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INFORMATION TECHNOLOGY IN A GLOBAL SOCIETY
HIGHER LEVEL
PAPER 1

Thursday 14 November 2013 (afternoon)

2 hours 15 minutes

INSTRUCTIONS TO CANDIDATES

- Do not open this examination paper until instructed to do so.
- Section A: answer two questions.
- Section B: answer one question.
- Section C: answer one question.
- Each question is worth *[20 marks]*.
- The maximum mark for this examination paper is *[80 marks]*.

SECTION A

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

1. **Mobile Wallet**

    Customers are now using their mobile/cell phone to make purchases
    at the grocery store. Before this they used a credit card or cash.

    On the cell phone there is an application ("the wallet") that
    stores the user's credit or debit information used in transactions.
    This application uses a form of radio frequency identification
    (RFID) technology that requires a chip to be installed in their
    cell phone.

 | Go to photo source: |
    |---|
    | http://www.carryology.com/ wallets/the-mobile-wallet/ |

    In order to purchase groceries, items are first scanned into the
    register and a total is calculated. The customer waves their cell phone
    over the RFID reader, enters their PIN and the total amount for their grocery order is deducted from
    the customer's account. Secure encryption technology is used to pass the card information to the
    credit card company to complete the payment. Grocery stores have found that setting up this system
    is very expensive.

    Many grocery stores are using mobile wallets to gather information about customers' spending habits
    and will be offering a lot of incentives to get people to use it, such as discount vouchers and store
    offers sent to their cell phone.

    [Source: Text: adapted from: http://www.google.com/wallet/, 24 November 2011
    http://techcrunch.com/2011/10/09/american-express-to-release-an-api-for-digital-wallet-platform-serve-focuses-on-data-and-personalization/,
    24 November 2011;
    http://www.huffingtonpost.com/2011/05/26/google-wallet-money-data_n_867774.html, 24 November 2011.]

    (a) (i)   Identify **two** pieces of information that are being collected by the grocery store's
                computer system when the bill is paid.   [2]

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

         (iii) Define the term *encryption*.   [2]

    (b) (i)   Explain **one** reason why encryption is used in this case.   [2]

         (ii)   Explain **two** disadvantages for the customer of using "the wallet".   [4]

    (c) To what extent are the security measures used by the store during purchases appropriate?   [8]

2.   DRM (Digital Rights Management) Cloud movies
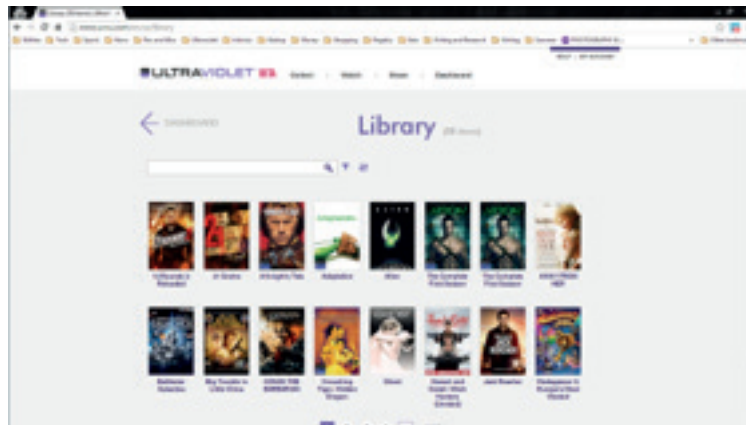
[Source: ©STL Partners. Used with permission.]

Ultra Violet – buy, store, play movies

Ultra Violet is a cloud service that allows customers to buy the rights to watch movies. This can be done on up to 12 Internet-connected devices, such as TVs, computers, tablets and cell phones when they buy a title with *Ultra Violet* rights.

Once a consumer sets up an account, a "digital locker" enables the content to be accessed from the cloud.

