VCE Information Technology: Software Development 2011–2015

Written examination – End of year

Examination specifications

Overall conditions

The examination will be sat at a time and date to be set annually by the Victorian Curriculum and Assessment Authority (VCAA). VCAA examination rules will apply. Details of these rules are published annually in the *VCE and VCAL Administrative Handbook*.

There will be 15 minutes reading time and 2 hours writing time.

The examination will be marked by a panel appointed by the VCAA.

The examination will contribute 50 per cent to the study score.

Content

The *VCE Information Technology Study Design 2011–2015* is the document for the development of the examination. The study design includes the 'Glossary' (pp. 12–15) and the 'Problem-solving methodology' (pp. 16–18).

Questions will be based on the key knowledge and key skills that underpin all outcomes in Units 3 and 4. The weighting given to each unit and each outcome will be approximately equal across the examination. Aspects of some outcomes that require the use of computers will not be examined; however, underpinning knowledge and skills associated with these practical aspects are examinable.

Format

The examination will be in the form of a question and answer book. It may include questions that refer to stimulus material, such as case studies and images.

The examination will comprise three sections.

Section A will be worth 20 marks and will consist of 20 multiple-choice questions each worth 1 mark. Students will be required to answer all questions from Section A on a multiple-choice answer sheet.

Section B will be worth 20 marks and will consist of short-answer questions.

Section C will be worth 60 marks and will be based on a case study. Section C may include short-answer, multiple-part and extended-answer questions. Materials relating to the case study for Section C will be presented as an insert.

Students will be required to provide answers to questions in Section B and Section C in the spaces allocated in the question and answer book.

All questions will be compulsory. The total marks for the examination will be 100.

Approved materials and equipment

- Normal stationery requirements (pens, pencils, highlighters, erasers, sharpeners and rulers)
- One scientific calculator

Advice

During the 2011–2015 accreditation period for VCE Information Technology: Software Development, examinations will be prepared according to the examination specifications above. Each examination will conform to these specifications and will assess a representative sample of key knowledge and key skills.

The following sample questions are intended to demonstrate how new aspects of Units 3 and 4 of VCE Information Technology: Software Development may be examined. They do not constitute a full examination paper. Teachers should note that Section C is an abridged version of a case study. Teachers and students should also be aware that the terminology used in the examination will be in accordance with definitions provided in the 'Glossary' and the 'Problem-solving methodology' in the study design.

Answers to multiple-choice questions are provided on page 13.

Answers to other questions are not provided.

The following documents should be referred to in relation to the VCE Information Technology: Software Development examination.

- *VCE Information Technology Study Design 2011–2015* and the section 'Advice for teachers'
- *VCE Information Technology Assessment Handbook 2011–2015*
- *VCAA Bulletin VCE, VCAL and VET*

Sample questions

SECTION A – Multiple-choice questions

Question 1
In a use case diagram an ellipse ⬭ represents
A. an actor.
B. an entity.
C. a use case.
D. a data flow.

Question 2
An array is
A. a file of records.
B. a data structure to store files.
C. a file that allows data to be manipulated easily.
D. a data structure that allows data to be manipulated easily.

Question 3
In the Open Systems Interconnections (OSI) model the physical layer represents how
A. a connection to a communications medium can be started or stopped.
B. a connection to the correct network is established.
C. a connection to an application is established.
D. a connection to the user is established.

Question 4
For K←1 to 50
        NewMember ← Person[K]
EndFor

In the above pseudocode, Person is an example of
A. a file.
B. an array.
C. a record.
D. an array of records.

SECTION B – Short answer questions

Question 1

George has recently completed a Software Requirements Specification (SRS) for a health care company for which he has been contracted to produce a software solution. The software solution will be used by customers as they enter a claims centre and select their required service from a touch screen. This should help streamline the queuing and claims process. Agnes, the IT manager of the health care company, tells George that the SRS did not address any of the non-functional requirements of the software solution.

List **two** non-functional requirements that would be of particular relevance in this situation and for each requirement justify why it is important.

_____

_____

_____

_____

_____

4 marks

Question 2

Sally and Judith are having a discussion about the Open Systems Interconnections (OSI) model. Sally tells Judith that Layer 1 (the physical layer) is where TCP/IP protocol operates and Judith disagrees. Judith says that Ethernet protocol runs on Layer 1 and TCP/IP runs on some higher layers. You explain to both Sally and Judith that Ethernet protocol runs in Layer 2 and TCP/IP protocols do in fact reside in Layers 3 and 4.

Explain the function of Layer 1 of the OSI model, making reference to how Layer 1 forms the basis for both Ethernet and TCP/IP to work in subsequent layers.

_____

_____

_____

_____

_____

4 marks

Question 3

Consider the following stack.

Stack

92
75
23
83
52

Top

1

A stack algorithm has been designed to output 'Stack full' when an attempt is made to add an item when the stack is full. The stack algorithm will output 'Stack empty' when an attempt is made to remove an item when the stack is empty. The algorithm also displays information to the user when items are added or removed.

Complete the following table.

