



## ATAR course examination, 2018

### Question/Answer booklet

# COMPUTER SCIENCE

Please place your student identification label in this box

Student number: In figures

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In words

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### 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	21	21	70	94	40
Section Two Extended answer	4	4	110	110	60
<b>Total</b>					100

## Instructions to candidates

1. The rules for the conduct of the Western Australian external examinations are detailed in the *Year 12 Information Handbook 2018*. 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 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.
5. The Source booklet is not to be handed in with your Question/Answer booklet.

**Section One: Short answer****40% (94 Marks)**

This section contains **21** 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****(6 marks)**

- (a) State the purpose of a Gantt chart. (1 mark)

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- (b) Draw a program evaluation review technique (PERT) chart in the space below the table to represent the information shown. (5 marks)

Task	Description	Start date	Finish date	Dependency
1	Feasibility study	01/09/2018	05/09/2018	nil
2	Data collection	05/09/2018	12/09/2018	Task 1
3	Design development	12/09/2018	20/09/2018	Task 2
4	Application development	20/09/2018	30/09/2018	Task 3
5	Purchase equipment	20/09/2018	30/09/2018	Task 3
6	User documentation	30/09/2018	05/10/2018	Task 4
7	Implementation	30/09/2018	06/10/2018	Task 5
8	User training	06/10/2018	08/10/2018	Task 6 and 7

**See next page**

**Question 2**

**(6 marks)**

Describe the **two** stages of the systems development life cycle (SDLC) listed below and provide an example of an activity undertaken in each stage.

Design: \_\_\_\_\_

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Development: \_\_\_\_\_

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**Question 3**

**(4 marks)**

Describe **one** advantage and **one** disadvantage for a company using a standard operating environment (SOE).

Advantage: \_\_\_\_\_

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Disadvantage: \_\_\_\_\_

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**Question 4****(6 marks)**

(a) Explain how an operating system manages concurrency.

**(3 marks)**

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(b) An operating system acts as an interface between the hardware and the applications. It has four main roles, including managing concurrency. List **three** other roles of an operating system.

**(3 marks)**

One: \_\_\_\_\_

Two: \_\_\_\_\_

Three: \_\_\_\_\_

**Question 5****(1 mark)**

Outline the role of a file system.

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**Question 6****(2 marks)**

State the function of the following:

Address bus: \_\_\_\_\_

Control bus: \_\_\_\_\_

**Question 7**

**(4 marks)**

Describe the **two** types of processing listed below.

Distributed: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Multi-core: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**Question 8**

**(7 marks)**

Disaster recovery plans are considered an essential requirement for all companies.

- (a) State the purpose of a disaster recovery plan. (1 mark)

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

- (b) Describe **three** types of disaster recovery tools. (6 marks)

One: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Two: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Three: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**Question 9****(4 marks)**

Justify why you would use each of the database systems listed below.

Distributed: \_\_\_\_\_

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Centralised: \_\_\_\_\_

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**Question 10****(5 marks)**

(a) Describe the role of data mining.

**(2 marks)**

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(b) Explain **one** ethical implication of data mining.

**(3 marks)**

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Question 11

(5 marks)

- (a) Explain why an organisation should have a code of conduct that outlines the use of ICT by its staff. (3 marks)

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- (b) Outline **two** ways in which an organisation could dispose of customer data securely. (2 marks)

One: \_\_\_\_\_

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Two: \_\_\_\_\_

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Question 12

(4 marks)

In relation to a database, explain the **two** terms listed below.

Data anomaly – update: \_\_\_\_\_

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Referential integrity: \_\_\_\_\_

