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**Criterion 2**  
Demonstrate knowledge and understanding of the components of an information system, and their inter-relationships.

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Demonstrate knowledge and understanding of social issues associated with information systems.
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**Case Study: Metro bus services**

The Metro™ bus services operate in each city in Tasmania and many nearby towns. Over the years many concerns have been raised, including buses running late, buses not very full, and passengers sometimes uncertain about the services offered. Metro decided to try to find a solution to some of these concerns and organised a meeting of interested people.

Two ideas were proposed.

(i) People could phone Metro and identify which bus route they want or which place they want to go to – then they would be given the time of the next suitable bus.

(ii) Each bus stop could have a small display showing the arrival time of the next bus on each route passing that stop. The display would be constantly in communication with the buses and the Metro base depot.

**Question 1**

(a) List the merits and problems that you can see in the first idea (i) above, in the context of an ICT problem.

*Type your answer below this line:*

(b) List the merits and problems that you can see in the second idea (ii) above, in the context of an ICT problem.

*Type your answer below this line:*

(c) Propose to Metro a third idea which would help the passengers get up-to-date bus information.

*Type your answer below this line:*

(d) Which of these three ideas would you recommend Metro explore, and why?

*Type your answer below this line:
Question 2

Metro listened to all these ideas and made a decision to implement the second idea, where each bus stop has an accurate display of the arrival times and routes of the next buses.

Metro does not currently maintain accurate data about bus arrival times, so it would need to develop a new system.

(a) Define the scope and boundaries of an information system that would be required to ensure that at each bus stop there is a small display accurately showing the arrival times and routes of the next buses arriving at that stop.

Type your answer below this line:

(b) Consider possible information systems. Discuss the suitability of two different information systems. Which would work better and why?

Type your answer below this line:

Question 3

Metro needs to develop a way of collecting accurate data about bus arrival and departure times. In a city there may be 50 bus routes and perhaps 300 buses. Data must be collected from each bus as it progresses along its route.

(a) Outline a software system that would provide sufficient functions for this regular collection and sharing of bus data?

Explain your reasons.

Type your answer below this line:

(b) Metro is naturally concerned about the issues associated with installing and maintaining many displays (one at each bus stop). What types of displays and/or technologies might be suitable, and why?

Type your answer below this line:

(c) Suggest a system or systems for communicating data between bus stop displays and the Metro base.

Type your answer below this line:
Question 4

(a) What issues can arise both for the public and for Metro if the data displayed is often wrong?

Type your answer below this line:

(b) An employee decides to copy the software developed for Metro and sell it to bus companies on the mainland. What legal concerns does this present?

Type your answer below this line:

(c) A smart hacker found a way to interfere with the communications before they reached some of the displays. He then put some paid-for advertising on the displays — until Metro managed to stop him.

Was this an illegal act, or just a nuisance for Metro?

Type your answer below this line:
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Type your candidate ID Code here:

Tasmanian Certificate of Education

INFORMATION TECHNOLOGY and SYSTEMS

Senior Secondary

Subject Code: ITS315108

External Assessment

2012

SECTION B

Time: 60 minutes

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Questions: 4

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Case Study: the ‘Up and Comers’ Tennis Club

The ‘Up and Comers’ Tennis Club is a medium-size tennis club with about 150 members.

The committee is aware of some problems with administration of the club, including:

- staff sometimes do not respond to queries very quickly
- different people are sometimes given different information
- members don’t get financial receipts back quickly
- the committee has trouble getting accurate and informative financial information at meetings.

Some people on the committee, who know you study *Information Technology and Systems*, invite you to help. The administrators then seek your assistance with developing at least some solutions.

Question 5

You must first clarify what the real issues are.

(a) How would you try to clarify the scope of the project?

*Type your answer below this line:*

(b) Who are the people you think it is appropriate to consult, and why would you choose these people?

*Type your answer below this line:*

(c) You are ready to inform the committee on your findings.

