DESIGNING AND DEVELOPING OBJECT-ORIENTED COMPUTER PROGRAMS

9TH JUNE 2013

Examination Paper

Answer ALL questions.

Clearly cross out surplus answers.

Time: 3 hours

Any reference material brought into the examination room must be handed to the invigilator before the start of the examination.

ANSWER ALL QUESTIONS

QUESTION 1 **Marks**

a) Describe the process by which a *compiler* converts program instructions into machine code **and** give ONE (1) advantage of compilation. **4**

b) Java is an interpreted language which runs on the Java Virtual Machine. Explain what is meant by the term *Virtual Machine* and how its use differs from platform-dependent interpretation and compilation. **6**

Total 10 Marks

QUESTION 2

a) Using example code, explain what happens when the *append* method is used to combine two strings. Include a diagram in your description. **6**

b) Explain what is meant by *implicit conversion* with regards to converting primitive data types to Strings in Java **and** provide an example of how to do this in Java. **4**

Total 10 Marks

QUESTION 3

a) Define the terms *class* and *object* **and** explain the relationship between them. **4**

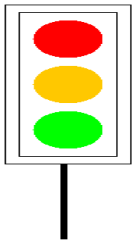
b) When an object is instantiated, the constructor method is called. Give an example of a constructor method for an Employee class which contains these attributes: empID, name, jobTitle and salary. The constructor method should take in the values for these attributes. **6**

Total 10 Marks

QUESTION 4

a) Describe the set of parameters which must be passed to the fillRect method of the graphics class. **3**

b) Assuming use of the graphics class, provide code samples of how you could draw a traffic light such as the one below. You must shade the lights the appropriate colour: red for the top light, orange for the middle light and green for the bottom light. **7**



Total 10 Marks

QUESTIONS CONTINUE ON NEXT PAGE

Marks

QUESTION 5

a) Provide the code for a pair of nested loops that will print out every element in an 8 by 8 2D array called *board* so that it retains its rows and columns structure. **6**

b) Explain what the *break* and *continue* statements do in a loop. **4**

Total 10 Marks

QUESTION 6

a) Using code to illustrate your answer, outline how you can use Swing components to create a series of ten JLabels in a Java user interface. **6**

b) Describe how the AdjustmentListener interface can be used to handle scrollbar adjustments in Java **and** provide details of the steps that must be taken in a Java class to set up an adjustment listener. **4**

Total 10 Marks

QUESTION 7

a) Explain what is meant by a *checked exception* **and** give an example of a checked exception in Java that would throw one. **4**

b) Explain how a catch block can differentiate between different kinds of exception. **6**

Total 10 Marks

QUESTIONS CONTINUE ON NEXT PAGE

QUESTION 8 **Marks**

a) Explain what is meant by the term *inheritance*. **4**

b) A program has a Pet class with the following attributes and methods. **6**

Pet
#name: String
+Pet() +getName():String +setName(String n): void +play():void +walk():void

Write the skeleton code for a Fish class which extends the Pet class.

The Fish class should inherit the name attribute of the Pet class, and the play, getName and setName methods. Its constructor should call the parent Pet class constructor. The Fish class should override the walk method with its own specialised walk method which prints a message explaining that fish cannot walk. It should have its own swim method. The swim method has a void return type and does not take in any parameters.

Total 10 Marks

QUESTION 9

a) Explain how LinkedLists are organised and the advantages this gives over ArrayLists. **7**

b) Explain the benefits of using an ArrayList over a LinkedList **and** give an example of when you would use an ArrayList in preference to a LinkedList. **3**

Total 10 Marks

QUESTION 10

a) Outline the steps required in order to read in text from a file on disk. **6**

b) Explain what is meant by an *exception* **and** give TWO (2) examples of behaviour in Java that would throw an IOException. **4**

Total 10 Marks

END OF PAPER