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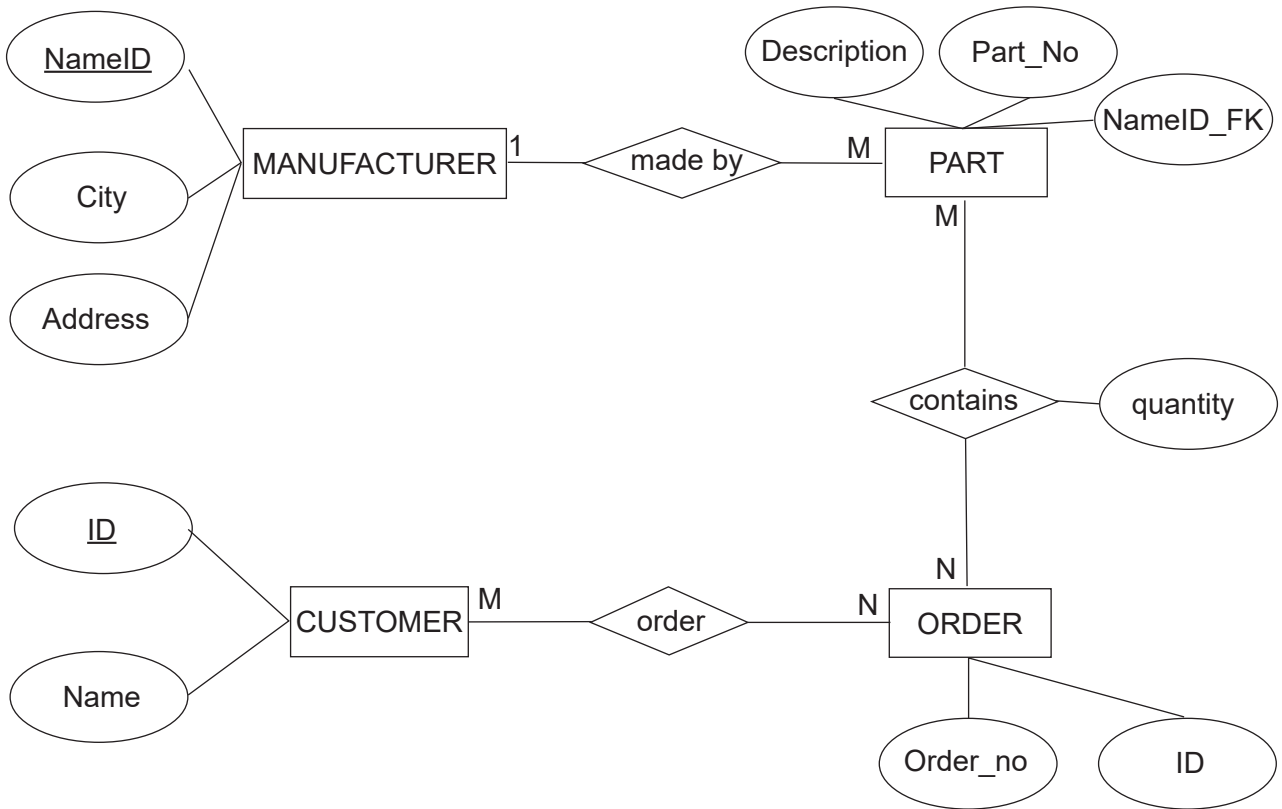
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Question 13

(4 marks)

The entity relationship (ER) diagram below has structural errors and is **not** normalised.



Explain why this database is **not** in 3rd normal form (NF).

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## Question 14

(4 marks)

Aside from user needs, describe **two** other factors that affect the development of software.

One: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Two: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

## Question 15

(11 marks)

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

1	BEGIN
2	COUNT←0
3	TOTAL_PRICE←0
4	INPUT (PRICE)
5	REPEAT
6	COUNT←COUNT+1
7	OUTPUT (COUNT, PRICE)
8	TOTAL_PRICE←TOTAL_PRICE+PRICE
9	INPUT (PRICE)
10	UNTIL PRICE=0
11	OUTPUT (TOTAL_PRICE)
12	END

- (a) Outline the purpose of the code on line 3. (1 mark)

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- (b) Describe a limitation of the iteration control structure used in the code. (2 marks)

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- (c) Rewrite the entire pseudocode using a test first iteration control structure. (8 marks)

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**Question 16**

**(4 marks)**

In relation to creating a program, describe the **two** concepts listed below.

Function: \_\_\_\_\_

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Modularisation: \_\_\_\_\_

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**Question 17**

**(3 marks)**

Explain how range checking is used to test an algorithm.

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**Question 18**

**(2 marks)**

Describe **one** difference between a syntax error and a run-time error.

