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NAME: _____

VCE[®] Computing: Software Development

Unit 3 & 4 Practice Written Examination

Reading time: 15 minutes

Writing time: 2 hours

QUESTION AND ANSWER BOOK

Structure of Book

<i>Section</i>	<i>Number of questions</i>	<i>Number of questions to be answered</i>	<i>Number of marks</i>
A	20	20	20
B	5	5	20
C	11	11	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 28 pages.
- Detachable Insert for Case Study 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

A coded module contains a named block of code that takes two variables as parameters and returns the result of a process when it is called.

The block of code would be a

- A. class.
- B. object.
- C. function.
- D. procedure.

Question 2

A school is developing a solution to enable parents to log in and remotely complete an online permission form for students to attend events such as excursions and camps.

The factors that will influence the design of the solution will include

- A. affordance, security, and usability.
- B. affordance, interoperability and legal.
- C. reliability, marketability, and usability.
- D. interoperability, marketability, and reliability.

Question 3

Use the following information for Questions 3 and 4

“Coffee Shed” is a drive-through coffee shop. To try and reduce the time customers spend in the queue during peak times, the Manager is investigating a solution which would allow them to place orders in advance from a mobile device.

A non-functional requirement of the solution could be

- A. the ability to run on both Android and iOS devices.
- B. allowing customers to select from a range of available products.
- C. allowing customers to select a pick-up time for orders.
- D. connecting to a 4G mobile service.

Question 4

The best way to determine the requirements of the proposed solution would be to

- A. observe how orders are currently placed.
- B. view a report about the current system.
- C. interview a small number of staff to find their preferences.
- D. create an online survey for users to complete.

Question 5

John is developing a module to provide video-call services for a Victorian-based tele-health provider. The solution will allow users to consult with a doctor using a mobile device or computer, and if required, receive a prescription via email. John has found an open-source solution he is interested in using.

Which legislation will be most important for him to consider whilst designing the solution?

- A. *Copyright Act 1968*
- B. *Health Records Act 2001*
- C. *Privacy Act 1988*
- D. *Privacy and Data Protection Act 2014*

Question 6

Which of the following is most likely an example of archiving data and information?

- A. At the end of each semester a school system moves student assessment data to a secondary server.
- B. A teacher leaves a school and after three weeks their files and email are removed from the system.
- C. An online ticket booking facility stores a copy of concert bookings on a cloud server.
- D. A student stores their project development files on a portable hard drive.

Question 7

A software requirements specification (SRS) should

- A. describe the functional and non-functional requirements, system and technical requirements, constraints, and scope of the solution.
- B. show the intended design of the solution in the form of layout diagrams and processing logic, in the form of algorithms as pseudocode.
- C. describe the data that will be input to the system; how it will be processed and stored and the information it will produce.
- D. show the timeframe and sequencing of tasks that will need to be completed to produce the solution.

Question 8

Which of the following strategies can be used to secure a web-application against XSS vulnerabilities?

- A. Using HTTPS to encrypt all data transmitted between the server and the client
- B. Using server-side input validation to ensure data entered by users is safe
- C. Implementing two-factor authentication to validate users
- D. Using firewalls to block malicious traffic

Question 9

```

Index  $\square$  0
N  $\square$  3
WHILE Nums[Index]  $\neq$  N AND Index < Nums.Length DO
    Index  $\square$  Index +1
END WHILE
IF Index < Nums.Length Then
    PRINT("True")
ELSE
    PRINT("False")
END IF

```

For the algorithm above, which of the following values of *Nums[]* will produce the output "**False**"?

- A. Nums \square {0, 1, 2}
- B. Nums \square {1, 2, 3}
- C. Nums \square {2, 3, 4}
- D. Nums \square {3, 4, 5}

Question 10

Before writing code for a sorting module, a student is checking the algorithm. To test her pseudocode, she uses the following data as input.

52	37	63	14	17	8	6	25
----	----	----	----	----	---	---	----

After one pass of the algorithm the data is arranged as:

6	37	25	14	17	8	52	63
---	----	----	----	----	---	----	----

Which of the following statements is true?

- A. The algorithm being used is a Selection sort with 6 as the pivot
- B. The algorithm being used is a Quick sort with 25 as the pivot
- C. The algorithm being used is a Quick sort with 52 as the pivot
- D. The algorithm being used is a Selection sort with 63 as the pivot

Question 11

The criteria to establish the efficiency and effectiveness of a software solution are determined during the

- A. analysis stage.
- B. design stage.
- C. development stage.
- D. evaluation stage.

Question 12

An online auction website includes the following algorithm for processing user bids, for storage in an SQL database.

```
READ current_bid  
  
INPUT new_bid  
  
IF new_bid > current_bid THEN  
    SubmitBid(new_bid)  
  
END IF
```

Before using the variable *new_bid* in a database query, the most appropriate process to perform on the input would be to

- A. first check that *new_bid* is numeric and then check that it is greater than *current_bid*.
- B. check that each character of *new_bid* is numeric and then check that it is greater than *current_bid*.
- C. after checking *new_bid* contains data, check that it is numeric and then check that it is greater than *current_bid*.
- D. after checking *new_bid* contains data, check that it is greater than *current_bid* and then check each character is numeric.

Question 13

Before using data to make decisions, organisations need to ensure that the characteristics of the data include

- A. ease-of-access, currency, and security of files.
- B. accuracy, authenticity, correctness, and timeliness.
- C. maintainability, reliability, ease-of-use, and relevance.
- D. authenticity, reasonableness, relevance, and robustness.

Question 14

Which of the following statements most accurately describes the process of public key encryption?

- A. The sender encrypts the message using their private key and the recipient decrypts the message using the sender's public key.
- B. The sender encrypts the message using the recipient's public key and the recipient decrypts the message using their private key.
- C. The sender and recipient both use the same public key to encrypt and decrypt the message.
- D. The sender and recipient use a shared secret key to encrypt and decrypt the message.

Question 15

```
Begin
  i ← 0
  C ← A[i] / B[i]
  While i < A.Length Do
    If A[i] / B[i] < C Then
      C ← A[i] / B[i]
      N ← i
    End If
    i ← i + 1
  End While
  Print N
End
```

A ← {10, 15, 12, 20}

B ← {2, 3, 4, 5}

The output of the pseudocode using the above data will be

- A. 0
- B. 1
- C. 2
- D. 3

Question 16

An organisation is carrying out simulated attacks on its computer systems to identify potential vulnerabilities and security weaknesses.

This process is called a

- A. usability test.
- B. hacking test.
- C. system test.
- D. penetration test.

Question 17

Which of the following is an example of a social engineering attack?

- A. A brute force attack to crack a user password and gain unauthorised access to a company's network
- B. Inserting malicious code in a social-media website, causing the website to deliver the malicious code to other users
- C. A phishing email asking an employee to share their password for a supposed software upgrade
- D. A DDoS attack to overload a website

Question 18

Which of the following data structures implements key-value pairs to store and retrieve data and support efficient lookup of values by keys?

- A. Records
- B. Associative arrays
- C. Linked lists
- D. Stacks

Question 19

Leo is developing a facial recognition system for recording attendance at university lectures. He has downloaded an open-source AI module from an online code repository that he wants to use.

Which of the following statements most accurately describes the usage of open-source software compared to freeware and shareware?

- A. Open-source software allows users to view, modify and distribute the source code, while freeware and shareware restrict access to the source code.
- B. Open-source software is developed and maintained by a single individual or organisation, while freeware and shareware are community-driven projects.
- C. Open-source software can only be used for personal or non-commercial purposes, while freeware and shareware can be used for commercial purposes.
- D. Open-source software is always available for free but may come with certain restrictions or limitations, while freeware and shareware can be used without restrictions.

Question 20

When comparing the Agile and Waterfall development models, which of the following statements is correct?

