VICTORIAN CURRICULUM AND ASSESSMENT AUTHORITY

2009 Software Development GA 3: Written examination

GENERAL COMMENTS

The 2009 Software Development paper comprised of three sections: Section A contained 20 multiple-choice questions, Section B comprised of five short answer questions and Section C was a case study. The maximum score was 90, with Section A worth 20 marks, Section B worth 21 marks and Section C worth 49 marks.

The multiple-choice section has been part of the examination since 2007; students have performed consistently with an average mark of 14 each year. As has been noted in previous Assessment Reports, it is important for students to provide responses to all multiple-choice questions. Throughout the year it may be appropriate for students to practise answering multiple-choice questions.

This year saw a considerable improvement in the responses provided in Section B. The mean score was 70 per cent, compared with 58 per cent in 2008. Over the last three years, students have shown increasing ability to master the responses required and have demonstrated that they have the sound theoretical knowledge required for this section of the examination.

Section C has followed a consistent format for many years and student responses were expected to apply to the case study. The mean for this section of the examination was 47 per cent; this has not changed significantly in the last three years with students generally averaging between 45 and 51 per cent. This year the traditional algorithm question was presented in an alternative format, allowing more students to provide appropriate responses; however, many students found Question 7 a significant challenge.

During the examination, students should:

- endeavour to use correct IT terminology
- discuss all options when asked to justify a choice or compare one option with another
- know the different response expectations for verbs such as ‘state’, ‘explain’, ‘justify’ or ‘describe’
- reread each question and their response to ensure the 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 or highlight key words
- endeavour to demonstrate their knowledge of the subject and apply that knowledge to the case study, as generic responses often result in low 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	Comments
1	77	15	5	2	
2	7	4	78	10	
3	80	1	19	0	
4	19	5	18	58	
5	1	1	10	88	
6	47	11	15	27	It appears that many students considered the preparation of a disaster recovery plan in the same way as the development of evaluation criteria, which takes place in the design phase. The study design explicitly lists disaster recovery plans as part of the implementation phase.
7	5	6	18	71	
8	4	78	2	16	
9	29	7	61	3	
10	87	7	2	4	
11	19	75	4	1	

Question	% A	% B	% C	% D	Comments
12	17	3	58	22	
13	78	8	14	0	
14	6	3	88	3	
15	84	13	1	1	
16	12	10	59	19	
17	60	3	28	8	
18	4	5	14	77	
19	17	22	52	10	
20	2	6	5	86	

Section B – Short answer questions

Note: Student responses reproduced herein have not been corrected for grammar, spelling or factual information.

Question 1

Marks	0	1	2	3	4	Average
%	1	6	9	44	40	3.2

Field	Field Type
Colour	String/Text
Date purchased	Time/Date
Supplier phone no. e.g. (03) 9987 2121	String/Text
Still available?	Boolean

Students were provided with a list of possible field types and were asked to select the most appropriate field type for each of the fields listed in the table. This question should have been highly accessible to students but it was disappointing that only 40 per cent of students were able to provide all four responses completely and appropriately. Many students responded incorrectly for 'Supplier' with numeric; however, the example clearly indicated that brackets and spaces would be entered so a numeric data type would not be able to contain these characters. Many students also could not identify the Boolean data type.

Question 2

Marks	0	1	2	3	Average
%	2	16	41	40	2.2

Appropriate responses included:

- greater potential market share for a niche product
- ability to trade 24/7
- provides easier communication with customers
- able to update information and prices quickly and easily
- a reduction in costs for promotion and advertising.

A variety of potential advantages were provided; however, a number of students selected one advantage, such as 'increased customer base', and wrote it in three different ways. Students needed to provide responses that related to the business scenario described.

Question 3

Marks	0	1	2	3	4	5	6	Average
%	2	1	3	3	18	11	61	**5.1**

Feature	Justification
(B) Ability to store and run additional software	The roll-marking program that is to be used does not come as part of the operating system already on the device, so there must be the ability to load and run additional software to enable the system to be implemented.
(E) Ability to connect to wireless LAN	This is essential if the system is to be able to send the student absent data wirelessly to the central computer.
(G) Ability to connect to external devices (such as GPS sensor and barcode reader)	The device will not be able to read the barcodes against the absent student if this feature is not available.

Given the school scenario provided, the three features listed in the table above were the essential features. Students may have talked about other features that may have been desirable; however, they were not the features that must have been present for the system to work as described.

Question 4

Overall, this question was handed reasonably well by students; however, many had difficulty with Question 4c.

