2006   Information Systems GA 3: Written examinations

GENERAL COMMENTS

The structure of the 2006 paper was the same as in 2003–2005; Section A contained short answer questions and Section B consisted of a case study. The maximum score was 100, with Section A worth 25 marks and Section B worth 75 marks. A newly accredited study design has been implemented in 2007; however, many of the comments and expectations about the style of responses continue to be valid. Note, in 2007 the examination will comprise of three sections: Section A – Multiple-choice (20 marks); Section B – Short answer (20 marks); and Section C – Case study (50–60 marks).

Section A required students to demonstrate core theoretical knowledge. Students appeared to be familiar with this structure; however, the mean score for this section continues to hover around 15 out of 25. Teachers should endeavour to use a similar questioning format throughout the year, and ensure that students are awarded marks only for complete, accurate responses. The Section A of past examination papers should be used when developing internal assessment tasks that have tests as approved task modes.

In Section B, students are expected to relate their responses specifically to the case study.

SPECIFIC INFORMATION

Section A – Short answer questions
Question 1

Marks	0	1	Average
%	75	25	0.3

Transaction Processing System (TPS)

This question was expected to be an easy opening question, yet only 25 per cent of students gained the mark allocated. It was clear from responses that students were not overly familiar with the types of information systems listed in the study design (transaction processing, decision support and expert systems).

Question 2

Marks	0	1	2	Average
%	25	47	28	1.1

2a.
Star

2b.
Local Area Network or LAN

Again this question was expected to be easily accessible to all Information Systems students, however, less then 30 per cent received full marks for this question. Student mixed up terms such as topology and type of network. It is important that students know the key terms, phrases and definitions as stated in the study design.

Question 3

Marks	0	1	Average
%	29	71	0.7

A switch is designed to send data intelligently to a network node, whereas a modem turns analogue signals to digital and digital to analogue so data may be transferred over an analogue connection, usually a phone line.

It was pleasing to see that most students were able to clearly articulate the difference between a switch and a modem, with most responses clearly stating that a switch connects computers and directs packets through the network and a modem generally facilitates an internet connection.

Question 4

Marks	0	1	2	Average
%	30	25	45	**1.2**

Administrator	User
• create, delete and manage user accounts • manage user connections and restrictions • manage centralised print jobs • set user security, etc.	• centralised services, e.g. file storage, printing, Internet. • peripheral sharing

Understanding networks and the role of a network operating system is a key part of the Information Systems course and it was disappointing that many students could not give one important service that this software provided.

Question 5

Marks	0	1	2	3	Average
%	2	9	25	64	**2.5**

A network administrator identifies the error rate of his organisation's Internet connection.	evaluation or analysis
A school replaces old computers in the computer room with new ones during the school holidays.	implementation
A graphics company identifies some concerns in the way it currently stores and accesses past customers' details.	analysis

Many students clearly identified the stage of the systems development life cycle.

Question 6

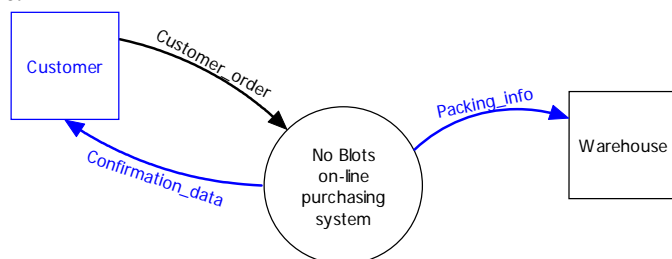| Marks	0	1	2	3	4	5	Average
%	27	19	17	16	12	9	**2.0**

6a.
A process is where data shown going in is transformed in some way into the data shown going out, or the way in which data is manipulated into information.

6b.
Data Store

c.

This question required students to interpret the dataflow diagram (DFD) provided and show their understanding of the elements that make up the diagram. There has been a DFD on most recent examinations so it was disappointing that many students did not gain a mark on this question and only nine per cent gained full marks.

Question 7

Marks	0	1	2	3	4	Average
%	3	6	14	22	55	**3.2**

7a.

Variable	Type
fruit_count	integer
message	text
good_fruit	boolean

7b.

Naming the procedure 'helen' is a poor choice because it offers no sign of what the procedure actually does so will not be useful to other programmers viewing the code or compiling the larger program.

