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2016 Examination Package -
Trial Examination 2 of 3

STUDENT NUMBER

Figures										Letter
Words										

SOFTWARE DEVELOPMENT

Units 3 & 4 – Written examination

*(*TSSM's *2014 trial exam updated for the current study design)*

Reading time: 15 minutes
Writing time: 2 hours

QUESTION & ANSWER BOOK

Structure of book

Section	*Number of questions*	*Number of questions to be answered*	*Number of marks*
A	20	20	20
B	4	4	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 26 pages with detachable insert containing a case study for Section C.

Instructions

- Print your name in the space provided on the top of this page.
- All written responses must be in English.

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

SECTION A – Multiple-choice questions

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

Question 1

In a data flow diagram, what is represented by a rectangle?

A. A role
B. An external entity
C. The system boundary
D. A process

Question 2

Which of the following is part of the planning of a solution?

A. Identifying the functional requirements of the current system.
B. Identifying, scheduling and monitoring tasks, resources, people and time.
C. Designing a new system using tools such as layout diagrams and a data dictionary.
D. Creating a UCD to show the interactions a role has with the current system.

Question 3

Ryan is currently undertaking user acceptance testing on a software solution he has created. At what stage of the problem solving methodology is he in?

A. Analysis
B. Design
C. Development
D. Evaluation

Question 4

What does incorporating validation into a program assist with?

A. Ensuring that all calculations are correct
B. Ensuring that the output is accurate
C. Ensuring that the solution solves the original problem
D. Ensuring the reasonableness of input data

SECTION A - continued

Refer to the following diagram when answering questions 5-7

```
1.          FOR i ← 1 to n-1 DO:
2.                 subList ← i
3.                 FOR j = i + 1 to n-1 DO:
4.                       IF A[j] < A[subList]
5.                             subList = j
6.                       END IF
7.                 NEXT j
8.                 temp ← A[I)
9.                 A[I] ← A[subList]
10.                A[subList] ← temp
11.         NEXT i
```

Question 5

Lines 4-6 of the algorithm display which type of control structure?

A. Selection

B. Sequence

C. Iteration

D. Arrays

Question 6

Which data structure is A[] an example of?

A. A record

B. A file

C. A one dimensional array

D. An associative array

Question 7

What is the function of the algorithm?

A. A quick sort

B. A linear search

C. A selection sort

D. A binary search

SECTION A - continued

TURN OVER

Question 8

CrossCountry is working with the Victorian Government to build the North South tollway. They have a special offer for commuters who sign up early; they can pay $100 and receive $150 credit on their account. Many people have signed up for the offer and recently a car manufacturer has asked for these people's contact details to send them special offers on new car purchases.

If *CrossCountry* does what the car manufacturer is asking, which law would *CrossCountry* be in breach of?

A. Spam Act 2003

B. Privacy Act 1988

C. Copyright Act 1968

D. The Privacy and Data Protection Act 2014

Question 9

What does a binary search require of a list in order to search effectively?

A. The list must only include integers.

B. The list must be sorted.

C. The list must include multiple data types.

D. The list cannot exceed 50 items.

Question 10

A cloud computing company specialises in saving clients game data online. When their clients use their *PlayBox* they press "save" and it transmits the save file to the company's server. This happens about 500 times per day at the moment. Each of the save files are 2MB. At the end of an entire year, how much storage space would the cloud computing company have used up?

A. 36,500 gigabytes

B. 3.65 gigabytes

C. 365 gigabytes

D. 365 megabytes

SECTION A – continued

Question 11

Which sorting technique would be the most efficient to use when dealing with a large list of items?

A. Quick sort
B. Selection sort
C. Binary sort
D. Linear sort

Question 12

Which of the following cannot occur in a data flow diagram?

A. Process to data store data flow
B. External entity to data store data flow
C. Process to external entity data flow
D. Data store to process data flow

The following algorithm applies to questions 13 and 14

```
1.   PROCEDURE S(A, F[])
2.        n ← length(A)
3.        found ← FALSE
4.        REPEAT
5.             FOR i = 1 to n-1 DO
6.                  IF F[i, 0] = A THEN
7.                       found ← TRUE
8.                       item ← F[i, 1]
9.                       DISPLAY item
10.                 END IF
11.            END FOR
12.       UNTIL n = 0
13.  END
```

Question 13

What is the purpose of the algorithm?

