BCS THE CHARTERED INSTITUTE FOR IT

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

PROGRAMMING PARADIGMS

Wednesday 23rd April 2025 - Morning

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

Time: THREE 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.
Common programming paradigms include procedural and object-oriented.

a) Presenting your answer in the form of a table, discuss **five** major differences between these two paradigms.

(10 marks)

b) Identify **two** software development tasks. One that is better suited to an object-oriented approach and one that is better suited to a procedural approach. Discuss and justify why each approach is preferred.

(10 marks)

c) Programming languages can also be categorised as imperative or functional. Briefly discuss the difference between these two paradigms specifically in the context of data mutability.

(5 marks)

A2.
Common approaches to convert source code into executable code include compilation and interpretation.

a) Presenting your answer in the form of a table, discuss **five** major differences between these two approaches.

(10 marks)

b) Identify **two** software development scenarios, one in which compilation would be preferred and one in which interpretation would be preferred. Discuss and justify why each approach is preferred.

(10 marks)

c) As an alternative to writing code that is compiled or interpreted, one might write in assembly language. Discuss a scenario where this would be an appropriate choice.

(5 marks)

A3.
Source code can be developed using command line tools, or through an Integrated Development Environment (IDE).

a) Presenting your answer in the form of a table, discuss **five** major differences between these two approaches.

(10 marks)

b) From the perspective of the programmer, identify and discuss **two** common features of IDEs that are intended to make the software development process easier. Comment on the degree to which each feature is successful in aiding the software developer.

(10 marks)

c) IDEs often provide the ability to step over and step into code. What does this mean, and what is this functionality used for?

(5 marks)

[Turn Over]

Section B
Answer Section B questions in Answer Book B

B4.

a) Discuss the major difference between recursive and iterative approaches to implementing a function. In your answer, identify situations where the recursive or iterative approach are preferred.

(10 marks)

b) In mathematics, the factorial function is defined as the product of the positive integers from 1 to x (for instance, 3 factorial = 3×2×1 = 6).

Using an imperative language that you are familiar with, implement a function that performs this calculation using iteration and another function using recursion. Each function should accept one integer argument and produce one integer output.

(10 marks)

c) Provide an implementation of the factorial calculation, in a functional language you are familiar with, using recursion.

(5 marks)

B5.

a) Discuss the difference between existential queries and conjunctive queries in logic programming.

(4 marks)

b) In first-order logic (predicate calculus), what do the terms existential quantifier and universal quantifier mean? Discuss how they are related.

(5 marks)

c) With the aid of a code example in a logic language that you are familiar with, distinguish between the three concepts of facts, rules, and queries. Show how queries are used to interrogate the code in your example.

(16 marks)

END OF EXAMINATION