



MARKSCHEME

May 2008

INFORMATION TECHNOLOGY IN A GLOBAL SOCIETY

Higher Level

Paper 2

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Examiners should be aware that in some cases, candidates may take a different approach, which if appropriate should be rewarded. If in doubt check with your Team Leader.

In the case of an “identify” question read all answers and mark positively up to the maximum marks. Disregard incorrect answers. In the case of a “describe” question, which asks for a certain number of facts *e.g.* “describe two kinds”, mark the **first two** correct answers. This could include two descriptions, one description and one identification, or two identifications.

Area of Impact: Business and Employment

1. (a) Identify *two* collaborative IT tools a worker may use when telecommuting. [2 marks]

Answers may include:

- e-mail
- VoIP
- online chat
- discussion groups
- a collaborative web site such as a Wiki
- video conferencing
- microphone/speakers
- webcam
- teleconferencing
- collaborative document sharing *e.g.* Google docs
- voice networking
- instant messaging
- groupware
- PDA/smart phone/Blackberry with some indication of the collaborative nature (*e.g.* accessing phone calls, documents and Internet).

N.B. If a student lists microphone for one and speakers for another, they can only be awarded [1 mark]. If keyboard/mouse or file sharing are mentioned, these are not acceptable answers.

Award [1 mark] for any one of the above points identified up to a maximum of [2 marks].

(b) Describe how *two* advances in technology have led to an increase in telecommuting.

[4 marks]

Answers may include:

- broadband provides fast data transmission – this allows the transfer of large files/access to VoIP/multimedia downloads
- Virtual Private Networks – provide a secure private tunnel into the company network and are easy to set up
- costs have decreased – many workers can afford a broadband connection/free VoIP/affordability of faster computers
- improved security – encryption of files during transmission/improved authentication systems to verify the identity of the employee logging into the company network
- improvement in communication hardware such as web cams
- new developments in collaborative tools such as chat, IM, collaborative documents, VoIP
- advances in wireless communications – smart phones, Blackberries allow colleagues to stay connected with co-workers/WiFi allows workers to use laptops from hotspots *e.g.* in coffee shops from where they can establish their offices
- software that enables telecommuters to connect remotely to their workplace computers – this allows access to applications, files and other workplace resources.

Award [1 mark] for identifying each advance up to [2 marks].

Award [1 mark] for the relevant description up to [2 marks].

- (c) **Distinguish between the use of biometrics and passwords as a means of authenticating an employee who remotely logs on and accesses the company's server.**

[4 marks]

Biometrics	Passwords
Unique body characteristics. These could include face, fingerprint, hand, retina, iris, voice.	Secret numbers, letters, symbols.
High security cannot be forged.	Less secure, can be guessed/cracked.
An initial cost to install the scanners. This cost can be very expensive.	Cheap to implement.
Can't forget.	Easily forgotten.
No need to change.	Need to change regularly.

[1 mark]

A limited response that indicates very little understanding of the topic.

[2-3 marks]

A reasonable description of biometrics and passwords, although the answer may not contrast the two effectively at the bottom end of the band.

[4 marks]

A clear, detailed and balanced description of both technologies contrasting the benefits and limitations of each.

It is possible to achieve full marks considering one issue in depth.

- (d) **To what extent are employees' concerns about telecommuting outweighed by the advantages to *both* the employer *and* the employee?** [10 marks]

Employee concerns may include:

- lack of technical support at home if computer/connection malfunctions
- less involvement in meetings/potentially fewer opportunities for promotion
- less social contact with fellow workers
- inability to separate home and work – work encroaches on family life
- difficulty concentrating in home environment/greater need for self motivation
- the company no longer needs to hire employees locally leading to an increase of unemployment in the area
- lack of support for the home office (*e.g.* no photocopies, staplers, secretaries)
- employees may need to setup/set aside a workspace in the home
- expectations of being available longer hours – this may lead to expectations of more work
- lack of IT skills to use all the hardware devices and software tools
- the need to have Internet access and other equipment (*e.g.* fast computers, mobile phones, *etc.*) might involve costs for employees
- if the connection or technology at home fails (reliability of home equipment) then communication with the office is not possible, files may not be available or a meeting might have to be cancelled
- if the employer monitors the employee's home computer there could be a privacy issue as it is also used for personal files and communications.