The majority of students were able to provide an appropriate response; however, some students indicated that the name 'helen' would be hard for future **users** to understand rather then applying their response to the question stem and the key users of programming code, **programmers**.

Question 8

Marks	0	1	2	Average
%	25	34	41	**1.2**

RAM is volatile; that is, when the computer is shut down it is cleared and cannot be recovered. Programs are moved into RAM to be run. ROM, once set, cannot be deleted or edited, even if the computer is shut down. The instructions that tell a computer how to boot-up are stored in ROM.

This question is one that all information technology students should be able to respond to appropriately and fully. Some students confused ROM and RAM, CD-ROMs with ROM, hard disks with RAM, random and sequential access, etc.

Question 9

Marks	0	1	2	Average
%	43	31	26	**0.9**

A router makes a large network run faster by only sending data to the appropriate network or subnet that requires it. By sending data to the subnet that requires it, rather then every connected subnet, the total data sent is considerably less and so speed increases.

The key to this question was students understanding how a router would make a network more **efficient**. Many students simply defined the function of a router but failed to link that to how this would make the network more efficient. Also many students confused the function of a router and a switch. The large percentage of students who received no marks for this, and other similar, questions indicated that more time throughout the year may need to be spent covering hardware components and their function and capabilities.

Question 10

Marks	0	1	2	3	Average
%	4	5	17	75	**2.7**

Trial	Criterion being measured
Carefully examine the user interface of each program.	usability
Give the same task to both programs and record the time each takes to complete it.	efficiency
Have each program run the same task 1000 times and count how many times each crashes.	reliability

It was clear that most students understood each criterion.

Section B – Case study

Question 1

Marks	0	1	2	3	Average
%	29	20	22	28	**1.5**

1a.
Appropriate responses included:
- interview technicians
- observe climate control system
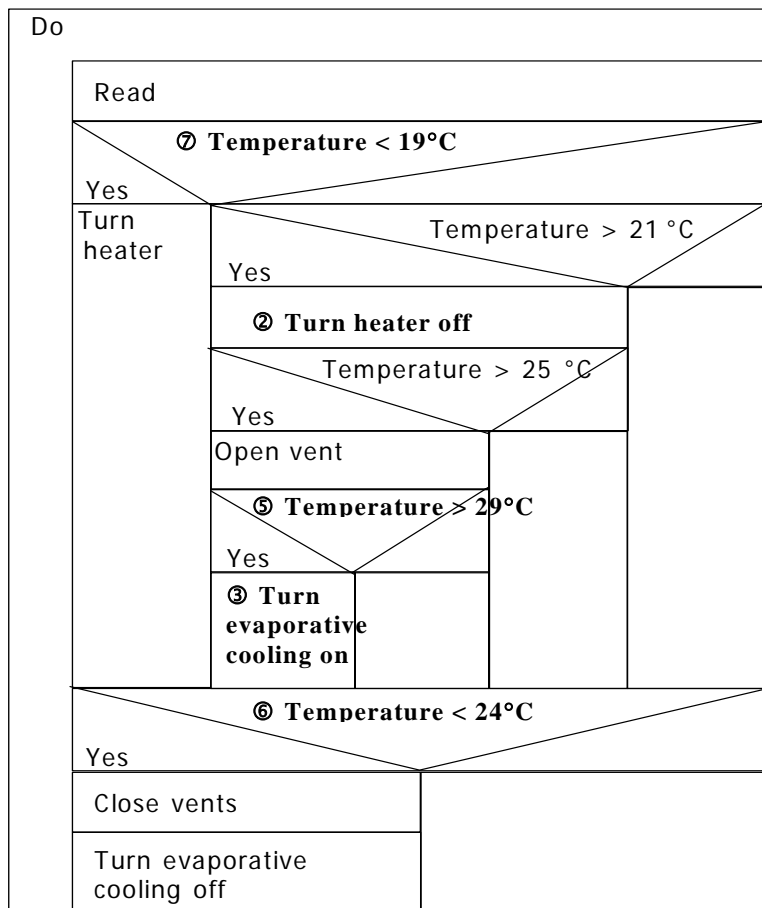- technical manual from manufactures
- manufacturer's website.

Single words such as 'website' were not appropriate as they did not provide sufficient information applying to the case study. Responses such as 'interview' and 'observation' were not accepted as they are methods of collecting data, not services.

