

**2020 Examination Package -  
Trial Examination 1 of 7**

**STUDENT NUMBER**

Figures										Letter
Words										

**SOFTWARE DEVELOPMENT**

**Units 3 & 4 – Written examination**

*(TSSM’s 2013 trial exam updated for the current study design)*

Reading time: 15 minutes  
Writing time: 2 hours

**QUESTION & 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	4	4	20
C	14	14	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 25 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**

The stages of the problem-solving methodology are:

- A. Investigation, Design, Development, Evaluation
- B. Analysis, Design, Implementation, Evaluation
- C. Analysis, Design, Manipulation, Evaluation
- D. Analysis, Design, Development, Evaluation

**Question 2**

When programming, if you need to store thousands of values, all of the same data type, you would use:

- A. a listbox.
- B. a record.
- C. an array.
- D. variables.

**Question 3**

In a use case diagram (UCD), a stick figure represents:

- A. a person.
- B. a role.
- C. a process.
- D. data transmission.

**Question 4**

Which of the following is not a factor that influences the design of solutions?

- A. Useability
- B. Affordability
- C. Authenticity
- D. Marketability

**SECTION A - continued**

**Question 5**

Evaluation criteria are created at which stage of the problem solving methodology?

- A. Analysis
- B. Design
- C. Testing
- D. Evaluation

*Refer to the following algorithm when answering questions 6 and 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] THEN
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 6**

What is the purpose of the algorithm?

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

**Question 7**

Which control structure does lines 3-7 of the algorithm represent?

- A. Iteration
- B. Recursion
- C. Selection
- D. Sequence

**SECTION A - continued  
TURN OVER**

## SOFTWARE DEVELOPMENT EXAM

### Question 8

Middleborough High School in Victoria has recently started an iPad programme, and the powers that have decided that students aren't allowed to use hard copy textbooks anymore. Your friend Macy had a great money saving idea – After she purchased the e-book for Software Development she handed it out to all of her friends to use on their iPads so they won't have to pay for it.

Which law is Macy in breach of?

- A. Information Privacy Act 2000.
- B. Privacy Act 1988
- C. Copyright Act 1968
- D. Health Records Act 2001

### Question 9

Which searching technique would work best on an *unsorted* list?

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

### Question 10

In a restaurant, when a customer places an order for a main meal about half of them also order dessert. The Use Case Diagram that best describes this scenario is

- A. Order main meal ←<<include>> -- Order dessert
- B. Order main meal ← <<extend>> -- Order dessert
- C. Order main meal -- <<include>>→ Order dessert
- D. Order main meal -- <<extend>> →Order dessert

**SECTION A** - continued

## SOFTWARE DEVELOPMENT EXAM

*The following algorithm applies to questions 11 and 12*

```
1   BEGIN
2       READ  grade
3       IF grade > 80 THEN
4           result ← 'distinction'
5       ELSE
6           IF grade > 65 THEN
7               result ← 'credit'
8           ELSE
9               IF grade > 50 THEN
10                  result ← 'pass'
11              ELSE
12                  result ← 'fail'
13              END IF
14          END IF
15      END IF
16  END
```

### Question 11

When the above algorithm was tested the user input grade as 50. They expected this to result in the output of 'pass', however this was not the case.

This was caused by a:

- A. syntax error.
- B. logic error.
- C. run time error.
- D. compiler error.

### Question 12

Test the above algorithm with the value grade=65.

The variable `result` will contain:

- A. 'distinction'
- B. 'credit'
- C. 'pass'
- D. 'fail'

**SECTION A - continued**  
**TURN OVER**

## SOFTWARE DEVELOPMENT EXAM

### Question 13

Evaluation of an information system is conducted:

- A. during the design phase.
- B. immediately following the development phase.
- C. after the system has been implemented and has been running for a period of time.
- D. at the same time as it is being tested.

