Basic Python Programs including Djano Mongo DB

1. Write a Python program that calculates the area of a circle based on the radius entered by the user.

```
import math
radius = float(input("Enter the radius of the circle: ")) # Taking input from the user area = math.pi *
(radius ** 2) # Formula for area of circle: πr²
print(f"r = {radius} Area = {area}") # Displaying the result
```

OUTPUT

```
Enter the radius of the circle: 5
r = 5.0 Area = 78.53981633974483
```

2. Write a Python program that accepts the user's first and last name and prints them in reverse order with a space between them.

```
first_name = input("Enter your first name: ") # Taking first name as input last_name = input("Enter
your last name: ") # Taking last name as input print(last_name + " " + first_name) # Printing names in
reverse order
```

OUTPUT

```
Enter your first name: Yash
Yash Enter your last name: Khadke
Yash Khadke
```

3. Write a Python program that accepts a sequence of comma-separated numbers from the user and generates a list and a tuple of those numbers.

```
numbers = input("Enter comma-separated numbers: ") # Taking input as a string num_list =
numbers.split(",") # Splitting string into list elements
num_tuple = tuple(num_list) # Converting list to tuple print("List:", num_list) # Printing list
print("Tuple:", num_tuple) # Printing tuple
```

OUTPUT

```
Enter comma-separated numbers: 1,2,3,4 List: ['1', '2', '3', '4']
Tuple: ('1', '2', '3', '4')
```

4. Write a Python program that determines whether a given number (accepted from the user) is even or odd, and prints an appropriate message to the user.

```
num = int(input("Enter a number: ")) # Taking number input if num % 2 == 0: # Checking divisibility by
2 print(f"{num} is an Even
number") else:
print(f"{num} is an Odd number")
```

OUTPUT

```
Enter a number: 7 7 is an Odd number Enter a number: 8
    8 is an Even number
```

5. Write a Python program to concatenate N strings.

```
n = int(input("Enter the number of strings you want to concatenate: ")) # Taking count of strings
concatenated_string = "" # Initializing empty string
for _ in range(n): # Loop runs n times
user_string = input("Enter a string: ") # Taking input string concatenated_string += user_string #
Concatenating strings
print("Concatenated String:", concatenated_string) # Printing the final concatenated result
```

OUTPUT

```
Enter the number of strings you want to concatenate: 3 Enter a string: Hello
Enter a string:
 Enter a string: World! Concatenated String: Hello World!
```

Practical No 2

1. **Write a Python program to do arithmetical operations addition and division.**

```
a = float(input("Enter first number: "))
b = float(input("Enter second number: ")) addition = a + B
division = a / b if b != 0 else "Undefined (division by zero)" print("Addition:", addition)
print("Division:", division)
```

OUTPUT

```
Enter first number: 10 Enter second number:
2 Addition: 12.0
Division: 5.0
```

2. **Write a Python program to find the area of a triangle.**

```
base = float(input("Enter base of the triangle: ")) height = float(input("Enter height of the triangle:

"))

area = 0.5 * base * height  # Formula for area of triangle: (1/2) * base * height print("Area of the
triangle:", area)
```

OUTPUT

```
Enter first variable: Hello Enter second variable:
World
After swapping: x = World y = Hello
```

3. **Write a Python program to swap two variables.**

```
x = input("Enter first variable: ") y = input("Enter second variable:
") x, y = y, x
print("After swapping: x =", x, "y =", y)
```

OUTPUT

```
Enter base of the triangle:
5 Enter height of the triangle: 4 Area of the triangle: 10.0
```

4. **Write a Python program to generate a random number.**

```
import random
rand_num = random.randint(1, 100) print("Random number:",
rand_num)
```

OUTPUT

```
Random number: 57
```

5. Write a Python program to convert kilometers to miles.

```
km = float(input("Enter distance in kilometers: ")) miles = km * 0.621371
print(f"{km} kilometers is equal to {miles} miles")
```

OUTPUT

```
Enter distance in kilometers: 10
10.0 kilometers is equal to 6.21371 miles
```

6. Write a Python program to display calendar.

```
import calendar
year = int(input("Enter year: "))
month = int(input("Enter month (1-12):
")) print(calendar.month(year, month))
```

OUTPUT

```
Enter year: 2023
Enter month (1-12): 3
March 2023  Mo Tu We Th Fr Sa
Su 1  2  3  4  5
6  7  8  9 10 11 12
13 14 15 16 17 18 19
20 21 22 23 24 25 26
27 28 29 30 31
```

7. Write a Python program to swap two variables without temp variable.

```
a = int(input("Enter first number: "))
b = int(input("Enter second number: "))
a = a + b
b = a - b a = a - b
print("After swapping: a =", a, "b =", b)
```

OUTPUT

```
Enter first number: 15 Enter second number:
25
After swapping: a = 25 b = 15
```

8. Write a Python program to check if a number is positive, negative, or zero.

```
num = float(input("Enter a number:
      ")) if num > 0: print("The number is P ositive") elif num < print("The   number is Negative") else:
   print("The number is Zero")
```

OUTPUT

```
Enter a number: -7
The number is Negative
```

9. Write a Python program to check if a year is a leap year.

```
   year = int(input("Enter a year: "))
if (year % 4 == 0 and year % 100 != 0) or (year % 400 == 0): print(year, "is a Leap Year")
   else:
   print(year, "is not a Leap Year")
```

OUTPUT

```
Enter a year: 2020 2020 is a Leap Year
```

10. Write a Python program to check if a number is odd or even.

```
num = int(input("Enter a number: ")) if num % 2 == 0:
   print(f"{num} is Even") else:
print(f"{num} is Odd")
```

OUTPUT

```
Enter a number: 4 4 is Even
```

Practical No 3

1. **Create a dictionary of your favourite books and their authors and print it.**

```
books = {
"1984": "George Orwell",
"To Kill a Mockingbird": "Harper Lee", "The Great Gatsby": "F. Scott Fitzgerald", "Pride and Prejudice":
"Jane Austen"
}
print("Favorite Books and Authors:", books)
```

OUTPUT

```
Favorite Books and Authors: {'1984': 'George Orwell', 'To Kill a Mockingbird': 'Harper Lee', 'The Great
Gatsby': 'F. Scott Fitzgerald', 'Pride and Prejudice': 'Jane Austen'}
```

2. **Add a new book to the dictionary and print the updated dictionary.**

```
books["The Catcher in the Rye"] = "J.D. Salinger"  # Adding a new book print("Updated Books
Dictionary:", books)
```

OUTPUT

```
Updated Books Dictionary: {'1984': 'George Orwell', 'To Kill a Mockingbird': 'Harper Lee', 'The Great
Gatsby': 'F. Scott Fitzgerald', 'Pride and Prejudice': 'Jane Austen', 'The Catcher in the Rye': 'J.D.
Salinger'}
```

3. **Remove a book from the dictionary and print the updated dictionary.**

```
books.pop("1984") # Removing a book by title print("Dictionary after removing a book:", books)
```

OUTPUT

```
Dictionary after removing a book: {'To Kill a Mockingbird': 'Harper Lee', 'The Great Gatsby': 'F. Scott
Fitzgerald', 'Pride and Prejudice': 'Jane Austen', 'The Catcher in the Rye': 'J.D. Salinger'}
```

4. **Use the keys() method to print a list of the book titles in the dictionary.**

```
print("Book Titles:", list(books.keys()))  # Extracting only book titles
```

OUTPUT

```
Book Titles: ['To Kill a Mockingbird', 'The Great Gatsby', 'Pride and Prejudice', 'The Catcher in the Rye']
```

5. **Use the values() method to print a list of the author names in the dictionary.**

```
print("Author
Names:", list(books.values()))  # Extracting only author names
```

OUTPUT

```
Author Names: ['Harper Lee', 'F. Scott Fitzgerald', 'Jane Austen', 'J.D. Salinger']
```

6. **Create a set of your favourite colours and print it.**

```
colors = {"Red", "Blue", "Green", "Black", "White"} print("Favorite Colors Set:", colors)
```

OUTPUT

```
Favorite Colors Set: {'Blue', 'Green', 'White', 'Black', 'Red'}
```

7. Add a new colour to the set and print the updated set.

colors.add("Yellow") # Adding a new color print("Updated Colors Set:", colors) **OUTPUT**

Updated Colors Set: {'Blue', 'Green', 'White', 'Black', 'Red', 'Yellow'}

8. Remove a colour from the set and print the updated set.

colors.discard("White") # Removing a color print("Set after removing a color:", colors) **OUTPUT**

Set after removing a color:

{'Blue', 'Green', 'Black', 'Red', 'Yellow'}

9. Create a new set that contains only the colours that start with the letter "B" and print it.

colors_starting_with_B = {color for color in colors if color.startswith("B")} print("Colors starting with 'B':", colors_starting_with_B)

OUTPUT

Colors starting with 'B': {'Blue', 'Black'}

10. Use the len() function to find the number of colours in the set and print it.

print("Number of colors in the set:", len(colors))

