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

lass:	BSSE 7th A/B/C	Date:	14th July, 2025
ubject:	Software Reverse Engineering	Instructor:	Ms. Faiza Hameed
otal Time Allowed: 3hrs		Max Marks: 50	
lame:		Registration #	

SECTION-A (Marks: 50)

Q#1: [CLO # 1]: **[5+5 Marks]**

1. A financial company discovers a bug in their online payment processing module. Simultaneously, they are planning to migrate the application to a cloud-based architecture and add multilingual support. Identify and classify the different types of maintenance required in this situation. Justify your answer.
2. A hospital is using a legacy system for patient records which is reliable but runs on obsolete hardware and lacks support for mobile access. The hospital is debating whether to retain, re-engineer, or replace it. As an IT consultant, recommend a course of action. Discuss the pros and cons of each option based on legacy system characteristics and challenges.

Q#2: [CLO # 2]: **[5+5 Marks]**

1. Differentiate among the following tools used in reverse engineering: **Disassembler, Decompiler, Debugger,** and **Binary Analysis Tools**. For each, explain its primary purpose, input, output, requirement of source code, and the typical use cases in reverse engineering.
2. You are working on a legacy Customer Relationship Management system with tightly coupled modules and want to modularize it. Explain which static reverse engineering technique(s) would be most appropriate to support this transformation. Justify your answer with reference to how this technique contributes to understanding, analyzing, and refactoring the system's high-level structure.

Q#3: [CLO # 3]: **[5+5 Marks]**

1. You are leading a team responsible for integrating multiple third-party APIs (shipping, payments, and inventory) into an e-commerce platform. Identify any two integration patterns you would apply and explain why each pattern is appropriate.
2. List down the steps involved in source code transformation. You are provided with the following code of a legacy **procedural C code** used in a payroll system: Transform the above code into an **Object-Oriented** structure using **Java**. Your transformation should demonstrate:
   - Encapsulation of employee data.
   - A class that handles salary calculation logic.
   - A method to print the salary slip.

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Salary Calculation Program

```
#include <stdio.h>

float calculate_salary(float base_salary, int overtime_hours) {
    float overtime_pay = overtime_hours * 15.0
    return base_salary + overtime_pay;
}

void print_salary_slip(char name[], float salary) {
    printf(
    printf(                    , name);
}                              , salary);

main() {
    employee[] =                ;
    base = 3000.0;
    overtime = 10;
    total = calculate_salary(base, overtime);
print_salary_slip(employee, total);
return 0;
}
```

Q#4: [CLO # 4]: **[5+5 Marks]**

1. A company is concerned that its desktop software could be reverse-engineered by competitors. Recommend appropriate code obfuscation techniques to protect the software. Also provide one practical example for each technique.
2. A junior developer complains that codebase is too large and hard to understand. Recommend specific techniques to help improve their program comprehension. How would you introduce cognitive models to assist them?

Q#5: [CLO 2, 3]: Practical Questions: **[10 Marks]**

1. Write the command to initialize a JavaScript project with npm
2. Explain what happens when you run the command npx eslint app.js --fix.
3. Write the Java command used to attach JProfiler to a running application.
4. What does the "Extract Method" refactoring option do?
5. Describe what happens when you use the "Rename Symbol" feature.
6. What Python command is used to install the Selenium package?
7. Write one Selenium command to fill a login username field with the ID "userInput".
8. What command is used to start a legacy app stack using Docker Compose?
9. What is the function of the LogAttribute processor in NiFi?
10. What does PutDatabaseRecord do in NiFi?

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