

2021 Trial Examination

STUDENT
NUMBER

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Letter

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SOFTWARE DEVELOPMENT

Unit 3 & 4 – Written examination

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	5	5	20
C	13	13	60
			Total 100

- Students are permitted to bring into the examination room: pens, pencils, highlighters, erasers, sharpeners and rulers.
- Students are NOT permitted to bring into the examination room: blank sheets of paper and/or white out liquid/tape.
- No calculator is permitted in this examination.

Materials supplied:

- Question and answer book of 20 pages.

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.

Instructions for Section A

Answer all questions 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

Software Requirement Specifications:

- A. represents the design ideas.
- B. is a document used in the design stage.
- C. includes context and mockup diagrams.
- D. Documents key tasks in the analysis stage.

Question 2

A program allows the input of two negative integers **num1** and **num2** represented as strings. What would the product of **num1** and **num2** be, represented as a string?

input: num1 = "-20", num2 = "-40"

- A. 60
- B. 800
- C. "-60"
- D. "800"

Question 3

Which of these protocols is responsible for moving data packets between the nodes?

- A. IP
- B. TCP
- C. HTML
- D. WWW

SECTION A – continued

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Use the following information to answer Questions 4 and 5.

First pass

First comparison

9	5	6	4	11
---	---	---	---	----

 →

5	9	6	4	11
---	---	---	---	----

Second comparison:

5	9	6	4	11
---	---	---	---	----

 →

5	6	9	4	11
---	---	---	---	----

Third comparison:

5	6	9	4	11
---	---	---	---	----

 →

5	6	4	9	11
---	---	---	---	----

Fourth comparison:

5	6	9	4	11
---	---	---	---	----

 →

5	6	4	9	11
---	---	---	---	----

Second pass

First comparison:

5	6	4	9	11
---	---	---	---	----

 →

5	6	4	9	11
---	---	---	---	----

Second comparison:

5	6	4	9	11
---	---	---	---	----

 →

5	4	6	9	11
---	---	---	---	----

Continues...

Question 4

The example above is most likely a:

- A. quick sort.
- B. bubble sort
- C. binary sort.
- D. selection sort.

Question 5

How many comparisons would be required to sort this array?

- A. 3.
- B. 4.
- C. 8.
- D. 12.

**SECTION A – continued
TURN OVER**

Question 6

A new language institute is in the process of installing a firewall into its new network. The purpose of this firewall is to:

- A. stop viruses coming to the network.
- B. block malware such as ransomware and phishing.
- C. monitor and controls incoming and outgoing network traffic.
- D. provide different access levels to the company's personnel.

Question 7

The Victorian *Health Records Act 2001*:

- A. works in conjunction with the Privacy Act 1988.
- B. legislates the handling of health records of patients in the public sector.
- C. legislates the handling of health records in both the public and private sectors.
- D. provides direction with the collection of health information all over Australia.

Question 8

Matilda is developing a solution for her friend, Domenic, and she has completed 75% of it. She needs more members to be able to finish on time, however Domenic cannot afford it! This would be considered:

- A. an economic constraint.
- B. a scope constraint.
- C. a functional requirement.
- D. a non-functional requirement.

Question 9

Which one of the following is the most appropriate technique for collecting detailed and authentic data about an existing information system?

- A. Survey the users of the system.
- B. Blogs written by IT technicians.
- C. Interview the manager of the information system.
- D. Observation of how the users interact with the system.

SECTION A – continued

2021 SOFTWARE DEVELOPMENT EXAM

Use the following information to answer Questions 10-12

A folk-dancing club stores their dancers' data as follows:

mem_surname	mem_name	mem_gender	mem_mobile	mem_birthdate	mem_enroll_date
Collins	Andrea	F	0438 094 307	Sep 2000	Jan 2015

Question 10

The most appropriate data type for *mem_gender* would be:

- A. text.
- B. string.
- C. Boolean.
- D. character.

Question 11

The data structure shown is:

- A. a record.
- B. a string.
- C. an associative array.
- D. a one-dimensional array.

