Industry Problem Statement

Hospital Patient Billing System (Python) *(Non-Clinical)*

Business Background

A hospital wants to build a Python-based internal system to manage:

- Patient registration
- Consultation, treatment, and room charges
- Insurance coverage and deductions
- Final bill and discharge summary

The system should simulate a **real hospital billing workflow** (non-medical), implemented incrementally using clean coding and real business rules.

Task 1: Patient Registration (Input Validation)

Objective

Capture and validate patient information.

Requirements

Write a program to accept:

- Patient ID
- Patient Name
- Age
- Admission Type (OPD / IPD)

Business Rules

- Age must be **greater than 0**
- Admission type must be valid

- Patient name must contain only alphabets

Expected Outcome

Validated patient record ready for billing.

Task 2: Consultation Charge Entry

Objective

Record consultation charges.

Requirements

- Accept consultation fee

Business Rules

- Consultation fee must be **greater than 0**

Expected Outcome

Valid consultation charge recorded.

Task 3: Treatment Charges Entry

Objective

Record charges for treatments and procedures.

Requirements

- Accept multiple treatment charges
- Store charges in a list

Business Rules

- Each charge must be **greater than 0**

Expected Outcome

Clean list of treatment charges.

Task 4: Room Charges Calculation (IPD Only)

Objective

Calculate room charges for admitted patients.

Requirements

Accept:

- Room charge per day
- Number of days admitted

Business Rules

- Room charges apply **only for IPD patients**
- Charges and days must be greater than 0

Formula

```
Room Charges = Room Charge per Day × Number of Days
```

Expected Outcome

Correct room charges calculated.

Task 5: Total Medical Bill Calculation

Objective

Calculate total hospital bill before insurance.

Formula

```
Total Bill = Consultation + Treatment Charges + Room Charges
```

Expected Outcome

Accurate total medical bill.

Task 6: Insurance Coverage Validation

Objective

Validate insurance availability.

Requirements

- Accept insurance type (Yes / No)
- Accept insurance coverage limit

Business Rules

- Coverage limit must be greater than 0 if insurance is available

Expected Outcome

Valid insurance details captured.

Task 7: Insurance Deduction Calculation

Objective

Apply insurance coverage to the bill.

Rules

- Insurance deduction cannot exceed coverage limit
- Deduction ≤ Total Bill

Formula

```
Insurance Deduction = min(Total Bill, Coverage Limit)
```

Expected Outcome

Correct insurance deduction amount.

Task 8: Net Payable Amount Calculation

Objective

Calculate amount payable by the patient.

Formula

```
Net Payable = Total Bill − Insurance Deduction
```

Expected Outcome

Final payable amount.

Task 9: Billing Summary (Procedural)

Objective

Generate a billing summary before discharge.

Summary Should Include

- Patient ID & Name
- Admission Type
- Total Bill
- Insurance Deduction
- Net Payable

Task 10: Store Patient Billing Records

Objective

Simulate hospital billing database.

Requirements

- Store billing records in a list of dictionaries

Task 11: Patient Class Design (OOP)

Objective

Model patient billing as an object.

Create class `Patient` with:

Attributes

- patient_id
- name
- age
- admission_type
- consultation_fee
- treatment_charges
- room_charges

Task 12: Bill Calculation Methods

Objective

Encapsulate billing logic.

Methods

- calculate_total_bill()
- calculate_net_payable()

Task 13: Insurance Method

Objective

Encapsulate insurance deduction logic.

Method

- apply_insurance()

Task 14: Invoice Generation Method

Objective

Generate professional hospital invoice.

Method

- generate_bill_summary()

Task 15: Final Discharge Bill Output

Objective

Generate final discharge bill.

Output Format (Example)

```
Patient ID        : P345
Name              : Ramesh Kumar
Admission Type    : IPD
Total Bill        : ₹85,000
Insurance Covered : ₹50,000
Net Payable       : ₹35,000
Discharge Status  : Cleared
```