ADRIAN
JANSON
PUBLISHING

Victorian Certificate of Education
2018

Letter

STUDENT NUMBER

COMPUTING: SOFTWARE DEVELOPMENT

Written Examination

Sample Exam, 2018

Reading time: *. to *.** (15 minutes)**
Writing time: *. to *.** (2 hours)**

QUESTION AND ANSWER BOOK

Structure of book

Section	Number of questions	Number of questions to be answered	Number of marks
A	20	20	20
B	7	7	20
C	14	14	60
			Total 100

- Students are permitted to bring into the examination room: pens, pencils, highlighters, erasers, sharpeners, rulers and one scientific calculator.
- Students are NOT permitted to bring into the examination room: blank sheets of paper and/or white out fluid/tape.

Materials supplied
- Question and answer booklet of 18 pages.
- Detachable insert containing a case study for Section C in the centrefold.
- Answer sheet for multiple choice questions.

Instructions
- Detach the insert from the centre of this book during reading time.
- Write your **student number** in the space provided above on this page.
- Check that your **name** and **student number** as printed on your answer sheet for multiple-choice questions are correct, **and** sign your name in the space provided to verify this.
- All written responses must be English.

At the end of the examination
- Place the answer sheet for multiple-choice questions inside the front cover of this book.

Students are NOT permitted to bring mobile phones and/or any other unauthorised electronic communication devices into the examination room.

SECTION A – Multiple choice questions

Instructions for Section A

Answer **all** questions in pencil on the answer sheet provided for multiple-choice questions.
Choose the response that is **correct** or that **best answers** the question.
A correct answer scores 1, an incorrect answer scores 0.
Marks will **not** be deducted for incorrect answers.
No marks will be given if more than one answer is completed for any question

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Question 1
In designing a new software product, a company was able to cut the time it took to compile a sales brochure. This could best be described as an improvement in:
A. Wages
B. Cost
C. Efficiency
D. Effectiveness

Question 2
'City Tech will provide up time of 99.5%' is a statement that could be best described as:
A. An organisational goal
B. A mission statement
C. A banner heading for the web-site
D. An information system objective

Question 3
Which of the following is **not** a benefit of writing an algorithm?
A. Find errors in logic
B. Easier to divide a program up amongst a team for coding
C. Test the user interface
D. Make the code as efficient as possible

The following information is required for Questions 4, 5 and 6
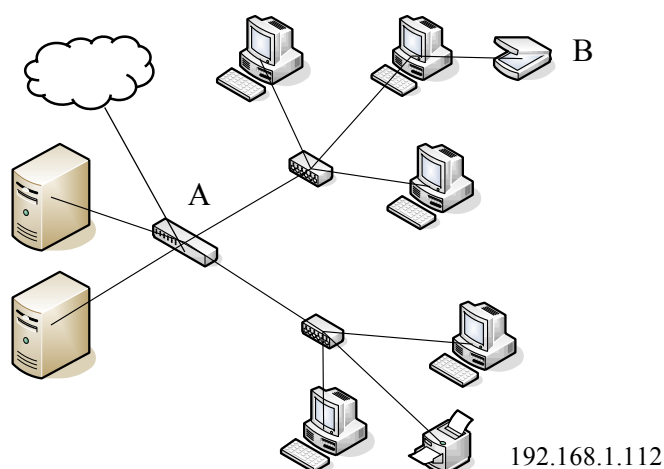
B

A

192.168.1.112

3

Question 4
The network device shown at position A in the diagram is most likely a:
A. Router
B. Switch
C. Hub
D. Firewall

Question 5
The scanner shown at position B is poorly placed as:
A. It will not work in this position.
B. It will only be able to be used when the computer it is connected to is on.
C. It should be connected to the server.
D. Other users will not be able to locate it.

Question 6
The printer shown has an IP address of 192.168.1.112. The IP address of the gateway is most likely to be:
A. 1.0.0.1
B. 192.168.0.1
C. 192.1.1.1
D. 192.168.1.1

Question 7
An interface that is 'forgiving' is one that:
A. Works reliably all of the time
B. Is easy to understand
C. Allows the user to undo transactions
D. Works on a variety of platforms

Question 8
The presence of the logic error would most likely mean that:
A. The program would not run at all
B. The program would run for a time and then crash
C. The program would not compile
D. The program would most likely give incorrect results in response to supplied input

Question 9
The validation technique known as 'existence checking' is when the code:
A. Checks to see that a value is within a specified range
B. Prompts the user to click 'next'
C. Checks to see that a value has been entered
D. Checks to see that a value is of the correct type

The following information is required for Questions 10, 11 and 12.

