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

Section	Number of questions	Number of questions to be answered	Number of marks
A	20	20	20
B	6	6	20
C	13	13	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 23 pages
- Detachable containing a case study for Section C 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.

Use the information below to answer Questions 4 and 5.

Anika has written the function below to find the average of a set of numbers.

start
{find average}
  input numbers

  for i ← 0 to count(numbers)
    total ← total + numbers[i]
  endfor

  output total / count(numbers)
end

Question 4

What type of data structure would the variable *numbers* most likely be?

A. array.

B. record.

C. integer.

D. dictionary.

Question 5

Which two control structure are used in the algorithm?

A. method, iteration.

B. iteration, selection.

C. selection, sequence.

D. sequence, iteration.

Question 6

Which of the following is an example of an economic constraint?

A. level of user expertise.

B. speed of processing.

C. privacy of data.

D. time.

Question 7

Which of the following is true regarding classes in an object-oriented programming language?

A.   Classes don't require documentation.

B.   A class must contain at least one method.

C.   Objects are made into classes when the program runs.

D.   Classes make it harder to use code in different places in a program.

Use the following diagram to answer Questions 8 and 9.
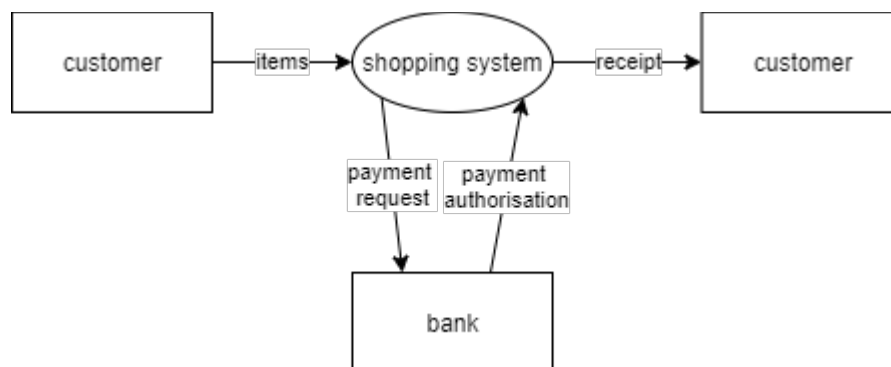
Question 8

In the diagram 'bank' is an example of

A.   an external entity.

B.   a data flow.

C.   a data store.

D.   a process.

Question 9

A Level 1 data flow diagram would show more detail about

A.   the customer.

B.   the bank system.

C.   the shopping system.

D.   none – this is already a Level 1 diagram.

Question 10

Which of the following tools would best depict the relationship between users and systems?

A.   network diagram.

B.   use case diagram.

C.   interface diagram.

D.   data flow diagram.

Question 11

Joel has been asked to develop a software solution that improves the efficiency of his workplace's current practices. Which of the following techniques would provide him with the most reliable data for his analysis?

A.   system generated reports.

B.   interview with the employer.

C.   small group interview with employees.

D.   social media posts of employees complaining about the workplace.

Question 12

Evaluating different design ideas

A.   uses creative processes.

B.   involves convergent thinking.

C.   should not involve input from the client.

D.   occurs during the evaluation stage of the PSM

Use the information below to answer Questions 13 to 15.

Frances has been asked to develop a system which helps teachers calculate and share marks for their students. The system must allow teachers to log in, set up classes, set up grade items, enter student grades and calculate each student's final result. It will also allow the teacher to send each student a personalised summary of their marks.

Question 13

Which of the following would be a functional requirement of the teacher mark book system?

A.   Teachers will be able to enter results on their phone or their laptop.

B.   Additional features will be easy to add.

C.   Students only receive their own results.

D.   Incorrect data will not be accepted.

Question 14

Which of the following could be used to evaluate the teacher mark book system for effectiveness?

