

MARKSCHEME

May 2006

INFORMATION TECHNOLOGY IN A GLOBAL SOCIETY

Higher Level

Paper 2

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General marking principles

- All marking should be in red.
- Every page should show evidence of being marked. If there is nothing creditworthy on a page, there should be some mark such as a wavy line to indicate that it has been seen.
- Write a sub total mark in the margin against each part question.
- The total mark for each question should be placed in the margin at the end of the question and ringed.
- Place a tick for each point credited at the place where the answer gains credit.
- The number of ticks must match the sub totals in the margin for all questions except part (d) in every question.
- For part (d) tick every valid point but award a maximum of **[10 marks]**.
- On the front cover, indicate the questions 1 – 4 in the candidate question column.
- Enter the total for each question in red in the ‘Examiner’ column.
- Enter the question paper total at the bottom of the ‘Examiner’ column.

Annotation of scripts

Scripts should be annotated to indicate how certain decisions have been made. Use the following codes only to support judgements:

| Annotation | Meaning |
|-------------------|---|
| BOD | Marginal point - benefit of doubt given |
| JE | Just enough |
| NAQ | Not answered question |
| NBOD | Marginal point – benefit of doubt not given |
| NE | Not enough |
| OC | Off course |
| R | Repetition |
| TV | Too vague |

Area of Impact: Business and employment

1. (a) Describe the meaning of the term URL in the context of online travel. [2 marks]

Award [1 mark] identifying the acronym URL and [1 mark] for describing its use in the context of online travel.

- URL stands for Uniform/Universal Resource Locator **[1 mark]** plus description (e.g. URL stands for Uniform Resource Locator. It is the address of an online travel company on the web, for example <http://www.airfrance.com>)
- URL is the site address by which a web browser can locate a web page. **[1 mark]** + expansion relevant to online travel (e.g. In the context of online travel an example would be www.britishairways.com). **[1 additional mark]**.

Do not accept issues relating to issuing and checking tickets.

Reward other acceptable answers with the approval of the team leader.

(b) Describe two different ways that IT could be used to authenticate a passenger's identity when boarding a plane. [4 marks]

Award [1 mark] for each way which is identified up to a maximum of [2 marks].

Award [1 additional mark] for the description of the way up to a maximum of [2 additional marks].

- using a fingerprint scanner / iris scanner / face scanner/voice recognition **[1 mark]** plus expansion/example (and matching with database to authenticate passenger) **[1 additional mark]**
- swiping a smart card / Machine Readable Passport with passenger's details **[1 mark]** plus expansion/example (e.g. a card/chip stores the passenger's photo and this is matched manually by the check in person or electronically using facial recognition technology) **[1 additional mark]**
- using a logon and password **[1 mark]** plus expansion/example (e.g. customers are given a special logon and secret password which is matched against the customer database to verify the person) **[1 additional mark]**.
- Typing into a terminal the passport number of the passenger **[1 mark]** plus expansion/example (e.g. matching the photograph from database with the passenger) **[1 additional mark]**.
- carrying a card embedded with RFID technology **[1 mark]** plus RFID must be combined with biometrics to authenticate the traveller eg finger print is compared with a database of fingerprints **[1 additional mark]**
- using a VeriChip, an RFID device implanted into the traveller **[1 mark]** plus expansion/example (eg a scanner reads the information on the chip and matches the ID with the database of passengers) **[1 additional mark]**

Reward other acceptable answers with the approval of the team leader.

- (c) Describe *two* advantages of Internet access for a travel agent when making customer bookings. **[4 marks]**

Award [1 mark] for each advantage which is identified up to a maximum of [2 marks].

Award [1 additional mark] for the description of the advantage up to a maximum of [2 additional marks].