OUTPUT

Number of colors in the set: 5

Practical No 4

1. **Program to Find the GCD of Two Positive Numbers.**

```
num1 = int(input("Enter first positive number: ")) num2 = int(input("Enter second positive number:
")) while num2:
    num1, num2 = num2, num1 % num2 print(f"GCD of the numbers is
{num1}")
```

OUTPUT

```
Enter first positive number: 48 Enter second positive number:
18 GCD of the numbers is 6
```

2. **Write Python Program to Find the Sum of Digits in a Number.**

```
num = int(input("Enter a number:
")) sum_of_digits = 0 while num:
sum_of_digits += num % 10
num //= 10
print(f"Sum of digits is {sum_of_digits}")
```

OUTPUT

```
Enter a number: 1234 Sum of digits is 10
```

3. **Write a program that prints the first 10 multiples of 3.**

```
multiples_of_3 = [3 * i for i in range(1, 11)] print("First 10 multiples of 3:", multiples_of_3)
```

OUTPUT

```
First 10 multiples of 3: [3, 6, 9, 12, 15, 18, 21, 24, 27, 30]
```

LIST

1. **Create a list of your favourite Hindi comedy movies and print the third movie in the list.**

```
movies = ["Hera Pheri", "Andaz Apna Apna", "Dhamaal", "Chup Chup Ke", "Golmaal: Fun Unlimited"]
print("Third movie in the list:", movies[2])
```

OUTPUT

```
Third movie in the list: Dhamaal
```

2. **Add a new movie to the list and print the updated list.**

```
movies.append("Bhool Bhulaiyaa") print("Updated Movie List:", movies)
```

OUTPUT

```
Updated Movie List: ['Hera Pheri', 'Andaz Apna Apna', 'Dhamaal', 'Chup Chup Ke', 'Golmaal: Fun
Unlimited', 'Bhool Bhulaiyaa']
```

3. **Remove the second movie from the list and print the updated list.**
   movies.pop(1)
   print("List after removing the second movie:", movies)

   OUTPUT
   List after removing the second movie: ['Hera Pheri', 'Dhamaal', 'Chup Chup Ke', 'Golmaal: Fun

   Unlimited', 'Bhool Bhulaiyaa']

4. **Sort the list in alphabetical order and print the sorted list.**
   movies.sort()
   print("Sorted Movie List:", movies)
   OUTPUT
   Sorted Movie List: ['Bhool Bhulaiyaa', 'Chup Chup Ke', 'Dhamaal', 'Golmaal: Fun Unlimited', 'Hera Pheri']

5. **Create a new list that contains only the first and last movie in the original list and print it.**
   first_last_movies = [movies[0], movies[-1]] print("First and Last Movie:", first_last_movies) **OUTPUT**
   First and Last Movie: ['Hera Pheri', 'Bhool Bhulaiyaa']

TUPLE

1. **Create a tuple of your favourite foods and print the second food in the tuple.**
   foods = ("Pizza", "Biryani", "Pani Puri", "Chole Bhature", "Dosa") print("Second food in the tuple:", foods[1])
   OUTPUT
   Second food in the tuple: Biryani

2. **Try to change the second food in the tuple and see what happens.**
   try:
      foods[1] = "Pasta" # Tuples are immutable, so this will raise an error except TypeError as e:
   print("Error:", e)
   OUTPUT
   Error: 'tuple' object does not support item assignment

3. **Create a new tuple that contains only the first and last foods in the original tuple and print it.**
   first_last_foods = (foods[0], foods[-1]) print("First and Last Food:", first_last_foods) **OUTPUT**
   First and Last Food: ('Pizza', 'Dosa')

4. **Use the len() function to find the number of foods in the tuple and print it.**
   print("Number of foods in the tuple:", len(foods))
   OUTPUT
   Number of foods in the tuple: 5

5. **Convert the tuple to a list and print the list.**

```
foods_list = list(foods)
print("Tuple converted to list:", foods_list)
```

OUTPUT

```
Tuple converted to list: ['Pizza', 'Biryani', 'Pani Puri', 'Chole Bhature', 'Dosa']
```

Practical No 5

1. Print all even numbers from 0 to the given number

```
num = int(input("Enter a number: ")) i = 0
while i <= num:
if i % 2 == 0: print(i)
i += 1
```

OUTPUT

```
Enter a numb er: 10
0
2
4
6
8
10
```

2. Print each character of a string on a new line

```
text = input("Enter a string: ") for char in text:
print(char)
```

OUTPUT

```
Enter a string: Hello
He l  l o
```

3. Print pattern

a)
```
for  i in range(1, 6): for j in range(1, i + 1):
    print(j, end="") print()
```

b)
```
ch = 65
for i in range(1, 5): for j in range(i):
   print(chr(ch), end=" ") ch += 1
   print()
```

c) for i in range(4, 0, -1): for j in range(i):
        print(i, end="") print()

d) for i in range(1, 6, 2): for j in range(5 - i, 0, -1):
        print(" ", end="") for j in range(i):
    print("*", end="
    ") print()

e) for i in range(1, 6, 2): for j in range(5 - i, 0, -1):
        print(" ", end="") for j in range(i):
        print("*", end="") print()

f) for i in range(1, 5): for j in range(i):
        print((j + i) % 2, end="") print()

Output

```
1
12
123
1234
12345
```

```
A
B C
C D E
D E F G
```

```
4444
333
22
1
```

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


*
***
*****

1
01
101
0101
```

6. Find ASCII value of a character

```
char = input("Enter a character: ") print("ASCII value of", char, "is", ord(char))
```

OUTPUT

Enter a character: A ASCII value of A is 65

7. Simple calculator

```
a = float(input("Enter first number: "))
b = float(input("Enter second number: ")) op = input("Enter operation (+, -, *, /): ") if op == "+":
    print("Result:", a + b) elif op == "-":
    print("Result:", a - b) elif op == "*":
    print("Result:", a * b) elif op == "/":
if b != 0: print("Result:", a /
b) else:
        print("Division by zero error") else:
print("Invalid operation")
```

OUTPUT

*Enter first number: 10 Enter second number: 5 Enter operation (+, -, *, /): * Result: 50.0*

8. Find the largest element in an array

```
   n = int(input("Enter number of elements: ")) arr = []


   for i in range(n): arr.append(int(input())

   )

   largest=arr[0] for num in arr:
if num > largest: largest = num
   print("Largest element:", largest)
```

OUTPUT

```
Enter number of elements:
5 1
3
7
2
5
Largest element: 7
```

9. Add two matrices

```
   r = int(input("Enter number of rows: "))
   c = int(input("Enter number of columns: ")) mat1 = []
   mat2 = [] result = []
   for i in range(r):
   row = []
for j in range(c): row.append(int(input()))
   mat1.append(row
   ) for i in range(r):
   row = []
for j in range(c): row.append(int(input()))
   mat2.append(row
   ) for i in range(r):
   row = []

for j in range(c): row.append(mat1[i][j] + mat2[i][j])
   result.append(row
   ) for row in result:
for num in row: print(num, end=" ")
   print()
```

OUTPUT

```
  Enter number of rows: 2  Enter number of columns: 2 Enter elements of first matrix: 1 2
3
4
Enter elements of second matrix: 5
6
7
8
Resultant Matrix:
6 8
10 12
```

Practical No 6

1. Program to find the sum of all odd and even numbers up to a number specified by the user.

```
def sum_odd_even(n):
even_sum = sum(i for i in range(0, n+1, 2))  # Sum of even numbers odd_sum = sum(i for i in range(1,
n+1, 2))  # Sum of odd numbers return even_sum, odd_sum

num = int(input("Enter a number: "))  # Taking input from the user even_sum, odd_sum =
sum_odd_even(num)  # Calling the function

print(f"Sum of even numbers up to {num} is: {even_sum}") print(f"Sum of odd numbers up to {num}
is: {odd_sum}")
```

OUTPUT

```
Enter a number: 10
Sum of even numbers up to 10 is: 30 Sum of odd numbers up to 10 is: 25
```

2. Program to check if a given string is a palindrome using slicing.

