Open University *of* Mauritius

BSc (HONS) APPLIED ICT [OUbs017]

EXAMINATION FOR:		November/December 2019
MODULE	:	Object Oriented Programming [OUbsc017214]
DURATION	:	2 Hours
DATE	:	Tuesday 03 December 2019

INSTRUCTIONS TO CANDIDATES

1. The question paper consists of **FOUR (4) Questions.**
2. Answer **ALL questions**.
3. Always start a new question on a fresh page.
4. Total marks: **100**

This question paper contains 4 questions and 7 pages.

ANSWER ALL QUESTIONS

QUESTION 1 (25 MARKS)

a) How is Object Oriented Programming different from Structured Programming?

(5 marks)

b) Define the following terminologies as used in Object Oriented Programming and provide a simple example of each:

i. this keyword **(2 marks)**

ii. local variables **(2 marks)**

iii. Instance variables **(2 marks)**

iv. Instantiation **(2 marks)**

v. super keyword **(2 marks)**

c) Differentiate between the following Object-Oriented concepts using simple examples of your own: -

i. no-argument constructor v/s overloaded constructor **(2 marks)**

ii. public v/s private **(2 marks)**

iii. concrete class v/s abstract class **(2 marks)**

iv. single inheritance v/s multiple inheritance **(2 marks)**

v. overloading v/s overriding **(2 marks)**

QUESTION 2 [25 MARKS]

A simple computer application is required for a fast food company that primarily sells fish based products: sandwiches, nuggets, rolls & French fries. Below is a simplified list of the requirements identified.

The fast food restaurant offers a variety of meals to customers for breakfast, lunch and dinner. Menu items may be sold independently though. A customer places his/her order and pays at the checkout counter before being served all food items bought.

a) Write down all the classes needed for the system described above.

(5 marks)

b) Write down appropriate data members for each class identified.

(5 marks)

c) Write down appropriate methods for each class.

(5 marks)

d) Write down a Java application to place an order for a lunch combo meal that contains a fish sandwich, French fries, nuggets, a soft drink and a spicy fish roll.

(5 marks)

e) Write down a Java application to calculate & display the total cost to be paid by the customer.

(5 marks)

QUESTION 3 [25 MARKS]

a) A motor vehicle dealer can sell many types of vehicle. Vehicles have attributes such as Registration Number, Make, Model, Year, Origin, Selling Price. Vehicles can be motorbikes, cars, vans, lorries, buses, etc. Cars can have additional attributes such as colour. Lorries can have additional attributes such as Load in Kgs.

Using the principles of inheritance, show how this scenario can be implemented.

(8 marks)

b) The following code generates a runtime error when run. What is the error?

```
public class MyClass {
  public static void main(String[ ] args) {
    int[] myNumbers = {1, 2, 3};
    System.out.println(myNumbers[3]);
  }
}
```

(1 mark)

c) How can runtime errors be avoided? Show your answer, using the code above.

(4 marks)

d) Write a Java program to create an array of **ten (10)** elements and display the average of the **ten (10)** numbers.

(8 marks)

e) Assuming you are using a LinkedList to model a stack, give the Java command to

i. Add an item

ii. Remove an item

iii. Check the size of the stack

iv. Check whether the stack has elements

(4 marks)

QUESTION 4 [25 MARKS]

a) Define Object Serialisation.

(2 marks)

b) What is the purpose of Object Serialisation?

(2 marks)

c) Explain the lines 14, 36, 43, 45, 49, 51, 59, 78 in the following code:

```
1.  // Java code for serialization and deserialization
2.  // of a Java object
3.  import java.io.*;
4.
5.  class Emp implements Serializable {
6.  private static final long serialversionUID =
7.                                  129348938L;
8.      transient int a;
9.      static int b;
10.     String name;
11.     int age;
12.
13.
14. public Emp(String name, int age, int a, int b)
15.     {
16.         this.name = name;
17.         this.age = age;
18.         this.a = a;
19.         this.b = b;
20.     }
21.
22. }
23.
24. public class SerialExample {
25. public static void printdata(Emp object1)
26.     {
27.
28.         System.out.println("name = " + object1.name);
29.         System.out.println("age = " + object1.age);
30.         System.out.println("a = " + object1.a);
31.         System.out.println("b = " + object1.b);
32.     }
33.
34. public static void main(String[] args)
```

```
35.    {
36.        Emp object = new Emp("ab", 20, 2, 1000);
37.        String filename = "shubham.txt";
38.
39.
40.        try {
41.
42.
43.            FileOutputStream file = new FileOutputStream
44.                                    (filename);
45.            ObjectOutputStream out = new ObjectOutputStream
46.                                    (file);
47.
48.
49.            out.writeObject(object);
50.
51.            out.close();
52.            file.close();
53.
54.            System.out.println("Object has been serialized\n"
55.                            + "Data before Deserialization.");
56.            printdata(object);
57.
58.
59.            object.b = 2000;
60.        }
61.
62.        catch (IOException ex) {
63.            System.out.println("IOException is caught");
64.        }
65.
66.        object = null;
67.
68.
69.        try {
70.
71.
72.            FileInputStream file = new FileInputStream
73.                                    (filename);
74.            ObjectInputStream in = new ObjectInputStream
75.                                    (file);
76.
77.
78.            object = (Emp)in.readObject();
79.
80.            in.close();
81.            file.close();
82.            System.out.println("Object has been deserialized\n"
83.                                + "Data after Deserialization.");
84.            printdata(object);
85.
86.
```

```
87.         }
88.
89.         catch (IOException ex) {
90.             System.out.println("IOException is caught");
91.         }
92.
93.         catch (ClassNotFoundException ex) {
94.             System.out.println("ClassNotFoundException" +
95.                                " is caught");
96.         }
97.     }
98. }
99.
```

(8 marks)

d) Give the output when the above code is run.

(8 marks)

e) A Thread goes through various stages in its life cycle. Name the five stages.

(5 marks)