2007   Software Development GA 3: Written examination

GENERAL COMMENTS

The structure of the 2007 paper was new and comprised of three sections: Section A contained 20 multiple-choice questions, Section B comprised of short answer questions and Section C was a case study. The maximum score was 93, with Section A worth 20 marks, Section B worth 20 marks and Section C worth 53 marks. Students appeared to adapt well to the new structure, possibly as Sections B and C were similar to past years.

Multiple-choice questions were asked for the first time in 2007. Most students handled this section reasonably well, with an average mark of 14. However, a number of students left questions unanswered. Students should be encouraged to provided responses to **all** multiple-choice questions even if they are unsure of the correct response. Marks are not deducted for incorrect answers. Teachers are encouraged to consider using multiple-choice questions throughout the year for formative assessment.

Section B required students to demonstrate core theoretical knowledge. Students appeared to be familiar with this structure, but it is disappointing that the mean score for this section was approximately 55 per cent. Students were not required to apply their knowledge to a case study, rather they were just required to demonstrate knowledge about key concepts. Teachers should endeavour to use a similar questioning format throughout the year, perhaps using Section A of past examination papers (2003–2005) and assessment reports as tools to help develop internal assessment and practice examination material.

Section C has followed a consistent format for many years (previously as Section B), and student responses were again expected to apply to the case study. Students found many questions in this section challenging, with many gaining no marks on particular questions, either through providing no response or an incorrect response. The mean for this section of the paper was approximately 43 per cent, showing a considerable decrease from the 2006 mean of 60 per cent. This may have been due to students being less familiar with some of the questioning styles and question content expectations.

During the examination, students should:
- endeavour to use correct IT language throughout the paper
- re-read the question and their response to ensure the actual question has been answered
- avoid using pencil in Sections B and C, as responses in pencil can often be difficult for assessors to read
- read the case study and questions carefully and underline key words
- endeavour to demonstrate their knowledge of the subject and apply that knowledge to the case study, as generic responses often result in little or no marks.

SPECIFIC INFORMATION

For each question, an outline answer (or answers) is provided. In some cases the answer given is not the only answer that could have been awarded marks.

Section A – Multiple-choice questions

The table below indicates the percentage of students who chose each option. The correct answer is indicated by shading.

Question	% A	% B	% C	% D
1	1	1	3	94
2	10	71	13	7
3	50	32	14	3
4	7	14	22	56
5	75	1	23	1
6	6	84	2	9
7	3	4	65	29
8	22	14	54	10
9	55	5	21	19
10	2	10	19	70
11	7	72	10	10
12	22	2	71	4
13	7	79	11	3
14	7	3	4	86
15	6	0	3	90
16	9	7	83	2
17	11	60	16	13
18	13	4	81	3
19	74	3	15	8
20	15	16	57	12

Section B – Short answer questions

Question 1

Marks	0	1	2	3	Average
%	16	13	30	40	**2.0**

- Bus: All nodes connecting computers and other devices are on the same cable (backbone). If one node fails everything after that will not work.
- Star: Each computer/device is connected by its own cable that connects directly to a central distribution device (for example, a switch). If one fails it does not affect others.
- Hybrid: A combination of two or more of the above structures (it can be two stars joined, or one star with one bus, etc.).

This was a straightforward question, so it was disappointing that less than half of the students completed it. A significant number of students could not provide a description of any of the topologies listed. The topology most often not attempted was hybrid. These topologies are listed in the glossary of the study design and should form part of the content covered in the course.

Question 2a.

Marks	0	1	Average
%	34	66	**0.7**

60GB

It was pleasing that the majority of students answered this question correctly. A question such as this has not appeared on the paper in a number of years so it was reassuring that students could attempt the calculation correctly using the information provided. A number of students provided lengthy calculations, which was not required.

Question 2b.

Marks	0	1	2	Average
%	5	41	55	**1.5**

Students needed to describe a problem that may occur if only CDs are used as a storage solution. For example, using CDs as the **only** storage solution is high risk, because if a CD was lost there would be no back up. In addition, Robert would need an excessive number of CDs to store all the images, and locating a file would be difficult.

A majority of students were able to provide an appropriate response to this question. Those who did not receive full marks had generally misread the question.

Question 2c.

Marks	0	1	2	3	Average
%	5	38	40	17	**1.7**

As this question was asking students to describe an appropriate storage/backup strategy, they needed to describe and justify a number of steps when formulating a strategy. For example, use two different media, such as DVD and an external hard disk, as they are relatively cheap and have a higher capacity then CDs. Store backups in different locations to the ensure safety of the original pictures.

