National University of Computer and Emerging Sciences

Software Re-Engineering (SE4001)

Sessional-I Exam

Date: February 21, 2026

Course Instructor(s)

Dr. Farooq Ahmed, Mr. Arslan Asif

Total Time: 1 hour
Total Marks: 30
Total Questions: 3

Name: Hasan Yahya

22L-7971
Roll No

RSE-8B
Section

Student Signature

Do not write below this line

Attempt all questions on the answer sheet

CLO 1: Describe Software Re-Engineering principles

Question 1 **[5 marks]**

Differentiate between Reverse Engineering and Forward Engineering in the context of software re-engineering. How do they complement each other?

CLO 2: Explain the activities involved in Software Re-Engineering

Question 2 **[5 marks]**

Differentiate between software maintenance and software re-engineering in terms of objectives and activities involved.

CLO 4: Compute metrics to analyze design documents

Question 3 **[10+5+5 marks]**

Answer the following questions considering the code of an Employee class provided on next page:

1. Compute LCOM (CK), LCOM (HS) and WMC (with cyclomatic complexity) for the given class and show complete working.
2. Analyze the class for cohesion in accordance with the design principles and the metrics
3. What conclusion can be drawn with respect to role of metrics in evaluating design / implementation based upon the results obtained in first two parts?

```
public class Employee {

    private String name;
    private double salary;
    private int employeeId;

    public Employee(String name, double salary, int employeeId) {
        this.name = name;
        this.salary = salary;
        this.employeeId = employeeId;
    }

    public void increaseSalary(double percentage) {
        salary = salary + (salary * percentage / 100);
    }

    public String getEmployeeDetails() {
        return "ID: " + employeeId + ", Name: " + name + ", Salary: " + salary;
    }

    public boolean isSameEmployee(int id) {
        return this.employeeId == id;
    }

    public double calculateBonus(double performanceRating) {
        return salary * performanceRating * 0.1;
    }
}
```

Comp = 1

Comp = 1

Comp = 1

Comp = 2

Comp = 1

Note that equations for LCOM (CK) and LCOM (HS) are as follows:

CK: $LCOM = |P| - |Q|$, if $|P| > |Q|$
0 otherwise

HS:
$$LCOM^* = \frac{\left(\frac{1}{a}\sum_{j=1}^{a} m(A_j)\right) - m}{1 - m}$$