- the travel agent can quickly check the availability of seats **[1 mark]** plus expansion/example (e.g. by logging onto an airline booking site and keying in the flight number a list of available seats will be shown) **[1 additional mark]**
- the travel agent can immediately book or reserve a seat **[1 mark]** plus expansion/example (e.g. this prevents double booking of seats) **[1 additional mark]**
- the travel agent can quickly locate the alternatives / prices for the customer **[1 mark]** plus expansion/example (e.g. all airline Internet sites can be searched and prices compared or e.g. search bots may be used to find the cheapest fare) **[1 additional mark]**.
- the customer and travel agent can communicate by email **[1 mark]** plus expansion/example (e.g. travel agent may pick up extra sales this way) **[1 additional mark]**.
- the travel agent can make other travel bookings on the Internet at the same time **[1 mark]** plus expansion/example (e.g. hotels, car hire, tours) **[1 additional mark]**
- the travel agent does not need to be in the office to deal with the customer **[1 mark]** plus expansion/example (e.g. bookings can be made anywhere and anytime ie not restricted to office hours/could lead to less need for office space and fewer staff) **[1 additional mark]**
- the travel agent can save time dealing with customers **[1 mark]** plus expansion/example (e.g. this could mean the ability to serve more customers each day and increase income) **[1 additional mark]**

Reward other acceptable answers with the approval of the team leader.

(d) Passengers are often worried about booking travel online.

Discuss privacy, security and reliability concerns when passengers book their trips online. Evaluate these concerns. [10 marks]

For each concern

Award [1 mark] for identifying the concern.

Award [1 additional mark] for an expansion/description of the concern.

Award [1 additional mark] for adding a new dimension to the discussion.

Award up to [3 marks] for evaluating the arguments.

Evaluation can take place within a concern up to a maximum [1 mark] per concern or up to [3 marks] as a final summary at the end.

The mark scheme provides for 12 possible marks. Tick every valid point but award to a maximum of [10 marks].

N.B.: Do not expect the candidates to distinguish privacy, reliability and security issues. Mark what they have written irrespective of the heading they use.

- Concern: phishing / pharming – there could be scams with fraudulent sites [1 mark], description/expansion/example (e.g. impact – customers could enter their credit card details and lose their money) [1 additional mark], new dimension (e.g. customers must be wary of deals sent in Spam and they should check the references of the site or even consider using a third party service (escrow service) when paying) [1 additional mark]
- Concern: transmission security – customers may be concerned about the privacy of their booking details such as name, address, flight times in transmission [1 mark], description/expansion/example (e.g. if the transmission is not secure hackers may gain access to unencrypted data intercepted when booking details are transmitted) [1 additional mark], new dimension (e.g. if a hacker gained enough information about the customer this could result in embarrassment or blackmail) [1 additional mark]
- Concern: illegal access to database – customers may be concerned about the security of their details once they have been sent to the travel company [1 mark], description/expansion/example (e.g. if the company doesn't have a secure network or database unscrupulous employees (insiders) could access credit card details) [1 additional mark], new dimension (e.g. an employee who gains enough information about a customer could steal the customer's identity and commit fraudulent acts) [1 additional mark].
- Concern: reliability of data stored – customers could have concerns about unnecessary, incorrect or out of date information stored in the company's database [1 mark], description/expansion/example (e.g. incorrect address or previous booking no longer relevant) [1 additional mark], new dimension (e.g. company policy clearly stated and agreed in line with any legal Data Protection requirements) [1 additional mark].

- Concern: company using data for other purposes – company can sell your details to other companies [**1 mark**], description/expansion/example (e.g. your details used to send unsolicited mail) [**1 additional mark**], new dimension (e.g. there must be a policy telling you they will do this and giving the opportunity to opt out) [**1 additional mark**].
- Concern: reliability of the Web site - Customers may have concerns about the reliability of the software on the travel site [**1 mark**], description/expansion/example (eg once the booking is made the page may not reload to confirm the booking or allow printing [**1 additional mark**], new dimension (eg the customer may even book a second time believing the booking has not been made leading to frustration getting the money back) [**1 additional mark**].

