Open University of Mauritius

BSc (Hons) Applied ICT with Specialisation [OUba017]

EXAMINATIONS FOR:	May/June 2016 – Year 2 Semester 1
MODULE:	**Object Oriented Programming [OUba017214]**
DURATION:	2 HOURS
READING TIME:	10 Minutes

INSTRUCTIONS TO CANDIDATES

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

This question paper contains 3 Structured 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:

   a. Object
   b. Private “variable”
   c. ArrayList
   d. Interface
   e. Unified Modelling Language

[10 MARKS]

b) Describe how Object Oriented Programming is different from traditional programming?

[5 MARKS]

c) A class vehicle has only one attribute, MaxCarryingCapacity. Write a java program that implements the vehicle class using Encapsulation principles.

[10 MARKS]

d) Using the collection of LinkedList, write a java program that will declare, and insert 4 values in an LinkedList called Runners. The program should then display the size and check whether “Bolt” is one of the runners of the LinkedList.

[10 MARKS]

QUESTION 2 [35 MARKS]

a) Another important principle of Object Oriented Programming in Polymorphism. Using an appropriate example, explain polymorphism as applied to Object Oriented Programming.

[8 MARKS]

b) An author can write many books. Books have attributes such as ISBN, Title, price, publisher, and Author has attributes such as Name, Email, gender. Using the principles of inheritance show how this scenario can be implemented in Java.

[8 MARKS]

c) 'Maigry' company engaged in rental of boats for cruises on the beaches of Belle Mare and Blue Bay in recent times has developed very dynamically. In order to exploit efficiently as possible a growing base of boats, the company decided to invest in IT system supporting its core business. The system primarily includes the management of reservations and rental boats, and servicing of boats. Propose a Use Case diagram for the boat rental system.

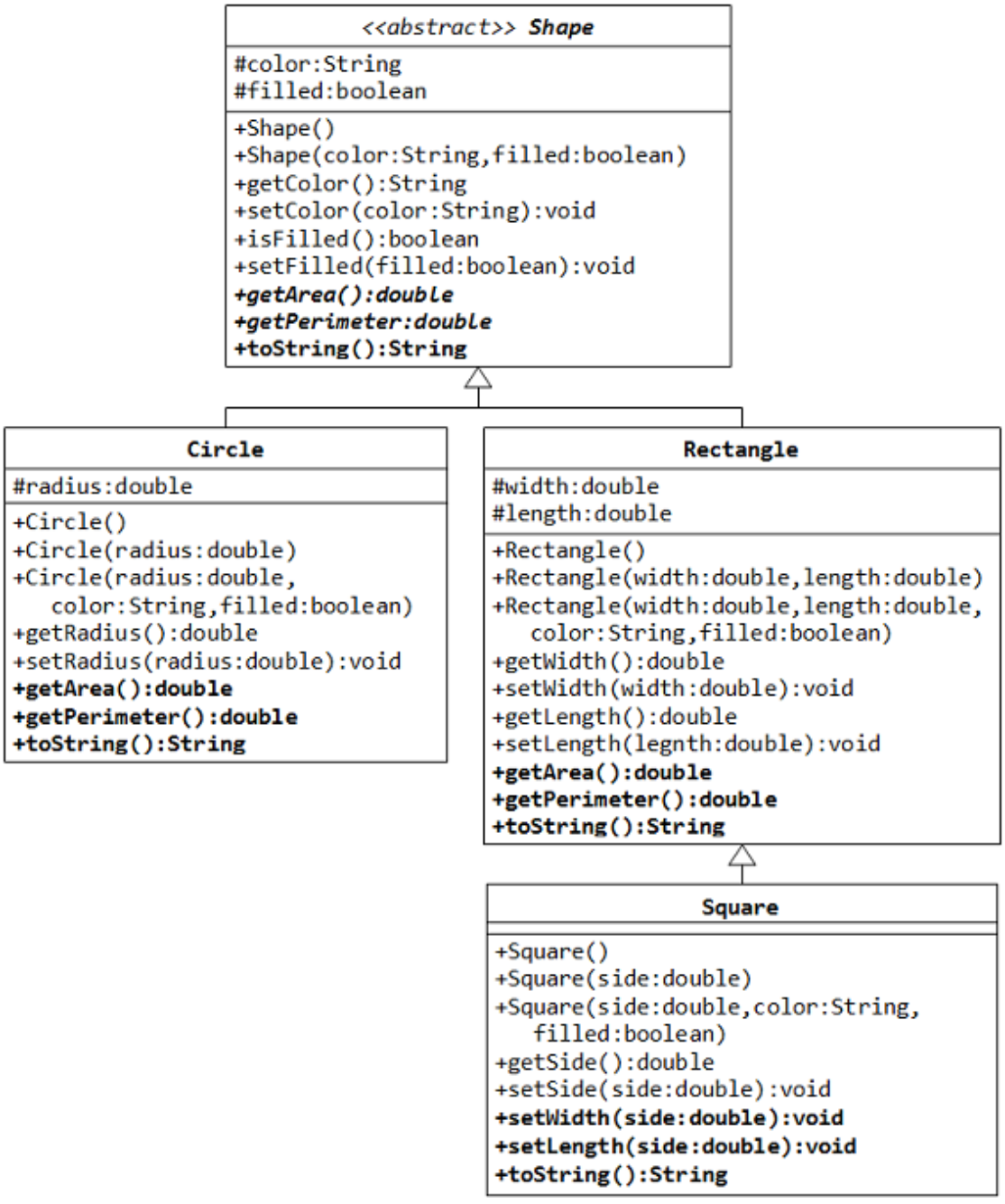
[9 MARKS]