A. Bubble sort
B. Quick sort
C. Binary search
D. Linear search

Question 14

Which data structure is F[] an example of?

A. 1D array
B. Integer
C. 2D array
D. Random file

Question 15

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

A. Information
B. Data
C. Processes
D. People

Question 16

Evaluation of a solution is used primarily to:

A. ensure that validation rules are present and working.
B. check whether the system performs all functions correctly.
C. see whether the original problem has been solved.
D. discover any inefficiencies in user documentation.

Question 17

Cal is a network technician at a secondary school. He has recently discovered that the network is running slower than usual, however there seems to be no other problems with any software.

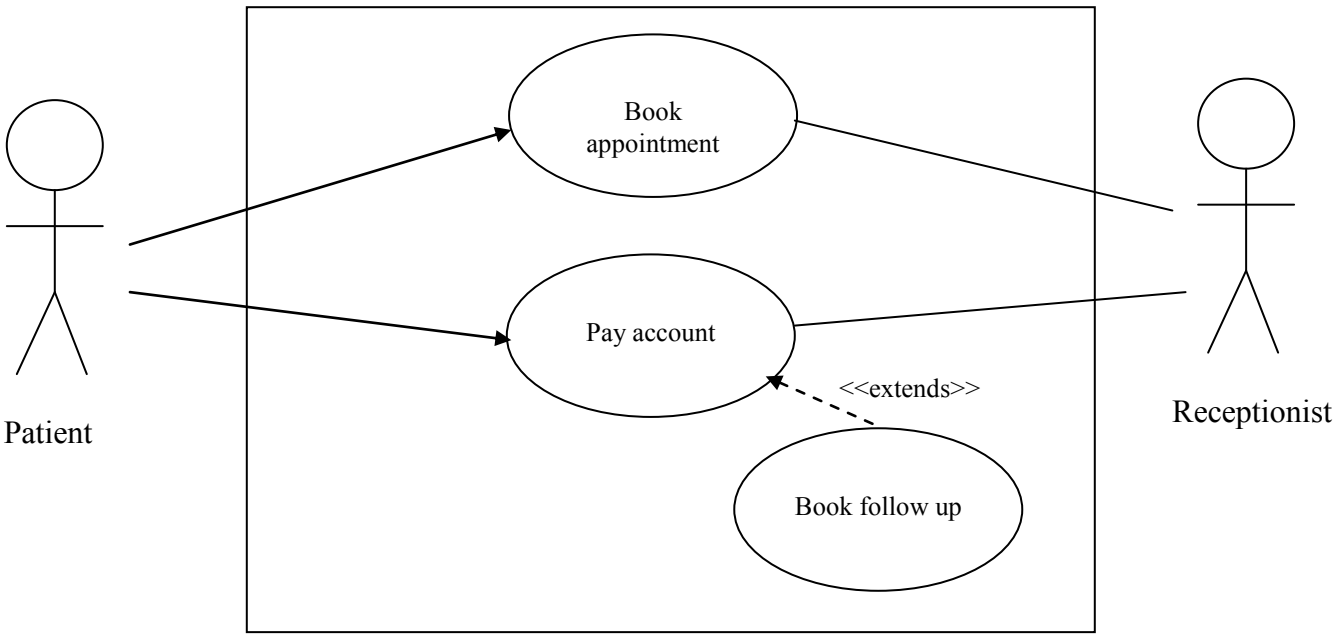
What is likely to have happened to the network?

A. A virus has been installed after a student clicked on it.
B. A worm has entered the network and is duplicating itself.
C. Spyware has come in through an email attachment.
D. A Trojan has been brought in by students transferring games from ones USB flash drive to another.

SECTION A – continued

The following Use Case Diagram applies to questions 18 and 19

Mrs Jones is the receptionist for a local GP. Patients call her to make an appointment with the doctor. A patient will also pay the account at the conclusion of appointment and, if the doctor has requested one, they will also book a follow up visit.