1b.
Students could have provided a range of examples, such as 'specifications concerning ranges of measurements that the sensors produce' or 'how to install/configure/connect sensors to the system'.

Question 2

Marks	0	1	2	3	4	5	Average
%	7	3	2	4	10	74	**4.3**

```
Do
  ┌──────────────────────────────────────────────┐
  │ Read                                          │
  ├──────────────────────────────────────────────┤
  │ ⑦ Temperature < 19°C                         │
  │ Yes                                           │
  ├──────────┬───────────────────────────────────┤
  │ Turn     │ Temperature > 21 °C               │
  │ heater   │ Yes                               │
  │          ├──────────────────────────┬────────┤
  │          │ ② Turn heater off        │        │
  │          ├──────────────────────────┤        │
  │          │ Temperature > 25 °C      │        │
  │          │ Yes                      │        │
  │          ├──────────────┬───────────┤        │
  │          │ Open vent    │           │        │
  │          ├──────────────┤           │        │
  │          │ ⑤ Temperature > 29°C     │        │
  │          │ Yes          │           │        │
  │          ├──────┬───────┤           │        │
  │          │③ Turn│       │           │        │
  │          │evapor│       │           │        │
  │          │ative │       │           │        │
  │          │cooling on    │           │        │
  ├──────────┴──────┴───────┴───────────┴────────┤
  │ ⑥ Temperature < 24°C                         │
  │ Yes                                           │
  ├──────────────────────┬───────────────────────┤
  │ Close vents          │                       │
  ├──────────────────────┤                       │
  │ Turn evaporative     │                       │
  │ cooling off          │                       │
  └──────────────────────┴───────────────────────┘
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It was pleasing that a majority of students were able to interpret the Nassi-Shneiderman diagram correctly, with 74 per cent of students getting full marks.

Question 3

Marks	0	1	2	3	4	Average
%	32	10	24	10	24	**1.8**

Factors	Need for investigation
Technical criterion: Compatibility – will the software work with her current control units?	Lucy wants to integrate this with her current greenhouse components, so they need to be compatible. Lucy needs to be sure that the units of measurement used are the same as the units used in Australia.
Operational criterion: Availability of equipment and support in Australia	It is very important for Lucy to keep her system running at all times. Long delays could mean loss of income.
Operational criterion: Language of the user guides and interfaces and technical guides	As the equipment is Dutch she needs to make sure that all manuals and screens are produced in English.
Economic criterion: Cost of components and installation	The cost of linking the new parts with her current greenhouse components.

Students found it difficult to identify appropriate factors. Many repeated reliability and robustness, which were already identified in the question stem. It was important to ensure that all responses applied to Lucky Orchids.

The study design covers economic, technical and operational factors, and students should use these key terms when addressing questions of this style. For example, in the table above, the key term is listed then an element of that factor is described; this method of answering will help students to fully respond to the question. Simply responding with the words technical or economic is not sufficiently detailed.

Questions 4a–b.

Marks	0	1	2	Average
%	28	11	61	**1.4**

4a.
A relevant fault would be 'no indication where to put the upper or lower limits' or 'no units mentioned'.

4b.
The appropriate corrections could include 'add the words minimum and maximum above the boxes', or 'add the units after each box; for example, ^{o}C after each white box, next to temperature'.

Many students handled these questions with ease and were able to identify a design error and indicate appropriate corrections.

Questions 4c–d.

Marks	0	1	2	Average
%	54	3	42	**0.9**

4c.
Does not indicate which room the fault has occurred in.

4d.
Add a text box stating which room has the error.

Many students were not able to indicate an appropriate response for this second error. Student responses needed to apply to the case study but did not need to refer directly to it.

Question 5

Marks	0	1	2	3	4	Average
%	17	30	30	16	8	**1.7**

Answers could have included some of the following information.
- Before Lucy allows this to happen she should check her licence requirements for the software. As Peter is not charging for the software or trying to sell it again, he is not breaking any legal or ethical considerations in this area.
- Some software specifically prohibits it from being edited by other programmers. Lucy would need to see if it can be edited to make sure it is legal.
- Ethically, Lucy can not redistribute or sell the altered software.
- Other considerations to consider included:
  - is the code open source?

o will the company support Lucy after the alterations have been made

o current copyright legislation.