A.   The system allows teachers to enter marks quickly.

B.   The system can be created within the allocated budget.

C.   The system calculates the final grade accurately 100% of the time.

D.   The system allows teachers to easily navigate to a different class group.

Question 15

The system allows for the date and time of the assessment to be entered but does not specify the format. Different teachers could enter dates and times differently. Consequently, the data stored could lack integrity. Which factor of integrity would be in question?

A.   accuracy.

B.   relevance.

C.   timeliness.

D.   reasonableness.

Question 16

Validation is used to ensure

A.   inputs are accurate.

B.   outputs are accurate.

C.   inputs are reasonable.

D.   outputs are reasonable.

Question 17

A hash function is written that stores a set of integers from an array. The hash function divides the integer by 4 and uses the remainder as an index value. The numbers to be stored are [5, 12, 15, 17]. Some have already been entered.

[0]	[1]	[2]	[3]
12	5		15

Which hash key will 17 be stored in?

A.   0

B.   1

C.   2

D.   3

Question 18

While Hiroshi was developing his software solution his laptop crashed, and he could not re-start it. He was able to download the latest copy of his files from a cloud storage service and continue development on a new computer.

Having another copy of his working files is an example of

A.   backup.

B.   archiving.

C.   good luck.

D.   version control.

Question 19

Physical security controls include

A.   audit trails.

B.   access restrictions.

C.   usernames and passwords.

D.   shredding confidential documents.

Question 20

The key focus of the evaluation stage of the PSM is

A.   to ensure the solution works as quickly as possible.

B.   to determine the solution meets the original goals.

C.   to ensure that the solution has no errors.

D.   to check if the solution is secure.

SECTION B – Short-answer questions

Instructions for Section B
Answer **all** questions in the spaces provided.

Question 1 (3 marks)

Hannah is creating a small software solution for a client who has a tight deadline to work to and is quite clear about what the solution should do. Identify which development model approach would best suit her project and justify why it would be preferred over another model?

Model _____

Justification_____

_____

_____

_____

_____

Question 2 (3 marks)

Sandra is creating a data dictionary for a software solution she is working on.

a.   Describe one convention she should follow when determining the names of her variables?   1 mark

_____

b.   Apart from the name, what other information is important for Sandra to include in the data dictionary?   2 marks

_____

_____

_____

Question 3 (5 marks)

A golf club holds a member competition every Saturday. The player with the lowest score wins the competition. If two or more players have the same lowest score, all players with that score are declared the winners. The club needs to determine the winner(s) from an associative array of called *scores* with player names used as the keys and players scores as the value. The names of the winner (or winners) should be output as an array and the winning score given as a separate output.

Note: the number of lines provided is not indicative of the lines of code required, it is just space for you to work.

begin

   input scores = [ ]

      winnerNames = [ ]

      winnerScore = 999

output winnerNames, winnerScore

end

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Question 4 (3 marks)

An online shopping system allows customers to view items in their catalogue and then add them to a shopping basket if they decide to purchase them. They can then purchase them securely by checking out through an online banking service.

