

## EE 5262 -Object Oriented Design Patterns and Principles

please answer any 3 questions

in class test

1.

Consider a scenario where you are designing a system for a library management application. The application requires a class responsible for managing the connection to the database. You want to ensure that there is only one instance of this class throughout the entire application.

Explain the concept of the Singleton Pattern and how it addresses the requirement for a single instance of a class.

Provide a sample implementation of the Singleton Pattern in the context of the library management system. Include relevant code snippets and explain how your implementation ensures a single instance of the database connection manager.

Discuss the potential advantages and disadvantages of using the Singleton Pattern in this scenario. Include considerations related to thread safety, lazy initialization, and any impact on unit testing.

Marks 20

2. a. What is the Proxy Design Pattern?

b. What are the key components of the Proxy Design Pattern?

c. Can you explain the different types of proxies in the Proxy Design Pattern?

d. How does the Proxy Design Pattern contribute to the overall software design?

Marks 20

3. let's consider a scenario where the Observer pattern can be applied. The Observer pattern is a behavioral design pattern where an object, known as the subject, maintains a list of its dependents, called observers, that are notified of any changes in the subject's state.

Let's take an example of a weather monitoring system. In this scenario, we'll have a WeatherData class (subject) that monitors the current weather conditions. There will be various displays (observers) that want to be notified whenever the weather changes so they can update their information accordingly.

- a. Provide a sample implementation of the Observer pattern in the context of the weather monitoring system.

- b. Provide a class diagram for the weather monitoring system

Marks 20

- 4. a. Explain the Adapter pattern and provide an example?
  - b. Provide a sample implementation of the Adapter pattern.
  - c. Provide a class diagram for the Adapter pattern.

Marks 20