREATE TABLE COMPANY12345

(ID INT PRIMARY KEY NOT NULL,

NAME TEXT NOT NULL,

AGE INT NOT NULL,

ADDRESS CHAR(50),

SALARY REAL);''')

print("Table created successfully")

conn.execute("INSERT INTO COMPANY12345 (ID,NAME,AGE,ADDRESS,SALARY)\

VALUES (1, 'Paul', 32, 'California', 20000.00 )")

conn.execute("INSERT INTO COMPANY12345 (ID,NAME,AGE,ADDRESS,SALARY) \

VALUES (2, 'Allen', 25, 'Texas', 15000.00 )")

conn.execute("INSERT INTO COMPANY12345 (ID,NAME,AGE,ADDRESS,SALARY) \

VALUES (3, 'Teddy', 23, 'Norway', 20000.00 )")

conn.execute("INSERT INTO COMPANY12345 (ID,NAME,AGE,ADDRESS,SALARY) \

VALUES (4, 'Mark', 25, 'Rich-Mond ', 65000.00 )")

conn.commit()

print("Records created successfully")

cursor = conn.execute("SELECT ID,NAME,AGE,ADDRESS,SALARY from COMPANY12345")

for row in cursor:

print("ID = ", row[0])

print("NAME = ", row[1])

print("AGE=", row[2])

print("ADDRESS = ", row[3])

print("SALARY = ", row[4])

print("Operation done successfully");

conn.close()

# To update the table

import sqlite3

conn = sqlite3.connect('test.db')

print("Opened database successfully")

conn.execute("UPDATE COMPANY set SALARY = 25000.00 where ID = 1")

conn.commit()

print ("Total number of rows updated :", conn.total\_changes)

cursor = conn.execute("SELECT id, name, address, salary from COMPANY")

for row in cursor:

print ("ID = ", row[0])

print ("NAME = ", row[1])

print ("ADDRESS = ", row[2])

print ("SALARY = ", row[3], "\n")

print("Operation done successfully")

conn.close()

# To perform delete operation

import sqlite3

conn = sqlite3.connect('test.db')

print( "Opened database successfully")

conn.execute("DELETE from COMPANY where ID = 2;")

conn.commit()

print ("Total number of rows deleted :", conn.total\_changes)

cursor = conn.execute("SELECT id, name, address, salary from COMPANY")

for row in cursor:

print ("ID = ", row[0])

print ("NAME = ", row[1])

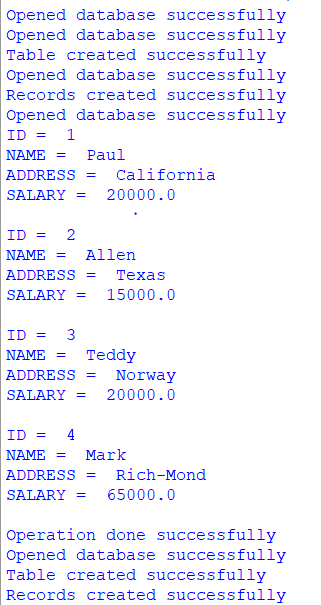
print ("ADDRESS = ", row[2])

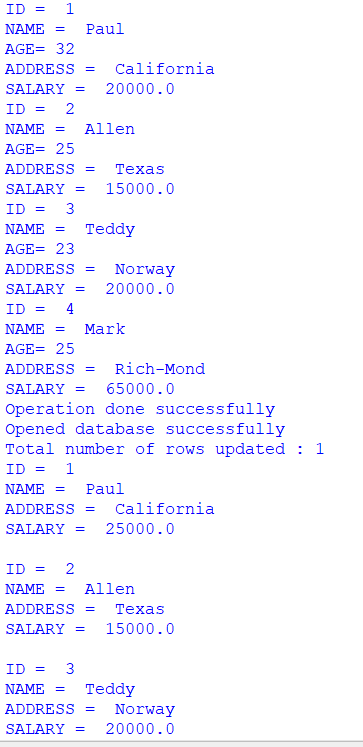
print ("SALARY = ", row[3], "\n")

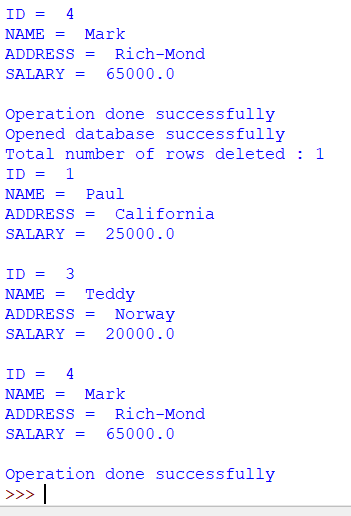
print ("Operation done successfully");

conn.close()

Output:







**Result:**

Thus the Python program to implement table creation and insertion with SQL, to implement creation of two tables and print the details depending upon particular field, to perform delete, update, modify are executed successfully.

**Ex.No:6**

**Date:**

**IMPLEMENTATION OF IMPERATIVE PROGRAMMING PROGRAM**

**AIM:**

To Write a Python Programs to implement imperative programming paradigm

6a. Write a program to find sum of n numbers

**ALGORITHM 1:**

* Start the program
* Create the list
* Initialize the sum variable to 0
* Find sum for the numbers in list
* Print the sum
* Stop

**PROGRAM1 :**

my\_list = [1, 2, 3, 4, 5]

sum = 0

for x in my\_list:

    sum += x

print(sum)

**OUTPUT 1:**

15

6b. Write a program to get a list of characters and concatenate it to form a string

**ALGORITHM  :**

* Start the program
* Initialize the set of characters
* Get the character one by one and conatenate
* Stop

**PROGRAM  :**

sample\_characters = ["p","y","t","h","o","n"]

sample\_string = ''

sample\_string

sample\_string = sample\_string + sample\_characters[0]

sample\_string ="p"

sample\_string = sample\_string + sample\_characters[1]

sample\_string ="py"

sample\_string = sample\_string + sample\_characters[2]

sample\_string ="pyt"

sample\_string = sample\_string + sample\_characters[3]

sample\_string ="pyth"

sample\_string = sample\_string + sample\_characters[4]

sample\_string ="pytho"

sample\_string = sample\_string + sample\_characters[5]

sample\_string ="python"

print(sample\_string)

**OUTPUT :**

'python'

6c. Write a program to get a characters ‘welcome’ and to display

**ALGORITHM 2 :**

* Start the program
* Initialize the characters in ‘welcome’
* Get each string one by one and concatenate each one using for loop
* Print the each character of welcome one by one.
* Stop

