



ATAR course examination, 2017

Question/Answer booklet

COMPUTER SCIENCE

Please place your student identification label in this box

Student number: In figures

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In words

Time allowed for this paper

Reading time before commencing work: ten minutes

Working time: three hours

Materials required/recommended for this paper

To be provided by the supervisor

This Question/Answer booklet

Source booklet

Number of additional
answer booklets used
(if applicable):

To be provided by the candidate

Standard items: pens (blue/black preferred), pencils (including coloured), sharpener, correction fluid/tape, eraser, ruler, highlighters

Special items: non-programmable calculators approved for use in this examination, 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 material. 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 examination
Section One Short answer	20	20	70	68	40
Section Two Extended answer	4	4	110	111	60
Total					100

Instructions to candidates

1. The rules for the conduct of the Western Australian external examinations are detailed in the *Year 12 Information Handbook 2017*. Sitting this examination implies that you agree to abide by these rules.
2. Write your answers in this Question/Answer booklet. Wherever appropriate, fully labelled diagrams, tables and examples should be used to illustrate and support your answers.
3. You must be careful to confine your answers 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.
4. Supplementary pages for the use of planning/continuing your answer to a question have been 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.
5. The Source booklet is not to be handed in with your Question/Answer booklet.

Section One: Short answer**40% (68 Marks)**

This section contains **20** questions. You must answer **all** questions. Write your answers in the spaces provided.

Supplementary pages for the use of planning/continuing your answer to a question have been 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**(4 marks)**

Outline **one** advantage and **one** disadvantage of interviews and questionnaires as data gathering techniques.

Interviews

Advantage: _____

Disadvantage: _____

Questionnaires

Advantage: _____

Disadvantage: _____

Question 2

(2 marks)

Give **two** reasons why a digital camera has an embedded operating system.

One: _____

Two: _____

Question 3

(3 marks)

List **three** benefits of using virtualisation.

One: _____

Two: _____

Three: _____

Question 4

(3 marks)

List **three** features of a file system.

One: _____

Two: _____

Three: _____

Question 5**(5 marks)**

A courier company has a number of drivers. Each driver is allocated a car for the term of their contract and is required to collect their car from the company yard each morning. A database for the allocation of vehicles would contain the following:

Driver (Driver's License)

Car (Car Registration; Driver's License FK)

Over time, the company has discovered that there are occasions when allocated vehicles are parked in the yard and not used.

It has been decided that a better strategy would be to allocate a driver to a car on a daily basis, rather than each driver being allocated a specific vehicle for the term of their contract.

The structure of the vehicle database has to be updated to reflect this strategy. Create a new entity that contains appropriate primary and/or foreign keys.

Question 6**(3 marks)**

- (a) Describe the role of open systems in database interconnectivity. **(2 marks)**

- (b) Name the software component that needs to be installed to enable connectivity between a data-driven website and its database. **(1 mark)**

Question 7**(2 marks)**

Describe the purpose of a data dictionary, using an address book database as an example.

Question 8

(4 marks)

The manager of an online bookstore has decided to provide customers with the option of using a smartphone application (app) to access the bookstore. His draft design for the interface of the prototype is shown below.

Identify **two** strengths and **two** weaknesses of the design using the descriptors labelled 'A', 'B', 'C' and 'D'. Indicate each strength and weakness by circling it on the diagram and labelling it with the corresponding letter name.

- A. effective navigational design
- B. ineffective navigational design
- C. logical order of use
- D. illogical order of use

Prototype Bookstore App

Log in:

Choose book:

\$25.00
Unit price

-
+
Change quantity

2 - \$50.00
Quantity ordered /
total \$

Apply discount

Discount \$

Final cost

Checkout area

Items in basket

Total discount \$

Amount due \$

Go to payment screen

First time customer registration

Question 9**(4 marks)**

Rhys is the manager of a software development team and has instructed the team to minimise the costs of a current project by excluding encryption from the software solution. Outline **two** ethical concerns that a member of Rhys' team should have in relation to following this instruction.

One: _____

Two: _____

Question 10**(3 marks)**

Explain the purpose of benchmarking in relation to computer hardware.

Question 11

(7 marks)

Explain the Fetch – Execute cycle and provide an example of a Central Processing Unit (CPU) component for each stage of the cycle.

Question 12

(3 marks)

Outline **three** characteristics of records as a data type.

