ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)

ORGANISATION OF ISLAMIC COOPERATION (OIC)

Department of Computer Science and Engineering (CSE)

LAB FINAL EXAMINATION **WINTER SEMESTER, 2021-2022**

DURATION: 2 HOURS **FULL MARKS: 50**

SWE 4302: Object Oriented Concepts-II Lab

INSTRUCTIONS

Create a maven project named as Lab Final suffix by your ID (e.g, LabFinal55). Add testing dependencies in pom.xml. To implement a task, you must create a package named as task1, task2 etc. Every task must be within desired package.

You can use previous code examples. However, you are not allowed to use any internet resources.

1. **Code Smell**

   a) Listing 1 has a code smell. Identify the code smell and Implement the refactored code. 5

```
class SomeClass {
    void plugIn(Computer c);
    void shutDown(Computer c);
    void hasSamePrice(Computer c1, Computer c2);
    void hibernate(Computer c);
}
```

Listing 1: Smelly Code Snippet

   b) Listing 2 has a code smell. Identify the code smell and Implement the refactored code. 10

```
class Mail
{
  public void SendEmail(string subject, string body, string to, string from,
    string cc, bool sendImmediately)
  {
      EmailService.Send(subject, body, to, from, cc, sendImmediately);
  }
  public void SendEmail(string subject, string body, string to, string from,
    string cc)
  {
      EmailService.Send(subject, body, to, from, cc);
  }
}
```

Listing 2: Smelly Code Snippet

2. **SOLID**

   a) A Book Rent Service Scenario. 20

   To rent a book we have to specify which book, number of days and base rent fee. A fine will be applicable for every types of book if rent days exceeds 7 days. Otherwise total rent fee will be base rent multiplied by number of days. A Book has title, author as attributes. A book can be RegularBook, KidsBook, or NewBook. Total rent calculation will be different for different books. To calculate total rent following criteria should be maintained.

   - if regular book, a discount of 20% of base rent will be applicable during total rent calculation.
   - if kids book, a discount of 10% of base rent will be applicable during total rent calculation.

- if new book, an extra charge of 30% of base rent will be applicable during total rent calculation.
- if rent days ≤ 7, no fine is applicable; else fine will be number of extra days multiplied by 4;

Task

1. Create appropriate classes to implement the scenario.
2. Write test cases for Rent Service to test every types of book rent with or without fine. At least 6 test cases.

3. **Generics**

a) Simple Generic Calculator: 10

Task

1. Create a generic interface named Operation. Generic type's upper bound is Number. It has four methods namely add, subtract, multiply, divide which takes two generic type arguments and return a generic value.
2. Implement the Operation interface in a Calculator class which only supports Double type data and implement the methods properly.
3. Write test cases for Calculator. At least 4 test cases.

4. **Reflection**

a) **Task** 5

1. Create one test case to check the super class of Book is Object from Question 2.
2. Create a test case to check whether Calculator is abstract or not from Question 3