Employer advantages may include:

- cost saving on office space/parking
- ability to employ global workers/handicapped people/parents with small children
- increased productivity/less absenteeism
- reduced liability risks *e.g.* reduced accidents in the work place.

Employee advantages may include:

- time saved in travelling to and from work
- may work at home if ill/injured
- reduced costs *e.g.* petrol
- less interruptions
- more control over organisation of work
- more control over factors outside work *e.g.* flexibility with child care/family time.

N.B. Negatives for the company are not relevant and will not be rewarded with any marks.

Please see generic markband information sheet on page 14.

Area of Impact: Science and the Environment

2. (a) **Identify *two* processes involved in data logging.**

[2 marks]

Answers may include:

- physically collecting the data using hardware
- using a computer to collect data through sensors
- analyzing/processing/verifying the data
- saving/storing results
- outputting results
- converting analogue signals to digital.

Award [1 mark] for any one of the above processes identified up to a maximum of [2 marks].

(b) Describe *two* other ways that automatic data logging may be used.

[4 marks]

Answers may include:

- weather stations – to capture information about weather conditions (temperature, wind, pressure, humidity)
- medicine – capturing information from sensors attached to patients at ICU
- greenhouses – capturing information about temperature and humidity to actuate and change the conditions
- engine management – collection of data about driving history
- driving patterns – to automatically detect the speed of a car
- stock control using smart shelves – shelves automatically scan the RFID tags in products and alert the store when supplies are getting low
- RFID tags worn by athletes – used for entry to club/finishing positions in races
- RFID tags worn by travellers boarding a plane – used to check the passenger list
- criminals can be tracked through an electronic device worn as a bracelet or belt – using GPS the location of the criminal is found and data is automatically sent to a police control station
- use of RFID tags on products – used to automatically record the prices as customers walk through checkout counters
- use of sound sensors – to capture sound levels in different areas of a building (school/hospital) – to help provide a better work/study/hospital environment
- use of movement sensors to record seismic activity – data is recorded to study patterns and make predictions
- data logging – to monitor seasonal water levels in a river that tends to flood or to determine the rate of increase of water levels and give predictions about flooding
- reading of car number plates – to identify drivers who are breaking speed limits
- tracking tagged wild animals – to study behavioural patterns.

N.B. Valid examples of automatic data collection by sensors will be accepted but answers cannot be accepted where data has been manually entered or swiped.

Award [1 mark] for each use identified up to [2 marks].

Award [1 mark] each for the relevant description up to [2 marks].

(c) Explain *two* advantages of using automatic data logging to keep records compared with manual data logging.

[4 marks]

- Data can be captured 24/7 without the need for people to make measurements.
- Data from automatic logging is exact and no mistakes are made unless equipment is faulty.
- Data is in digital form from the moment it is captured and can be used straight away to produce graphs or statistics.
- Data from data logging can be analysed immediately and results can help prevent disaster.
- Automatic data collection allows for data to be collected faster and more efficiently than manually collecting the information.
- After the initial startup cost, no one has to be paid to collect the data
- Data can be captured in places which are too remote or dangerous for humans *e.g.* in deserts or on top of a volcano.

[1 mark]

A limited response that indicates very little understanding of the topic.

[2-3 marks]

A reasonable description of the differences between data captured automatically or manually although the answer may lack appropriate reasoning at the bottom end of the band. [2 marks] for two advantages identified or one advantage described. [3 marks] for two advantages described.

[4 marks]

A clear, detailed explanation giving reasons why automatic data logging is often preferred to manual data logging.

- (d) **Information obtained at automatic tolls may also be used to map traffic information and help telecommuters travel on the highways. Some cards may also contain customer's information or an identification number to relate the customer to a record in a driver database for later use.**

To what extent do the concerns about invasion of drivers' privacy outweigh the advantages of using this system to improve the traffic of cars in a city?