Complete the Use Case diagram to reflect these requirements.
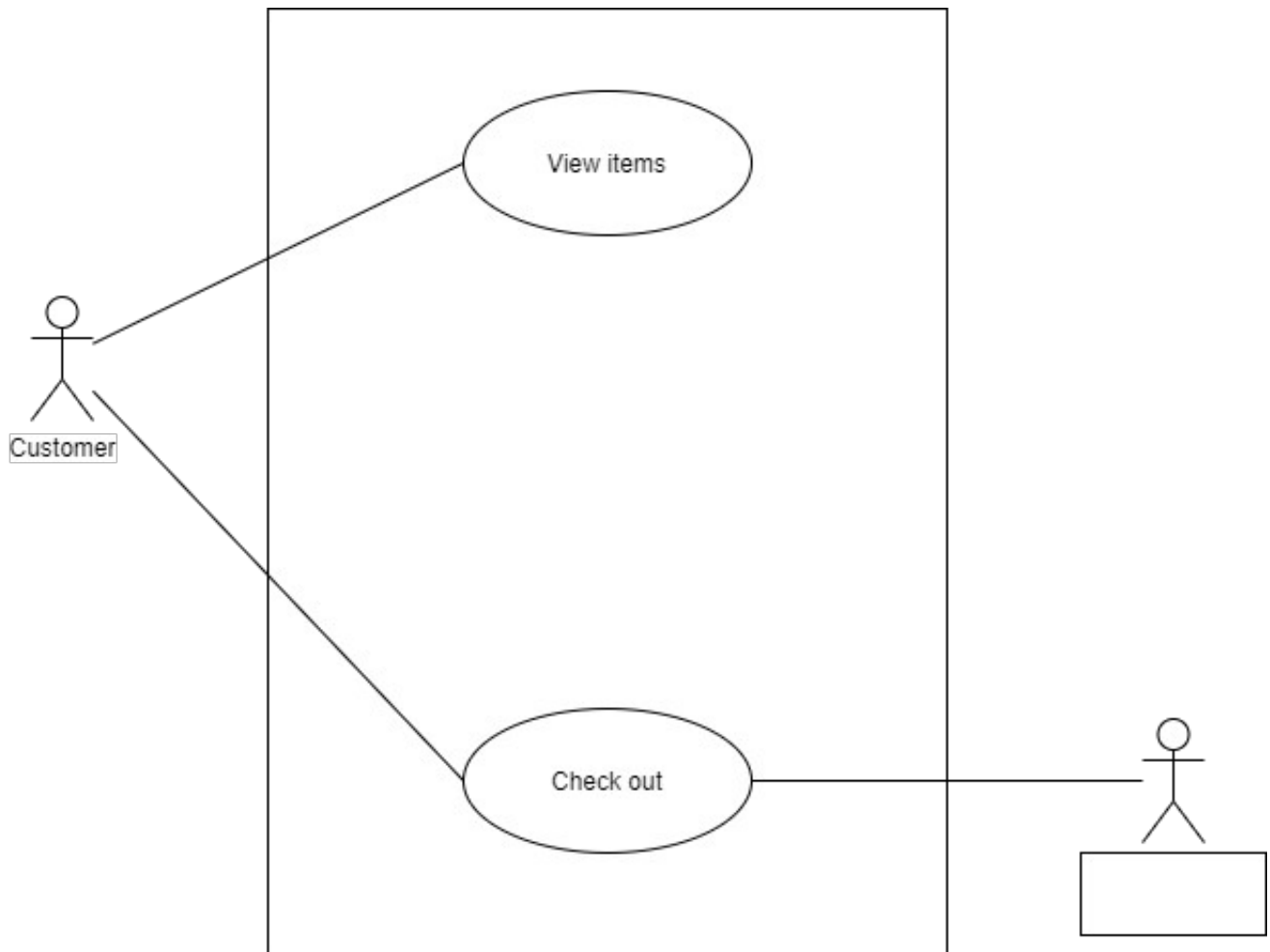
Question 4 (3 marks)

EyeSeeYou Optometrists collect a range of sensitive data about the clients and their physical health. Recently, an employee showed the network administrator a suspicious email they received that looked like it had come from the company, but asked them to click a link and sign-in to a different program.

Identify the type of attack and outline a strategy the company should take to prevent any breaches of data in relation to this attack.

_____

_____

_____

_____

_____

_____

_____

Question 5 (3 marks)

At the end of a development project, Sam and Sarah undertake an evaluation of their project plan. They identify several reasons why their initial plan changed over the course of the project including Sarah's laptop crashing and having to be replaced, Sam getting sick, and not being able to work and their client adding requirements after the development stage had begun.

