Name: **V Number:**

Midterm

Course Name: Software Architecture and Design (SENG 350)

Instructor: Shuja Mughal

Date: 29 November 2024

Total Marks: 50

Time Allowed: 25 minutes

Instructions

• Read everything carefully before answering.

• Write your answers clearly in the space provided.

Case Study:

Scenario:

GreenFleet is building a ride-sharing platform focusing on eco-friendly transportation. The platform connects drivers of electric vehicles with passengers who want to reduce their carbon footprint. It must include the following features:

- **Dynamic Ride Matching:** Match passengers to drivers based on their proximity, route compatibility, and vehicle availability.
- **Eco-Incentive Tracking:** Passengers earn "eco-points" for choosing ridesharing over personal car usage, and drivers earn incentives for high customer satisfaction.
- **Notifications:** The platform must notify users about ride updates, earned eco-points, and promotions. Future channels like in-app push notifications and social media integration may be added.
- **Scalability:** The system should efficiently scale as user demand grows, especially during peak hours.
- **Real-Time Updates:** Ride status (e.g., "Driver En Route," "Ride in Progress") must update in real-time, even under high concurrency.

Challenge:

GreenFleet wants your team to propose a design pattern and tactics to address two critical aspects:

- The notification system must be scalable and capable of integrating new communication channels without major changes to the existing codebase.

- The real-time updates feature must ensure consistent and reliable information delivery across all users, even during heavy traffic.

Your Task for the hybrid midterm (25 Marks):

1. Implement the design pattern and the tactics:
   - It should align with what you said in the in-class midterm.
   - It should align with the class diagram as well.

Your Task in-class midterm (25 Marks):

1. Identify a design pattern and tactics for each of the two challenges:
   - For notifications, ensure scalability and adaptability to future requirements. (1 mins) (2 Marks)

   - For real-time updates, prioritize consistency, reliability, and performance. (1 mins) (2 Marks)

2. Justify your choices by explaining how the chosen pattern and tactics will address the challenges effectively. (4 mins) (5 Marks)

3. Create a single (One) UML Class Diagram for your chosen design pattern and tactics. (Combine them into a single UML Class Diagram) (14 mins) (16 marks)