**PROGRAM 2 :**

sample\_characters = ["w","e","l","c","o","m","e"]

sample\_string = ''

sample\_string

for c in sample\_characters:

sample\_string = sample\_string + c

print(sample\_string)

**OUTPUT 2 :**

w

we

wel

welc

welco

welcom

welcome

6d.Write a program to iterate between 10 to 20 and to find factor and to display prime number

**ALGORITHM 3 :**

* Start the program
* Get the numbers between 10  and 20
* Find the factor of a number
* Display the prime number
* Stop

**PROGRAM 3:**

for num in range(10,20):

for i in range(2,num):

if num%i == 0:

j=num/i

print(num,i,j)

else:

print(num, "is a prime number")

**OUTPUT 3:**

10 2 5.0

10 5 2.0

10 is a prime number

11 is a prime number

12 2 6.0

12 3 4.0

12 4 3.0

12 6 2.0

12 is a prime number

13 is a prime number

14 2 7.0

14 7 2.0

14 is a prime number

15 3 5.0

15 5 3.0

15 is a prime number

16 2 8.0

16 4 4.0

16 8 2.0

16 is a prime number

17 is a prime number

18 2 9.0

18 3 6.0

18 6 3.0

18 9 2.0

18 is a prime number

19 is a prime number

**RESULT:**

Thus the Python  program to implement to find sum of n numbers, to get a list of characters and concatenate it to form a string, to get a characters ‘welcome’ and to display  and to iterate between 10 to 20  to display prime number have been executed successfully.

**EX.NO:7**

**DATE:**

**IMPLEMENTATION OF PARALLEL PROGRAMMING PROGRAM**

**AIM:**

To Write a Python Programs

1. to implement data parallelism using Pool class

2. to implement the parallel program using Process class

3. to implement Synchronization between processes using Lock

4. to implement Sharing state between processes using shared memory

**ALGORITHM 1:**

* Start the program
* Import POOL
* Define FUNCTION
* Call POOL function
* Execute the program

**PROGRAM 1:**

from multiprocessing import Pool

def f(x):

return x\*x

if \_\_name\_\_ == '\_\_main\_\_':

with Pool(5) as p:

print(p.map(f, [1, 2, 3]))

**OUTPUT 1:**

[1, 4, 9]

**ALGORITHM 2:**

* Start the program
* Import PROCESS
* Define FUNCTIONS
* Print Parent class details
* Setup Threads and Start it
* Execute the program

**PROGRAM 2:**

from multiprocessing import Process

import os

def info(title):

print(title)

print('module name:', \_\_name\_\_)

print('parent process:', os.getppid())

print('process id:', os.getpid())

def f(name):

info('function f')

print('hello', name)

if \_\_name\_\_ == '\_\_main\_\_':

info('main line')

p = Process(target=f, args=('bob',))

p.start()

p.join()

**OUTPUT 2:**

main line

module name: \_\_main\_\_

parent process: 10

process id: 34

function f

module name: \_\_main\_\_

parent process: 34

process id: 58

hello bob

**ALGORITHM 3:**

* Start the program
* Import PROCESS, LOCK
* Define FUNTION
* Define Lock
* Setup Threads and Start it
* Execute the program

**PROGRAM 3:**

from multiprocessing import Process, Lock

def f(l, i):

l.acquire()

try:

print('hello world', i)

finally:

l.release()

if \_\_name\_\_ == '\_\_main\_\_':

lock = Lock()

for num in range(10):

Process(target=f, args=(lock, num)).start()

**OUTPUT 3:**

hello world 0

hello world 1

hello world 2

hello world 3

hello world 4

hello world 5

hello world 6

hello world 7

hello world 8

hello world 9

**ALGORITHM 4:**

* Start the program
* Import PROCESS , VALUE , ARRAY
* Define FUNCTION
* Define PROCESS
* Setup Threads and Start it
* Execute the program

**PROGRAM 4:**

### from multiprocessing import Process, Value, Array

### def f(n, a):

### n.value = 3.1415927

### for i in range(len(a)):

### a[i] = -a[i]

### if \_\_name\_\_ == '\_\_main\_\_':

### num = Value('d', 0.0)

### arr = Array('i', range(10))

### p = Process(target=f, args=(num, arr))

### p.start()

### p.join()

### print(num.value)

### print(arr[:])

**OUTPUT 4:**

3.1415927

[0, -1, -2, -3, -4, -5, -6, -7, -8, -9]

**EX.NO:8**

**DATE:**

**IMPLEMENTATION OF CONCURRENT PROGRAMMING PROGRAM**

**AIM:**

To Write a Python Programs

1. to implement race condition in concurrent program

2. to implement the concurrent program using Locks

**ALGORITHM 1:**

* Start the program
* Import THREADING
* Define SHARED VARIABLE
* Define functions
* Setup Threads and Start it
* Execute the program

**PROGRAM 1:**

import threading

x = 0 # A shared value

COUNT = 10

def incr():

global x

for i in range(COUNT):

x += 1

print(x)

def decr():

global x

for i in range(COUNT):

x -= 1

print(x)

t1 = threading.Thread(target=incr)

t2 = threading.Thread(target=decr)

t1.start()

t2.start()

t1.join()

t2.join()

print(x)

**OUTPUT 1:**

Output first time : Output second time :

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

**ALGORITHM 2:**

* Start the program
* Import THREADING
* Define SHARED VARIABLE
* Define functions using ACQUIRE , RELEASE functions
* Setup Threads and Start it
* Execute the program

**PROGRAM 2:**

import threading

x = 0 # A shared value

COUNT = 10

lock = threading.Lock()

def incr():

global x

lock.acquire()

print("thread locked for increment cur x=",x)

for i in range(COUNT):

x += 1

print(x)

lock.release()

print("thread release from increment cur x=",x)

def decr():

global x

lock.acquire()

print("thread locked for decrement cur x=",x)

for i in range(COUNT):

x -= 1

print(x)

lock.release()

print("thread release from decrement cur x=",x)

t1 = threading.Thread(target=incr)

t2 = threading.Thread(target=decr)

t1.start()

t2.start()

t1.join()

t2.join()

**OUTPUT 2:**

Output count=10: Output count=5 :

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

**Ex.No:9**

**Date:**

**IMPLEMENTATION OF FUNCTIONAL PROGRAMMING PROGRAM**

**AIM:**

To implement functional programming in python.

