

ATAR course examination, 2022
Question/Answer Booklet



**COMPUTER
SCIENCE**
Year 12 ATAR

Student Number: In figures

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Student Name: In words

Time allowed for this paper

Reading time before commencing work: ten minutes

Working time for paper: three hours

Materials required/recommended for this paper

To be provided by the supervisor

This Question/Answer Booklet

Source booklet

Number of additional
booklets used (if
applicable):

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To be provided by the candidate

Standard items: pens, pencils, eraser, correction fluid/tape, ruler, highlighters

Special items: non-programmable calculators, MATHOMAT and/or Mathaid and/or any system flowchart template

Important note to candidates

No other items may be taken into the examination room. It is **your** responsibility to ensure that you do not have any unauthorised notes or other items of a non-personal nature in the examination room. If you have any unauthorised material with you, hand it to the supervisor **before** reading any further.

Structure of this paper

Section	Number of questions available	Number of questions to be answered	Suggested working time (minutes)	Marks available	Percentage of exam
Section One: Short Answer	21	21	70	106	40
Section Two: Extended Answer	4	4	110	120	60
Total					100

Instructions to candidates

- The rules for the conduct of Western Australian external examinations are detailed in the *Year 12 Information Handbook 2022: Part II Examinations*. Sitting this examination implies that you agree to abide by these rules.
- Write your answers in the spaces provided in this Question/Answer Booklet. A blue or black ballpoint or ink pen should be used. Wherever appropriate, fully labelled diagrams, tables and examples should be used to illustrate and support your answers.
- You must be careful to confine your responses to the specific questions asked and to follow any instructions that are specific to a particular question. Where no specific instructions are given, you should feel free to use a range of formats to express your knowledge and understandings.
- Spare pages are included at the end of this booklet. They can be used for planning your responses and/or as additional space if required to continue an answer.
 - Planning: If you use the spare pages for planning, indicate this clearly at the top of the page.
 - Continuing an answer: If you need to use the space to continue an answer, indicate in the original answer space where the answer is continued, i.e. give the page number. Fill in the number of the question(s) that you are continuing to answer at the top of the page.

Section 1: Short answer**40% (106 Marks)**

This section contains **22** questions. You must answer **all** questions. Write your answers in the spaces provided.

Supplementary pages for planning/continuing your answers to questions are provided at the end of this Question/Answer booklet. If you use these pages to continue an answer, indicate at the original answer where the answer is continued, i.e. give the page number.

Suggested working time: 70 minutes.

Question 1**(2 marks)**

Why is reading data to and from RAM more efficient than reading data to and from a USB device?

Question 2**(6 marks)**

Create a trace table using the long or condensed method on the next page that represents the following algorithm after the loop is executed for the third time.

Score [12, 14, 13, 19]

$i \leftarrow 0$

TotalScore $\leftarrow 0$

for $i < 4$

TotalScore \leftarrow TotalScore + Score [i]

End

Print TotalScore

Question 3**(3 marks)**

Explain why it is important to create test data that checks boundary data. Illustrate with an example algorithm.

Question 4**(1 mark)**

Disc striping corresponds with which RAID level?

Question 5**(2 marks)**

Identify and discuss which type of cabling media is most susceptible to electromagnetic interference.

Question 6**(5 marks)**

Draw a line from the description to the correct protocol. Not all protocols have a description.

A system containing mappings of domain names to various types of data, such as numerical IP addresses	WPA2
A network protocol providing an alternative solution to the manual allocation of IP addresses	CSMA/CA
What is the name of a network protocol that specifies the format of packets and addressing scheme in network communications?	DHCP
defines how network devices respond when two devices attempt to use a data channel simultaneously and encounter a data collision	IP
A security protocol designed to strengthen existing WEP implementations without requiring the replacement of legacy hardware	DNS
	CSMA/CD
	TCP/IP

Question 7**(7 marks)**

a) Explain what a Distributed Denial of Service (DDoS) attack is.

(3 marks)

b) Discuss two strategies that could be undertaken to protect a network from a DDoS attack.

(4 marks)

Question 8**(8 marks)**

Discuss four factors that influence the performance of a network. Identify how each factor can be adjusted to optimise network performance.

Question 9

(4 marks)

Discuss two purposes of internal documentation.

Question 10

(11 marks)

Describe four tools that would assist a developer in applying the Software Development Cycle (SDC). Identify the stage each tool would occur at. One has been done for you.

