NAME: _____

VCE®Computing: Software Development

UNITS 3 & 4 Practice Examination

Reading time: 15 minutes **Writing time: 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 liquid/tape**.**

Materials supplied

- Question and answer book of 29 pages.
- Detachable insert at end of booklet.
- Answer sheet for multiple choice questions.

Instructions

- Remove the insert containing the case study during reading time.
- Write your **name** on the space provided above on this page **and** on the answer sheet for multiple-choice questions.
- All written responses must be in 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 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

Sam is has been asked to develop a new system to keep track of photocopy paper storage around the office. She speaks to a number of her colleagues about where they keep their paper and what they do when they need additional paper for their printer or photocopier. The data collection method she used is

A. interviews.

B. surveys.

C. observation.

D. formal.

Question 2

Frank is a network administrator. His department has recently introduced a new network addition designed to improve network security. Better network security would be considered

A. a system goal.

B. a system objective.

C. an organisational goal.

D. an organisational objective.

Question 3

Which statement is true regarding a Software Requirements Specification?

A. The SRS contains solution designs.

B. The SRS contains the internal code documentation.

C. The SRS contains the evaluation criteria.

D. The SRS contains details of the intended operating environment for the solution.

Use the following algorithm to answer Questions 4 and 5.

```
Input age
While age IS NOT NULL
  If age <= 6 Then
    output "child"
  Elseif age < 15 Then
    output "junior"
  Else
    output "adult"
  Endif
  Input age
Endwhile
```

Question 4

This algorithm contains examples of which programming structures?

A. Iteration and selection.

B. Selection and sequence.

C. Iteration and sequence.

D. Sequence, iteration and selection.

Question 5

This algorithm uses which validation technique?

A. Range checking.

B. Existence checking.

C. Data type checking.

D. Spell checking.

Question 6

When developing a new internet application, which one of the following is an example of a non-functional requirement?

A. Provide navigation to any page within 3 clicks.

B. Display the company logo in the top left corner.

C. Include alt-text for all images.

D. Track page click-through counts.

Question 7

Which of the following design tools could be used to show the data type of variables required for a solution?

A. Data dictionary.

B. Data flow diagram.

C. Pseudocode.

D. IPO chart.

Question 8

Ahmed missed a milestone deadline for his recent project by two days. Fortunately, this did not impact on the final completion date of the whole project. Which of the following statements is true?

A. Ahmed's task was on the critical path as it did not delay the project.

B. Ahmed's task had at least two days' slack time.

C. The project did not contain any slack time.

D. The task was not on the critical path as it delayed the whole project.

Question 9

```
days_of_week ← ["Mon", "Tue", "Wed", "Thu", "Fri", "Sat", "Sun"]
```

Using the variable days_of_week, which of the following operations would return "Sun"?

A. days_of_week[ ].

B. days_of_week[6].

C. count(days_of_week).

D. days_of_week["Sun"].

Question 10

Ameen is a computer programmer who wants to develop a software solution to help the local football club manage the roster for their café. All of the people who work in the café are volunteers and any profits they make go back to the club to buy equipment for the players. Julie is the café manager. She has a tablet device that she always has with her. She would like the program to run on her tablet so she can manage the rosters anytime she needs to.

Which of the following would be a technical constraint on the solution?

A. Be able to run on a tablet device.

B. Be cheap to create.

C. Include the football teams' colours.

D. All users must have a Working with Children Check as they are volunteers.

Question 11

Which of the following is true regarding a peer-to-peer application?

A. There must be one, and only one, dedicated server device.

B. Redundant data is routinely lost in the system.

C. All devices are equal within the solution.

D. No devices will be able to connect to the internet.

Question 12

Simone is a beginner developer who wants to implement an efficient searching algorithm in her program. She knows that the data she will be looking through could contain thousands of records, but she also knows they will already be ordered. Which statement best describes the algorithm she should select for this task?

A. She should choose a selection search as she is a beginner and the algorithm is easy to implement.

B. She should choose a binary search as the data is already sorted and it will be fast to run.

C. She should choose a quick search as it is relatively fast for large data sets.

D. She should choose a linear search as it checks every record, so she won't miss the one she is looking for.

Question 13

Which of the following design tools would be used to describe the way a system will display data?