- A. The Agile and Waterfall models are both iterative development models.
- B. The Agile and Waterfall models have the same level of flexibility and responsiveness to change.
- C. The Agile model is more suitable for small-scale projects, while the Waterfall model is better suited for large-scale projects.
- D. The Agile model emphasises adaptability and collaboration, while the Waterfall model follows a sequential, rigid approach.

END OF SECTION A

SECTION B – Short-Answer Questions

Instructions for Section B

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

Question 1 (6 marks)

Peta is part of the development team designing a solution to improve the efficiency of the stock management process for a local supermarket. The solution, to be developed for a hand-held device, will allow users to scan a product's barcode. It will then display the product details including the name, category, price, and the number of items in stock.

Peta is considering possible file types to store the data and has designed an XML solution using sample data.

```
<?xml version="1.0" encoding="UTF-8"?>
<products>
  <product barcode="100934553427">
    <name>Lakes Salted Butter</name>
    <stock>766</stock>
    <price>5.99</price>
  </product>
  <product barcode="183637768091">
    <name>Breyer's Chocolate Ice Cream</name>
    <stock>572</stock>
    <price>12.99</price>
  </product>
</products>
```

- a. Peta's colleague Johan has suggested that a CSV file would be a better format.

Suggest reasons to justify Peta's choice to use XML and why Johan may have recommended that CSV would be a more appropriate format.

2 marks

- b. Peta has asked Johan to design the data structures to hold the product data read from the disk file.

She has a barcode.

Johan has designed records and has shown her the following table.



Record: Product

product_barcode	String
product_name	String
product_price	Integer
product_stock	Integer

Identify two concerns with the data types Johan has selected and suggest more appropriate types for those variables.

2 marks

Peta and Johan have been discussing how to search for products using the scanned barcode.

The supermarket currently stocks over 25,000 different products. Peta is concerned about the efficiency of the search algorithm used because of the number of items and the frequency of searches performed; she is considering whether a linear or binary search would be most appropriate.

- c. Identify and justify an appropriate strategy for searching the data. 2 marks

Question 2 (2 marks)

Describe the purpose of a software audit.

Question 3 (4 marks)

Complete the trace table below to determine the output of the following algorithm for the given values.

```

1.   A ← 6
2.   B ← 15
3.   BEGIN
4.   IF A < B THEN
5.       A ← A + B
6.       B ← A - B
7.       A ← A - B
8.   END IF
9.   WHILE A mod B ≠ 0 DO
10.      A ← A + B
11.      B ← A - B
12.      A ← A - B
13.      B ← B mod A
14.   END WHILE
15.   PRINT B
    
```

Note: The mod operator returns the remainder of A divided by B.

	Line	A	B	A < B	A mod B ≠ 0	Output
4.	A < B	6	15	True		
5.	A ← A + B	21	15			
6.	B ← A - B	21	6			
7.	A ← A - B	15	6			
9.	A mod B ≠ 0	15	6		False	
10.	A ← A + B					
11.	B ← A - B					
12.	A ← A - B					
13.	B ← B mod A					
9.	A mod B ≠ 0					
a.	Print B					

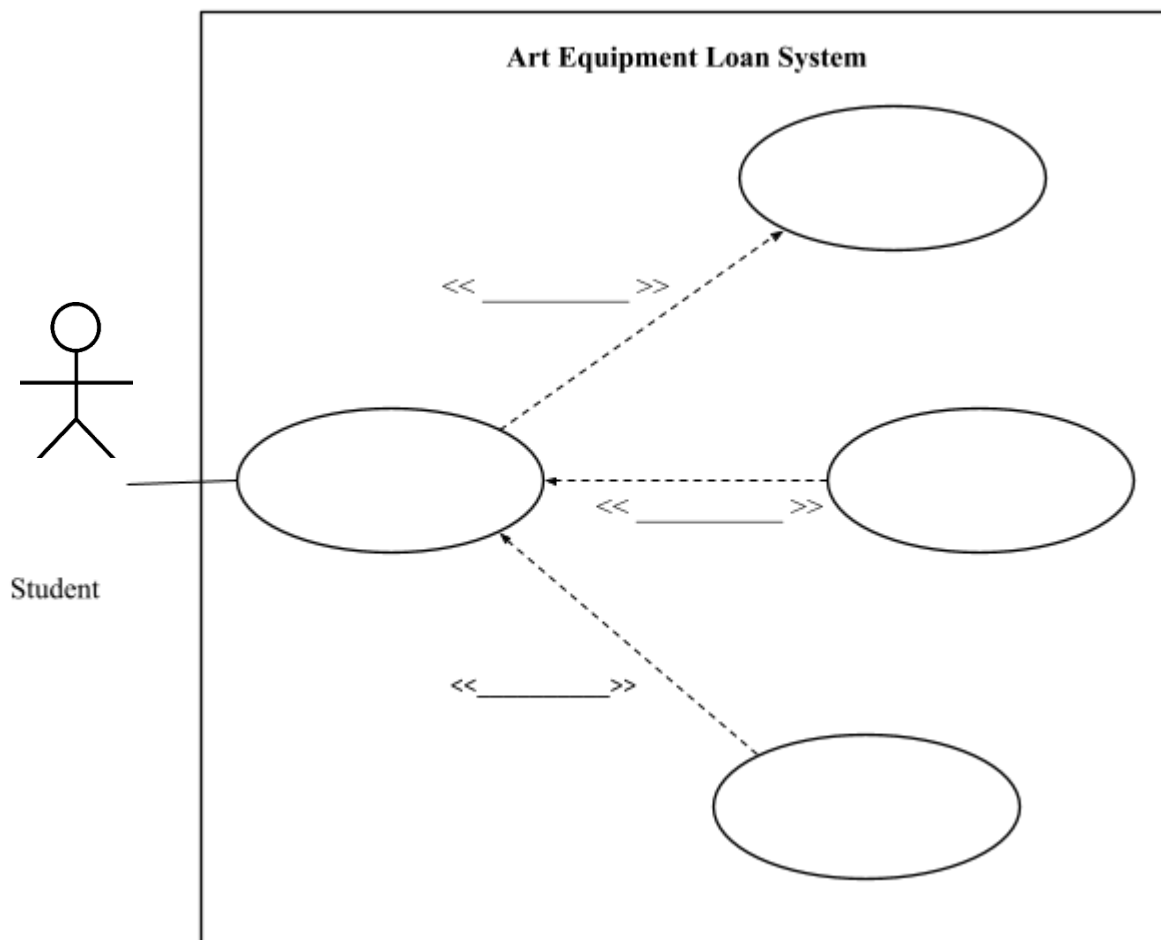
Question 4 (4 marks)

Jasmine is developing a solution for the school Art Department which will record the equipment borrowed by students. She is currently designing a Use Case diagram to show how students will interact with the system.

Jasmine wants the solution to allow students to do the following:

- log in and view items that are available for borrowing.
- To borrow an item if it is available.
- Book to borrow an item when it becomes available if it is not currently available.

Complete the Use Case diagram below to demonstrate these requirements by naming the Use Cases and relationships.



Question 5 (4 marks)

The pseudocode for a function to check the centre of gravity of an aircraft at take-off has been written.

At take-off, the centre of gravity (CoG) for the aircraft must be less 120.14 centimetres aft of the datum for a take-off weight of 885 kilograms or less.

```
FUNCTION CheckCentreOfGravity(CoG, take_off_weight)
BEGIN
  IF CoG < 47.3 OR take_off_weight <= 1950 THEN
    RETURN True
  ELSE
    RETURN False
  END IF
END
```

- a. Complete the following test table to validate the CheckCentreOfGravity function. 3 marks

Item being tested		Expected result	Actual result
CoG	Weight		
120.14	885	True	True

- b. Identify an error in the algorithm and rewrite the line, correcting the error. 1 mark

END OF SECTION B

SECTION C – Case Study

Instructions for Section C

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

Remove the Case Study Insert and read **all** the information provided before you answer these questions.