### Question 14

Which one of the following is not an operation of a Stack or a Queue:

- A. Push
- B. Tail
- C. Dequeue
- D. Pop

### Question 15

Which one of the following is *not* one of activities of 'recording the progress of a project'

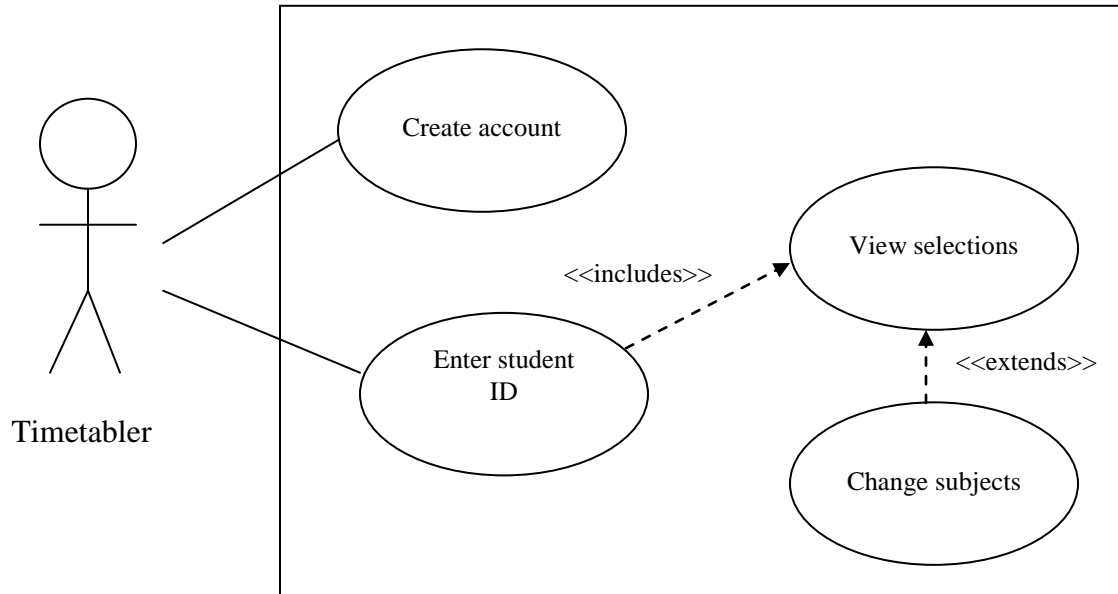
- A. Assigning tasks to resources
- B. Adjustments to tasks and time frames
- C. Keeping Logs
- D. Annotations

**SECTION A - continued**

*The following Use Case Diagram applies to questions 16 and 17*

It's subject selection time and the timetabler (Mr. Phillips) is currently very busy! He has many students requesting to not only input their subject selections, but also view them to make sure that they chose the correct subjects and change them if necessary.

Mr. Phillips uniquely identifies each student through their student ID when viewing and changing all of these details, and the student ID is created during the student's first visit.



**Question 16**

What are the lines connecting the use cases known as?

- A. Associations
- B. Data flows
- C. System boundaries
- D. Actors

**Question 17**

What is the difference between the <<includes>> and the <<extends>> lines?

- A. The associated use cases are of less importance to the system as a whole
- B. The <<extends>> require an external system for the use case to be implemented
- C. The <<includes>> will always occur with the main process, the <<extends>> is conditional.
- D. There is no difference.

**SECTION A - continued  
TURN OVER**

**Question 18**

Spyware is an example of what type of threat to the security and integrity of data?

- A. Disappointing
- B. Deliberate
- C. Events-based
- D. Accidental

**Question 19**

Your friend has recently downloaded what he thought was a great new music track from an internet peer-to-peer application. After he double clicked on it to play it, his computer immediately opened up pop-up advertisements, and it has been happening ever since.

What has he downloaded?

- A. A virus
- B. Spyware
- C. A worm
- D. A Trojan

**Question 20**

Which one of the following best suits the definition of Archiving?

- A. Long – term storage of data in a physical drive and on the cloud.
- B. Short – term storage of data on disk drives in compressed form.
- C. Long – term storage of data in an external location, usually compressed
- D. Short – term storage of data on the cloud, in compressed form.

**END OF SECTION A**



**SECTION B - Short-answer questions**

**Instructions for Section B**

Answer **all** questions in the spaces provided

**Question 1** (6 marks)

Jimmy, a newly hired programmer at your company has been asked to design and create a software solution for roll marking that will be implemented in a secondary school. One of the first things he has been asked to do is list the functional and the non-functional requirements.