A. Flow chart.

B. Object description.

C. Mock-up.

D. Pseudocode.

Question 14

Which of the following represents a recursive algorithm?

A.
```
Begin
{function_a}
  Input num
  If num = 0 Then
    Return "zero"
  ElseIf num < 0 Then
    Return "negative"
  Else
    Return "positive"
  EndIf
End
```

B.
```
Begin
{function_b}
  Input num
  If num = 1 Then
    Return 1
  Else
    ans ← function_b(num-1) * num
  EndIf
  Return ans
End
```

C.
```
Begin
{function_c}
  Input num
  While num > 0
    rem ← num mod 2
    result ← concat(rem, result)
    num ← truncate(num / 2)
  EndWhile
  Return result
End
```

D.
```
Begin
{function_d}
  Input num
  prev_term ← 0
  curr_term ← 1
  counter ← 1
  Do
   result ← prev_term + curr_term
   prev_term ← curr_term
   curr_term ← result
   counter++
  While counter < num
  Return result
End
```

Question 15

XML is a popular format to store and transfer data between systems. This is true because

A. the data contains a description of itself.

B. you can use commas in the data.

C. the file sizes are very small.

D. the data is difficult to read.

Question 16

Sebastian works for a large bank. Two days a week, he works from home where he is able to log in to the workplace network and share resources. Which of the following technologies could Sebastian use to keep his connection to the workplace secure?

A. HTTP

B. HTML

C. VPN

D. 802.11ac

Question 17

Harry has nearly finished the development of a new software solution. One of the final steps is to test the usability of the software. The usability test

A. takes place during the evaluation stage of the Problem Solving Methodology.

B. has prescribed tasks for the user to complete.

C. doesn't need to be documented as the developer should watch the test.

D. allows the test user to select what they want to test.

Question 18

The variable `heights` is an unsorted array of integers as below:

[12, 32, 27, 11, 34, 16, 13]

Which of the following partly-sorted arrays represents the variable after 2 passes of the selection sort algorithm?

A. [12, 11, 13, 32, 27, 34, 16]

B. [11, 12, 13, 16, 27, 32, 34]

C. [11, 12, 27, 32, 34, 16, 13]

D. [12, 11, 27, 16, 13, 32, 34]

Question 19

Consider the following algorithm.

```
Begin
  Input size_number
  If size_number < 5 Then
     size_category ← "small"
  ElseIf size_number < 9 Then
     size_category ← "medium"
  ElseIf size_number < 15 Then
     size_category ← "large"
  Else
     size_category ← "extra large"
  EndIf
  Output size_category
End
```

Which of the following represents the least data required to fully test the algorithm?

A. 0,5,9,15

B. 4,5,8,9,14,15,16

C. 4,5,6,8,9,10,14,15,16

D. 1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16

Question 20

A new point-of-sale system allows a store to provide a discount to Loyalty Card holders. Since the new system has been operating, the staff at the store have noticed that it does not always apply the discount at the same rate each time. The developers of the system should

A. re-check their code to see if their calculation is correct.

B. run some more tests.

C. not worry as the project is now complete.

D. conduct an evaluation to ensure the system meets the requirements.

SECTION B – Short-answer questions

Instructions for Section B

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

Question 1 (2 marks)

Simon is a project manager for a new software solution. In the project, it has been determined the design process cannot begin until all elements of the analysis stage are completed and the development cannot begin until all tasks in the design stage are completed. The end of these stages mark key moments in the life of the project.

a. What is the name given to tasks that must be completed before another can begin? 1 mark

_____

b. What is the name given to key moments in the project? 1 mark

_____

Question 2 (2 marks)

Compare the ovals drawn in a Use Case Diagram with the circles drawn in a Data Flow Diagram.

_____

_____

_____

_____

Question 3 (1 mark)

Pauline is developing a function which calculates the cost of all maintenance requests for a given month. Provide an appropriate name for the function.

_____

Question 4 (3 marks)

Kylie is writing a function to sort a large list of song titles alphabetically. Recommend a sorting algorithm for her function by comparing the selection sort and quick sort algorithms.