Answers must apply to the Case Study.

Question 1 (1 mark)

Identify **one** information system goal for the mobile application being developed for carers.

Question 2 (3 marks)

After discussions with Kate, Tao has constructed a software requirements specification (SRS) for the project.

Identify in which section of the SRS the following statements would be included.

Statement	SRS Section
Client data will be stored and transmitted securely.	
The web application will match carers skills with client care needs.	
The mobile app will run on both Android and iOS devices.	

Question 3 (12 marks)

Tao has decided to use an Agile development model for the development of the web and mobile applications.

- a. Justify why Tao may have chosen the Agile development model rather than the Waterfall development model. 3 marks

Tao has determined the project will be developed in two stages and has assigned two developers to the project. She has proposed the following schedule for the design and development for the solution.

Task	Duration (weeks)
Analysis	1
Design web application	1
Build and test web application	3
Install web application on client server and test	1
Design mobile solution	1
Develop and test mobile module	4
Integrate mobile solution with web application	1
Conduct usability test	1
Deploy mobile module to client devices	1

Tao has broken the task of building and testing the web application into three sprints and started constructing a Gantt chart to show the activities and milestones.

- b. Complete the Gantt chart on the following page to demonstrate how the web application can be completed in the time frame initially allocated. 7 marks

Task No.	Task Name	Duration	Dependencies	Week																						
				1					2					3				4								
				M	T	W	T	F	M	T	W	T	F	M	T	W	T	F	M	T						
Sprint 1		5																								
1	Build main screen	2		■	■																					
2	Build care request screen	3		■	■	■																				
3	Stakeholder review	1	1, 2				■																			
4	Implement fixes	1	3					■																		
5	Sprint 1 complete	0	4					◆																		
Sprint 2		5																								
6	Build login interface	1	5																							
7	Code and test secure login module	3	5																							
8	Stakeholder review	1	7																							
9	Implement fixes	1	8																							
10	Sprint 2 complete	0	9																							
Sprint 3		5																								
11	Construct data storage	1	10																							
12	Code and test data storage module	2	11																							
13	Stakeholder review	1	12																■							
14	Implement fixes	1	13																	■						
15	Sprint 3 complete	0	14																		◆					
16	Install and test web application	5	15																					■	■	

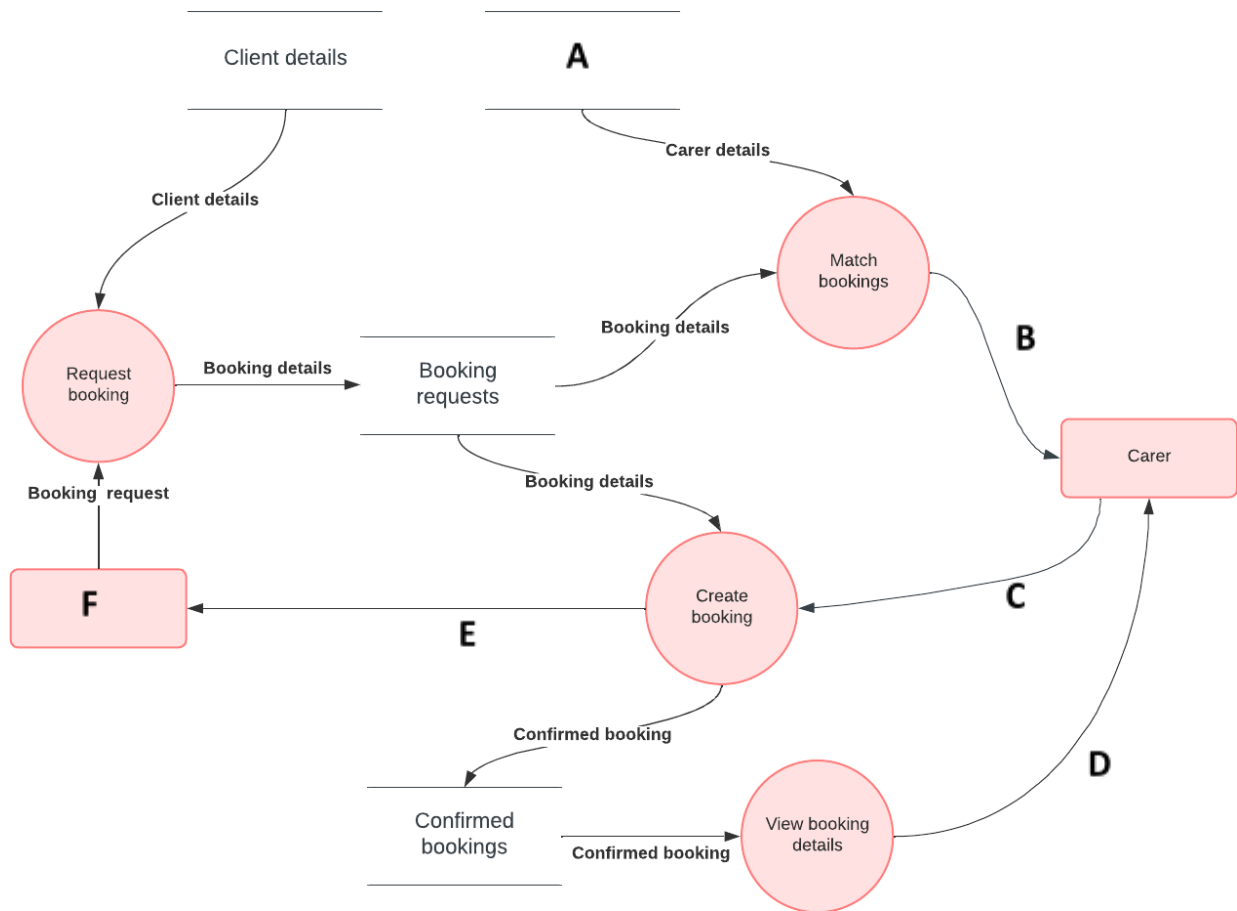
c. One of the developers assigned to build the care request screen of the web solution is concerned about the number of days allocated to the task.

Explain the impact on the project timeline if this task were to be delayed. 2 marks

Question 4 (6 marks)

The web application will allow carers to view care requests from clients which match their level of skill, as either Personal Care Assistants (PCAs) or nurses. Carers will be able to create a booking and view details of the booking, including the personal and related medical details of the client.

