

PRINCE OF SONGKLA UNIVERSITY
FACULTY OF ENGINEERING
Department of Computer Engineering

Midterm Examination: Semester 2

Academic Year: 2005-2006

Date: 10th December, 2005

Time: 13:30 – 15:30 (2 hours)

Subject Number: 240-321

Rooms: A401

Subject Title: Advanced Computer Programming Techniques

Lecturer: Aj. Andrew Davison

Exam Duration: 2 hours

This paper has 2 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

(35 marks; 35 minutes)

- a) Write a Java `Student` class which stores a student's name, student number, and year of study. There should be methods for accessing the name, number, and year, and a method for changing the year value. There should also be a `toString()` method which returns the student details as a single `String`. All the data in the class should be private. (10)
- b) Write a short `TestStudent` class that shows how a `Student` object can be created and used. (5)
- c) Write a subclass of `Student` called `PostgradStudent`. It should include data on the student's thesis and department, and methods for getting and setting those values. There should also be a `toString()` method. All the data in the class should be private. (7)
- d) Write a short `TestPostgradStudent` class that shows how a `PostgradStudent` object can be created and used. (3)
- e) Explain **two** programming techniques which allow code in `PostgradStudent` to directly access and change the data inherited from `Student`. Explain which of these techniques is better. (10)

Question 2

(30 marks; 30 minutes)

- a) What is a polymorphic data structure? (15)
- b) Explain abstract classes and interfaces. (15)

Each answer should include diagrams and short code fragments where possible.

Question 3

(25 marks; 25 minutes)

- a) Write a Java application that reads a string from an input dialog box, and prints the *tokens* in the string to a message dialog box. (15)
- b) What are the main *differences* between the `String` and `StringBuffer` classes? Include diagrams and short code fragments where possible. (10)

Question 4

(30 marks; 30 minutes)

Describe the **three** types of inner class (member, local, and anonymous). Include diagrams and short code fragments where possible.

--- *End of Examination* ---