PRINCE OF SONGKLA UNIVERSITY

FACULTY OF ENGINEERING

Department of Computer Engineering

Midterm Examination: Semester 2

Date: 19th December, 2009

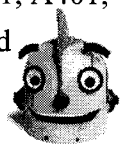
Subject Number: 241-211

Academic Year: 2009-2010

Time: 13:30 – **15:30 (2 hours)**

Rooms: R200, R201, A401,

Robot Head



Subject Title: Object Oriented Programming (OOP)

Lecturer: Aj. Andrew Davison

Exam Duration: 2 hours

This paper has 4 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

(15 marks; 15 minutes)

Explain the differences between a *class* and an *object*?

Explain using words, diagrams, and code fragments in your answers.

Question 2

(20 marks; 20 minutes)

a) Explain *call-by-value* and *call-by-reference* parameter passing in Java. (12)

b) Explain in words and diagrams the output of the following program: (8)

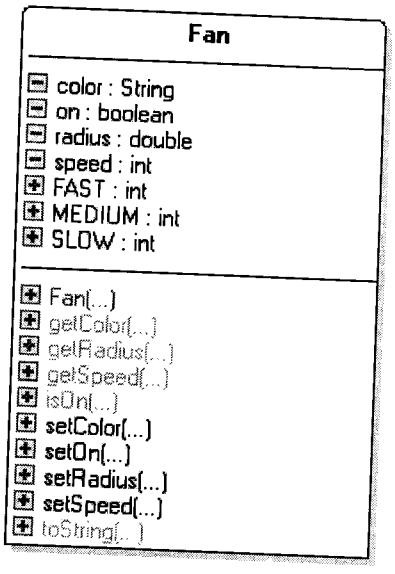
```
public class Test
{
  public static void main(String[] args)
  {
    Count myCount = new Count();
    int times = 0;
    for(int i=0; i < 100; i++)
      increment(myCount, times);
    System.out.println("count is " + myCount.count);
    System.out.ptintln("times is " + times);
  }

  private static void increment(Count c, int times)
  { c.count++;
    times++;
  }
}  // end of Text class


public class Count
{
  public int count;

  public Count(int c)
  {  count = c;  }

  public Count()
  {  count = 0;  }
}  // end of Count class
```

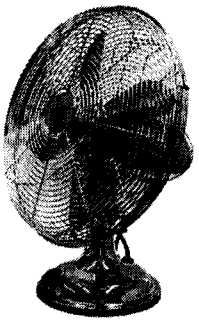
Q.3 on Next page.

Question 3

(25 marks; 25 minutes)

a) Write a Java class called Fan to model fans. The data values and methods are shown in the class diagram shown below. You need to implement the methods. The toString() method returns a string consisting of all the values of the data in an object. The fan has three speeds, represented by the constants 1, 2, and 3 to mean slow, medium, and fast speed. (15)





b) Write a short `TestFan` class that shows how **two** `Fan` objects can be created and used. Draw *diagrams* explaining how the objects work. (10)

Question 4

(35 marks; 35 minutes)

a) Explain what *string immutability* means? (13)

Hint: "immutable" means "cannot change". Explain using words, diagrams, and code fragments in your answers.

b) Write a main() program which asks the user to enter a string, and then calls a static function to report whether the string is a *palindrome*. (22)

A string is a palindrome if it reads the same forwards and backwards. For example, the words "mum", "dad", and "noon" are all palindromes.

Hints: use the Scanner class to read in the string. Use String.charAt(int index) to access the character at the index position in a string.

Q.5 on Next page.

Question 5

(25 marks; 25 minutes)

a) Write a main() program that uses Java's Random class to create an ArrayList of randomly generated *integers*, which have values somewhere between -5 and 5.

The number of integers to be generated is supplied by the user inputting the number when prompted by the program. *Hint*: use Java's Scanner class. (10)

b) **Must** part (a) use an ArrayList, or could an array be utilized instead? Explain your answer in words. (5)

c) Write a single static function that returns the index position of the largest integer in the list **and** the index position of the smallest integer. (10)

--- End of Examination ---