**1. Write the python program to add two lists of input [7,8,1,2,3,4,5] and [3,4,1,29,1,5,1] using map and lambda and then perform multiplication for the resultant value off add with the input list [4,1,69,2,7,3,6]**

**ALGORITHM 1:**

* Define lambda function to add two numbers and assign a variable.
* Define two lists and pass it to lambda function using map function.
* Print the result
* Create another list and pass the output of previous step.
* Print the output.

**PROGRAM 1:**

add=lambda x,y:x+y

l=[7,8,1,2,3,4,5]

a=[3,4,1,29,1,5,1]

d=list(map(add,l,a))

print(d)

e=[4,1,69,2,7,3,6]

f=list(map(add,d,e))

print(f)

mul=lambda x,y:x\*y

y=list(map(mul,d,f))

print(y)

**OUTPUT 1:**

[10, 12, 2, 31, 4, 9, 6]

[14, 13, 71, 33, 11, 12, 12]

[140, 156, 142, 1023, 44, 108, 72]

**2. Write the python program to return the numbers divisible by 2 from the input list = [21, 24, 12, 34, 10, 15, 41] using lambda and filter function.**

**ALGORITHM 2:**

* Use lambda function to check whether the number is divisible by 4.
* Pass the list as parameter.
* Display the result.

**PROGRAM 2 :**

l=[21,24,12,34,10,15,41]

res=list(filter(lambda x:(x%2==0),l))

print(res)

**OUTPUT 2 :**

[24, 12, 34, 10]

**3.Write the python program to get the multiplication and division from the list of input = [10, 24, 34, 42, 19] using lambda and reduce function.**

**ALGORITHM 3:**

* Define lambda to add two numbers a and b.
* Define lambda to multiply two numbers.
* Import reduce function.
* Pass both the lambda functions to reduce and assign to variables d and e.
* Print the results.

**PROGRAM 3 :**

from functools import reduce

f=[10,24,34,24,19]

d=reduce(lambda a,b:a\*b,f)

e=reduce(lambda a,b:a/b,f)

print(d)

print(e)

**OUTPUT 3:**

3720960

2.6874785001719986e-05

**4.Write the python program to find sum of list elements and to find maximum element of the list**

**ALGORITHM 4:**

* Initialize the list
* Use reduce to compute sum of list
* Use reduce to compute maximum element from list
* Print the results.

**PROGRAM 4:**

import functools

lis = [ 1 , 3, 5, 6, 2, ]

print ("The sum of the list elements is : ",end="")

print (functools.reduce(lambda a,b : a+b,lis))

print ("The maximum element of the list is : ",end="")

print (functools.reduce(lambda a,b : a if a > b else b,lis))

**OUTPUT 4:**

he sum of the list elements is : 17

The maximum element of the list is : 6

**5.Write the python program to find product of list elements and to find concatenated product of the list**

**ALGORITHM 5:**

* Importing operator for operator functions
* Initialize the list
* Use reduce to compute product
* Use reduce to compute maximum element from list
* Print the results.

**PROGRAM 5:**

import functools

import operator

lis = [ 1 , 3, 5, 6, 2, ]

print ("The product of list elements is : ",end="")

print (functools.reduce(operator.mul,lis))

# using reduce to concatenate string

print ("The concatenated product is : ",end="")

print (functools.reduce(operator.add,["welcome","to","SRM"]))

**OUTPUT 5:**

The product of list elements is : 180

The concatenated product is : welcome to SRM

**RESULT:**

Thus the Python program to implement functional programming paradigm have been written and executed successfully.

**Ex.No:10**

**Date:**

**IMPLEMENTATION OF LOGIC PROGRAMMING PARADIGM**

**AIM:**

To implement logic programming paradigm in python.

### 1. Write the python program to map values to a function using pyDatalog

**ALGORITHM 1:**

* Import pyDatalog and pyDatalog
* Creating new pyDatalog variables
* Creating square function
* Reverse order as desired
* Displaying the output .
* Print the output.

**PROGRAM 1:**

from pyDatalog import pyDatalog

pyDatalog.create\_terms("A, Pow2, Pow3")

def square(n):

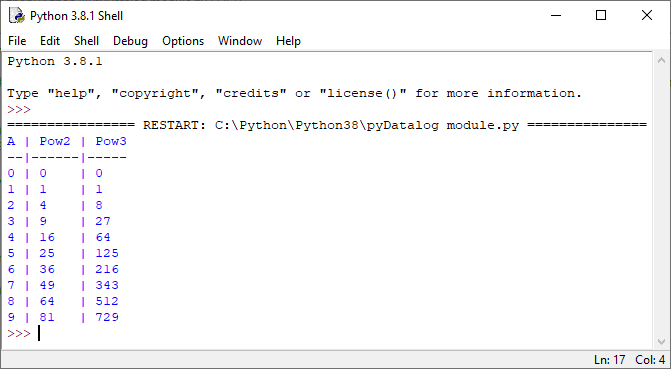
return n\*n

pyDatalog.create\_terms("square")

input\_values = range(10)[::-1]

print ( A.in\_(input\_values) & (Pow2 == square(A)) & (Pow3 == A\*\*3) )

**OUTPUT 1:**

****

2. Write the python program to solve 8 Queens problem

**ALGORITHM 2:**

* Import pyDatalog
* The queen in the first column can be in any row
* Find the queens in the first 2 columns, find the first one first, then find a second one
* Repeat for the queens
* The second queen can be in any row, provided it is compatible with the first one
* Find the third queen, first find a queen compatible with the second one, then with the first
* Rre-use the previous clause for maximum speed, thanks to memorization
* Repeat for all queens
* Keep one queen in row X1 and another in row X2 if they are separated by N columns
* Print the queens

**PROGRAM 2 :**

from pyDatalog import pyDatalog

pyDatalog.create\_terms('N,X0,X1,X2,X3,X4,X5,X6,X7')

pyDatalog.create\_terms('ok,queens,next\_queen')

# the queen in the first column can be in any row

queens(X0) <= (X0.\_in(range(8)))

# to find the queens in the first 2 columns, find the first one first, then find a second one

queens(X0,X1) <= queens(X0) & next\_queen(X0,X1)

# repeat for the following queens

queens(X0,X1,X2) <= queens(X0,X1) & next\_queen(X0,X1,X2)

queens(X0,X1,X2,X3) <= queens(X0,X1,X2) & next\_queen(X0,X1,X2,X3)

queens(X0,X1,X2,X3,X4) <= queens(X0,X1,X2,X3) & next\_queen(X0,X1,X2,X3,X4)

queens(X0,X1,X2,X3,X4,X5) <= queens(X0,X1,X2,X3,X4) & next\_queen(X0,X1,X2,X3,X4,X5)

queens(X0,X1,X2,X3,X4,X5,X6) <= queens(X0,X1,X2,X3,X4,X5) & next\_queen(X0,X1,X2,X3,X4,X5,X6)

queens(X0,X1,X2,X3,X4,X5,X6,X7) <= queens(X0,X1,X2,X3,X4,X5,X6) & next\_queen(X0,X1,X2,X3,X4,X5,X6,X7)