If candidates have written under the three headings mark as below:

- **Privacy**: customers may be concerned that their personal details are sold to other companies [**1 mark**], description/expansion/example (e.g. if on-sold to a company this company could send you unsolicited mail) [**1 additional mark**], new dimension (e.g. there must be a policy telling you they will do this and giving you an opportunity to opt out) [**1 additional mark**]
- **Security** : customers may be concerned about the **security** of their credit card details during transmission/when stored on the company database [**1 mark**], description/expansion/example (e.g. unencrypted data may be intercepted when booking details are transmitted/if the booking site is not secure hackers may gain access to details stored on a server and) [**1 additional mark**], new dimension (e.g. a hacker who gains enough information about a customer could steal the customer's identity and commit fraudulent acts) [**1 additional mark**]. Alternatively security could focus on transmission and the new dimension could highlight the added concern of security on the server (or vice-versa).
- **Reliability**: there could be scams with fraudulent sites [**1 mark**], description/expansion/example (e.g. impact – customers could enter their credit card details and lose their money) [**1 additional mark**], new dimension (e.g. customers must be wary of deals sent in Spam and they should check the references of the site or even consider using a third party service (escrow service) when paying) [**1 additional mark**]
- **Reliability alternative**: Customers may have concerns about the reliability of the software on the travel site [**1 mark**], description/expansion/example (eg once the booking is made the page may not reload to confirm the booking or allow printing [**1 additional mark**], new dimension (eg the customer may even book a second time believing the booking has not been made leading to frustration getting the money back) [**1 additional mark**].

Reward other acceptable answers with the approval of the team leader.

Area of Impact: Education

- 2 (a) Identify *three* tables that could be part of the library’s relational database. **[3 marks]**

Award [1 mark] for each table identified up to a maximum of [3 marks].

- Student table
- catalogue/books/holdings table
- loans table
- publisher
- category/type.
- Classes table

(Note: fields are not correct).

Reward other acceptable answers with the approval of the team leader.

- (b) The librarian needs to produce a list of drama books that Year 12 students have not returned on time. Describe the query needed. **[3 marks]**

Award [1 mark] for each aspect of the query up to a maximum of [3 marks].

- type = drama
- due date <today’s date / returned = no *(accept either of these, not both)*
- Year level = 12

Answers can be in sentence format, or in query format as above.

Must be a query ie “Make a list of Year 12 students” is not an answer it is just repeating the question.

- (c) Describe *two* policies that should be implemented for backing up the library’s data. **[4 marks]**

Award [1 mark] for each policy which is identified up to a maximum of [2 marks].

Award [1 additional mark] for the description of the policy up to a maximum of [2 additional marks].

- data should be backed up regularly **[1 mark]** plus expansion/example (e.g. there should be a daily backup of the loans made on that day) **[1 additional mark]**
Note: the frequency must be realistic – fortnightly would not be appropriate in a library.
- backup files should be stored off site **[1 mark]** plus expansion/example (e.g. they could be locked in another building in a fireproof safe or e.g. some companies offer off-site data backup) **[1 additional mark]**
- backups must be checked for reliability **[1 mark]** plus expansion/example (e.g. this should involve restoring the data and checking that the data is reliable) **[1 additional mark]**
- backup media should be rotated **[1 mark]** plus expansion/example (e.g. this could follow the grandfather, father, son method) **[1 additional mark]**
- full or partial backup should be implemented **[1 mark]** plus expansion/example (e.g. partial backup every day and full backup at the end of the week) **[1 additional mark]**.
- The backup must be kept secure **[1 mark]**, plus /expansion/example (e.g. it should be safe from unauthorised access) **[1 additional mark]**

Reward other acceptable answers with the approval of the team leader.

- (d) Discuss *three* advantages of this computerised school library system compared with a manual system. Evaluate these advantages. **[10 marks]**

For each advantage:

Award [1 mark] for identifying the advantage.

Award [1 additional mark] for an expansion/description.

Award [1 additional mark] for adding a new dimension to the discussion

Award up to [3 marks] for evaluating the arguments.

Evaluation can take place within an advantage up to a maximum **[1 mark]** per advantage or up to **[3 marks]** as a final summary at the end.

The mark scheme provides for 12 possible marks. Tick every valid point but award to a maximum of [10 marks].