_____

_____

_____

_____

_____

Question 5 (2 marks)

John and Joan run a soup kitchen for disadvantaged people and need to produce a required shopping list from quantities they have in stock in their truck and the ingredients for the expected number of meals they will give out that night. The algorithm takes two associative arrays with produce names as keys and amount in stock as values. It also takes the number of meals expected. It returns an associative array of the items they need to purchase and the amounts in the same format as the input. Part of the algorithm has been done for you.

Complete the selection statement and assignment statement.

```
Begin
   Input in_stock[ ], ingredients[ ], meals
   ForEach ingredient In ingredients[ ] As key, value
     If in_stock[key] ____________________________________ Then
       required[key] ← ____________________________
     EndIf
   EndForEach
   Output required[ ]
End
```

Question 6 (6 marks)

A small advertising agency has recently discovered that some of their ideas have been used by larger competing firms. The network manager believes there has been a security breach and that data has been accessed by an unauthorised person. Identify one software control and one physical control the agency could review and explain how each could be tested.

Software Control _____

Test _____

_____

_____

_____

Physical Control _____

Test _____

_____

_____

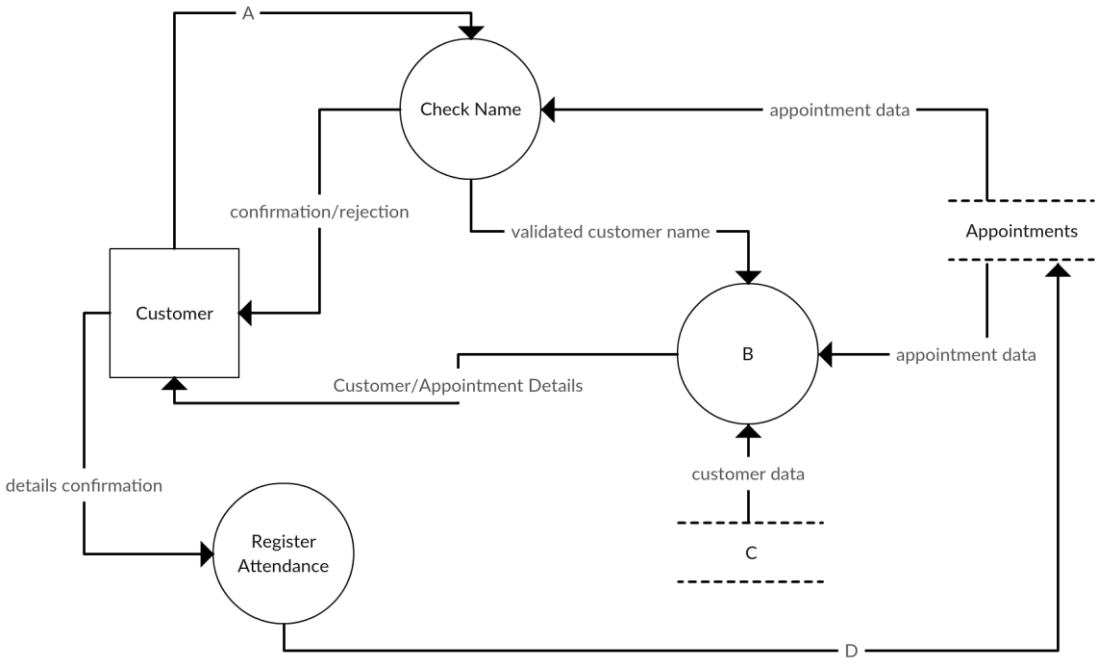
_____

Question 7 (4 marks)

Gail is developing a new software solution for customers to sign in when they arrive at a local dentist.

When a customer arrives, they will type their name into a login page. The system will then look up the list of customers who have an appointment within the next hour. If there is a matching appointment, it will display some customer details such as their full name, and some appointment details such as the nature of the appointment (such as fix braces, remove braces, clean, check) and the appointment time. It will then ask the customer to confirm the information is correct. Once the customer confirms their details, their attendance is logged in the appointments file. If there is no matching record, it prompts them to speak to a receptionist.

Complete the following data flow diagram to represent this system by adding the correct labels for A, B, C and D in the spaces provided below.



