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**INFORMATION TECHNOLOGY IN A GLOBAL SOCIETY
HIGHER LEVEL
PAPER 2**

Thursday 19 November 2009 (morning)

2 hours

INSTRUCTIONS TO CANDIDATES

- Do not open this examination paper until instructed to do so.
- Answer three questions.

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Answer **three** questions.

Area of impact: Science and the environment / Health

1. The national DNA database for the United Kingdom (UK) currently contains the personal information and DNA data for approximately 4.5 million people. Each individual has a unique DNA code. Currently, DNA samples are only collected from people who are arrested by the police. The DNA data is permanently stored in the DNA database regardless of whether the individuals are found guilty of the crime or not.

This DNA database is already the largest relational database of this type in the world. The UK government now wants to expand the use of the DNA database by including the DNA data from all people living in the UK. This is controversial because it would also include collecting the DNA data from children at birth. Some government officials are concerned because they feel that this expansion would be undesirable and raise significant technical and ethical issues.

[Source: adapted from “*Nation of suspects*” *fear on DNA*, <http://news.bbc.co.uk/1/hi/uk/7261361.stm>, 24 February 2008]

- (a) Define the term *relational database*. [2 marks]
- (b) Describe the process of how a particular person’s DNA could be checked against data in the national DNA database to see if their DNA data has been stored. [4 marks]
- (c) Explain **two** security measures that would need to be implemented by a government before a national DNA database can be introduced. [4 marks]
- (d) Evaluate the possible impacts on UK citizens of collecting DNA data from children at birth. [10 marks]

Area of impact: Business and employment

2. Many businesses have now become completely reliant on IT to enable their continued development. For example, some companies have no fixed office space, yet have been able to grow and gain a large share of their market. Their employees use IT to telework. This has had significant effects on the size and the nature of the companies. IT has also improved the working conditions for the employees who telework.

Domain names are also important to companies relying on IT and are often described as “virtual real estate”. Companies, such as *Toys “R” Us*, have been known to pay a considerable amount of money for a domain name (<http://www.toysrus.com>) because a well chosen domain name can be an asset.

- (a) For the following URL: <http://www.richmondtdaylor.co.uk/images/photo27.jpg>
- (i) identify the domain name *[1 mark]*
 - (ii) identify the file name. *[1 mark]*
- (b) (i) Describe **one** way a new company can register a new domain name. *[2 marks]*
- (ii) The domain name (<http://www.toysrus.com>) is held in a database on the Domain Name System (DNS) server as a unique IP address such as 192.16.172.12.
- Describe why a company would prefer to use a domain name for its web site rather than an IP address. *[2 marks]*
- (c) Explain **two** technical issues that must be addressed to enable a company to introduce teleworking for its employees. *[4 marks]*
- (d) To what extent has the change to teleworking been beneficial to both employers and employees? *[10 marks]*

Area of impact: Education / Politics and government

3. The United States (US) military is one of the world’s largest users of digital game-based learning. Some of the technologies that are needed in military simulations are expert systems, artificial intelligence and video gaming. The military uses simulations to:
- train soldiers, sailors, pilots and tank drivers to master equipment
 - teach teamwork between soldiers and other military units
 - develop military strategies
 - plan responses to terrorist incidents and threats.

In fact, the military uses simulations to provide support for almost every aspect of training.

[Source: adapted from <http://www.marcprensky.com/writing/Prensky%20-%20Digital%20Game-Based%20Learning-Ch10-Military.pdf>,
26 May 2009]

- (a) Define the term *simulation*. [2 marks]
- (b) Describe **two** differences between artificial intelligence and expert systems. [4 marks]
- (c) Explain why artificial intelligence is used in the construction of digital game-based learning. [4 marks]
- (d) Evaluate the role of digital game-based learning and simulation in the training of soldiers. [10 marks]

(Question 4 continued)

- (a) Identify **two** kinds of information that are stored in an online video broadcasting database about each of the videos. *[2 marks]*
 - (b) Describe **two** reasons why there is a requirement to use a captcha when setting up an account. *[4 marks]*
 - (c) Explain **two** ways video services such as YouTube can ensure that the videos uploaded by members comply with copyright laws. *[4 marks]*
 - (d) To what extent have web sites such as YouTube been used for more purposes than leisure and entertainment? *[10 marks]*
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