- a. Jimmy has asked you to define for him what exactly the difference between a functional and a non-functional requirement is, and give him one example of each for the school's software solution.

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4 marks

**SECTION B – Question 1 - continued**  
**TURN OVER**

SOFTWARE DEVELOPMENT EXAM

- b. As a part of the design phase, Jimmy is required to write criteria that will be used to evaluate the solution even though he is not conducting the evaluation. Why is this the case?

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2 marks  
Total 6 marks

**Question 2** (3 marks)

Anthony, who is a novice programmer, needs to create a module to store the surnames of the members of his yacht club to make it easy to search for a required member.

- a. Which data structure should be used for this purpose?

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1 mark

- b. In order for a search to be made for a particular surname, the data needs to be sorted. List and explain what technique you would use to sort the data, and why you would use it.

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2 marks  
Total 3 marks

**SECTION B** - continued

SOFTWARE DEVELOPMENT EXAM

**Question 3** (5 marks)

Monique runs a very successful law firm in Toorak. She has 3 employees and many rich and famous clients. Now that all of her employees seem to have mobile devices that they use for checking email and other online activities, she has set up a wireless network. She trusts all of her employees (as they are all very honest), so she hasn't set a password for the wifi.

- a. Name one law that Monique may be in breach of, and state why.

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2 marks

- b. Now that Monique knows about the implications of not securing her clients' details, she is worried about the data sent between mobile devices and her network and would like to ensure that it is secure. Outline one technique for securing data during transmission.

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3 marks

Total 5 marks

**SECTION B** - continued  
**TURN OVER**

SOFTWARE DEVELOPMENT EXAM

**Question 4** (6 marks)

A software solution for managing client orders has recently been installed on a network that at any time can have up to 80 computers accessing it concurrently. As it has been in operation for a few months, it is time to evaluate it.

- a. List one criteria that could be used to measure the effectiveness of the new solution.

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1 mark

- b. List one criteria that could be used to measure the efficiency of the new solution.

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1 mark

- c. Explain two methods of data collection that could be used for the evaluation, and why they would be used.

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4 marks

Total 6 marks

**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** (6 marks)

Now that the recommendations have been made and accepted, Andrew has given Mack an algorithm of how it will calculate the cost of a trip. He has said that this will be far quicker and accurate than the current method, which will save *Captain Mack's tackle and charters* money and increase the number of bookings. He has also requested a 10% discount for clients who book for five or more days.

Upon initiation, all of the guides are set to available unless the program modifies them to be booked on particular dates.

```

1      BEGIN
2          INPUT start_date
3          INPUT end_date
4
5          total_days = end_date - start_date
6
7          cost ← operator_cost * total_days
8
9          IF total_days >= 5 THEN
10             cost ← cost * 0.1
11         END IF
12
13         DISPLAY cost
14     END

```

Unfortunately, when implementing the code, there were numerous errors found. Although the program worked, it continually misquoted clients. Complete the testing table on the following page to assist with finding out the problem.

**SECTION C – Question 1 - continued**  
**TURN OVER**

SOFTWARE DEVELOPMENT EXAM

- a. Select logical test data for total\_days to fully test the boundaries of the algorithm. You may assume that operator\_cost is 200.

Variable	Test data	Expected value	Actual value
total_days			
total_days			
total_days			

3 marks

- b. Describe an error in the algorithm.

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1 mark

- c. Suggest a way in which the algorithm could be altered to fix the error you found in part b.

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2 marks

Total 6 marks

**SECTION C - continued**



SOFTWARE DEVELOPMENT EXAM

c. Why wouldn't Andrew recommend that the booking details just be stored on each device so that the employees can make quotes and take bookings then update the central database at the end of each day? Give two reasons.

i. Reason 1: \_\_\_\_\_

Explanation: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

ii. Reason 2: \_\_\_\_\_

iii. Explanation: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

6 marks

Total 12 marks

**Question 3**(2 marks)

As part of the design of the new system, Andrew has set some evaluation criteria. Fill in the table below, explaining a technique for testing each criteria.

Criteria	Technique
Is the solution easy to use?	
Are accurate results produced when data is entered?	

