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STUDENT NUMBER

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COMPUTING: SOFTWARE DEVELOPMENT

Written Examination

Sample Exam 3, 2016

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	15	15	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 21 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

Question 1

A mission statement is:

- A. A lengthy document outlining all business practices
- B. Only for public relations purposes
- C. A blurb for the website stating name and location and ‘about us’
- D. A statement of the ultimate goals of the organisation

Question 2

Which of the following is **not** a component of an information system?

- A. Reports
- B. Data
- C. People
- D. Digital hardware and software components

Question 3

When transferring data across a wired network, the most likely protocol would be:

- A. HTTP
- B. Ethernet
- C. TCP/IP
- D. FTP

Question 4

VPN stands for:

- A. Virtual Private Network
- B. Virtual Public Node
- C. Very Public Network
- D. Volatile Packet Net

Question 5

In a DFD, an entity represents:

- A. A person inside the organisation that deals with data
- B. A system within the organisation that processes data
- C. A system outside the organisation that processes data
- D. A person or company outside the organisation that receives or provides data

SECTION A – continued
TURN OVER

The following information is required for Questions 6, 7 and 8.

Table 1

Variable Name	Type	Size (bytes)
ID	Integer	1
Title	String	10
Classification	String	10
Borrowed	Boolean	1

Question 6

The tool displayed in Table 1 can best be described as a:

- A. Context Table
- B. Data Flow Diagram
- C. Variable List
- D. Data Dictionary

Question 7

The maximum number of unique 'ID' numbers that could be stored would be:

- A. 16
- B. 256
- C. 255
- D. 2056

Question 8

A Boolean data type stores data that is:

- A. Encrypted
- B. A prime number
- C. A positive integer
- D. True or false

Question 9

One of the first steps in moving forward with the creation of a new software solution should be:

- A. Writing code
- B. Writing documentation
- C. Working out a detailed budget
- D. Working out what needs to be done and the timelines involved

Question 10

In creating a mind map, which of the following is the most correct?

- A. The central idea or concept is placed in the middle of the mind map
- B. Each person thinks of their own ideas and these are combined at the end
- C. More important concepts are represented with larger circles
- D. A maximum of 6 circles should be added to ensure that the ideas are not too broad

SECTION A – continued
TURN OVER

The following information is required for Questions 11, 12 and 13.

```
▼<CATALOG>
  ▼<CD>
    <TITLE>Empire Burlesque</TITLE>
    <ARTIST>Bob Dylan</ARTIST>
    <COUNTRY>USA</COUNTRY>
    <COMPANY>Columbia</COMPANY>
    <PRICE>10.90</PRICE>
    <YEAR>1985</YEAR>
  </CD>
  ▼<CD>
    <TITLE>Hide your heart</TITLE>
    <ARTIST>Bonnie Tyler</ARTIST>
    <COUNTRY>UK</COUNTRY>
    <COMPANY>CBS Records</COMPANY>
    <PRICE>9.90</PRICE>
    <YEAR>1988</YEAR>
  </CD>
  ▼<CD>
    <TITLE>Greatest Hits</TITLE>
    <ARTIST>Dolly Parton</ARTIST>
    <COUNTRY>USA</COUNTRY>
    <COMPANY>RCA</COMPANY>
    <PRICE>9.90</PRICE>
    <YEAR>1982</YEAR>
  </CD>
```

Question 11

The data shown above is in which file format?

- A. CSV
- B. HTML
- C. Javascript
- D. XML

Question 12

This is not a complete file. It is easy tell this because:

- A. There is no closing 'catalog' tag
- B. The last item listed begins with 'G' and this is not close to the end of the alphabet
- C. The file states that there are 7 items in total
- D. The arrow at the side of the main tag has not been expanded

Question 13

The <YEAR> field would most likely be of type:

- A. Character
- B. Text
- C. Number
- D. Date

Question 14

What does the process known as benchmarking achieve?