# the second queen can be in any row, provided it is compatible with the first one

next\_queen(X0,X1) <= queens(X1) & ok(X0,1,X1)

# to find the third queen, first find a queen compatible with the second one, then with the first# re-use the previous clause for maximum speed, thanks to memoization

next\_queen(X0,X1,X2) <= next\_queen(X1,X2) & ok(X0,2,X2)

# repeat for all queens

next\_queen(X0,X1,X2,X3) <= next\_queen(X1,X2,X3) & ok(X0,3,X3)

next\_queen(X0,X1,X2,X3,X4) <= next\_queen(X1,X2,X3,X4) & ok(X0,4,X4)

next\_queen(X0,X1,X2,X3,X4,X5) <= next\_queen(X1,X2,X3,X4,X5) & ok(X0,5,X5)

next\_queen(X0,X1,X2,X3,X4,X5,X6) <= next\_queen(X1,X2,X3,X4,X5,X6) & ok(X0,6,X6)

next\_queen(X0,X1,X2,X3,X4,X5,X6,X7) <= next\_queen(X1,X2,X3,X4,X5,X6,X7) & ok(X0,7,X7)

# it's ok to have one queen in row X1 and another in row X2 if they are separated by N columns

ok(X1, N, X2) <= (X1 != X2) & (X1 != X2+N) & (X1 != X2-N)

# give me one solution to the 8-queen puzzle

print(queens(X0,X1,X2,X3,X4,X5,X6,X7).data[0])

(4, 2, 0, 6, 1, 7, 5, 3)

**OUTPUT 2 :**

(7, 3, 0, 2, 5, 1, 6, 4)

(4, 2, 0, 6, 1, 7, 5, 3)

**RESULT:**

Thus the Python program to implement logical programming paradigm have been written and executed successfully.

**Ex.No:11**

**Date:**

**IMPLEMENTATION OF DEPENDENT TYPE PROGRAMMING PARADIGM**

**AIM:**

To implement Dependent Type Programming paradigm in python.

1. Write the python program to Program to create type aliases typing module.

**ALGORITHM 1:**

* Start
* From typing import list
* Initiate vector e
* def scale function initialize to vector :

Return [ scalar\* number of or number in vector]

* Declare a scale function
* Print output
* End the program

**PROGRAM 1:**

from typing import List

# Vector is a list of float values

Vector = List[float]

def scale(scalar: float, vector: Vector) -> Vector:

return [scalar \* num for num in vector]

a = scale(scalar=2.0, vector=[1.0, 2.0, 3.0])

print(a)

**OUTPUT 1 :**

[2.0, 4.0, 6.0]

2. Program to check every key: value pair in a dictionary and check if they match the name : email format.

**AIM:**

To write a program to check every key: value pair in a dictionary and check if they match the name : email format.

**ALGORITHM 2:**

* Start
* From typing import disk
* import rc
* create an alias called ‘Contact Diet’
* check if name and strings
* check for email
* Print the output

**PROGRAM 2:**

from typing import Dict

import re

# Create an alias called 'ContactDict'

ContactDict = Dict[str, str]

def check\_if\_valid(contacts: ContactDict) -> bool:

for name, email in contacts.items():

# Check if name and email are strings

if (not isinstance(name, str)) or (not isinstance(email, str)):

return False

# Check for email xxx@yyy.zzz

if not re.match(r"[a-zA-Z0-9\.\_\+-]+@[a-zA-Z0-9\.\_-]+\.[a-zA-Z]+$", email):

return False

return True

print(check\_if\_valid({'viji': 'viji@sample.com'}))

print(check\_if\_valid({'viji': 'viji@sample.com', 123: 'wrong@name.com'}))

**OUTPUT 2:**

True

False

**ALGORITHM 3:**

* Start
* From typing import New Type
* Create a new user Type called ‘Student ID’ that consists of an integer.
* Create a new user Type called ‘Student ID’
* define a function get\_student\_name.
* return username for ID.
* Print student details.

**PROGRAM 3:**

from typing import NewType

# Create a new user type called 'StudentID' that consists of

# an integer

StudentID = NewType('StudentID', int)

sample\_id = StudentID(100)

from typing import NewType

# Create a new user type called 'StudentID'

StudentID = NewType('StudentID', int)

def get\_student\_name(stud\_id: StudentID) -> str:

return str(input(f'Enter username for ID #{stud\_id}:\n'))

stud\_a = get\_student\_name(StudentID(100))

print(stud\_a)

stud\_b = get\_student\_name(-1)

print(stud\_b)

**OUTPUT 3**

Enter username for ID #100:

Joseph

Joseph

Enter username for ID #-1:

John

John

**RESULT:**

Thus the Dependent type programming paradigm programs has been executed successfully.

**Ex.No:12**

**Date:**

**IMPLEMENTATION OF NETWORK PROGRAMMING PARADIGM**

**AIM:**

To implement network programming paradigm in python.

1. Program to implement client server program using TCP

### ALGORITHM 1:

### TCP Server:

* Import Socket
* Create a socket object
* Reserve a port on your computer
* Next bind to the port this makes the server listen to requests coming from other computers on the network
* Put the socket into listening mode
* Establish connection with client.
* Send a thank you message to the client.
* Close the connection with the client
* Print the output.

### TCP Client:

* Import Socket
* Create a socket object
* Define the port on which you want to connect
* Connect to the server on local computer
* Receive data from the server
* Close the connection with the server
* Print the output

**PROGRAM 1:**

**TCP Server**

#!/usr/bin/python # This is server.py file

import socket # Import socket module

s = socket.socket() # Create a socket object

host = socket.gethostname() # Get local machine name

print(host)

port = 12348 # Reserve a port for your service.

s.bind((host, port)) # Bind to the port

s.listen(5) # Now wait for client connection.

print('Socket successfully created')

print('socket binded to 12348')

print('socket is listening')

while True:

c, addr = s.accept() # Establish connection with client.

print('Got connection from', addr)

c.send(b'Thank you for connecting')

c.close() # Close the connectionimport socket

**OUTPUT 1:**

Socket successfully created

socket binded to 12348

socket is listening

Got connection from ('127.0.0.1', 52617)

**TCP Client**

#!/usr/bin/python # This is client.py file

import socket # Import socket module

s = socket.socket() # Create a socket object

host = socket.gethostname() # Get local machine name

port = 12348 # Reserve a port for your service.

s.connect((host, port))

print(s.recv(1024))

s.close()

**OUTPUT 1:**

Thank you for connecting

2. Program to implement client server program using UDP

### ALGORITHM 2

### UDP Server:

* Import Socket
* Create a datagram socket
* Bind to address and ip address
* Listen for incoming datagram
* Send reply to client
* Print client message
* Print the client IP address.