```
def is_palindrome(s):
s = s.lower().replace(" ", "")  # Converting to lowercase and removing spaces return s == s[::-1]  #
Checking if the string is equal to its reverse

user_string = input("Enter a string: ")  # Taking input from the user if is_palindrome(user_string):  #

Checking if palindrome
    print(f"'{user_string}' is a palindrome.") else:
print(f"'{user_string}' is not a palindrome.")
```

OUTPUT

```
Enter a string: Race car 'Race car' is a palindrome.
```

3. Count Vowels, Consonants, and Blanks in a String

```
def count_chars(s):
vowels = "aeiouAEIOU"
consonants = sum(1 for c in s if c.isalpha() and c not in vowels) vowel_count = sum(1 for c in s if c in
vowels)
blanks = s.count(' ')
return vowel_count, consonants, blanks
```

OUTPUT

```
Enter a sentence: Hello World Vowels, consonants, blanks: (3, 7, 1)
```

4. Print Characters Common in Two Strings

```
def common_chars(s1, s2): return set(s1) & set(s2)
```

OUTPUT

Enter first string: hello

Enter second string: world Common characters: {'l', 'o'}

5. Calculate Percentage of Marks

```
def calculate_percentage(marks): total_marks = sum(marks)
    percentage = (total_marks / (len(marks) * 100)) * 100 return percentage
```

OUTPUT

Enter marks separated by space: 80 90 100
Percentage: 90.0

6. Display Fibonacci Sequence up to n Terms

```
def fibonacci(n): a, b = 0, 1
    fib_seq = []
    for _ in range(n):
    fib_seq.append(a) a, b = b, a + b
    return fib_seq
```

OUTPUT

Enter the number of Fibonacci terms: 7 Fibonacci sequence: [0, 1, 1, 2, 3, 5, 8]

7. Remove Duplicate Words from a Sentence and Sort Them

```
    def remove_duplicates_sort(sentence):
    words = list(set(sentence.split())) return " ".join(sorted(words))
```

OUTPUT

Enter a sentence: the quick brown fox jumps over the lazy dog Sorted unique words: brown dog fox jumps lazy over quick the

8. Implement Stack Operations using *args

```
def stack_operations(*args): stack = []
    for op in args:
    if op.startswith("push"):
    val = op.split() stack.append(val)
elif op == "pop": if stack:
        stack.pop() elif op == "peek":
    if stack:
          return stack[-1] return stack
```

OUTPUT

operations = ["push 10", "push 20", "pop", "peek"] Stack after operations: 10

Practical No 7

1. OOP Concepts in Pharmaceuticals. Using Inheritance, Encapsulation, Abstraction, and Polymorphism

```
   from abc import ABC, abstractmethod class DrugFormulation(ABC):
def _init_(self, name, dosage, manufacturer): self._name = name
   self._dosage = dosage self._manufacturer =manufacturer

   @abstractmethod defadminister(self):
   pass

   def get_info(self):
   return f"{self._name} ({self._dosage}) by {self._manufacturer}"

   # Tablet class inherits from DrugFormulation class Tablet(DrugFormulation):
   def administer(self):
         return f"Administer {self._name} tablet orally with water." class Capsule(DrugFormulation):
   def administer(self):
   return f"Administer {self._name} capsule with warm water."

   class Injection(DrugFormulation):
   def administer(self):
   return f"Administer {self._name} injection intravenously."

def prescribe_drug(drug: DrugFormulation): return drug.administer()

   tablet = Tablet("Paracetamol", "500mg", "PharmaCorp") capsule = Capsule("Amoxicillin", "250mg",
   "MediHealth") injection = Injection("Insulin", "10ml", "BioCare")

   print(prescribe_drug(tablet)) print(prescribe_drug(capsule)) print(prescribe_drug(injection))
```

OUTPUT

```
Administer Paracetamol tablet orally with water. Administer Amoxicillin capsule with warm water.
Administer Insulin injection intravenously.
```

2. Program to find the sum of an array

```
defsum_of_array(arr): return sum(arr)
```

OUTPUT

```
arr = [1, 2, 3, 4, 5]
Sum of array: 15
```

3. **Program to find the largest element in an array**

```
def largest_element(arr):
return max(arr)
```

OUTPUT

```
arr = [1, 2, 3, 4, 5]
Largest element in array: 5
```

4. **Program to split the array and add the first part to the end**

```
def split_and_add(arr, split_index):
return arr[split_index:] + arr[:split_index]
```

OUTPUT

```
arr = [1, 2, 3, 4, 5]
split_index = 2
Array after splitting and adding: [3, 4, 5, 1, 2]
```

5. **Program to add two matrices**

```
def add_matrices(matrix1, matrix2):
return[[matrix1[i][j] + matrix2[i][j] for j in range(len(matrix1[0]))] for i in range(len(matrix1))]
```

OUTPUT

```
matrix1 = [ [1, 2, 3],
  [4, 5, 6],
  [7, 8, 9]
  ]
matrix2 = [ [9, 8, 7],
  [6, 5, 4],
  [3, 2, 1]
  ]
  Sum of matrices: [[10, 10, 10], [10, 10, 10], [10, 10, 10]]
```

Practical No 8

1. **Write a program to create point class with x,y,z coordinate and methods increment point, decrementpoint, add points , less than , greater than , equal to , check in which quadrant it lies,check whether the point is collinear and print point.**

```
class Point:
def __init__(self, x, y, z):
self.x = x self.y = y self.z = z

# Increment each coordinate by 1 def increment(self):
self.x += 1
self.y += 1
self.z += 1

def decrement(self):
self.x -= 1
self.y -= 1
self.z -= 1

def add(self, other):
return Point(self.x + other.x, self.y + other.y, self.z + other.z)

def __lt__(self, other):
return (self.x, self.y, self.z) < (other.x, other.y, other.z)

def __gt__(self, other):
return (self.x, self.y, self.z) > (other.x, other.y, other.z)

def __eq__(self, other):
return (self.x, self.y, self.z) == (other.x, other.y, other.z)

def quadrant(self):
if self.x > 0 and self.y > 0: return "First Quadrant"
elif self.x < 0 and self.y > 0: return "Second Quadrant"
        elif self.x < 0 and self.y < 0: return "Third Quadrant" elif self.x > 0 and self.y < 0: return "Fourth
                                                                                          Quadrant"
else:
return "On Axis"
```

```
def __str__(self):
return f"Point({self.x}, {self.y}, {self.z})"

p1 = Point(1, 2, 3)
p2 = Point(-1, -2, 0)

p1.increment() p2.decrement()

p3 = p1.add(p2)

print(str(p1)) print(str(p2)) print(str(p3)) print(p1 < p2) print(p1.quadrant()) print(p2.quadrant())
```

OUTPUT

```
Point(2, 3, 4)
Point(-2, -3, -1)
Point(0, 0, 3) False
First Quadrant Third Quadrant
```

2. Create class watch with hr,min,sec,alarm,type and methods setalarm, stopalarm,showtime.

```
class Watch:
def __init__(self, hr, min, sec, alarm=None, type="Digital"): self.hr = hr
self.min = min self.sec = sec self.alarm = alarm self.type = type

def set_alarm(self, alarm_time): self.alarm = alarm_time

                                    def stop_alarm(self):
                                      self.alarm = None

def show_time(self):
return f"{self.hr:02}:{self.min:02}:{self.sec:02}"
```

```
watch = Watch(9, 30, 45)
print(watch.show_time())  # Displays time in HH:MM:SS format

watch.set_alarm("10:00:00") print("Alarm set for:", watch.alarm) watch.stop_alarm()
print("Alarm:", watch.alarm)
```

OUTPUT

```
09:30:45
Alarm set for: 10:00:00 Alarm: None
```

3. Write Python Program to Simulate a Bank Account with Support for depositMoney, withdrawMoney and showBalance Operations.

```
class BankAccount:
def __init__(self, balance=0):
self.balance = balance

def deposit_money(self, amount):
self.balance += amount

def withdraw_money(self, amount):
if amount <= self.balance:
   self.balance -= amount else:
print("Insufficient funds!")

def show_balance(self):
return f"Balance: {self.balance}"

account = BankAccount(100) account.deposit_money(50) print(account.show_balance())
account.withdraw_money(75) print(account.show_balance()) account.withdraw_money(100)
print(account.show_balance())
```
OUTPUT

```
Balance: 150
Balance: 75 Insufficient funds! Balance: 75
```

4. Create class vehicle with attributes(color,capacity,enginpower,tyre) and behaviour (start,stop) Create class car which inherit vehicle class with

attributes(airbags,gear,speed,fuel,) and methods(accelerate ,fillfuel,playmusic(),onAC()) Create class electric car with attribute(battery) and behaviour(charging(),battery level().

```
class Vehicle:
def __init__(self, color, capacity, engine_power, tyres):
self.color = color self.capacity = capacity
self.engine_power = engine_power self.tyres = tyres

def start(self):
print("Vehicle started.")

def stop(self):
print("Vehicle stopped.")

class Car(Vehicle):
def __init__(self, color, capacity, engine_power, tyres, airbags, gear, speed, fuel): super().__init__(color,
capacity, engine_power, tyres)
self.airbags = airbags self.gear = gear self.speed = speed self.fuel = fuel

def accelerate(self):
self.speed += 10

def fill_fuel(self, amount):
self.fuel += amount

def play_music(self):
print("Playing music.")

def on_ac(self):
print("AC turned on.")

class ElectricCar(Car):
def __init__(self, color, capacity, engine_power, tyres, airbags, gear, speed, battery): super().__init __
(color, capacity, engine_power, tyres, airbags, gear, speed, fuel=0) self.battery = battery

def charging(self): print("Car is charging.")

def battery_level(self):
return f"Battery level: {self.battery}%"

vehicle = Vehicle("Red", 5, "150 HP", 4) vehicle.start()
vehicle.stop()

car = Car("Blue", 5, "200 HP", 4, airbags=6, gear="Automatic", speed=50, fuel=10) car.start()
car.accelerate() car.fill_fuel(20) car.play_music() car.on_ac()
print(f"Car color: {car.color}, Speed: {car.speed}, Fuel: {car.fuel}")

e_car = ElectricCar("Green", 5, "180 HP", 4, airbags=4, gear="Manual", speed=40, battery=80)
e_car.start() e_car.charging() print(e_car.battery_level())
```

OUTPUT