- the librarians are relieved of many labour intensive and mundane tasks **[1 mark]**, description/expansion/example (e.g. no need to manually file catalogue/borrowing cards as this is done automatically by the database software) **[1 additional mark]**, new dimension (e.g. this provides a greater level of accuracy as humans are prone to errors and cards can be misfiled and lost resulting in access denied to books) **[1 additional mark]**
- teachers/students can access the catalogue from any computer linked to the Intranet **[1 mark]**, description/expansion/example (e.g. there is no need to walk to the library to see if a book is available for loan as it can be reserved from a local computer) **[1 additional mark]**, new dimension (e.g. this can have a negative effect on the library as people are less likely to browse and see new library displays) **[1 additional mark]**
- stocktaking can be done efficiently and accurately **[1 mark]**, description/expansion/example (e.g. using a barcode reader linked to the library network accuracy is virtually ensured provided the barcode has not been damaged) **[1 additional mark]**, new dimension (e.g. stocktaking may be done more frequently and this has an impact on maintaining a well stocked library) **[1 additional mark]**
- enquiries / lists can be created quickly with a simple search **[1 mark]**, description/expansion/example (e.g. this means less work for librarians and reliable, timely notices/students or teachers can do searches and easily find resources) **[1 additional mark]**, new dimension (e.g. the result of this is that there will be fewer overdue books and a better service for customers) **[1 additional mark]**.
- Saves storage space by replacing physical cabinets with electronic storage **[1 mark]**, description/expansion/example (e.g. this gives extra space for study areas or more books) **[1 additional mark]**, new dimension (e.g. data can be shared) **[1 additional mark]**.
- A backup can easily be made of all the library files **[1 mark]**, description/expansion/example (e.g. it would not be realistic to do this with a manual card file where cards would each need to be photocopied) **[1 additional mark]**, new dimension (e.g. if the library burnt down the stock list and list of borrowed materials could be retrieved allowing the library to restock and locate books on loan) **[1 additional mark]**

If the candidate has written a full discussion of the advantages of a computerised over a manual system but not made any reference to a library then maximum 1 mark.

Do not accept less paper used ie advantage for the environment. On the contrary much more paper/printouts are produced.

Reward other acceptable answers with the approval of the team leader.

Area of Impact: Health/Science and environment

3. (a) Describe the role of a computer program in a surgical robot. [2 marks]

Award [1 mark] for identifying the role of a computer program in a surgical robot.

Award [1 additional mark] for the description of the role.

- a computer program is a set of instructions to carry out a surgical procedure [1 mark] plus description (e.g. in robotic surgery the robot could be programmed to make the incision in the patient during hip surgery) [1 additional mark].

Reward other acceptable answers with the approval of the team leader.

(b) Describe two sensors used in robotic surgery. [4 marks]

Award [1 mark] for each sensor which is identified up to a maximum of [2 marks].

Award [1 additional mark] for the description of the sensor up to a maximum of [2 additional marks].

- robotic arm that senses touch [1 mark] plus description (e.g. which gives feedback from contact with the patient) [1 additional mark]
- camera, which is a visual sensor [1 mark] plus description (e.g. provides 3D image of the incision) [1 additional mark]
- distance sensors [1 mark] plus description (e.g. an instrument to check the location of drilling) [1 additional mark].
- motion sensors on the robot detect movement of the surgeon's hands [1 mark] these movements are replicated by instruments attached to the robot [1 additional mark]
- temperature sensor probe [1 mark] monitors and adjusts temperature at the site of a cut [1 additional mark]
- a pressure sensor [1 mark] eg a special glove that allows the surgeon to feel the pressure exerted by the robotic arm. [1 additional mark]

Reward other acceptable answers with the approval of the team leader.

(c) Explain the terms WAN and bandwidth in the context of telesurgery. [4 marks]

Award [1 mark] for identifying the nature of WAN and [1 mark] for identifying the nature of Bandwidth.

Award up to an [additional 2 marks] for explaining the role of both terms in the context of telesurgery.

- a WAN is a wide area network which covers a large geographic area/often local area networks, connected through a public system [1 mark]. In telesurgery, this would link the remote doctor to the operating theatre where the patient is located [1 mark].
- bandwidth: capacity of a communications channel/amount of data that can be sent [1 mark]. A broadband connection (i.e. high bandwidth) would be needed in telesurgery for reliable real-time processing [1 mark].

(d) Issues of concern related to robots include the following:

- **reliability**
- **cultural awareness**
- **cost**
- **privacy**
- **legal implications**

Discuss *three* of the above issues that may arise when the possibility of performing telesurgery is considered. Evaluate these issues. [10 marks]

For each consideration

Award [1 mark] for identifying the consideration.