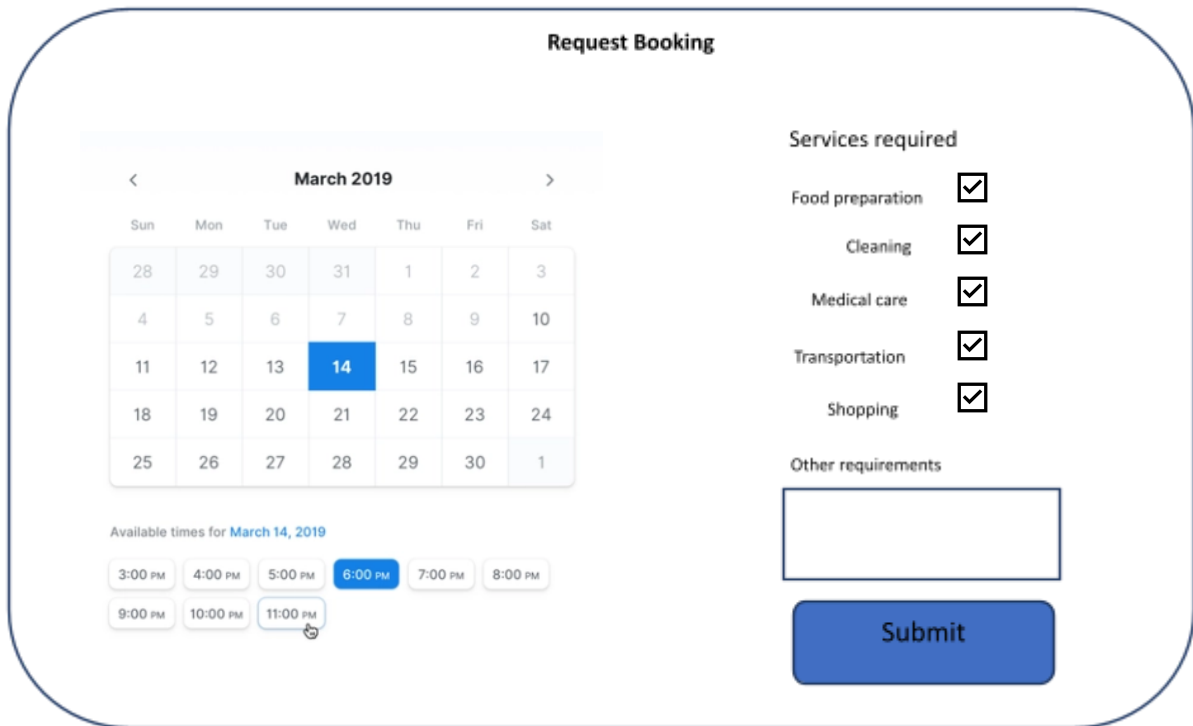
Using the Context Diagram in the Case Study, complete the partial data flow diagram below by naming the labelled elements.



Label	Element Name
A	
B	
C	
D	
E	
F	

Question 5 (6 marks)

The team designing the interface for the care request screen have created a mock-up.



- a. Identify and justify **one** feature of the interface design that contributes to the effectiveness of the design and **one** feature that contributes to the efficiency of the design. 4 marks

Effectiveness: _____

Efficiency: _____

- b. Describe an appropriate validation process that will need to be performed for the date and time values, which would be submitted as part of a booking request. 2 marks

Question 6 (10 marks)

One of the developers is writing the algorithm to match carers with care requests.

When a carer logs in to the mobile app, they will be able to view a list of available bookings, which match the level of care they are able to provide with the level of care required by the client making a request.

The function `CreateMatchedBookingList` will read an XML file containing all the client booking requests and store the data in memory.

A sample of the data in the booking request node of the file is shown below.

```
<booking_request ID="1234">
  <allocated>False</allocated>
  <required_care_level >3</required_care_level >
  <client_name>John Smith</client_name >
  <client_address>123 Big Street, Little Town 9099</client_address
  >
  <client_phone>0987654321</client_phone>
</ booking_request >
```

The algorithm will perform the following steps:

- Iterate through each booking request read from the data file.
- If a booking request has not been allocated and the `carer_level` field of the `carerdetails` object is greater than or equal to the `required_care_level` field of the booking request then,
 - Add the booking request id to the list of matched bookings.
 - Set the `allocated` field of the request object to “true.”
 - Return the list of matched bookings.

- a. Complete the algorithm as pseudocode to create a list of matched bookings for a carer. 6 marks

```

FUNCTION CreateMatchedBookingList(carerDetails)
BEGIN
    READ bookingRequestList
    matchedBookingList □ [ ]
    index □ 0
    FOREACH bookingRequest IN bookingRequestList
    
```

END

- b. Define the data types or data structures for each of the variables listed in a data dictionary. 4 marks

Variable name	Data type
carerDetails	
bookingRequest	
matchedBookingList	
bookingRequest.allocated	

Question 7 (3 marks)

The development team working on the mobile module of the project have been asked to use version control software.

Discuss how the use of version control software could assist the Websoft developers to efficiently manage the development process.

Question 8 (8 marks)

Due to problems with integrating the data storage module, the project has gone over time by a week. In her original schedule, Tao had allocated one week for usability testing. Kate wants to have the system available as soon as possible and questioned Tao about the delay, and the need to carry out a usability test.

- a. Describe the purpose of a usability test and justify to Kate why it should be carried out before the system is made available to users. 2 marks

- b. Kate has suggested that her office staff be used as participants in the usability test; however, Tao believes the office staff would not be appropriate for the task.

Suggest reasons why Tao may have decided the office staff would not be suitable participants in a usability test of the web application.

2 marks

- c. Identify **one** feature of the web application and describe a strategy to evaluate it as part of a usability test.

4 marks

Web application feature: _____

Strategy: _____

Question 9 (4 marks)

Kate has found a low-cost cloud storage solution that she is considering using. Tao is concerned about the security of the data and is examining the legislation requirements with which the solution will need to comply.

- a. Identify the principal legislation Tao will need to be aware of and explain its key requirements. 3 marks

- b. Identify a software security control strategy that could be implemented on the mobile app to help ensure these requirements are met. 1 mark

Question 10 (4 marks)

When they arrive at a client’s address, carers are required to log in to the app and validate that they have started work. There have been several occasions where clients have complained that carers did not arrive on time, resulting in disputes over payment.

One of the developers has suggested inserting code into the app to report the GPS location data of the mobile device and allow them to track the location of carers. Kate is concerned about the ethical and legal implications of this practice.

Identify and discuss **one** ethical and **one** legal concern Kate should consider regarding this suggestion.

Ethical concern: _____

Legal concern: _____

Question 11 (3 marks)

The system has been fully implemented and Tao wants to evaluate its effectiveness.

Describe an evaluation strategy that would allow Tao to assess how effective the solution has been in meeting the initial requirements.

END OF QUESTION AND ANSWER BOOK

Insert for Section C – Case Study

Please remove from this book during reading time.

Call on Kate

“Call on Kate” is a small Melbourne-based company that provides in-home support for people with care or medical needs. The company currently employs several part-time carers but wants to expand its business.

The carers range from Personal Care Assistants (PCAs) who can provide basic care, to qualified nurses who can administer more advanced medical care. Clients can arrange to have a carer visit their home to assist with a range of health-related issues, including managing medications. Carers are assigned to clients based on the level of care required. Many of their clients are elderly and suffer from a range of visual or physical impairments.

The company wants to implement a new web-based solution that will allow more efficient access for clients wanting to book a service. They also want an easier and more effective way for carers to be assigned to a client, based on the required level of care.

Neither Kate, the owner of the company, nor her business partner have any experience with online solutions and are unsure exactly what the solution will look like, or how it will work. They are keen though, to have the system up and running as soon as possible.

The company has employed Websoft, a software development company that specialises in web applications and mobile solutions, to design and develop a solution.

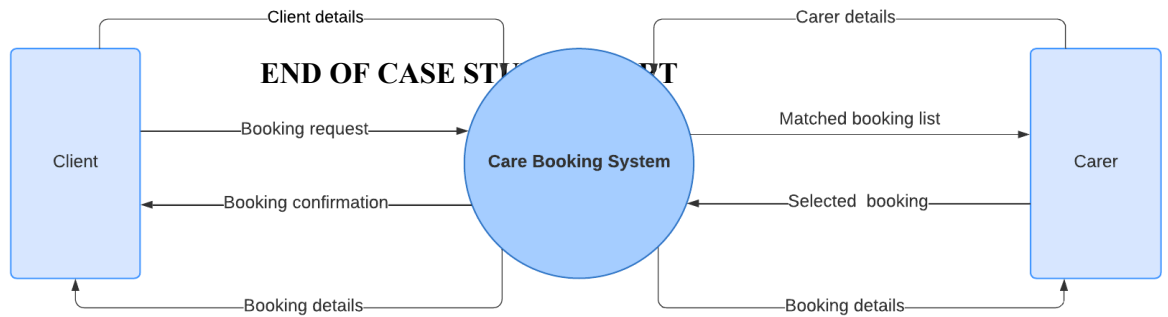
Kate has asked that the new solution enable clients to store their personal details, including medical records, and manage bookings for in-home services. She also wants carers to be able to select and manage the bookings they take and view any related medical data of their clients.