Consider the algorithm shown below:

```
Begin
        Index ← 0
        Read Length[Index],Width[Index],Height[Index]
        While Height[Index] <> -1 Do
                TSA ← 2 * Length[Index] * Width[Index] + 2 * Width[Index] * Height[Index] +
                        2 * Height[Index] * Length[Index]
                Display TSA
                Index ← Index + 1
                Read Length[Index],Height[Index],Width[Index]
        End While
End
```

The algorithm reads from the following data file:

5, 6, 2
3, 4, 5
1, 10, 2
77, 88, -1

Question 10
The data structure Length[Index] is most likely to be:
A. A one-dimensional array
B. A two-dimensional array
C. A reference to a hash table
D. An integer

Question 11
The first number that the algorithm will display is:
A. -1
B. 6
C. 562
D. 104

Question 12
After reading the last line of the data set, the algorithm does not finish as it should. This is because:
A. Height[Index] will equal 88 and not -1
B. Index will not equal -1
C. Height[Index] will equal -1
D. TSA will be greater than 0

Question 13
Which of the following could not be used to gather data from potential users of an App that is being developed regarding their requirements?
A. An online survey
B. A focus group
C. Observation
D. Interviews

Question 14

An element of a DFD which transforms the data coming into it is known as a:

A. Data flow
B. Data store
C. Process
D. Entity

Question 15

True/False choices in a questionnaire would best be stored as which data type?

A. Integer
B. Character
C. String
D. Boolean

Question 16

Which of the following could be legal?

A. A company sells the details of its clients to a marketing firm without permission
B. A company requests medical information from customers
C. Trying to guess someone's password so that you can access their social media accounts
D. Inspecting the code of a competitor's software product so that it can be used in your own

Question 17

A set of test data that would test the boundaries of an age range that can be from 18 to 80 years would be?

A. 17, 18, 80, 81
B. 18, 80
C. 18, 19, 79, 80
D. 16, 17, 19, 78, 79, 81

Question 18

Data that is collected that is descriptive in nature can be categorised as:

A. Associative
B. Quantitative
C. Qualitative
D. Strings

Question 19

The use of a naming convention such as the Hungarian Convention ensures:

A. Variable names will be kept to the smallest size possible
B. Consistency of the naming of program elements
C. Code will be easy to read for other programmers
D. Descriptive names will not be used

Question 20

Which of the following should not be used as an actor in a Use Case diagram?

A. Maxwell Smith
B. System Administrator
C. Accounting Department
D. Time sheet software

END OF SECTION A

SECTION B – Short-answer questions

Instructions for Section B

Answer **all** questions in the spaces provided.

Question 1

With reference to the stages of the Problem Solving Methodology, the stage that involves writing software to be used within the solution is called the _____ stage.

1 mark

Question 2

Ben is discussing the pros and cons of agile development with Tiffany. While Ben favours using agile development as the finished product is more reflective of the needs of the client, Tiffany argues that the costs can spiral out of control.

a. Explain how agile development results in a more finished product.

_____

_____

1 mark

b. In reference to the point Tiffany is making, discuss how this could occur and how it could be prevented.

_____

_____

_____

2 marks

Question 3

a. In relation to project management, explain what a milestone is.

_____

1 mark

b. Describe **two** strategies that can be used to ensure that a project does not miss its scheduled milestones.

1. _____

2. _____

2 marks

Question 4

Consider the algorithm shown below:

```
Begin
        Input A
        Input B
        Input C
        While A<>0 Do
                D ← (A+B+C) / 3
                Display D
                Input A
                Input B
                Input C
        End While
End
```

a.   State a value of 'A' that would result in algorithm ending.

_____

1 mark

b.   If the algorithm is supplied with the following input, what two values would be displayed?
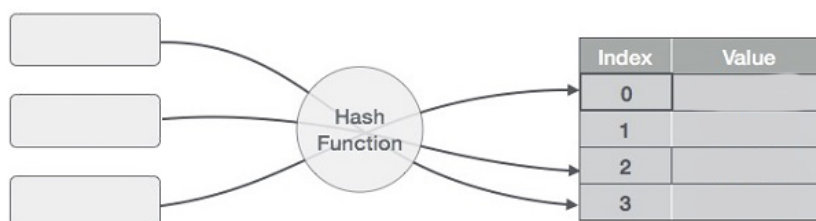10, 12, 11, 3, 9, 9, 0, 562, -10

Value 1: _____

Value 2: _____

2 marks

Question 5

The diagram below shows how a hash table works conceptually.

a. Explain what a hash function does.