Award [1 additional mark] for an expansion / description of the consideration.

Award [1 additional mark] for adding a new dimension to the discussion.

Award up to [3 marks] for evaluating the arguments.

Evaluation can take place within a consideration up to a maximum [1 mark] per consideration or up to [3 marks] as a final summary at the end.

The mark scheme provides for 12 possible marks. Tick every valid point but award to a maximum of [10 marks].

Answers must specifically relate to telesurgery.

- Reliability of operation and the connection / response time of equipment must be guaranteed to work. **[1 mark]**, description / expansion / example (e.g. a doctor must be present to follow an emergency procedure in case of a delay of communication between the performing doctor and the robotic arms) **[1 additional mark]**, new dimension (e.g. legal consequences may occur for the doctor/hospital) **[1 additional mark]**
- Cultural awareness: Doctors and patients have to be aware that there may be cultural / religious differences regarding the performance of surgical operations in different countries. **[1 mark]**, description / expansion / example (e.g. decisions when performing operations on pregnant women will involve moral or ethical considerations relating to the country where the operation occurs) **[1 additional mark]**, new dimension (e.g. doctor / patient / hospital agreement document should be signed taking into consideration any possible outcomes) **[1 additional mark]**
- Cost for the patient: Even though the patient will not have to travel, equipment for robotic surgery is expensive. **[1 mark]**, description / expansion / example (e.g. the hospital will have to have all the equipment required by the performing doctor, surgical instruments and appropriate camera and imaging software) **[1 additional mark]**, new dimension (e.g. insurance companies may only authorize this type of surgery on patients who cannot travel due to severe medical conditions/who pays overheads for expensive equipment) **[1 mark]**
- Privacy of data distributed globally **[1 mark]** description / expansion / example (e.g. information about the patient will be sent/stored in more than one location) **[1 additional mark]**, new dimension (encryption should be used to secure sensitive patient data) **[1 additional mark]**

- There may be legal implications if a remote doctor is not registered in the state/country where the surgery is performed **[1 mark]**. Description/expansion/example (e.g. in some countries doctors must take up separate registration in each state **[1 additional mark]**, new dimension (e.g. this could result in legal proceedings, especially if there are any errors/this could result in additional costs for the doctor) **[1 additional mark]**
- Privacy of the operation when surgeon is at a remote location **[1 mark]** description/expansion/example (eg the operation may involve a sensitive issue and it is impossible to tell who is present during the operation when it is run from a remote place **[1 additional mark]**, new dimension (eg policies need to be developed regarding onlookers outside the main medical team) **[1 additional mark]**.

Reward other acceptable answers with the approval of the team leader.

4. (a) Describe *two* types of malicious attacks. **[4 marks]**

*Award [1 mark] for each type of malicious attack identified up to a maximum of [2 marks].
Award [1 additional mark] for the description of the attack up to a maximum of [2 additional marks].*

- Trojan horses which attempt to install software **[1 mark]** plus description (e.g. installs a virus/captures passwords) **[1 additional mark]**.
- Email spoofing - tricking user about origins of an email **[1 mark]** plus description (e.g. may lead to user disclosing personal information) **[1 additional mark]**.
- Virus sent as an email attachment **[1 mark]** plus description (e.g. damages files on the computer) **[1 additional mark]**.
- Spyware – malicious software downloaded to user’s computers **[1 mark]** plus description (e.g. tracks personal information such as web sites visited) **[1 additional mark]**.
- Hacker – accessing your computer **[1 mark]** plus description/expansion (e.g. viewing/altering/deleting your files/data) **[1 additional mark]**.
- Worm – a destructive program that spreads through networks **[1 mark]** plus description (eg sends itself to all addresses in the recipient’s address book **[1 additional mark]**)
- Denial of service attack on a network **[1 mark]** plus description (eg a network is flooded with traffic and as a result crashes) **[1 additional mark]**

(b) Describe *two* ways in which information in a computer can be protected from damage caused by malicious attack. **[4 marks]**

*Award [1 mark] for each way identified up to a maximum of [2 marks]
Award [1 additional mark] for the description of the way up to a maximum of [2 additional marks].*