Function	Top	Output
Push (23)	2	Item added (23)
Push (18)		Item added (18)
Pop	2	Item removed (18)
Push (75)		
Push (92)	4	
Push (47)		

6 marks

Question 4

Part of a solution created for Liam to generate roofing jobs is the automatic sending of weekly emails to customers for whom quotations have been prepared. Recently Liam received an email from a customer who received a quotation three months ago, asking him to stop sending emails as they are spam. Liam disagrees with this.

Explain what action Liam should take referring to the *Spam Act 2003* (Cwlth).

_____

_____

_____

_____

_____

4 marks

Question 5

Julianna operates an online art supply business and she recently added the ability to accept orders from customers via her website. A friend of hers, who is overseas, sends Julianna a text message that reads: 'great website Jules, but you need to make your website secure!'

a. What could Julianna do to make her website secure?

_____

_____

_____

_____

2 marks

b. Why is Julianna's friend suggesting that she implement a security measure?

_____

_____

_____

_____

2 marks

Question 6

Longwayaway Secondary College asks all students who exit the college before they complete Year 12 to fill in a questionnaire. A portion of the questionnaire is shown above.

A program is to be written that allows the college's office staff to enter student answers into a file on disk.

The programmer is required to make data entry as efficient as possible.

a. Identify one major structural characteristic of the input data that the programmer should take into account when designing the program.

_____

_____

<div align="right">1 mark</div>

b. Explain how taking this characteristic into account will improve the efficiency of data entry.

_____

_____

_____

<div align="right">2 marks</div>

SECTION C – Case study

Case Study Insert

The existing system

Tiddlywinks is a popular world sport and is managed by the World Tiddlywinks Union (WTU). The WTU runs its Tiddlywinks World Cup competition every ten years. As Australia is one of the leading Tiddlywinks nations, the WTU has its headquarters in Melbourne.

The WTU hosts its own website. This has not been updated since the last World Cup held in 2001. It only offers a basic service where visitors can read about various tiddlywinks competitions held in different countries, view photographs taken at the matches and check the latest international tournament schedule. It is not interactive.

The popularity of tiddlywinks has been steadily declining over the last few years and the WTU sees its 2011 World Cup as a great opportunity to publicise the game. One aspect of this is to improve its website.

Proposed system

For the 2011 Tiddlywinks World Cup, the WTU would like to set up a new website. It has hired Mario, a systems analyst, to oversee the creation of the software required for the new website. After many weeks in discussion and analysis, Mario draws up a software requirements specification. Part of the specification is as follows.

The homepage of the website must be the access point for everyone who has anything to do with the World Cup competition.

The software must cater for four groups of people.

- ordinary visitors to the site who will only be allowed to find out general information about the competition such as scores and matches
- fans who will subscribe to the WTU so that they can get extra in-depth information about the competition
- team officials from each tiddlywinks playing nation
- WTU officials

The software requirements specification also includes the following use case diagram.
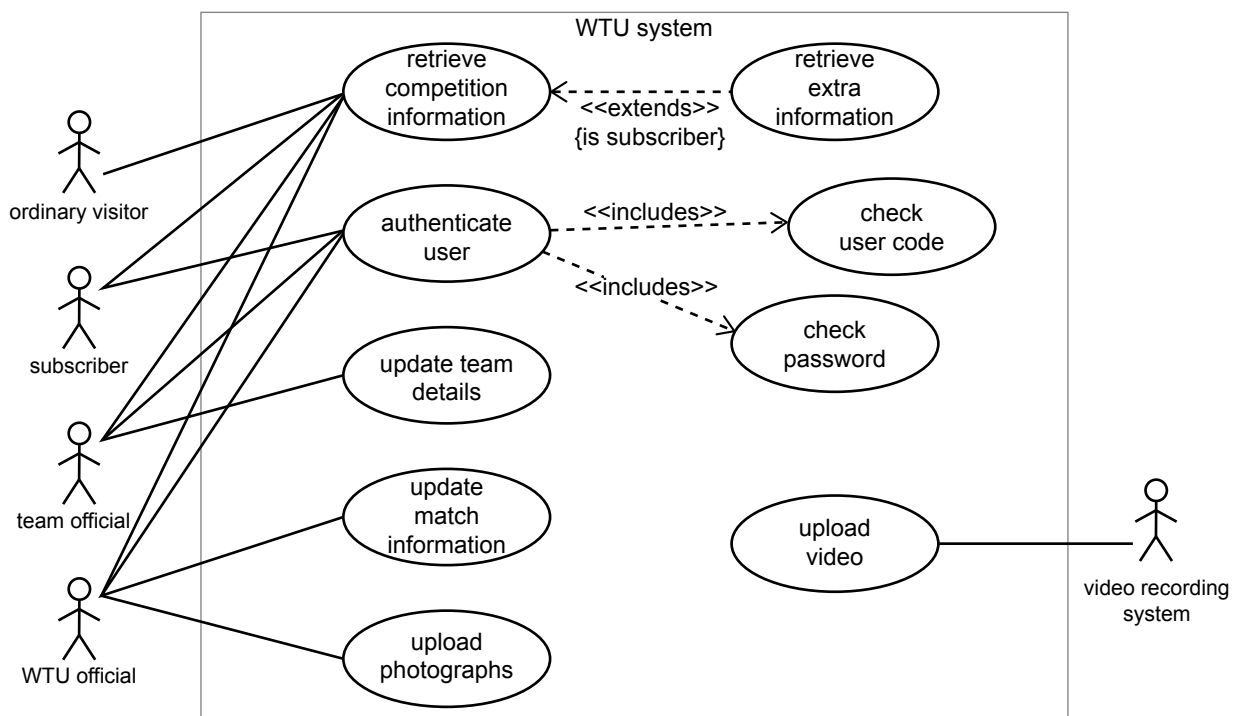
Some design decisions