### UDP Client:

* Import Socket
* Create a client socket
* Create a UDP socket at client side
* Send to server using created UDP socket
* Print the server message

**UDP Server:**

import socket

localIP = "192.168.1.100"

localPort = 20002

bufferSize = 1024

msgFromServer = "Hello UDP Client"

bytesToSend = str.encode(msgFromServer)

# Create a datagram socket

UDPServerSocket = socket.socket(family=socket.AF\_INET, type=socket.SOCK\_DGRAM)

# Bind to address and ip

UDPServerSocket.bind((localIP, localPort))

print("UDP server up and listening")

# Listen for incoming datagrams

while(True):

bytesAddressPair = UDPServerSocket.recvfrom(bufferSize)

message = bytesAddressPair[0]

address = bytesAddressPair[1]

clientMsg = "Message from Client:{}".format(message)

clientIP = "Client IP Address:{}".format(address)

print(clientMsg)

print(clientIP)

# Sending a reply to client

UDPServerSocket.sendto(bytesToSend, address)

**OUTPUT 2:**

UDP server up and listening

Message from Client:Hello UDP Server

Client IP Address:('192.168.1.100', 52397)

**UDP Client**

import socket

msgFromClient = "Hello UDP Server"

bytesToSend = str.encode(msgFromClient)

serverAddressPort = ("192.168.1.100", 20002)

bufferSize = 1024

# Create a UDP socket at client side

UDPClientSocket = socket.socket(family=socket.AF\_INET, type=socket.SOCK\_DGRAM)

# Send to server using created UDP socket

UDPClientSocket.sendto(bytesToSend, serverAddressPort)

msgFromServer = UDPClientSocket.recvfrom(bufferSize)

msg = "Message from Server {}".format(msgFromServer[0])

print(msg)

**OUTPUT 2:**

Message from Server Hello UDP Client

**RESULT:**

Thus the Python program to implement TCP client and server and UDP client and server have been written and executed successfully.

**Ex.No:13**

**Date:**

**IMPLEMENTATION OF SYMBOLIC PROGRAMMING PARADIGM**

**AIM:**

To implement symbolic programming paradigm in python.

13a. Write the commands to perform the operations on substitutions and expressions

**ALGORITHM:**

1. Import sympy module
2. Evaluate the expression using sympy command
3. Print the result

**Program:**

# import sympy

from sympy import \*

x, y, z = symbols('x y z')

exp = x\*\*2 + 7 \* y + z

print("Before Substitution : {}".format(exp))

# Use sympy.subs() method

res\_exp = exp.subs([(x, 2), (y, 4), (z, 1)])

print("After Substitution : {}".format(res\_exp))

x = symbols('x')

exp = cos(x) + 7

print("Before Substitution : {}".format(exp))

# Use sympy.subs() method

res\_exp = exp.subs(x, 0)

print("After Substitution : {}".format(res\_exp))

x, y = symbols('x y')

exp = x\*\*2 + 1

print("Before Substitution : {}".format(exp))

# Use sympy.subs() method

res\_exp = exp.subs(x, y)

print("After Substitution : {}".format(res\_exp))

**Output:**

Before Substitution : x\*\*2 + 7\*y + z

After Substitution : 33

Before Substitution : cos(x) + 7

After Substitution : 8

Before Substitution : x\*\*2 + 1

After Substitution : y\*\*2 + 1

13b. To perform the following operations on matrices

**ALGORITHM:**

1. Import matrix from sympy.matrices.
2. Create the matrix
3. Print the matrix
4. Display the matrix
5. Display 0th row
6. Print first column
7. Delete the first column from the matrix
8. Insert the row into the matrix
9. Generate two matrices
10. Print addition of two matrices
11. Print the multiplication of two matrices

**Program:**

from sympy.matrices import Matrix

m=Matrix([[1,2,3],[2,3,1]])

print(m)

M=Matrix(2,3,[10,40,30,2,6,9])

print(M)

print(M.shape)

print(M.row(0))

M.col(1)

M.row(1)[1:3]

print(M)

M=Matrix(2,3,[10,40,30,2,6,9])

M.col\_del(1)

a=Matrix([[1,2,3],[2,3,1]])

print(a)

a1=Matrix([[10,30]])

a=M.row\_insert(0,M)

print(a)

a2=Matrix([40,6])

a=M.col\_insert(1,M)

print(a)

M1=Matrix([[1,2,3],[3,2,1]])

M2=Matrix([[4,5,6],[6,5,4]])

print(M1+M2)

M1=Matrix([[1,2,3],[3,2,1]])

M2=Matrix([[4,5],[6,6],[5,4]])

print(M1\*M2)

**Output:**

Matrix([[1, 2, 3], [2, 3, 1]])

Matrix([[10, 40, 30], [2, 6, 9]])

(2, 3)

Matrix([[10, 40, 30]])

Matrix([[10, 40, 30], [2, 6, 9]])

Matrix([[1, 2, 3], [2, 3, 1]])

Matrix([[10, 30], [2, 9], [10, 30], [2, 9]])

Matrix([[10, 10, 30, 30], [2, 2, 9, 9]])

Matrix([[5, 7, 9], [9, 7, 5]])

Matrix([[31, 29], [29, 31]])

13c. Write the commands to find derivative, integration, limits, quadratic equation

**ALGORITHM:**

1. Import sympy module
2. Make a symbol
3. Find the derivative of the expression
4. Print the result
5. Find the integration of the expression
6. Print the result
7. Find the limit of the expression
8. Print the result
9. Find the quadratic equation of the expression
10. Print the result

**Program:**

from sympy import \*

x = Symbol('x')

 #make the derivative of cos(x)\*e ^ x

ans1 = diff(cos(x)\*exp(x), x)

print("The derivative of the  sin(x)\*e ^ x : ", ans1)

# Compute (e ^ x \* sin(x)+ e ^ x \* cos(x))dx

ans2 = integrate(exp(x)\*sin(x) + exp(x)\*cos(x), x)

print("The result of  integration is : ", ans2)

# Compute definite integral of sin(x ^ 2)dx

# in b / w interval of ? and ?? .

ans3 = integrate(sin(x\*\*2), (x, -oo, oo))

print("The value of integration is : ", ans3)

# Find the limit of sin(x) / x given x tends to 0

ans4 = limit(sin(x)/x, x, 0)

print("limit is : ", ans4)

# Solve quadratic equation like, example : x ^ 2?2 = 0

ans5 = solve(x\*\*2 - 2, x)

print("roots are : ", ans5)

**Output:**

The derivative of the sin(x)\*e ^ x : -exp(x)\*sin(x) + exp(x)\*cos(x)

The result of integration is : exp(x)\*sin(x)

The value of integration is : sqrt(2)\*sqrt(pi)/2

* limit is : 1

roots are : [-sqrt(2), sqrt(2)]

RESULT:

Thus the Python program to implement symbolic program have been written and executed successfully.

