ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)
ORGANISATION OF ISLAMIC COOPERATION (OIC)
Department of Computer Science and Engineering (CSE)

MID SEMESTER EXAMINATION   **WINTER SEMESTER, 2019-2020**
DURATION: 1 Hour 30 Minutes   **FULL MARKS: 75**

SWE 4301: Object Oriented Concepts II

Programmable calculators are not allowed. Do not write anything on the question paper.
There are **3 (three)** questions. Answer **all** of them.
Figures in the right margin indicate marks.

1. a) Describe Liskov Substitution Principle (LSP) in no more than 4 sentences.   4

   b) Give a code example where the inheritance used for code re-usability but it violates the Liskov Substitution Principle. Rewrite the code with composition.   13+8

2. a) Describe Open-Closed Principle (OCP) in no more than 4 sentences.   4

   b) Give a code example where the Open-Closed Principle is violated. Assume that the code has been refactored so that OCP violation is no longer there. Draw a class diagram for the refactored version of the code.   13+8

3. a) Can you fix a bug by refactoring a code? Justify your answer.   5

   b) Explain why unit test is important for refactoring.   5

   c) Two facts about code are that code will change over time, and that code is read more times than it is written. What are the implications of these two facts?   5

   d) Assume that Cat and Dog are subtypes of Animal. Which of the statements from line 11 to 15 will compile, which will not?   10

```
1.  void doWithCat(Cat cat) {
2.  }
3.
4.  void doWithAnimal(Animal animal) {
5.  }
6.
7.  void demo() {
8.  Animal a = new Animal();
9.  Cat c = new Cat();
10.       Dog d = new Dog();
11.       a = c;              // 1
12.       c = a;              // 2
13.       d = c;              // 3
14.       doWithCat(a);       // 4
15.       doWithAnimal(c);    // 5
16.       }
```