

# Python Fundamentals (Assignment4)

## Assignment Problems

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### Concept: Classes & Objects

Q1. Create a `BankAccount` class with **attributes** `account_number`, `owner_name`, and `balance`.

Add **methods** to `deposit`, `withdraw`, and `check balance`.

### Concept: Classes & Objects

Q2. Create a class `Book` with the following attributes:

- title
- author
- list of reviews

And add methods to:

- add a new review
- count reviews
- display all reviews

### Concept: Encapsulation

Q3. Create a class `Student` with **private** attributes `_name`, `_roll_no`, and `_marks`. Provide **getter** and **setter** methods with validation (e.g., marks cannot be negative, roll number has to be between 1 & 100 & name cannot be empty).

### Concept: Function Overriding

Q4. Create a class `Shape` with a method `area()`.

Create subclasses `Circle`, `Rectangle`, and `Triangle` that **override** the `area()` method.

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### Concept: Inheritance

**Q5.** Create a **base class** `Vehicle` with attributes like brand and model. Create two **subclasses** `Car` and `Bike` that add extra attributes - seats (in Car) & engine\_cc (in Bike).

### Concept: Abstraction

**Q6.** Create an **abstract class** `Employee` with an **abstract method** `calculate_salary()`. Create subclasses `Intern`, `FullTimeEmployee`, and `ContractEmployee` that implement the method differently.

### Concept: Constructor Overloading (with Default Parameters)

**Q7.** Create a class `Person` that allows the constructor to work with:

- name only
- name + age
- name + age + address

As direct constructor overloading (multiple constructors) are not allowed but we have to use **default parameters** to simulate constructor overloading.

### Concept: Instance & Class Attributes

**Q8.** Create a class `Player` with:

- a class variable `player_count`
- instance variables `name` and `level`

Track how many players were created.

### Concept: Multiple Inheritance

**Q9.** Create the following classes: `Herbivore`, `Carnivore`, `Omnivore` with some attributes & methods. Then create a class `Bear` that inherits from all the above classes to showcase how multiple inheritance works.

## Concept: OOP

### Q10. Mini Project – OOP Chat System

Let's create a Chat System using OOPs concepts. We have to create classes:

- `User`
- `Message`
- `ChatRoom`

And we have to implement functions:

- sending messages
- viewing chat history
- user joining and leaving the chatroom

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