- A. Tasks within the organisation are compared to best practice
- B. Results of tests within the organisation are published online
- C. Processes within the organisation are timed and compared to their main competitor
- D. The main bench within the organisation is 'marked up' to show when tests were carried out

SECTION A – continued
TURN OVER

Question 15

What rights does an author of a work **not** have?

- A. The right to chose when and how the work will be distributed
- B. The right to incorporate protection methods to protect their work
- C. The right to control how their work is communicated to others
- D. The right to prevent anyone quoting from the work

Question 16

In tracing transactions between users of information systems, which method would be the most effective?

- A. Written logs beside each workstation
- B. Using access logs and audit trails
- C. Requiring an email to be sent per transaction
- D. Video camera surveillance

Question 17

A software solution is struggling to be effective with the main problem being the timeliness of data. This means:

- A. Data is too large to be processed
- B. Once it has been processed, the timeframe of its usefulness has passed
- C. The data is not being communicated clearly
- D. The data does not have data or time fields attached to it

Question 18

Internal documentation is:

- A. A user guide which is included inside the code of a software solution
- B. Documentation that is only intended for those internal to the organisation
- C. Documentation intended for those that might make changes to the code
- D. Documentation that is opened by typing an administrator password

Question 19

Client.Surname could be an example of a piece of code you might see when dealing with:

- A. a one dimensional array
- B. a hash table
- C. a data dictionary
- D. a record

Question 20

When coding a search for data in an array, Joey decides to start at the beginning and check each array element in turn. This is called a:

- A. linear search
- B. brute force
- C. binary search
- D. hash function

END OF SECTION A

SECTION B – Short-answer questions**Instructions for Section B**

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

Question 1

A variable type that can only have two values: ‘true’ or ‘false’ is called _____.
1 mark

Question 2

What is the difference between efficiency and effectiveness?

2 marks

Question 3

Consider the following array of numbers that is to be sorted in ascending order using a selection sort. The sort is programmed to move through the array from left to right.

Index	0	1	2	3	4
List(Index)	65	23	45	62	27

a. On the first pass through the array, what number would be selected?

Value: _____
1 mark

b. How many passes will it take to sort this array?

Value: _____
1 mark

c. If this array had 1000 elements, how many passes would it take to sort this array?

Value: _____
1 mark

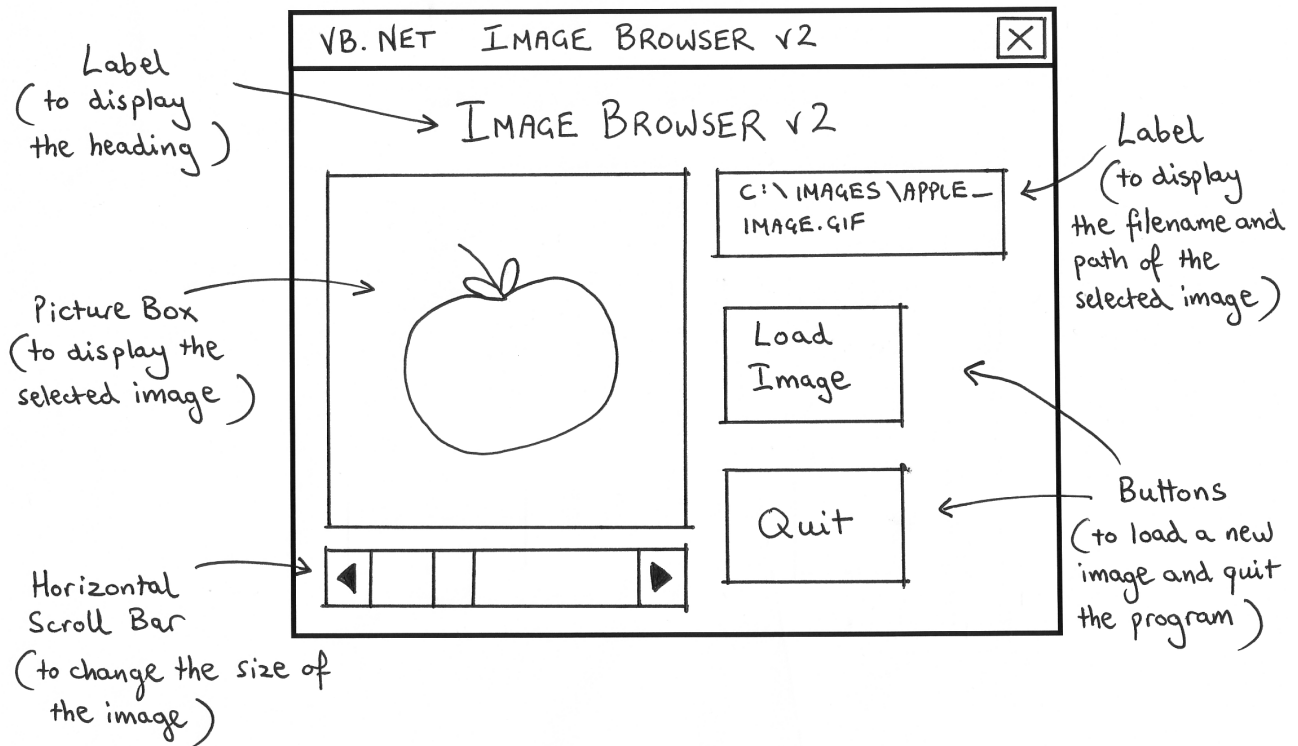
d. If this array had 1000 elements, how many comparisons would it take to sort this array?

