



**TRIBHUVAN UNIVERSITY**  
**INSTITUTE OF ENGINEERING**

PULCHOWK CAMPUS

A REPORT ON  
Programming in Python Language

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### QUESTION 1:

Define a class Student with attributes name, roll\_number, and marks. Implement a method display\_info() that prints the details of the student. Create an instance of Student and call the display\_info() method to display the student's details..

### CODE 1:

```
class Student:

    def __init__(self, name, roll_number, marks):

        self.name = name

        self.roll_number = roll_number

        self.marks = marks


    def display_info(self):

        print(f"Name: {self.name}")

        print(f"Roll Number: {self.roll_number}")

        print(f"Marks: {self.marks}")


s1 = Student("Rahul", 101, 88)

s1.display_info()
```

### OUTPUT 1:

```
Name: Rahul
Roll Number: 101
Marks: 88
```

### QUESTION 2:

**Create a base class Animal with a method speak() that prints "Animal makes a sound". Derive a class Dog from Animal and override the speak() method to print "Dog barks". Instantiate the Dog class and call its speak() method.**

### CODE 2:

```
class Animal:
```

```
def speak(self):  
    print("Animal makes a sound")
```

```
class Dog(Animal):  
    def speak(self):  
        print("Dog barks")
```

```
# Example  
pet = Dog()  
pet.speak()
```

#### OUTPUT 2:

```
Dog barks
```

#### QUESTION 3:

**Define a class BankAccount with private attributes account\_number and balance. Implement methods to deposit and withdraw money, ensuring that the balance cannot go below zero. Provide a method to get the account details. Test the class by performing deposit and withdrawal operations.**

#### CODE 3:

```
class BankAccount:  
    def __init__(self, account_number, balance=0):  
        self.__account_number = account_number  
        self.__balance = balance  
  
    def deposit(self, amount):  
        self.__balance += amount  
        print(f'Deposited ₹ {amount}. New Balance = ₹ {self.__balance}')
```

```
def withdraw(self, amount):  
    if amount <= self.__balance:  
        self.__balance -= amount  
        print(f'Withdrew ₹{amount}. New Balance = ₹{self.__balance}')  
    else:  
        print("Insufficient Balance!")  
  
def get_details(self):  
    print(f'Account Number: {self.__account_number}, Balance: ₹{self.__balance}')
```

# Example

```
acc1 = BankAccount(123456789, 5000)  
acc1.deposit(2000)  
acc1.withdraw(3000)  
acc1.withdraw(6000)  
acc1.get_details()
```

**OUTPUT 3:**

```
Deposited ₹2000. New Balance = ₹7000  
Withdrew ₹3000. New Balance = ₹4000  
Insufficient Balance!  
Account Number: 123456789, Balance: ₹4000
```

**QUESTION 4:**

**Create a base class Shape with a method area(). Derive two classes Rectangle and Circle from Shape. Implement the area() method in both derived classes. Instantiate Rectangle and Circle, and demonstrate polymorphism by calling their area() methods.**

**CODE 4:**

```
import math
```

```
class Shape:
    def area(self):
        pass

class Rectangle(Shape):
    def __init__(self, length, breadth):
        self.length = length
        self.breadth = breadth

    def area(self):
        return self.length * self.breadth

class Circle(Shape):
    def __init__(self, radius):
        self.radius = radius

    def area(self):
        return math.pi * self.radius * self.radius

# Example
shapes = [Rectangle(10, 5), Circle(7)]
for s in shapes:
    print("Area:", s.area())
```

#### **OUTPUT 4:**

```
Area: 50
Area: 153.93804002589985
```

### QUESTION 5:

Define a class Person with attributes name and age. Derive a class Employee from Person with additional attributes employee\_id and salary. Implement a method display\_employee() in Employee that prints all the details. Create an instance of Employee and display the information.

### CODE 5:

```
class Person:
```

```
    def __init__(self, name, age):
```

```
        self.name = name
```

```
        self.age = age
```

```
class Employee(Person):
```

```
    def __init__(self, name, age, employee_id, salary):
```

```
        super().__init__(name, age)
```

```
        self.employee_id = employee_id
```

```
        self.salary = salary
```

```
    def display_employee(self):
```

```
        print(f'Name: {self.name}, Age: {self.age}, ID: {self.employee_id}, Salary: ₹{self.salary}')
```

```
# Example
```

```
emp1 = Employee("abc", 28, "E101", 50000)
```

```
emp1.display_employee()
```

### OUTPUT 5:

```
Name: abc, Age: 28, ID: E101, Salary: ₹50000
```

**QUESTION 6:**

Define a class **Vector** with attributes **x** and **y**. Overload the **+** operator to add two **Vector** objects. Implement the **\_\_add\_\_()** method and test it by adding two **Vector** instances.

**CODE 6:**

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

    def __add__(self, other):
        return Vector(self.x + other.x, self.y + other.y)

    def display(self):
        print(f'({self.x}, {self.y})')

# Example
v1 = Vector(2, 5)
v2 = Vector(4, 7)
v3 = v1 + v2
v3.display()
```

**OUTPUT 6:**

```
(6, 12)
```

**QUESTION 7:**

Create a class **Book** with attributes **title** and **author**. Overload the **\_\_str\_\_()** method to return a string representation of the **Book** object in the format **"Title by Author"**. Test this method by printing a **Book** instance.

**CODE 7:**

```
class Book:

    def __init__(self, title, author):

        self.title = title

        self.author = author

    def __str__(self):

        return f'{self.title}' by {self.author}"

# Example

b1 = Book("The White Tiger", "Aravind Adiga")

print(b1)
```

**OUTPUT 7:**

```
'The White Tiger' by Aravind Adiga
```



### QUESTION 8:

Define a class `Time` with attributes `hours`, `minutes`, and `seconds`. Overload the `==` operator to compare two `Time` objects for equality. Implement the `__eq__()` method and test it by comparing two `Time` instances.

### CODE 8:

```
class Time:
    def __init__(self, hours, minutes, seconds):
        self.hours = hours
        self.minutes = minutes
        self.seconds = seconds

    def __eq__(self, other):
        return (self.hours == other.hours and
                self.minutes == other.minutes and
                self.seconds == other.seconds)
```

# Example

```
t1 = Time(10, 30, 15)
t2 = Time(10, 30, 15)
t3 = Time(9, 45, 20)
```

```
print(t1 == t2) # True
print(t1 == t3) # False
```

### OUTPUT 8:

```
True
False
```

**QUESTION 9:**

**Define a class Person with attributes name and age. Define another class Address with attributes street, city, and zipcode. Create a Contact class that contains an instance of Person and Address. Implement methods to display the contact details. Create a Contact object and display its information.**

**CODE 9:**

```
class Person:
```

```
    def __init__(self, name, age):  
        self.name = name  
        self.age = age
```

```
class Address:
```

```
    def __init__(self, street, city, zipcode):  
        self.street = street  
        self.city = city  
        self.zipcode = zipcode
```

```
class Contact:
```

```
    def __init__(self, person, address):  
        self.person = person  
        self.address = address  
  
    def display_contact(self):  
        print(f'Name: {self.person.name}, Age: {self.person.age}')  
        print(f'Address: {self.address.street}, {self.address.city} - {self.address.zipcode}')
```

```
# Example
```

```
p1 = Person("Amit", 22)
a1 = Address("MG", "USA", "560001")
c1 = Contact(p1, a1)
c1.display_contact()
```

**OUTPUT 9:**

```
Name: Amit, Age: 22
Address: MG, USA - 560001
```