Question 12

The naming convention used for the variables in this software solution is:

- A. snake case.
- B. camel case.
- C. use case notation.
- D. Hungarian notation.

Question 13

Which one of the following would be a suitable criterion for evaluating the effectiveness of a software solution?

- A. The solution is easy to use.
- B. The colour scheme is appealing.
- C. It takes three (3) steps to move to the next screen.
- D. The software calculates and outputs the required results.

SECTION A – continued
TURN OVER

Question 14

A use case diagram is a tool which:

- A. describes how a user interacts with a system.
- B. shows the data flow between processes.
- C. shows the visualisation of a system in its entirety.
- D. describes functions a user can complete in the system.

Question 15

A gaming room will be giving Wi-Fi access to the gamers. Which of the following is considered a functional requirement?

- A. The system must be easy to maintain.
- B. The connection must comply with privacy laws.
- C. The user interface must be easy to use for gamers to connect.
- D. The system must provide continuous access to those using the Wi-Fi.

Question 16

The effectiveness of an online membership system can be evaluated by:

- A. the amount of time it takes to move from one screen of the form to the other.
- B. measuring the cost associated with the new system in comparison to the previous one.
- C. counting the number of correctly validated members compared to the previous system.
- D. the amount of time required to process memberships compared to the previous system.

Question 17

A new music streaming service is interested in finding out which brand of device their subscribers use to listen to music and creates a user interface for the entry of data in a survey. The most effective control to use to enter the brand of device would be:

- A. a slider.
- B. a dropdown.
- C. a textbox.
- D. checkbox.

Question 18

Monique has developed a program for a new handbag business which calculates the total price and a discount (if applicable), and outputs the total cost. Which of the following criteria would be suitable for the evaluation stage?

- A. Is the calculation for the discount correct?
- B. Is the user interface clear and easy to use?
- C. Is the user warned if there is an error input?
- D. Do the validation techniques work accordingly?

Question 19

The purpose of trace tables is to:

- A. fix run time errors.
- B. test for syntax errors in the algorithm.
- C. test the output of the software solution.
- D. check for possible logic errors in the algorithm.

Question 20

Variable names and their details are documented in:

- A. a record.
- B. an XML file.
- C. a data dictionary.
- D. an object description.

**END OF SECTION A
TURN OVER**

SECTION B - Short-answer questions

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

Question 1 (7 marks)

A search must find the number **36** in an array of 18 unsorted values.

30	22	40	5	12	54	36	57	78	90	51	45	79	2	33	29	27	73
----	----	----	---	----	----	----	----	----	----	----	----	----	---	----	----	----	----

a. How many iterations will it take to find the number 36?

1 mark

b. What type of search has been used?

1 mark

c. How does this search work?

2 marks

d. Name and describe another type of search.

3 marks

SECTION B – continued

Question 2 (4 marks)

Alice, a photographer and owner of a print shop, transfer large files with images captured with her camera, which she places on calendars, mugs, canvas and other media. Alice is in the process of setting up her new office and she is not sure about the type of network she should install.

- a. Describe two advantages of **wireless** network.

2 marks

- b. Describe two advantages of **wired** networks.

2 marks

Question 3 (4 marks)

Describe two techniques that can be used to generate design ideas in the design stage.

Technique 1: _____

2 marks

**SECTION B – continued
TURN OVER**

Technique 2: _____

2 marks

Question 4 (3 marks).

Paul has asked his assistant Lily to produce two alternative designs of a booking form for a plumbing business in the form of annotated mockup diagrams. The clients will then be able to enter the required data for appointments, but Lily is unfamiliar with the concept of annotated mockup diagrams.

- a. What is an annotated mockup diagram?

1 mark

- b. List two features that should be included.

2 marks

Question 5 (2 marks).

Explain the difference between a syntax error and a logic error in a program.

END OF SECTION B

SECTION C – Case study

Instructions for Section C

Please remove the insert of this book during reading time. Use the case study provided in the insert at the back to answer the questions in this section.

Answers must apply to the case study.

