



# DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

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## ASSIGNMENT - 1

Student Name: Deepanshu Mandhyan  
Branch: CSE  
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Subject Name: System Design

UID: 23BCS12327  
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**Q1. Explain the role of Interfaces and Enums in software design with proper examples?**

Soln:

### **1. Interfaces in Software Design:**

An interface defines a contract that a class must follow. It specifies what a class should do, but not how it should do it. Interfaces help in achieving abstraction, loose coupling, and multiple inheritance.

#### **Role of Interfaces:**

- Provide standard behaviour across different classes
- Support abstraction by hiding implementation details
- Enable loose coupling between components
- Allow multiple inheritance
- Improve maintainability and scalability

#### **Example of Interface:**

```
interface Payment {  
    void pay (double amount);  
}
```



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```
class CreditCardPayment implements Payment {  
    public void pay(double amount) {  
        System.out.println("Paid " + amount + " using Credit Card");  
    }  
}  
  
class UpIPayment implements Payment {  
    public void pay(double amount) {  
        System.out.println("Paid " + amount + " using UPI");  
    }  
}
```

## 2. Enums in Software Design:

An enum (enumeration) is a special data type used to define a fixed set of constant values.

Enums make the code more readable, safer, and error-free.

### Role of Enums:

- Represent fixed choices or states
- Improve type safety
- Avoid use of hard-coded constants
- Make code more readable and maintainable
- Reduce logical errors

### Example of Enum:

```
enum OrderStatus {
```

PLACED,



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SHIPPED,  
DELIVERED,  
CANCELLED  
}

```
class Order {  
    OrderStatus status;  
}
```

**Q2. Discuss how interfaces enable loose coupling with example?**

**Ans:**

Loose coupling means that different components of a software system have minimal dependency on each other.

A loosely coupled system allows changes in one component without affecting other components.

Interfaces play a crucial role in achieving loose coupling by separating what a class does from how it does it.

## **Role of Interfaces in Loose Coupling:**

Interfaces enable loose coupling in the following ways:

- Classes depend on interfaces, not concrete implementations
- Implementation details can be changed without modifying dependent classes
- Promotes flexibility, reusability, and scalability
- Makes the system easier to test and maintain

## **Example: Loose Coupling Using Interface**

Step 1: Define an Interface:

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```
interface MessageService {  
    void sendMessage(String message);  
}
```

Step 2: Implement the Interface:

```
class EmailService implements MessageService {  
    public void sendMessage(String message) {
```

```
        System.out.println("Email sent: " + message);  
    }  
}
```

```
class SMSService implements MessageService {
```

```
    public void sendMessage(String message) {  
        System.out.println("SMS sent: " + message);
```

```
    }  
}
```

Step 3: Use Interface in Client Class

```
class Notification {  
    MessageService service;
```

```
    Notification(MessageService service) {  
        this.service = service;
```

```
    }  
    void notifyUser(String message) {  
        service.sendMessage(message);
```

```
}
```