BCS THE CHARTERED INSTITUTE FOR IT

BCS HIGHER EDUCATION QUALIFICATIONS
BCS Level 5 Diploma in IT

OBJECT ORIENTED PROGRAMMING

Friday 22nd March 2019 - Afternoon
Answer **any** FOUR questions out of SIX. All questions carry equal marks
Time: TWO hours

Answer any Section A questions you attempt in Answer Book A
Answer any Section B questions you attempt in Answer Book B

The marks given in brackets are **indicative** of the weight given to each part of the question.

Calculators are **NOT** allowed in this examination.

Section A

Answer Section A questions in Answer Book A

A1

    a)   Describe the effect of the following access modifiers that are used in the declaration of variables and methods:

        i)   public;
        ii)   private;
        iii)   protected.

(6 marks)

    b)   Explain the difference between an object in an object-oriented language and a variable in a structured programming language.

(4 marks)

    c)   Give the meaning of the following terms:

        i)   delegation;
        ii)   collection class;
        iii)   class library.

        Within your answer explain how a programmer might use these concepts.

(15 marks)

A2

    a)   Compare and contrast the way in which classes are implemented in typed object oriented programming languages, such as Java or C#, and untyped object oriented programming languages, such as Smalltalk or PHP.

(8 marks)

    b)   Explain why encapsulation is a key concept when working with objects.

(5 marks)

    c)   Compare and contrast the following:
        i)   Procedural programming;
        ii)   Structured programming;
        iii)   Object oriented programming.

(12 marks)

A3 *Premier Tours* is a travel company that specialises in arranging bespoke holidays in Africa and Asia. The Chief Executive Officer (CEO) provides a list of holiday suggestions that will be published on the company website and each year the CEO reviews these to ensure they are still satisfactory.

In addition to the CEO, there are two types of permanent staff at the company: Sales Representatives and a Financial Officer.

A customer can browse the company website for holiday ideas. When they wish to book a holiday they are required to provide their details, state where they wish to visit, and specify when they want to travel. These details are passed to a Sales Representative who will help produce an itinerary that details all the holiday requirements and the final cost.

Three months before the holiday is due to begin the Financial Officer generates an invoice that the customer is required to pay within two weeks, otherwise the holiday is cancelled.

Every year the CEO visits a different destination to assess the facilities they offer, to ensure they match the company's high standards. Once their holiday is finished the customer is sent a questionnaire to complete, which the CEO will use as part of the review process.

a) Produce a Use Case diagram for the above scenario.

(15 marks)

b) Explain the following Use Case concepts:

  i)   Use Cases;
  ii) Actors;
  iii) Associations;
  iv) System boundary boxes;
  v)   Packages.

Within your answer include examples from the above scenario if appropriate.

(10 marks)

Section B

Answer Section B questions in Answer Book B

B4

a) Describe the difference between *overriding* and *overloading*. Provide a code fragment that implements these concepts to illustrate your answer.

(10 marks)

b) Explain the difference between *class variables*, *instance variables*, and *member variables*. Provide a code fragment that implements these concepts to illustrate your answer.

(15 marks)

B5

a) What is the name for a collection of methods with no implementation? Explain why this may be done using an illustrative example.

(10 marks)

b) Explain the difference between *single inheritance*, *multi-level inheritance* and *multiple inheritance*. Provide a code fragment that implements these concepts to illustrate your answer.

(15 marks)

B6

a) Why is it usually considered poor practice to declare fields (data members) with the public access modifier?

(7 marks)

b) Explain how 'mock' objects could be used in the testing of an object oriented program.

(10 marks)

c) Describe the difference between *compile-time errors* and *run-time errors* that may be experienced in program development and testing.

(8 marks)

END OF EXAMINATION PAPER