Describe two effective ways of communicating with the committee, and compare the effectiveness of these two methods.

*Type your answer below this line:*
Question 6

During the consultation process two particular problems were identified:

(i) The tennis club’s website is somewhat limited.

(ii) The tennis club’s membership records are a mix of:
• some details written on membership forms
• some e-mails received and sent
• some records in a spreadsheet — mainly of those who had paid.

(a) At the time, this was some of the tennis club’s website (click to see attached images).

Specifically referring to this club’s website, discuss three aspects of it you would change and why.

Type your answer below this line:

(b) The membership records are incomplete. The committee wants accurate lists of those who are financial members, those who have not yet paid and new members for each quarterly meeting.

Describe an effective information system for storing and accessing these membership records.

Type your answer below this line:

Question 7

A couple of business people in the club tell the committee it should buy accounting software, such as MYOB™ (‘Mind Your Own Business’) or Quickbooks™. The committee cannot afford these, and looks for a cheaper solution.

(a) Can the committee use Microsoft Excel™ or a spreadsheet in OpenOffice™ to manage the club’s finances? What other options does the tennis club have? Explain.

Type your answer below this line:

You are asked to make recommendations on what the club needs to maintain a contemporary website.

(b) Discuss your recommendations on the software, hardware and communication access required to maintain a contemporary website.

Type your answer below this line:

(c) The committee wants the website to show more up-to-date information about players and matches.
Is this feasible for the club?
If so, suggest the software and hardware the committee may need. If not, explain why.

Type your answer below this line:

Question 8

Committee members often have private discussions about various things happening in the club. One said:

“ It is difficult for members to contact each other; for example, to organise replacements for sick players.”

(a) What legal and other issues should be considered before putting contact details (eg. names, address, phone numbers) of all members on a website for members to be able to look up information about others?

Type your answer below this line:

Some parents have expressed concern that videos of their children playing may be put up on the club website. Others are not at all concerned; indeed they would like to see videos of their children playing.

(b) Are there any legal issues relating to information about children being put up on a website? What advice would you give the club about this?

Type your answer below this line:

A good information system can help track the finances and assets of an organisation.

(c) Discuss some software solutions so as to identify and prevent misuse of finances and assets.

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ATTACHMENT – Section B, Qu. 6(a)

Tennis Club home page ...

The 'Competitions' page ...

Tennis Club, we are fun oriented, & offer competition & social tennis & many exciting social activities for all ages.

We have 8 Floodlit Classic Clay tennis courts & a large comfortable clubhouse, which includes a licensed bar, pool table, dart board & a wide screen TV.

upcoming club events

working bee
June 24, 2012

midweek round robin & lunch
June 28, 2012. Open to non members

junior holiday clinic and round robin
July 9-11, 2012

trivia night
August 11, 2012

junior club championships
September 15 & 16, 2012

classic clay at XXXX

competitions

At XXXX Tennis Club we have a wide range of competitions available for all ages.

For the under 18's we have Juniors & Seniors is open to everyone along with Night Tennis & Midweek.

Juniors & Seniors are played on Saturdays & during summer on Sundays

Pennant is only played during the winter season

Midweek Ladies is played all year round on Tuesday & Thursday mornings

Night Tennis is offered all year round, Monday, Tuesday & Thursday nights

Our club coach is XXXX, who offers a wide range of services available for young & old. For more details, go to the Coaching page.

Competitions Available...

Juniors  Seniors  Pennant  Midweek Ladies  Night Tennis  Social Tennis
### tennis club photos

If you cannot see the photos on this page, please click on this [Alternate Page](http://www.heatherdaletc.org.au/index.html).

