Diploma Programme
Programme du diplôme
Programa del Diploma

Information technology in a global society
Standard level
Paper 1

Friday 15 November 2019 (afternoon)

1 hour 30 minutes

Instructions to candidates

- Do not open this examination paper until instructed to do so.
- Answer two questions. Each question is worth **[20 marks]**.
- The maximum mark for this examination paper is **[40 marks]**.

8819 – 5512

5 pages

Answer **two** questions. Each question is worth [20 marks].

1. Biometric authorization

Bright Creativa is an advertising company with approximately 100 employees, who work in their head office in Seattle. The company has decided to introduce a biometric authorization system using fingerprint scanners (see **Figure 1**). This enables the employees to gain access to the company's resources, for example to enter the building, log on to the company network and even purchase items from the company cafe.

Figure 1: An employee using biometric authorization to access the office at *Bright Creativa*

[Source: adapted image (recoloured) "Fingerprint scanner in Tel Aviv" by David Shankbone (https://commons.wikimedia.org/). Under copyright and creative commons licence 3.0 (https://creativecommons.org/licenses/by/3.0/).]

The system is linked to the company database. The employee's identification number (employee ID) is the primary key field in the *Employee* table, which stores their personal details. The company database includes other tables that store data on when they access the building, the frequency that they log on to the network and the items they purchase from the cafe. Some employees are concerned about the increased level of surveillance within the company, but the company has reassured these employees that a privacy policy has been developed.

[Source: © International Baccalaureate Organization 2019]

(a) (i) Identify **two** fields that could be in the *Employee* table of the database. [2]

(ii) Identify **two** characteristics of a relational database. [2]

(iii) Identify **two** methods that could be used to ensure that the data input to the database is accurate. [2]

(b) As part of the implementation of the biometric authorization system, *Bright Creativa* has written a privacy policy.

Explain **three** features that *Bright Creativa* would need to include in a privacy policy linked to the company's biometric authorization system. [6]

(c) To what extent is the employees' improved access to company resources outweighed by their concerns about the level of surveillance by the company? [8]

2. Wildfire modelling

The fire control centre in the Kinakora National Park in New Zealand often has to cope with the natural phenomenon of wildfires. Staff have been collecting data about wildfires since 1970.

The size of each fire is measured and the vegetation types affected are recorded. Data on the weather conditions is collected from sensors in the park. The staff at the fire control centre use this information to fight the fire.

A new computer modelling system is being developed using the product development life cycle (PDLC). With data collected from previous fires, this new system will improve the quality of the information available when fighting future fires.

The new system will enable staff at Kinakora National Park to send information to tourists in the park to warn them when they are in danger from a fire.

(a) (i) Identify **two** stages of the product development life cycle (PDLC). [2]

(ii) Identify **two** methods that could be used to train the staff to use the new modelling system. [2]

(iii) Identify **two** measurements that could be taken by the weather sensors in the Kinakora National Park. [2]

(b) Two methods for informing tourists about wildfires in Kinakora National Park are:
- Short Message Service (SMS) texting/text messaging
- Posting information on the Kinakora National Park website.

Analyse these **two** methods. [6]

(c) Evaluate Kinakora National Park's decision to use computer modelling to develop strategies for dealing with wildfires. [8]

3. Online learning

TailorEd is a free online learning system that personalizes students' learning by providing teachers with data about how students are progressing in their courses. Students create a personal profile and work through the assignments at their own pace. Teachers can log in to the learning system to see how the students are progressing. However, concerns have been expressed about the amount of data that is being collected.

The school has found that when students access the course platform some content is being blocked by the school firewall. The network administrator has been asked to investigate the situation. Teachers believe that it would be more appropriate to train the students to use the platform responsibly, rather than use technology to block their access to certain websites.

(a) (i) Identify **two** ways that the *TailorEd* system could provide feedback to the students. [2]

(ii) Identify **two** ways that the data collected about students' academic progress could be used by *TailorEd*. [2]

(iii) Outline how a firewall functions. [2]

(b) There are two possible methods for ensuring students use the *TailorEd* online learning system responsibly. They are:
- Restrict access to sites that may be considered inappropriate.
- Educate the students about acceptable use.

Analyse these **two** options. [6]

(c) To what extent do the benefits of collecting students' progress data outweigh the concerns of the students, teachers and parents? [8]

4. Sharing dashcam* footage with police

Many police departments have started campaigns to encourage members of the public to upload footage of possible offences committed by drivers to police websites. The police are looking for footage of activities such as dangerous driving and driving whilst talking on a cell/mobile phone (see **Figure 2**).

Members of the public can create an account on the police website to upload footage from their dashcam (**Figure 3**). They can also upload their dashcam footage anonymously.

Figure 2: Examples of dashcam footage

[Source: © International Baccalaureate Organization 2019]

Figure 3: An example of a dashcam

[Source: with kind permission from TheDashcamStore.com]

* dashcam: a video camera mounted on the dashboard or mirror of a vehicle and used to continuously record activity through the vehicle's windshield/windscreen
[Source: by permission. From Merriam-Webster.com © 2019 by Merriam-Webster, Inc. https://www.merriam-webster.com/dictionary/dashcam]

(a) (i) Identify **one** video file type that could be uploaded to the police department server. [1]

(ii) Calculate how long it would take to upload a 1 gigabyte (GB) video file to the police website using 80 million bits per second (Mb/s) internet connection.

1 gigabyte (GB) = 1000 megabytes (MB). [2]

(iii) Identify **three** steps that the public will need to take to upload their footage to the police website. [3]

(b) (i) Distinguish between privacy and anonymity. [2]

(ii) The police websites include help pages that give the public guidance on files and on how to upload them.

Explain why the help pages should provide guidelines about the file format and the file resolution. [4]

(c) The police are considering using dashcam footage uploaded by the public as part of their attempt to reduce the number of accidents caused by dangerous driving.

Discuss whether this dashcam footage should be used by the police as part of their attempt to reduce the number of accidents caused by dangerous driving. [8]