

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

MID SEMESTER EXAMINATION
 DURATION: 1 HOUR 30 MINUTES

SUMMER SEMESTER, 2022-2023
 FULL MARKS: 75

SWE 4201: Object Oriented Concepts I

Programmable calculators are not allowed. Do not write anything on the question paper.
 Answer all 3 (three) questions. Figures in the right margin indicate full marks of questions with corresponding COs and POs in parentheses.

1. a) What are abstract classes and interfaces? Give four differences between an interface and an abstract class. 5
(CO1)
(PO1)
- b) Analyze Code Snippet 1, which has several compile or run-time errors. However, these errors are not related to brackets, semicolons or library inclusions. Locate 5 errors in the code and explain the reason behind the error(s). Write the corresponding solution code only. 20
(CO2)
(PO1)

```

1 abstract class Computer {
2     private String brand;
3     private String model;
4     public Computer(String brand, String model) {
5         this.brand = brand;
6         this.model = model;
7     }
8     public abstract void turnOn();
9     public abstract void turnOff();
10 }
11 class BasicComputer extends Computer {
12     public int ramSize;
13     public BasicComputer(String brand, String model, int ramSize) {
14         this.ramSize = ramSize;
15     }
16     @Override
17     public void turnOff() {
18         System.out.println("Turning off...");
19     }
20 }
21 interface InternetConnectivity {
22     void connectToInternet(String wifiName);
23     void disconnectFromInternet();
24 }
25 class AdvancedComputer extends Computer, InternetConnectivity {
26     public String gpuModel;
27     public AdvancedComputer(String brand, String model, int ramSize,
28         String gpuModel) {
29         super(brand, model, ramSize);
30         this.gpuModel = gpuModel;
31     }
32     public void connectToInternet(String wifiName) {
33         System.out.println("Connecting to " + wifiName + "...");
34     }
35     @Override
36     public void disconnectFromInternet() {
  
```

```

36 System.out.println("Disconnecting from the internet...");
37 }
38 }
39 class Main {
40     public static void main(String[] args) {
41         Computer comp = new AdvancedComputer("Dell", "XPS", 16, "RTX 3080");
42         comp.turnOn();
43         Computer comp1 = new Computer("HP", "Pavilion");
44         InternetConnectivity internetConnectivity = new BasicComputer("HP", "Pavilion", 8);
45         InternetConnectivity internetConnectivity = new AdvancedComputer("Dell", "XPS", 16, "RTX 3080");
46         internetConnectivity.connectToInternet("MyWiFi");
47     }
48 }

```

Code Snippet 1: A Java program for Question 1.b

2. a) For each of the following items, state whether it should naturally be considered as a class or an object. 5
(CO1)
(PO1)
- Tomorrow • Ahmed Sofa • LinkedIn • Publisher • Social Media • Mobile • Book • Person • Fruit • Toyota car
- b) Organize the following classes into inheritance hierarchies. There can be more than one hierarchy. 8
(CO1)
(PO1)
- Animal • 3DShape • Zebra • Employee • Vehicle • Cube • Shape • SalariedEmployee • PetAnimal • Consultant • Bird • 2DShape • Cat • Manager • Fish • Triangle
- c) Considering Code Snippet 2, write classes to represent the code structure, and find out whether any object oriented concept exists within them. 6
(CO1)
(PO1)

```

1 "galaxy": {
2     "name": "Milky Way",
3     "age": 13,
4     "blackHole": {
5         "name": "Sagittarius A*",
6         "mass": 4.31E6,
7         "radius": 44.23
8     }
9 }

```

Code Snippet 2: A Java program's output along with attributes and values for Question 2.c

- d) Explain the advantages of using read-only and write-only methods in encapsulation along with examples. 6
3. a) Explain the multiple inheritance problem with an example. 5
- b) A software company wants to build a vehicle rental system. Each vehicle has a unique ID, model name, availability for rental, daily rent fee, and damage fine. A vehicle could be a Car or a PickupVan. A PickupVan has a load capacity and a Car has number of seats. To rent a vehicle, anyone has to specify the vehicle's ID, the rent start date, and the number of days. The system checks the availability of the vehicle for rent. If it is available, it will be added to the rental list. When a vehicle is returned, the system searches the rental list using the vehicle's ID and removes it from the list if found. The system can calculate the total rent fee based on rate, days, and damage. 20
(CO2)
(PO1)
- Write an Object Oriented solution for the system using any programming language.