#### club house

![Club House Image 1](image1)

![Club House Image 2](image2)

#### classic clay tennis courts

![Classic Clay Tennis Courts Image 1](image3)

![Classic Clay Tennis Courts Image 2](image4)

![Classic Clay Tennis Courts Image 3](image5)

![Classic Clay Tennis Courts Image 4](image6)

#### kitchen

![Kitchen Image 1](image7)

![Kitchen Image 2](image8)
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Case Study: First Aid Providers

‘First Aid Providers Pty Ltd’ has developed a laptop/netbook package of First Aid injury identifiers (‘what to look for’) and treatments for injuries. The information is organised in a series of topics, and includes questions and photos with descriptions.

The software has been well tested and the medical information validated.

This package is now ready to market.

Question 9

A state Ambulance Service is interested in buying this package and providing it to all their staff.

(a) How would they evaluate the suitability of this software, compared to other similar software that might be available?

Type your answer below this line:

(b) What other features would be expected from the software developers so that the software is always fully supported?

Type your answer below this line:

Question 10

First Aid Providers Pty Ltd’s own employees have been well trained in using the package and have extensive experience with it. However potential buyers have no such experience. The current employees suggest the package could be redesigned around a website.

This website would need to be highly accessible and usable in remote and difficult environments.

(a) What would need to be considered in a proposed web-based design for the public?

Type your answer below this line:

(b) What issues should be considered regarding the potential use of the website version on tablets or smart phones?

Type your answer below this line:

(c) Users could access the website (on a subscription) or they could purchase the full application.

What advantages and disadvantages are there in purchasing the application version of this software compared with subscribing to the website?

Type your answer below this line:


**Question 11**

Another option is to have a higher performance version for sale for use in ambulances where there are highly trained paraprofessionals to operate it, a good power supply and reasonable space. There is also potential access to wireless broadband and satellite broadband communication to enable ambulance staff to communicate with specialists in hospitals.

(a) What technical issues are there in using broadband or satellite communication from an ambulance in this situation?

Type your answer below this line:

(b) Discuss possible advantages and disadvantages of such broadband communication.

Type your answer below this line:

**Question 12**

(a) ‘First Aid Providers Pty Ltd’ has identified an issue — that a software upgrade could be incorrectly installed, affecting the accuracy of information, and one or more patients die.

Whose fault, if anyone’s, would that be? Discuss the legal issues involved.

Type your answer below this line:

(b) Laptops may need to store certain details, print out photos and contain identity information. They also need to record the advice given.

Suppose a laptop was lost or stolen and private patient data was accessed and made available online. What legal or social issues might be involved here?

Type your answer below this line:

(c) Some users have said that the software is so good that it might be copied and sold all around the world. Discuss any ways that the software developers could make sure this did not happen, or make it less likely to happen.

Type your answer below this line:
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Case Study: RFID car parking device

A developer has invented a device that allows any car carrying it to park in any parking space on the street or in a car park without paying cash. Instead, the parking payment is automatically deducted from an account.

The person who owns the device attaches it to their car, registers it with parking providers of their choice, and puts money, say $50, into a parking account. When the person parks they press a button on the device. A message is sent by the RFID device and the parking fee is automatically deducted from the parking account. The ’meter’ never runs out, because the device automatically keeps paying while the car is parked.

Parking meters and car park voucher stations must be adapted to work with this RFID device.

The developer wants to sell the device and its operating system to parking providers.

Question 13

(a) Identify two different types of businesses that the inventor might approach to purchase the product.

Type your answer below this line:

(b) What are the advantages and disadvantages for parking providers who purchase the system?

Type your answer below this line:

(c) Suppose the Toyota™ car company in Australia is approached to put the device in all their cars to gain a marketing advantage. Discuss the scope of the issues that would be faced by Toyota, and any constraints that might exist.

Type your answer below this line:
Question 14

The system was presented to a range of potential buyers.

Initially the Magnificent City Council (MCC) was persuaded to run a trial.

Eventually, the MCC decides to fit the necessary hardware and software in two car parks and to 100 parking meters. The MCC also offers to provide 500 car owners with the device for the trial.

