BCS THE CHARTERED INSTITUTE FOR IT

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

IT and the Environment

Wednesday 26th September 2018 - 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. The traditional server room of an organisation relies on air-conditioning to maintain the level of temperature and humidity and to help ensure that the servers continue to operate correctly. These air-conditioning systems use substantial amounts of electricity and require regular maintenance.

Your company is moving to a new building and has the opportunity to design new server rooms.

a) Discuss THREE design options which would help reduce the environmental impact of the server rooms. **(12 marks)**

b) Select ONE of these design options, which you believe has the best environmental outcome. Write a report for your Board of Directors, describing the overall benefits to the organisation of implementing this proposal. **(13 marks)**

A2. A company working on behalf of a government environmental agency would like to monitor the change of sea-ice over a 5 year period. The area to be monitored is in a remote southern hemisphere location with almost no human settlement. Particular issues to be investigated are the seasonal dynamics of the ice coverage and whether there is a longer-term trend over the 5 year period.

a) Why would remote sensing be useful for this project? **(5 marks)**

b) The company is considering the use of LiDAR for this project. Discuss the practical aspects of how LiDAR could be used in this context. **(10 marks)**

c) Discuss how the quality of data obtained during environmental monitoring using LiDAR could be assessed. **(10 marks)**

B3. You have been asked to design an "Introduction to IT and the Environment" course for school students, aged 11 – 14. In particular, you are to explain the environmental impacts of each stage of a product's life cycle.

   a) Using a laptop and a printer as example products, discuss the main points that you would include in the course for the following life cycle stages.

      i.   The manufacturing stage.

      ii. The use stage.

      iii. The disposal stage.

                                                                    (15 marks)

   b) For the same course and the same group of school students (age 11 -14), explain why it is common practice to estimate the carbon footprint of a data centre before it is built. Your answer should show the steps involved in such an audit, discuss the limitations of an estimation process, and explain what might be missed by only considering carbon.

                                                                    (10 marks)

B4. A city wishes to install a city-wide environmental, traffic and air quality monitoring system. The proposal is to use Internet of Things (IoT) technology to provide the data gathering parts of this system. There will be a data centre based in government offices to support the analysis and control of the data gathering. It is expected that there will be over 50,000 devices in the monitoring systems.

   Some residents are worried about the harmful effects of such a large number of active IT devices using wireless communication across the city.

   a) What information should the city authorities provide to respond to these residents?
                                                                    (10 marks)

   b) What are the technical advantages and disadvantages of using a wired network with fixed sensors in place of the wireless IoT system?   **(15 marks)**

B5. A country has the natural resources to generate energy from solar, wind, tide and water sources. It wants to make use of its renewable energy sources to replace the current fossil fuel power stations, which use locally-mined coal and supply 100% of the country's energy.

   a) Explain the information technology hardware and software systems which will be required to support this new, renewable energy generation.   **(10 marks)**

   b) How will individual citizens be affected by the change of energy systems?
                                                                    (5 marks)

   c) How can citizens become involved in this power generation process, and what IT will be required to enable this?   **(10 marks)**