UNIT – III
DECOMPOSITION AND ALGORITHMIC THINKING

Create Algorithms and Visualize algorithms through the sequence of steps as a Flowchart for the following problems:

1. Bank ATM Withdrawal System

Problem: Design an algorithm for an ATM machine that checks if a user′s withdrawal request can be fulfilled.
Requirements:
Input: Account balance, requested withdrawal amount, daily limit.
Conditionals: Check if the account balance and daily limit allow the withdrawal.
Functions: One function to validate the request, another to calculate the new balance.
Iteration (optional): Allow for multiple withdrawal attempts until the transaction is successful or canceled.

2. E-commerce Shipping Cost Calculator

Problem: Create an algorithm to calculate shipping costs based on item weight, distance, and user membership status (e.g., standard, premium).
Requirements:
Input: Weight of items, shipping distance, and membership status.
Conditionals: Different rates for different weight classes, distance ranges, and membership types.
Functions: Separate functions for calculating base cost, discounts, and total cost.
Control Flow: Allow for choosing different shipping speeds and calculating their respective costs.

3. Budget Tracker with Monthly Expenses

Problem: Design an algorithm to track monthly expenses and alert the user if they are nearing or exceeding their budget.
Requirements:
Input: Budget limit, list of expenses, category (e.g., groceries, utilities, entertainment).
Conditionals: Check if expenses exceed budget in any category or overall.
Functions: Function to add new expenses, calculate remaining budget, and send alerts.
Iteration: Loop through all expenses to calculate the total and remaining budget.

4. Hotel Room Reservation System

Problem: Develop an algorithm to manage room reservations, checking availability and updating the booking calendar.
Requirements:
Input: Room type, dates requested, current booking status.
Conditionals: Check if the requested dates are available, room type capacity.
Functions: Function to check availability, function to add a booking, function to calculate total cost based on room type.
Iteration: Check through a list of available rooms and select the best fit.