BRAC UNIVERSITY
Department of Computer Science and Engineering

Examination: Final **Duration: 1 Hour 45 Min**
Semester: Fall 2023 **Full Marks: 35**

CSE 470: Software Engineering
SET B

Name: ID: Section:

Q1. Consider a scenario: Company X needs software that will do some specific tasks for their internal usage. They hired you to develop their system. Now, you are in charge of developing software that will be small-scale. You have been asked to develop the system in a tight budget and limited resources. You are also informed that the requirements are fixed and it will be completely error-proof at the end of the all phases that are required for this software to be built. In addition, You are instructed to resolve issues or problems of every steps of development through the entire development time to make the system reliable and safe. You have also been told that there is no chance to correct incomplete or missing requirement analysis, design errors, or development errors once your due deadline is over.

a. **Which** SDLC model would be appropriate for the given scenario to develop the software? **[2] [CO1]**
b. Can we use the Agile development process for the given scenario? Justify your answer. **[3] [CO1]**

Q2. Now, consider the scenario, BracU has shifted to it's new permanent campus. Since we know that the office of the registrar is in charge of handling all the academic processes and instructions, it single handedly decides the **course-schedule-details** and provides them for the students and teaching staffs. Now, students and teaching staffs follow the instructions for courses that come from the office of registrar.

a) According to above-mentioned scenario, consider yourself as a student and your section faculty as part of teaching staffs. What design pattern should be appropriate to be followed? Justify your answer. **[4] [CO3]**

b) Write the code (in any programming/scripting language) for the design pattern. **[3.5] [CO3]**

Q3. Consider the following code snippet. **[CO4]**

a. **Determine** the Specialization Index (SIX) for the **Athletics** Class. **[5]**

b. **Illustrate** the Control Flow Graph (CFG) for the organizeClub() method, and remember to label the relevant node numbers on your question paper. **[7]**

c. **Calculate** the cyclomatic complexity of the control flow graph drawn for the organizeClub() method. **[3]**

```
public class Academic {
   public void startActivities() {
         System.out.println("University academic events have started.");
   }

   public void endActivities() {
         System.out.println("University academic events have ended.");
   }

   private void announceChampion() {
         System.out.println("Champion of the university events is not yet decided.");
   }
}

public class Athletics extends Academic {
   private void announceChampion() {
         System.out.println("Champion of the university athletics event is the Blue Team.");
   }

   public void bestAthlete() {
        System.out.println("The Most Valuable Player of university athletics is Ali.");
   }
}

public class CampusEvents extends Athletics {
   public void bestAthlete() {
        System.out.println("The Most Valuable Player of Campus Wide Events is Sara.");
   }
```

```
public void organizeClub() {
      boolean clubHosted = true;
      int year = 2023;
      boolean ocaClub = true;
      boolean otherClub = false;

      for (int i = 0; i < 3; i++) {
         for (int j = 0; j < 3; j++) {
            if (i == 2) {
               ocaClub = true;
            }

            if (j == 2) {
               ocaClub = true;
            }

            if (i == 1) {
               otherClub = true;
            }

            if (j == 1) {
               otherClub = true;
            }
         }
      }
   }

   public void StarStudent() {
      System.out.println("The Star Student of the University New Campus is Rana");
   }
}
```

Q4. Consider the following code snippet. **[CO5]**

a. **Identify** at least 3 code smells from the below code and name them. **[3]**

b. **Refractor** the source code to remove 4 different Code smells(write the code segment in your copy which has code smell and then show the correct way to refactor it). **[4.5]**

NB: The "**System.out.println**" statements should not cause any smells

```
public abstract class Education{

    public void provideQualityEducation();
    public void takeClasses();
    public void checkExamScripts();
}

public class Student extends Education{

    public String studentName;
    public String studentId;
    public String department;
    public String enrollmentDate;
    public int totalCreditCompleted;
    public double currentCGPA;
    public String semester;

    public String InternationalPolitics = "no polictics";

    public void setStudentDetails(String studentName,
                    String studentId, String department,
                    String enrollmentDate,
                    double  totalCreditCompleted,
                    double currentCGPA, String semester)
    {
        this.studentNam = studentName;
        this.studentId = studentId;
        this.department = department;
        this.enrollmentDate = enrollmentDate;
        this.totalCreditCompleted = totalCreditCompleted;
        this.currentCGPA = currentCGPA;
        this.semester = semester;
    }

    //below method is for showing student Details
    public void meritBasedScholarship() {

        collectStudentsInformation();
        getStudentsSemesterDetails();

        System.out.println("Student Name: " + this.x);
        System.out.println("Student ID: " + this.studentId);
        System.out.println("Department: " + this.y);
        System.out.println("Enrollment Date: " + this.z);
    }
}
```

```
public class Teacher
{
    public String teacherName;
    public String teacherID;;

    public String InternationalPolitics = "no
politics";

    public void setTeacherDetails (String
teacherName, String teacherID)
    {
        this.teacherName = teacherName;
        this.teacherName = teacherID;
    }

}
```