_____

1 mark

b. What is the main advantage that a hash table has over a one-dimensional array?

_____

_____

1 mark

Question 6

The array of data shown below is to be sorted using a quick sort algorithm.

Index	0	1	2	3	4	5	6	7	8	9
Value	25	16	5	2	34	32	26	14	12	1

a. At the beginning of the sort, what are the values of 'up' and 'down'?

'up': _____

'down': _____

2 marks

b. Complete the first pass, and fill out what the array looks like below.

Index	0	1	2	3	4	5	6	7	8	9
Value										

1 mark

c. During the first pass, what was the value of the 'pivot'?

'pivot': _____

1 mark

Question 7

Most organisations employ both logical and physical security controls to protect their information systems. Describe **two** common logical security measures and **two** common physical security measures that can be used.

Logical measure 1: _____

_____

Logical measure 2: _____

_____

Physical measure 1: _____

_____

Physical measure 2: _____

_____

4 marks

END OF SECTION B

SECTION C – Case Study

Instructions for Section C

Please remove the insert from the centre of this book during reading time.
Use the case study provided in the insert to answer the questions in this section.
Answer **all** questions in the spaces provided.

Question 1
During their initial meeting, Chloe from OHOOM suggests that they make a list of functional requirements for the new App. In the context of how the App will be used, describe **four** functional requirements.

Requirements of the software solution	Description
Functional	1. 2. 3. 4.

4 marks

Question 2
For the following list of features or concerns, **circle** whether they are a scope or constraint.

- No technical staff on site _____ Scope   Constraint

- Place orders with (effectively) zero wait time _____ Scope   Constraint

- App to work with iOS, Android and Windows _____ Scope   Constraint

- Orders to be tracked with feedback to the user _____ Scope   Constraint

- App to include accessibility features _____ Scope   Constraint

- $5,000 budget to develop the App _____ Scope   Constraint

6 marks

Question 3

Chloe would like to create a context diagram to describe the key information that will be flowing in and out of MSIYS (some of which will be handled by the App). Label the entities and data flows in the diagram below:
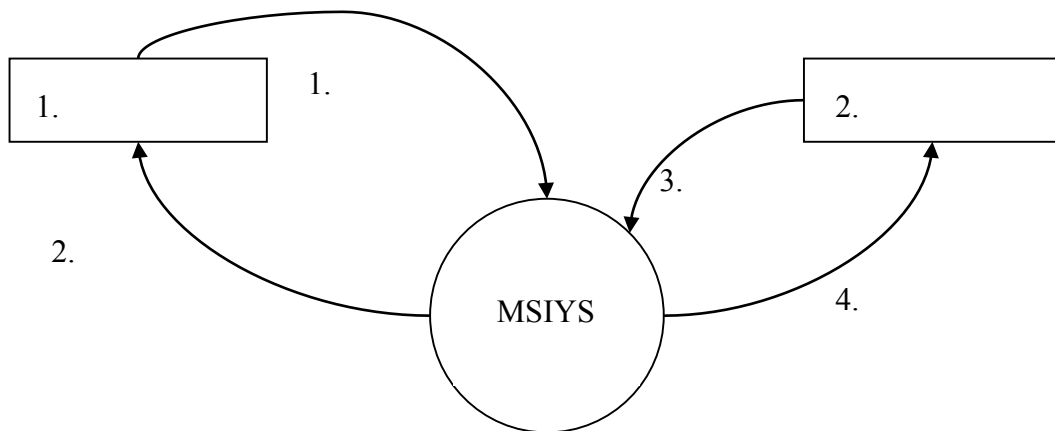
6 marks

Question 4

Chloe raises some concerns she has about authentication. Most of the small business clients of MSIYS have 1 or 2 employees and these clients will likely be able to order food and drinks freely through the App. However, some clients of MSIYS have 5 or more employees. Being an open environment, people often leave their phones on their desks while they talk to others, visit the bathroom or collect a print job.

a. List **two** ways the functioning of the App could be abused if there is no authentication in place?

1: _____

_____

2: _____

_____

2 marks

b. Describe an authentication method that could be build into the App to prevent either of these abuses.

_____

_____

_____

_____

2 marks

Question 5

At present, Phillip has the SSID and network password displayed at various places in the office space. He feels that this is adequate, as people entering the office space need to use their swipe cards to gain access anyway.

