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INFORMATION TECHNOLOGY IN A GLOBAL SOCIETY
STANDARD LEVEL
PAPER 1

Wednesday 7 November 2012 (afternoon)

1 hour 45 minutes

INSTRUCTIONS TO CANDIDATES

- Do not open this examination paper until instructed to do so.
- Answer three questions. Each question is worth *[20 marks]*.
- The maximum mark for this examination paper is *[60 marks]*.

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

1. **Health and dentistry**

Many dentists have upgraded their IT systems by using a local area network (LAN). This makes it possible for the dental technician to take an X-ray of a patient's teeth and for the dentist to review the patient's X-rays on a monitor in another room.
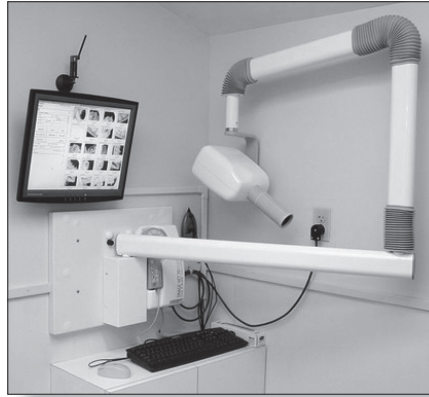

[Source: http://www.bluehousedental.com.au/images/Xray/Digital_Dental_Xray.jpg]

The upgraded IT system includes simulation software which allows dentists to view the predicted changes in the condition of a patient's teeth over a period of time, showing the result with or without treatment.

With these upgraded systems, dentists are now using electronic, instead of paper charts, for each patient. These charts can be updated by the dental technician on one computer while the dentist views them on another.

The patient can also view their charts on a monitor. This is useful when the dentist would like to discuss a treatment with the patient.
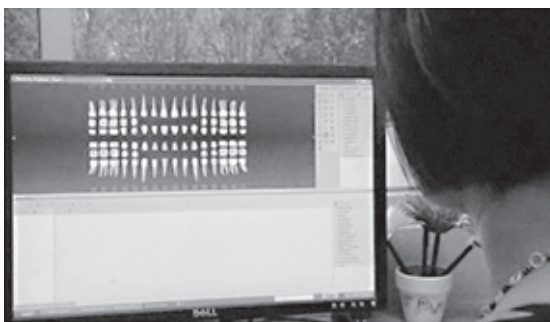
[Source: http://www.cisco.com/web/solutions/smb/heroes/uk/index.html#/skyeDental, 18 July 2012]

(This question continues on the following page)

(Question 1 continued)

(a) (i) Describe **one** difference between a local area network (LAN) and a wide area network (WAN). *[2]*

(ii) The upgraded IT system is a LAN based on a client/server network. Outline the relationship between the client and the server in the upgraded IT system. *[2]*

(iii) The developers of the upgraded IT system own the intellectual property rights for the system. Define the term *intellectual property*. *[2]*

(b) Analyse the impacts of implementing the upgraded IT system for the dentist. *[6]*

(c) To what extent should dentists use simulation software to determine future treatment for their patients? *[8]*

2. *Live-brary*

A local library has acquired a lending service called *Live-brary* that uses *Adobe* Digital Editions software which allows borrowers to access free digital content which can be both read online and downloaded to read offline. To borrow e-books from the library, borrowers need to install special software to download e-books on to their e-reader, smartphone, tablet or laptop.

Borrowers create an account to register the software. Activation allows the borrower to either read the e-book online through streaming or read offline from the downloaded copy that is "borrowed" for a period of 7, 14, or 21 days. If a borrower keeps an e-book for more than the number of days allowed, then they must pay a fine for each day over the limit.