A _____

B _____

C _____

D _____

SECTION C – Case study

Instructions for Section C

Remove the case study insert during reading time.
Use the case study provided in the insert to answer the questions in this section. Answers must apply to the cast study.
Answer **all** questions in the spaces provided.

Question 1 (8 marks)
The new financial year is 7 weeks away and Simon would really like to get his new app out before then so as his clients are encouraged to start using his services straight away. He knows there is a lot to get done and wants to make sure that Jono has enough time to write and test his code. Jono provided these guidelines for Simon's project plan:

- Review software specifications 2 days
- Complete software design 9 days
- Write software 14 days
- Integrate artwork into software 1 day
- Configure web host and install app 3 days
- Test and update program 2 days

Sarah, is a graphic designer. She has agreed to complete the artwork required for the new software. She has worked with Jono before and understands the requirements for a mobile web application. She tells Simon it will take her five days to complete the assets and says she can start as soon as Simon and Jono have completed the software designs. Jono says he will only need one day to add them to the software.

Before Jono can get started, Simon will need to complete his system analysis, including collecting data from prospective clients (he thinks this will take three days) and determine the solution requirements, which he will complete in two. Jono has also asked that Simon help with the testing process.

Only week days can be included on the plan.

Using the information provided, complete the Gantt chart to show that Simon's 7 week deadline is achievable.

a. Record the duration for each of the tasks. 1 mark

b. Identify those responsible for each task. 1 mark

c. Complete the Gantt chart from the information provided. 6 marks

			Days						
Task	**Duration (days)**	**Person(s) Responsible**	5	10	15	20	25	30	35
Data Collection									
Solution Requirements									
End Analysis									
Review SRS									
Design software									
End Design									
Write software									
Create artwork									
Integrate artwork into software									
Configure web host and install app									
Test and update program									
End Development									

Question 2 (1 mark)

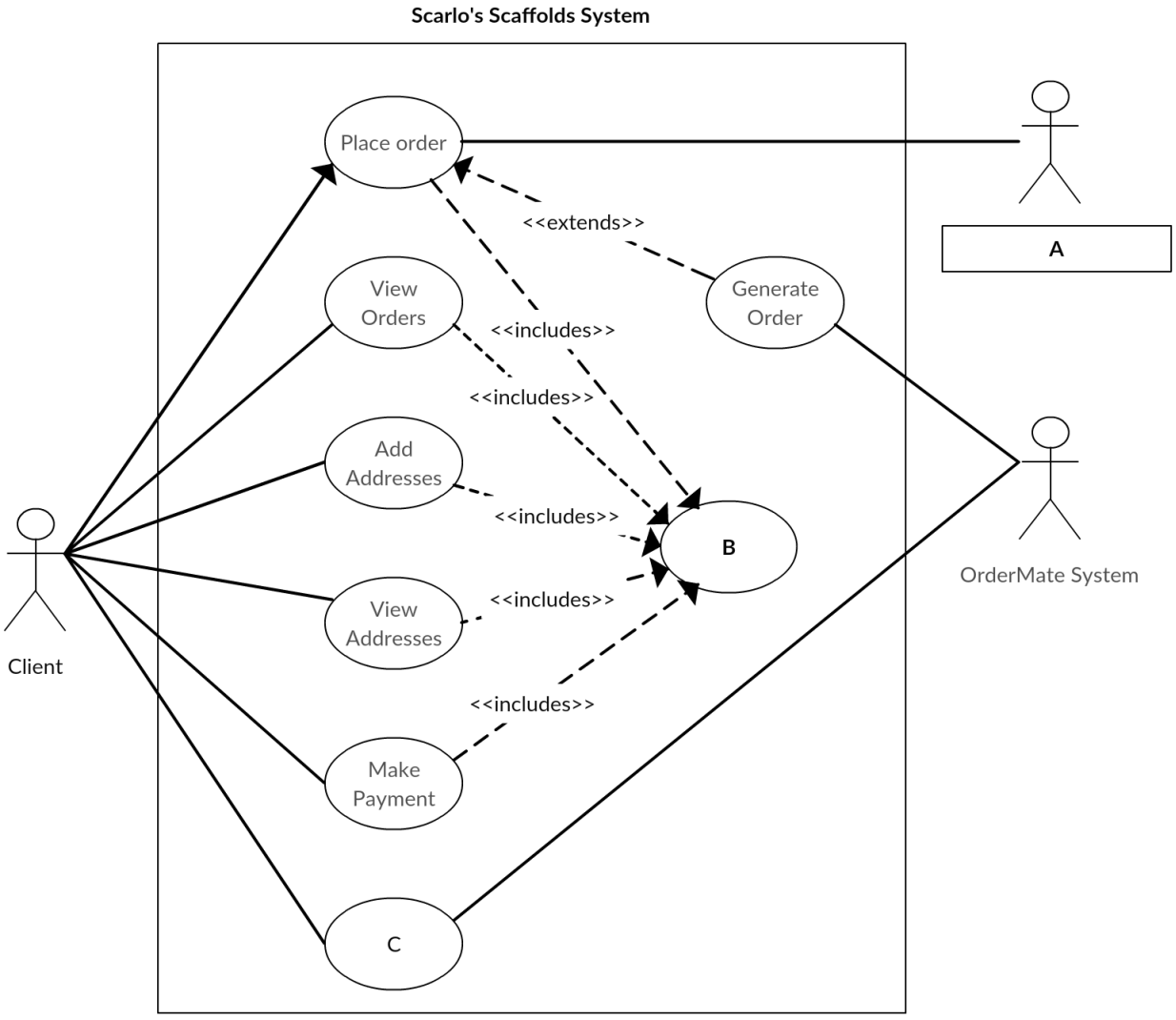
After some consideration, Simon realised how good the OrderMate system has been working for payments, so he has decided not to include payments as part of new web application.