2 marks

**SECTION C** – continued





SOFTWARE DEVELOPMENT EXAM

**Question 6**(6 marks)

List two **non-functional requirements** and explain how they would apply specifically to the solution *BookFish*.

Non-functional requirement: \_\_\_\_\_

Explanation: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Non-functional requirement: \_\_\_\_\_

Explanation: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

6 marks

**Question 7**(2 marks)

Captain Mack is worried about the costs involved with all of these extra devices that are being bought and asks why they can't just have a computer. List four components that make up an information system.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

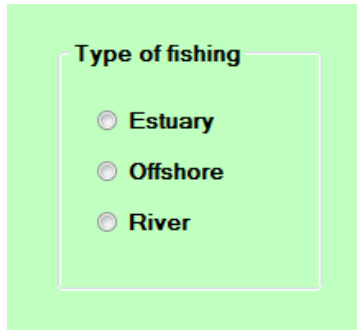
\_\_\_\_\_

2 marks

**SECTION C** – continued

**Question 8**(2 marks)

Below is a small part of the interface used for bookings:



Why has Andrew made use of radio buttons instead of checkboxes?

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2 marks

**Question 9** (2 marks)

List and explain two constraints for using the mobile devices to access *BookFish*.

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2 marks

**SECTION C** - continued

**TURN OVER**



SOFTWARE DEVELOPMENT EXAM

**Question 11**(6 marks)

Captain Mack has now decided that he would like to have the names in the list sorted by surname. *Logical IT Solutions* have come up with the following algorithm for sorting the data:

```
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] THEN
5.                     subList = j
6.                 END IF
7.             NEXT j
8.             temp ← A[I]
9.             A[I] ← temp
10.            A[subList] ← temp
11.        NEXT i
```

a. What type of sorting algorithm have *Logical IT Solutions* used?

\_\_\_\_\_

1 mark

b. What data structure has been made use of for A [ ] ?

\_\_\_\_\_

1 mark

c. Describe the error in the algorithm

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

2 marks

**SECTION C – Question 11 - continued**

**TURN OVER**

SOFTWARE DEVELOPMENT EXAM

d. Suggest one way that you could fix the algorithm. Include what you would change and/or what you would add to it.

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2 marks

**Question 12**(7 marks)

Andrew had created a Gantt chart at the beginning of the project. Being a novice programmer Andrew would like to understand the steps of evaluating a project plan. Could you help Andrew?

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Total 7 marks

**SECTION C - continued**  
**TURN OVER**

**Question 13**( 6 marks)

- a. Captain Mack also wants to protect his bookings data. To do this, he would like to start backing up his data in the event that his computer or an employee deletes the data accidentally. Recommend and justify a suitable backup medium that Captain Mack can use to store his data.

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- b. Captain Mack would also use backup strategies, could you suggest how he could use incremental and back up strategies to achieve the same.

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6 marks

**END OF QUESTION AND ANSWER BOOK**

**CASE STUDY INSERT FOR SECTION C**

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

## Case Study

### Captain Mack's tackle and charters

Captain Mack owns a small fishing business that sells fishing gear and organises charters with local operators (for a standard 15% “finder’s fee” of course). Located in East Gippsland, he advertises through “The Star” (a local newspaper) and a very basic website. He also owns a shop where customers can come and stock up on tackle.

When a potential client first contacts Captain Mack, he writes down the information about what they would like to do, such as the type of fishing (estuary, offshore or river – they can only select one), which operator can be used and which location they would like to fish (East Gippsland is full of fishy locations). Captain Mack then prepares a quote and he calls them back with the details and they can accept or decline.

Captain Mack knows all of his local operators and what their numbers are, what type of fishing they cover etc., so he has never bothered to keep very good records apart from writing down their numbers on a piece of paper that he has stuck on the wall next to his phone.

### The problem

After the floods of the last couple of years, the waterways of East Gippsland have thrived, which has led to an increase in the number of fishermen in the area. Captain Mack is always finding it too busy working in his tackle shop to keep up with demand. He has hired another two employees to assist him with running the tackle shop and organising charters. In an attempt to be more efficient, Captain Mack has put the three mobile phone numbers up on the website so that they can be contacted to book charters anytime, anywhere.