This question was poorly done. Many students did not pick up the key point that Robert had only one storage solution, which meant that they needed to provide two alternative storage media as a key part of their response.

Question 3

Marks	0	1	2	3	4	Average
%	21	15	22	22	21	**2.1**

Acceptance criteria	Testing procedure
The server must have less than two failures a month	Test log failures over a year: if less than two per month, the criterion has been met.
The network is able to have 150 computers logged on at the same time without crashing	Undertake a controlled test of 150 computers: log in and if the system crashes, the criterion has not been met.
More than one user can be using the system and updating the same files at the same time	Have two or more people access and update the same file. Record any problems and check the data file to ensure the file was updated: if done by multiple users, the criterion has been met.
Records can always be retrieved in less than four seconds	Have 150 people all try to retrieve a record at the same time and see how long it takes: if less than four seconds for all, the criterion has been met.

Only 21 per cent of students gained full marks on this question as many students were unable to provide an appropriate 'testing procedure'. Some students did indicate a test but then failed to describe what data they were looking for or what information they would gain from the test. For example, for the first criterion, 'log server failures' was an insufficient answer as it did not go on to state that this would need to be done over a period of time, that the log would need to be checked to ensure that there were fewer than two failures a month during that period, or that one month of testing would be insufficient to ascertain whether the criterion had been meet.

Question 4

Marks	0	1	2	3	Average
%	41	32	19	9	**1.0**

Using appropriate naming conventions for variables and objects:
- allows the programmer to effectively debug
- ensures naming consistency
- ensures easy identification of objects.

Many students did not seem to understand naming conventions within a programming environment, or they had a limited ability to express their knowledge. Many students simply rewrote what was in the question.

Question 5

Marks	0	1	2	3	4	Average
%	15	20	29	22	14	**2.0**

An appropriate answer to a legal issue could have been: If Mick developed this administrative system as part of his work at BN College then the college owns the software and Mick is unable to implement the same system in a second location without the college's permission.

Students needed to demonstrate their knowledge of copyright laws and apply this knowledge to the scenario provided. Many students were not able to express more than a limited understanding of how copyright laws would be applied in this situation. Students need to ensure that they can **apply** their knowledge of the law, not just recite sections; therefore, teachers should endeavour to provide scenario-based discussions when addressing laws such as copyright.

Section C – Case study

Question 1a.

Marks	0	1	Average
%	52	48	**0.5**

Customers

Question 1b.

Marks	0	1	Average
%	78	23	**0.2**

The missing element, 'Cakes', is not a data flow.

Question 1c.

Marks	0	1	Average
%	64	36	**0.4**

The Bakers provide data to the system rather than processing the data, therefore they would be considered an entity rather than part of the system.

The use of context and data flow diagrams in the written examination has been relatively consistent over the last few years; therefore teachers and students should have been well prepared for this style of question. However, this question required students to explain their understanding rather than to construct elements of a diagram, which caused problems for a number of students.

Students need to practise constructing context and data flow diagrams and also need to have an understanding of the theory behind the decision making for each element represented. The relevant key knowledge point for this question also requires students to be able to construct data dictionaries (see page 38 of the *Information Technology VCE Study Design*).

Question 2a.

Marks	0	1	Average
%	56	44	**0.5**

DFD C

Question 2b.

Marks	0	1	2	Average
%	46	36	18	**0.7**

DFD A is incorrect because it has an input 'low ingredient' that is not required to process orders. Also it does not lead to any output.

DFD B is incorrect because it shows a data flow that is ingredients (flours, yeast, sugar) rather than data.

Question 2c.

Marks	0	1	2	Average
%	59	18	23	**0.7**

The inappropriate entry in the data dictionary was 'Calculate quantities needed' as this is a process, not an element of data.

Question 2 required students to interpret elements of a data flow diagram. Part c. asked students to demonstrate their knowledge of a data dictionary, and tested new content in this study design. It is clear that this area may need to be covered in more depth. Teachers should be incorporating this into their System Analysis and Design concepts along side DFD.

Question 3a.

Marks	0	1	Average
%	91	9	**0.1**

The REPEAT – UNTIL loop initialises (sets up) the array to store the quantity of each ingredient.

Students needed to show understanding of both a REPAT – UNTIL loop and an arrays.

Question 3b.