```
Vehicle started. Vehicle stopped. Vehicle started. Playing music. AC turned on.
Car color: Blue, Speed: 60, Fuel: 30 Vehicle started.
Car is charging. Battery level: 80%
```

5. Define a class Person and its two child classes: Male and Female. All classes have a method "getGender" which can print "Male" for Male class and "Female" for Female class

```
    class Person:
def get_gender(self): pass

class Male(Person): def get_gender(self):
    return "Male"

class Female(Person): def get_gender(self):
    return "Female"

    man = Male() woman = Female()
    print(man.get_gender()) print(woman.get_gender())
```

OUTPUT

```
Male Female
```

6. Implement Object-Oriented Programming (OOP) concepts in Python, including Polymorphism, Encapsulation, Inheritance, and Abstraction, using a pharmaceutical- related example

```
   from abc import ABC, abstractmethod class Medicine(ABC):
   @abstractmethod def use(self):
   pass

class Tablet(Medicine): def use(self):
   return "Swallow with water."

class Syrup(Medicine): def use(self):
   return "Take with a spoon."

class Capsule(Medicine): def use(self):
   return "Take with warm water."

   class Doctor:
def prescribe(self, medicine: Medicine): return medicine.use()

   doc= Doctor() tab = Tablet()
   print(doc.prescribe(tab))

   doc = Doctor() tablet_medicine = Tablet() syrup_medicine = Syrup() capsule_medicine = Capsule()

   print(doc.prescribe(tablet_medicine))

   print(doc.prescribe(syrup_medicine))  print(doc.prescribe(capsule_medicine))
```

OUTPUT

```
Swallow with water. Take with a spoon. Take with warm water.
```

7. Design a Python program to simulate different types of Drug Formulations using OOP principles. The program should:

1. **Use Inheritance to create different drug formulations (e.g., Tablet, Capsule, Injection).**
2. **Implement Encapsulation to protect sensitive drug data.**
3. **Apply Abstraction to define a blueprint for drug formulations.**
4. **Demonstrate Polymorphism by overriding methods in different drug types**

```
    from abc import ABC, abstractmethod class DrugFormulation(ABC):
    def __init__(self, name, dosage, manufacturer):
    self._name = name  # Encapsulation: Protecting sensitive drug data self._dosage = dosage
    self._manufacturer = manufacturer

    @abstractmethod def administer(self):
    pass

    def get_info(self):
    return f"{self._name} ({self._dosage}) by {self._manufacturer}"

class Tablet(DrugFormulation): def administer(self):
    return f"Administer {self._name} tablet orally with water."

class Capsule(DrugFormulation):  def administer(self):
    return f"Administer {self._name} capsule with warm water."

class Injection(DrugFormulation): def administer(self):
    return f"Administer {self._name} injection intravenously."

def prescribe_drug(drug: DrugFormulation): return drug.administer()

    tablet = Tablet("Paracetamol", "500mg", "PharmaCorp")
```

```
capsule = Capsule("Amoxicillin", "250mg", "MediHealth") injection = Injection("Insulin", "10ml",
"BioCare")

print(prescribe_drug(tablet))  print(prescribe_drug(capsule))  print(prescribe_drug(injection))
```

OUTPUT

```
Administer Paracetamol tablet orally with water.
Administer Amoxicillin capsule with warm water.
Administer Insulin injection intravenously
```

Practical No 9

1. **Write a regular expression to extract year, month and date from a string Extract only 3 digit numbers from string Extract all of the words and numbers from string.Find out all of the words which start with a vowel.Find out all of the words, which start with a consonant.Count total numbers of a, an and the.**

```
import re

text = "Today's date is 2024-03-24. The event was held on 1999/12/31. Some numbers: 456, 89, Words: apple"

# 1. Extract Year, Month, and Date from a string

date_pattern = r"(\d{4})[-/](\d{2})[-/](\d{2})"

dates = re.findall(date_pattern, text)

print("Extracted Dates (Year, Month, Day):", dates)

# 2. Extract Only 3-Digit Numbers

three_digit_pattern = r"\b\d{3}\b"

three_digit_numbers = re.findall(three_digit_pattern, text)

print("Three-digit numbers:", three_digit_numbers)

# 3. Extract All Words and Numbers

words_numbers_pattern = r"\w+"

words_numbers = re.findall(words_numbers_pattern, text)

print("All words and numbers:", words_numbers)

# 4. Find All Words That Start with a Vowel

vowel_pattern = r"\b[aeiouAEIOU]\w*"

vowel_words = re.findall(vowel_pattern, text)

print("Words starting with a vowel:", vowel_words)

# 5. Find All Words That Start with a Consonant

consonant_pattern = r"\b[^aeiouAEIOU\W]\w*"

consonant_words = re.findall(consonant_pattern, text)
```

```
print("Words starting with a consonant:", consonant_words)
```

output

```
Extracted Dates (Year, Month, Day): [('2024', '03', '24'), ('1999', '12', '31')] Three-digit numbers: ['456']
All words and numbers: ['Today', 's', 'date', 'is', '2024', '03', '24', 'The', 'event', 'was', 'held', 'on', '1999',
'12', '31', 'Some', 'numbers', '456', '89', 'Words', 'apple']
Words starting with a vowel: ['is', 'event', 'on', 'apple']
Words starting with a consonant: ['Today', 's', 'date', '2024', '03', '24', 'The', 'was', 'held', '1999', '12',
'31', 'Some', 'numbers', '456', '89', 'Words']
```

2. Write a Python program to find all words which are at least 4 characters long in a string.

```
import re
text = "python program to find all words which are at least 4"

# Regular expression to match words with at least 4 characters
pattern = r"\b\w{4,}\b"

# Find all matching words
long_words = re.findall(pattern, text)
print("Words with at least 4 characters:",long_words)
```

output

```
Words with at least 4 characters: ['python', 'program', 'find', 'words', 'which', 'least']
```

3. Write a Python program to check for a number at the end of a string.

```
import re
def ends_with_number(s):
  pattern = r"\d+$"
  return bool(re.search(pattern, s))

test_strings = [
  "Hello123",
  "Python 2024",


]
for text in test_strings:
  print(f"'{text}' ends with a number? {ends_with_number(text)}")
```

output

```
'Hello123' ends with a number? True
'Python 2024' ends with a number? True
```

4. Write a Python program to check for a number starting with 2 or 1 and having 4 digits

```
def check_number(number):
    num_str = str(number)
    if len(num_str) == 4 and (num_str[0] == '1' or num_str[0] == '2'):
        return "Valid: The number starts with 1 or 2 and has 4 digits."
    else:
        return "Invalid: The number doesn't meet the criteria."
number = int(input("Enter a 4-digit number: "))
print(check_number(number))
```

output

```
Enter a 4-digit number: 1234
Valid: The number starts with 1 or 2 andhas 4 digits.
```

5. Write a Python program that matches a string that has an 'a' followed by anything, ending in 'b'

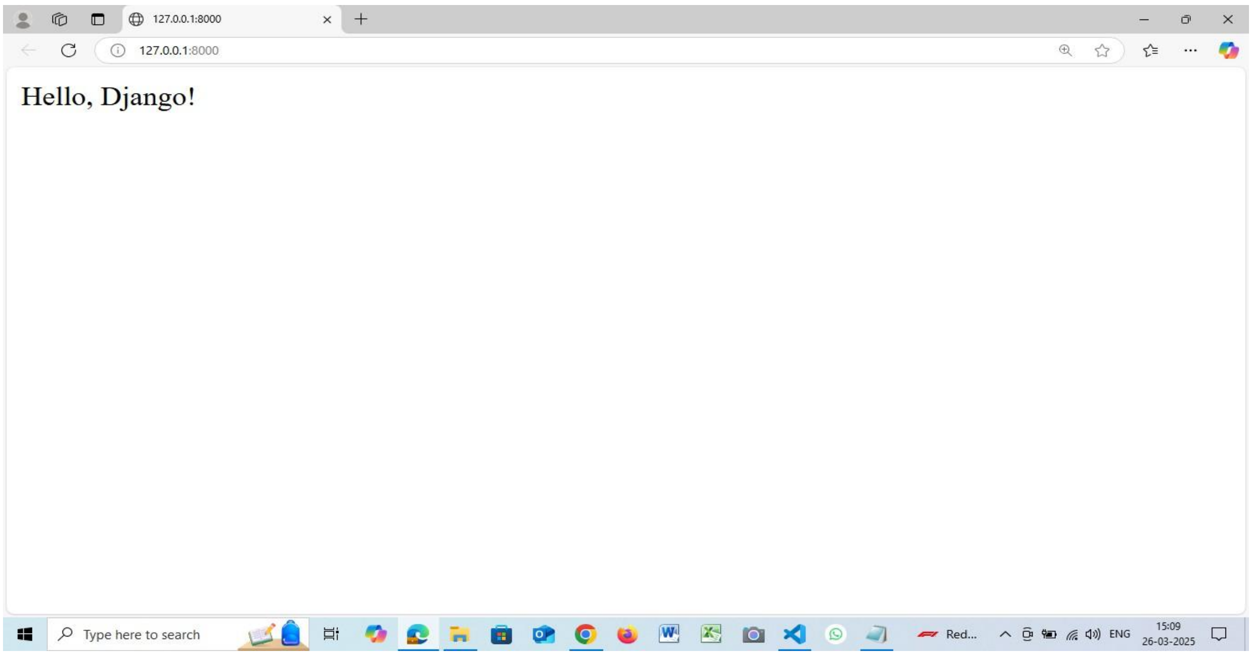
```
import re
def match_string(s):
    pattern = r'^a.*b$' # Regex pattern: 'a' at start (^) followed by anything (.*) and ending in 'b' ($)
    if re.match(pattern, s):
        return "Valid: The string starts with 'a' and ends with 'b'."
    else:
        return "Invalid: The string does not meet the criteria."
test_str = input("Enter a string: ")
print(match_string(test_str))
```

output