One: _____

Two: _____

Three: _____

Question 13**(2 marks)**

Describe the role of a repeater when used in a network.

Question 14**(3 marks)**

Consider the following pseudocode and answer the question parts that follow.

Module Age2Animal (Name, Age)

Choice ← ''

If Age < 5 then

 Choice ← 'Zebra'

Else

 Choice ← 'Aardvark'

End If

Output (Name, ' likes the animal ', Choice)

End Module

(a) Identify **one** local variable. (1 mark)

(b) List **one** parameter. (1 mark)

(c) State the output when the call Age2Animal ('Jenny', 5) is executed. (1 mark)

Question 15

(2 marks)

Satellite services are used to provide broadband internet connectivity to regional and remote areas of Australia. State **one** advantage and **one** disadvantage of using satellites for this purpose.

Advantage:

Disadvantage:

Question 16

(2 marks)

Describe the purpose of a stub in programming.

Question 17

(1 mark)

State the primary function of the Dynamic Host Configuration Protocol (DHCP).

Question 18

(3 marks)

List **three** characteristics of Internet Protocol version 6 (IP6).

One: _____

Two: _____

Three: _____

Question 19

(6 marks)

Explain **two** ways in which an interpreter and a compiler are different.

One: _____

Two: _____

Question 20

(6 marks)

Explain each of the strategies listed below.

Phishing: _____

Denial of Service (DoS): _____

Section Two: Extended answer

60% (111 Marks)

This section has **four (4)** questions. Answer **all** questions. Write your answers in the spaces provided.

Supplementary pages for the use of planning/continuing your answer to a question have been 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.

Question 21

(45 marks)

Refer to the Source booklet to answer this question.

A company called BooX4us has hired a team to develop a system so that customers can order books online. As part of the development process, the company wants a smaller system to be built first, which it will test with 10 customers. It wants the feedback from this test incorporated into the development of the system before implementing it. As a member of the development team, you will need to ensure that you engage with the test trial and BooX4us for ongoing feedback during the development process.

(a) Give **two** characteristics of each of the system development methodologies listed below.

(4 marks)

Linear

One: _____

Two: _____

Iterative

One: _____

Two: _____

(b) As a member of the development team creating the BooX4us system, justify which of these methodologies would be the most suitable to use for the project.

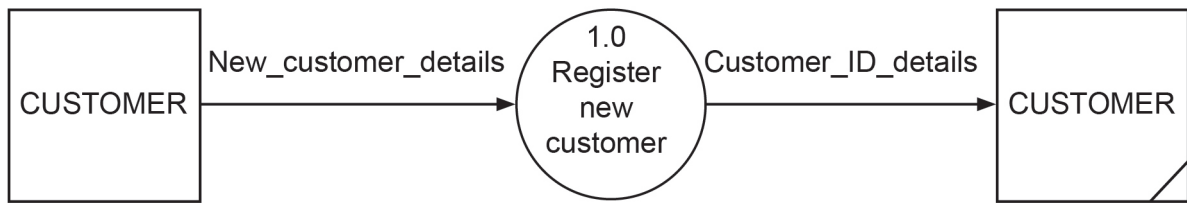
(2 marks)

- (c) Complete the context diagram below for the BooX4us online book order system. (10 marks)



Question 21 (continued)

- (d) Complete the Level 0 Data Flow Diagram (DFD) below for the BooX4us online book order system. (20 marks)



- (e) With reference to your Level 0 DFD, draw a Level 1 DFD by expanding Process 1.0 Register new customer.

Consider the following:

- the customer must enter their name, street address, postcode, phone number, email address and a password
- the system checks that all data details have been entered
- the details are checked against the customer data store to ensure that the new customer is not already in the data store
- when registration is complete, the customer details and the customer ID that has been created are saved in the customer data store
- on confirmation that the new customer is unique, the customer ID is emailed to the new customer.

(9 marks)

Question 22**(21 marks)**

The development team has created the following description of the Entity Relationship (ER) diagram for the BooX4us database.

- A customer can place many orders but each order belongs to only one customer.
- An order is for books, i.e. an order can consist of more than one book and a title can be ordered by more than one customer.
- Each book title has a unique identifier called an ISBN.

(a) Using Chen notation, draw an ER diagram that includes the following:

- the names of all primary keys
- the names of all foreign keys
- the relationships
- the cardinality.