**Ex.No:14**

**Date:**

**IMPLEMENTATION OF AUTOMATA PROGRAMMING PARADIGM**

**AIM:**

To implement symbolic programming paradigm in python.

14a. To write a program to convert DFA to NFA using python.

**ALGORITHM:**

1. Initialize the transitions
2. Copy the input in list
3. Parse the string of a,b in 0,1 for simplicity
4. Counter to remember the number of symbols read
5. Set the final states
6. Check for each possibility
7. Move further only if you are at non-hypothetical state
8. Read the last symbol and current state lies in the set of final states
9. Input string for next transition is input[i+1:]
10. Increment the counter
11. Print the state

**Program:**

import sys

def main():

transition = [[[0,1],[0]], [[4],[2]], [[4],[3]], [[4],[4]]]

x = input("enter the string: ")

x = list(x)

for index in range(len(x)):

if x[index]=='a':

x[index]='0'

else:

x[index]='1'

final = "3"

start=0

i=0

trans(transition, x, final, start, i)

print("rejected")

def trans(transition, x, final, state, i):

for j in range (len(x)):

for each in transition[state][int(x[j])]:

if each < 4:

state = each

if j == len(x)-1 and (str(state) in final):

print("accepted")

sys.exit()

trans(transition, x[i+1:], final, state, i)

i = i+1

main()

**Output:**

enter the string: abb

accepted

enter the string: aaaabbbb

rejected

14b.Write a program to convert NFA to DFA

**ALGORITHM:**

1. Take NFA input from User
2. Enter total no. of states
3. Enter total no. of transitions/paths eg: a,b so input 2 for a,b,c input 3
4. Enter state name eg: A, B, C, q1, q2 ..etc
5. Creating a nested dictionary
6. Enter path eg : a or b in {a,b} 0 or 1 in {0,1}
7. Enter all the end states that
8. Assign the end states to the paths in dictionary\
9. Print NFA
10. Enter final state/states of NFA
11. Holds all the new states created in dfa
12. List of all the paths
13. Conatins all the states in nfa plus the states created in
14. Compute first row of DFA transition table
15. Create a nested dictionary in dfa
16. Create a single string from all the elements of the list
17. Append it to the new\_states\_list
18. Compute the other rows of DFA transition table
19. Create a temporay list
20. Assign the state in DFA table
21. Create a single string(new state) from all the elements of the list
22. Assign the new state in the DFA table
23. Remove the first element in the new\_states\_list
24. Print the DFA created
25. Print Final states of DFA

**Program:**

import pandas as pd

def main():

nfa = {}

n = int(input("No. of states : "))

t = int(input("No. of transitions : "))

for i in range(n):

state = input("state name : ")

nfa[state] = {}

for j in range(t):

path = input("path : ")

print("Enter end state from state {} travelling through path {} : ".format(state,path))

reaching\_state = [x for x in input().split()]

nfa[state][path] = reaching\_state

print("\nNFA :- \n")

print(nfa)

print("\nPrinting NFA table :- ")

nfa\_table = pd.DataFrame(nfa)

print(nfa\_table.transpose())

print("Enter final state of NFA : ")

nfa\_final\_state = [x for x in input().split()]

new\_states\_list = []

dfa = {}

keys\_list = list(list(nfa.keys())[0])

path\_list = list(nfa[keys\_list[0]].keys())

dfa[keys\_list[0]] = {}

for y in range(t):

var = "".join(nfa[keys\_list[0]][path\_list[y]])

dfa[keys\_list[0]][path\_list[y]] = var

if var not in keys\_list:

new\_states\_list.append(var)

keys\_list.append(var)

while len(new\_states\_list) != 0:

dfa[new\_states\_list[0]] = {}

for \_ in range(len(new\_states\_list[0])):

for i in range(len(path\_list)):

temp = []

for j in range(len(new\_states\_list[0])):

temp += nfa[new\_states\_list[0][j]][path\_list[i]]

s = ""

s = s.join(temp)

if s not in keys\_list:

new\_states\_list.append(s)

keys\_list.append(s)

dfa[new\_states\_list[0]][path\_list[i]] = s

new\_states\_list.remove(new\_states\_list[0])

print("\nDFA :- \n")

print(dfa)

print("\nPrinting DFA table :- ")

dfa\_table = pd.DataFrame(dfa)

print(dfa\_table.transpose())

dfa\_states\_list = list(dfa.keys())

dfa\_final\_states = []

for x in dfa\_states\_list:

for i in x:

if i in nfa\_final\_state:

dfa\_final\_states.append(x)

break

print("\nFinal states of the DFA are : ",dfa\_final\_states)

main()

**Output:**

No. of states : 4

No. of transitions : 2

state name : A

path : a

Enter end state from state A travelling through path a :

A B

path : b

Enter end state from state A travelling through path b :

A

state name : B

path : a

Enter end state from state B travelling through path a :

C

path : b

Enter end state from state B travelling through path b :

C

state name : C

path : a

Enter end state from state C travelling through path a :

D

path : b

Enter end state from state C travelling through path b :

D

state name : D

path : a

Enter end state from state D travelling through path a :

A

path : b

Enter end state from state D travelling through path b :

A

NFA :-

{'A': {'a': ['A', 'B'], 'b': ['A']}, 'B': {'a': ['C'], 'b': ['C']}, 'C': {'a': ['D'], 'b': ['D']}, 'D': {'a': ['A'], 'b': ['A']}}

Printing NFA table :-

a b

A [A, B] [A]

B [C] [C]

C [D] [D]

D [A] [A]

Enter final state of NFA :

D

**RESULT:**

Thus the Python program to implement the conversion of  DFA to NFA and NFA to DFA have been written and executed successfully.

