

DSP505: Programming Lab for Data Science and Artificial Intelligence

TPL616: Advanced Programming for DSAI

Lab-2: Practice Problems (OOP)

Due Date: 30-Aug-2025

Task-0:

Execute the example codes discussed in the class to make yourself familiar with the classes and objects.

Task-1:

Assume that you are hired as a software developer by an e-commerce company (like Amazon/Flipkart) to design the backend shopping cart system. Customers will browse products, add them to their shopping cart, and place orders. You need to implement the core classes and logic using Object-Oriented Programming principles in Python.

1. Product Class

Attributes:

- - product_id, name, price, stock (number of items available)

Methods:

- - update_stock(quantity) : decreases/increases stock
- - is_available(quantity): checks if requested quantity is in stock

2. CartItem Class

Represents a product inside the cart.

Attributes:

- - product (Product object), quantity (number of items added to cart)

Methods:

- - get_total_price() → returns price * quantity

3. ShoppingCart Class

Attributes:

- - cart_items (list/dict of CartItem objects)

Methods:

- - add_product(product, quantity)
- - remove_product(product_id)
- - update_quantity(product_id, new_quantity)
- - view_cart() → list all products with quantity and total price
- - get_total_bill() → calculate total bill of the cart
- - checkout() → Deduct stock from each product and empty the cart

4. Customer Class

Attributes:

- - customer_id, name, email, cart (ShoppingCart object)

Methods:

- - add_to_cart(product, quantity)
- - remove_from_cart(product_id)
- - checkout_cart()

Constraints

1. A customer cannot add more quantity than available stock.
2. Negative quantity is not allowed.
3. Cart should handle duplicate items gracefully (update instead of adding twice).
4. Once checkout is done, the cart should be cleared.

Examples:

1. Customer Alice browses the catalog.

- - Products available:
- - P101: Wireless Mouse (₹599, stock: 10)
- - P102: Keyboard (₹999, stock: 5)

2. Alice adds 2 Wireless Mice and 1 Keyboard to her cart.

3. Alice views cart →

Wireless Mouse x 2 = ₹1198

Keyboard x 1 = ₹999

Total Bill = ₹2197

4. Alice checks out.

- - Stock updated: Mouse → 8 left, Keyboard → 4 left.
- - Cart is now empty.

Implement this system using Python classes, objects and ensure that all constraints are respected.