```
Enter a string: appleb
Valid: The string starts with 'a' and ends with 'b'.
```

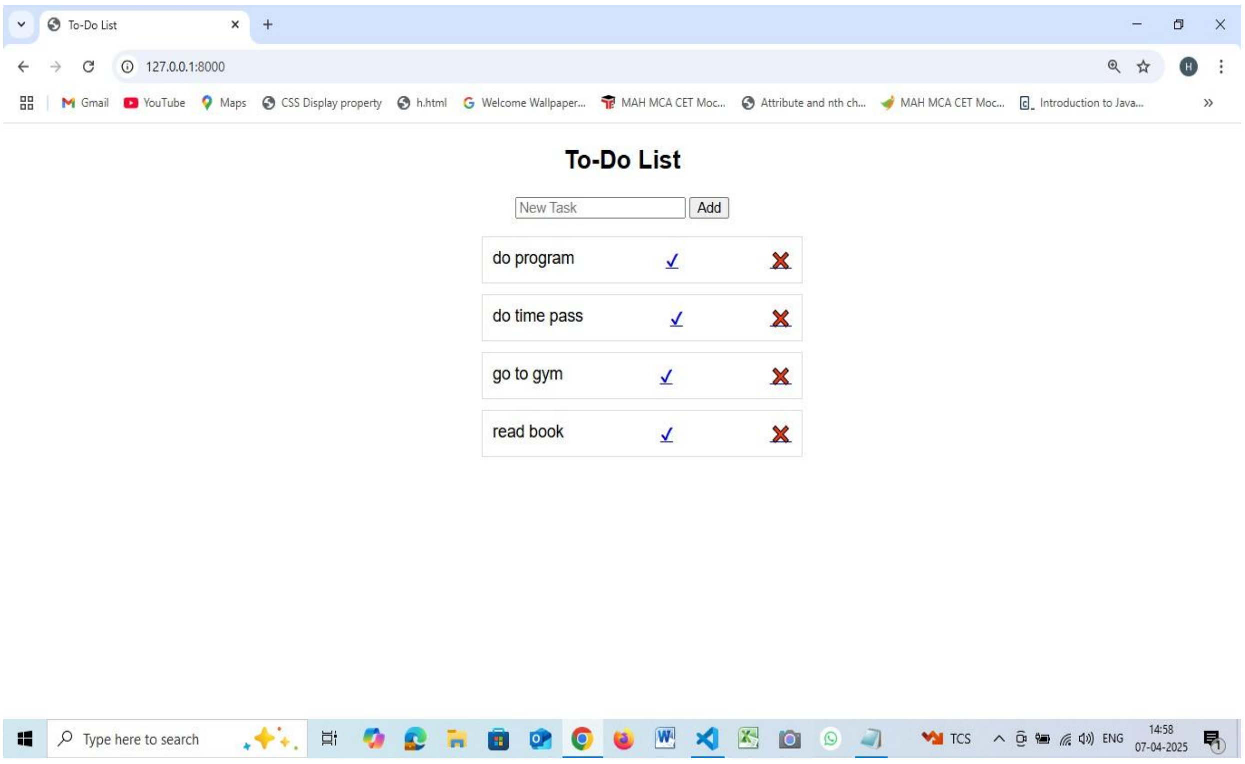
Practical No 10 (Django)

1. Create a simple app that displays "Hello, Django!" in the browser.



```
Hello, Django!
```

2. Create a basic to-do list app with Django.



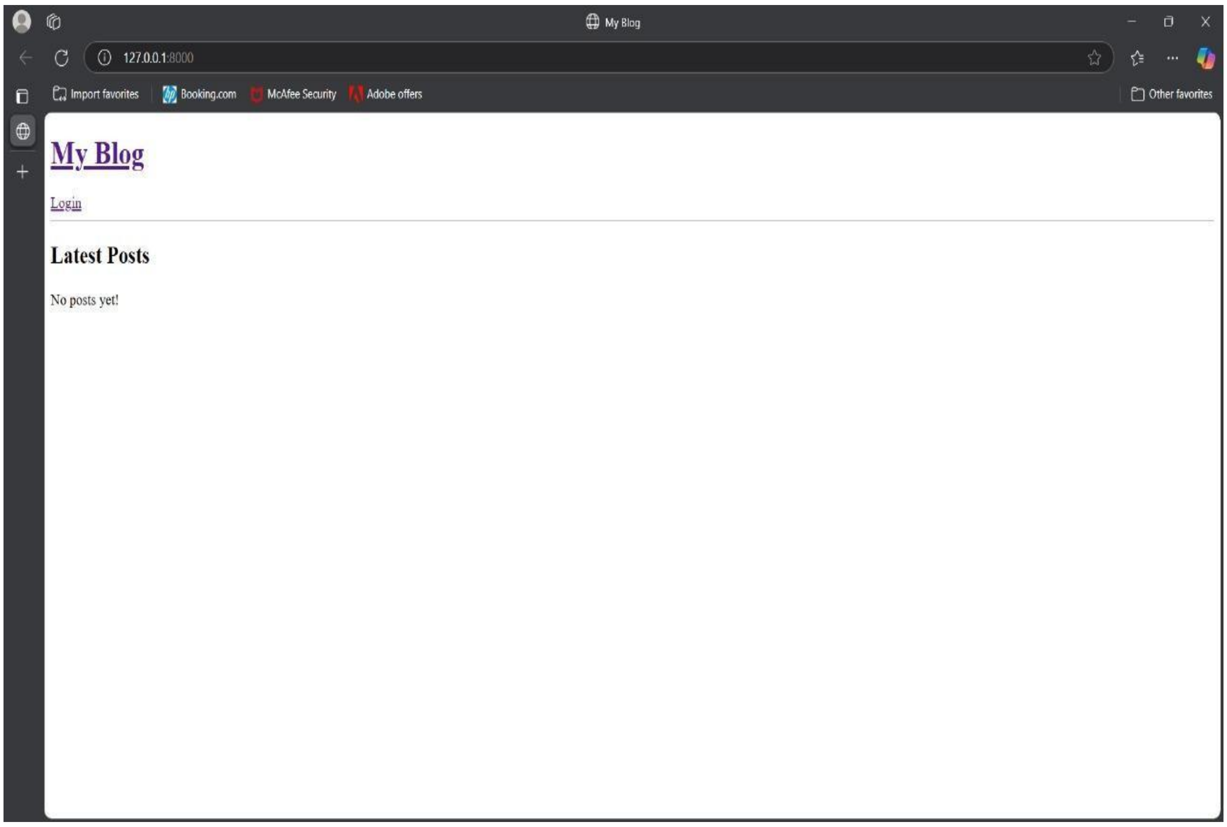
To-Do List

New Task Add

do program	✓	✗
do time pass	✓	✗
go to gym	✓	✗
read book	✓	✗

3. Create a Blog Application using Django.

- **Users can create, read, update, and delete blog posts.**
- **Features like categories, comments, and user authentication.**
- **Example: A personal blogging platform like WordPress.**


My Blog

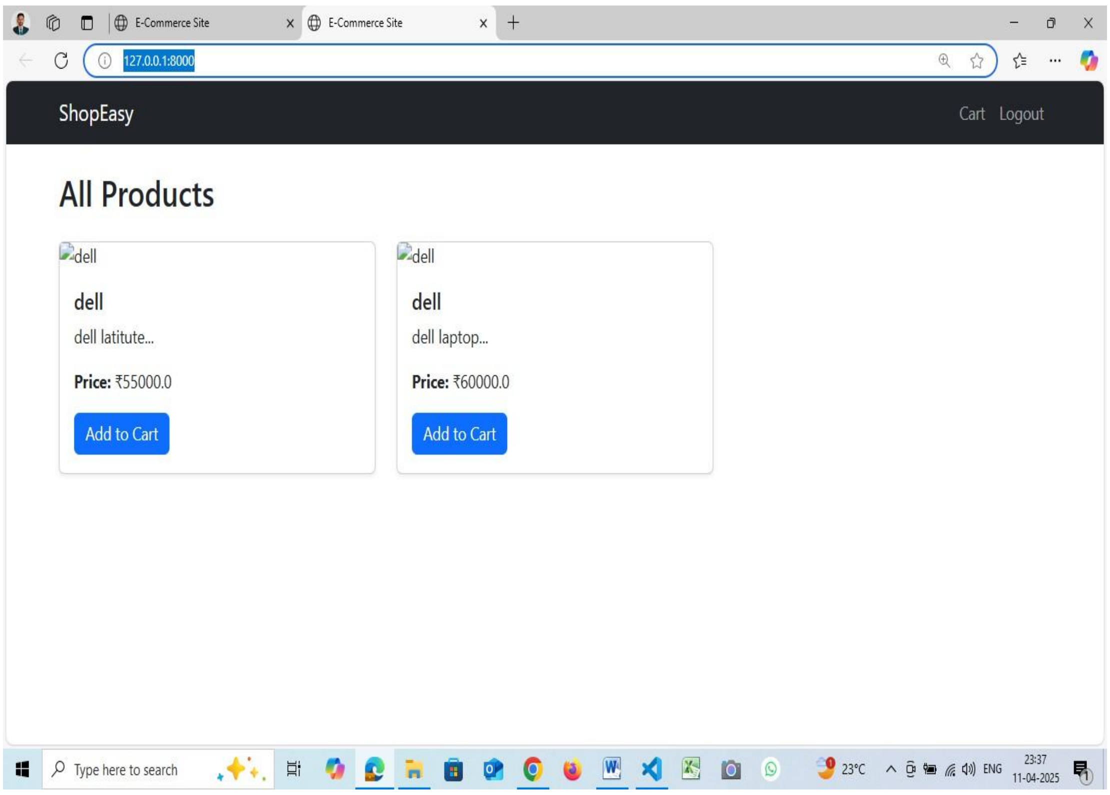
Login

Latest Posts

No posts yet!

4.E-Commerce Website using Django.

- **Product catalog, shopping cart, and payment integration.**
- **Order management, user profiles, and review systems.**
- **Example: Online stores like Amazon or Shopify.**



All Products

dell

dell latitute...

Price: ₹55000.0

Add to Cart

dell

dell laptop...

Price: ₹60000.0

Add to Cart

Practical No 11

1. Insert Single Document – A program to insert one document into a MongoDB collection.
from pymongo import MongoClient