Question 4a.

Marks	0	1	2	Average
%	28	33	39	**1.1**

The following is an example of a good student response.

Because integer stores only full whole numbers, not decimals, and cost (price) values are in a decimal.

Question 4b.

Marks	0	1	Average
%	32	68	**0.7**

Floating point decimal

Question 4c.

Marks	0	1	2	Average
%	42	38	20	**0.8**

Students should be able to describe data structures, the advantages of their use and their weaknesses. Many students did not provide a response to the question, which is disappointing as data structures feature in both Units 3 and 4.

The following are examples of acceptable student responses.

An array only has to be defined once and can hold a large amount of items in its list. The array can be easily loaded up at the start of the application, more quickly then loading up large amounts of variables, therefore saving on time thus being more efficient.

Writing a large number of variables is very time consuming and makes the program look too messy (for other coders). By placing the variable ItemCost in an array, he does not need to create a large number of variables because the array is made up of the variables. An array holds one data element so an array could contain ItemCost, this way it is more efficient to run (the program needs only to search the array) and it is less time consuming.

Question 5

Marks	0	1	2	3	Average
%	19	16	31	34	**1.8**

In general, students made a reasonable attempt at responding to this question. It was clear they knew the reason for the validation order; however, many had difficulty explaining why the order was necessary without simply restating the question. Students need to practise questions that require them to articulate programming concepts, not simply utilise these concepts while programming.

The following is an example of a good student response.

> *This order systematically validates the data and whether it is in the prescribed limits. A numeric test cannot be undertaken if the item does not exist. The existence test assures the user that the product is there. If that succeeds then proceed to the numeric test. If not, the problem is narrowed to just the existence. Finally, if the numeric test succeeds, then the range test can be conducted to ensure that out of parameter numbers will not occur.*

Section C – Case study

Question 1

It was disappointing that less than 50 per cent of students were able to identity the reason for change (Question 1a.) or that it was a social factor (1b.). This type of question has been done poorly by students for a number of years. Teachers should model questions regarding factors promoting change on Question 1 (Section C) in both the 2008 and 2009 examinations when preparing assessment items.

Question 1a.

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

The main reason for Truss-Tee changing the system was that they could not find carpenters to retrain/use as designers.

Question 1b.

Marks	0	1	Average
%	53	47	**0.5**

Social factor

Question 2a.

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

- produce engineering and cost data
- produce cutting data

Students were provided with a data flow diagram to assist in interpreting the data flows and processing described in the case study. Many found interpreting the data flow diagram quite difficult. Some students gave only one process or listed all processes and received no marks. The question asked for the names of the processes; this clearly indicated that more than one process was required for a complete response.

Question 2b.

Marks	0	1	Average
%	9	91	**0.9**

PC1

Question 2c.

Marks	0	1	Average
%	77	23	**0.3**

A possible response could have been checking the data entry to ensure only reasonable data is allowed into the system.

It was clear from students' responses that they had a general understanding of validation and why it is used, with many answering 'to check data' or 'to validate data'. However, very few students could articulate a clear definition of the process 'validate client data'. The study design defines validate as 'to check that data input to a computer system is of an appropriate type for processing and within acceptable boundaries' (page 52). Although this is the definition all students should study, responses clearly indicated that very few students had actively studied the glossary. Teachers are encouraged to copy the glossary for all students and test their understanding and knowledge of written definitions throughout the year.

Question 3

Marks	0	1	2	Average
%	52	40	7	**0.6**

This question tested students' knowledge of documentation types. Correct responses included, for example, reading the technical manual (simply writing 'check documentation' was not sufficient) and checking the company's website. It was also acceptable to respond with 'by testing the software'. However, it was clear from responses that students either did not understand the question, as responses had nothing to do with documentation, or they did not read the question correctly and responded with 'call MyCut' or 'speak to someone else that has used the software'. These responses were both incorrect as the question stated that speaking to people or contacting MyCut should not be considered.

Question 4

Marks	0	1	2	3	Average
%	32	29	24	14	**1.2**

Possible calculations included:

- ((40,000,000 bytes * 8)/56,000 bits)/60 = 95.23 min
- (40,000,000 bits/56,000 bits)/60 = 11.9 min
- ((40,000,000 bytes * 10)/56,000 bits)/60 = 119 min (takes into account check bits and check sums that would be added).

Students could also multiply any of the above by four, as on average each set of plans involved four pages.

Results using either 40 Mb or 40 MB were accepted.

The second part of the question asked students to explain in detail why the existing Internet connection would no longer be appropriate.