Value: _____
1 mark

SECTION B – continued
TURN OVER

Question 4

Consider the diagram shown below:



- a. What is the name for a diagram of this type?

1 mark

- b. Who has this diagram been produced for?

1 mark

- c. At what stage of the Problem Solving Methodology would a diagram such as this be produced?

1 mark

- d. List two benefits of producing a diagram of this type (as opposed to not producing one at all).

Benefit 1: _____

Benefit 2: _____

2 marks

**SECTION B – continued
TURN OVER**

Question 5

Study the pseudo-code algorithm below:

```

Begin
  Input Number
  Loop from 1 to Number
    Display "Iteration: ", Number
    Sample  $\leftarrow$  Random (100)
    If Sample > 50 Then
      Display "Sample has passed"
    Else If Sample < 50 Then
      Display "Sample has failed"
    End If
  End If
End

```

- a. What is the smallest integer value for 'Sample' that would result in the text "Sample has passed" being displayed?

Value: _____ 1 mark

- b. What is the largest integer value for 'Sample' that would result in the text "Sample has failed" being displayed?

Value: _____ 1 mark

- c. For what value would neither "Sample has passed" or "Sample has failed" be displayed?

Value: _____ 1 mark

- d. Suggest **one** way that this could be fixed.

_____ 1 mark

SECTION B – continued
TURN OVER

Question 6

What is the difference between a method and a function?

2 marks

Question 7

A company has decided to change from performing a daily incremental backup to performing a single full backup once per week. List two disadvantages of such a move.

Disadvantage 1: _____

Disadvantage 2: _____

2 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

Keenan would like to begin the process by gathering some data from customers about what they would like to see in a system such as the one he is proposing. He decides to conduct a survey in-store as well as interview some of his frequent customers. List **four** questions that he should be asking customers as part of this data gathering process?

Question 1: _____

Question 2: _____

Question 3: _____

Question 4: _____

4 marks

Question 2

Keenan needs to take into account a number of constraints when pitching his idea to *CodeWizardz*. For each of the categories listed below, list **two** constraints that need to be considered.