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**Question 19****(8 marks)**

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Module Inputnums
    Input (num1)
    Input (num2)
End Module

Function Average (num1,num2)
    (num1+num2) /2
End Function

Module Outputavg (average)
    Output (average)
End Module

Main Module
    Call Inputnums
    Call Average (num1,num2)
    Call Outputavg
End Module
```

In the space below, draw a structure chart that represents the algorithm above.

**Question 20**

**(2 marks)**

Outline **one** advantage and **one** disadvantage of using fibre optic transmission media instead of shielded twisted pair (STP).

Advantage: \_\_\_\_\_

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Disadvantage: \_\_\_\_\_

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**Question 21**

**(2 marks)**

Describe the difference between a storage area network (SAN) and a network attached storage (NAS).

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**End of Section One**

**See next page**

**Section Two: Extended answer**

**60% (110 Marks)**

This section has **four** questions. 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.

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Refer to the Source booklet to answer Questions 22–25.

**Question 22**

**(38 marks)**

- (a) Identify the system development methodology that C.C. Supermarket Corporation should use in the development of their online shopping portal and outline why. (3 marks)

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- (b) Describe **two** computer-aided software engineering (CASE) tools that could be used by the system analyst for this project. (4 marks)

One: \_\_\_\_\_

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Two: \_\_\_\_\_

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**Question 22** (continued)

- (c) Draw the Level 0 Data Flow Diagram (DFD) for the C.C. Supermarket Corporation online shopping portal system. (28 marks)



- (d) The C.C. Supermarket Corporation online shopping portal has now been operating for three months and there have been some complaints from customers. Explain how you would use **one** data gathering technique to help identify the issues that customers are experiencing. (3 marks)

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**Question 23****(23 marks)**

The systems analyst has provided the following description of the Entity Relationship (ER) diagram for the C.C. Supermarket Corporation online shopping portal system.

- A customer can place many orders but each order belongs to only one customer on a particular date.
- An order can consist of many products but each product belongs to one order.
- Each order has one payment on a particular date.
- Many products are sourced from many suppliers.

(a) Using Chen's 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.

You need to ensure that your ER diagram is in the 3rd normal form.

**(13 marks)**

- (b) Refer to your ER diagram in part (a) and write a query, using Structured Query Language (SQL), that will display customers' orders from 1/11/2018 to 30/11/2018 with the following information:
- OrderDate
  - OrderID
  - CustomerID
  - ProductID.
- (4 marks)

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- (c) Explain how you could apply **two** validation rules in your database structure. (6 marks)

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## Question 24

(26 marks)

The programming team has developed a framework for the Main module of the algorithm that will be used to calculate the total cost, including delivery cost of items purchased, using the C.C. Supermarket Corporation's online shopping portal.

Your task is to finish the algorithm by completing the unfinished modules:

- Module CalculateTotalCost
- Module DeliveryCost
- Module OutputFinalTotal.

To complete the first module on page 21, you are required to calculate the total cost of 10 items purchased.

To complete the second module on page 22, you need to calculate the cost of delivery based on the postcode of the customer.

Complete the third module on page 23 by calculating the total cost of the order. This will require you to calculate a 10% administrative charge on the total cost of all items, which you will then add to the total cost. You will then need to add the delivery cost to the total cost.