[Source: Text adapted from http://hiddenwires.co.uk/resourcesarticles2007/articles20070402-02.html, 24 November 2011;
http://www.engadget.com/2011/10/09/ditching-drm-could-reduce-piracy-prices-inconvenience, 24 November 2011
http://www.telco2.net/blog/2010/10/entertainment_supply_chain_bre.html, 24 November 2011]

(a)   (i)   Identify **two** features of digital rights management (DRM).   *[2]*

      (ii)   Apart from movies, identify **two** other media that use DRM.   *[2]*

      (iii)   Define the term *intellectual property*.   *[2]*

(b)   *Ultra Violet* has policies on its website describing the user agreement. Explain **two** policies that might be included and how they protect the rights of users.   *[6]*

(c)   Customers may purchase UltraViolet movies and television shows through participating UltraViolet retailers with the options to download them to personal devices **and** stream them from their digital library. Evaluate these **two** options of download and stream.   *[8]*

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3. **Senior Care goes hi-tech with virtual doctor visits**

Donna Sergisson waits to see her doctor in her room in the Wayne County Nursing Home where she is a resident. She will not see him face to face, but will use a videoconferencing system.

At the nursing home, Donna is seen by a nurse who can talk using the videoconferencing system to the doctor in a local hospital. Once the videoconference has taken place, Donna is treated by the nurse following the doctor's instructions.

The doctor also has access to the nursing home's electronic record system to type in his assessment, progress and notes, as well as review other doctors' and nurses' comments, look at patient history and what medications patients are taking. The electronic records are held in a database created by the nursing home technical staff.

[Source: adapted from http://www.waynepost.com/feature/x748725715/Senior-care-goes-hi-tech, 24 November 2011]

(a) (i) Identify **two** input devices required for the videoconference to take place. *[2]*

 (ii) There have been issues with the accuracy of the information held in the database. Describe how validation and verification are used to ensure data is accurate. *[4]*

(b) Explain **three** technical issues that would need to be addressed in order to set up an effective videoconferencing system. *[6]*

(c) The nursing home technical staff are considering replacing the existing database with a new one. The two options being considered are:
 • purchasing a commercial package that has been developed for institutions such as nursing homes
 • developing the database themselves.

 Evaluate these **two** options. *[8]*

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SECTION B

*Answer **one** question. Each question is worth [20 marks].*

4.   Project Management

The senior managers at Crystals Fitness Centre, a national business with 75 fitness centres, want to improve their advertising. The owner, Crystal Wild, has decided that she needs to produce a ten minute promotional video highlighting the main features of her business, which includes fitness, nutrition, personal training and conditioning. The video will contain photos, video clips and audio tracks.

The systems analyst used by Crystal decides to use Gantt and PERT charts to manage this IT project. The figure below is an example of the use of a Gantt chart to show the stages of the system development life cycle (SDLC).

Task	In charge	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
																WEEKS
1. video concept/idea		→														
2. requirements specification				→												
3. write the script					→											
4. feasibility (who, why, what, when and how)						→										
5. determine locations for shooting						→										
6. draw storyboards						→										
7. prepare shooting script							→									
8. hire the cast and crew							→									
9. shoot the video								→								
10. edit the video												→				
11. test the video														→		
12. final editing																→

(a)   (i)   Outline the type of project management development methodology that is used in the figure above.   *[2]*

During the analysis phase, the systems analyst will make decisions regarding the minimum hardware requirements for developing videos.

(ii)   State **two** hardware requirements that a computer will need in order to develop videos.   *[2]*

(iii)   State **two** design requirements for developing the video.   *[2]*

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(Question 4 continued)

Systems analysts use a variety of tools and techniques throughout the system development life cycle to gather information when developing the product.

(b)   Explain why the use of a development methodology similar to the one in the Gantt chart on the opposite page may not be appropriate in the development of the advertising video.   *[6]*

(c)   Discuss whether project management tools such as Gantt and PERT charts enable IT projects, such as the Crystals Fitness Centre video project, to be successfully completed.   *[8]*

5. **Managing the IT support at OBI International**

OBI International is a company with 5000 employees worldwide that has an IT support team based in São Paulo. Their in-house IT support team is responsible for the resolution of all IT requests in the São Paulo office and in their other offices worldwide.