List **three** ways this system could be abused and propose a more secure method that could be put into place.
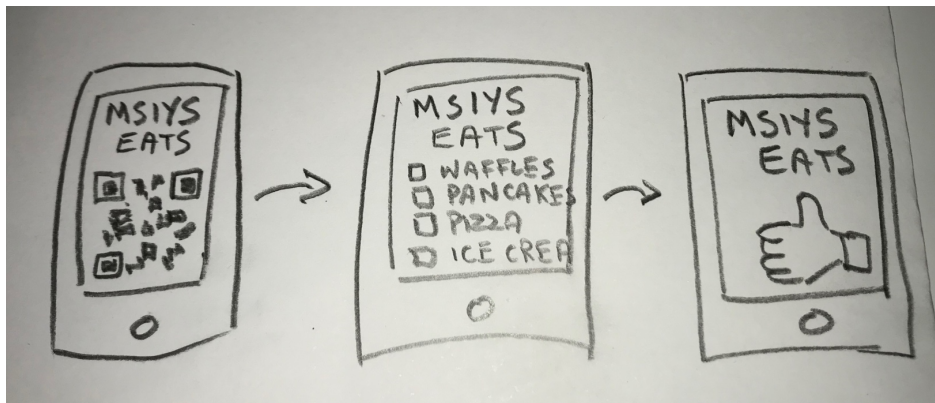
1: _____

_____

2: _____

_____

3:_____

_____

Proposal: _____

_____

4 marks

Question 6

Phillip shares a rough concept sketch that he has made with Chloe. Describe **two** concerns you would have with this design as shown.

1: _____

_____

2: _____

_____

2 marks

TURN OVER

Question 7

Menu data sourced via the Ooba Eats API is in the form of an XML file. A sample of this file is shown below.

```
<?xml version="1.0" encoding="UTF-8"?>
        <pablos-crepe-barn>
                <breakfast>
                        <food-item>
                                <id>12085</id>
                                <name>Belgian Waffles</name>
                                <description>Two of our incredible Belgian waffles with our world
                                famous maple syrup!</description>
                                <price>$8.99</price>
                                <valid-till>"29/12/18"</valid-till>
                        </food-item>
```

Chloe intends to import this data and have the storage occur in the App as a collection of arrays of records. There would be an array for breakfast, lunch, dinner and snack menu items.

a.   What is the advantage of using a record data structure to store the contents of the XML file as opposed to a number of 1D arrays?

_____

_____

_____

1 mark

b.   For each of the following variables, **select** whether it should be a Boolean, Integer, Character, Floating Point, Date, Char or String variable type and **justify** your choice.

Variable Name	Type	Justification
msiys-breakfast(1).name		
msiys-breakfast(1).price		
msiys-lunch(5).description		
msiys-dinner(10).id		

8 marks

SECTION C − continued
TURN OVER

Question 8

Kelly, one of the programmers at OHOOM, is writing an algorithm for the new App. Under Phillip's direction, the prices that are read in via the Ooba Eats API will have a $0.10 surcharge added to them to cover the ongoing costs of maintaining the App. Kelly has written an algorithm for this process shown below.

```
Def Calculate_Adjusted_Prices
        index ← 0
        While not end of breakfast list
                index ← index + 1
                msiys-breakfast(index).price ← msiys-breakfast(index).price + 0.10
        End While
        While not end of lunch list
                index ← index + 1
                msiys-lunch(index).price ← msiys-lunch(index).price + 0.10
        End While
        While not end of dinner list
                index ← index + 1
                msiys-dinner(index).price ← msiys-dinner(index).price + 0.10
        End While
        While not end of snack list
                index ← index + 1
                msiys-snack(index).price ← msiys-snack(index).price + 0.10
        End While
```

a. When Kelly first tests the logic of the algorithm using a trace table, she finds that the breakfast items are adjusted correctly but the rest of the menu items are left untouched. Locate the source of the error and suggest a correction that can be applied to fix this issue.

Error: _____

Correction: _____

_____

2 marks

b. Kelly, Chloe and Phillip have a discussion about this process. Chloe raises the issue of a large surcharge being applied if the client orders a large number of separate items. Phillip agrees to limit the maximum surcharge to $0.50. If a variable were added called '*surcharge*' describe what could be done to implement what has been described.

_____

_____

_____

2 marks

c. Write a line that could be added to Kelly's algorithm that will ensure that the maximum surcharge will be $0.50.

