

Information Systems GA 3: Written examination

GENERAL COMMENTS

Areas of strength and weakness

The structure of the examination paper differed from previous years. The examination booklet comprised nine questions. Each question was divided into one, two or three parts with each part being worth between 1 and 12 marks. The maximum possible score was 94. Space was provided after each question part for students to write their responses. The case study and resource material relating to the case study were printed on a detachable insert placed in the centrefold of the examination booklet. Students were expected to detach the insert so they would have the case study in front of them to refer to as they were responding to the questions. However, a significant number of examination booklets had the case study insert left in the booklet. As the same format will be used for the 2002 paper, teachers should explain to students the purpose of the detachable case study and demonstrate how to best use it.

The examination paper encouraged students to be more direct and focused in their responses. Almost all students related most of their answers to the case study and completed the paper. Teachers should strongly discourage students from using pencil. On a positive note, the number of students sitting the Information Systems examination continues to increase as 3274 students sat the examination.

Question 1b (software functions), Question 5 (algorithm testing) and Question 9 (data acquisition to evaluate an information system) proved to be the most difficult for students. Students performed best in Question 3. The marks allocated to a question are a useful guide as to how much detail is required in a response.

The usual number of students lost marks because they did not read the questions properly and failed to distinguish between instructions such as **describe**, **discuss**, and **explain**. This was a particular problem with Question 1. Teachers are urged to impress on their students the importance of reading the question carefully and reading the question again after completing their answer to ensure it has addressed the question. A number of students who wrote strong responses underlined the key words in the questions and this would be a useful technique for all students to adopt.

SPECIFIC INFORMATION

Question 1

The first step in developing a new system is conducting an analysis of the current system. Deon, the systems analyst, needed to find out about the:

- technical specifications of the hardware
- the functions of the software
- the data flow through the system.

a. (Average mark 3.28/Available marks 6)

Identify two relevant technical specifications of the existing fileserver hardware and explain why Deon needs to know these.

Acceptable responses identified a characteristic or capability of any item of hardware on the fileserver and gave a reason this information was needed. For example:

- RAM storage capacity; needed to determine whether there will be enough RAM to run all required programs concurrently
- CPU processing speed; needed to determine whether the CPU is fast enough to cope with all required tasks
- HDD capacity; needed to determine whether there will be enough storage space for the music files to be downloaded.

Students generally answered this question well although some identified hardware items that were attached to other parts of the system rather than the fileserver. A number of students had no idea what a fileserver is or the functions it performs.

b. (2.25/6)

Identify two relevant functions of the existing fileserver software and explain why Deon needs to know these.

Expected responses included:

- whether operating system allows/controls logging on; need to know this because customers need to gain access to download music files
- whether there is a virus checker utility because Internet users could introduce a virus to the system
- file transfer through the network operating system if not functioning correctly could result in corrupt data being stored on the hard disk drive
- what drivers are installed to control peripherals in case new drivers might be required to run the new hardware.

This question was poorly answered. Many students could identify software as an operating system or utility but few were able to identify functions of that software. Teachers are advised to impress on students the relationship between hardware and software and the functions performed by software in a networked information system.

c. (2.26/4)

Discuss two different methods Deon could use to acquire any of the data you have identified in part a and/or part b.

Students were expected to identify two methods and give a reason for using each method or to discuss what the method could do or to describe the method to earn full marks. Some students struggled for answers.

Accepted responses included:

- read the user manuals for all software on the system as these will explain the software functions
- use the system information display program to find CPU speed and RAM size
- log on to the system and search the directories to find a virus checker if any.

Answers suggesting that Deon ask the network administrator for particular specified information were accepted provided they described the type of information the administrator could provide. Responses suggesting that Deon ask management or 'someone who knows something about the system' were not acceptable. Some students suggested Deon 'look at' the fileserver. Students need practice writing about processes and systems using accurate, unambiguous language.

Question 2 (4.96/10)

The data flow diagram (DFD) provided an outline of the design of the current system.

Complete Deon's diagram by labelling the processes, data stores, and sources and destinations of the data.

Students found this question difficult with only 60% students gaining more than half marks. Since DFDs have appeared on previous papers, it was disappointing that 17% of students gained no marks at all. DFDs are an important tool in systems analysis and students should be able to correctly identify all elements of a DFD. A number of students tried to complete the data flow diagram as if it were for the new information system. This indicated they had not read the question carefully. Due to time and mark allocation constraints, students were not required to label the data flows in the diagram. Teachers should note, however, that these are an integral aspect of DFDs and students should learn how to identify data sources, destinations, processes, data stores, data flows and attach the appropriate symbols to them.

