



INFORMATION TECHNOLOGY and SYSTEMS

Senior Secondary

Subject Code: ITS315108

External Assessment

2010

Time: Two Hours

On the basis of your performance in this examination, the examiners will provide results on each of the following criteria taken from the course statement:

- Criterion 1** Demonstrate knowledge and understanding of how real world information problems are analysed and solved.
- Criterion 2** Demonstrate knowledge and understanding of the components of an information system, and their inter-relationships.
- Criterion 3** Demonstrate knowledge and understanding of social issues associated with information systems.

Pages: 16
Questions: 16

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CANDIDATE INSTRUCTIONS

Candidates **MUST** ensure that they have addressed **ALL** of the externally assessed criteria on this examination paper.

The paper is divided into **FOUR** sections.

Each section contains **ONE** Case Study.

Candidates must attempt **TWO** sections (ie **TWO** Case Studies).

Candidates must answer **ALL** questions in their chosen sections.

ALL questions in each section are of equal value.

Answer each section in a separate answer booklet.

It is recommended that you spend approximately 60 minutes on each section.

You should take care with the presentation of your answers, which should be comprehensive and to the point. Except where advised otherwise, your answers should be in complete sentences. You should show diagrams where appropriate but not to the exclusion of all text. You should structure your answers in the same order as issues are raised in each question.

All written responses must be in English.

SECTION A

Answer **ALL** questions in this section.

You should spend approximately **60 minutes** on this section.

Use a separate answer booklet for this section.

This section assesses **Criteria 1, 2 and 3**.

Case Study:

The managers of the high school's canteen (school population approximately 600) have been considering ways of improving the service they offer to students. Discussions with a few students and parents have focussed on the way students order and pay for foods, and awareness of the range of quality foods offered.

You have been offered, by your teacher, as a person who can help analyse the issues and suggest possible solutions. The managers have strongly indicated their openness to a 'state of the art' approach to their concerns.

Question 1

Consultations so far suggest that students see mobile phones and a website as possible technologies which will help the canteen's operations.

- (a) A significant number of the students must be surveyed or queried to see what alternatives they would use or recommend. Discuss **TWO** approaches which could be considered to obtain these opinions. Recommend, with reasons, your preferred approach.
- (b) How would you recommend the survey data be stored, processed and effectively presented to the canteen managers and school Principal?

Section A continues opposite.

Section A (continued)**Question 2**

Suppose the two preferred alternatives are:

- students can order by website and collect their order through a 'fast serve' canteen line, or
 - students can order by mobile phone.
- (a) What features of an online ordering/purchasing system are important in knowing exactly what a student is ordering, particularly emphasising the canteen's 'healthy food' options?
- (b) A website would need to be maintained daily, and no canteen staff at the moment have the necessary knowledge. What training would you offer the canteen staff?
- (c) What problems might there be in implementing a phone ordering system?

Question 3

There are phone lines into the canteen, but no other Internet-type connections.

- (a) Discuss the hardware and communications requirements if the canteen managers choose to have a website. Estimate the possible costs (both for set up and on-going operation) of an online food ordering site.
- (b) A number of students have already been ordering by SMS message to the canteen, but these orders are just written down. What technologies, including software, may be available or required to allow SMS messages to be integrated with the website?

Question 4

These three issues have already been raised in the discussions:

- Students who order 'inappropriate' foods, particularly if they are already identified as 'unhealthy', may be able to be identified and counselled. Is this either desirable or feasible, given the data available from the website?
- Parents may choose to order their child's (or children's) food and pay online - perhaps even overriding the child's choices. What privacy and security concerns does this raise for the canteen managers? (Take into account the use and maintenance of an EFTPOS online payment system.)
- The school staff have stated that they do not wish to have students ordering foods online, or by phone, during class time. They suggest the website should be able to be blocked from student access during class time.

You are requested by the canteen managers and Principal to present opinions and a recommendation on these issues, taking into account any relevant laws or ethical positions. Choose **TWO** of these issues, summarise the anticipated arguments for and against, and give a recommendation for each of those **TWO** issues.

SECTION B

Answer **ALL** questions in this section.

You should spend approximately **60 minutes** on this section.

Use a separate answer booklet for this section.

This section assesses **Criteria 1, 2 and 3**.

Case Study:

SportsGear is the name of a College's small business which hires out sports equipment to students at lunchtime. The day to day operation is handled by students, under teacher management. Students who wish to borrow use their student ID card, and agree to pay a fee for the late return of any items.

Question 5

For years the recording system has been to write the date, students' details and the equipment borrowed in an exercise book, and students are required to leave their ID cards as security. When returned, the exercise book entry is initialled and dated in the 'Returned' column. A group of Information Technology and Systems students is considering a project to develop an information system to replace the exercise book.

