Open University *of* Mauritius

BSc (HONS) APPLIED ICT [OUbs017]

EXAMINATION FOR:		JULY / AUGUST 2020
MODULE	:	Object Oriented Programming [OUbs017214]
DATE	:	Monday 27 July 2020
DURATION	:	2 Hours

INSTRUCTIONS TO CANDIDATES

1. This 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) *Encapsulation* is one of the four fundamental OOP concepts. The other three are inheritance, polymorphism, and abstraction. What is Encapsulation? How is Encapsulation implemented in Java (just mention the Java keywords)?

(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) Write down the class *Magazine* to contain the following:

i. data members: name, editor_in_chief and id (3 attributes)

(2 marks)

ii. set methods for each attribute. (3 setters)

(2 marks)

iii. get methods for each attribute. (3 getters)

(2 marks)

iv. abstract method toString of type String.

(2 marks)

b) Write down the subclass *OnlineMagazine* to contain the following:

i. integer variable web_pages.

(1 mark)

ii. set method for the attribute.

(1 mark)

iii. get method for the attribute.

(1 mark)

iv. method toString which returns a string value *Online Magazine*.

(1 mark)

c) Write down the subclass *PrintMagazine* to contain the following:

i. integer variable no_of_pages.

(1 mark)

ii. set method for the data member.

(1 mark)

iii. get method for the data member.

(1 mark)

iv. method toString which returns a string value *Print Magazine*.

(1 mark)

d) Now write down an application to perform the following:

i. create **one (1)** *OnlineMagazine* object and **one (1)** *PrintMagazine* object.

(3 marks)

ii. Use the set methods to assign any values to the data members.

(3 marks)

iii. Use the get methods to display the values.

(3 marks)

QUESTION 3 [25 MARKS]

a) The following code generates a runtime error when it is compiled. Identify the error.

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

(1 mark)

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

(4 marks)

c) Write a Java program to create an array of five elements and display the sum of the **five (5)** numbers.

(8 marks)

d) Give **one (1)** advantage and **one (1)** disadvantage of using an *Array* over a variable.

(4 marks)

e) Give **one (1)** similarity and **one (1)** difference of using an *Array List* over a *Linked List.*

(4 marks)

f) Assuming you are using a *Linked List* to model a *Queue*, give the Java command to

i. Add an item

ii. Remove an item

iii. Check the size of the queue

iv. Check whether the queue has elements

(4 marks)

QUESTION 4 [25 MARKS]

a) A *Product* can be an *Album*, a *Book* or a *Movie*. Products have attributes such as *Title* and *Price* as well as methods *Purchase* and *Download*. Album has attribute *Artist*. Book has attribute *Author*. Movie has attribute *Director*. Draw a Class Diagram to show how this scenario can be implemented using the principles of inheritance.

(9 marks)

b) Define Object Serialisation.

(2 marks)

c) What is the purpose of Object Serialisation?

(2 marks)

d) Program 1 shows an OO program. What will be the output, giving reasons?

```
//Program 1
class Buah {
  double i;
  void display()
   {System.out.println(i); }
}
class Rambutan extends Buah {
  double j;
  void display()
  {System.out.println(j);  }
}

class inheritance_demo {
  public static void main(String args[])
  {
    Rambutan abc = new Rambutan();
    abc.i=5.0;
    abc.j=6.0;
    abc.display();
  }
}
```

(4 marks)

e) Program 2 shows a Java program. What will be the output, giving reasons?

```
//Program 2
public class Test
{
    public static void main(String[] args)
    {
        try
        {
            return;
        }
        finally
        {
            System.out.println( "Finally" );
        }
    }
}
```

(4 marks)

f) What is an abstract class? Choose **one (1)** answer.

i. An abstract class is one without any child classes.

ii. An abstract class is any parent class with more than one child class.

iii. An abstract class is a class that cannot be instantiated, but can be a base class.

iv. abstract class is another name for "base class".

(2 marks)

g) To prevent any method from being override, method must be declared as: (Choose one answer)

i. static

ii. const

iii. final

iv. abstract

(2 marks)