_____

1 mark

Question 9

Phillip has an idea that he feels can be implemented for the benefit of all of MSIYS's clients. Since clients will be installing an App on their phone, tablet or notebook, the App could also be used to gather browsing data from clients with the view to directing targeted advertising to them.

a.   Discuss the legalities of this proposal from Phillip?

_____

_____

_____

2 marks

b.   Describe how this could be implemented if Phillip decided that he did want to proceed with this idea.

_____

_____

_____

2 marks

Question 10

A number of implementation models are being considered by the OHOOM Technologies team. Kelly is pushing for the App to be developed as a thin client mobile application while Chloe prefers it to be a rich client App.

a.   What is the difference between a thin client mobile application and a rich client one?

_____

_____

2 marks

b.   Which application architecture would be the best one to implement and why?

_____

_____

_____

_____

_____

2 marks

Question 11

In an effort to keep the size of the source files as small as possible, Kelly has maintained two versions of the software. In the development version, she has included comprehensive internal documentation that describes the variables, data structure and logic of the code. In the production version, she has taken out all of these lines and simply included the line:

For development enquiries, please contact Kelly Sutcliff, ksuttcliff@gmail.com. Rates negotiable!

Discuss the legalities of what Kelly has done.

_____

_____

_____

_____

_____

_____

_____

2 marks

Question 12

The café at MSIYS has been open for two weeks, but orders have been minimal as the App is still not ready to be released. Phillip is getting frustrated as food is being wasted and he is losing money in wages. Phillip instructs OHOOM Technologies to skip their final testing phase in which they intended to compare the functioning of the App to the SRS.

Describe **two** consequences that might be a result of skipping this phase.

1: _____

_____

_____

2: _____

_____

_____

2 marks

Question 13

The App has been implemented. A server has been placed in Phillip's office and the App sources all of its data from this server. While the App is operating as expected, nothing has been done to prevent threats to the integrity of data on the server or at MSIYS. For each of the types of threat listed below, describe one potential threat that could occur and how this could be prevented.

Type of threat	Possible threat to data	How the loss could be prevented
Accidental		
Event-based		
Deliberate		

6 marks

Question 14

Chloe suggests that some features be added to an update of the App to allow for Phillip to more easily evaluate how the App is being used and received by clients.

Describe **two** changes that could be made to the App to allow this to be done.

1: _____

_____

_____

2: _____

_____

_____

2 marks

END OF QUESTION AND ANSWER BOOK

Insert for Section C – Case study

Please remove from the centre of this book during reading time.

The existing system

MSIYS (My Space Is Your Space) is a flexible office space occupying the whole second floor of a modern office building in the Melbourne CBD. Members of MSIYS can come to the office space at any time and use any of the facilities as if it were their own office. The space consists of 20 desks (of various sizes), several meeting rooms, tea and coffee facilities, free Wi-Fi, executive bathrooms (with showers) and printing facilities. The monthly membership price covers the use of all of these facilities and the space is open 24/7 (access by swipe card). Tech support is handled via a ticketing system and is on-call (not on site). Phillip Gaines owns and manages the centre and is on site (and has his own dedicated office) during normal business hours. Some desks have monitors, keyboards and mice connected to docks that clients can plug in to.

Phillip receives many requests from clients in relation to catering. While it is easy enough for clients to take the lift down to the street and get drinks or food from local cafes, sometimes they find it inconvenient. Phillip would like to set up the Your Space Café on site and allow clients to order via an App for table service or local Ooba Eats establishments.

Phillip has employed OHOOM Technologies to design and implement the new App. In the meantime, Phillip is handling construction of the Café and employing staff.

In meeting with consultants from OHOOM, the following was decided:
- When clients download the App, they would register it using their MSIYS account, so that the food order would be able to be billed to their account.
- When placing an order, the user of the App would scan a QR code (which would be located on every desk and in every meeting room within the office area), so that the café will know where to bring the order.
- The App will allow multiple logins under the same account, to allow clients to have several people registered if need be.
- The App will have a list of café items that can be ordered (some of which may vary from day to day). The App will also be able to display menu items from local cafes and restaurants, that the App will then place orders with, via an Ooba Eats API (a code module that will be supplied by Ooba Eats that will integrate with the App seamlessly).

SOLUTIONS and TEACHER NOTES
SECTION A – Multiple choice questions

Question 1

In designing a new software product, a company was able to cut the time it took to compile a sales brochure. This could best be described as an improvement in:
A. Wages
B. Cost
C. Efficiency
D. Effectiveness

Measures of time, cost or effort are always efficiency. Effectiveness relates to correctness of the information or how well as solution works. Make yourself familiar with the glossary definitions of these terms in the Study Design.