This question was particularly poorly done, with a large majority of students getting two or fewer marks. The question asked for 'legal obligations and/or ethical considerations' that Lucy should think about, which meant that responses needed to be from Lucy's perspective. For the four marks students were required to either provide four considerations or two detailed explanations.

Question 6

Marks	0	1	2	3	4	Average
%	19	12	33	12	24	**2.1**

6a.

Boundary conditions were not all tested; for example '19' only tests below the limit of 20%, not on the limit.

Students were asked to show their understanding of testing boundary conditions; however, a majority of students were unable to appropriately explain why the test data was not complete. Many simply restated the question and indicated that the test table did not fully test the program. A number of other students indicated the error was a lack of an 'actual results' column, this showed limited understanding of the purpose of the testing table in this study.

6b.

These boundary conditions need to be tested with a more extensive range of values, including 81 and 20. Students needed to identify the values to be tested.

Question 7

Marks	0	1	2	3	4	5	6	Average
%	6	3	18	19	22	16	17	**3.6**

7a.

		Action required	Action produced by algorithm
temperature	light	curtain motor	curtain motor
34	16 000	Close	Close
34	5 000	Close	Open
29	5 000	Open	Open
29	16 000	Close	Open

Many students were able to get all four values correct. Those who did not get all four correct tended to enter two values (close and open) in their responses rather then the final state of the variable, as stated in the question.

7b.

If Temperature < MinTemp **Or** Light < MinLight **Then**

7c.

Replace the OR in the line with an AND in the second IF

If Temperature < MinTemp **And** Light < MinLight **Then**

Question 8

Marks	0	1	2	3	4	5	6	7	Average
%	7	3	5	8	14	19	23	21	**4.7**

8a.

Hazards could have included:

- power failure
- theft/vandalism
- computer failure
- environmental factors – heat, humidity, water, dirt, etc.

Three hazards were required; however, a number of students listed consequences of hazards, such as overheating, rather then what the hazard was (in this case heat).

8b.
For example, for power failure, the computers require power to continue to work. If computers are not always on, Lucy will not know if the correct conditions are all working to allow for maximum growth so she may get fewer orchids and this could mean a loss of profits.

Many students were able to identify what the concern was with the hazard selected, but found it difficult to go on and apply that to the case study and discuss the impact on the nursery and business.

8c.
Most students were able to provide an appropriate response for this part of the question, with many indicating that a secure, air conditioned enclosure was required to protect the computer from theft, water, heat, etc.

Question 9

Marks	0	1	2	Average
%	9	27	64	1.6

If CAT 5 was chosen, justifications could have included:
- this is a more secure option between the greenhouse and the house, as wireless connections are more susceptible to security breaks
- cable is cheaper, however the installation across the 30 metres between the greenhouse and the house would add an extra cost.

If wireless was chosen, justifications could have included:
- this is the simplest option to install as there would be no trenches to dig to lay cables.
- this is the more flexible option as it would mean that Lucy could have her house computer anywhere she wants, whereas using cabling means that the connecting points for the computer would need to be hard wired.

A majority of students were able to provide a well-structured justification for their preferred option.

Question 10

Marks	0	1	2	3	4	5	6	7	Average
%	4	3	6	9	16	18	24	21	4.8

10a.
Wide Area Network

A number of students were not able to identify this network type.

10b.
Examples of correct responses included:
- use dial up Internet – cheap and easy to implement
- use broadband – no individual call costs
- set up a microwave link – no need to use the phone system.

For each option students were expected to identify a strength. It was surprising to see the number of students who either indicated they had no knowledge of what a microwave link was (for example, they wrote comments such as 'a what?') or did not enter a response.

10c.
Most students selected broadband. An appropriate response would be: 'the broadband connection offers the best value for Lucy's nursery. Although more expensive then dialup, broadband is cheaper then the microwave connection. Broadband offers a permanent connection that is faster and more reliable than a dial up connection and is cheaper then the microwave link. For Lucy, broadband offers a fast, reliable connection to her greenhouses without being too expensive.'

Most students were able to justify a choice but some did not apply their response to the case study and did not justify why it was the best for Lucy. Any of the options were acceptable if justified appropriately.

Question 11

Marks	0	1	2	3	Average
%	42	14	18	25	**1.3**

Sequential data must be read in the order it is written (saved) where as random access data can be read from any point, given an index is known. Therefore a random access data file would provide quicker access to records. Given Lucy wants measurements from differing times of the year, these records will be spread out and therefore it will quicker and simpler using a random access files to find the required data, rather then going through all data one record at a time in the sequential file.