Answer all questions in the spaces provided.

Question 1 (2 marks)

Ismael and his team are ready to identify the goals and objectives to direct his new project.

- a. Identify an information system goal:

- b. Identify an organisational goal:

Question 2 (4 marks)

- a. Ismael requested Molly to email a short survey about the features of the app the retirees would want in the app. Why did he choose a survey as a collection method?

2 marks

- b. He also collected the report about the security cameras that Yolande has been selling. What can Ismael and his team learn from this?

2 marks

SECTION C – continued
TURN OVER

Question 3 (6 marks)

They are about to present the Software Requirements Specification (SRS) to ‘*The Eye Security Company*.’ They have already documented the nature of the problem and now are ready to complete the other sections of the design brief.

- a. Identify who the clients are (details?)

1 mark

- b. State one functional and a non-functional requirement of the app.

2 marks

- c. Identify one legal and one usability related constraint.

2 marks

- d. State the scope of the proposed solution.

1 mark

SECTION C – continued

Question 5 (4 marks)

The pseudocode for the users to access the app has been written and is shown below.

```
BEGIN
  count ← 0
  WHILE count < 3
    username ← input username
    password ← input password
    IF username=='home_owner001' and password=='*****' THEN
      PRINT ('Welcome to your Home Secure App')
      break
    ELSE
      PRINT ('Try again.')
      count += 1
    END IF
  END WHILE
END
```

- a. State the purpose of the variable *count* in the pseudocode?

1 mark

- b. Identify the lines which form the *iteration*.

1 mark

- c. How many attempts will the homeowner have to log in before the program exits? Explain why.

2 marks

SECTION C – continued

Question 6 (6 marks)

Ismael is consulting with his team about the development approach they will adopt to complete this project: agile, spiral or waterfall.

Recommend one of the models and justify your selection.

Question 7 (4 marks)

The retirees' representative stated during the survey that they would like to continue with the traditional username and password to access the system. Ismael is trying to convince him to adopt a multifactor authentication system.

- a. Explain what multifactor identification is and provide an example.

2 marks

- b. Explain the issue that currently exists with passwords as a single factor authentication.

2 marks

SECTION C – continued

Question 8 (6 marks)

Ismael has asked another team member to sketch the four screens required for the app. Below are the first two UIs.

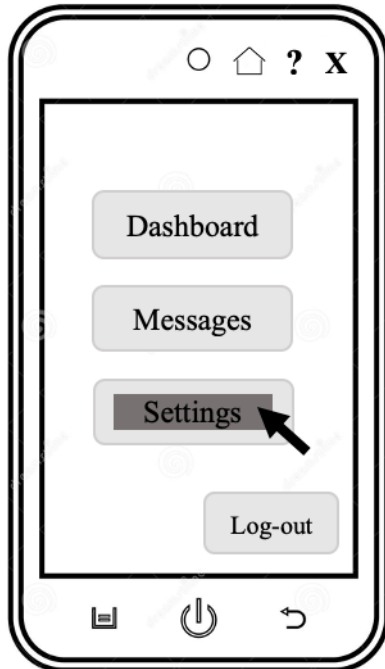


Figure 2 - Welcome screen

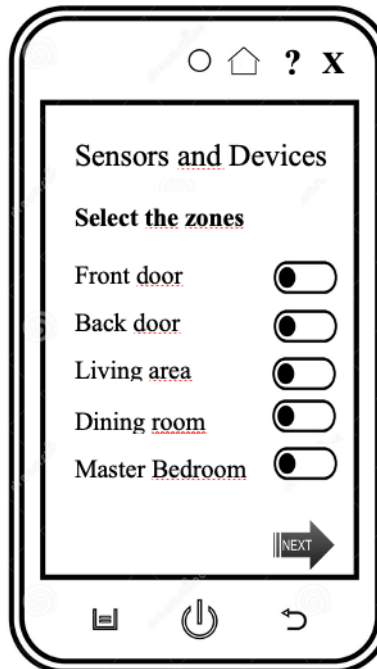


Figure 3 - Settings

- a. Discuss the clarity of the user interface of the second screen, 'Settings'.