[10 marks]

Concerns about driver's privacy invasion:

- information may be saved to track people *e.g.* politicians, criminals
- information saved may be made available to others
- databases may not have appropriate security, hackers may gain access.

Advantages for improvement of traffic control:

- maps may be produced to understand traffic flow at different times, days
- drivers who use the highways may get information about better ways to plan routes and avoid traffic jams
- information about highways with less traffic may be made available to navigation systems in cars and drivers may chose better routes.

Please see generic markband information sheet on page 14.

Area of Impact: Health / Education

3. (a) **Define the term WAN.**

[2 marks]

Answers may include:

- Wide Area Network
- connects several LANs
- covers large geographical area
- computers are linked between health call centres in different locations.

[1 mark] for any two of the above points defined up to a maximum of [2 marks].

(b) **Describe two parts of the expert system that could be used to provide this health advice to callers.**

[4 marks]

- A knowledge base derived from experts – the knowledge base would contain the symptom, the diagnosis and the type of advice to give the patient.
- A human interface allowing the user to interact with it – this includes a menu and search capability allowing the nurse to search for a symptom or a past patient.
- An inference engine which uses user input, knowledge base, applies logical principles → expert advice – this would include rules such as “if the patient is experiencing chest pain then there is a possibility of a heart attack so advice is call an ambulance”.

Award [1 mark] for each part identified up to [2 marks].

Award [1 mark] each for the relevant description up to [2 marks].

N.B. The answer should use the correct terminology e.g. knowledge base. Mention of a database is not sufficient.

- (c) Explain *two* advantages of using a simulation as a method of training nursing staff in the use of this expert system for the health call centre. **[4 marks]**

Answers may include:

- a simulation allows the nurse to “experience” a typical call/this is more realistic than reading about the procedure in a manual
- a simulation allows the nurse to input different types of symptoms to learn about the different types of advice/for example choose chest pain and follow through the outcomes
- a simulation allows the nurse to learn in a safe environment/new staff can learn without putting the patient at risk
- training can take place anywhere and anytime/nurses could practise at home with a computer and the simulation software
- nurses can learn at their own pace/simulations can be repeated as many times as needed
- a simulation of an event may be used to test nurses and evaluate their actions – the person testing can provide a better explanation if the nurses make mistakes.

[1 mark]

A limited response that indicates very little understanding of the topic.

[2-3 marks]

A reasonable description of the advantages of using a simulation, although the answer may lack appropriate reasoning at the bottom end of the band.

[2 marks] for two advantages identified or one advantage described.

[3 marks] for two advantages described.

[4 marks]

A clear, detailed explanation with reasons for the advantages of using a simulation.

(d) Evaluate the implementation of this nationwide health call centre system for the public *and* the government.

[10 marks]

Advantages for government and public:

- there will be less demand on hospital services for minor complaints
- remote/house-bound people will benefit as they are not able to drive to a doctor
- access can be provided 24 hours/day unlike doctors' surgeries
- a triage system can direct patients to the most appropriate service *e.g.* hospital or pharmacy
- immediate response unlike visiting a doctor
- cheaper than the cost of visiting a doctor
- healthcare is accessible to all people
- government could be alerted to a rapid spread of disease
- improved public health as it may prevent self medication – people who do not go to the doctor can now make a phone call to receive advice
- access to a potentially greater amount of knowledge than can be provided by one doctor.

Concerns for the government and public:

- the knowledge base must be accurate otherwise the wrong information could be given to patients and lives could be at risk
- the knowledge base must be kept up-to-date with the latest drugs and any new drug problems/side effects
- the computer system must be protected against viruses and hardware failure or advice for patients could be unavailable
- cost of implementation and training may have an impact on the public through taxes
- the call system is limited as patients cannot be seen in real life
- the public may be concerned about privacy if they are asked to provide personal details.

Please see generic markband information sheet on page 14.