Tao from Websoft has been appointed as the Lead Software Developer for the project. After discussions with Kate, she has proposed a solution consisting of two components:

- A secure web application that will allow clients to manage their data, and book care appointments.
- A mobile application that will allow carers to select the care appointments they will undertake.

A member of the development team has also constructed a Context Diagram (Figure 1) of the proposed care booking system.

Figure 1: Context Diagram

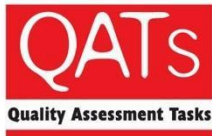


Section A: Multiple-Choice Answer Sheet

NAME: _____

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



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VCE® Software Development

Unit 3 & 4 Practice Written Examination

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Solution Pathway

Below are sample answers. Please consider the merit of alternative responses.

SECTION A – Multiple-Choice Questions (20 marks)

Question	Answer	Comments
1	C	All are named blocks of code but, a function is the only one that returns an output. Procedures are like functions but don't return a value; methods are defined within a class and are used to manipulate the data within an object; a class is a blueprint for an object and are the basis of OO programming.
2	D	From the Study Design the factors influencing the design of solutions include affordance, interoperability, marketability, security, and usability. This excludes options A, B and C.
3	A	From the Study Design the non-functional requirements are robustness, reliability, usability, maintainability, and portability. B and C would be functional requirements and D is a constraint or environmental characteristic.
4	D	As the solution is to provide a more efficient way for customers to place orders the most relevant data would be gained by finding out their requirements. Response A is the only other reasonable option, but observation of the orders being placed would not reveal information relevant to a mobile solution.
5	C	As the module is open source the <i>Copyright Act</i> does not apply and <i>Privacy and Data Protection Act</i> only applies to Victorian Government agencies. Both the Privacy Act and Health Records Act cover how health data is stored and communicated but, as the Privacy Act is a federal statute it has primacy.
6	A	By definition - as the data is moved to secondary server this would be archiving. Option B is deletion of files, C is backing up and D is primary storage.
7	A	An SRS should include sections detailing the Scope, Requirements, Constraints and Environment of a solution. B is a design, C is a DFD, and D is a Gantt chart.
8	B	While all the options listed can help improve the overall security of a web-application, the most effective way to prevent XSS vulnerabilities is to implement server-side input validation. This approach involves validating all data received from clients on the server-side, which helps to prevent any malicious scripts or code from being executed on the client-side

9	<i>A</i>	The algorithm uses a Linear Search approach but requires students to demonstrate an understanding of how it iterates through the array.
10	<i>C</i>	Students need to be able to recognise the state of data after either a Selection or Quick sort have been applied.
11	<i>B</i>	This is one of the activities of the PSM design stage.
12	<i>C</i>	Validation of needs to be applied to all input in the order - existence, type, and range. Option A omits existence, B omits type and D is in the wrong order.
13	<i>B</i>	To be useful data needs to have integrity and be available. From the Study Design the characteristics of data that has integrity include accuracy, authenticity, correctness, reasonableness, relevance, and timeliness.
14	<i>B</i>	Public Key or asymmetric encryption is a one of software security controls used protect data during transmission.
15	<i>C</i>	Students need to be able to interpret pseudocode and trace the processing of algorithms that use the three control structures.
16	<i>D</i>	Penetration test component is a key component of risk management strategy to protect data and systems.
17	<i>C</i>	Threats to networks and data include social engineering. Phishing involves psychological manipulation while the other options are mechanical operations.
18	<i>B</i>	By definition - associative arrays and dictionaries use key-value pairs.
19	<i>A</i>	Open-source software is free and allows user to use and modify the source code. Typically, free- and shareware have some licensing restrictions placed on their usage and the source code is not available.

20	<i>D</i>	There is little or no opportunity for client feedback during the development stage of Waterfall model while this is a feature of the Agile model
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SECTION B – Short-Answer Questions (20 marks)

Question 1 (6 marks)

- a. Her colleague Johan has suggested that a CSV file would be a better format.

Suggest reasons to justify Peta’s choice to use XML and why Johan may have recommended that CSV would be a more appropriate format. 2 marks

- **1 mark** for identifying a reason to support selecting XML.
- **1 mark** for identifying a reason to support selecting CSV.

Sample high level response:

The tag structure in XML allows Peta to clearly identify the meaning of data in the file, for example the barcode of each product, whereas in a CSV file the fields are just separated by a comma and have no identifier. CSV files are smaller and easier to create than XML files which can be an advantage when dealing with large data sets.

- b. Peta has asked Johan to design the data structures to hold the product data read from the disk file.

Identify two concerns with the data types Johan has selected. Suggest and justify more appropriate types for those variables. 2 marks

- **1 mark** for identifying that the product barcode should be an Integer and providing a justification such as ease of searching or size in memory.
- **1 mark** for identifying that product price should be a Floating point and providing a justification such as accuracy or performing math operations on.

Sample high level response:

Johan has defined product barcode as a string, but in the sample, he was given it as a 12 digit number. Using an integer would make it easier to search for. He has also defined product price as an Integer but in the XML document it is a currency correct to two decimal places. For accuracy a floating point more be a more appropriate data type.

- c. **Identify and justify an appropriate strategy for searching the data. 2 marks**

- **1 mark** for identifying a strategy that includes sorting the data and using a binary search algorithm. (A strategy must include more than one step so no marks for only identifying a binary search)
- **1 mark** for providing a valid justification based on the information provided including the data size and number of search operations to be performed.

Sample high level response:

Sample high level response:

Because of the large number of items to be searched a binary search would be a better choice as it is much more efficient than a linear search. To use a binary search the data would first need to be sorted and although this is expensive, the frequency of searches would justify the cost.

Question 2 (2 marks)

Describe the purpose of a software audit.

- **1 mark up to 2 marks for each** purpose of a software audit identified, including potential risks associated with the quality or reliability of software, adherence to regulation and licensing requirements.
- Students must differentiate between a software audit and a software evaluation that examines strengths and weaknesses of the software.
- Marks should not be given for identification of the processes involved in the audit.

Sample high level response:

The purpose of a software audit is to identify potential risks or issues with the performance, reliability, or security of the software they use and its compliance with regulations and licensing requirements.

Question 3 (4 marks)

Complete the trace table below to determine the output of the following algorithm for the given values.

```

1.  A  $\square$  6
2.  B  $\square$  15
3.  BEGIN
4.  IF A < B THEN
5.      A  $\square$  A + B
6.      B  $\square$  A - B
7.      A  $\square$  A - B
8.  END IF
9.  WHILE A mod B  $\neq$  0 DO
10.     A  $\square$  A + B
11.     B  $\square$  A - B
12.     A  $\square$  A - B
13.     B  $\square$  B mod A
14.  END WHILE
15.  PRINT B
    
```

- **Up to 3 marks** for completing the trace table correctly: Students need to indicate at least the **highlighted** values for each line.
 - o **1 mark** for tracing the values of A and B correctly through lines 10, 11 and 12.
 - o **1 mark** for correctly completing line 13.
 - o **1 mark** for correctly completing line 9.
- **1 mark** for determining the output line 15.

