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School code

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School name

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Given name/s

--

Family name

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Attach your
barcode ID label here

Book

--

of

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books used

External assessment 2023

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 (34 marks)

- 4 short response questions

Section 3 (25 marks)

- 1 extended response question



DO NOT WRITE ON THIS PAGE
THIS PAGE WILL NOT BE MARKED

Section 1

Instructions

- 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.
- Choose the best answer for Questions 1–10.
- 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"/>

	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"/>

Ensure you have filled an answer bubble for each question.

Do not write outside this box.

Section 2

Instructions

- Write using black or blue pen.
 - 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 four questions and is worth 34 marks.
-

QUESTION 11 (9 marks)

A digital ticketing system has been created to manage ticket sales for a popular event, where thousands of people are expected to log in over a short timeframe. To reduce load and keep user data secure, the system follows the criteria:

- data size in data stores should be kept to a minimum
- data should be securely transmitted.

a) Describe how data size and security can be managed to fulfil these criteria.

[2 marks]

Data size: _____

Data security: _____

Do not write outside this box.

b) Complete the algorithm using pseudocode to symbolise securing the user password and verifying the account username and password for the system. The algorithm must demonstrate the useability principle of safety.

[7 marks]

BEGIN

 INPUT username

 INPUT password

Do not write outside this box.

QUESTION 12 (5 marks)

A dentist runs a mobile van for dental check-ups at school. Patient details and dental treatments are recorded on a computer in the van, and patient data is transferred daily to a central server in the practice by email. The computer does not have a secure log-in system, and all staff can access the email account, since there is a rotating roster of staff. Patient confidentiality is important as some staff are parents of students at the school. Multiple personal data security needs are not being met by the current system.

- a) Evaluate the security impacts of the system to identify two personal data security needs.

[3 marks]

Do not write outside this box.

b) A VPN has been proposed to secure the van's system. Describe a secure feature of a VPN and explain how this could improve data security.

[2 marks]

Do not write outside this box.

QUESTION 13 (9 marks)

A one-time pad algorithm encrypts an 8-character word and outputs the result. The algorithm uses 0 as the first index in an array. There are four errors on lines 9 to 21 inclusive.

```
1 BEGIN
2   INPUT word
3   word = word converted to lowercase
4   plainText = word converted to an array
5   //The GenerateOTPKey function will return an array of 8 random
   numbers
6   key = GenerateOTPKey()
7   cipherText = array of 8 blank characters
8   alphabet = lowercase alphabet converted to an array
9   FOR i =0 to 9
10    alphabetLocation = -1
11    FOR j =0 to 25
12     IF plainText[j] = alphabet[i]
13      alphabetLocation = j
14    ENDIF
15  ENDFOR
16  //Check if not found
17  IF alphabetLocation ≥ 0 THEN
18    cipherText[i] = alphabet(alphabetLocation + key[i])mod 26
19  ENDIF
20 ENDFOR
21 OUTPUT cipherText[i]
22 END
```

