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| **National University of Computer and Emerging Sciences, Lahore Campus** | | | | |
| C:\Users\saif\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.Word\final design.jpg | **Course:** | **Software Design and Analysis** | **Course Code:** | **CS-3004** |
| **Program:** | **BS (Computer Science)** | **Semester:** | **Fall 2023** |
| **Duration:** | **30 Minutes** | **Total Marks:** | **20** |
| **Quiz Date:** | **6-Nov-23** | **Roll No.** |  |
| **Section:** | **BCS-5L** | **Name:** |  |
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**Question 1) (10 Marks)**

Consider a video game that has different creatures and characters. One interesting creature is a mermaid. The mermaid eats and talks like a woman, and swims like a fish. This game has several modules. One of these modules (Mod1) uses only eat and talk functions while another (Mod2) uses only the swim function. Refactor the code so it follows SOLID Principles and mention which principle is violated in this code.

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| **class IMermaid {**  **public:**  **virtual void eat() = 0;**  **virtual void talk() = 0;**  **virtual void swim() = 0;**  **};**  **class Mermaid : public IMermaid {**  **public:**  **void eat() override {**  **cout <<"eats like a woman." << endl;**  **}**  **void talk() override {**  **cout <<"talks like a woman." << endl;**  **}**  **void swim() override {**  **cout << "swims like a fish." << endl;**  **}**  **};**  **class Mod1 : public IMermaid {**  **public:**  **void eat() override {**  **cout << "Mod1 uses Mermaid's eat." << endl;**  **}**  **void talk() override {**  **cout << "Mod1 uses Mermaid's talk." << endl;**  **}**  **void swim() override {**  **// Empty implementation to satisfy the interface.**  **}**  **};**  **class Mod2 : public IMermaid {**  **public:**  **void eat() override {**  **// Empty implementation to satisfy the interface.**  **}**  **void talk() override {**  **// Empty implementation to satisfy the interface.**  **}**  **void swim() override {**  **cout << "Mod2 uses Mermaid's swim." <<endl;**  **}**  **};**  **// SRP and ISP is violated in this code** | **Solution:**  **class Eater {**  **public:**  **virtual void eat() = 0;**  **};**  **class Talker {**  **public:**  **virtual void talk() = 0;**  **};**  **class Swimmer {**  **public:**  **virtual void swim() = 0;**  **};**  **class Mermaid : public Eater, public Talker, public Swimmer {**  **public:**  **void eat() override {**  **cout <<"eats like a woman." << endl;**  **}**  **void talk() override {**  **cout <<"talks like a woman." << endl;**  **}**  **void swim() override {**  **cout << "swims like a fish." << endl;**  **}**  **};**  **class Mod1 : public Eater, public Talker {**  **public:**  **void eat() override {**  **cout << "Mod1 uses Mermaid's eat." << endl;**  **}**  **void talk() override {**  **cout << "Mod1 uses Mermaid's talk." << endl; }**  **};**  **class Mod2 : public Swimmer {**  **public:**  **void swim() override {**  **cout << "Mod2 uses Mermaid's swim." <<endl;**  **}**  **};** |

**Question 2) Define Common Coupling. What are issues related to Common Coupling? (10 Marks)**