Although there is a record number of bookings, this has led to some problems:

1. A few times both employees have put in bookings for the same charter operator at the same time, as the spreadsheet of bookings is saved back at the shop.
2. Even though Captain Mack knows all about the charter operators and what specialty each one has, the employees do not, so sometimes they struggle to answer questions from prospective clients when the Captain Mack is away from the shop, which has led to missed bookings.

### Proposed system

Although an “old man of the sea”, Captain Mack has asked his son Andrew (who has just completed a Software Engineering degree) to analyse the problems he is facing and make some recommendations on what he should do.

Andrew has given him the following recommendations:

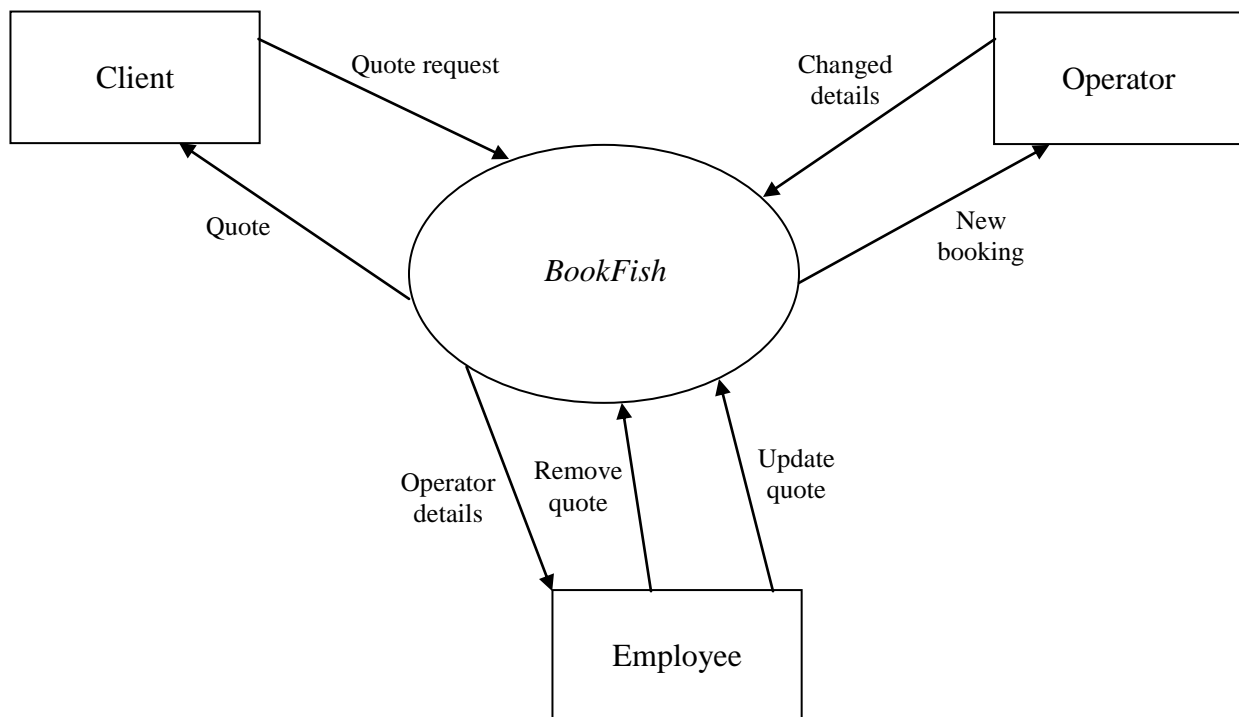
1. Set up a central database that includes all details about charter operators, including their number, what type of fishing they specialise in, which location(s) they fish and their



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- available dates. This can be updated as they add or remove operators (which they do often, as it can be very seasonal).
2. Set up the database on a computer at the tackle shop to act as a webserver so it can be accessed remotely.
  3. Purchase mobile computing devices to be used by Captain Mack and his 2 employees.
  4. Create a new software solution, *BookFish* to:
    - View operator details
    - Create quotes for potential clients
    - Send quote electronically to a client's email address
    - Update and remove quotes
    - Upload confirmed bookings to the central database
    - Send confirmed bookings to the local operator
  5. Allow operators to access it to change their details

### Context diagram



**END OF CASE STUDY INSERT FOR SECTION C**