Question 3

This question addressed file formats and was well answered with over 66% students gaining full marks on part a and 77% gaining full marks on part b but less than half gained full marks on part c.

a. (6.14/7)

Select the sound file format you think Deon should recommend for storing the archival music data on the web server. Give three reasons for your choice.

Responses that provided three logical reasons for the selected file format were accepted. For example:

- MP3 because: 1) it's a popular existing format; 2) it's a compromise between quality and download speed; 3) most PCs have software installed that will play MP3 files
- AIFF because: 1) it is the industry standard; 2) all the other files are stored in this format; 3) although it takes more space the hard drives have large storage space and are not expensive to purchase if more are needed.

Responses that selected Real Audio (RA) were accepted if the reasons were logical for that file format.

Those who performed poorly on this question had not read the question carefully. For example, some students selected the RA format because it didn't lose data quality when the source material for the question quite clearly stated 'Compressed format, loses data ... FM quality'. Other students selected three file formats. Better students recognised the importance of selecting a file format that is likely to be easily downloadable for Toadstool Music's potential Internet customers.

b. (0.77/1)

If the sound file format you have chosen is used, approximately how many megabytes of storage space will be required on the web server?

This question required students to calculate the storage space required to store the music files in the file format they selected in part a. Expected answers were:

- 1 000 000 for AIFF, CD-DA or WAV format
- 100 000 for MP3 format
- 14 000 for RA format
- 70 000 for AAC format.

Responses such as 'a lot' were not acceptable.

c. (1.91/3)

Three different storage media are available for the server.

- a single 36 Gb hard drive
- a 300 Gb hard disk array
- a 120 Gb tape drive.

Which storage medium should Deon choose for the web server? Explain why this choice is better than the other two options.

This question required students to compare the three media. The most appropriate answer to this question was the 300 GB hard disk array and acceptable reasons included: the tape drive was unsuitable because retrieving files would be too slow; a single hard disk drive was not large enough unless using the Real Audio (RA) format; the hard disk array was likely to have built in redundancy so if one disk failed another could quickly restore the files; the hard drive allowed quick access to single tracks; and it allowed for adding new files as the business grew.

Most students understood that tape drives are slow in retrieval times. A small group did not know what a hard disk array was.

Question 4

Responses to this question revealed that up to a third of students did not understand the purpose of network protocols.

a. (0.62/1)

Tick the box beside the most appropriate protocol for the new system.

The correct answer was TCP/IP.

b. (1.0/2)

Explain why this is the most appropriate protocol.

Given that Toadstool Music had to link their network to the Internet and allow customers to download files, the appropriate protocol was TCP/IP. IPX/SPX were developed by Novell and are appropriate for local area networks. NetBEUI is a proprietary protocol developed by IBM and is only supported by Windows and a few other systems. HTTP is the protocol for reading webpages. Music/CD is not a protocol.

Question 5

This question was designed to test students' ability to interpret an algorithm and develop appropriate test data. Students were supplied with an algorithm for downloading music files and two data sets.

a. (7.91/11)

ai.

Indicate the reasons why data set 1 and data set 2 were selected and state the message that will be displayed on the screen.

For any algorithm data should be selected that will test any rules and calculations. The algorithm provided for Question 5 had two rules:

1. Customers may download up to 15 tracks in one session at a price of \$1 per track.
2. To protect their artists, if a customer downloads four tracks or more from any one artist/group, the total download price will be \$20.

A prototype user interface design was also supplied with the resource material for this question to assist students to visualise the task required.

The first data set contained valid data within the upper limit of a download (15 songs) but it contained the upper limit for songs for one band. According to the algorithm the screen would 'Display Total Price' thus the expected screen output was '20'. Similar statements were accepted, for example 'Price is \$20'.

The second data set contained data within the acceptable range for song numbers per artist (no more than three) and within the acceptable range for normal price (15 songs). The expected screen display was '15' or 'Price is \$15' or something similar.

aii.

Select a third set of test data from the songs shown in the prototype user interface. This set should test another part of the algorithm.