- (a) Describe **TWO** possible approaches for an information system in this context.
- (b) Which would you recommend the group develop, and why?

Section B continues opposite.

Section B (continued)**Question 6**

The student group decides to develop a relational database for *SportsGear*.

- (a) What specific features of a relational database might be suitable in this application?
- (b) It is suggested that one table should identify the student, and another table each item of equipment which can be borrowed. Each piece of equipment is already barcoded (balls are coded on a sheet).
- (i) Draw up **two** tables like this, one for each of the student and equipment tables, and fill in the field details you recommend (you can include more rows if you wish to):

Field name (name of field)	Field type (data type)	Example (give at least one example of the possible data stored)

- (ii) Students are able to borrow multiple items through the year. Draw a diagram which shows the relationship(s) between the tables used in the database to achieve this. Explain why you believe this to be the most appropriate way.

Question 7

The group now needs to make decisions about how this database could be implemented.

- (a) Do the sports staff really need a desktop computer in the sports store, or are there better alternatives, perhaps even something like an iPad™? Discuss the practicality/feasibility of up to **three** different hardware solutions for this system.
- (b) In the ‘real world’, a borrowing or hiring system like this could be used by renters of office equipment (eg. photocopiers or computers) or sports equipment (eg. to fitness centres).
- (i) How scalable is this system (for a much larger operation), perhaps to allow for 100 or 1000 times the intended use in the school?
- (ii) What are some issues to be considered in designing and running a commercial database, with many users, perhaps at various locations, and where the database will be used to supply data for significant management decisions?

Section B continues over the page.

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Section B (continued)

Question 8

There are reports of regular complaints about inaccuracy and/or misuse of database data in both the public (government) and private (business) sectors. Three common ones are given below.

Choose **TWO** of these, and discuss the social, legal and ethical issues involved.

- *The data is never right, and I can't get them to fix it!*

Whose responsibility (or responsibilities) is this, and what should you expect of the database owner?

- *'I am sure I didn't give them permission to make this information public!'*

What are some of the privacy guidelines which apply to database owners? What happens if the company/business has no published data privacy guidelines?

- *'Company A must have sold my contact details - how else could company B have got them?'*

Businesses often choose to datamine (analyse their data) to find patterns or possibilities for improving their business profit. This may include selling some of the data they have. For example, a producer of fine cheeses might be very interested in finding out what other foods the cheese buyers purchase in supermarkets.

Are there guidelines in this area? If so, explain what they are. If not, discuss the guidelines you would propose.

SECTION C

Answer **ALL** questions in this section.

You should spend approximately **60 minutes** on this section.

Use a separate answer booklet for this section.

This section assesses **Criteria 1, 2 and 3**.

Case Study:

A couple who have just graduated from University, Ben and Carol, decide to set up an IT business specialising in providing business solutions for clients.

Carol's specialisation is in the 'back end' operations, including editing, arranging data and making the 'system' work. Ben specialises in the user interface, and handles all client interactions.

Their first client wishes to market a new range of exercise/fitness equipment to individuals and businesses throughout Tasmania. Its key innovation is that each item of equipment reads and stores various exercise data every 5 seconds throughout the exercise program, for example heart rate and degree of difficulty.

Question 9

The client requests Ben's and Carol's assistance with their marketing program.

- (a) Suggest to Ben **TWO** desirable aspects of the marketing program, and how ICT can be useful in those areas.
- (b) The client isn't sure of the best way to use the exercise data collected, and has discussions with Carol on possible techniques. Propose **TWO** solutions that Carol may offer the client to retrieving and using the data.

Section C continues opposite.

Section C (continued)**Question 10**

After consultation, a web developer proposes a website which would be able to store and present the results for each client, using custom software. This analysis could include comparisons of results over a period of time, or with a predetermined goal. The user, for example a fitness centre, would need to upload the data from each exercise machine.

- (a) The data available would be in the form of a text file with delimiters (perhaps CSV) or possibly XML format. How could this data be made readable for uploading and analysis? What issues might need to be clarified here?
- (b) If the data is to be accessed through a website, it must be organised for display and analysis. Describe to Carol **at least ONE** way of organising and storing this data.

Question 11

A fitness centre or individual user will need advice on what equipment and software they will need (perhaps to purchase) to:

- retrieve data from each piece of equipment
 - get it ready for uploading to a website
 - uploading the data, with full identification of the person.
- (a) Prepare a list of all equipment and software needs (for retrieval and uploading the data), with a brief explanation of your reasons for these choices. (Ben is aware that many customers may not be very ICT-literate.)
 - (b) Ben and Carol agree to prepare a marketing presentation aimed at potential purchasers. Discuss the equipment and software it would be desirable for Ben and Carol to have for them to effectively prepare and convey their presentations about these items of equipment.