Marks	0	1	2	3	Average
%	82	10	2	6	**0.3**

Variable	Expected value	Actual value
Qty(1)	1.5	0
Qty(2)	0	0
Qty(3)	2	2

An error occurred in the test data provided for this question on the original paper; the values for each of the Product_Recipes were transposed and should have been (1, 1), (1, 2), (1, 3). Some students calculated responses for the test table using the values as written on the examination paper and others calculated using the correct values. Correct responses for either alternative were awarded marks. The responses shown here are those for the correct values.

Question 3c.

Marks	0	1	Average
%	90	10	**0.1**

Ingredient_ID is set to 1 in the first of the nested repeat loops and immediately in the second part of the nested loop it is increased by 1, so the amount of the first ingredient is never calculated.

Students needed to have a full understanding of each of the elements within the algorithm in order to answer this part correctly.

Question 3d.

Marks	0	1	2	Average
%	90	3	6	**0.2**

Either of:
- change the initial value of Ingredient_ID from 1 to 0 in the second loop
- move the Ingredient_ID increment line to the end of the loop and change the terminal conditions from UNTIL Ingredient_ID = Num_Ingredients to UNTIL Ingredient_ID > Num_Ingredients

Question 3 challenged students. Only a very small number completed all parts successfully, and over 80 per cent scored no marks for all parts. The algorithm in the question was not overly complicated; however, the use of a two dimensional array may have provided an extra element of difficulty that prevented many students from attempting the question.

Question 4

Marks	0	1	2	3	Average
%	31	42	14	13	**1.1**

Variable	Use	Type
Ingredient_ID	Loop Control on Ingredient ID	integer
Num_Ingredients	Total Number of Ingredients	*integer*
Qty()	Quantity in kilos of an Ingredient	*one dimensional array*
Product_Recipes()	Quantity of a particular item required for a single product	*two dimensional array*

This question type has occurred in a variety of forms since 2002; however, only a small percentage of students were able to gain full marks.

Question 5

Marks	0	1	2	Average
%	61	26	12	**0.5**

Appropriate responses included the following.

- A Serial Access file would be unsuitable because each new order is written to the end of the file, and finding a required order would be difficult as Sebastian would have to go through each in turn until he found the required order. The same would be true for changing customers' orders. However, Random Access files allow Sebastian to locate customer orders efficiently as the files can be added or accessed in any order; this also allows orders to be changed more efficiently. This would be important since many regular customers change their orders with the bakery.
- The entire Serial Access file must be read and written each time there is a change, but Random Access files can be searched and only the part that is changed needs to be rewritten. This is important as a large number of daily changes to orders must be made.

Although similar questions have appeared in past examination papers, many students were unable to provide responses that showed their understanding of Random Access files versus Serial Access files (see the relevant key knowledge point on page 43 of the study design).

Question 6

Marks	0	1	2	3	4	5	6	Average
%	16	16	20	19	14	10	5	**2.5**

Appropriate examples of advantages for each device included the following.

Laptop
- has a large and easy to see screen with a user friendly keyboard, which would allow orders to be entered and stored efficiently by the drivers

PDA
- small and easy to carry, so drivers could take them into stores and enter orders onsite
- orders could be sent via wireless communication to the bakery computer

Mobile phone
- small and compact
- drivers are familiar with their functions
- orders could be called in as required

This question appeared easy but many students struggled to provide a full and complete response that directly applied to the case study and was applicable for the 'given use' stated in the question. Some students responded with a financial discussion that could not be linked to the given use and could therefore not be awarded any marks.
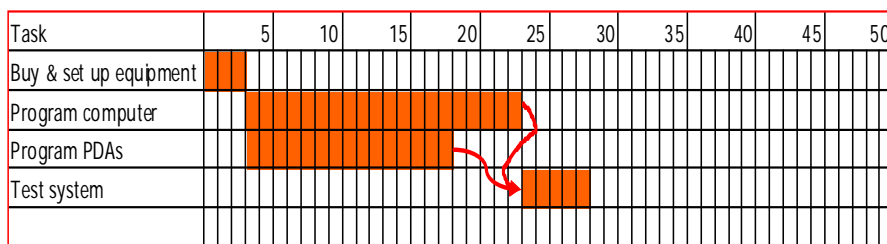
Question 7

Marks	0	1	2	3	4	Average
%	24	4	21	20	31	**2.3**

Either Peach or Strawberry was accepted as the recommended alternative; Watermelon was not accepted as it was not Internet enabled. Students could use a number of reasons to justify their choice; however, to gain full marks they needed to apply the reason to the case study. For example, 'Peach is Internet enabled which means that customer orders could be directly transmitted back to the bakery computer, so Sebastian could begin processing orders before the drivers returned.'

Question 8a.