Expected responses were those that selected a data set that added up to more than 15 tracks, that is outside the valid range for the download. The reason for this data was that it exceeded the number of songs permitted. In a case such as this the algorithm stated that the screen output would be 'Too many songs'. Other valid responses were accepted provided the justification for their selection was logical.

Thirty three percent of students achieved full marks on this question. Choice of test data is critical to testing algorithms yet many students did not know the purpose of test data or how test data should be selected.

b. (1.07/4)

Find two errors in the algorithm. Explain how to correct them.

The expected answers were:

Error 1: If Count songs > 4
 Correction: If Count songs > 3 or If Count songs >= 4

Error 2: The price calculation if the number of tracks selected was within normal range was omitted
 Correction: If Song Price = 20 then
 Total Price ← 20
 Display Total Price
 Else Total Price ← Total Songs
 Display Total Price
 End if

Any other valid errors found and corrected were given credit.

This question was poorly answered with over half the students either not attempting the question or gaining no marks and just over 8% gaining full marks. Students are expected to be familiar with methods for designing, developing and testing algorithms.

c. (1.25/2)

Explain why the Song File Numbers were written to the Temp file rather than each song being downloaded immediately after selection.

Acceptable responses to this question included:

- to store the requests so the number selected can be checked to prevent the customer downloading more than fifteen songs
- if the credit card details don't process then the transaction can be cancelled by Toadstool Music
- if the customer changes their mind they can cancel the order.

Question 6

a. (4.67/6)

Three system changeover methods are shown below. Describe one advantage and one disadvantage of each method.

Acceptable responses included:

Method	Advantage	Disadvantage
direct	<ul style="list-style-type: none"> • cheaper than other methods because it takes less time to implement • quicker to implement so new system is up and running earlier • less disruption to normal business because the changeover is done quickly 	<ul style="list-style-type: none"> • can be stressful for employees because no training time • if it doesn't operate properly the firm has no system at all • if the new system goes down it can cause employee stress
phased	<ul style="list-style-type: none"> • there is less chance of things going wrong if the conversion is done bit by bit • this method allows testing of each part of the new system before adding the next part 	<ul style="list-style-type: none"> • is more difficult to coordinate • it takes longer to make the change
parallel	<ul style="list-style-type: none"> • gives employees time to get used to the new system • if the new system fails we can fall back on the old one 	<ul style="list-style-type: none"> • can cause employees a lot of extra work • some employees may be reluctant to convert to new system if they can still use the old one

This question required students to demonstrate their knowledge of three methods of introducing a new system and was well answered although some students confused the advantages of phased and parallel methods of changeover.

b. (2.44/3)

Deon wants to install the new system using a direct changeover method in one weekend. The manager prefers a phased changeover that is achieved over a period of two months. Rebecca, a sound engineer, has suggested parallel running the old and new systems for one month then a changeover to the new system.

Which method would you recommend as the best option for Toadstool Music? Give two reasons for your choice.

Whilst Question 6a tested students' knowledge of changeover methods, this question required students to relate that knowledge directly to the case study. Given that direct changeover would be risky in that if the new system failed

Toadstool Music would probably lose customers and thus revenue, and parallel changeover technically was not appropriate as the new system was to perform new functions, the only acceptable response was phased conversion.

Acceptable reasons for selecting that method were:

- could test CD making in the shop as a prototype for the Internet ordering system
- give staff a chance to learn and test the procedures for selecting songs
- Toadstool could ensure each part of the new system worked before proceeding to the next stage, e.g. install the CD writer in the shop, then connect to the Internet, then install the music downloading system
- it's a cheaper option as Toadstool could put the CD making system in the shop then later pay for the Internet system and spread the cost.

Both parts of this question were well answered with most students able to give two valid reasons for their choice of method. Less successful students supplied responses that did not relate to the case study or failed to recognise that the new system was introducing new functions to the enterprise and thus the parallel conversion method was not appropriate.

Question 7 (2.93/4)

Freya logs on to the Toadstool Music website for the first time. She notices that before she can download music she must register her name and provide her credit card details and email address.

Discuss two concerns that Freya may have as a result of these actions.

This question was well answered. To gain full marks students were expected to identify a relevant concern and state why it was a concern. Acceptable responses addressed the privacy issue relating to Freya's credit card details. Was Toadstool's system secure enough to prevent a hacker reading her credit card details and using them to make purchases on her card? Or could someone within the company steal them? The second concern related to Toadstool Music misusing her personal details (name and email address) by sending her junk mail or selling the data to another company.