Tool 1: Pseudocodes: _____

Tool 2: _____

Tool 3: _____

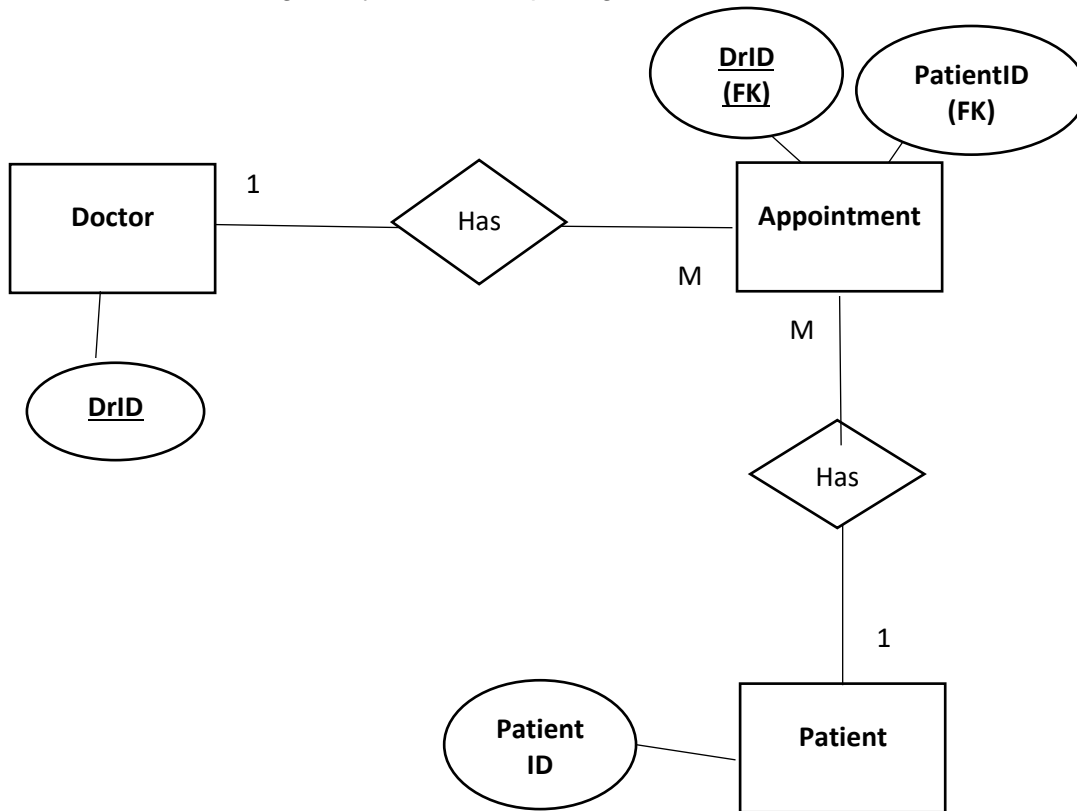
Tool 4: _____

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Question 11

(3 marks)

Examine the following Entity Relationship Diagram.



a) Dr Jones had to see a Patient with ID J234 twice in one day. Discuss the issue this could create within the database. (2 marks)

b) How could this be resolved? (1 mark)

Question 12**(7 marks)**

Here is a code snippet

```
i ← 0
```

```
total ← 0
```

```
For i < 10
```

```
    Input (age)
```

```
    total ← total + age
```

```
End for
```

```
Output ("Average age is:", total/10)
```

a) Discuss why variable 'age' should be validated?

(2 marks)

b) Which validation method could be used?

(1 mark)

c) Change the code to incorporate a validation method

(4 marks)

Question 13**(12 marks)**

Examine the following algorithm:

```
testScore: integer
Begin
Display "Enter test score"
Input testScore
Case testScore of
    (testScore >= 90):Display "Your grade is A"
    (testScore >= 80):Display "Your grade is B"
    (testScore >= 70):Display "Your grade is C"
    (testScore >= 60):Display "Your grade is D"
else
    Display"Your grade is F"

End Case
End
```

- a) The teacher was wanting to automate grade distributions according to a test that was out of 100.

Discuss what could happen if testScore is negative or greater than 100. (2 marks)

- b) What could be done to fix this problem? (1 mark)

c) Write a function below that: (9 marks)

- Accepts maximum and minimum integer values as parameters for testScores
- Inputs testScore
- Checks that testScore is an acceptable value by comparing it with maximum and minimum integer values
- Calculates the grade based criteria given in the previous page
- returns a new variable **grade** to the main line.