d) To give an exam, an instructor first notifies the students of the exam date and the material to be covered. She then prepares the exam paper (with sample solutions), gets it copied to produce enough copies for the class, and hands it out to students on the designated time and location. The students write their answers to exam questions and hand in their papers to the instructor. The instructor then gives the exam papers to the TAs, along with sample solutions to each question, and gets them to mark it. She then records all marks and returns the papers to the students. Draw a sequence diagram that represents this process.

[10 MARKS]

QUESTION 3 [30 MARKS]

The class diagram below shows the superclass Shape and its subclasses Circle, Rectangle and Square.



The class Shape contains:

- Two private instance variables color (String) and filled (boolean). The private variables can be accessed by its subclasses and classes in the same package.

- Two constructors: a no-arg (no-argument) constructor that initializes the color to "green" and filled to true, and a constructor that initializes the color and filled to the given values.
- Getter and setter for all the instance variables.
- A toString() method that returns "A Shape with color of xxx and filled/Not filled".
- Two methods getArea() and getPerimeter().

The Circle class contains:

- An instance variable radius (double).
- Three constructors as shown. The no-arg constructor initializes the radius to 1.0.
- Getter and setter for the instance variable radius.
- Methods getArea() and getPerimeter().
- Override the toString() method inherited, to return "A Circle with radius=xxx, which is a subclass of yyy", where yyy is the output of the toString() method from the superclass.

The Rectangle class contains:

- Two instance variables width (double) and length (double).
- Three constructors as shown. The no-arg constructor initializes the width and length to 1.0.
- Getter and setter for all the instance variables.
- Methods getArea() and getPerimeter().
- Override the toString() method inherited, to return "A Rectangle with width=xxx and length=zzz, which is a subclass of yyy", where yyy is the output of the toString() method from the superclass.

The class Square has no instance variable, but inherits the instance variables width and length from its superclass Rectangle and contains:

- Three constructors as shown. The no-arg constructor initializes the width and length to 1.0.
- Override the toString() method to return "A Square with side=xxx, which is a subclass of yyy", where yyy is the output of the toString() method from the superclass.
- Override the setLength() and setWidth() to change both the width and length, so as to maintain the square geometry.

Write the code for the classes Shape, Circle, Rectangle and Square.

[10 + 7 + 7 + 6]

END OF QUESTION PAPER