Sample high level response:

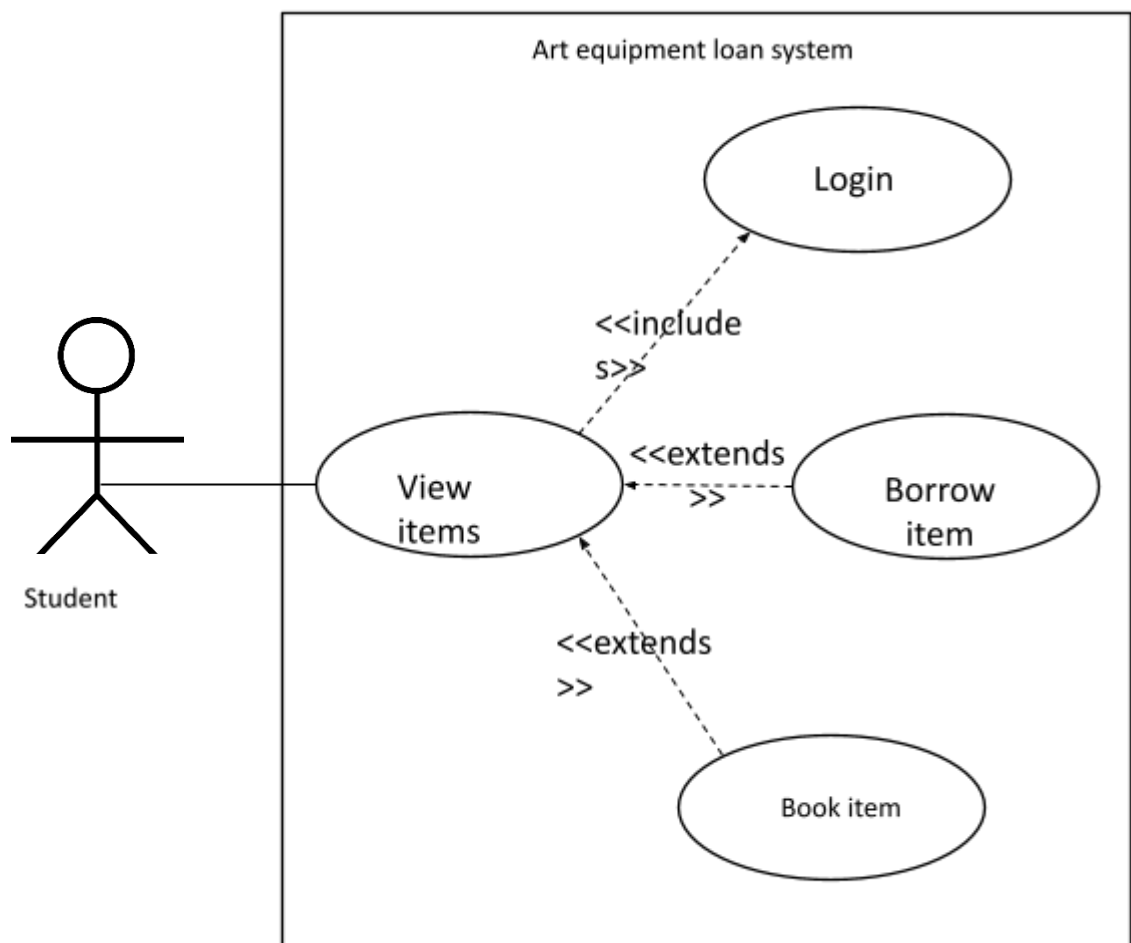
10.	A \square A + B	21	6			
11.	B \square A - B	21	15			
12.	A \square A - B	6	15			
13.	B \square B mod A	6	3			
9.	A mod B \neq 0	6	3		TRUE	
15.	Print B	6	3			3

Question 4 (4 marks)

Complete the Use Case diagram to demonstrate these requirements by naming the Use Cases and relationships.

- **1 mark** for identifying the *View Items* use case.
- **1 mark each** for correctly identifying the *Login*, *Book Item* and *Borrow Item* use cases and their relationships. (3 marks in total)
- Relationships **must be** correctly identified for the *Login*, *Book Item* and *Borrow Item* use cases to gain a mark.
- Any reasonable Use Case name that implies the following is acceptable.

Sample high level response:



Question 5 (4 marks)

a. **Complete the test table to validate the CheckCentreOfGravity function. 3 marks**

- **1 mark each up to 3 marks** for correctly completing each line the test table with test data and the expected and actual results.

Sample high level response:

Item being tested		Expected result	Actual result
CoG	Weight		
47.2	1950	True	True
47.2	1951	FALSE	TRUE
47.3	1950	FALSE	TRUE
47.3	1951	FALSE	FALSE

b. **Identify an error in the algorithm and rewrite the line correcting the error.**

1 mark

- **1 mark** for identifying and correcting the line with the error.

Sample high level response:

```
IF CoG < 47.3 AND take_off_weight <= 1950 THEN
```

SECTION C – Case Study (60 marks)

Question 1 (1 mark)

Identify one information system goal for the mobile application being developed for carers.

- **1 mark** for identifying an information system goal from the case study. Goals of information systems involve the transformation of data into information to facilitate decision making.
- From the Case Study the mobile app for carers should enable them to “select and manage the bookings they take”. Students are only required to identify not justify.

Sample high level response:

To manage their bookings by selecting available care appointments that match their skills.

Question 2 (3 marks)

Identify which section of the SRS the following statements would be included in.

- **1 mark** for each correctly identified sections of the SRS. (3 marks in total)
- “*Client data will be stored and transmitted securely*” – as the solution is transmitting and storing private and medical data security is a constraint.
- “*The web application will match carers skills with client care needs.*” – a functional requirement as it is a product feature that must be implemented. It could also reasonably be in the scope as it describes a characteristic or feature of the solution.
- “*The mobile app will run on both Android and iOS devices.*” – a non-functional requirement as it relates to portability.

Sample high level response:

Statement	SRS section
Client data will be stored and transmitted securely.	<i>Constraints</i>
The web application will match carers skills with client care needs.	<i>Scope or Requirements or Functional requirements</i>
The mobile app will run on both Android and iOS devices.	<i>Requirements or Non-functional requirements</i>

Question 3 (12 marks).

- a. Justify why Tao may have chosen the Agile development model rather than the Waterfall development model. 3 marks**

Students need to identify features from the Case Study that would support the selection of an Agile model and justify their response by comparing the two models in terms of effectiveness.

The Case Study states that Kate has little experience with mobile solutions and is unsure as to what the final product will look like or function.

- **1 mark** for identifying a feature from the Case Study to support the selection of the Agile model.
- **2 marks** for identifying one or more features of the Agile model that would align with the identified feature of the Case Study and comparing it to the Waterfall model. Responses could include key words such as “incremental” compared to “rigid” or “sequential” or describe the difference between the feedback and stakeholder engagement between the models.

Sample high level response:

Kate is unsure what the solution will look like and has had little experience with mobile apps. The Agile model's incremental approach would allow greater flexibility than the Waterfall's sequential approach. It would allow Kate could provide feedback to Tao during development to ensure the solution meets her requirements.

b. Complete the Gantt chart to demonstrate how the web application can be completed within the time frame initially allocated. 7 marks

- 1 mark for correctly completing each of the missing tasks of the Gantt chart. (7 marks in total)

Task No.	Task Name	Duration	Dependencies	Week															
				1					2					3				4	
				M	T	W	T	F	M	T	W	T	F	M	T	W	T	F	M
Sprint 1		5																	
1	Build main screen	2		█	█														
2	Build care request screen	3		█	█	█													
3	Stakeholder review	1	1, 2				█												
4	Implement fixes	1	3					█											
5	Sprint 1 complete	0	4					◆											
Sprint 2		5																	
6	Build login interface	1	5					█											
7	Code and test secure login module	3	5					█	█	█									
8	Stakeholder review	1	7							█									
9	Implement fixes	1	8								█								
10	Sprint 2 complete	0	9									◆							
Sprint 3		5																	
11	Construct data storage	1	10									█							
12	Code and test data storage module	2	11										█	█					
13	Stakeholder review	1	12													█			
14	Implement fixes	1	13														█		
15	Sprint 3 complete	0	14															◆	
16	Install and test web application	5	15															█	█

c. Explain the impact on the project timeline if this task were to be delayed. 2 marks