Question 8

This question addressed system testing.

a. (0.67/1)

Identify one aspect of system performance that this proposal will test.

Most students successfully identified an appropriate aspect of system performance. A range of responses was acceptable for example, reliability of the backup system or how much it takes to overload the system.

b. (2.7/4)

Explain two important aspects of the disaster recovery plan that will be tested.

Acceptable responses included:

- whether the backup data disks have data on them because the system must be restored without data loss and if the backup data disks are not tested there may be a fault with the backup procedures or the disks
- whether data is recovered as quickly as expected so that they don't lose customers because the system is down. If data recovery is slow the reasons must be investigated and new procedures or equipment may need to be purchased
- whether the system can be restarted and operate normally because they will lose customers if the applications or web site aren't fully functional and so steps will have to be taken to improve disaster recovery
- whether the backup disks are readily accessible although in a safe location because the procedures may need changing for example if one person has the key to the storage space for the backup disks and that person is absent during the system crash restoration can't occur until they return.

Most students distinguished the disaster recovery plan testing from system performance testing in part a. and were able to at least identify an aspect that needed testing. The 40% of students who gained full marks were able to explain the aspect by describing the purpose of testing or the consequences of a failed test or both.

c. (1.88/3)

Do you agree with the manager's comments? Justify your answer.

All systems should have a disaster recovery plan and this should be tested because history shows that systems do fail. Although a system may be working well a virus or some natural or unnatural disaster could affect it. The impact of system failure can be costly. In the case of Toadstool Music it could mean loss of customers and thus loss of income. A few students agreed with the manager but most were able to state at least two reasons for testing the system.

Question 9

This question addressed one aspect of system evaluation, that of data acquisition. It identified four types of users who could provide useful data for the evaluation: management, sales staff, web technical staff and customers.

ai-ii. (6.69/12)

Describe the data each type of person could provide.

Describe how this data could be collected.

Acceptable responses included:

Sales staff – could provide data about the difficulty/ease of use of the CD creation system in the shop, the speed of use of the system, the reliability of the system. This data could be collected by interviewing the sales staff, keeping a log of problems with the system, or observing the system in operation (a questionnaire could be administered but the number of sales staff was so small it would probably not be worth the expense).

Shop customers – could provide data about the time taken to order songs and get their CD and could comment about the quality of CDs. This data could be collected by interview or questionnaire administered while customers were in the shop.

Internet customers – could comment about accessibility of the site, download time, quality of the files. This data could be collected by an online questionnaire or a questionnaire emailed to customers.

Web technical staff – could provide data about the number of hits on the site, the number of crashes of the system, the types and frequency of problems with the system. This data could be collected by keeping a maintenance log and installing website access statistics gathering software.

Management – could provide data about the number of customer complaints, system maintenance costs, number of sales, and profits. This data could be collected from the complaints file and financial reports.

Most students gained at least half marks for this question. The responses demonstrated that many students did not know the relative functions of staff at various levels of a business or the data to which they have access. For example, whilst sales staff may be able to provide anecdotal evidence about the most popular songs or the total number of shop sales, it is management that will have the accurate sales figures. Sales staff could not provide any data about online sales. Management are not the appropriate staff type to provide data about the actual operation of the system unless they are operating users. Observation was not an appropriate method for any users other than the sales staff. Many students were unable to distinguish appropriate data collecting methods for the different types of users. Some students suggested that data could be gathered from customers through unsolicited emails. Such emails are spontaneous and are not examples of a data collection method.

b. (2.44/4)

Select two people from the list used in part a – sales staff, customers, web technical staff, management. Discuss why the data that they provide will be useful in evaluating the success of the new system.

This question required students to focus on the data not the person. Some students were confused in this. Acceptable responses included:

- the data provided by sales staff will indicate whether they can do their work efficiently or whether they are losing customers if the CD burning is taking too long or isn't reliable
- the data from Internet customers will indicate whether they are frequent users or whether they are new customers in which case the firm is reaching the bigger audience they hoped for
- the data provided by web technical staff will indicate whether the hardware is coping with the traffic and whether the business needs to upgrade the RAM or processors
- the data provided by management will indicate whether sales revenue and profits have increased and thus the firm has achieved its goal in changing the system.