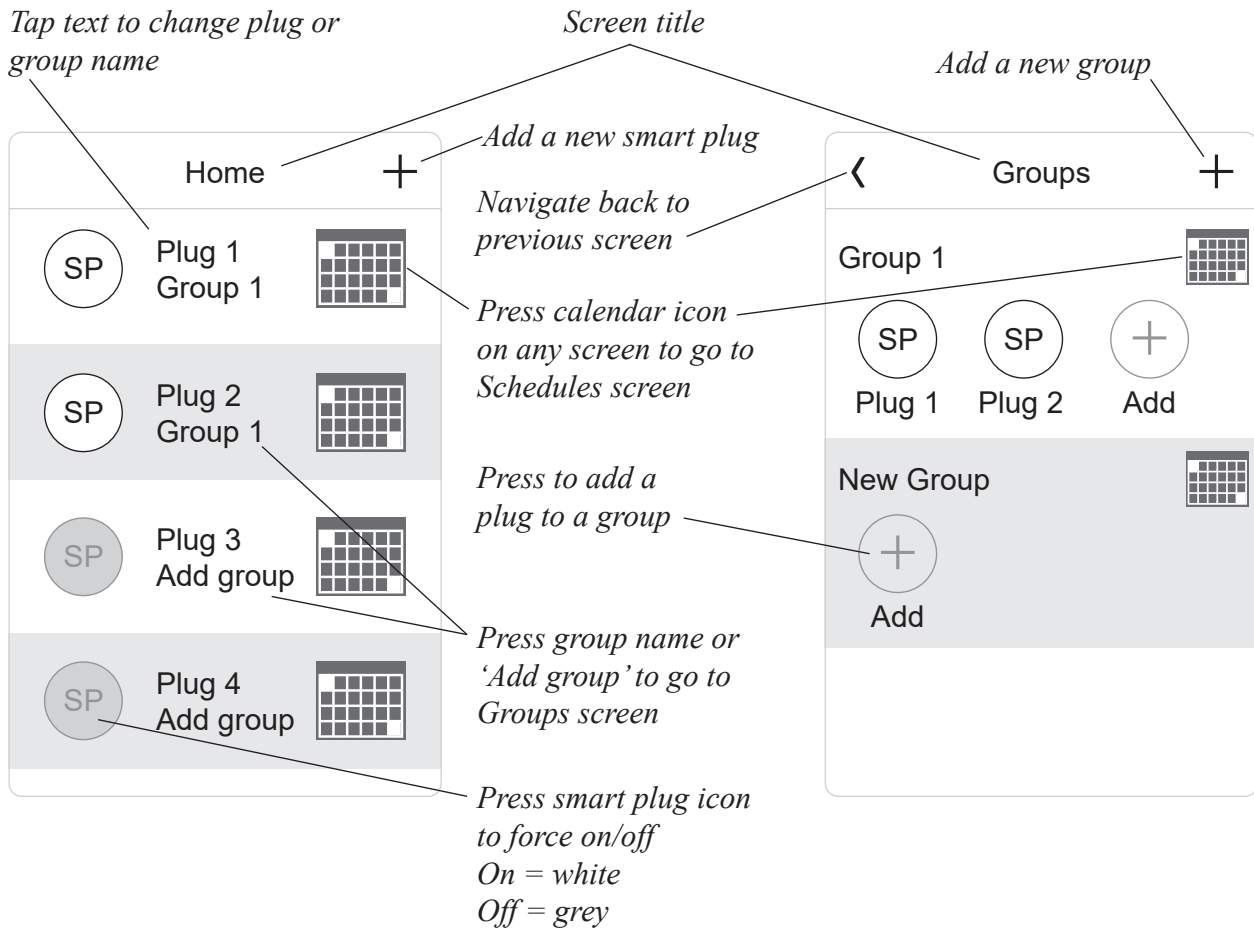
Do not write outside this box.

Use pseudocode to correct the four errors on lines 9 to 21. Justify your response.

Do not write outside this box.