2 marks

- b. Discuss the use of space in both screens.

2 marks

- c. Discuss the formatting used in the second screen.

2 marks

**SECTION C – continued
TURN OVER**

Question 9 (3 marks)

The team has decided to store their clients' details in this format:

```
<retirees>
  <client_id="home_owner00">
    <name> Prero, Daragh </name>
    <birth_date> 08/09/1943 </birth_date>
    <address> 9 Lions Rd, Croydon Hills </address>
    <joined_date>01/01/2021</joined_date>
    <description>details about the clients </description>
  </client>
</retirees>
```

- a. Identify the file type they have used.

1 mark

- b. State two features of this type of file.

2 marks

Question 10 (4 marks)

Discuss the following ethical issues.

- a. Yolande has asked Ismael to install advertising for her company along with the app. Discuss an ethical consideration with this request.

2 marks

- b. One of the team members has uploaded a copy of the source code of the app to his cloud account so that they can modify and submit it as theirs for the end of the year project in his IT course.

2 marks

SECTION C – continued

Question 11 (4 marks)

This application will be used to monitor and control the security of their clients' homes through the sensors and cameras installed in different zones. Therefore, the security of this application is paramount. Ismael and his team discuss the possible threats to the data transferred. Discuss two threats to data.

Question 12 (6 marks)

Ismael asks his team to develop a risk management strategy.

- a. Explain what this is.

2 marks

- b. Describe two possible risk management strategies that will assist in minimising security vulnerabilities.

2 marks

- c. Identify and describe the web protocol that this company should use to protect the data transmitted to and from the mobile devices.

Question 13 (6 marks)

Retirees have been using the mobile app for a while now. Ismael is ready to perform an evaluation.

- a. Suggest an evaluation strategy they should carry out. Include what data collection will be used, what would be the content, who will be asked to complete it, when it will take place.
4 marks

- b. Write criteria for evaluating the effectiveness and efficiency of the solution.
 - Efficiency

- Effectiveness

2
marks

END OF QUESTION AND ANSWER BOOK

Insert for Section C – Case study

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

The Eye Technology

Retirees look forward to travelling and enjoying their time freely after so many years of work. However, holidays away from home is also a time for concern as the majority of burglaries take place in empty properties. Molly, a travel agent who specialises on holidays for retirees, has heard this concern over and over again.

Molly has thus approached Ismael (who specialises in custom software solutions) about this issue, as it is affecting her business. People are choosing short trips instead of longer holidays as they do not want to leave their homes for a long time.

Ismael takes the issue back to his team and they realise that there might be a niche for developing an app for this age group. They start researching and learning about security camera technology as this is the first time they will be developing an app for security cameras. Ismael contacts Yolande who is the owner of “*The Eye*” Security Company - a company which has been installing traditional cameras for many years. Ismael proposes that they work together to offer a new system for current and prospective clients. Yolande would have to invest in the latest and best wire-free camera available today: The “Arleine Pro 4 Security Camera”, but she accepts the proposal and is excited about it as her sales have been dropping for about a year. Ismael and his team start organising their new project timeline using a Gantt Chart.

After some data collection Ismael analyses the results. It is clear that the retirees want to be able to monitor and modify sensors and cameras from anywhere while travelling. They are aware of the many other features that come with this technology such as: activating indoor and outdoor lighting; rolling up automated blinds and; making noise to make it look like someone is at home, but they just want to be able to monitor and control the sensors and cameras! At a later stage Ismael will develop a more sophisticated app to cater to a more sophisticated clientele.

Ismael and his team will develop a customised app that will automatically activate the alarm when the sensor detects movement, warn the homeowner via their mobile device and inform the local police. They will be able to see videos in full HD day and nighttime, the battery will last for up to 2 months in standby mode and it will work with 5G networks. The retirees will require network coverage and a GPS signal for their mobile device, but they will be able to control the app easily because the UI will be designed to be clear and user-friendly even on smaller displays.