Reviewed!
18/12/25

COMSATS University Islamabad, Abbottabad Campus
Department of Computer Science
Examination – Final Exam (Fall 2025)

Class: BSSE 7th A/B/C
Date: 31st Dec, 2025
Subject: Software Reverse Engineering
Instructor: Ms. Faiza Hameed
Total Time Allowed: 3hrs
Max Marks: 60
Name: _____
Registration # _____

SECTION-A (Marks: 60)

Q#1: [CLO # 1, Learning Level: Understanding]: [5+5+5 Marks]

1. Explain how preventive maintenance can help in minimizing the need for corrective maintenance in legacy systems, also provide an example?
2. A software development team is maintaining a 15-year-old legacy system for which all original design documents and specifications have been lost. The team is required to understand the existing system in order to safely add new features. Discuss how can reverse engineering process help in this situation?
3. Differentiate the complete legacy system replacement and legacy system migration with respect to the, **cost implications**, **risk involved**, and, **impact on business continuity**.

Q#2: [CLO # 2, Learning Level: Applying]: [8+4+3 Marks]

1: Apply the practical reverse engineering and provide one-line answers to the following questions. [8 marks]

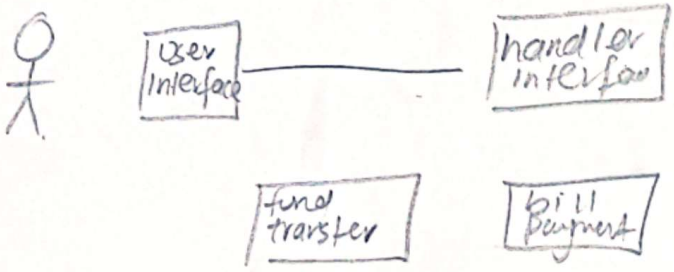
i. Write a Selenium command to set a global wait time of 10 seconds for all elements.
ii. What Python command is used to install the Selenium package?
iii. Which Docker command builds and starts containers from a Docker Compose file?
iv. Name three actions you can perform inside a Docker container to explore a legacy system.
v. Which shortcut opens the Control Flow Graph (CFG) of a function in Ghidra?
vi. Where can you find the main function quickly in Ghidra?
vii. Which processor helps print FlowFile attributes for debugging?
viii. Which tool provides version control for NiFi flows?

2: An online banking system was built as a monolithic application, handling fund transfers, bill payments, and balance inquiries in a single module. The request-processing logic uses deeply nested conditional statements for validation, authentication, authorization, logging, and fraud checks. As new security rules were added, the code became complex and hard to modify, with changes in one check affecting others. The bank plans to modernize the system to improve scalability, maintainability, and flexibility.

i. Choose a suitable design pattern and draw a diagram showing how it handles requests to improve flexibility and ease of adding new processing steps. **[4 marks]**
ii. Draw an architecture diagram showing how converting a monolithic system to microservices improves scalability and maintainability. **[3 Marks]**

Q#3: [CLO # 3, Learning Level: Analyzing]: [6+4+5 Marks]

1: Examine the given Java code, identify three refactoring issues, and provide the refactored code addressing these issues. [6 Marks]



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```
public class InvoiceCalculator {
  public void processInvoice(double a, double b, int c) {
    if (a > 0 && b > 0 && c > 0) {
      double total = a * b;
      if (c > 10) {
        total = total * 0.9;       }
      System.out.println("Invoice amount: " + total);
    } else {
      System.out.println("Invalid input");   } }
  public static void main(String[] args) {
    InvoiceCalculator ic = new InvoiceCalculator();
    ic.processInvoice(100, 5, 12);  }}
```

2: A hospital's lab system must deliver individual test results securely to the corresponding patient portal, ensuring each message is processed by only one recipient. Examine the scenario and select the integration pattern that ensures direct delivery of messages, and provide the reason? point to point pattern. **[4 Marks]**

3: A smart home IoT hub sends temperature, motion, and humidity data to a cloud server using an undocumented binary protocol. The company plans to migrate it to a network-centric platform. **[5 Marks]**

i. How would you analyze network traffic to reverse engineer this protocol?
ii. How does protocol dissection help identify message headers and payloads?

Q#4: [CLO # 4, Learning Level: Evaluating]: **[8+7 Marks]**

1: Evaluate the given code and provide its code comprehension by drawing control flow diagram. **[8 Marks]**

execution pathspublic class OrderProcessor {

```
  public void processOrder(int quantity, double price, boolean isMember) {
    double discount = 0.0;
    if (quantity <= 0 || price <= 0) {
      System.out.println("Invalid order");
      return;  }
    if (isMember) {
      discount = 0.1;
    } else if (quantity > 10) {
      discount = 0.05; // 5% discount for bulk orders }
    double totalPrice = quantity * price * (1 - discount);
    if (totalPrice > 500) {
      System.out.println("High-value order: Apply extra verification");  }
    System.out.println("Total price: " + totalPrice);   }
  public static void main(String[] args) {
    OrderProcessor op = new OrderProcessor();
    op.processOrder(12, 50, true);  }}
```

2: Evaluate the anti-tampering techniques used by a software company to protect their application from unauthorized modifications and maintain software integrity. **[7 Marks]**

Good Luck!

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