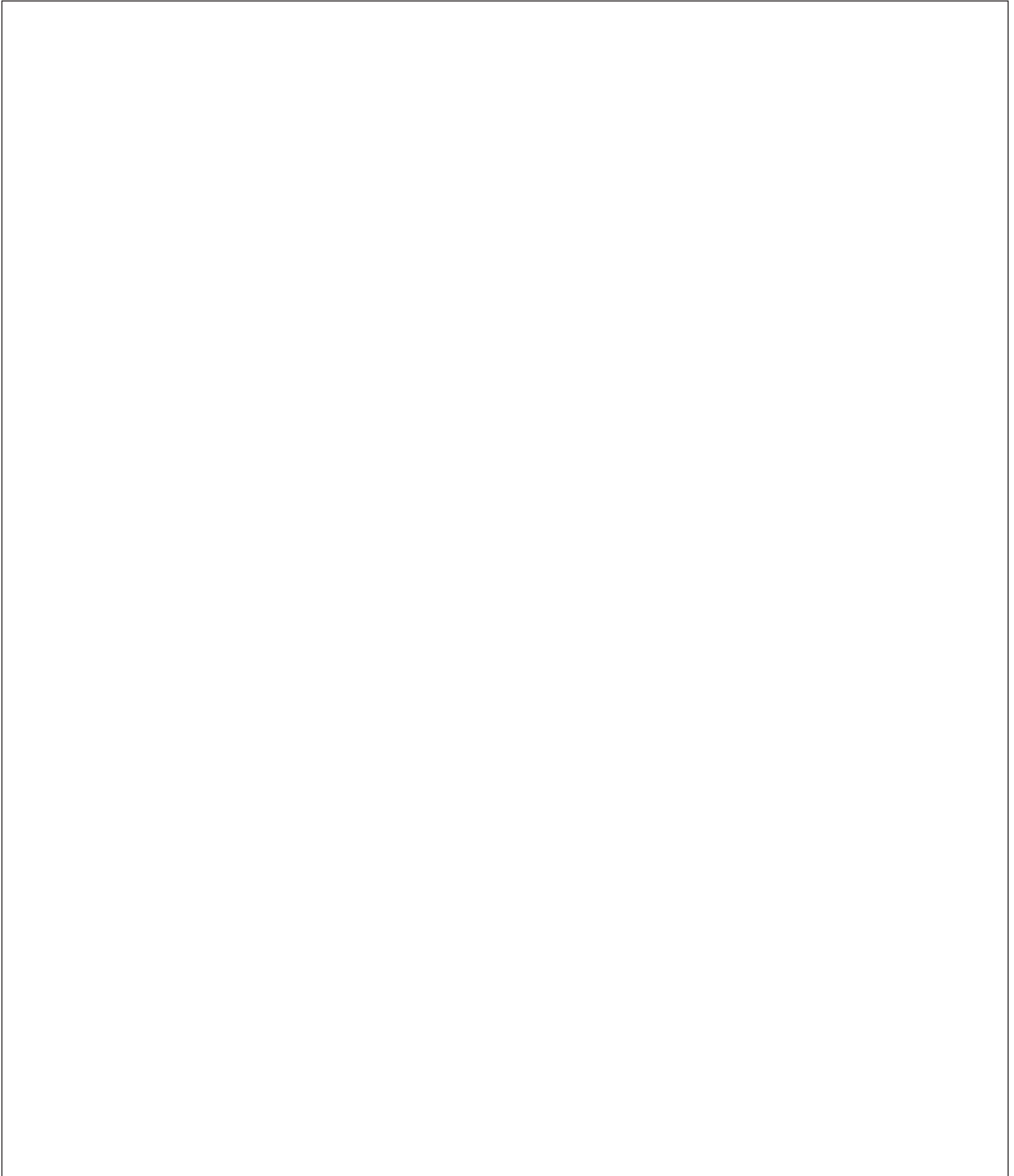
QUESTION 14 (11 marks)

The user interface symbolises a new smart home system that manages plugs to allow for efficient energy use. The home screen lists plugs alphabetically and annotations describe the function of each element. Schedules allow users to set on/off schedules for individual smart plugs and groups.



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- a) Symbolise the user interface for the Schedules screen, allowing for multiple on/off times per day and selecting any day of the week. Describe the function of each element. [7 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 at the back of this question and response book.

Do not write outside this box.

b) Evaluate the user interface of the smart home system to recommend two additional features that could improve accessibility. Justify your response.

[4 marks]

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Section 3

Instructions

- This section has one question and is worth 25 marks.
-

QUESTION 15 (25 marks)

A school has developed a digital system to vote on student leadership positions. The system is incomplete, and a few unprogrammed processes remain.

Programmed components include:

- a registration and login feature using a universal password provided on voting day and their student or staff email address
- a list of candidates organised by nominated leadership positions
- the ability to cast votes
- the ability to count votes.

Unprogrammed processes include site administration:

- distributing a universal password to registered users via email on voting day
- importing candidate details and nominations in XML format
- checking/verifying votes
- publishing results.

- a) In XML format, symbolise how data would be structured for "Candidate X", who is in Year 11 and has been nominated for esports captain.

[4 marks]

Do not write outside this box.

The voting rules for the system are:

- only students and staff can vote
- each user can only vote once
- voting takes place on a nominated day between 8:30 am and 4:00 pm.

b) Explain system features that would ensure the implementation of the three voting rules. [3 marks]

Do not write outside this box.

To maintain data integrity, the school plans to integrate the voting system with the existing school database to access student and staff profiles. The school database contains all active user profiles and will enable identification of any conflicts of interest. A conflict of interest exists where a voter is related to a candidate, e.g. staff cannot vote for their own children.

- c) Symbolise data flow for a programmed component that will allow all voting rules to be enforced while integrating the existing school database.

[14 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 at the back of this question and response book.

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ADDITIONAL PAGE FOR STUDENT RESPONSES

Write the question number you are responding to.

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