Question 18

What are the stick figures known as?

A. Associations

B. Data flows

C. System boundaries

D. Actors

Question 19

Why is it an arrow and not a line connecting the *patient* with "Book appointment"?

A. The patient initiates the use case "Book appointment"

B. The patient is the only role that interacts with "Book appointment"

C. Communication is one way from the patient to the receptionist through the use case "Book appointment"

D. The designer has inserted the wrong symbol

Question 20

John has been sending client details between his work email and his home email so that he can work on their files at home. He knows this is not the best option, however would also like to know the best way to protect these files.

In order to protect these files, John should:

A. ensure that both his home and office network have a firewall installed.

B. encrypt the files.

C. scan the files when he opens them to check for malware.

D. update his antivirus software.

END OF SECTION A

SECTION B - Short-answer questions

Instructions for Section B

Answer **all** questions in the spaces provided

Question 1 (6 marks)

Simon, one of your programmer friends has been telling you how he can write programs that run efficiently because he doesn't include internal documentation.

a. Identify two reasons you would give to Simon to show him that his statement is incorrect. 2 marks

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b. Explain a naming convention that you have used throughout the year. Using examples include at least two elements of the convention in your response. 4 marks

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SECTION B - continued

TURN OVER

Question 2 (3 marks)

Eloise is currently writing a mobile phone application that needs to store a user's details, including their first name, surname, high score and best level.

a. Which data structure should Eloise use for this purpose? 1 mark

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b. Compare and contrast the data structure used above with another data structure that you are familiar with. 2 marks

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Question 3 (3 marks)

Outline the purpose of an associative array.

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SECTION B - continued

Question 4 (8 marks)

a. When a function is called, a parameter is passed to it (called `nametofind`) to be searched for within an array (called `members[]`). A Boolean variable (called `found`) is initialised to false. The function then checks each item within the file against the name to find until it either finds the correct name or gets to the end of the file. It then returns the value of `found` and the function ends.

6 marks

Write this as pseudocode. It has been started for you.

```
FUNCTION find(nameToFind)




END
```

SECTION B - continued
TURN OVER

b. The previous response identified the segment of code as a function. Explain what a function is, and how it differs from a procedure. 2 marks

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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 (4 marks)

Identify and explain two constraints on the solution being proposed by *IT2you*.

Question 2 (6 marks)

Identify and explain two non-functional requirements of the new system being proposed by *IT2You*.

Non-functional requirement: _____

Explanation: _____

_____

_____

_____

Non-functional requirement: _____

Explanation: _____

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Question 3 (7 marks)

Russell considers himself quite the computer expert and has been looking at the context diagram of the current system. He is wondering why the parts themselves are not appearing on the context diagram.

a. Explain to Russell why this is the case. 2 marks

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SECTION C – continued

b. *IT2You* have also decided to create a use case diagram (UCD) as well for the current system. Once again Russell decides this isn't needed as there is already a context diagram. Explain to Russell the difference between a context diagram and a UCD, and why both are needed in a thorough analysis. 3 marks

c. Distinguish between the arrow as shown in the context diagram and a line in a UCD. 2 marks

SECTION C – continued
TURN OVER

Question 4 (4 marks)

IT2You would like to fully understand the existing system before they begin to create the new solution, so they would like to undertake data collection. Identify two data collection methods that *IT2You* could use, and the stakeholder(s) who will be involved in each one.

Question 5 (2 marks)

During design, *IT2You* will be creating a data dictionary. What does a data dictionary contain, and why will it be useful when developing the solution?

SECTION C – continued

Question 6 (9 Marks)

Russell, Glen and Barry now have to decide on the most appropriate mobile computing device that they should use to enter in their repair details. This will include interacting with the database, adding new jobs and to view, delete and amend current repair jobs.

They are having some trouble agreeing on a device, and below are the specifications of their top three choices.

