

## CAT – II ( Software Engineering ) A1 Slot

### Answer Key

Q1)

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#### a) Active Classes and Collaborative Classes (3M)

| Active Class               | Collaborative Classes                     |
|----------------------------|-------------------------------------------|
| Customer                   | Order, Payment, Restaurant                |
| Order Processing System    | Customer, Restaurant, Payment Gateway     |
| Restaurant Manager         | Menu, Order, Delivery Partner             |
| Payment Gateway            | Order, Customer, Bank Server              |
| Delivery Partner Allocator | Delivery Partner, Order, Location Service |
| Real-Time Tracker          | GPS Service, Order, Delivery Partner      |

#### b) Sequence Model for Payment Processing (5M)

##### Classes involved:

- Customer
- Swiggy App / Order System
- Payment Gateway
- Bank Server
- Order Database

Customer -> Swiggy App : Place Order

Swiggy App -> Order System : Create Order

Order System -> Payment Gateway : Request Payment

Payment Gateway -> Bank Server : Authorize Transaction

Bank Server -> Payment Gateway : Approval / Rejection

Payment Gateway -> Order System : Payment Status

Order System -> Order Database : Update Order Status

Order System -> Customer : Payment Confirmation

## c) Implications of Cardinality Mapping in Class Model (2M)

Cardinality mapping defines **how many objects of one class relate to objects of another class**.

### Implications during implementation:

1. **Database Design**
  - Determines primary–foreign key relationships.
  - Example:
  - One Customer → Many Orders (1:N)
2. **Memory/Object Management**
  - Determines data structures like lists, arrays, or single references.
3. **Constraint Enforcement**
  - Ensures rules like one payment per order or many items per order.

Q2)

| No   | Statement                                                | Answer                   |
|------|----------------------------------------------------------|--------------------------|
| i    | Order Validation performs a single purpose               | Functional Cohesion      |
| ii   | Validation passes data to next module in chain           | Sequential Cohesion      |
| iii  | Processes order id, items, restaurant id using same data | Communicational Cohesion |
| iv   | Tasks executed in fixed order                            | Procedural Cohesion      |
| v    | GPS updates and ETA grouped by category                  | Logical Cohesion         |
| vi   | Notifications triggered when order updates               | Temporal Cohesion        |
| vii  | Database grouping based on shared data                   | Communicational Cohesion |
| viii | Unrelated tasks placed together                          | Coincidental Cohesion    |
| ix   | Payment Gateway has one responsibility                   | Functional Cohesion      |
| x    | Startup tasks executed at same time                      | Temporal Cohesion        |

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**Q3)**

## **a) Client–Server Architecture for Swiggy (4M)**

### **Advantages**

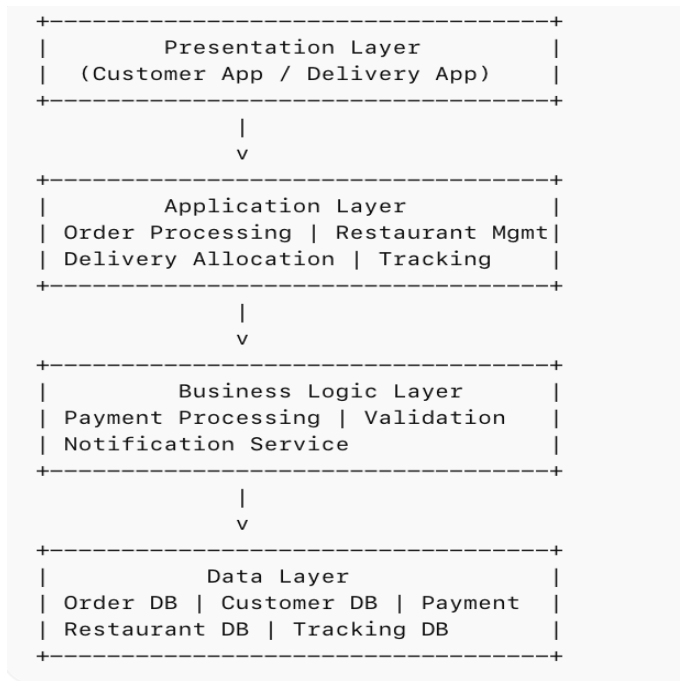
1. **Centralized Data Management**
  - Orders, payments, and tracking stored in central server.
2. **Scalability**
  - Server resources can be upgraded for high demand.
3. **Security**
  - Sensitive data like payments handled on secure servers.
4. **Easy Maintenance**
  - Updates done at server level.