Describe one way that Sam and Sarah could record these changes and their impact on the project and discuss how it could help with future projects.

_____

_____

_____

_____

_____

_____

_____

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 (6 marks)

Anthea is excited to start work on the app. However, she knows that such a large project requires careful management. She creates the following task list:

Task Number	Task Name	Duration	Dependency
1	Data collection	1 week	-
2	Analyse data	3 days	1
3	Complete SRS	4 days	2
4	Design interface and client sign off	1 week	3
5	Design data storage and algorithms	1 week	3
6	Develop therapist interface and data storage	4 weeks	4,5
7	Develop patient interface	4 weeks	6
8	Testing and program update	2 weeks	7

a.   Using the task list above, complete the following Gantt chart.   4 marks

Task		Weeks													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.															
2.															
3.															
4.															
5.															
6.															
7.															
8.															

b.   Identify two points in the project that would be considered milestones by annotating the chart above.   2 marks

Question 2 (6 marks)

Identify two different data collection techniques Anthea could use to determine the requirements for the project. For each technique, identify one piece of data she can collect and justify why this technique is the most appropriate in that instance.

Collection technique 1_____

Data and justification

_____

_____

_____

_____

_____

_____

Collection technique 2_____

Data and justification

_____

_____

_____

_____

_____

_____

Question 3 (2 marks)

Once she has analysed the data, Anthea identifies functional and non-functional requirements, constraints, and the scope for the project. To formalise her findings, Anthea produces a Software Requirements Specification (SRS). Apart from these components, what else should she include in the document?

_____

_____

Question 4 (4 marks)

Therapists will use the patient email and data about prescribed exercises such as type, frequency and duration to create an exercise program for each patient. Patients will receive their exercise program and update the system each time they complete their exercises.

Use this information and the context diagram provided to identify the labels in the Level 1 Data Flow Diagram below.
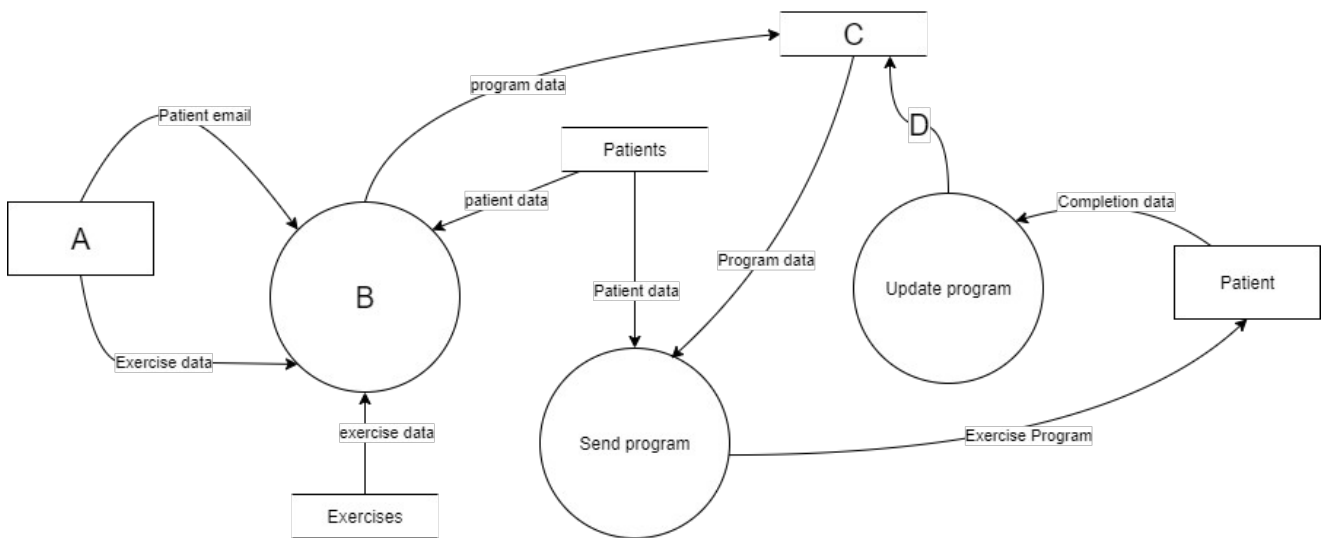
A _____