Which activity of the Problem Solving Methodology would Simon have been working on when he made this decision?

_____

Question 3 (3 marks)

Jono drew a Use Case Diagram on the back of a napkin one night, but some of the words were smudged.



Complete the use case diagram by writing the correct labels for A, B and C in the spaces below.

A _____

B _____

C _____

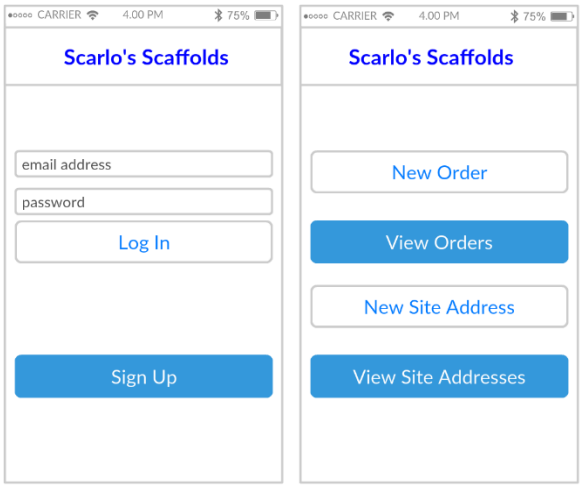
Question 4 (3 marks)

Several of Simon's friends are also builders and Simon thinks they would have some good ideas about the program requirements and application interface. He decided he wants to collect some data from them regarding their need for a system like this.

Suggest and justify a suitable data collection technique for Simon to achieve this.

Question 5 (4 marks)

Once Simon determined the system requirements, he and Jono came up with some alternative designs for the main screens of the new software.



Design 1

Design 2

a. Write 2 evaluation criteria Simon could use to determine a preferred design. 2 marks

Criterion 1 _____

_____

_____

Criterion 2 _____

_____

_____

b. Using these criteria, recommend a final design choice for the new software interface. 2 marks

_____

_____

_____

_____

_____

Question 6 (9 marks)

The scaffolding systems Simon is going to offer come in kits of specific sizes. They are modular in design comprising enough materials for 10 metres long by 5 metres high of scaffold with supports and platforms. Customers can purchase multiple modules to the lengths and heights they require. Each additional module will also require a "connector pack" to join it to the next kit.

The cost per order will depend on the length of time an order is placed for. Modules are charged at $440 per week for up to 8 weeks. If the order is for more than 8 weeks, the cost is $400 per week. Connector packs are an additional $40 per week, regardless of duration. Orders will be charged in full week lots.

There is a standard delivery and pickup cost of $200 per order, regardless of the size of the order or duration.