Mario has decided that

• subscribers will be allowed to create their own user code, but it must begin with a letter
• WTU officials and team officials will be given a seven character user code. It will be made up of a two-digit 'country code' followed by a five-letter 'name code'.

For WTU officials the country code will be 00 and for team officials it will identify their country, as shown below.

Code	Type of official	Code	Type of official
00	WTU official	17	New Zealand
11	Australia	18	Turkey
12	United States of America	19	Brazil
13	Great Britain	20	Russia
14	South Africa	21	China
15	Japan	22	Pakistan
16	Greece	23	India

When the 'authenticate user' use case is activated one of its tasks will be to check that the format of the user code is correct. Mario has written an algorithm for the checking function. The user code entered by the website visitor will be passed to it.

Function CheckUserCodeFormat(UserCode)

Begin

FormatCorrect ← False

If First character of (UserCode) is alphabetic **Then**

FormatCorrect ← True

Else

If Length(UserCode) = 7 **Then**

CountryCode ← First 2 characters of (UserCode)

NameCode ← Last 5 characters of (UserCode)

If CountryCode is Numeric **Then**

FormatCorrect ← True

If NameCode is Alphabetic **Then**

FormatCorrect ← True

EndIf

EndIf

EndIf

EndIf

Return FormatCorrect

End

Question 1

The use case diagram shows that everyone will be able to visit the website, but that certain visitors will be given special access.

a.   State the name of the use case that all visitors to the website will be able to interact with.

_____

<div align="right">1 mark</div>

b.   State one kind of interaction that **only** a WTU official will be able to have with the website.

_____

_____

<div align="right">1 mark</div>

c.   Based on the use case diagram, list the information visitors will have to provide to the website so that the software can identify them as 'special'.

_____

_____

_____

<div align="right">2 marks</div>

Question 2

While showing the use case diagram to WTU management, one of the managers argues that the use case 'retrieve extra information' should have a different relationship with its base use case. He says it should be replaced with this.
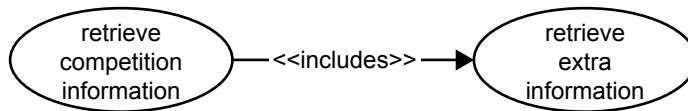
a.   State what difference, if any, this change will make for subscribers visiting the website.

_____

_____

<div align="right">1 mark</div>

b.   If this change is made, will the use case diagram match the software requirements specification? Explain your answer.

_____

_____

_____

_____

_____

_____

<div align="right">3 marks</div>

Question 3

a Certain visitors to the website will have a user code that follows the rules given in the case study insert. Complete the following table for the user codes given. Circle YES if the code has the correct format, or NO if it does not.

User code	simone12	12simone	2simone	12simon	123simo
Correct format?	YES NO	YES NO	YES NO	YES NO	YES NO

2 marks

b. Mario has produced an algorithm that checks the format of the user code (see case study insert). State the purpose of the **first** selection structure in the algorithm.

_____

_____

_____

2 marks

c. Use the algorithm to complete the following table.

User code	Value in FormatCorrect **at end of algorithm?**	**Explanation of value based on algorithm**
simone12		
12simone		
2simone		
12simon		
123simo		

5 marks

d. If the algorithm indicates that the user code has the correct format, then the use case must check that the user code exists. It will do this by searching through a list of all user codes looking for a match. Mario has chosen a binary search.

   i. Describe how the list of user codes must be arranged if the binary search is to operate successfully.

   _____

   _____

   ii. Suggest a suitable standard method for achieving this arrangement.

   _____

   _____

1 + 1 = 2 marks

Question 4

Mario has suggested that the WTU purchases a software tool to monitor each time the website goes down. He would hope the WTU website could maintain a reliability of no more than three down times per month.

Describe a strategy for using this software tool to monitor the reliability of the website.

_____

_____

_____

_____

_____

3 marks

Question 5

Identify **two** possible security issues that will need to be addressed by the WTU and explain one technique the WTU could use to prevent one of these issues.

_____

_____

_____

_____

_____

_____

_____

4 marks

Note to teachers: the algorithm presented in the case study contains an intentional error and as a consequence the tables in Questions 3a and 3c should not match. While these sample questions do not contain questions relating to finding and correcting the error, as part of exam preparation, teachers might like to take students through a 'debugging' exercise using this algorithm.

Answers to multiple-choice questions

Question	Answer
1	C
2	D
3	A
4	B