It was disappointing to see that over 40 per cent of students were unable to obtain a mark for this question, which was one of the most poorly answered questions on the paper. Many students attempted to provide a response, but showed limited knowledge of the difference between sequential access and random access. Many responded with reference to random accessing multiple files rather then records within a file.

Question 12

Marks	0	1	2	3	4	Average
%	27	5	7	15	46	**2.5**

12a.
Correct responses include 'Gantt chart' and 'Pert chart'. Software packages such as Excel or Project were not acceptable as they are not a tool. Many students were able to provide a correct response.

12b.
Responses similar to the following were appropriate:
- it will help Lucy put all the tasks that have to be completed in order
- it will show how long each task will be and which tasks will overlap. This will help Lucy and her team plan which tasks can be completed simultaneously so they can organise companies and workmen at the correct time
- it will help Lucy allocate resources and identify milestones as the new system is installed.

Most students were able to describe three ways project management could assist Lucy manage her project.

Question 13

Marks	0	1	2	3	4	Average
%	19	18	20	19	23	**2.1**

13a.
Pilot

13b.
Responses similar to the following were appropriate:
- it can be tested thoroughly in the local nursery before implementing in the remote one
- it would be impossible to run both systems at the same time, as the sensors could conflict with each other
- changing over both nurseries at once would put all of Lucy's orchids at risk if the system should fail
- it is closer to home, therefore easier to monitor if a problem occurs.

Most students were able to describe why the changeover described was better than other methods but a number of students did not correctly name the method described, many indicated it was phased.

Question 14

Marks	0	1	2	3	4	Average
%	4	7	31	24	34	**2.8**

Possible responses included:
- install an anti-virus program and have it set to automatically update on a regular basis. This would mean that Lucy's system is always protected from new viruses
- do not open any suspect emails from an unusual source. This would ensure that even if the email has an unknown virus contained in it there will be no opportunity for that virus to infect her system
- do not allow any member of the family to put files on the computer from an external source using secondary media. Again, this would ensure that her computer cannot receive an unknown virus through opening a file that has not been checked by an anti-virus program.

Most students were able to identify anti-virus software as a possible way of preventing viruses. However, the question asked students to describe two ways, not just list solutions, so a complete description was required to gain full marks. A firewall was accepted as long as the student adequately described how viruses would be stopped by the firewall.

Question 15

Marks	0	1	2	3	4	Average
%	17	14	18	27	25	**2.3**

15a.

Appropriate user documentation included:
- a quick reference manual which gives a brief overview of how the system operates
- an online help option which gives a brief overview of how the system operates.

Students needed to provide a description of the user documentation suggested, not just a title such as 'flash cards'.

15b.

Examples include:
- a section on each of the controls and how they operate
- diagrams of how the system is connected.
- instructions on how to check if the system is working correctly
- instructions for how to look at the error logs
- a troubleshooting or question and answer section.

Students found it more difficult to identify the topics that should be included. As the question used the word 'identify', there was no need for a lengthy description; however, the topics needed to be more than one word.

Question 16

Marks	0	1	2	3	4	5	6	Average
%	8	5	9	19	16	16	28	**3.9**

- Claim 1: What do they mean by doing it all for her? Lucy needs to investigate exactly what they will backup and how. Also she should discover how reliable the data security company is.
- Claim 2: Is there a means of contacting the company by telephone if the Internet is not working? What provisions have the company made in the case of the Internet not working to complete that backup and to be able to access it.
- Claim 3: What measures does the company take to keep the site secure? Lucy needs to find out the format that it will be stored in. Ideally it should be encrypted so that if it is illegally accessed then it cannot be read. What happens if the files become corrupted?

This question required some discussion of each claim listed. This presented a challenge for some students so often they did not obtain full marks.

Question 17

Marks	0	1	2	3	4	Average
%	14	11	20	30	26	**2.4**

17a.

At least two errors occurred: the light and temperature exceeded the set limits on 27-5-2006 and 03-9-2006 respectively.

17b.

There are not more than two errors in one month (there were two only in March).

17c.

Lucy should check to see if the correct alert messages requiring action and the correct date and time were sent to her mobile phone.

This question was done quite well by most students. Students needed to select data from the table that either helped prove or disprove the objectives identified.