The OrderMate software has a feature called "OrderMate's Rates" which encourages companies who are using the system to provide discounts to each other through their software. Scarlo's Scaffolds will provide half price pick-up and delivery for those customers who are part of this scheme.

Jono has started developing an algorithm to calculate the cost of an order. Using the prompts provided, complete the order calculation procedure. *Continued over page……*

```
begin
{order_calculation}
  input number_of_modules, number_of_weeks, mates_rates
  {cost_per_week}
  _____________________________________________________________

  _____________________________________________________________

  _____________________________________________________________

  _____________________________________________________________

  _____________________________________________________________

 {number_of_connectors}
  number_of_connectors ← _____________________________________

 {scaffold_cost}
  scaffold_cost ← ____________________________________________

  _____________________________________________________________

 {delivery_cost}
  _____________________________________________________________

  _____________________________________________________________

  _____________________________________________________________

  _____________________________________________________________

  _____________________________________________________________

  output scaffold_cost, delivery_cost
end
```

Question 7 (6 marks)

a. Below is a sample set of the data Jono will use to test the algorithm. Complete the "Expected result" column in the testing table. 2 marks

Item testing	Inputs	Expected result
discount of cost_per_week depending on number_of_weeks	number_of_weeks = 8 number_of_modules = 3 mates_rates = true	scaffold_cost = delivery_cost =
	number_of_weeks = 9 number_of_modules = 3 mates_rates = true	scaffold_cost = delivery_cost =

b. Provide 2 more sets of data that would test a different element of the calculation algorithm and explain how this data will test that element. 4 marks

Item testing	Inputs	Explanation
	number_of_weeks = number_of_modules = mates_rates =	
	number_of_weeks = number_of_modules = mates_rates =	

Question 8 (6 marks)

The OrderMate documentation includes the XML file format required to import new accounts and orders. The Account Import file format is given below.

```
<?xml version="1.0" encoding="UTF-8"?>
<accounts>
  <account>
    <name>Example Company</name>
    <contact>John Example</contact>
    <addresses>
      <address type="billTo">
        <street>23 Example St</street>
        <city>Melbourne</city>
        <state>VIC</state>
        <postcode>3001</postcode>
        <country>Australia</country>
      </address>
    </addresses>
    <phone_numbers>
      <phone_number type="mobile">0400123456</phone_number>
      <phone_number type="business">(03)95552345</phone_number>
    </phone_numbers>
    <mates_rates_member>false</mates_rates_member>
  </account>
</accounts>
```

a. The first line of the XML file is called the prolog. What is the purpose of the prolog and why is it important? 2 marks

_____

_____

_____

_____

_____

b. Give an example of an attribute from the file provided. 1 mark

_____

c. Identify the most suitable data type for each of the following elements in the file. 3 marks

Element	Data type
street	
mates_rates_member	
postcode	

Question 9 (3 marks)

Identify a software security control that Scarlo's Scaffolds System (SSS) can use to protect the data supplied by clients during communication with the web server. Explain how this control works.

Software security control _____

_____

Explanation _____

_____

_____

_____

_____

_____

_____

_____

Question 10 (3 marks)

Luke is a real estate agent and knows about the power of advertising. When he heard about Simon's new project he decided he would offer to help Simon pay for the development of the new software. In exchange, Simon would put an ad on the bottom of each page for Luke's real estate agency's "House of the Week". Clicking the ad in the SSS software would send the client's details to Luke and open a web browser on the client's phone showing the details of the house. As a new business, Simon is attracted to the idea of getting help with the start-up costs, but is concerned about how the clients might react to having Luke contact them using data given to SSS.

Identify one piece of legislation that Simon should be aware of and outline how he might incorporate Luke's ideas while still meeting his legal obligations.

Question 11 (3 marks)

Data collected and created by the SSS and OrderMate systems are vital to the successful operation of Scarlo's Scaffolds. Simon knows that good back-up and recovery procedures are important but he is unsure of the best method. Describe a backup strategy and explain how it will keep Simon's data safe.

