BCS THE CHARTERED INSTITUTE FOR IT

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

PROGRAMMING PARADIGMS

Tuesday 11th May 2021 – 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.

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

Section A
Answer Section A questions in Answer Book A

A1.
This question is about object-oriented paradigm and language standardisation.

a)   Explain, with examples, the **four** basic principles of object-oriented languages?

(16 marks)

b)   The international standards for programming languages are perceived as a major aid for software developers when making language choices for software development. What are the benefits of standardisation and uptake of programming languages?

(9 marks)

A2.
This question is about programming environments.

a)   Integrated Development Environments (IDEs) help software developers to maximise productivity.

   i)   State the **key** features of an IDE you are familiar with.
   ii)   Critically evaluate its benefits for maximising productivity.

(15 marks)

b)   Compare and contrast the **key** features of language compilers and interpreters. Your answer must highlight the **benefits** of the tools from a developer's perspective.

(10 marks)

A3.
This question relates to the nature of programming languages.

Discuss the meaning of the terms scripting languages and data-oriented languages. Identify examples of these types of languages and discuss which situations you would use the languages in.

(25 marks)

Section B
Answer Section B questions in Answer Book B

B4.
This question is about concurrency.

a)   Define the term concurrency with reference to software systems. Explain why it is desirable for a programming language to provide support for concurrency.

(5 marks)

b)   Discuss problems that can arise when sharing resources in a concurrent system and describe solutions that are available. Illustrate your answer with at least **ONE** real concurrent language example.

(15 marks)

c)   Briefly discuss any problems that may still exist in concurrent systems even if you apply the solutions that you described in part b)?

(5 marks)

B5.
This question is about logic and functional programming.

a)   "A logic program written in the Prolog programming language specifies what a program should do and not how it does it."

With reference to this statement, discuss the differences between a logic programming language and an imperative programming language.

(10 marks)

b)   What is a recursive function? Explain any similarities and differences with iteration.

(7 marks)

c)   Using a functional language of your choice, write a **recursive** function called `doubleList`, which should take a list as a parameter and return a list where each element in the original list has been doubled.

For example, `doubleList [1, 2, 3, 4, 5]` should give the result `[2, 4, 6, 8, 10]`.

(8 marks)

END OF EXAMINATION