PRINCE OF SONGKLA UNIVERSITY

FACULTY OF ENGINEERING

Department of Computer Engineering

Midterm Examination: Semester 2 **Academic Year**: 2007-2008

Date: 22nd December, 2007 **Time**: 13:50 – **15:30 (2 hours)**

Subject Number: 240-321 **and** 241-211 **Rooms**: A400

Subject Title: Advanced Computer Programming Techniques
and Object Oriented Programming

Lecturer: Aj. Andrew Davison

Exam Duration: 2 hours

This paper has 3 pages.

Authorized Materials:

- Writing instruments (e.g. pens, pencils).
- Books (e.g. dictionaries) and calculators are **not** permitted.

Instructions to Students:

- *Answer questions in English.* Perfect English is **not** required.
- Attempt all questions.
- Write your answers in an answer book.
- Start your answer to each question on a new page
- Clearly number your answers.
- Any unreadable parts will be considered wrong.
- When writing programs, use good layout, and short comments; marks will not be deducted for minor syntax errors.
- The marks for each part of a question are given in brackets (...).

Question 1 (30 marks; 30 minutes)

a) What are the differences between a *class* and an *object*? (10)

b) What is *encapsulation*? (4)

c) What are the differences between a *method* and a *constructor*? (4)

d) What is a *class diagram*? (4)

e) What is *loose coupling*? (4)

f) What is *cohesion*? (4)

Each answer should include diagrams and **small** code fragments where possible.

Question 2 (30 marks; 30 minutes)

a) Write a Java Counter class which includes fields to hold the current count and an increment amount.

Counter has two constructors: one which takes no inputs and sets the counter and increment to 1, and a constructor with two arguments for initializing the count and increment.

There are 3 methods in Counter: reset() resets the counter to its start value, getCount() returns the current value of the counter, and increment() increments the counter value using the increment amount. (20)

b) Write a class called UseCounter which contains a main() method that creates several different counters, increments them in a loop, and prints their changing values. Include diagrams in your answer to help explain how the objects change. (10)

Question 3 (40 marks; 40 minutes)

a) Explain *call-by-value* and *call-by-reference* parameter passing in Java. Include diagrams and **small** code fragments in your answer. (10)

b) What is a *generic* class? (5)

c) Write a Java program that stores information about a collection of music CDs.

For each CD, store the singer's name, the price of the CD, the title of the CD, and the year when the CD was released. A CD may have up to 20 tracks (different songs). Each track's title, and its length in minutes and seconds, should be included with the other CD information. *Hint*: you should write CD and Track classes.

Write a main() method which shows off the program features. (25)

Question 4 is on the Next Page

Question 4 (20 marks; 20 minutes)

a) Explain the main difference between the String and StringBuilder classes. (5)

b) What are the two main ways of testing for equality in Strings, and how are they different? (5)

c) Write a spamCheck() method which takes a String argument representing the contents of an e-mail and returns an integer representing the liklihood that the e-mail is *spam* (i.e. junk e-mail).

spamCheck() carries out two tests:

(i) it checks if more than 10% of the characters in the string are exclamation marks (!). *Hint*: String.charAt(int i) might be useful;

(ii) it checks if the words "Nigeria" or "Viagra" are in the string.

If only one of (i) or (ii) is detected, then spamCheck() returns 1; if both tests succeed then it returns 2, otherwise it returns 0. (10)

For example, spamCheck() would return 2 when passed the following string:

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"Viagra is super good!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!"
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--- End of Examination ---