Area of Impact: Politics and Government / Arts, Entertainment and Leisure

4. (a) **Identify *two* services that an ISP can provide to users.** **[2 marks]**

Answers may include:

- Internet access
- e-mail accounts
- web space hosting
- spam or adware filtering
- web page filtering
- technical support
- virus protection.

Award [1 mark] for any two of the above points identified up to a maximum of [2 marks].

- (b) **Describe *two* other methods families can use to protect children from inappropriate material on the Internet.** **[4 marks]**

Answers may include:

- parental supervision while children use the Internet
- keeping the computer in a visible family area
- installing private filtering software
- setting the browser to high security
- setting the search engine to safe search mode
- parental education - teaching children how to recognise inappropriate sites
- use browser's facilities of password protection for content and create list of accepted web sites
- purchase a Spam filter to protect children from Spam with offensive offers
- install a firewall to search for specific words or phrases *e.g.* set up the firewall to block data containing the word pornography.

Award [1 mark] for identifying each method up to [2 marks] and an additional [1 mark] for the relevant description up to [2 marks].

- (c) Explain *two* ways the filtering software can prevent access to offensive and disturbing material. **[4 marks]**

Answers may include:

- key word searching – checks incoming files for words on its list
- black list of unacceptable websites – will not allow these web sites to load
- white list of only acceptable websites – allows only predetermined web sites
- use of Proxy server – this server is fed with a list of websites that will not be allowed through
- web page code contains rating tags – filtering software uses rating tags to block unsuitable sites.

[1 mark]

A limited response that indicates very little understanding of the topic.

[2-3 marks]

A reasonable description of the ways, although the answer may lack appropriate reasoning at the bottom end of the band. [2 marks] for two ways identified or one way described. [3 marks] for two ways described.

[4 marks]

A clear, detailed explanation with reasons.

- (d) To what extent are the negative effects of government control of the Internet, outweighed by the benefits to families of using the free filtering software? **[10 marks]**

Negative effects of government control:

- lack of freedom of access to information
- government could also filter opposing political or cultural information
- government will decide on the appropriateness of information
- children will not learn to protect themselves
- cost which could be passed on to the tax payer.

Positive effects on families:

- parents do not need to worry or supervise children
- children will have a safe environment
- computer can be placed anywhere in the house
- some parents may now decide to have Internet access.

Please see generic markband information sheet on page 14.

Markband for all extended response questions

<i>Level 0</i>	<i>0 marks</i>	<i>No knowledge or understanding of IT issues and concepts or use of IT terms.</i>
<i>Level 1</i>	<i>1-2 marks</i>	<i>A brief and generalized response with very little knowledge and understanding of IT issues and concepts with very little use of IT terms.</i>
Description	<i>3-5 marks</i>	<p><i>Some knowledge and understanding of IT issues and/or concepts, although a tendency towards fragmentary, common sense points at the bottom of the band with very little use of IT terms.</i></p> <p><i>A description that has a basic sense of structure but is not sustained throughout the response with a limited use of IT terms.</i></p> <p><i>At the top end of this band the description is sustained.</i></p>
Examination or Analysis	<i>6-8 marks</i>	<p><i>An examination/analysis of the IT issues that may lack depth or be unbalanced e.g. only covering one stakeholder at the lower end of the band.</i></p> <p><i>A competent examination/analysis of the IT issues covering a range of stakeholders, using IT terms appropriately.</i></p> <p><i>At the top end of the band the examination contains some clear and coherent connections between the IT issues and there may be an attempt to evaluate it in the form of unsubstantiated comments.</i></p>
Opinion (discuss, evaluate and to what extent)	<i>9-10 marks</i>	<p><i>Thorough knowledge and understanding of IT issues and concepts.</i></p> <p><i>Appropriate use of IT terms and application to specific situations throughout the response.</i></p> <p><i>A detailed and balanced discussion/evaluation that demonstrates a clear understanding of the way IT facts and ideas are related.</i></p> <p><i>Opinions, conclusions and/or judgments, albeit tentative, are provided and are well supported at the top end of the band.</i></p>