```
# Step 1: Connect to MongoDB
client = MongoClient("mongodb://localhost:27017/")

# Step 2: Create/Get a database
db = client["mydatabase"]

# Step 3: Create/Get a collection
collection = db["students"]

# Step 4: Create a document (Python dictionary)
student_data = {
    "name": "Yash Jawarkar",
    "age": 23,
    "course": "MCA",
    "city": "Pune"
}

# Step 5: Insert the document
result = collection.insert_one(student_data)

# Step 6: Print inserted ID and success message
print("Document inserted with ID:", result.inserted_id)
```

output

```
Document inserted with ID: 66191b8b1b3c23b157f5db0e
```

2. Insert Multiple Documents – Inserts a list of documents into a collection at once.

```
from pymongo import MongoClient

# Step 1: Connect to MongoDB
client = MongoClient("mongodb://localhost:27017/")

# Step 2: Create/Get a database
db = client["mydatabase"]

# Step 3: Create/Get a collection
collection = db["students"]

# Step 4: Create a list of documents (list of dictionaries)
students_data = [
    {"name": "Rahul", "age": 22, "course": "BCA", "city": "Mumbai"},
    {"name": "Sneha", "age": 24, "course": "MCA", "city": "Pune"},
    {"name": "Amit", "age": 23, "course": "MBA", "city": "Delhi"},
    {"name": "Priya", "age": 21, "course": "BBA", "city": "Chennai"}
]

# Step 5: Insert the documents
result = collection.insert_many(students_data)

# Step 6: Print inserted IDs
print("Documents inserted with IDs:")
for doc_id in result.inserted_ids:
    print(doc_id)
```

output

```
Documents inserted with IDs:
66191c5a1b3c23b157f5db0f
66191c5a1b3c23b157f5db10
66191c5a1b3c23b157f5db11
66191c5a1b3c23b157f5db12
```

3. Find All Documents – Retrieves and prints all documents from a specified collection.

```
from pymongo import MongoClient

# Step 1: Connect to MongoDB
client = MongoClient("mongodb://localhost:27017/")

# Step 2: Select the database
db = client["mydatabase"]

# Step 3: Select the collection
collection = db["students"]

# Step 4: Find all documents in the collection
all_documents = collection.find()

# Step 5: Print all documents
print("All Documents in 'students' collection:")
for doc in all_documents:
    print(doc)
```

output

```
All Documents in 'students' collection:
{'_id': ObjectId('66191b8b1b3c23b157f5db0e'), 'name': 'Yash Jawarkar', 'age': 23, 'course': 'MCA',
'city': 'Pune'}
```

```
{'_id': ObjectId('66191c5a1b3c23b157f5db0f'), 'name': 'Rahul', 'age': 22, 'course': 'BCA', 'city':
'Mumbai'}
{'_id': ObjectId('66191c5a1b3c23b157f5db10'), 'name': 'Sneha', 'age': 24, 'course': 'MCA', 'city':
'Pune'}
{'_id': ObjectId('66191c5a1b3c23b157f5db11'), 'name': 'Amit', 'age': 23, 'course': 'MBA', 'city': 'Delhi'}
{'_id': ObjectId('66191c5a1b3c23b157f5db12'), 'name': 'Priya', 'age': 21, 'course': 'BBA', 'city':
'Chennai'}
```

4. Find Document by Field – Searches for documents that match a specific field value (e.g., name = "Alice").

```
from pymongo import MongoClient

# Step 1: Connect to MongoDB
client = MongoClient("mongodb://localhost:27017/")

# Step 2: Select the database
db = client["mydatabase"]

# Step 3: Select the collection
collection = db["students"]

# Step 4: Define the query
query = {"name": "Sneha"}

# Step 5: Search and print matching documents
results = collection.find(query)

print("Documents where name = 'Sneha':")
for doc in results:
 print(doc)
```

output

```
Documents where name = 'Sneha':
{'_id': ObjectId('66191c5a1b3c23b157f5db10'), 'name': 'Sneha', 'age': 22, 'course': 'MCA', 'city':
'Pune'}
```

5. Update a Single Document – Updates the first document that matches a given condition.
from pymongo import MongoClient

```
# Step 1: Connect to MongoDB
client = MongoClient("mongodb://localhost:27017/")

# Step 2: Select the database
db = client["mydatabase"]
```

```
# Step 3: Select the collection
collection = db["students"]

# Step 4: Define the query and the new values
query = {"name": "Sneha"}  # Condition
new_values = {"$set": {"city": "Bangalore"}}  # Update operation

# Step 5: Perform the update
result = collection.update_one(query, new_values)

# Step 6: Output result
if result.modified_count > 0:
   print("Document updated successfully.")
else:
   print("No document matched or update was not necessary.")
```

output

```
Document updated successfully.
```

6. Update Multiple Documents – Updates all documents that meet a certain filter.

```
from pymongo import MongoClient

# Step 1: Connect to MongoDB
client = MongoClient("mongodb://localhost:27017/")

# Step 2: Select the database
db = client["mydatabase"]

# Step 3: Select the collection
collection = db["students"]

# Step 4: Define the filter and the update
filter_query = {"city": "Pune"}
new_values = {"$set": {"course": "M.Sc."}}

# Step 5: Perform the update
result = collection.update_many(filter_query, new_values)

# Step 6: Output result
print(f"{result.modified_count} document(s) updated.")
```

output

```
2 document(s) updated.
```

7. Delete a Single Document – Removes one document based on a condition.
from pymongo import MongoClient

```
# Step 1: Connect to MongoDB
```

```
client = MongoClient("mongodb://localhost:27017/")

# Step 2: Select the database
db = client["mydatabase"]

# Step 3: Select the collection
collection = db["students"]

# Step 4: Define the delete condition
delete_query = {"name": "Amit"}

# Step 5: Delete the first matching document
result = collection.delete_one(delete_query)

# Step 6: Output result
if result.deleted_count > 0:
   print("Document deleted successfully.")
else:
   print("No matching document found.")
```

output

```
Document deleted successfully.
```

8. Delete Multiple Documents – Deletes all documents that satisfy a condition.

```
from pymongo import MongoClient

# Step 1: Connect to MongoDB
client = MongoClient("mongodb://localhost:27017/")

# Step 2: Select the database
db = client["mydatabase"]

# Step 3: Select the collection
collection = db["students"]

# Step 4: Define the condition for deletion
delete_query = {"city": "Pune"}

# Step 5: Delete all matching documents
result = collection.delete_many(delete_query)

# Step 6: Output result
print(f"{result.deleted_count} document(s) deleted.")
```

output

```
2 document(s) deleted.
```

9. Find Documents with Projection – Retrieves documents but only returns specific fields.