Question 12 (7 marks)

Now that the new application has been in use for some time, Simon would like to determine if it meets the requirements that he established at the beginning of the process.

a. What is the name of this task? 1 mark

b. Simon developed a number criteria to determine the success of his new system. For each of those given below, state if they represent functional or non-functional requirements and whether the requirement is one of efficiency or effectiveness. 4 marks

Criteria	Functional or Non-functional	Efficiency or Effectiveness
1. Are customers able to create a new order within 3 minutes?		
2. Is it easy to click elements on the screen without accidentally clicking the wrong one?		
3. Are orders calculated accurately?		
4. Is data entered by users secure from unwanted interference?		

c. Using one of the criteria above, suggest a strategy that would help Simon determine if his new system meets the requirements. 2 marks

_____

_____

_____

_____

_____

_____

_____

Question 13 (4 marks)

Following a positive system review and excellent feedback from his clients, Simon believes there is a good opportunity to expand his application with more features and to offer more products for builders to hire. Before embarking on a new project, he wants to review his final project plan from the SSS project so he can try to avoid any similar problems in the next project.

a. Identify two reasons why Simon's project plan might have changed. 2 marks

_____

_____

_____

_____

_____

_____

b. Describe one way in which changes to a project plan can be monitored and explain how this might be useful for Simon in the future. 2 marks

_____

_____

_____

_____

_____

_____

END OF QUESTION AND ANSWER BOOK

Insert for Section C – Case Study

Please detach from this book during reading time.

Scarlo's Scaffolds System

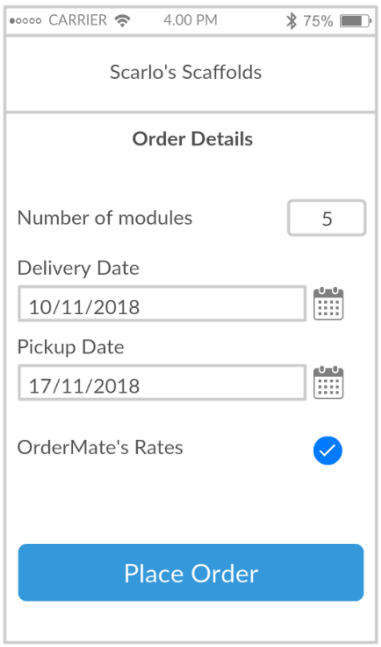
Simon Scarlett has been in the building trade for some time and was always frustrated by the challenge of getting the right scaffolding for his building jobs. He wanted an easier way to organise for scaffolding to be delivered to building sites, ordering more when required and arranging for the scaffolding to be taken away at the end of a job.

He had the idea for a simple mobile web application which he will call Scarlo's Scaffold System or SSS. The application will allow builders to:

- Create an account
- Add building site addresses
- Place orders, including drop off and collection dates and times
- Pay accounts

Simon has already been using a robust stock ordering, accounts and payment system called "OrderMate". He wants to continue using this software for his accounting and stock management, while allowing his customers to use the new system to place their orders.

User Interfaces



Most of the builders Simon knows are always working outdoors or travelling between job sites. They use their phones all the time and this is the most likely tool they would use for his service. He also knows that most of them are only basic technology users so he needs to ensure the screens are simple and obvious to use.

An example of the user interface for the ordering page is shown.

Sample ordering page interface

Software Interfaces

The OrderMate software allows customer accounts to be created and orders to be placed using an XML file transfer. The new system will need to send data to OrderMate to ensure that the accounting software is up to date.

Simon would like to approve any orders before they are generated in OrderMate.

Development

Jono, a friend of Simon's, is a web developer and has agreed to complete the programming required to develop the application for Simon for a reasonable fee.

END OF INSERT

NAME: _____

Section A: Multiple Choice Answer Sheet

For each multiple choice question, shade letter of your choice.

Question				
1	A	B	C	D
2	A	B	C	D
3	A	B	C	D
4	A	B	C	D
5	A	B	C	D
6	A	B	C	D
7	A	B	C	D
8	A	B	C	D
9	A	B	C	D
10	A	B	C	D
11	A	B	C	D
12	A	B	C	D
13	A	B	C	D
14	A	B	C	D
15	A	B	C	D
16	A	B	C	D
17	A	B	C	D
18	A	B	C	D
19	A	B	C	D
20	A	B	C	D