B _____

C _____

D _____

Question 5 (5 marks)

Seeing as she already has a data flow diagram, Anthea is considering whether she needs to create a use case diagram as well.

a.   Describe the purpose of a use case diagram   1 mark

_____

_____

b.   Compare the stick figure used in a use case diagram to the rectangle used in a data flow
         diagram. Include the name given to each symbol in your response.   4 marks

_____

_____

_____

_____

_____

_____

Question 6 (5 marks)

During the analysis phase several requirements were determined and from these Anthea created two alternative designs.

Design 1

Design 2

a.　Write two evaluation criteria to assist Anthea selecting between her alternate designs
　　　– one for efficiency and one for effectiveness.　　　　　　　　　　　　　　2 marks

　　　Efficiency criterion _____

　　　_____

　　　_____

　　　Effectiveness criterion _____

　　　_____

　　　_____

b.　Using the two criteria, justify which design you would recommend.　　　　3 marks

　　　_____

　　　_____

　　　_____

　　　_____

　　　_____

　　　_____

　　　_____

　　　_____

Question 7 (3 marks)

Anthea's system will not have access to the clinic's patient data in their current system. Patients will create their own account in Anthea's system, and tell their physiotherapist their email address, which will then be entered in their patient data in the clinic's existing system. This will provide a unique identifier link between the two systems.

Identify the relevant legislation and discuss the implications for Phil and his practise in allowing Anthea to view their data.

_____

_____

_____

_____

_____

_____

Question 8 (4 marks)

Anthea's system will send details of the patient's exercise program to the therapist's current system, using the email address to identify the patient. These will then be added to the patient's notes automatically as plain text. The existing system requires data to be in XML format.

a.   Explain why different systems use XML to transfer data.   2 marks

_____

_____

_____

b.   What validation would you expect the therapist's current system to implement before adding the notes to a patient's record?   2 marks

_____

_____

_____

Question 9 (4 marks)

Before beginning her coding, Anthea decides to write pseudocode for some elements of the new system.

a.   Describe what pseudocode is.   2 marks

_____

_____

_____

_____

b.   Suggest two reasons why a developer would write pseudocode before beginning
          development.   2 marks

_____

_____

_____

_____

Question 10 (5 marks)

When patients are creating the account in the new system, their password is stored using a cryptographic hash algorithm which ensures it is virtually impossible to crack.

When patients then login to the system, the login function checks a `userArray` for the email address and, if found, compares the stored password (which is already hashed) with the return value of a `hashPassword` function. If the username and hashed password match, the function returns TRUE. If either the email address is not found, or the passwords do not match, the function returns FALSE.

The login procedure requires the following information:
- Patient email address (for username)
- Patient password (entered by the user)
- Stored user details in an array of objects with
    - email
    - password (secured with a cryptographic hash algorithm)

The object description is below:

Object: User

Property Name	Data Type	Description

| email | string (255) | |
| password | string (128) | stored hashed password |

Complete the algorithm in pseudocode in the space provided.

begin
{check password function}

      input email, password
      input userArray
      hashedPassword ← hashPassword(password)
end

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Question 11 (5 marks)

When the physiotherapists look at their patient data, they want a quick view of whether the patient has marked all activities set since the previous consultation as completed.

