

DUBLIN CITY UNIVERSITY

SAMPLE EXAM PAPER

- COURSE: M.Eng./Grad.Dip in Electronic Systems RAE - RACeE
- **YEAR:** Postgraduate
- SUBJECT / MODULE: EE553 Object Oriented Programming
- **EXAMINERS:** Derek Molloy
- *TIME ALLOWED:* 3 hours
- *INSTRUCTIONS:* Answer **FOUR** questions. All questions carry equal marks.
 - ?? Before you start put your name and id-number on the supplied disks!
 - ?? Please use the answer books and the supplied disks to complete your answers to this exam.
 - ?? On the disk, please use separate directories for each question attempted, called question1, question2, etc.
 - ?? For each question you attempt, please reference your files on the disk related to that question in your answer book.
 - ?? You are responsible for insuring that you have copied all the files that form your answers onto the disk.

PLEASE DO NOT TURN OVER THIS PAGE UNTIL YOU ARE TOLD TO DO SO

This booklet contains 4 pages, including the cover sheet.

Question 1.

(a) Answer the following short questions. Keep your answers brief.

- "The keyword protected has slightly different meaning in Java and (i) C++". Explain this statement?
- (ii) Explain the term *panel*.
- Explain the use of the Class class in Java. (iii)
- How is *scope resolution* performed in C++? (iv)
- Explain how JDBC involves using a Statement object. (v)
- (vi) Describe the function of Servlets.
- Explain the *extends* keyword and show how it is used. (vii)

[14 marks]

[6 marks]

- (b) What is a Java Interface? Why is it used? Give an application example of how you might use an Interface.
- (c) The Java language can use a Just-In-Time Compiler (JIT). What advantages does the use of a JIT provide when developing Internet based applications? How does this JIT compiler sit into the lifecycle of an Applet?

[5 marks]

Question 2.

(a) Java can be used very successfully in image processing applications. Describe how Java handles images: How are images loaded? How are images stored? How can we draw lines, circles and rectangles directly onto this image?

[9 marks]

(b) Write a Java applet that loads an image from the local hard disk, performs a threshold filter at the greylevel of 128 and displays the filtered image. (An image is supplied for this section called "question2.gif" as in Figure 1.) [16 marks]

(a) (b) Figure 1. (a) Shows the "question2.gif" image for question 2(b). (b) Shows the expected filtered output image that should be obtained.



Question 3.

(a) **Abstract Classes** are commonly used in C++. Why are they used and what is the C++ syntax for their use?

[5 marks]

(b) **Memory Leaks** are not unusual in C++. How can these memory leaks occur? Write a short section of code that demonstrates a memory leak.

[11 marks]

(c) Write a section of C++ code that demonstrates the use of **dynamic binding**. [9 marks]

Question 4.

 (a) Threading is a very powerful aspect of the Java programming language. Explain the two main ways that Java uses to incorporate threading into applications. Discuss synchronization - Why is it used? Give an example application of when you would use it.

[8 marks]

(b) Write a section of Java code that uses the Java **Swing** set to create the following **application**. The Progress bar will start moving after the Start button is pressed and should stop when the button is pressed again.

Breek's Threaded ProgressBar	
Progress Bar	Press to start

[17 marks]

Question 5.

(a) What does object serialization mean?

[3 marks]

(b) What is JDBC and how is it used in Java? Explain the term **ResultSet**.

[7 marks]

(c) Write a Java client/server pair, where the client sends a string to server, the server then counts the number of words and sends the counted number of words back to the client.

You have been supplied with three sets of code to handle the basic aspects of this application. These are called

- ?? Client.java,
- ?? Server.java and
- ?? ConnectionHandler.java

These files are in the directory **question5**.

[15 marks]