- Installing a firewall with spyware, adware protection **[1 mark]** and adding settings to detect and delete spyware/adware programs **[1 additional mark]**
- increasing the security of the level of the Internet connection to a maximum **[1 mark]** choosing browser options which won’t allow entry of suspicious programs **[1 additional mark]**
 - running a spyware/adware cleaning software program **[1 mark]** installing special software and regularly scanning the hard drive **[1 additional mark]**.
 - running a virus scanning software program **[1 mark]** using it to isolate and/or delete suspect files **[1 additional mark]**.
- Updates to operating system software **[1 mark]** some companies offer free, automatic updates or patches to overcome security problems which appear after the software is produced **[1 additional mark]**
- Using an offline data backup service **[1 mark]** note that this does not prevent damage but allows the home user to recover the data **[1 additional mark for this understanding]**
- Secure sensitive files by encrypting the files on the computer **[1 mark]**, plus expansion (eg using encryption software the files are coded so the encryption key is needed to decode them) **[1 additional mark]**

- (c) **Explain why some companies release software that invades people’s computers.** **[4 marks]**

Award [1 mark] for each justification identified up to a maximum of [2 marks].

Award [1 additional mark] for giving a reason for each justification up to a maximum of [2 additional marks].

*N.B: You can award up to 4 marks for a single, well-developed explanation
Do not accept illegal activities (virus implants, stealing credit card numbers)*

- Learn about users’ preferences **[1 mark]** in order to send advertisements targeted to the area of their interests/on sell users’ preferences **[1 additional mark]**
- prevent corporate espionage **[1 mark]** to prevent dishonest employees sending company secrets to competitors **[1 additional mark]**
- to send advertisements to a wide audience **[1 mark]** with little cost compared with alternative forms of advertising **[1 additional mark]**

- (d) **In the United States, legislation is under consideration that will allow the government to ban the use of software such as spyware, that invades people’s computers.**

Discuss an economic issue and a privacy issue that the government should recognize when considering the implementation of this legislation. Evaluate these issues.

[8 marks]

For each consideration

Award [1 mark] for identifying the consideration.

Award [1 additional mark] for an expansion / description of the consideration.

Award [1 additional mark] for adding a new dimension to the discussion.

Award up to [2 marks] for evaluating the arguments.

Evaluation can take place within a consideration up to a maximum [1 mark] per consideration or up to [2 marks] as a final summary at the end.

- Restricting some companies doing legitimate business/or economic loss to companies involved in spyware **[1 mark]**, description / expansion / example (e.g. could ban legitimate pop ups such as warnings from bank Web sites to customers) **[1 additional mark]**, new dimension (e.g. it would be impossible to distinguish between popups with different content) **[1 additional mark]**
 - Feasibility of locating the source of spyware, adware **[1 mark]**, description / expansion / example (e.g. the Internet is unregulated and anybody can post information) **[1 additional mark]**, new dimension (e.g. amount/cost of public money spent on a difficult task) **[1 additional mark]**
 - Reliability of confirming the source **[1 mark]**, description / expansion / example (e.g. a popup may reside on the user’s computer but appear to be coming from a company web site) **[1 additional mark]**, new dimension (e.g. this could result in innocent users/companies receiving incorrect sanctions) **[1 additional mark]**
 - Possible privacy issues of government inspecting users’ computers **[1 mark]** description / expansion / example (e.g. government may introduce spyware to uncover spyware on users’ computers) **[1 additional mark]** new dimension (e.g lack of public trust using the Internet) **[1 additional mark]**
 - ISPs under scrutiny **[1 mark]**, description / expansion / example (e.g. the government might request information about their customers in order to track offences) **[1 additional mark]**, new dimension (ISPs may begin monitoring their customers/government may insist on government approved providers with implication of lack of freedom in a country) **[1 additional mark]**.
 - The US Government upholds the individual’s right to privacy **[1 mark]**, description/expansion/example (eg all home computer users should be free from outside intrusion without permission **[1 additional mark]**, new dimension (eg solutions could include the Government funding companies to produce anti-spyware software and providing it free to US citizens) **[1 additional mark]**.
-