BCS THE CHARTERED INSTITUTE FOR IT

BCS HIGHER EDUCATION QUALIFICATIONS
BCS Level 6 Professional Graduate Diploma in IT

PROGRAMMING PARADIGMS

Tuesday 26th April 2022 - Morning

Answer **any** THREE questions out of FIVE. All questions carry equal marks.

Time: THREE hours

Answer any <u>Section A</u> questions you attempt in <u>Answer Book A</u>
Answer any <u>Section B</u> questions you attempt in <u>Answer Book B</u>

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

Section A
Answer Section A questions in Answer Book A

A1.

Inheritance and Polymorphism are two important concepts in object-oriented programming languages.

a) Explain **both** of these concepts and discuss how they are used when writing code. In your answer, provide examples of these concepts using an object-oriented language you are familiar with.

(18 marks)

b) Discuss what benefits inheritance can provide when compared to code written in procedural languages.

(7 marks)

A2.

a) The steps of testing and debugging form an important part in the development and deployment of software systems.

   i) Define testing and debugging.

   (5 marks)

   ii) What is the main difference between testing and debugging?

   (10 marks)

b) Programming languages can be implemented by three methods: compiler, interpreter or hybrid. Using programming languages that you are familiar with, compare the three methods of software translation process.

(10 marks)

A3.

a) Using examples, show the key features of scripting and data-oriented languages and their uses in commercial software development.

(15 marks)

b) Programmer productivity can be improved using an Interactive Development Environment (IDE). Using examples, discuss how an IDE supports programmer productivity.

(10 marks)

Section B
Answer Section B questions in Answer Book B

B4.

For a programming language to support concurrency, solutions to the problems of process synchronisation and communication are required. Explain these problems and discuss solutions that are available.

(25 marks)

B5.

a) What is meant by the terms side-effects and referential transparency in the context of both functional and imperative programming languages? Illustrate your answer with examples.

(15 marks)

b) Using a functional language of your choice, write a recursive function called `evenList`, which should take a list as a parameter and return a list which only includes items from the original list that were even.

You can assume that there is a function called `even` that returns `true` if a value is even and `false` if it is odd.

For example, `evenList [1, 2, 3, 4, 5]` should give the result `[2, 4]`.

(10 marks)

End of Examination