(11 marks)

- (b) In reflecting on the BooX4us database, the development team has realised that books can be sourced from more than one wholesaler. Represent below how you would extend your ER diagram to take this information into account. Include the entities and appropriate primary and foreign keys. You **must** use the following as a structure for your answer. (6 marks)

Entity_name (Primary key(s) and/or Attribute FK(s))

- (c) Refer to your ER diagram and write a query, using Structured Query Language (SQL), that will include:

- FirstName
- LastName
- OrderNumber
- Totalcostoforder.

(4 marks)

Question 23

(22 marks)

BooX4us has code that displays text on a specific part of the screen using a grid-based coordinate system (x, y). The module below uses a custom function that moves the cursor to the appropriate coordinates.

Module DisplayText (X, Y, Text)

```

01 YOffset ← 0
02 If X < 0 then
03   X ← 0
04 End if
05 If X > 80 then
06   X ← 80
07 End if
08 YOffset ← 24 - Y
09   MoveTo (X, YOffset)
10 Output (Text)
    
```

End Module

- (a) Examine the module above and complete the trace table below for the input parameters (-10, 10, 'Item: '). (3 marks)

Line#	X	Y	YOffset
01			
02			
03			
04			
05			
06			
07			
08			
09			
10			

- (b) It has been identified that the Module DisplayText does not check to determine whether the value to the parameter is within a certain range. The programmer for the development team attempts to add some range checking code between lines 07 and 08, shown below (by the three lines marked 07.1, 07.2 and 07.3), but introduces another error. On what line is the error? Write the correct code. (2 marks)

```

07.1 If Y > 24 then
07.2   X ← 24
07.3 End if
    
```

The mapping of text and/or graphics on a screen is typically done using a grid-based coordinate system (x, y). The BooX4us system needs to be upgraded to enable the viewing of text and/or images on larger resolution screens. To do this the development team needs to convert the old coordinate system (80 x 24) to a new coordinate system (640 x 480) using the relationship that follows.

When the old x value = 40, then the new x value = 320:
 $40 \times (640 \div 80) = 320$.

When the old y value = 12, then the new y value = 240:
 $12 \times (480 \div 24) = 240$.

- (c) Given the information above, write a module in pseudocode that:
- converts coordinates from the old system (80 x 24) to those used in the new system (640 x 480)
 - ensures that in the new coordinate system (0, 0) is in the bottom left-hand corner of the screen and (640, 480) is in the top right-hand corner of the screen
 - passes the old coordinate pair as value parameters and returns the new coordinate pair in reference parameters. (10 marks)

Question 23 (continued)

BooX4us offer their customers a discount on their online book orders based on the information that follows.

If a book order costs:

- less than \$100, no discount applies
- between \$100 and \$200 (inclusive), a 5% discount applies
- over \$200, a 10% discount applies.

(d) Write a function in pseudocode (using a case statement) to calculate the discounted price for a book order. (7 marks)

Question 24**(23 marks)**

The BooX4us bookstore has upgraded its network to facilitate improved access to a locally-hosted website and online database. This network upgrade includes new wireless and wired functionality, network-attached storage and improved internet access. The database that enables the online book order system is also stored locally.

- (a) Jack has read about the BooX4us bookstore and is keen to purchase books online. He has upgraded his wireless router/modem in order to get a more reliable internet connection. The device he is using has the default administrator password of 'password', and has the wireless encryption activated. Give **two** reasons why Jack should change the administrator password. (2 marks)

One: _____

Two: _____

- (b) Describe **two** benefits to BooX4us of installing a Network Attached Storage (NAS) system. (4 marks)

One: _____

Two: _____

Question 24 (continued)

- (c) A customer has complained that the BooX4us website is very slow, particularly when viewing images of products. Provide **two** reasons why the network performance may be an issue and explain how you could solve **one** of them. (5 marks)

One: _____

Two: _____

Solution: _____

- (d) Using Cisco conventions, draw a network diagram that shows a customer connected to a home-based, local area network and the BooX4us system. The customer's home network consists of a wireless router, a tablet device using a wireless connection and a desktop computer with a wired connection. The BooX4us system consists of a firewall, router, Network Attached Storage (NAS), database server and web server. (12 marks)

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*Published by the School Curriculum and Standards Authority of Western Australia
303 Sevenoaks Street
CANNINGTON WA 6107*