Anthea wrote the following algorithm which receives an array of all activities scheduled for a patient since their last visit and their status (complete = TRUE or complete = FALSE).

```
begin
{check all complete function}
        input userActivities
        allComplete ← FALSE

        for i ← 0 to count(userActivities)
                if userActivities[i].complete = TRUE then
                        allComplete ← TRUE
                else
                        allComplete ← FALSE
                endif
        endfor
        return allComplete
end
```

a.   Anthea created the following test data to check her algorithm.
      Complete the table of expected and actual results.   3 marks

Test data	Expected result	Actual result
userActivity.complete = [TRUE, TRUE, TRUE]	TRUE	TRUE
userActivity.complete = [TRUE, TRUE, FALSE]		
userActivity.complete = [FALSE, TRUE, TRUE]		
userActivity.complete = [FALSE, FALSE, FALSE]		

b.   Describe the logic error contained in Anthea's algorithm.   2 marks

_____

_____

_____

_____

Question 12 (6 marks)

Anthea has nearly completed the solution and now needs to conduct usability testing.

a.   Discuss how usability testing differs from other testing that Anthea has completed for the
         solution.   2 marks

_____

_____

_____

_____

b.   Using the prompts below complete two usability test plans by briefly describing the
         purpose of one test and how feedback will be collected for each user type.   4 marks

         User – therapist

         Purpose of the test _____

         _____

         How feedback will be collected _____

         _____

         User – patient

         Purpose of the test _____

         _____

         How will feedback will be collected _____

_____

Question 13 (5 marks)

Having successfully delivered the software solution to Phil, Anthea is preparing to evaluate her solution.

a.   How long Anthea should wait before conducting the evaluation? Justify your response.   2 marks

_____

_____

_____

_____

b.   Describe a strategy that Anthea could implement to evaluate her solution.   3 marks

_____

_____

_____

_____

_____

_____

END OF QUESTION AND ANSWER BOOK

Phil's Physio

Phil is a physiotherapist in a clinic in southeast Melbourne. Each time he has a patient, he finds himself drawing the same diagrams and explaining the same exercises for his patients to complete. There have been times when these are confusing to the patient, and some patients have complained about losing the pieces of paper that their programs and exercise diagrams are drawn on.

He and the other 4 therapists in the clinic want an app for clients that help them understand how do their recovery exercises. They want an app to include:

- The ability to select from a list of exercises and set repetitions and durations
- A link to custom-made videos of the exercises being performed correctly
- The ability to allow patients to check off that they have completed each exercise.

Phil's clients range in age from school children to retirees and he is sure they could all benefit from this new app.

Phil understands there are many elements involved in getting an app like this up and running and has engaged a developer, Anthea, to begin the process.

As part of the analysis stage, Anthea created this context diagram.
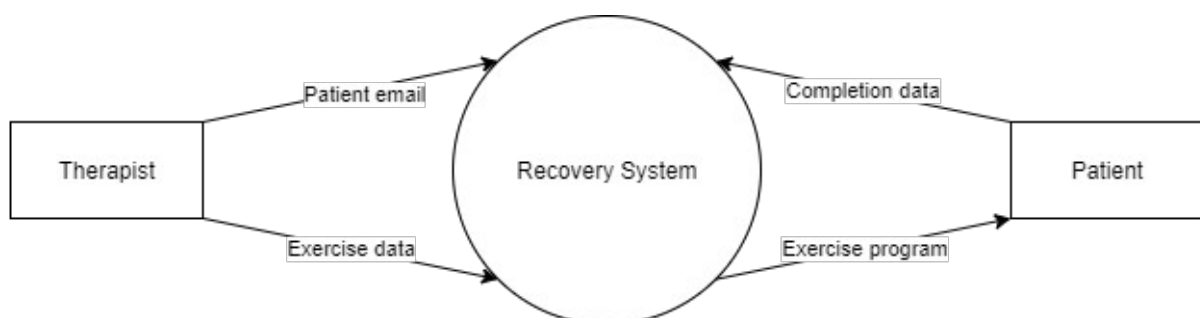
END OF CASE STUDY INSERT

VCE Computing: Software Development   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