The senior management of OBI International is considering outsourcing* all of the tasks performed by their IT support team in São Paulo.

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* outsourcing: transferring portions of work to outside suppliers rather than completing it internally

(a) (i) One of the responsibilities of the IT support team is the installation of software. State **two** additional responsibilities of an IT support team. *[2]*

(ii) Identify **four** necessary requirements to ensure that all software installed on OBI International systems meets legal requirements. *[4]*

(b) Explain **three** policies that should be introduced to ensure that the IT support team meets the needs of OBI International and its employees. *[6]*

(c) The Senior Managers at OBI International chose to have its IT support provided by outsourced companies rather than the in-house IT department.

Evaluate this decision. *[8]*

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SECTION C

*Answer **one** question. Each question is worth [20 marks].*

6.   **Driverless trains?**

High speed trains are being developed in many Asian countries. Most of them are designed to stay on the ground and run on rails. However, in some countries, Maglev trains are being prototyped. These high speed robotic trains use sensors which allow them to "fly" a few centimetres off the ground and within side walls.
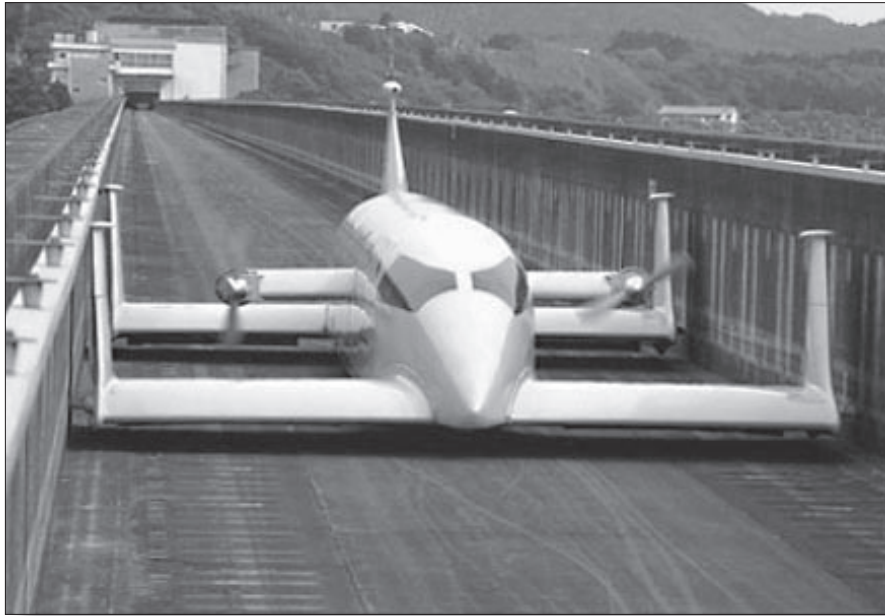
[Source: Text: © International Baccalaureate Organization 2014
Photo: ©Kohama Yasuaki. Used with permission.]

To make this system more efficient an expert system has been developed to aid the operation of trains, including establishing the safest and smoothest mode of operation, optimising fuel consumption and for training new operators.

The expert system uses an on board computer installed in the train and obtains data from sensors installed in many locations on the train.

The expert system sends advisory messages to the train operator according to the most appropriate rules for any situation. A train operator uses this information as well as his own experience to "drive" the train.

When new decisions are made, this additional information is added to the expert system.

(Question 6 continued)

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

     (ii) Describe **two** characteristics that make this robotic train system an expert system.   *[4]*

(b) The developers of this system are creating a training simulator so that new operators can gain experience in "driving" the Maglev trains on the routes under varying conditions.

     Explain what considerations will need to be included in the development of the robotic train simulation to ensure the training can cover all possible situations that may be encountered.   *[6]*

(c) The managers of a new Maglev train system are considering whether to have a driver on the train or to have no driver and operate the train remotely.

     Evaluate these **two** options.   *[8]*

7.   Robotic Vacuums

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(Question 7 continued)

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(Question 7 continued)