Following is an example of an acceptable response.

> *One GIF file sent at a speed of 56kpps will take 95 minutes to send. The Truss-Tee company cannot afford to spend time waiting for files to transfer back and forth. This could lose the company clients and also waste worker time as they cannot work until a file is received. Paying the workers to wait is costing the company money.*

Question 5a.

Marks	0	1	Average
%	77	23	**0.3**

- 56 GB = (4*40*250/1000) +16 GB
- 21 GB = ((4*40*250/1000)/8) +16 GB – if the student used 40 Mb instead of 40 MB

Students did not need to show the calculation; it is shown here for explanation purposes only.

Question 5b.

Marks	0	1	2	Average
%	31	27	42	**1.1**

This question asked students to suggest a backup medium and justify their answer. However, many students read this as 'provide a backup strategy'. The question did not ask about when and how the backup would happen, nor its storage location. Stating a backup medium with sufficient capacity and justifying it based on the large capacity required by Truss-Tees was expected.

Following is an example of an acceptable student response.

> *A suitable backup medium for PC1 is an external hard drive. As the amount of data on PC1 could be quite large, storage mediums such as CDs and DVDs will be ineffective as Truss-Tees will need a large number of them. An external hard drive will be suitable as they can be purchased in a large size (eg150GB) and will be able to store all the backup files from PC1 each day.*

Question 6

Marks	0	1	2	3	4	5	Average
%	8	3	18	18	35	5	**3.4**

Possible answers included:

- CPU – PC1 needs a fast CPU as it may be processing many tasks at once, including scanning plans, entering client details into the database and other various management tasks for Truss-Tee
- storage – PC1 will need a good amount of storage on which to store the GIF plans, plus any additional files. Since each GIF is 40 Mb large, a large hard drive is needed
- RAM – PC1 needs to have sufficient RAM to be able to store temporary parts of the images scanned to hard drive from the scanner.

The question was answered with varying degrees of success. Students were asked to list the three most important specifications that should be considered by Truss-Tee when selecting a new PC1; however, it appeared that a number of students failed to read these key words. It appeared that some students randomly picked three specifications and described them, and others thought they needed to select from computer ABC, GP or Bell. Some students assumed they needed to pick the PC with the best RAM, storage or screen and explain why it was better. All three of these interpretations were incorrect. This is an example of where giving students many past examinations questions and/or papers can help them with the experience of attempting to respond to questions under examination conditions. In this case, the table provided stimulus rather than options to be selected from.

Question 7a.

Marks	0	1	2	3	Average
%	23	9	11	57	**2**

Following is an example of an acceptable student response.

The values 2.3, 2.4 and 2.5 test all possible number types that could occur. 2.3 is smaller then the required length, 2.4 is equal to the required length and 2.5 is greater then the required length. This comprehensively tests the algorithm.

Question 7b.

Marks	0	1	2	Average
%	59	7	34	**0.8**

Length required	What should be returned	What is actually returned
2.3 metres	true	true
2.4 metres	true	false
2.5 metres	false	false

Question 7c.

Marks	0	1	Average
%	39	61	**0.6**

A possible response could have been: It rejects a good piece of timber when the length of timber is the same as the maximum suitable, but the algorithm says it is not suitable when it is suitable.

Question 7d.

Marks	0	1	Average
%	31	69	**0.8**

- If Timber_Length >= Length_Required Then
- If Timber_Length > Length_Required **OR** Timber_Length = Length_Required Then

This type of question has traditionally been done poorly by students. This year's algorithm question, though it may have appeared less demanding, still provided many students with a challenge. Most students were able to identify and correct the error; however, many students were still unable to complete the test table correctly or explain why a certain value would be used to test the algorithm. Both of these concepts are highly important when developing software solutions and should be constantly reinforced even when developing minor or small programs throughout the course of the year.

Question 8

Marks	0	1	2	3	4	Average
%	12	27	36	16	9	**1.8**

For a number of years the examination has contained an ethical and/or legal-type question, and this year it continued to be answered poorly. However, many students were able to write an appropriate comment about copyright concerns.

In the 2008 Assessment Report it was stated that students should 'contrast the two views and add further relevant information showing their understanding.' However, many students again did not provide this type of response. This is an area that students need to focus on during their examination preparation.

The following is an example of an acceptable answer.