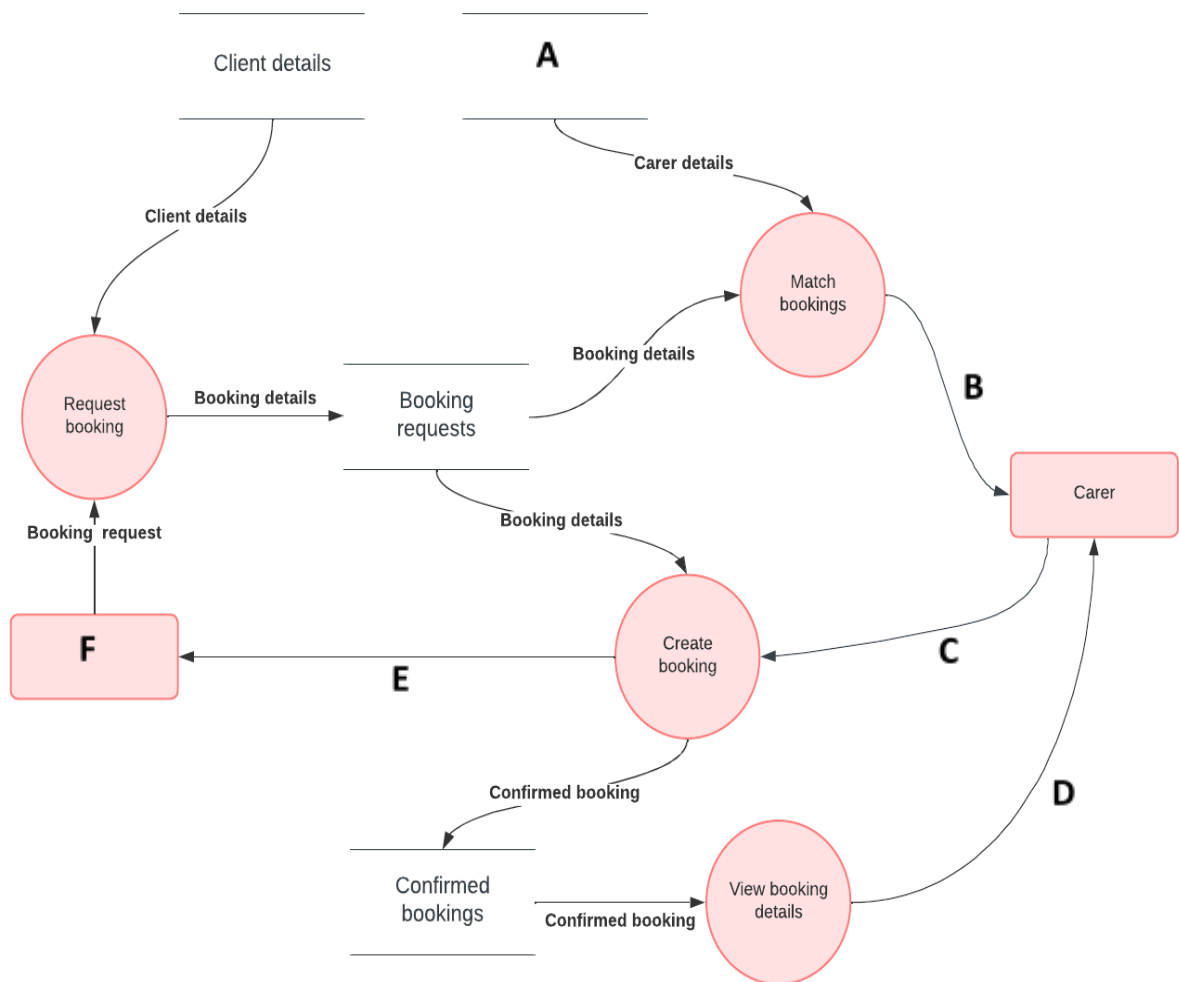
- 1 mark for identifying that the task is on the critical path of the project.

- **1 mark** for stating the any delay or overrun will impact the completion of task 15 (Sprint 3) and possibly jeopardise the project completion date unless time can be made up somewhere else.

Sample high level response:

The task is on the critical path and delay will result in Sprint 3 being completed on time. It could also delay the whole project unless time can be made up somewhere else.

Question 4 (6 marks)



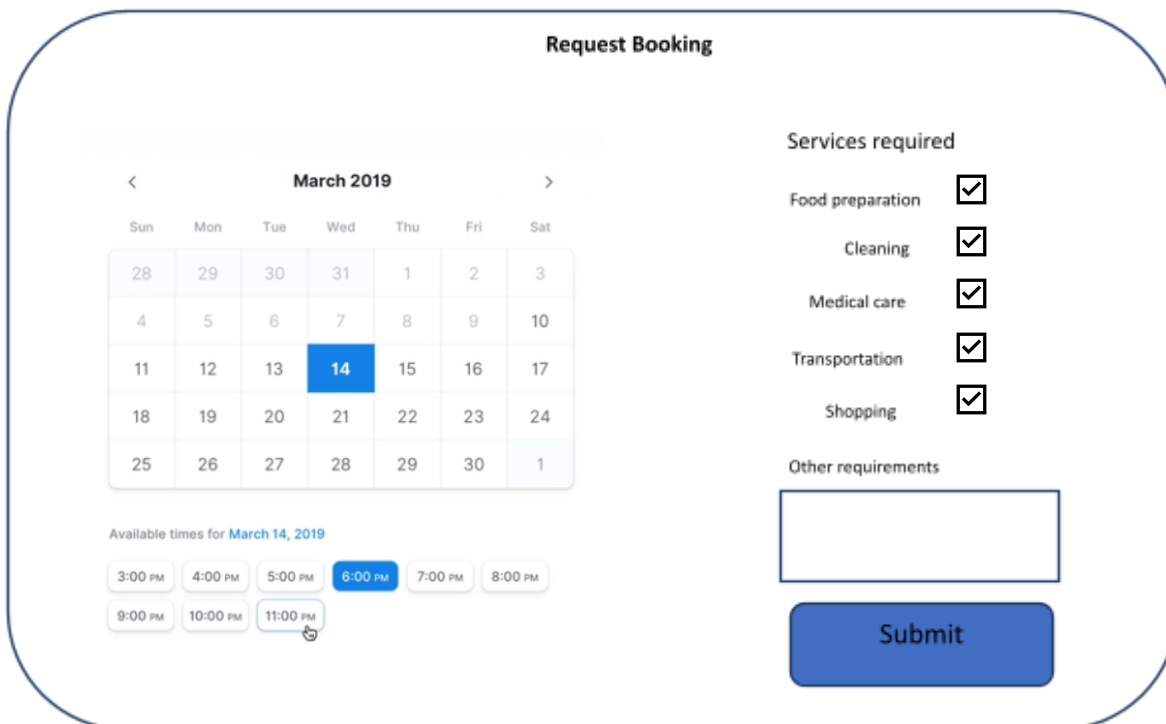
- **1 mark each** for correctly naming the components of the DFD. Note: Names must align with the information given in the Context Diagram. (6 marks in total)

Sample high level response:

Label	Element name
A	<i>Carer details</i>
B	<i>Matched booking list</i>

C	<i>Selected booking</i>
D	<i>Booking details</i>
E	<i>Booking confirmation</i>
F	<i>Client</i>

Question 5 (6 marks)



- a. Identify and justify one feature of the interface design that contribute to the effectiveness of the design and one feature that contributes to the efficiency of the design.** **4 marks**

Efficiency

Features of the interface which contribute to efficiency relate to the time and effort required to complete a task. These could include any UI feature that improves functionality or makes it easier to use by reducing the time and effort required to perform a task. There are several appropriate responses but, students need to justify the feature in terms of efficiency as it relates to time taken to complete a task.