The MCC must keep records of where this equipment is installed and if it ever needs repair. They will then determine if it results in increased usage over time.

(a) Would a database or a spreadsheet or some other software tool be the best for keeping these records? Justify your answer.

Type your answer below this line:

The Council decides to monitor daily the usage of these devices. It records daily usage at each car park and parking meter (on the street) for four weeks before and for eight weeks after installation of the system.

(b) What would be the best tool for storing this daily usage data from every usage point for the 12 weeks? Justify your answer. (Note that the Council staff will need to analyse and present data at the end of the trial.)

Type your answer below this line:

Question 15

This trial requires users to be registered, so that parking account details can be organised. As each user has the right to request details of all account deductions, full records of each user, and of their parking account transactions will be kept.

The Council’s Computer Systems Support Officer develops the following relational database structure outline:

(Note that multiple payments can be things like while the car is parked – see the Case Study details. Do not be concerned by single fields for name, address, ‘Car make + model’. These will be expanded into multiple fields when confirmed.)

(a) Discuss how well a database with this structure outline would meet the Council’s needs.

Type your answer below this line:
Money has to be deposited in the user’s parking account for this to work. The equipment would not authorise parking if there were no funds in the user’s account.

(b) How feasible (economical and practical) would it be to have the RFID device itself able to directly transfer money into the user’s parking account from a bank account?

Type your answer below this line:

(c) Suggest ONE other way money could be transferred to the user’s parking account.

Type your answer below this line:

(d) Compare the suitability of both these methods for transferring money into the parking account, and recommend one that is most suitable for most users.

Type your answer below this line:

Question 16

It may not be long before some people try to take advantage of this new system.

(a) Money deductions for parking fees each involve small parking account transfers (‘microtransactions’). How secure would these transfers be, and how easily might someone else be able to ‘forge’ these and make unapproved deductions? Discuss the legal, social and ethical issues these unauthorised deductions raise.

Type your answer below this line:

Users might challenge the accuracy of the deductions from their accounts. Some might even be able to provide evidence (e.g. diary, photos) that it could not have been their car parked at a particular place and time.

(b) What aspects of the trial process would assist the MCC to either accept or reject these claims?

Type your answer below this line:

(c) If this parking technology worked well, perhaps it could be used in other situations.

Suggest a couple of other useful applications.

Discuss the social and ethical issues in using RFID and/or microtransactions technology in ways such as these.

Type your answer below this line:
Database structure:

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<thead>
<tr>
<th>Field Name</th>
<th>Data Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>ID</td>
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</tr>
<tr>
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<td>Text</td>
</tr>
<tr>
<td>Address</td>
<td>Text</td>
</tr>
<tr>
<td>Phone</td>
<td>Number</td>
</tr>
<tr>
<td>Car make + model</td>
<td>Text</td>
</tr>
<tr>
<td>Car Registration</td>
<td>Text</td>
</tr>
<tr>
<td>RFID ID</td>
<td>Text</td>
</tr>
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<td>Text</td>
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</table>
```

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<table>
<thead>
<tr>
<th>Field Name</th>
<th>Data Type</th>
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<td>Text</td>
</tr>
<tr>
<td>Meter ID</td>
<td>Text</td>
</tr>
<tr>
<td>Data &amp; time</td>
<td>Text</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Field Name</th>
<th>Data Type</th>
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<td>ID</td>
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<tr>
<td>Meter ID</td>
<td>Number</td>
</tr>
<tr>
<td>Location</td>
<td>Text</td>
</tr>
</tbody>
</table>

```

Relationships diagram:

- tbl_User
  - ID
  - Fullname
  - Address
  - Phone
  - Car make + model
  - Car Registration
  - RFID ID
  - Parking account number

- tbl_Deductions
  - ID
  - RFID ID
  - Meter ID
  - Data & time

- tbl_Location
  - ID
  - Meter ID
  - Location

```

```