**Ex.No:15**

**Date:**

**IMPLEMENTATION OF GUI PROGRAMMING PARADIGM**

**AIM:**

To implement GUI  programming paradigm in python.

15a. Design a calculator to perform all mathematical operations using python

**Algorithm:**

1. Importing the module – tkinter
2. Create the main window (container)
3. Add any number of widgets to the main window
4. Apply the event Trigger on the widgets.

**Program:**

from tkinter import \*

expression = ""

def press(num):

global expression

expression = expression + str(num)

equation.set(expression)

def equalpress():

try:

global expression

total = str(eval(expression))

equation.set(total)

expression = ""

except:

equation.set(" error ")

expression = ""

def clear():

global expression

expression = ""

equation.set("")

if \_\_name\_\_ == "\_\_main\_\_":

gui = Tk()

gui.configure(background="light green")

gui.title("Simple Calculator")

gui.geometry("270x150")

equation = StringVar()

expression\_field = Entry(gui, textvariable=equation)

expression\_field.grid(columnspan=4, ipadx=70)

button1 = Button(gui, text=' 1 ', fg='black', bg='red',

command=lambda: press(1), height=1, width=7)

button1.grid(row=2, column=0)

button2 = Button(gui, text=' 2 ', fg='black', bg='red',

command=lambda: press(2), height=1, width=7)

button2.grid(row=2, column=1)

button3 = Button(gui, text=' 3 ', fg='black', bg='red',

command=lambda: press(3), height=1, width=7)

button3.grid(row=2, column=2)

button4 = Button(gui, text=' 4 ', fg='black', bg='red',

command=lambda: press(4), height=1, width=7)

button4.grid(row=3, column=0)

button5 = Button(gui, text=' 5 ', fg='black', bg='red',

command=lambda: press(5), height=1, width=7)

button5.grid(row=3, column=1)

button6 = Button(gui, text=' 6 ', fg='black', bg='red',

command=lambda: press(6), height=1, width=7)

button6.grid(row=3, column=2)

button7 = Button(gui, text=' 7 ', fg='black', bg='red',

command=lambda: press(7), height=1, width=7)

button7.grid(row=4, column=0)

button8 = Button(gui, text=' 8 ', fg='black', bg='red',

command=lambda: press(8), height=1, width=7)

button8.grid(row=4, column=1)

button9 = Button(gui, text=' 9 ', fg='black', bg='red',

command=lambda: press(9), height=1, width=7)

button9.grid(row=4, column=2)

button0 = Button(gui, text=' 0 ', fg='black', bg='red',

command=lambda: press(0), height=1, width=7)

button0.grid(row=5, column=0)

plus = Button(gui, text=' + ', fg='black', bg='red',

command=lambda: press("+"), height=1, width=7)

plus.grid(row=2, column=3)

minus = Button(gui, text=' - ', fg='black', bg='red',

command=lambda: press("-"), height=1, width=7)

minus.grid(row=3, column=3)

multiply = Button(gui, text=' \* ', fg='black', bg='red',

command=lambda: press("\*"), height=1, width=7)

multiply.grid(row=4, column=3)

divide = Button(gui, text=' / ', fg='black', bg='red',

command=lambda: press("/"), height=1, width=7)

divide.grid(row=5, column=3)

equal = Button(gui, text=' = ', fg='black', bg='red',

command=equalpress, height=1, width=7)

equal.grid(row=5, column=2)

clear = Button(gui, text='Clear', fg='black', bg='red',

command=clear, height=1, width=7)

clear.grid(row=5, column='1')

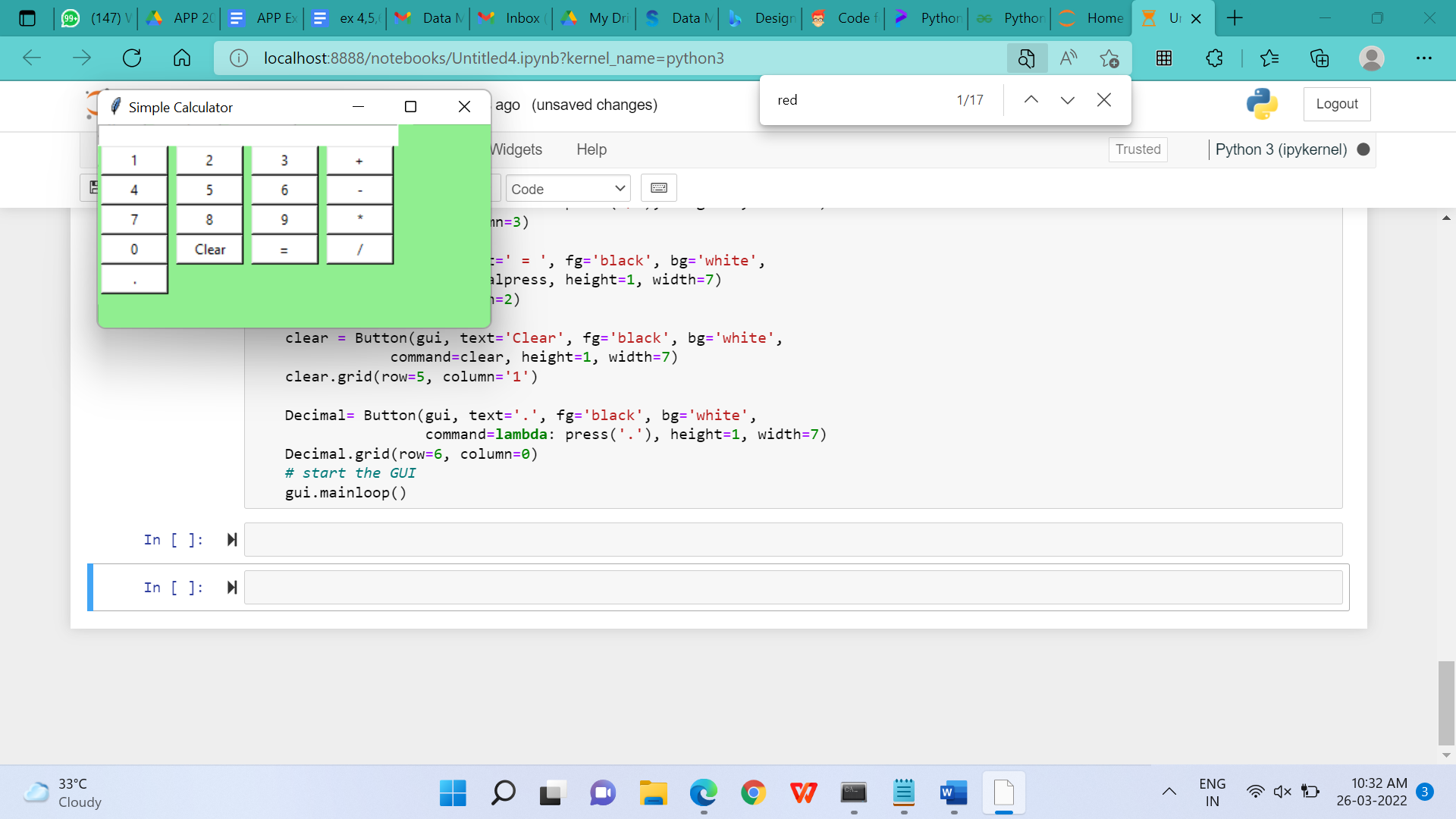
Decimal= Button(gui, text='.', fg='black', bg='red',