Question 12

It is regarded as essential that the software must reliably upload the exercise data, perhaps including a verification message about successful uploading, and store it so that only the authorised users can access it.

Further, the web-based software may be able to identify possible health issues from the data.

Discuss some social and ethical issues which may arise in relation to the collection, storage, analysis and security of the user's data, including possible health notifications.

SECTION D

Answer **ALL** questions in this section.

You should spend approximately **60 minutes** on this section.

Use a separate answer booklet for this section.

This section assesses **Criteria 1, 2 and 3**.

Case Study:

A local community garden has developed over many years from a small group of 3 retired men who started a vegetable garden on a vacant block to a community organisation of over 100 people, men and women, young and older, looking after 3 different gardens.

Currently the basic way they work is:

- each person who joins (\$10 per year fee) is allocated a small garden plot
- they have free access to a toolshed of gardening equipment and can buy seeds, sprays, etc. from the supervisors
- there is a stall for selling vegetables grown
- some experienced/qualified people are employed to give specialist advice or assistance.

Until now the organisation has kept all their records on cards or in folders. They have approached you for advice on how to use a computer to maintain (and improve) their records. You decide to accept!

Section D continues opposite.

Section D (continued)**Question 13**

Large organisations are notoriously hard to work with on a project - there are too many ideas or concerns to reach agreement on. However there is a core group of about 6 people who will work with you.

- (a) Discuss the ways in which you could work with this group to clarify what is possible, and appropriate, in this context. In each case explain the concerns you might have, as well as the good aspects.
- (b) You are offered a photocopy of their records covering about the last 6 months, to see what they are doing now. While neatly organised, the information is fairly incomplete and seems to reflect the interests of the particular person who recorded it, with little consistency. You may have difficulty deciding on the 'preferred format'.

What are some of the issues to be considered in converting from a paper-based information system to a computer-based version?

Question 14

- (a) The solution (if they go ahead) will include software which either you develop, or is based on standard software (eg. Microsoft Office™ or OpenOffice™), or is customised from specific-purpose purchased software, for example to manage a small business.

You will need to recommend a solution to the group. Identify and explain **THREE** key considerations before you can recommend the most appropriate solution.

- (b) There is a particular project they are struggling with. They have a number of gardeners who will volunteer to help people with their home gardens. At the moment this is not working well.

Propose a software solution to allow volunteers to be matched to people who request assistance. Give specific details to convince them that you understand the problem and have a realistic solution.

Question 15

The organising group is not keen to leave a computer on site because of potential vandalism or theft. However some people have offered use of their laptop/netbook computers, and the group might be able to buy one. You identify that a possible solution is for all the information to be web-based rather than on a specific computer.

- (a) How would this be organised, and what equipment would the organisation need to have access to?
- (b) If the solution does become web-based, this opens up possibilities of people 'booking' volunteers from home, and even some marketing of their work and their produce for sale. What technologies would be required, either to the web designer (client) or the server (back end), to be able to build these solutions for the organisation?

Section D continues over the page.

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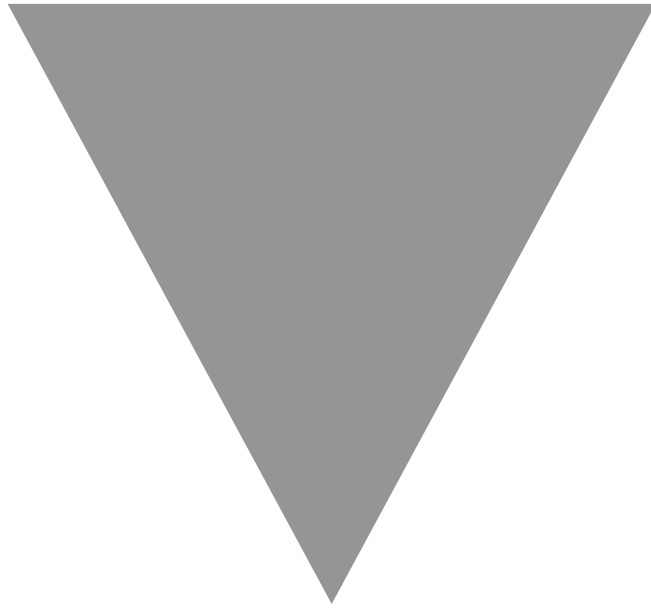
Section D (continued)

Question 16

Traditionally decisions in the organisation have been made face-to-face, and they have experienced few conflicts. In discussions the following types of concerns are raised:

- few people might understand the system, and it would be too complicated
- some people might be able to steal from it
- privacy concerns regarding personal details and photos being made public
- if they have a blog or FAQs section, people might give poor or incorrect advice.

Considering these or other issues you identify, give some direction on social, legal or ethical issues relevant in this context.



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