```
Module CalculateTotalCost ( )  
Begin
```

*(Missing code)*

```
End
```

```
Module DeliveryCost ( )  
Begin
```

*(Missing code)*

```
End
```

```
Module OutputFinalTotal ( )  
Begin
```

*(Missing code)*

```
End
```

```
Main module
```

```
Call CalculateTotalCost ( )
```

```
Call DeliveryCost ( )
```

```
Call OutputFinalTotal ( )
```

```
End module
```

**See next page**







**Question 24** (continued)

- (d) To ensure the Module DeliveryCost you developed in part (b) is operating correctly, test the boundaries of the module by providing sample postcodes, and the resulting output for each, in the table below. The first line has been done for you. (4 marks)

<b>Test data</b>	<b>Output</b>
5001	This order cannot be shipped.



**This page has been left blank intentionally**

**See next page**

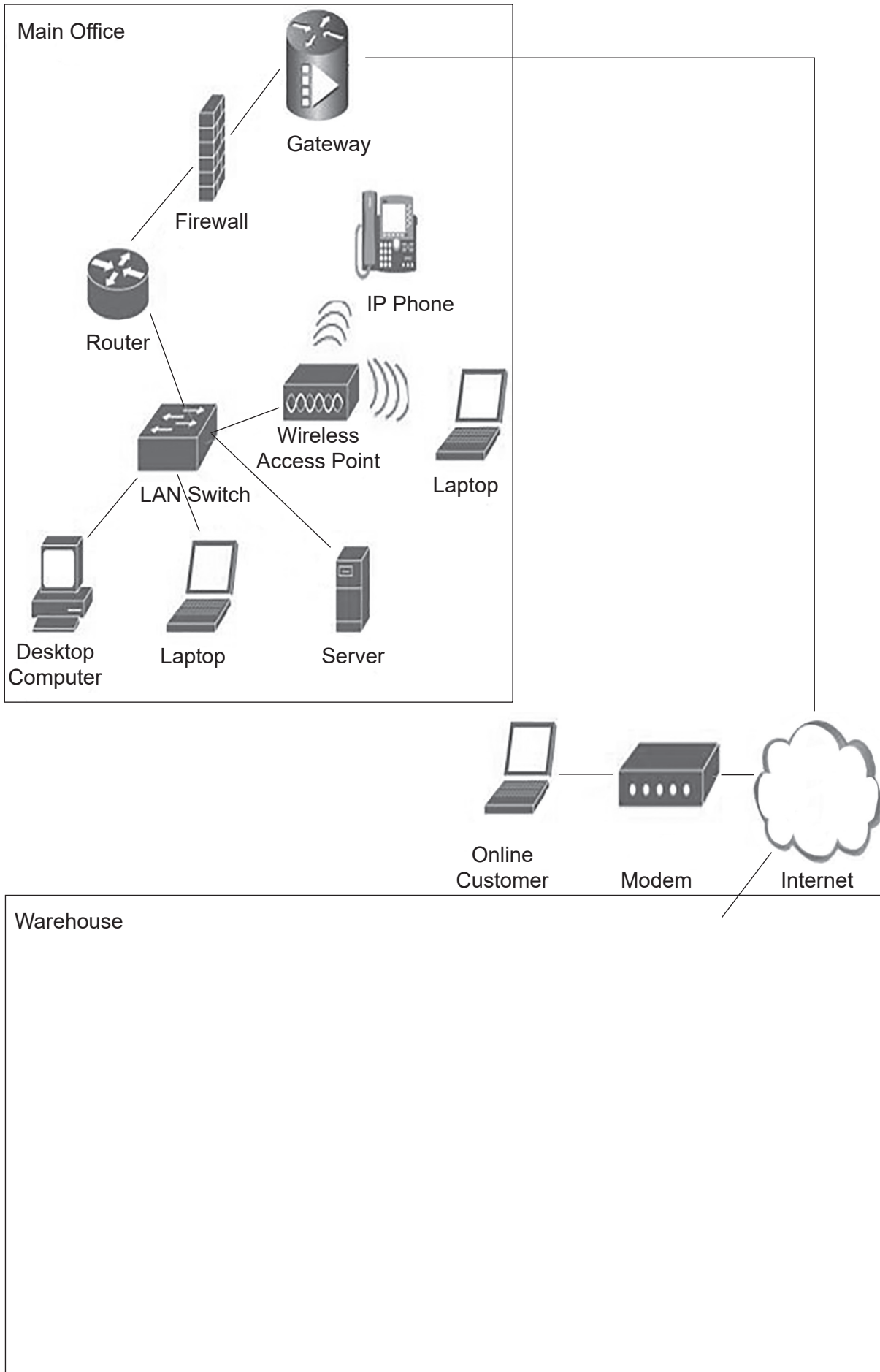
**Question 25****(23 marks)**

C.C. Supermarket Corporation has a network that includes its warehouse, main office and online customers, as shown in the diagram on page 27.

The main office network comprises of a web server, wireless access points, laptops, IP phone, desktop computer, firewall, a switch and a router. The customer uses a modem to connect to their internet service provider (ISP).

C.C. Supermarket Corporation wants to improve its warehouse functionality. The warehouse; therefore, requires a secure connection with minimal data collisions to the ISP for its IP phone, desktop computer, printer and database server. To achieve this, it will also need to use a switch, a router and a firewall.

- (a) Using Cisco conventions, draw a network diagram in the warehouse box provided on page 27 that shows the connections within the warehouse and the connection of the warehouse to the ISP. (10 marks)



Question 25 (continued)

- (b) The server of the C.C. Supermarket Corporation’s warehouse receives a file with recent customer orders from the main server of the Corporation. It has been identified that a number of orders have been corrupted. Explain how a checksum error detection method can be used to identify and correct errors in transmitted data. (3 marks)

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- (c) Describe how each of the devices listed below enables the C.C. Supermarket Corporation to operate its online shopping portal. (10 marks)

Router: \_\_\_\_\_

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Switch: \_\_\_\_\_

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Network interface card (NIC): \_\_\_\_\_

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Modem: \_\_\_\_\_

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Wireless access point: \_\_\_\_\_

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