command=lambda: press('.'), height=1, width=7)

Decimal.grid(row=6, column=0)

gui.mainloop()

**Output:**



15.b Write a program to implement employee salary calculation using python. Input the employee name and the basic salary calculate and display the net salary using following condition.

(i)if the basic salary is more than 50000 then include 10% tax.

(ii)iif the basic salary is more than 30000 then include 5% tax.

**Algorithm:**

**Program:**

from tkinter import \*

def Ok():

result = float(e2.get())

if(result > 50000) :

tax = result \* 10/100

elif(result > 30000) :

tax = result \* 5/100

else :

tax = 0

taxText.set(tax)

nsal = result - tax

nsalText.set(nsal)

root = Tk()

root.title("Employee Salary Calculation System")

root.geometry("300x400")

global e1

global e2

global taxText

global nsalText

taxText = StringVar()

nsalText = StringVar()

Label(root, text="Employee Name").place(x=10, y=10)

Label(root, text="Salary").place(x=10, y=40)

Label(root, text="Tax").place(x=10, y=80)

Label(root, text="Total:").place(x=10, y=110)

e1 = Entry(root)

e1.place(x=100, y=10)

e2 = Entry(root)

e2.place(x=100, y=40)

tax = Label(root, text="", textvariable=taxText).place(x=100,y=80)

nsal = Label(root, text="", textvariable=nsalText).place(x=100, y=110)

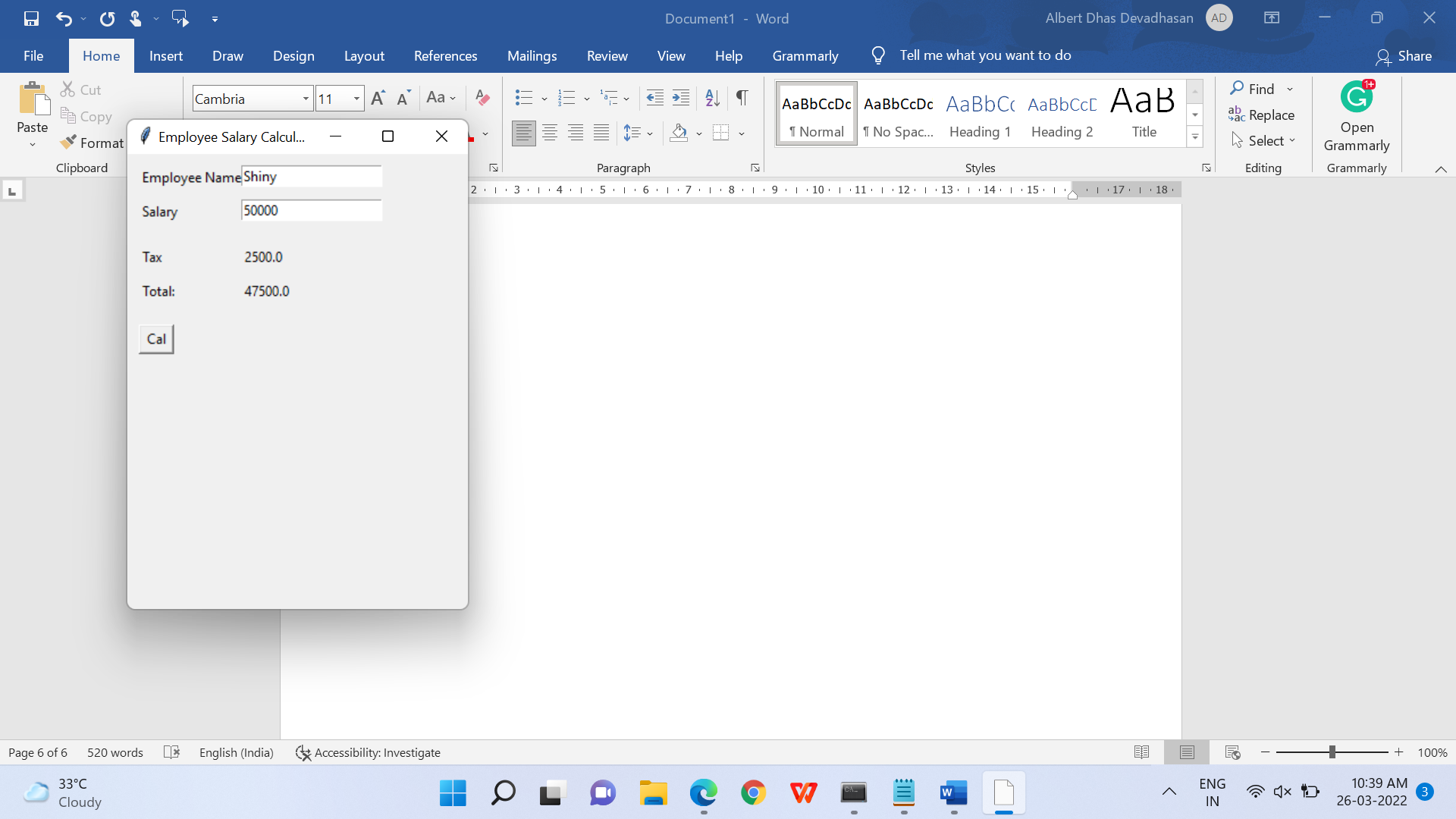
Button(root, text="Cal", command=Ok ,height = 1, width =3).place(x=10, y=150)

empname = Entry(root)

empsal = Entry(root)

root.mainloop()

**Output:**



**RESULT:**

Thus, the Python GUI program for calculator and employee salary calculation have been written and executed successfully.