> *There are legal issues that face Rose in making that decision. Under the Australian Copyright law Rose would need to receive MyCut's permission for Rose to make her own modifications. Rose would also have to check the license agreement MyCut and Truss-Tee have to see if she can make modifications. Using her friend to get the software's source code is not ethically right by Rose. She is going behind the companies back and performing actions that are illegal. Rose is therefore putting Truss-Tee also in a bad position.*

Question 9

Marks	0	1	2	3	4	Average
%	32	8	25	7	28	**1.9**

There were many possible answers to this question, including (but not limited to):

- the availability of scanners – depending on Truss-Tee's time frame they may need to choose the supplier who has them available and can supply them in the shortest time frame
- the location of the suppliers may be relevant in relation to the provision of warranty support, repairs and training. An overseas supplier may not have the ability to provide the same type of support as the local supplier. This would influence their choice
- the reliability of the suppliers will be important. A brand new company may not have the track record of a long-established company and so their reliability will need to be investigated to ensure that the goods will come through. This is also related to the level of customer service provided as this will be important for future support
- training requirements of the product and the training provided by the supplier may also be reasons for choosing one product over another. If the scanners are complex to set up and use, a supplier that can provide specific training may be important.

This question posed similar problems to Question 6, with students appearing to misunderstand what the question was asking. They were asked to describe two factors to consider when comparing two scanners for purchase. The question stated that technical specifications and cost were the same so they should not be considered. Many students still included a technical specification in their response. Many students received no marks for this question; however, they were able to list why one mobile phone should be considered over another. Students need to have examples that relate to their reality to be able to contextualise some of the key concepts of the study design. They also need to develop a glossary of terms such as factors and specifications and synonyms that could be used in an examination.

Question 10a.

Marks	0	1	Average
%	73	27	**0.3**

Appropriate responses included:

- only the Melbourne factory will have high speed Internet
- Melbourne can deal with graphic images but other factories cannot.

Question 10b.

Marks	0	1	Average
%	65	35	**0.4**

Other factories will not able to receive/handle GIF files in a timely manner, therefore the new system will not function as required.

Question 10c.

Marks	0	1	2	Average
%	60	12	28	**0.7**

Direct changeover – all factories will then be able to send/receive GIF files so the new system can be fully functional, unlike the pilot if only one factory has high speed Internet access.

Students found this question a challenge. Many were unable to explain why the pilot changeover would be a concern and many responded that phased changeover would be the most appropriate method. For the new system to work all factories needed to change; this discounted any method other than a direct change in all locations. Changeover methods are a key concept with clearly defined plans of actions. Students should be able to clearly identify a method, write about it advantages and disadvantages, and suggest an appropriate method for a particular situation.

Question 11

Marks	0	1	2	3	4	5	6	Average
%	8	5	20	14	29	15	8	**3.3**

Again, students found it difficult to construct clear and detailed responses. Many students were able to give examples of security such as virus checkers, a firewall, username/password (software solutions) and access protection, such as swipe card, biometric, surveillance measures, alarms, guards, etc. (physical), but many struggled to provided an explanation about how it would provide protection for the Truss-Tee information. Students need to practise writing responses that fully answer a question.

Question 12

Marks	0	1	2	3	4	5	Average
%	37	15	11	16	10	11	**1.8**

The following is an example of a possible response.

Evaluation strategy	**Criterion 1: Processing of plans takes no longer than it used to**	**Criterion 2: Reliability of the system is maintained**
Time frame	3–6 months after implementation	3–6 months after implementation
Data to be collected and from where	• quote dates from PC1 • job logs from designers • cutting start dates from assemblers • historical data from previous system	• error logs from within the system. • data showing the downtime of the system • Internet transmission data
How the data will be used to evaluate the criteria and the overall goal	Data about when quotes are generated will give a start date for the process, the job logs will determine when the designers process the plans and the cutting start dates will determine when the job was finalised. This data can be compared against historical data related to job times to ensure that the new system meets this criterion. This assists in demonstrating that the goal of efficiently sharing the design workload is achieved.	With fewer staff doing the same workload and with extra Internet traffic the system will be under greater strain. Error logs and data showing the downtime of the system will demonstrate the system's performance under strain. Internet transmission data will show how the system is coping with the extra traffic. This will all help to determine whether this criterion is met and assist in demonstrating the goal of efficiently sharing the design workload.

This question required students to complete the table for Criterion 2, with Criterion 1 provided as an example of what was expected. Even though Criterion 1 was modelled for students, most students were not able to complete this question. It was clear that most students found the evaluation stage of the System Development Life Cycle a challenge to understand and articulate. Many students did not provide a response to the question. Students should be encouraged to write a response for every question. This is another area that teachers should concentrate on as part of examination preparation.