Question 2

'City Tech aims to provide up time of 99.5%' is a statement that could be best described as:
A. An organisational goal
B. A mission statement
C. A banner heading for the web-site
D. An information system objective

While goals and objectives of information systems are not a big focus of this study, they are mentioned in the Study Design, so make sure you are familiar with the definitions.

Question 3

Which of the following is **not** a benefit that writing an algorithm provides?
A. Find errors in logic
B. Easier to divide a program up amongst a team for coding
C. Test the user interface
D. Make the code as efficient as possible

Question 4

The network device shown at position A in the diagram is most likely a:
A. Router
B. Switch
C. Hub
D. Firewall

Question 5

The scanner shown at position B is poorly placed as:
A. Will not work in this position.
B. It will only be able to be used when the computer it is connected to is on.
C. It should be connected to the server.
D. Other users will not be able to locate it.

Question 6

The printer shown has an IP address of 192.168.1.112. The IP address of the gateway is most likely to be:

A. 1.0.0.1
B. 192.168.0.1
C. 192.1.1.1
D. 192.168.1.1

Response B is close, but 192.168.0 is a different subnet to 192.168.1. The most likely scenario is that the gateway will be on the same subnet as the printer which is 192.168.1.x

Question 7

An interface that is 'forgiving' is one that:

A. Works reliably all of the time
B. Is easy to understand
C. Allows the user to undo transactions
D. Works on a variety of platforms

Question 8

The presence of the logic error would most likely mean that:

A. The program would not run at all
B. The program would run for a time and then crash
C. The program would not compile
D. The program would most likely give incorrect results in response to supplied input

Question 9

The validation technique known as existence checking is when the code:

A. Checks to see that a value is within a specified range
B. Prompts the user to click 'next'
C. Checks to see that a value has been entered
D. Checks to see that a value is of the correct type

Question 10

The data structure Length[Index] is most likely to be:

A. A one-dimensional array
B. A two-dimensional array
C. A reference to a hash table
D. An integer

Question 11

The first number that the algorithm will display is:

A. -1
B. 6
C. 562
D. 104

Question 12

After reading the last line of the data set, the algorithm does not finish as it should. This is because:

A. Height[Index] will equal 88 and not -1
B. Index will not equal -1
C. Height[Index] will equal -1
D. TSA will be greater than 0

Question 13

Which of the following could not be used to gather data from potential users of an App that is being developed regarding their requirements?

A. An online survey
B. A focus group
C. Observation
D. Interviews

Observation is usually done to see how users interact with an existing software solution. In this case, the App is yet to be developed and data is sought on the requirements of users, so observation will not achieve this.

Question 14

An element of a DFD which transforms the data coming into it is known as a:

A. Data flow
B. Data store
C. Process
D. Entity

Question 15

True/False choices in a questionnaire would best be stored in which data type?

A. Integer
B. Character
C. String
D. Boolean

Key word is 'best'. A true/false response could be stored in any of these types but a boolean would be the most efficient.

Question 16

Which of the following could be legal?

A. A company sells the details of its clients to a marketing firm without permission
B. A company requests medical information from customers
C. Trying to guess someone's password so that you can access their social media accounts
D. Inspecting the code of a competitor's software product so that it can be used in your own

Option B could be legal if the company has a legitimate reason for requesting medical information.

Question 17

A set of test data that would test the boundaries of an age range that can be from 18 to 80 years old, would be?

A. 17, 18, 80, 81
B. 18, 80
C. 18, 19, 79, 80
D. 16, 17, 19, 78, 79, 81

18 and 80 are valid, so the test data needs to include these values as well as ones just outside these.

Question 18

Data that is collected that is descriptive in nature can be categorised as:

A. Associative
B. Quantitative
C. Qualitative
D. Strings

Question 19

The use of a naming convention such as the Hungarian Convention ensures:

A. Variable names will be kept to the smallest size possible
B. Consistency of the naming of program elements
C. Code will be easy to read for other programmers
D. Descriptive names will not be used

Technically, Hungarian Convention ensures consistency of the naming of program elements. Whether they will make any sense to other programmers is another question!

Question 20

Which of the following should not be used as an actor in a Use Case diagram?

A. Maxwell Smith
B. System Administrator
C. Accounting Department
D. Time sheet software

Actors in Use Case diagrams represent roles, organisations or systems but should not represent individuals. The reason for this is that individuals change roles or come and go from the organisation.

