Assignment 2, Spring 2025
CSE471: System Analysis and Design
Total Marks – 30

Q1. Component Diagram **[10]**

You are developing an e-commerce website that contains several components. The website has five components: Database, Product Catalog, Inventory, Cart, and Invoice. The Database component provides an interface called "storeInformation," which the Product Catalog component requires. The Product Catalog component offers an interface, "productInformation," which the Inventory component requires. The Database component requires the "stockDetails" interface provided by the Inventory component. The Product Catalog component provides another interface, "readProductDetails," which the Inventory and Cart components need. The Inventory component provides an interface called "syncDB," which depends on database updates from the Database component. The Inventory and Cart components provide an interface called "readCustomerBill," which the Invoice component requires. There are three components outside the Website component. They are Payment Gateway, Vat, and Tax. Inventory, Invoice, and Cart components provide "inventoryStatus," "customerInvoice," and "cartStatus" interfaces, respectively, and the Payment Gateway component requires all of these. The Payment Gateway component also requires "vatAmount" from the Vat component and "taxAmount" from the Tax component.

Q2. Component Diagram **[10]**

Suppose you are designing a BPM (Business process management) application. A BPM application built on software services and functionalities uses various components across the enterprise. An architect could use UML component diagrams to describe the application architecture in model-driven BPM application development.

The Business Process Orchestration (BPO) component has two interfaces (provided): "applicationEntry" and "processedApplication." The Enterprise Front Office System component requires those two interfaces. The BPO component has five required interfaces: legacyArtifact, silo, broker, rules, and dataMart. LegacyArtifact uses (depends on) legacyFile provided by the Legacy System component. The internal Silo Service component of the Legacy System provides a silo

interface. The Company Broker subsystem has two components: Company A and Company B. Company A provides the CA interface, and Company B provides the CB interface. The Broker component (internal to the Company Broker) has one provided interface named broker. This component has two required interfaces: interfaceCA and InterfaceCB, which use CA and CB. The Proprietary Rules Engine component provides the rules interface, and the Data-mart Wrapper Service component provides the dataMart component. Assembly connectors link these two components with the BPO component separately. The Data-mart Wrapper Service component is a part of the Data Warehouse component.

Q3. Data Flow Diagram **[10]**

The intelligent, automated vehicle system receives user authentication information to provide access to a user. The user first provides a fingerprint and a pin to a process called "Unlock Everything." The User Info database verifies the pin to the process, and the process unlocks everything. Once in the car, the user likes to play music. So, the user provides the song name, genre, and singer name to the music player (Play Music), which sends song information to the Music database to fetch music. The player fetches the song from the YouTube database if the music is unavailable. When the user is set, they can get a decision from a program (Analyze Travel Information) about whether their journey will be comfortable. So, the user sends the destination location information to the program. It requires distance and weather information from the Google Maps and BBC databases to send a decision to the user.

A. Draw a Context Diagram.
B. Draw a Level 1 Diagram.

Play Music has two helper functions: Check Availability and Fetch from YouTube. Check availability searches in the Music database using the music information provided by the user and get available or not available replies from the database. If the music is unavailable, the second helper function receives the information about the unavailable music from the Check availability and gets it from the YouTube database. Then, the first or second helper function will send the music to the user.

Next, analyzing travel information has some helper functions, too. Get Distance receives the travel destination from the user and calculates the distance using the route from the Google Map database. It then sends the distance to the Calculate required Fuel and Calculate Estimated Time functions. These two functions will send fuel and estimated time to the Make Decision function, which will send a decision to the user.

C. Is there any mistake? If so, what is it called? Draw a level 2 Diagram and fix the error (if any).