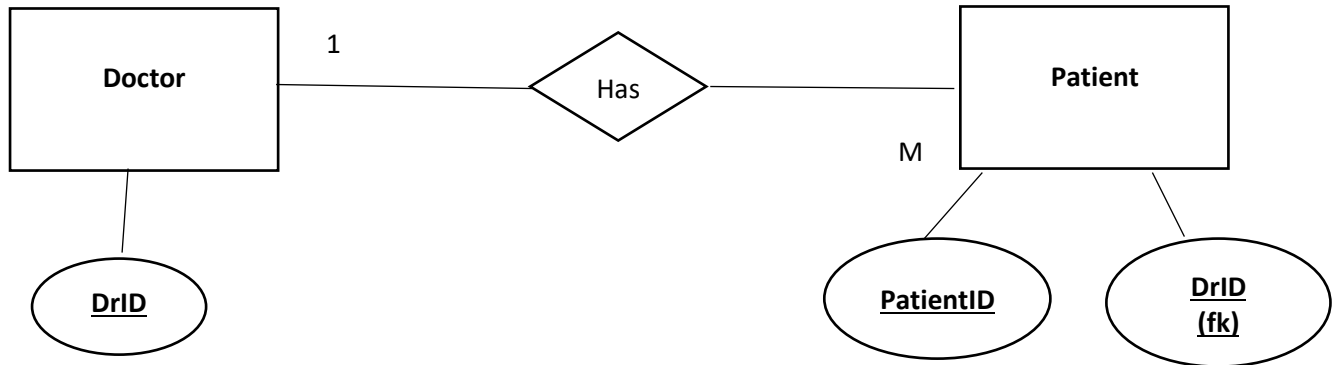
Question 14 **(4 marks)**

Discuss two advantages and two disadvantages of an online database compared to a locally stored database.

Question 15

(5 marks)

David's database has been designed following the Entity Relationship Diagram depicted below.



ID	Firstname	Surname	Address 1	Address 2	Suburb	Postcode	State	Phone numl	DrID
1	Frankie	Yelland	12	Patterson Plac	Dalkeith	6005	Wa	0513 546 845	
2	Dominic	Gill	34	Sockton Rd	Bassendean	6054	WA	0352 134 533	Giles
3	Mary	Stuart	25	Royal Plc	Midland	6055	WA 2135435	0516 513 213	Marcot
4	Sally	Glover	4	Plessant Plc	Mt Pleasant	6153	WA	0865 132 136	Giles
5	Peitro	Sadler	21	Royal St	East Perth	6004	WA	0963 155 654	James

a) He has noticed that there are records within the Patient table that have been left blank on the Dr Field. What methods could have been implemented to ensure this did not occur? (2 marks)

b) If not corrected, discuss what impact would null values in this field have upon data integrity? (3 marks)

Question 16**(3 marks)**

- a) What is an assembly language translated into before it can be executed? (1 mark)

- b) Provide two reasons why a programmer chose to develop in a high-level language rather than a low-level language? (2 marks)

Question 17**(3 marks)**

To be in third normal form (3NF),

1. the data must be in 2NF
2. be free of transitive dependencies.

Using the data below:

Patient (PatientID, PatientFirstName, PatientSurname, PatientDOB, Address1, Address2, Suburb, State)