### **Disadvantages**

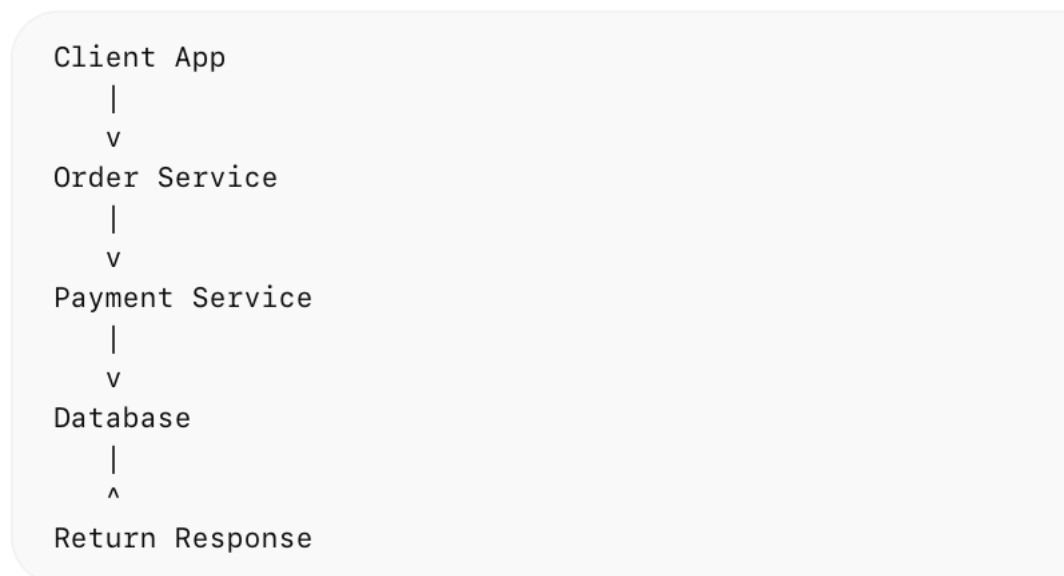
1. **Server Dependency**
  - If server fails, the entire system stops.
2. **Network Dependency**
  - Requires stable internet.
3. **Performance Bottleneck**
  - High traffic may slow server response.
4. **Higher Infrastructure Cost**

## b) Layered Architecture with Call-Return Control (6M)

### Layered Architecture Diagram



### Call-Return Control



Each layer **calls the lower layer and receives results back.**

## Q4

### a) Benefits of Manual Inspections (2 Benefits) (5M)

1. **Improves Code Quality**
  - Humans can detect design flaws and poor readability.
2. **Better Understanding of System**
  - Team members gain knowledge of system logic.

### Errors found through inspections (any four)

1. Missing or incorrect comments
2. Poor code readability
3. Logical design errors
4. Coding standard violations
5. Incorrect variable naming
6. Incomplete documentation

### b) Advantages and Disadvantages of Removing Manual Inspections (3M)

| Aspect          | Advantages                      | Disadvantages                          |
|-----------------|---------------------------------|----------------------------------------|
| Reliability     | Faster automated testing        | Logical errors may remain unnoticed    |
| Maintainability | Faster development              | Code readability and structure degrade |
| Long-Term Risk  | Reduced review time             | Technical debt increases               |
| Quality         | Automation ensures quick checks | Human insight missing                  |

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### c) Most Suitable Tool (2M)

**Structured Checklists** are most suitable.

#### Reason

- Ensures reviewers systematically check:
  - Coding standards

- Documentation
- Design consistency
- Helps maintain **quality even with AI-generated code**

Q5)

a. The Swiggy Order Processing and Delivery Management System: Design User Interface (UI) layouts for the following system screens: [6M]

i. Restaurant Order Management Screen-2M

ii. Delivery Partner Assignment Screen-2M

iii. Real-Time Order Tracking Screen-2M

b. Construct a comparative table that outlines key user interface design principles and demonstrates how these principles are concretely applied and satisfied in the developed screens. (4M)

1. Consistency
2. Visibility of System Status
3. Simplicity
4. User control and Freedom
5. Error Prevention and Handling
6. Efficiency of use.