```
from pymongo import MongoClient

# Step 1: Connect to MongoDB
client = MongoClient("mongodb://localhost:27017/")

# Step 2: Select the database
db = client["mydatabase"]

# Step 3: Select the collection
collection = db["students"]

# Step 4: Define projection (1 = include, 0 = exclude)
projection = {"_id": 0, "name": 1, "city": 1}

# Step 5: Find all documents with projection
results = collection.find({}, projection)

# Step 6: Print results
print("Documents (name and city only):")
for doc in results:
   print(doc)
```

output

```
Documents (name and city only):
{'name': 'Rahul', 'city': 'Mumbai'}
{'name': 'Priya', 'city': 'Chennai'}
```

10. Sort Documents – Finds and sorts documents based on one or more fields.
from pymongo import MongoClient
from pymongo import ASCENDING, DESCENDING # For sorting constants

```
# Step 1: Connect to MongoDB
client = MongoClient("mongodb://localhost:27017/")

# Step 2: Select the database
db = client["mydatabase"]

# Step 3: Select the collection
collection = db["students"]

# Step 4: Find and sort documents by age (ascending)
results = collection.find().sort("age", ASCENDING)

# Step 5: Print results
print("Students sorted by age (ascending):")
for doc in results:
   print(doc)
```

output

```
Students sorted by age (ascending):
{'_id': ..., 'name': 'Priya', 'age': 21, 'course': 'BBA', 'city': 'Chennai'}
{'_id': ..., 'name': 'Rahul', 'age': 22, 'course': 'BCA', 'city': 'Mumbai'}
{'_id': ..., 'name': 'Amit', 'age': 23, 'course': 'MBA', 'city': 'Delhi'}
{'_id': ..., 'name': 'Sneha', 'age': 24, 'course': 'M.Sc.', 'city': 'Pune'}
```

11. Limit Query Results – Retrieves a limited number of documents from a query.

```
from pymongo import MongoClient

# Step 1: Connect to MongoDB
client = MongoClient("mongodb://localhost:27017/")

# Step 2: Select the database
db = client["mydatabase"]

# Step 3: Select the collection
collection = db["students"]

# Step 4: Retrieve only the first 3 documents
results = collection.find().limit(3)

# Step 5: Print results
print("First 3 documents:")
for doc in results:
    print(doc)
```

output

```
First 3 documents:
{'_id': ..., 'name': 'Rahul', 'age': 22, 'course': 'BCA', 'city': 'Mumbai'}
{'_id': ..., 'name': 'Sneha', 'age': 24, 'course': 'MCA', 'city': 'Pune'}
{'_id': ..., 'name': 'Amit', 'age': 23, 'course': 'MBA', 'city': 'Delhi'}
```

12. Skip Documents in Query – Skips a specified number of documents and returns the rest.

```
from pymongo import MongoClient

# Step 1: Connect to MongoDB
client = MongoClient("mongodb://localhost:27017/")

# Step 2: Select the database
db = client["mydatabase"]

# Step 3: Select the collection
collection = db["students"]
```

```
# Step 4: Skip the first 2 documents and retrieve the rest
results = collection.find().skip(2)

# Step 5: Print results
print("Documents after skipping the first 2:")
for doc in results:
    print(doc)
```

output

```
Documents after skipping the first 2:
{'_id': 1, 'name': 'Amit', 'age': 23, 'course': 'MBA', 'city': 'Delhi'}
{'_id': 2, 'name': 'Priya', 'age': 21, 'course': 'BBA', 'city': 'Chennai'}
```

13. Create an Index – Creates an index on one or more fields to speed up queries.

```
from pymongo import MongoClient

# Step 1: Connect to MongoDB
client = MongoClient("mongodb://localhost:27017/")

# Step 2: Select the database
db = client["mydatabase"]

# Step 3: Select the collection
collection = db["students"]

# Step 4: Create an index on the 'name' field
index_name = collection.create_index([("name", 1)])  # 1 for ascending order

# Step 5: Output result
print(f"Index created: {index_name}")
```

output

```
Index created: name_1
```

14. Drop an Index – Removes an index from a collection.

```
from pymongo import MongoClient

# Step 1: Connect to MongoDB
client = MongoClient("mongodb://localhost:27017/")

# Step 2: Select the database
db = client["mydatabase"]

# Step 3: Select the collection
collection = db["students"]

# Step 4: Drop the index
index_name = "name_1"  # The name of the index to drop
```

```
collection.drop_index(index_name)

# Step 5: Output result
print(f"Index '{index_name}' dropped successfully.")
```

output

```
Index 'name_1' dropped successfully.
```

15. Aggregate with $group – Groups documents by a field and performs aggregations like sum or average.

```
from pymongo import MongoClient

# Step 1: Connect to MongoDB
client = MongoClient("mongodb://localhost:27017/")

# Step 2: Select the database
db = client["mydatabase"]

# Step 3: Select the collection
collection = db["students"]

# Step 4: Perform aggregation with $group
pipeline = [
  {
    "$group": {
      "_id": "$city",  # Group by 'city'
      "average_age": {"$avg": "$age"},  # Calculate average age
      "total_students": {"$sum": 1}  # Count total students in each city
    }
  }
]

# Step 5: Execute the aggregation pipeline
results = collection.aggregate(pipeline)

# Step 6: Print results
print("Aggregated Results (City, Average Age, Total Students):")
for doc in results:
  print(doc)
```

output

```
Aggregated Results (City, Average Age, Total Students):
{'_id': 'Mumbai', 'average_age': 23.5, 'total_students': 2}
{'_id': 'Chennai', 'average_age': 21.0, 'total_students': 1}
{'_id': 'Pune', 'average_age': 24.0, 'total_students': 1}
```

16. Aggregate with $match and $project – Filters and reshapes documents in an aggregation pipeline.

```
from pymongo import MongoClient

# Step 1: Connect to MongoDB
client = MongoClient("mongodb://localhost:27017/")

# Step 2: Select the database
db = client["mydatabase"]

# Step 3: Select the collection
collection = db["students"]

# Step 4: Perform aggregation with $match and $project
pipeline = [
    {
        "$match": {
            "age": {"$gt": 22}  # Filter students with age greater than 22
        }
    },
    {
        "$project": {
            "_id": 0,  # Exclude the '_id' field
            "name": 1,  # Include the 'name' field
            "age": 1,   # Include the 'age' field
            "city": 1   # Include the 'city' field
        }
    }
]

# Step 5: Execute the aggregation pipeline
results = collection.aggregate(pipeline)

# Step 6: Print results
print("Filtered and reshaped results (age > 22):")
for doc in results:
    print(doc)
```

output

```
Filtered and reshaped results (age > 22):
{'name': 'Amit', 'age': 23, 'city': 'Delhi'}
{'name': 'Sneha', 'age': 24, 'city': 'Pune'}
```

17. Check if Collection Exists – Checks whether a collection exists in the database.

```
from pymongo import MongoClient

# Step 1: Connect to MongoDB
client = MongoClient("mongodb://localhost:27017/")

# Step 2: Select the database
```

```
db = client["mydatabase"]

# Step 3: Check if the collection exists
collection_name = "students"

if collection_name in db.list_collection_names():
    print(f"The collection '{collection_name}' exists.")
else:
    print(f"The collection '{collection_name}' does not exist.")
```

output

```
The collection 'students' exists.
```

18. Count Documents – Returns the count of documents that match a query.

```
from pymongo import MongoClient

# Step 1: Connect to MongoDB
client = MongoClient("mongodb://localhost:27017/")

# Step 2: Select the database
db = client["mydatabase"]

# Step 3: Select the collection
collection = db["students"]

# Step 4: Count documents where age > 22
count = collection.count_documents({"age": {"$gt": 22}})

# Step 5: Print the count
print(f"Number of students older than 22: {count}")
```

output

```
Number of students older than 22: 2
```

19. Paginate Results – Implements pagination to retrieve documents in chunks or pages.

```
from pymongo import MongoClient

# Step 1: Connect to MongoDB
client = MongoClient("mongodb://localhost:27017/")

# Step 2: Select the database
db = client["mydatabase"]

# Step 3: Select the collection
collection = db["students"]

# Step 4: Define the number of results per page
results_per_page = 2
```

```
# Step 5: Get the page number (let's assume we are retrieving page 1)
page_number = 1

# Step 6: Calculate the number of documents to skip
skip = (page_number - 1) * results_per_page

# Step 7: Retrieve documents for the current page
results = collection.find().skip(skip).limit(results_per_page)

# Step 8: Print results
print(f"Results for page {page_number}:")
for doc in results:
    print(doc)
```

output

```
Results for page 1:
{'_id': ..., 'name': 'Rahul', 'age': 22, 'course': 'BCA', 'city': 'Mumbai'}
{'_id': ..., 'name': 'Sneha', 'age': 24, 'course': 'MCA', 'city': 'Pune'}

Results for page 2:
{'_id': ..., 'name': 'Amit', 'age': 23, 'course': 'MBA', 'city': 'Delhi'}
{'_id': ..., 'name': 'Priya', 'age': 21, 'course': 'BBA', 'city': 'Chennai'}
```

20. Connect to MongoDB Atlas – Connects to a remote MongoDB cluster hosted on MongoDB Atlas.