Screenshot removed for copyright reasons
For screenshot, please refer to www.live-brary.com.
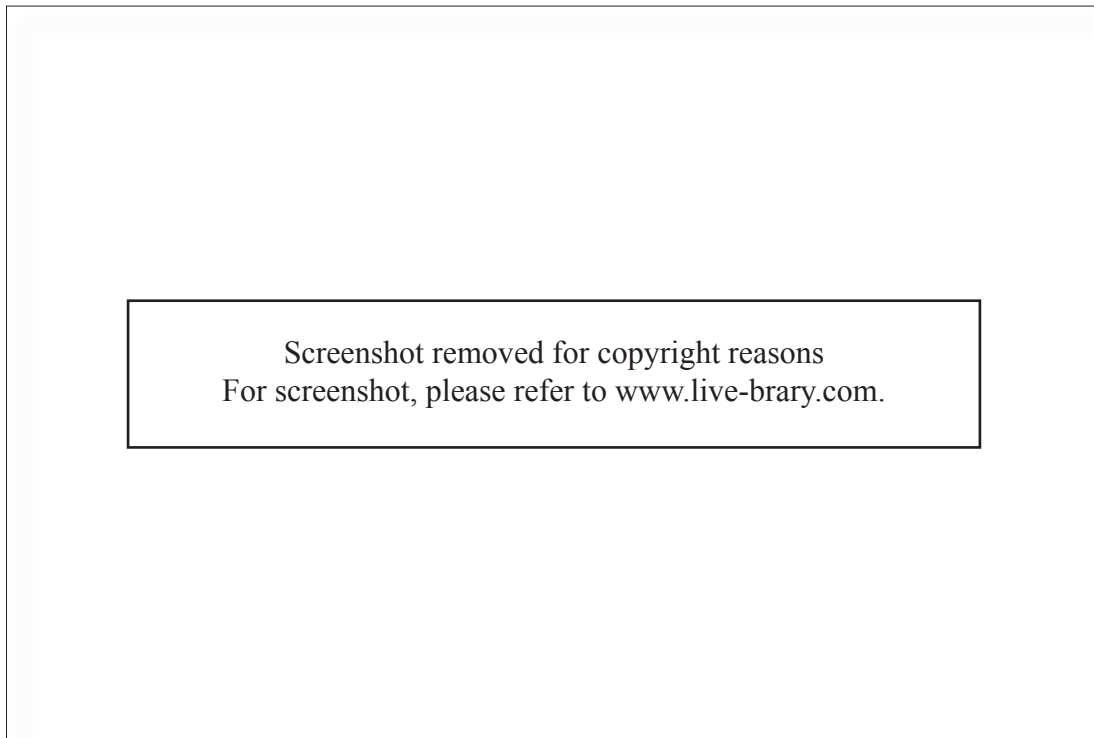
Borrowers will need a device to access the library's website to download the book. The books are available in both EPUB and PDF format. Both formats include digital rights management (DRM).

[Source: http://www.pocket-lint.com/news/26619/how-to-loan-an-ebook, 27 August 2009 and http://news.cnet.com/8301-17938_105-20028767-1.html, 29 September 2011]

(This question continues on the following page)

(Question 2 continued)

(a)   The information about the e-books, borrowers and circulation is stored in a relational database, similar to the one shown below.
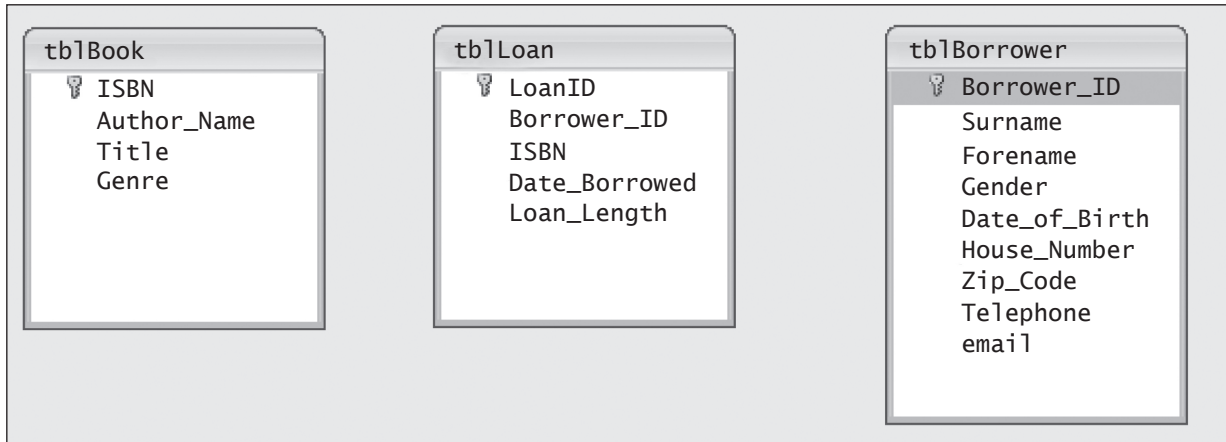
[© International Baccalaureate Organization, 2013]

(i)   State the key field in the table *tblBorrower*.   *[1]*

(ii)   State the data type for *Telephone*.   *[1]*

(iii)   *Loan_Length* uses a drop-down list with 7, 14 and 21 days. Outline why the drop-down list is used for this field.   *[2]*

(iv)   Identify **two** features of the database query shown below.   *[2]*

Field:	[Borrower_ID]	[Forename]	[Gender]	[Date_of_Birth]	IsJunior: [Date_of_Birth]<DateAdd("yyyy",-18,Date0)
Table:	tblborrower	tblborrower	tblborrower	tblborrower	
Sort:					
Show:	☐	☑	☑	☑	☐
Criteria:					0
or:					

[© International Baccalaureate Organization, 2013]

(b)   Explain **two** advantages that digital rights management (DRM), associated with the e-books, provides to the *Live-brary*.   *[6]*

(c)   *Live-brary* allows borrowers to access free digital content which can be read online and be downloaded to read offline. Evaluate **both** these options.   *[8]*

3.   Running your home from your touch-screen tablet

Touch-screen tablet computers can be used to control items such as curtains, lighting, air conditioning, heating and security cameras. You can control these items when you are away from home using WiFi or 3G cell/mobile phone networks to access the home network.