Marks	0	1	2	3	4	Average
%	9	7	13	11	59	**3.1**

Task		5	10	15	20	25	30	35	40	45	50
Buy & set up equipment											
Program computer											
Program PDAs											
Test system											

Question 8b.

Marks	0	1	Average
%	76	24	**0.3**

See above

Most students answered the first part of this question very well, correctly interpreting the information provided and constructing the Gantt chart. However, it was disappointing that many students did not attempt part b.

Question 9

Marks	0	1	2	Average
%	23	42	36	**1.2**

Appropriate explanations included:
- if the program needs to be altered in the future, Kayla or other programmers need to know what type of variables were used and their purpose
- if another programmer is called in later to fix problems or expand the program, the new programmer will be able to understand what the code does quickly and more easily.

It was disappointing that many students scored no marks for this question. A high percentage of the course is devoted to developing programming solutions, and students should have been able to give at least one reason to support the value of including good internal documentation. As the question was worth two marks students needed to provide two well-developed comments in their explanation.

Question 10a.

Marks	0	1	Average
%	58	42	**0.4**

A range check that generates a prompt for large numbers to get the driver to confirm the order.

Question 10b.

Marks	0	1	Average
%	48	52	**0.5**

An existence check against a list of Flip Flop products to confirm that it is correct before sending it.

Although most students were able to provide some response to this question, many simply stated a technique rather than providing a description.

Question 11a.

Marks	0	1	Average
%	50	50	**0.5**

She hasn't taken into account the resolution/screen size.

Question 11b.

Marks	0	1	Average
%	47	53	**0.6**

It can be improved by determining the screen size for the selected PDA and reducing the resolution size of all the components.

This style of question should have been familiar to students as it has appeared on a number of past papers. A change that has been incorporated from the new study design is that the user interfaces are for hand-held devices. Most students were able to provide some response to these questions; however, some students did not consider the device when suggesting errors or changes.

Question 12a.

Marks	0	1	Average
%	55	45	0.5

It doesn't allow Sebastian to see who the message is from or to see any part of the message to know whether he should accept it or not.

Question 12b.

Marks	0	1	Average
%	57	43	0.5

Any of:
- include another text box that displays the actual message
- add another button that allows Sebastian to preview the message
- add a text box to display sender information and a subject line.

Question 13a.

Marks	0	1	Average
%	56	44	0.5

Accepted concerns with the proposed training strategy included:
- parts of the training will be irrelevant to some staff
- one day of training may not be sufficient.

Some students wrote about loss of income due to the store being closed, despite being instructed in the question to state a concern **other than** the cost of shutting the bakery.

Question 13b.

Marks	0	1	Average
%	43	57	0.6

Accepted alternative strategies included:
- customise the training specifically to each role and conduct separate training modules
- use a 'train the trainer' model.

Many students described 'on the job training' but seemed to have limited or incorrect ideas of what this type of training actually is.

Most students were able to respond to this question, but many did not apply their response to the case study.

Question 14

Marks	0	1	2	3	4	Average
%	8	16	28	18	30	2.5

Option 4 – Electronic help manual with a search facility stored on the PDA. This would provide useful and in-depth help which can be used while delivering and receiving orders. A DVD or website help would not be useful as it cannot be used while drivers are on the road making deliveries. A quick guide card would not provide enough information to solve problems the drivers might face while using their PDAs, and could get lost easily.

This question was one of the better answered questions on the paper; however, students should remember that when justifying an option they should state what is good about their choice and then state why the other options are not suitable. Students who took this approach were able to access the four marks available for this question.

Question 15a.

Marks	0	1	2	Average
%	10	58	33	**1.3**

Appropriate strategies included:

- install a firewall between the web server and the Internet to filter access
- install password protection on the website so that only authorised users can access it
- encrypt all data on the website so the data will be unreadable to unauthorised people.

All of these should be monitored and tested to make sure that the system is protected.

Question 15b.

Marks	0	1	2	Average
%	34	28	38	**1.1**

Data should be saved on the PDA so that it can be transmitted when access becomes available or saved until the driver returns to the bakery. If they are not able to connect to the Internet, the drivers should be briefed about alternatives ways of transmitting their orders; for example, contact the bakery by phone to place the orders or use a paper-based order book for manual entry.

Students provided appropriate responses to Question 15, but many did not pick up the key word 'strategy' in the question. Many students were unable to outline a strategy. A strategy is a method by which an activity is carried out, and should consist of a set of steps or procedures; for example, 'What will be done?', 'When does it happen?' and 'Who does it?'. Students were expected to cover at least two methods that could be used to limit or eliminate the concern raised.