B.Sc. Engg. SWE 2nd Semester 13 August 2018 (Morning)

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

MID SEMESTER EXAMINATION **SUMMER SEMESTER, 2017-2018**

DURATION: 1 Hour 30 Minutes **FULL MARKS: 75**

SWE 4201: Object Oriented Concepts I

Programmable calculators are not allowed. Do not write anything on the question paper.

There are **4 (four)** questions. Answer any **3 (three)** of them.

Figures in the right margin indicate marks.

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1. a) Define class and object with an example of each. What is the relation between class and object? 5

   b) Organize the following classes into inheritance hierarchies and where appropriate create new classes: Student, Lecturer, Technician, Admin, Postgraduate Student, Undergraduate Student. 10

   c) Explain the terms overloading and overriding with example. 10

2. a) What is an abstract class and why do we need abstract class? 4

   b) Differentiate between static and dynamic polymorphism. 3

   c) What is a constructor? Describe how a constructor works. Can there be more than one constructor for a class? Justify. 10

   d) The following table is supposed to define the access to a field of a class permitted by each modifier in Java. Fill in the blanks of the following table with "Yes" if the field is accessible from the Class/Package/Subclass/World or "No" if it is not accessible: 8

Table 1: Access Level

Modifier	Class	Package	Subclass	World
public				
protected				
no modifier (default)				
private				

3. Every vehicle has a speed, color, and it can turn left and right. A bike is a vehicle which has a gear and rings bell for warning other vehicles in the road. Motor vehicles are special type of vehicles which runs on engine. The motor vehicles have different size of engines (usually measured in CC), license plates and beep horn for giving warning in the road. Among the motor vehicles, motor bike and car are of two types. All motor bikes have a model and cars have specific number of seats. 25

   Design the system on the basis of your knowledge on object oriented concept and write code to implement the system.

4. Examine the Figure 1 that contains a section of Java code with several errors. Locate the errors in the code and explain why you believe there is an error at that location. Write the correct code where there is an error. 25

Note: When you are thinking about one line of code, consider that rest of the code has no errors.

```
1  public abstract class Shape {
2       protected double dim1, dim2;
3       public Shape(double dim1, double dim2) {
4            this.dim1 = dim1;
5            this.dim2 = dim2;
6       }
7       abstract Shape();
8       abstract double area();
9       abstract void draw();
10 }
11 public class Rectangle extends Shape{
12      public Rectangle(double dim1, double dim2) {
13           super(dim1, dim2);
14      }
15      double area() {
16           return dim1 * dim2;
17      }
18      void area() {
19           System.out.println("The area is" + area());
20      }
21      void draw() {
22           System.out.println("Drawing four lines for a rectangle");
23      }
24      double getDiagon() {
25           return Math.sqrt(dim1*dim1 + dim2*dim2);
26      }
27 }
28 public class Triangle extends Shape{
29      public Triangle(double dim1, double dim2) {
30           super(dim1, dim2);
31      }
32      double area() {
33           return (dim1 * dim2)/2;
34      }
35      boolean draw() {
36           System.out.println("Drawing three lines for a triangle");
37           return true;
38      }
39 }
40 public class Main {
41      public static void main(String[] args) {
42           Shape shape = new Shape();
43           Shape rectangle = new Rectangle(10.5, 5.0);
44           System.out.println("Diagonal value of the rectangle is " +
             rectangle.getDiagon());
45
46           Shape triangle = new Triangle(12, 3);
47           triangle.draw();
48      }
49 }
```

Figure 1: Erroneous code (in Java) for Question 4.