**BCS THE CHARTERED INSTITUTE FOR IT**

BCS HIGHER EDUCATION QUALIFICATIONS
BCS Level 5 Diploma in IT

**SMART SYSTEMS**

Thursday 21st April 2022 - Morning

Answer any FOUR questions out of SIX. All questions carry equal marks.

Time: TWO 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.**

Artificial Intelligence (AI) is the science domain concerned with the development of systems that exhibit characteristics associated with intelligence in human behaviour.

a) There are two levels of duplication in AI. Identify and describe the **TWO** levels, using examples to illustrate your answer.

**(10 marks)**

b) Identify and briefly describe **FIVE** aspects of human intelligence that might be used to characterise intelligent knowledge-based systems.

**(15 marks)**

**A2.**

Machine Learning (ML) and Data Mining (DM), play a major role in Smart Systems development.

a) Explain the fundamental difference between Machine Learning and Data Mining.

**(8 marks)**

b) Define the purpose of Big Data.

**(7 marks)**

c) Using **TWO** relevant examples, explain how Machine Learning is useful in Smart applications for health care.

**(10 marks)**

**A3.**

Cyber Physical Systems (CPS) are being increasingly used in the development of Smart Systems.

a) Give a definition for Cyber Physical Systems.

**(5 marks)**

b) The security in Cyber Physical Systems is generally classified into two areas:

1. Information (data) security
2. Control security

Define and discuss the purpose of these two areas of security.

**(10 marks)**

c) Identify and briefly discuss **TWO** examples of cybersecurity challenges in Smart Systems; illustrate your answer with relevant examples.

**(10 marks)**

## Section B
## Answer Section B questions in Answer Book B

**B4.**

Smart Systems are gaining importance in all fields of application.

a) Identify and discuss **THREE** examples of Smart Systems in current use.

**(15 marks)**

b) Identify and discuss **TWO** enabling technologies for Smart Systems development.

**(10 marks)**

**B5.**

The use of Smart Systems has many advantages in industrial and social contexts. However, there are also a number of disadvantages with their development and use.

a) Identify and discuss **TWO** advantages of using Smart Systems in either industry or social contexts, illustrating your answer with an example for each.

**(10 marks)**

b) Identify and discuss **THREE** ethical issues that might arise from the development and use of Smart systems, using relevant examples to support your answer.

**(15 marks)**

**B6.**

Big Data and Data Analytics are widely used globally and play a major role in the domain of Smart Systems.

a) Identify and discuss **TWO** challenges with using Big Data and support your answer with relevant examples.

**(10 marks)**

b) Due to the introduction of Big Data, there are now three different types of data analytics. Identify and describe these **THREE** types, using relevant examples to support your answers.

**(15 marks)**

**End of Examination**