

LUI

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School code

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School name

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Given name/s

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Family name

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Attach your  
barcode ID label here

Book

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of

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books used

External assessment

Question and response book

# Digital Solutions

## Time allowed

- Perusal time — 15 minutes
- Working time — 120 minutes

## General instructions

- Answer all questions in this question and response book.
- Planning paper will not be marked.

## Section 1 (10 marks)

- 10 multiple choice questions

## Section 2 (41 marks)

- 3 short response questions

## Section 3 (21 marks)

- 1 extended response question



# Section 1

## Instructions

- Choose the best answer for Questions 1–10.
- This section has 10 questions and is worth 10 marks.
- Use a 2B pencil to fill in the A, B, C or D answer bubble completely.
- If you change your mind or make a mistake, use an eraser to remove your response and fill in the new answer bubble completely.

	A	B	C	D
Example:	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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	A	B	C	D
1.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Do not write outside this box.

## Section 2

### Instructions

- Write using black or blue pen.
  - Respond in paragraphs consisting of full sentences.
  - If you need more space for a response, use the additional pages at the back of this book.
    - On the additional pages, write the question number you are responding to.
    - Cancel any incorrect response by ruling a single diagonal line through your work.
    - Write the page number of your alternative/additional response, i.e. See page ...
    - If you do not do this, your original response will be marked.
  - This section has three questions and is worth 41 marks.
- 

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**THIS PAGE WILL NOT BE MARKED**

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- b) Further develop the user interface to include five new features: camera views for Cameras 1 and 2, and readings for speed, battery power and flight angle.

[5 marks]



**Note:** If you make a mistake in the diagram, cancel it by ruling a single diagonal line through your work and use the additional response space on page 18 of this question and response book.

- c) Use four elements and principles of visual communication to justify, in annotations on your diagram in 11b), the placement and visual appearance of the five new features of the user interface.

[4 marks]

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## QUESTION 12 (8 marks)

Marine markers are placed throughout Queensland waterways. Each marine marker is fitted with an Internet of Things (IoT) device that can broadcast a fault status via a satellite internet link.

Each day, the IoT device checks the status of the marker. If a fault is detected, the device broadcasts the marker's unique identifier, a positive fault status flag and the fault occurrence date and time.

This is an example data structure provided by a marine marker's IoT device:

```
{  
  "QldMarineMarkerId" : "3446",  
  "QldMarineMarkerFault" : "True",  
  "QldMarineMarkerDateTime" : "2020-02-02T18:00:00.000Z",  
}
```

A request has been made for a quarterly release of an ongoing summary of fault issues per area. The information will be centrally stored in this way:

```
MarineMarkerStatus [MarkerID, MarkerType, AreaDescription, Latitude, Longitude,  
Fault _ Detected]
```



Do not write outside this box.

a) Evaluate the proposed solution against the criteria of reliability and accuracy. *[2 marks]*

Reliability: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Accuracy: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

b) State two additional criteria and evaluate the proposed solution against these criteria. *[4 marks]*

Criterion: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Criterion: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

c) Justify why JSON is an effective method of data exchange between the marine markers and the central database system. Provide two reasons to justify your response. *[2 marks]*

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

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### QUESTION 13 (12 marks)

A games arcade has developed a digital solution for recording members' points. Members receive a membership card, which they scan when they play games at the arcade. The card records how many points a member receives from winning a game. A sample of the data is shown.

members				
id	given_name	last_name	email	phone
24	Adalai	Akkad	adacutiepie@email.com	0491 570 006
25	Michael	McNealy	mikemcnealy@email.com	0491 571 266
26	Shruti	Flynn	shrutikins@email.com	0491 574 118
27	Adam	Steinberg	steintheman@email.com	0491 577 644
28	Julia	Wong	juliawong@email.com	0491 579 455

members_activity				
id	card_number	join_date	last_visit	points_balance
24	789987	2005-08-12	2020-01-20	570
25	456654	2009-02-15	2019-12-20	80
26	753951	2010-05-05	2020-02-25	249
27	654123	2019-10-19	2020-03-10	1200

- a) Develop an algorithm to list all members by name. Sort the list alphabetically by last name.

[4 marks]

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## Section 3

### Instruction

- This section has one question and is worth 21 marks.

### QUESTION 14 (21 marks)

Two novice programmers who live in different locations want to develop a method for securing their email communication. They have decided to:

1. meet in the same location
2. use a generic code library that contains functions relating to a set of cryptology algorithms called 'Blowfish'
3. use only UTF-8 data encoding, e.g. the character '%' is considered to have a length of 8 bits in total
4. create their own programs using different languages
5. generate encrypted text using their programs
6. copy and paste encrypted text into their emails.

Function name	Blowfish key expansion	Blowfish crypt
Function code	<code>BlowfishInitiate(key)</code>	<code>Blowfish(Value, KeySet, Process-Type)</code>
Purpose	Completes the initial key expansion processes. Returns a data structure called Blowfish KeySets.	Completes the block algorithm process for encryption or decryption. Accepts a 64-bit-length set of values in the form of text, along with the pre-processed Blowfish KeySets.
Inputs	Key: text-based, 64-bit in length	Value: text-based, 64-bit in length KeySet: returned data structure from the BlowfishInitiate function Process-Type: 1 for encrypt, 2 for decrypt
Returns	KeySet	Text-based value
Example	<code>BlowfishInitiate("J\$8*\$#d")</code>	<code>Blowfish("abcdefg",MyKeySet,1)</code>

**Note:** If any input does not meet a function's length requirements, the function will fail and potentially cause a runtime error.

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**ADDITIONAL RESPONSE SPACE FOR QUESTION 11b)**

If you want this diagram to be marked, rule a diagonal line through the diagram on page 4.



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