Key Features	**Device 1**	**Device 2**	**Device 3**
Input	Stylus	Touch screen	Qwerty keyboard
Memory	2GB RAM	1GB RAM	4GB RAM
Processor	2GHz dual core	1GHz	2GHz dual core
Connectivity	Wi-fi	Wi-fi and 3G	Wi-fi
Battery	10 hours	8 hours	4 hours
Resolution	1024 x 768 pixels	1024 x 768 pixels	2,048 x 1,536 pixels
Camera	Yes, rear and front facing	Yes, rear facing	No
Weight	750 grams	570 grams	850 grams

a. Describe one factor not listed above that Russell, Glen and Barry should consider when selecting an appropriate device. 2 marks

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SECTION C – continued

TURN OVER

b. Referring to the table, identify one advantage and one disadvantage of each of the three devices. From this analysis, identify which device you would recommend they purchase.
5 marks

c. Identify and describe one piece of hardware required for setting up the network within the warehouse.
2 marks

SECTION C – continued

Question 7 (4 Marks)

Now that they are ready to develop the new system, *IT2You* is going to create a set of evaluation criteria which will be used to judge the success of the solution.

a. Russell wonders why *IT2You* is bothering with creating evaluation criteria before development has even started. Explain the purpose of creating evaluation criteria during the design stage.

2 marks

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b. List one criterion that could be used to measure the effectiveness of the solution and one that could be used to measure the efficiency.

2 marks

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SECTION C – continued

TURN OVER

Question 8 (6 marks)

The mechanics will use the app to check whether there is stock on hand for a particular part.

IT2You will use the following algorithm to check whether the parts are in stock and display a message to the mechanic on whether it is currently in stock or not.

```
1     BEGIN
2           GET partRequired
3           partAvailable ← FALSE
4           partFound ← FALSE
5           partNum ← 0
6           READ currentPart from partFile
7                 IF currentPart(partNum) = partRequired THEN
8                       partFound ← TRUE
9                 END IF
10                partNum ← partNum + 1
11          UNTIL End of File
12          IF partFound = TRUE THEN
13                IF partAvailable = TRUE THEN
14                      DISPLAY currentPart(partNum) & " is in stock"
15                ELSE
16                      DISPLAY currentPart(partNum) & " is not in stock"
17          END IF
18    END
```

a. The table below lists some of the variables above. Select the most appropriate data type for each from the following: Floating point, integer, Boolean, string, array, character.

3 marks

Variable	**Data type**
`partRequired`	
`partAvailable`	
`partNum`	

SECTION C – continued

b. When testing the system, it sometimes displays parts as available when they are not and as not available when they are available. Identify the line where the error is occurring and recommend a suitable fix. 3 marks

Question 9 (11 marks)

RGB charge a standard 0.5% per day late fee for customers who do not pay on time. After fixing up the other identified errors, they decide to create the algorithm to check if a customer needs to pay an overdue fee and if they do how much they will owe. This will be added on to the total cost. The pseudocode is below:

```
1     FUNCTION lateFee(datePayable, totalCost)
2     BEGIN
3           daysOverdue ← 0
4           feesOwing ← 0
5           IF paidDate <> NULL
6                 IF datePayable < paidDate THEN
7                       daysOverdue = datePayable – paidDate
8                       totalCost = daysOverdue * 0.005
9                 END IF
10          END IF
11          RETURN totalCost
12    END
```

a. Complete the table on the next page by selecting appropriate values for `paidDate` that would test the function along with a reason for selecting each. You can assume that `datePayable` is 30/06/2014 and `totalCost` is $500. You must select values that broadly test the function. 8 marks

SECTION C – continued

TURN OVER

paidDate	Expected totalCost	Actual totalCost	Reason for selecting test data

b. At which line number is the mistake with the algorithm, and what has it resulted in?

2 marks

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c. Write the pseudocode to correct the mistake indicated above. 1 mark

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SECTION C – continued

Question 10 (3 Marks)

As stated previously, one of the main problems at RGB is customers not paying. To get around this, whenever a customer drops off a car they are required to give their credit card details to the mechanic who will enter them into the system.

Identify and explain one piece of legislation that would apply to this situation.