[Source: http://www.trendhunter.com/trends/control4-ipad-app, 18 July 2012. Used with permission.]

Security cameras can be connected to devices on the home network by using USB cabling or WiFi. This makes the system flexible as you can place cameras wherever they are needed.

To view the live feed from the home security cameras, there are several possible methods that can be used for secure access. One method requires a password. The other possibility is to allow automatic access from your specific touch-screen tablet computer.

[Source: http://www.ihome.asia/ihome-systems-ipad-app/, 18 July 2012 and
adapted from http://uk.prweb.com/releases/e-life/homeautomation/prweb8746468.htm, 2 September 2011]

(This question continues on the following page)

(Question 3 continued)

    (a)   (i)   Define the term *WiFi*.   *[2]*

          (ii)   Define the term *USB*.   *[2]*

          (iii) Identify **two** tasks carried out by a router.   *[2]*

    (b)   (i)   Explain why the use of computers would be an efficient way to control your home.   *[4]*

          (ii)   Explain **one** difference between the access to a WiFi and a 3G mobile network.   *[2]*

    (c)   When setting up software and accessing websites such as *Amazon*, the user is often given a choice of two options:
- remain permanently logged in
- require the username and password to be entered every time.

         Justify the option you would choose when using a computer to access a website from home.   *[8]*

4. 3D in the classroom

The Abbey School in Reading, UK is using 3D projection technology for teaching biology to secondary (high) school students.

The students were looking at how a chest works, via a 3D-enabled projector. The teachers and students wore special 3D glasses and the teacher manipulated the image around 360 degrees.

"So cool", "It's huge", "I thought the diaphragm was a flat muscle", "I didn't realize it wasn't under the ribs" were just a few of the comments made when the girls put on their glasses to examine the model in more detail.

3D technology is new in schools. 3D-ready projectors cost three times as much as 2D projectors, and a class set of glasses currently costs around £1500.

To install the 3D technology, it is necessary to upgrade the network to cope with increased storage requirements, using a storage area network, and the increased data transfer speed required, by using fibre optic cables. The monitors must also have a sufficiently high specification to show the images clearly.

Some manufacturers are refusing to make 3D projectors because there are no agreed standards. As a result, the cost of this technology is not likely to be reduced in the next few years.

[Source: adapted from http://www.bbc.co.uk/news/technology-11891753, 27 December 2010]

(a) (i) Define the term *storage area network*. *[2]*

(ii) State **one** advantage of using fibre optic cable. *[1]*

(iii) State **one** disadvantage of using fibre optic cable. *[1]*

(iv) The school has bought a 5-user concurrent licence for the 3D software. Outline how this licence works. *[2]*

(b) Teachers find the on-screen instructions for changing settings from 2D mode to 3D mode very complicated and time-consuming. For example, the teacher must choose the following menu items each time they want to use 3D:

Menu > Detailed Menu > Image > Advanced Menu > 3D Mode > On

Analyse **two** IT methods of providing training for teachers to use the software and hardware linked to the new 3D system. *[6]*

(c) Other schools are investigating this 3D technology for their classrooms. Discuss whether they should invest in this system. *[8]*

5.   **Voice over internet protocol (VOIP)**

Some countries ban services such as *Skype*, which use VOIP technology.

Skype and other operators offering VOIP services bypass telephone networks in favour of offering free calls via the internet. These countries have laws that state all calls must pass through their national telecom companies.

Skype has more than 500 million users worldwide and many cell/mobile phone providers now offer *Skype* services.

Skype has been growing in popularity among individuals and businesses to make cheap or free international phone calls. Some governments are concerned that their national telecom companies will be losing income and will be unable to track conversations.

As a result, some countries are calling for severe measures to be taken against citizens using illegal VOIP services.

[Source: http://news.bbc.co.uk/2/hi/technology/8585998.stm, 24 March 2010 and
http://www.theglobeandmail.com/news/technology/china-poised-for-skype-crackdown/article1854189/,
31 December 2010]

(a)   (i)   Identify **two** characteristics of VOIP.   *[2]*

       (ii)   Define the term *protocol*.   *[2]*

       (iii) State **two** stages where a *Skype* call can be blocked from reaching the intended recipient.   *[2]*

(b)   Analyse the decision of some countries to ban services such as *Skype*.   *[6]*

(c)   In most countries the use of VOIP is legal. Discuss the decision of a business in these countries to use VOIP services instead of a conventional phone system.   *[8]*