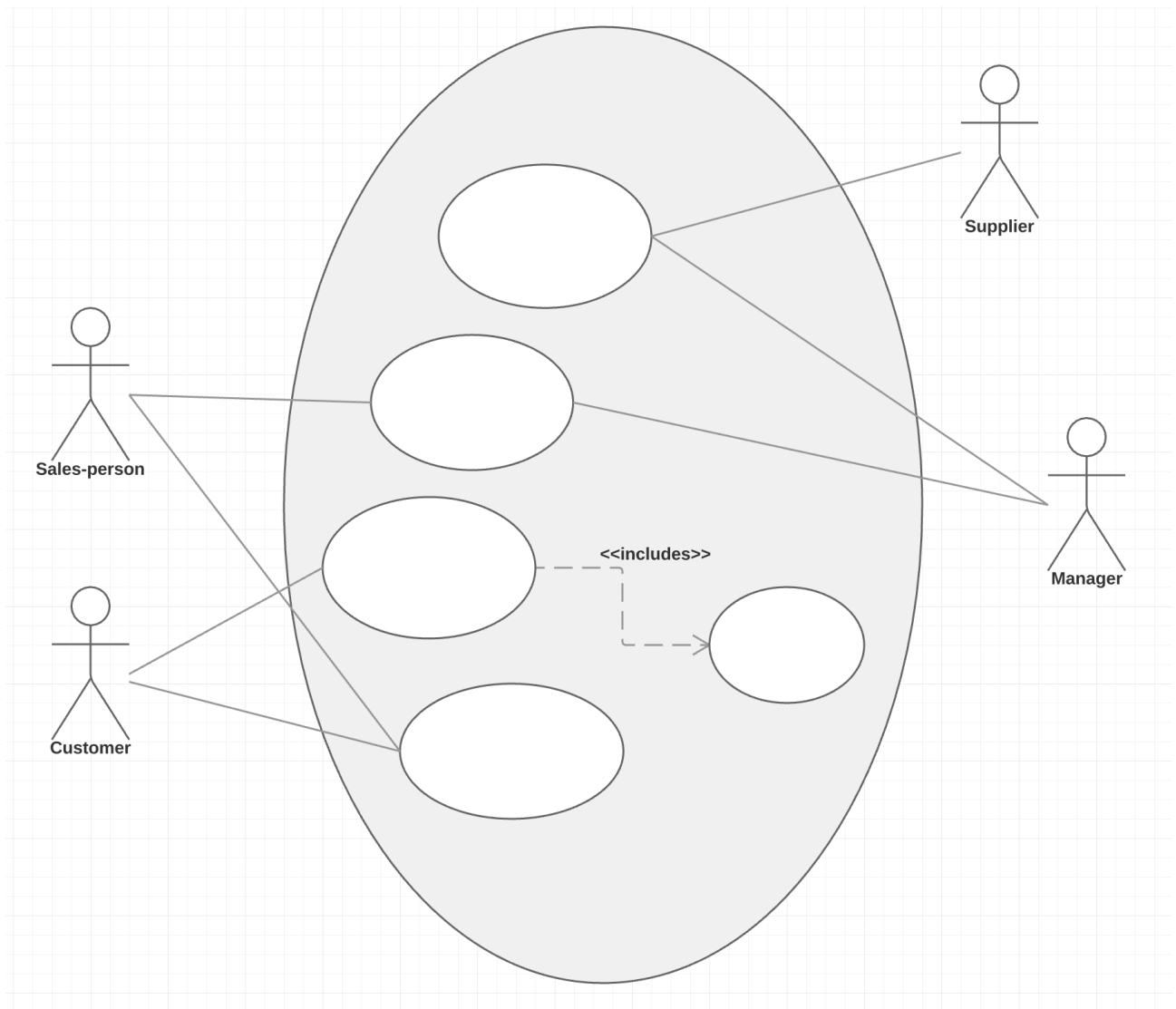
Category	Constraints
Social factors	1: 2:
Legal requirements	1: 2:
Compatibility	1: 2:

6 marks

SECTION C – continued
TURN OVER

Question 3

Helaine begins by drawing a Use Case Diagram so that she can begin to understand how the new system will work. Fill in the missing 'Use Cases' in the diagram below.



5 marks

SECTION C – continued
TURN OVER

Question 4

Helaine sets about creating a project plan.

- a. What is the major milestone that needs to be included in this plan?

_____ 1 mark

- b. List **three** tasks that will also need to be included in the plan.