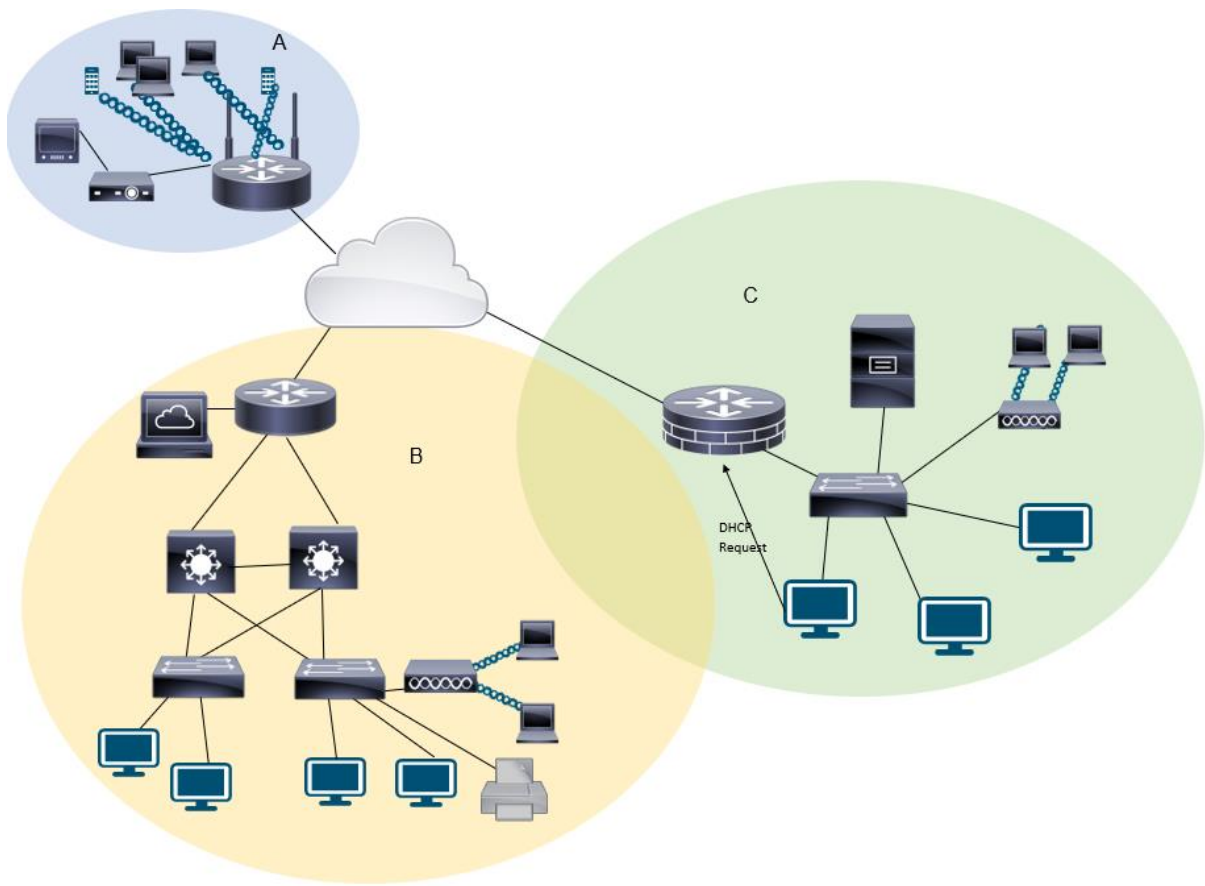
Doctor (DoctorID, DoctorName)

Appointment (AppointmentID, DoctorID (FK), PatientID(FK), DoctorName, PatientFirstName,)

- a) Describe what the term transitive dependency means. (2 marks)

- b) What needs to happen for this data to be in 3NF? (1 mark)

Questions 18 through to 20 relate to the following network diagram.



Question 18

(9 marks)

a) Describe the purpose of each network A, B and C.

(3 marks)

A: _____

B: _____

C: _____

b) Explain the functions of the router in each linking them to their identified purpose. (6 marks)

A: _____

B: _____

C: _____

Question 19 (3 marks)

Describe the role of the 'gateway' in network.

Question 20 (3 marks)

Explain how the role of the Dynamic Host Control Protocol (DHCP) is managed in the networks above.

Question 21**(5 marks)**

Discuss convergence in relation to the development of mobile phones. Provide examples.

End of section 1: short answer

Next page

Section2: Extended answer

60% (120 Marks)

This section contains 4 questions. You must answer **all** questions. Write your answers in the spaces provided.

Supplementary pages for planning/continuing your answers to questions are provided at the end of this Question/Answer booklet. If you use these pages to continue an answer, indicate at the original answer where the answer is continued, i.e. give the page number.

Suggested working time: 110 minutes.

Questions 22 through 25 refer to pages 1-2 in your Source Booklet.

Question 22

(21 marks)

- a) Explain which project management methodology would be best suited to developing the new systems for Ivan’s business. **(5 marks)**

- b) The manager of the company you work for has given you the following estimate of how long each stage of the project should take. (16 marks)

ACTIVITY	DEPENDENCY	DURATION
1 Preliminary Analysis		5
2 Analysis Document Study	1	6
3 Report to Ivan	1, 2	4
4 Design	3	8
5 Development Software	4	5
6 Hardware purchase	4	5
7 Implementation	5,6	3
8 Evaluation and Maintenance	7	3