```
from pymongo import MongoClient

# Step 1: MongoDB Atlas connection string
atlas_connection_string ="mongodb+srv://<Yash >:<hari123
>@cluster0.mongodb.net/<dbname>?retryWrites=true&w=majority"

# Step 2: Connect to MongoDB Atlas
client = MongoClient(atlas_connection_string)

# Step 3: Select the database and collection
db = client["mydatabase"]  # Replace 'mydatabase' with your database name
collection = db["students"]  # Replace 'students' with your collection name

# Step 4: Perform a simple query to check the connection
result = collection.find_one()  # Retrieve the first document from the collection

# Step 5: Print the result
if result:
    print("Connection successful! Here's a document:")
    print(result)
else:
    print("No documents found.")
```

output

```
Connection successful! Here's a document:
{'_id': ObjectId('...'), 'name': 'Rahul', 'age': 22, 'course': 'BCA', 'city': 'Mumbai'}
```

Practical No 12

1. Create a package named library and implement few functions of library in python.

```
# library/__init__.py
from .books import add_book
from .search import search_book
from .display import display_books
```

books.py

```
# library/books.py
library_collection = []

def add_book(title, author):
    book = {'title': title, 'author': author}
    library_collection.append(book)
    print(f"Book added: {title} by {author}")
```

search.py

```
# library/search.py
from .books import library_collection

def search_book(title):
    for book in library_collection:
        if book['title'].lower() == title.lower():
            print(f"Book found: {book['title']} by {book['author']}")
            return
    print("Book not found.")
```

display.py

```
# library/display.py
from .books import library_collection

def display_books():
    if not library_collection:
        print("Library is empty.")
        return
    print("Library Collection:")
    for idx, book in enumerate(library_collection, 1):
        print(f"{idx}. {book['title']} by {book['author']}")
```

main.py

```
# main.py
from library import add_book, search_book, display_books

add_book("The Alchemist", "Paulo Coelho")
add_book("1984", "George Orwell")
add_book("Python Basics", "Yash Jawarkar")

search_book("1984")
display_books()
```

output :

```
Book added: The Alchemist by Paulo Coelho
Book added: 1984 by George Orwell
Book added: Python Basics by Yash Jawarkar
Book found: 1984 by George Orwell
Library Collection:
1. The Alchemist by Paulo Coelho
2. 1984 by George Orwell
3. Python Basics by Yash Jawarkar
```

2. Create a module in python to perform simple calculator operations

```
# calculator.py
def add(a, b):
    return a + b

def subtract(a, b):
    return a - b

def multiply(a, b):
    return a * b

def divide(a, b):
    if b == 0:
        return "Error: Division by zero is not allowed."
    return a / b
```

```
# main.py
import calculator

a = float(input("Enter first number: "))
b = float(input("Enter second number: "))

print("Select Operation:")
print("1. Add")
print("2. Subtract")
print("3. Multiply")
print("4. Divide")

choice = input("Enter choice (1/2/3/4): ")

if choice == '1':
    print("Result:", calculator.add(a, b))
elif choice == '2':
    print("Result:", calculator.subtract(a, b))
elif choice == '3':
    print("Result:", calculator.multiply(a, b))
elif choice == '4':
    print("Result:", calculator.divide(a, b))
else:
    print("Invalid choice.")
```

Output

```
Enter first number: 10
Enter second number: 20
Select Operation:
1. Add
2. Subtract
3. Multiply
4. Divide
Enter choice (1/2/3/4): 1
Result: 30.0
```

Practical No 13

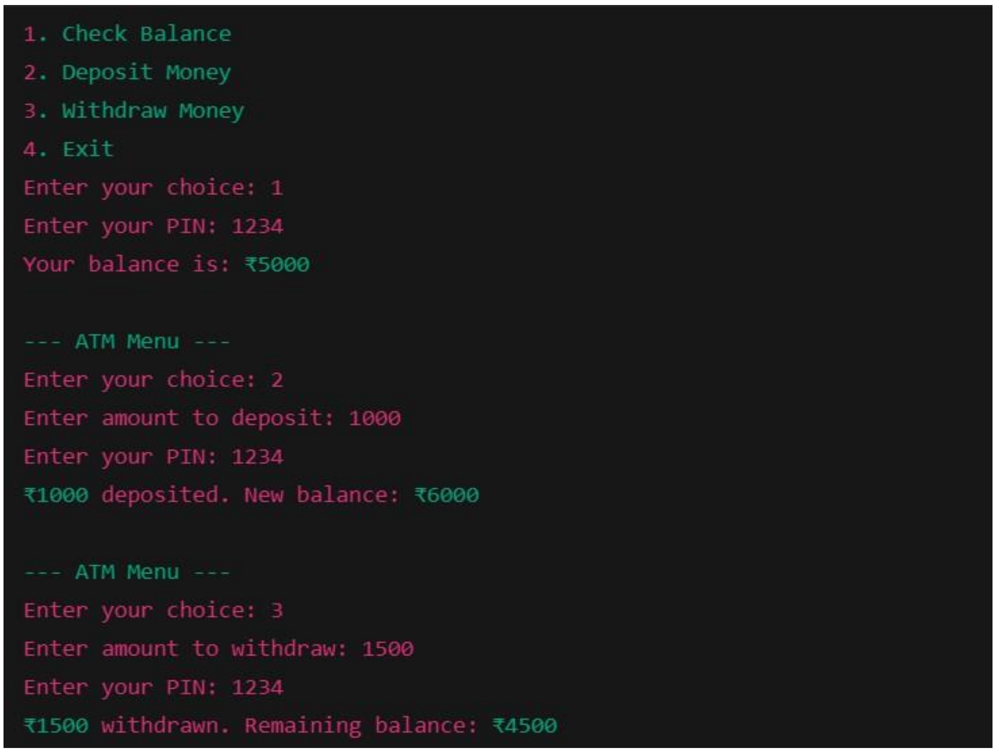
Create a Python program that simulates a basic ATM interface. The program will involve a class named ATM with encapsulated attributes like __balance and __pin. Access to these private attributes will be managed through public methods, demonstrating the concept of data hiding and controlled access.

- Define a class with private data members.
- Use getter and setter methods to manipulate private data.
- Implement methods for balance check, deposit, and withdraw, with PIN verification.
- Use conditionals and input handling for user interaction.

```
class ATM:
  def __init__(self):
    self._  balance = 0.0
    self.__pin = None

  # Setter method for PIN (only once)
  def set_pin(self, pin):
    if self.__pin is None:
      self.__pin = pin
      print("PIN set successfully.")
    else:
      print("PIN already set. Cannot reset PIN in this version.")

  # PIN verification method
  def verify_pin(self):
    entered_pin = input("Enter your PIN: ")
    return entered_pin == self.__pin
```

```
#Getter method for balance
def get_balance(self):
    if self.verify_pin():
        print(f"Your current balance is: ₹{self.__balance:.2f}")
    else:
        print("Incorrect PIN!")

# Method to deposit money
def deposit(self):
    if self.verify_pin():
        try:
            amount = float(input("Enter amount to deposit: ₹"))
            if amount > 0:
                self.__balance += amount
                print(f"₹{amount:.2f} deposited successfully.")
            else:
                print("Invalid amount. Please enter a positive value.")
        except ValueError:
            print("Invalid input. Please enter a numeric value.")
    else:
        print("Incorrect PIN!")

# Method to withdraw money
def withdraw(self):
    if self.verify_pin():
        try:
            amount = float(input("Enter amount to withdraw: ₹"))
            if 0 < amount <= self.__balance:
                    self.__balance -= amount
                    print(f"₹{amount:.2f} withdrawn successfully.")
                else:
                    print("Invalid amount or insufficient balance.")
            except ValueError:
                print("Invalid input. Please enter a numeric value.")
        else:
            print("Incorrect PIN!")

# ---- Main Program ----
def main():
    atm = ATM()

    print("Welcome to Secure ATM")
    pin = input("Set a 4-digit PIN to activate your ATM account: ")
    atm.set_pin(pin)

  while True:
        print("\nATM Menu:")
        print("1. Check Balance")
        print("2. Deposit Money")
        print("3. Withdraw Money")
        print("4. Exit")

        choice = input("Choose an option (1-4): ")

        if choice == '1':
            atm.get_balance()
        elif choice == '2':
            atm.deposit()
        elif choice == '3':
            atm.withdraw()
        elif choice == '4':
            print("Thank you for using the ATM. Goodbye!")
            break
        else:
            print("Invalid choice. Please try again.")

# Run the program
if _name___== "_main_":
    main()
```

Output



```
1. Check Balance
2. Deposit Money
3. Withdraw Money
4. Exit
Enter your choice: 1
Enter your PIN: 1234
Your balance is: ₹5000

--- ATM Menu ---
Enter your choice: 2
Enter amount to deposit: 1000
Enter your PIN: 1234
₹1000 deposited. New balance: ₹6000

--- ATM Menu ---
Enter your choice: 3
Enter amount to withdraw: 1500
Enter your PIN: 1234
₹1500 withdrawn. Remaining balance: ₹4500
```