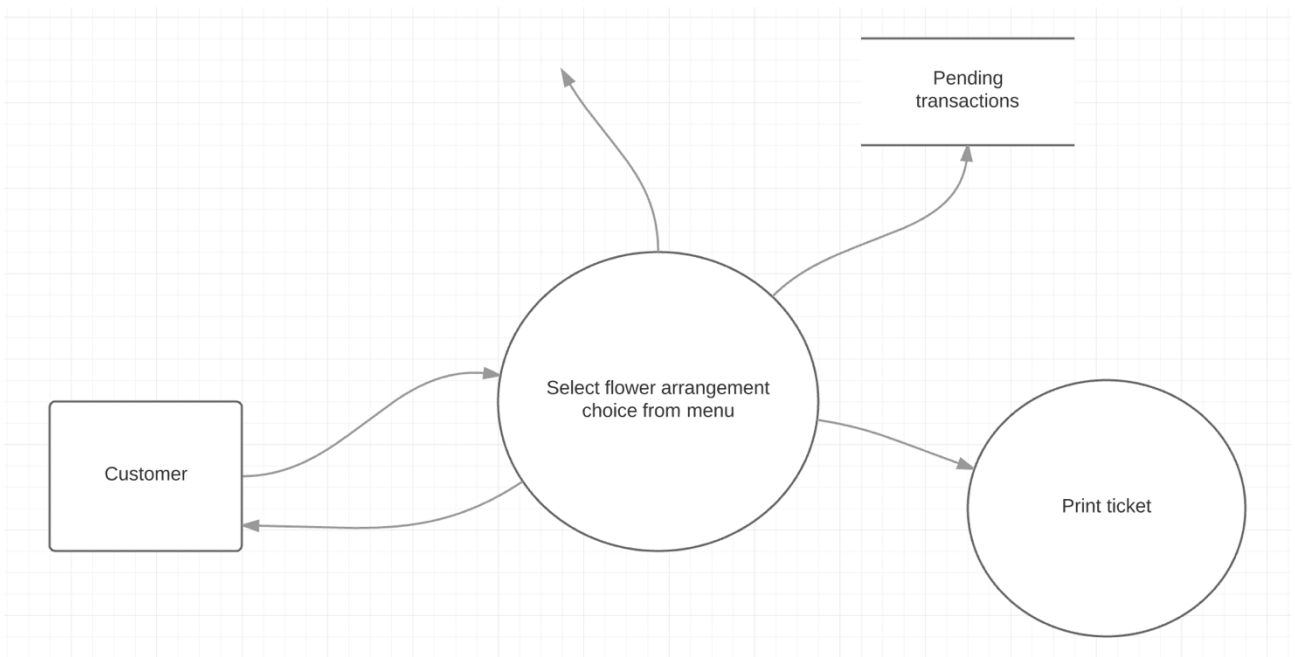
Task 1: _____

Task 2: _____

Task 3: _____ 3 marks

Question 5

Part of the DFD that Helaine produces for the project is shown below. Label the **five** data flows on the diagram.

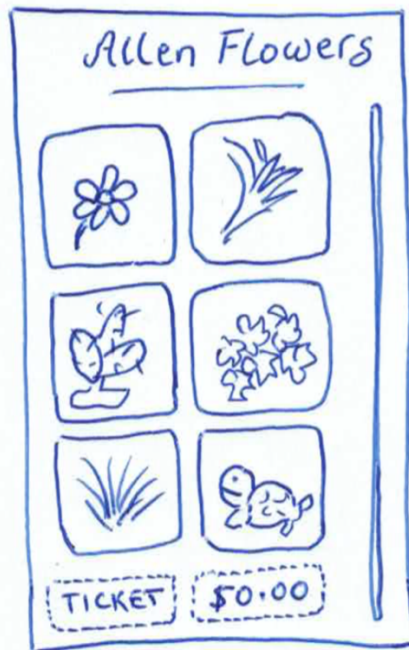


5 marks

SECTION C – continued
TURN OVER

Question 6

This is the design for the touch screen interface that Helaine is proposing.



