Open University *of* Mauritius

BSc (HONS) APPLIED ICT WITH SPECIALISATION [OUbs017]

EXAMINATIONS FOR: May/June 2015 - Year 2 Semester 1

MODULE: Object Oriented Programming [OUbs017214]

DURATION: 2 HOURS

READING TIME 10 MINUTES

INSTRUCTIONS TO CANDIDATES

1. This paper consists **3 Questions**.
2. Answer **ALL** questions**.**
3. Always start a new question on a fresh page.
4. Total marks: 100.
5. Write your student ID on each answer sheet.

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This question paper contains 3 questions and 5 pages.

ANSWER ALL 3 QUESTIONS

QUESTION 1 [35 MARKS]

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

(i) Constructor

(ii) Class Variable

(iii) LinkedList

(iv) Inheritance

(v) Serialized Object

[10 MARKS]

(b) What is object oriented programming? How does it differ from procedure oriented programming?

[5 MARKS]

(c) Encapsulation is one of the main concepts of Object Oriented Programming. Using an appropriate java code example demonstrate how encapsulation can be applied.

[10 MARKS]

(d) Using the collection of ArrayList, write a java program that will declare, and insert 3 values in an ArrayList called Employees. The program should then display the size and the second element of the ArrayList.

[10 MARKS]

QUESTION 2 [35 MARKS]

(a) Explain the concept of polymorphism with the help of an example.

[8 MARKS]

(b) Cars and Lorries and sub categories of Vehicles. BMW, Audi and Toyota are makes of Cars, while DAF is the make of a lorry. Using the principles of inheritance show how this scenario can be implemented in Java.

[8 MARKS]

(c) Using a suitable diagram, explain the hierarchy of Exceptions used in Java. Write a java program that uses a try and multiple catches as well as a finally section.

[8 MARKS]

(d) A vending machine sells beverages and snacks. Any user first insert coins/bank notes, then they have to choose either a snack or beverage by inserting a corresponding code. If the inserted is equal or higher than the amount required, then the snack/beverage is delivered, and change is returned. Remember that a vending machine may need technical assistance from time to time.

(i) Propose a Use Case diagram for the vending machine.

(ii) Illustrate the flow of operations of the vending machine through a Sequence diagram.

[4 + 7 MARKS]

<u>QUESTION 3</u> [30 MARKS]

Mr Imrit is working on a project which involves the study of different kinds of bees. He needs to keep details of the bees but, unfortunately his main Java programmer is currently on vacation.

He has contacted you to implement a program to help him in his research and he has provided you with the following details, which was compiled by his programmer. The class Honeybees is a kind of bees and has the characteristics as shown below:

```
Class Bees:
Variables:    Queen: String[]
              ColonySize: int
Methods:      Bees()
              Bees(Queens: String[], ColonySize: int)
              display(): void

Class HoneyBees:
Variables:    dangerous: boolean
Methods:      HoneyBees(Queens: String[], ColonySize: int)
              display(): void

Class MainBees:
Main(args: String[]): void
```

Implement the classes of Bees, Honey and MainBees such that:

The class Bees:

- The default constructor initialises the instance variables queens to only 1 queen named “Alice” and ColonySize to 500.
- The defined constructor takes in two parameters and initialises the corresponding instance variables.
- The method display, shows the information about a bee in the format below:

```
This bee colony has the following queens:

Queen 1:  Alice

The approximate colony size: 500
```

The class HoneyBees

- The defined constructor takes in two parameters (new String[] {"Lily","Mily"} and 250) and initialises the relevant instance variable. It sets the “dangerous” instance variable to true.

- The method display, shows the information about Honey Bees in the format below:

```
This bee colony has the following queens:
Queen 1: Lily
Queen 2: Mily

The approximate colony size: 250

The Honey Bees are: dangerous
```

[12 + 10 + 8 MARKS]