Use this information to

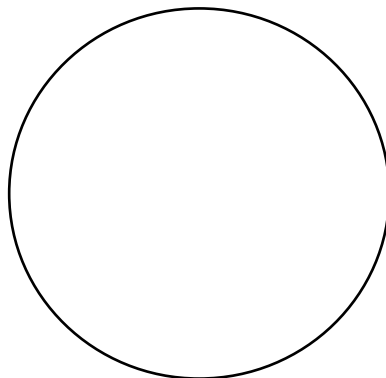
- a) Develop a pert chart (8 marks)

Question 23

(15 marks)

a) Explain to Ivan what a context diagram is and why you will be creating one. (3 marks)

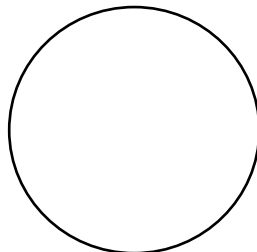
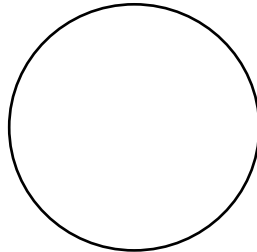
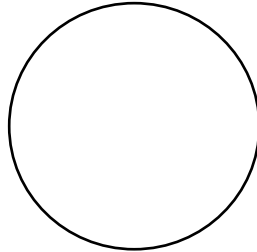
b) Complete the context diagram for Ivan's Sales and Invoice System below. (12 marks)



Question 24**(22 marks)**

a) Complete a data flow diagram level 0 for Ivan below.

(19 marks)



- b) One of your processes has multiple vectors going in and out and uses two data stores. Explain why a level 1 data flow diagram would be required. (3 marks)

Question 24**(36 marks)**

Ivan would like to automate the client contract development as much as possible.

When the client accesses the webform they are initially presented with the following:

- Existing client
- New client

If they are an existing client, **Module 1** is called.

If they are a new client, **Module 2** is called.

These are the following modules. Use appropriate and meaningful names for all the modules.

Module 1: Asks the client to enter their unique client number called clientID. This will be checked against an array called ClientID[] containing all the client numbers that is automatically passed into the module. If their client number exists, it will be passed back to the Main. If they have forgotten their client number, they will receive a message that says, "Please contact our friendly administration team on 98764546".

Module 2: This webform module is yet to be written, but when called, it will ask clients for some contact details to be emailed to Ivan who will arrange contact.

Module 3: The Webform Module is yet to be written but the variable ClientID is passed to the module and the variable contractValue is passed back to the Main Module.

Module 4: Accepts the variable contractValue and based on the amount. Based on this contractValue a Design Engineer is assigned to liaise with the client contained in the variable DE_Name. DE_Name is local.

- a) Create the structure chart for this algorithm showing all parameters that are passed.
(9 marks)

b) Write the pseudocode for Module 1 below.

(11 marks)

c) Why is Module 1 not a function?

(2 marks)

d) Using the following data, write the pseudocode for Module 4 using a function procedure. (9 marks)

contractValue	Design Engineer Name
>= \$500,000	Andrew
>=250,000 < 500,000	Brian
>= 100,000 < 250,000	Lucy
>= 50,000 < 100,000	Mike
<50,000	Wayne

e) For the Webform Module 3, a stub has been written that returns a manually entered contractValue. What does a stub do? (2 marks)

- f) When developing the software solution, Ivan has been advised that encryption of the data stored in the software is not required because users must log on with their unique ClientID.

Discuss why authentication and encryption should be an important part of the software solution. (3 marks)

Question 25**(26 marks)**

- a) Ivan's network has decided to expand and have taken on an office in Mirrabooka. They are keen to document their network infrastructure and have asked you to draw a network map for their offices demonstrating their connectivity using Cisco conventions.

The Thornlie office (head office) consists of a reception area, a sales office and a server room. There is a desktop workstation in the office and one in the reception. These are all attached to a network printer which is located in the reception area. The business mail server is located in the server room as well as a switch and a router. A modem and firewall are also located in the server room.

The Mirrabooka office is new and as such does not have a lot of equipment. A modem, router, firewall and switch have been installed. A wireless access point has also been setup so that the new manager can access the network through her notebook computer. A wired network printer has been setup in the reception area. (15 marks)

- b) The company is dependent on the network for their work. Discuss three potential threats to this network and how they can be prevented or intercepted and how any damage can be overcome. (6 marks)

Threat 1: _____

Threat 2: _____

Threat 3: _____

- c) Explain why the data for this company would be stored on a dedicated server. (3 marks)

- d) Explain why all the applications are stored on the server rather than locally. (2 marks)

End of questions

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