SECTION B – Short-answer questions

Question 1

development

1 mark

Question 2

a. At the completion of each phase in an agile development, the client is consulted and changes made, which may result in phases being revisited. The client is able to check and make adjustments while the development is occurring which results in a better product being created.

1 mark

b. An agile development can result in a project taking a lot longer than planned with phases being revisited. It can be prevented with a strong project management plan in place that caps the amount of time that is spent at each stage and prevents scope creep.

2 marks

Question 3

a. A point in time at which an event in the project (completion of stage or whole of the project) needs to be completed to a specific point or an event occurs.

1 mark

b.

1. Ensure that tasks have enough time built in to allow them to be completed allowing for delays.

2. Allocate enough resources to critical tasks so that they can be completed on time.

2 marks

Question 4

a.   0

1 mark

b.   Value 1: 11, Value 2: 7

2 marks

Question 5

a. It maps a value to an index based on a rule.

1   mark

b. It is quicker to locate values or determine if they are present.

1 mark

Question 6

d. 'up': 0, 'down': 9

2 marks

e.

Index	0	1	2	3	4	5	6	7	8	9
Value	14	16	5	2	1	12	25	26	32	34

1 mark

f. 'pivot': 25

1 mark

A variation of this question could have the sort already mid way through and ask you to perform a few comparisons or a complete pass from that point.

Question 7

Logical measures
- Usernames and passwords so that only those that are authorised can gain access to the information system.
- Levels of access which only allow those with the correct clearance in an organisation to access important / critical files.

Physical measures
- Security cameras which monitor critical areas such as the server room.
- Swipe cards on doors so that only those with clearance can gain physical access to certain areas.

4 marks

Other possible answers include the use of logs / audit trails and biometric devices such as fingerprint scanners / locks.

END OF SECTION B

SECTION C – Case Study

Question 1

| Requirements of the software solution	Description
Functional	1. Order food and drinks from the supplied menus 2. Display and order with local menus using the Ooba Eats API 3. Correctly link the order to the client's account 4. Locate the destination of the order correctly using the QR codes.

4 marks

Question 2

- No technical staff on site _____ Scope   Constraint

- Place orders with (effectively) zero wait time _____ Scope   Constraint

- App to work with iOS, Android and Windows _____ Scope   Constraint

- Orders to be tracked with feedback to the user _____ Scope   Constraint

- App to include accessibility features _____ Scope   Constraint

- $5,000 budget to develop the App _____ Scope   Constraint

6 marks

Constraints are things that need to be taken into account that may limit what the software solution will be able to do or need to be built into it as a specific requirement. Cost, compatibility of equipment and the operating environment are common constraints on solutions. Scope describes what the solution will (or won't) do.

Question 3
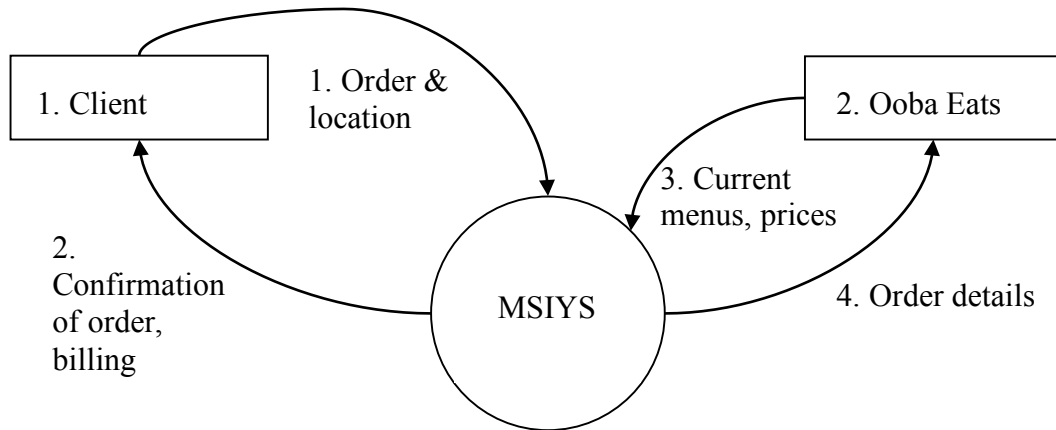
6 marks

Question 4
a.

1: If anyone in the business can place food orders, there may be duplication or orders placed that have not been approved by the owner of the business.