- a. Identify **two** concerns that you have with this interface and explain how they could be corrected.

Concern 1

Correction 1

Concern 2

Correction 2

4 marks

- b. One of Helaine's team at CodeWizardz suggests to Helaine that the interface needs to be more responsive. In the context of the system being developed, explain how this could be achieved.

1 mark

SECTION C – continued
TURN OVER

Question 7

Please refer to the extra material in the case study insert in answering the following questions.

- a. Describe the likely purpose of the following subroutines.

HashFunction: _____

Remove: _____

RetrieveNext: _____

3 marks

- b. Identify **two** errors in the algorithm and explain how they should be corrected.

Error 1: _____

Correction: _____

Error 2: _____

Correction: _____

4 marks

Question 8

While coding a sorting function within the hash table, one of Helaine's colleagues suggests that she should be using a quick sort instead of the selection sort that she has nearly finished.

For the software solution as described, which of the two sorting methods will be the most suitable and why?

2 marks

SECTION C – continued
TURN OVER

Question 9

Helaine understands that thorough testing is vital, especially given that the product is to be launched on Valentine's Day. She begins by creating the following testing table.

<i>Item Tested</i>	<i>Test Data</i>	<i>Expected Result</i>	<i>Actual Result</i>
User selects a simple arrangement with no extras, that is in stock.	Select simple arrangement (item is in stock)	Ticket is printed. Stock is removed from list.	

Describe **four** other scenarios that would need to be added to this testing table.

Scenario 1

Scenario 2

Scenario 3

Scenario 4

4 marks

Question 10

Helaine organises for a small pilot group to come to the store after hours and beta test the software solution. All of the participants sign non-disclosure agreements and are then allowed to experiment with the touch screen, placing orders and printing tickets for their orders. At the conclusion of this session, each of the participants is given a small questionnaire to complete.

- a. What question could you include on the questionnaire to determine how efficient the software solution is?

1 mark

- b. What question could you include on the questionnaire to determine how effective the software solution is?

1 mark

**SECTION C – continued
TURN OVER**

Question 11

Keenan calls Helaine one weekend with an idea. Keenan would like to add the ability for the customer to send the details of their order to an email address that they enter by touching on the screen. While Helaine thinks that the idea has some merit, she is concerned about specification creep given that the project is in the testing phase already.

- a. What stage of the Problem Solving Methodology is the project up to currently?

1 mark

- b. While Helaine is a believer in agile development, she is also acutely aware that the project is nearing completion and there is not much time left. What stage and activity will Helaine need to move the project back to, in order to implement this feature and why?

2 marks

Question 12

A recent update of 'Flower-O' has rendered the software solution inoperable. 'Flower-O' was accepting input from the software solution in the form of a CSV file and the format of this file has been changed.

- a. Propose a strategy to solve this problem in the short term that will not lead to a significant delay in the project.

2 marks

- b. How could this problem be prevented in the future?

1 mark

SECTION C – continued
TURN OVER

Question 13

For each of the categories of threat listed below, describe a realistic threat that will need to be addressed in terms of preventative measures of some sort.

Accidental	
Event-based	
Deliberate	

3 marks

Question 14

Propose a simple evaluation strategy for the software solution at *Allen Flowers*.

4 marks

SECTION C – continued
TURN OVER

Question 15

The launch day for the touch display at *Allen Flowers* was very successful. The business experienced an increase in sales and there was a lot of excitement in the store. Helaine and many of the staff of *CodeWizardz* were in attendance.

Towards the end of the day, Helaine had a great idea. She asked one of her staff to write a quick script that would use the photos taken of customers to create a dynamic slide show, which they displayed on another panel in the store. Customers generally thought it was a great idea, but there was one notable exception.

Tracey Haskins was in the store with her friends when the photos began to be displayed on the screen. She was surprised when a photo of her boyfriend (Myles) appeared on the screen considering that he had told her he was attending a conference in Madrid.