- **1 mark each** for identifying an appropriate feature.
- **1 mark** for an associated justification of the feature.

Sample high level response:

The use of checkboxes to select the services required. The clients can see the available services they can select from making it easier for them to choose multiple services they want rather than having to enter them by text.

Effectiveness

Features of the interface that contribute to effectiveness could include familiarity, communication of message, attractiveness, clarity, and usability.

- **1 mark** for identifying an appropriate feature.
- **1 mark** for an associated justification of the feature.

Sample high level response:

The use of the calendar component for selecting dates and the buttons for the available times would allow clients to easily see the times they can book an appointment on a given date.

- b. Describe an appropriate validation process that will need to be performed for the date and time values that would be submitted as part of a booking request. 2 marks**

As they are asked to describe a process, students need to explicitly reference what each of the data needs to be validated for not just list types of validation.

- **1 mark** for identifying that the time would need to be validated for existence.
- **1 mark** for identifying that the date would need to be validated for range.

Sample high level response:

The app would need to validate the time for existence by checking that the client had selected a time and validate the date for range by checking the selected date is greater than the current date.

Question 6 (10 marks)

- a. Complete the algorithm as pseudocode to create a list of matched bookings for a carer. 6 marks**

Students need to complete the algorithm as well formatted pseudocode.

They need to indent correctly and use the assignment operator □.

- **2 marks** for a correctly formatted IF statement including, accessing records using the fields. The THEN keyword is optional, but it must have an END IF. Part marks can be awarded.
- **1 mark** for adding the record to the array.
- **1 mark** for updating the allocated field.
- **1 mark** for incrementing the index.
- **1 mark** for returning the array.
- **Deduct 1 mark for incorrect indentation.**

Sample high level response:

```

FUNCTION CreateMatchedBookingList(carerDetails)
BEGIN
    READ bookingRequestList
    matchedBookingList
    index □ 0
    FOREACH bookingRequest IN bookingRequestList
        IF bookingRequest.allocated = False
            AND carerDetails.carer_level >= bookingRequest.required_care_level THEN
                matchedBookingList[index] □ bookingRequest
                bookingRequest.allocated □ True
                index □ index + 1
            END IF
        END FOREACH
    RETURN matchedBookingList
END
    
```

b. Define the data types or data structures for each of the variables listed in data dictionary.**4 marks**

- **1 mark** for each correct answer. (4 marks in total)
- Students need to identify the data structures as an array or record and the data type of the record field.

Sample high level response:

Variable name	Data type
carerDetails	<i>Record</i>
bookingRequest	<i>Record</i>
matchedBookingList	<i>Array (of bookingRequest records)</i>
bookingRequest.allocated	<i>Boolean</i>

Question 7 (3 marks)

Discuss how the use version control software could assist the Websoft developers to efficiently manage the development process.

- **3 marks** for providing a response that associates at least two features of version control and aligning them with features of the solution development.
- Students need to identify how the features version control could benefit the Websoft developers. This could include facilitating the management and organisation of different versions of the software code, enabling collaboration among team members, supporting security by tracking changes and facilitating easy rollbacks in case of errors or bugs.

Sample high level response:

By providing a centralised repository for code, version control would enable the developers at Websoft to collaborate more effectively when working on concurrent tasks. It would allow them to make changes without the risk of overwriting each other's work and in the event of a problem they could roll-back to a previous, safe version of the code.

Question 8 (8 marks)

- a. **Describe the purpose of the usability test and justify to Kate why it should be carried out before the system is made available to users.** **2 marks**

- **2 marks** for identifying the key purpose of usability testing and justifying why it should be carried out prior to the software being released.
- Students should identify the key purpose of usability testing as ensuring that the software product is easy to use and meets the needs of its intended users.

Sample high level response:

Even though Kate wants to have the system available, she needs to accept the delay to carry out usability testing. This will ensure that the web application meets her requirements and is easy for clients to use, for example that they can easily create an appointment.

- b. **Suggest reasons why Tao may have decided the office staff would not be suitable participants in a usability test of the web application.** **2 marks**

- **2 marks** for identifying at least two attributes of the office staff would not be appropriate for participating in the usability test.
- Students should be able to identify features such as: ability level using digital applications, familiarity with the process of creating a care appointment and, demographic features including age and potential disability level.

Sample high level response:

The office staff may have far stronger computer skills and be more familiar with the processes involved in creating an appointment than the Call on Kate's actual clients. They may also be from a different age group and some of the clients may have disabilities such as visual impairment that the office workers may not.

- c. **Identify one feature of the web application and describe a strategy to evaluate it as part of a usability test.** **4 marks**

Web application feature

- **1 mark** for identifying a feature of the web application – creating a care appointment.

Sample high level response:

Creating a care appointment.

Strategy

- **3 marks** for describing a strategy to evaluate the feature. Students need to identify a strategy with multiple steps including:
 - Create tasks designed to test the software's key features and functions that the participants will perform while using the software product.
 - Conduct the test by observing participants as they complete the tasks and recording their actions and responses.
 - Analyse the data collected during the test to identify areas where the software product can be improved.

Sample high level response:

Participants could be asked to create an appointment for a particular date and time requiring some services. They could be observed performing the tasks and their action and responses recorded. The data could then be analysed to see if any modifications need to be made.

Question 9 (4 marks)

a. Identify the principal legislation Tao will need to be aware of and explain its key requirements. 3 marks

- **1 mark** for identifying the Privacy Act (1988) as the key legislation associated with transmission and storage of health-related data.
- **2 marks** for explaining the key requirements. Students need to identify that the Privacy Act 1988 and the Australian Privacy Principles (APPs), set out requirements for the collection, use, and disclosure of personal information, including health information by Australian government agencies and private sector organisations.

Sample high level response:

As the solution will be dealing with private medical data of the clients, Tao needs to be aware of the Privacy Act (1988) and the APPs. She must ensure that personal information is collected and stored securely and that it is only used and disclosed for the purposes for which it was collected. She must also provide them with access to their personal information and allow them to correct any inaccuracies.

b. Identify a software security control strategy that could be implemented on the mobile app to help ensure these requirements are met. 1 mark

- **1 mark** for identifying a software security control for the mobile app including authentication using a strong password, two- or multi-factor authentication, encryption of data.

Sample high level response:

The app could implement two-factor authentication to access data.

Question 10 (4 marks)

Identify and discuss one ethical and one legal concern Kate should have regarding this suggestion.

Ethical concern

- **2 marks** for identifying an ethical concern.
- Students need to be able to identify the insertion of hidden code or malicious code by developers as an ethical issue.

Sample high level response:

An ethical issue would be that the carers would not be aware that they were being tracked and they had not consented to it. The app could be used to track them outside of work hours which would be an invasion of privacy.

Legal concern

- **2 marks** for identifying a legal concern.
- Students need to be able to identify aspects of privacy as a legal issue. The app would be collecting and storing location data without user consent.

Sample high level response:

A legal issue would be that the app would be collecting and transmitting private data in the form of the carer GPS location. As users had not consented to this it would contravene the Privacy Act 1988

Question 11 (3 marks)

Describe an evaluation strategy that would allow her to assess how effective the solution has been in meeting the initial requirements.

- **1 mark** for identifying a timeframe for the evaluation to be undertaken.
- **1 mark each up to 2 marks** for identifying multiple steps for gathering data of feasible evaluation strategy.

Sample high level response:

After four weeks of operation, Tao could interview Kate to see if the software is performing as expected. She could also interview some of the clients and carers to check how the web and mobile apps were performing. Examining the error logs on the web server could reveal if it was operating reliably.