2: A mobile phone could be used to quickly order food to a vacant location in the office area (by scanning a QR code) and billed to a company, by someone else.

2 marks

b. The App could have a number of senior people registered that will receive a notification of a pending order (via SMS, email, or via the App). That person then needs to approve the order before it will proceed.

2 marks

Question 5
1: a person with a swipe card could let their friends (who are non-members) enter the space and use the facilities for free.

2: Staff who work in the office (such as café staff, cleaning staff, etc) would be able to use the Internet connection for free.

3: The signal may be strong enough for people outside or on different floors to access, if they know the password.

Proposal: Users could be granted access via a secure authentication server that checks to see that they are a registered employee of a currently subscribed client.

4 marks

Question 6

1: The client cannot see any details about the dishes being ordered, such as price or description.

2: The interface is not intuitive. The heading 'MSIYS Eats' takes up too much screen real estate.

2 marks

Question 7

a. Data associated with each menu item is kept together. A collection of 1D arrays could easily become out of sync (that is – index 100 in one array may not match the data at index 100 in another array).

1 mark

b.

Variable Name	Type	Justification
msiys-breakfast(1).name	String	Name of the dish – multiple word description.
msiys-breakfast(1).price	String	Price includes a $ sign and a . point, so must be a string.
msiys-lunch(5).description	String	Description of the dish – several words (or a sentence or two).
msiys-dinner(10).id	Integer	Id is composed of a whole number.

8 marks

Question 8

a.

Error: The index variable is not reset to 0 each time a new while loop is started.
Correction: Before each while loop, insert the line 'index ← 0'.

2 marks

b. Instead of adding $0.10 to each menu item, add up the total number of menu items that have been ordered, and multiply this by $0.10. If the total is greater than $0.50, set the surcharge variable to $0.50.

2 marks

c. If surcharge > 0.50 then surcharge ← 0.50

1 mark

Question 9

a. For this feature to be included in the App, it is necessary to ask the permission of users under the Privacy Act 1988. The App would need to be designed so that if users 'opted out', the App will still work normally. Collecting the data without the permission of individual users would be illegal.

b. On install, the App could inform users that this was a 'feature' that was included and ask their permission to install it or whether they wanted to 'opt out'. It would also be a good idea to include this as an option in the App's settings so that users who changed their mind would not have to uninstall and reinstall the App to change the setting.

2 marks

Question 10

a. A thin client application has the bulk of its data stored on a server whereas a rich client application stores most of its data on the device.

2 marks

b. As every client would be accessing the menus (some on a daily basis), it would be preferable to have these stored centrally rather than have each App download the data separately. If clients were using their mobile Internet connections, the amount of data downloaded would potentially have an impact on their monthly data allowances.

2 marks

To be fair, the amount of data would not be great and mobile plans are generally quite generous with data, but having the data in a central place makes much more sense in this scenario.

Question 11

By including this line, it appears that Kelly is promoting her own work instead of that of OHOOM Technologies. Given that she works for OHOOM Technologies, her work product belongs to them and not to her. Phillip is also not getting the whole product that he has contracted OHOOM Techologies to produce, but as the omission is in the internal documentation, he may not be aware of this until changes need to be made to the App. When this occurs, it puts him in the position of having to contact OHOOM Technologies again or, if OHOOM is no longer in existence, paying a lot of money for a new programmer to effectively start from scratch.

2 marks

Question 12

1: OHOOM may not have the opportunity to ensure that all of the requirements outlined in the SRS have been addressed.

2: OHOOM may not have the opportunity to test compatibility with different devices and how the App performs in terms of robustness and stability.

2 marks

Question 13

Type of threat	Possible threat to data	How the loss could be prevented
Accidental	Phillip deletes the data off the server.	Maintain frequent backups of the server data that are stored in an off-site location or the cloud.
Event-based	Fire in the building destroys the server.	Maintain backups in the cloud.
Deliberate	The system is hacked from outside.	Ensure that firewalls, virus checkers and security protocols are in place. The database could also be encrypted.

6 marks

Many other threats could be mentioned here. Examiners will have a list of valid responses from which they will check your response. While this does mean that there are several ways in which you can achieve full marks in the question, you should always put down the most obvious answers first to make sure your response is on the examiner's list.

Question 14

1: Include a facility inside the App that logs all of the transactions, including aspects such as order frequency and time to place an order.

2: After each order is completed, have the App ask the client if they wish to submit feedback – either as a star rating (how happy they are with their order and the process) or allowing them to write a comment.

2 marks