In the months that followed, what seemed like a good idea began to be a PR disaster. The photo of Myles that caused Tracey to break up with him was printed on the front page of the local paper, together with an in-depth story. Myles commenced legal action against *Allen Flowers* saying that they had no right to take his photo.

- a. Is Myles correct and if so, explain why.

2 marks

- b. What can Allen Flowers do to prevent this from occurring in the future?

1 mark

END OF QUESTION AND ANSWER BOOK

Insert for Section C – Case study

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

TURN OVER

The existing system

Allen Flowers is an independent florist in Bendigo that has been serving the local community for over 20 years. The store is owned by Keenan Allen and he works there most of the time. He also employs three casual staff: Philip, Ben and Lucy.

While Keenan records all sales and prints receipts using a software package called 'Flower-O', he has an idea for a new system that could be used in the store that could be a point of difference in what is a competitive market.

On a recent trip to a fast food vender, Keenan noticed something new. He usually purchased his favourite burger item from the menu, but on this occasion, noticed that there were large touch screen panels in the store for customers to order custom menu items. Keenan liked the experience and novelty of ordering menu items in this way and felt that a similar system could be used in his florist. What's more, Keenan feels that if the system is successful in his store, he may then be able to manufacture and sell the system to florists worldwide.

The system that Keenan is proposing will work in the following way. On entering the store, a customer will be directed to the touch panel. If there is a queue at the touch panel, they will need to wait in line. Keenan intends to instruct his staff not to serve anyone unless they have been via the touch panel first. A customer at the touch panel can select from a number of choices based on common flower arrangements. If the arrangement they would like it not shown on the screen, they are able to print a ticket and proceed directly to the desk to be served. Once they have picked a flower arrangement, the software solution will direct them through a number of variations that are available while displayed a running cost at the bottom of the screen. Once they are satisfied, the customer orders the arrangement, a ticket is printed and the arrangement details are sent to an interface that the sales staff have access to.

The customer's order will be recorded and their face will be photographed (via a discrete camera located in the touch panel). Keenan feels that this could be developed into a feature that would recognise the person immediately upon their entry to the store and display their previous orders. He also likes the security aspect of doing this.

Keenan engages a local software development company called *CodeWizardz* to develop the new system. Helaine, the head software developer, will personally work on this project with the rest of her team.

Keenan tells Helaine that he would like the new system to be in place ready for Valentine's Day next year (6 months away). It is the busiest day of the year for florists across the country and Keenan knows that if the system works the way he envisions, he should be able to increase his profit above what his usual valentine's profit.

Extra material for Question 7

An algorithm has been designed that will work out if a flower arrangement is available by checking (and removing it from) a hash table.

At the beginning of the day, Keenan uses the management console to select the flower arrangements that he has in stock and add them to the system. This adds them into a hash table (inside the software solution), that has the arrangements grouped with those of similar features. If the software cannot offer the customer the exact arrangement that they have requested, it will offer them another from within the hash table.

Each category of the hash table is maintained as a 1D array as shown below:

Bouquets	110	125	92	42
Carnations	52	61	91	

The software solution maintains these arrays so that there are no gaps in the data elements (that is, if there are 3 items left, they are stored in array indexes 0-2).

The following algorithm manages this process:

```

HashValue ← HashFunction(UserChoice)
ArrangementAvailable ← Retrieve(HashValue, MasterHashTable)
If ArrangementAvailable Then
    Remove(HashValue, MasterHashTable)
    Display "Arrangement in stock – proceed to counter"
Else
    NearestValue ← RetrieveNext(HashValue, MasterHashTable)
    If NearestValue is null Then
        Display "No similar arrangements in stock – proceed to counter"
    Else
        Remove(NearestValue, MasterHashTable)
        Display "Would you like to choose this arrangement instead?"
        Input Choice
        If Choice = "N" Then
            Exit
        Else
            Display "Very good choice. Please proceed to the counter"
        End If
    End If
End If

```

END OF CASE STUDY INSERT