Question 11 (4 Marks)

a. Now that the system has been implemented, it is time to train the mechanics on how to use it. Recommend and justify an appropriate training method. 2 marks

SECTION C – continued

TURN OVER

b. Explain a strategy for evaluating whether or not the training method identified in the previous question was effective. 2 marks

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END OF QUESTION AND ANSWER BOOK

CASE STUDY INSERT FOR SECTION C
Please remove from during reading time.

Case Study

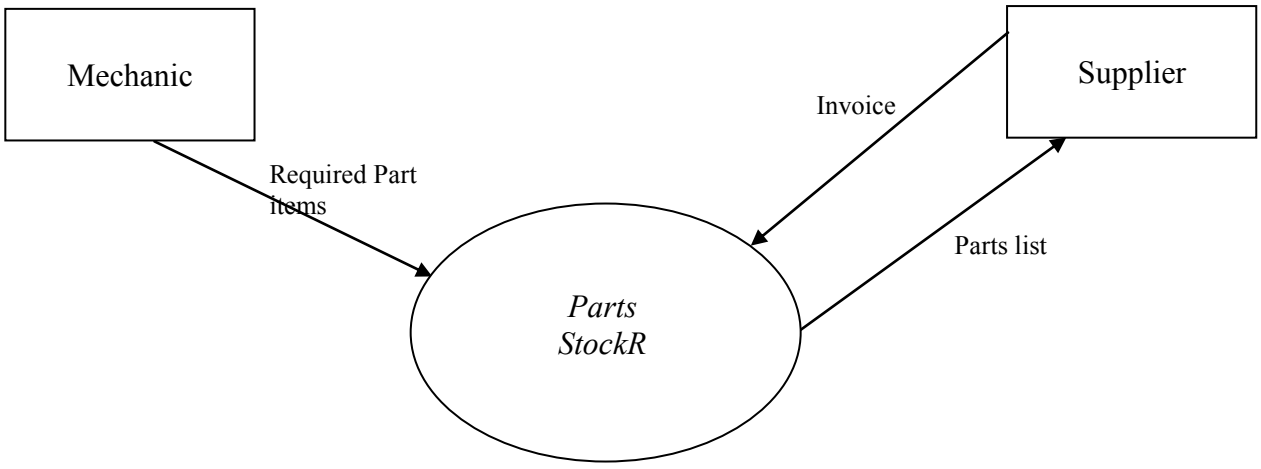
RGB mechanics

RGB Mechanics is a small company that operates in Montrose, Victoria. The company was founded by three brothers who own and run it on their own.– Russell, Glen and Barry. They have operated successfully in a small factory at the back of an industrial area for the past 15 years. They also have three or four mechanics working for them at any time, depending on demand for repairs. RGB mechanics has built up a great reputation within the local community, as they are hardworking and never overcharge their customers.

For years RGB has written down the cost of the car repairs, including parts, labour and any other costs when they finish fixing the car. They already have a stock management system (*Parts stockR*) in place so when they use a part the system will automatically re-order it. However this relies on staff using the central desktop computer (located in the office) to input the parts they have used on a job.

What they are now realising is that often they may be so involved in actually fixing the car that they forget to input the parts they use into *Parts StockR* and have been running low on, or even out of, required parts when they are attempting to fix a car. This has been a problem as they have to keep people's cars in for longer and they have been receiving customer complaints.

Below is a context diagram of the current ordering system.



Quotes are written by hand at the completion of a job, and often mechanics have no record of what parts they have used or even how many hours they have put into the job for labour costs. This has led to customers being overcharged or undercharged.

Russell, Glen and Barry have contacted *IT2you*, a software development company, who have been asked to come up with a complete solution that ensures that they have full records of the parts ordered, hours of labour used and an accurate invoice for customers.

IT2You have come up with the following recommendations:

1. Have an invoice that is calculated for each job as parts are entered into the system. This involves integrating a new solution with *Parts StockR*.
2. Set up a network around the warehouse and give each mechanic a mobile device so that they can enter parts in as they work rather than have to go to the central desktop.

Although none of the brothers has much experience with computers, they feel that this solution should assist them with not only ensuring that their invoices are correct, but also that they can fix and return the cars to their customers in a more timely manner.

END OF CASE STUDY INSERT FOR SECTION C