## Western Australian Certificate of Education

**Trial Examination, 2015**

##### Question/Answer Booklet

Please place your student identification label in this box

**COMPUTER**

**SCIENCE**

**Year 11 ATAR**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Student Number: In figures |  |  |  |  |  |  |  |  |  |  |

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

###### *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:  Multiple choice | 20 | 20 | 25 | 20 | 10 |
| Section Two:  Short answer | 20 | 20 | 65 | 57 | 35 |
| Section Three:  Extended answer | 7 | 7 | 90 | 76 | 55 |
|  |  |  |  | **Total** | 100 |

**Instructions to candidates**

1. The rules for the conduct of Western Australian external examinations are detailed in the *Year 12 Information Handbook 2015*. Sitting this examination implies that you agree to abide by these rules.

2. 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.

3. 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.

4. 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 One: Multiple-choice 10% (20 Marks)**

This section contains **20 questions**. Answer **all** questions on the separate Multiple-choice Answer Sheet provided. For each question, shade the box to indicate your answer. Use only a blue or black pen to shade the boxes. If you make a mistake, place a cross through that square, then shade your new answer. Do not erase or use correction fluid/tape. Marks will not be deducted for incorrect answers. No marks will be given if more than one answer is completed for any question.

Suggested working time: 25 minutes.

**Question 1**

Which of the following computer components performs calculations on data?

1. Control Unit
2. System Clock
3. Arithmetic Logic Unit
4. Program Counter

**Question 2**

Which of the following is **not** a form of secondary storage?

1. USB
2. Hard Drive
3. Solid State Drive
4. RAM

**Question 3**

Of the following documentation, which would be most useful to help test the logic of an algorithm?

1. Internal documentation
2. User Manual
3. Administration Manual
4. Storyboard

**Question 4**

The key variable that holds data used to generate a query for a report that lists the sales dollar value in descending order would be

1. Real
2. Text
3. Date/Time
4. Boolean

**Question 5**

Of the following, which is an example of machine language?

1. Binary code
2. Python
3. Java
4. Visual Basic

**Question 6**

Identify the correct statement below

1. An assembler is used to translate machine language into something that is understood by the computer.
2. A compiler is used to translate machine language into something that is understood by the computer.
3. An assembler is used to translate an assembly language into something that is understood by the computer.
4. An assembler is used to translate a high-level language into something that is understood by the computer.

**Question 7**

Identify the function of a program counter.

1. To store the address of the next instruction
2. To store the number of loops in a code
3. To store the length of the instruction
4. To store the result of an instruction.

**Question 8**

Which of the following devices connects multiple network segments using the same protocol?

1. Bridge
2. Router
3. Switch
4. Modem

**Question 9**

Which of the following correctly describes the function of SMTP?

1. It controls the transfer of hypertext
2. It controls file transfers over the internet
3. It determines the transmission and addressing of files over a network
4. It is the standard protocol for the transfer electronic mail.

**Question 10**

Software that controls all the systems resources is known as

1. Utility software
2. Operating system software
3. Communication software
4. Application software.

**Question 11**

Which of the following is using a binary coding system?

1. 10101001000001101
2. 86541
3. 10200050
4. 1520D

**Question 12**

Daniel is considering writing an algorithm that will allocate grades based on the following cutoffs

A: over 80%

B: Over 65%

C: Over 50%

D: Over 40%

E: Over 0%

Which of the following structures would be the most useful in the final algorithm?

1. Do until loop
2. One way selection
3. Two way selection
4. Multi-way selection.

**Question 13**

In the maintenance phase of the system development life cycle, what is most likely to occur?

1. Frequent backups
2. Fault finding and correction of the new system
3. Purchase the new hardware for the system
4. Conduct a feasibility study.

**Question 14**

When compiling a program, Silvia gets the following message

unexpected “;” in code line 35

The most likely cause of this message is

1. A syntax error
2. A logic error
3. The use of an incorrect variable
4. The use of the incorrect programming structure.

**Question 15**

To indicate a file within a data flow diagram, which of the following symbols is used?

1. c)
2. d)

**Question 16**

To define the boundaries of a system you would use a

1. Level 0 Data Flow Diagram
2. Entity Relationship Diagram
3. GANTT chart
4. Context Diagram

**Question 17**

Within a relational database, relationships are established by

1. Creating queries based on the primary key
2. Linking tables via primary and foreign keys
3. Developing reports based on queries
4. Enforcing referential integrity.

**Question 18**

A system has been designed to measure the volume of water in a cooling tank within a nuclear plant. If the volume is too low (below 15,000 litres) or too high (above 100,000 litres) a warning is displayed.

Which of the following correctly performs this function?

|  |  |  |  |
| --- | --- | --- | --- |
| a) | IF Volume < 15000 then  Display warning  If Volume <= 100,000  ELSE  Display warning  ENDIF  ELSE  ENDIF | b) | IF Volume <= 100000 THEN  ELSE  IF Volume < 15000 THEN  Display warning  ELSE  ENDIF  Display warning  END IF |
| c) | IF Volume >= 100000 THEN  Display warning  IF Volume <= 15000 THEN  Display warning  ELSE  ENDIF  ELSE  ENDIF | d) | IF Volume >100000 THEN  Display warning  ELSE  IF Volume <15000 THEN  Display warning  END IF  ENDIF  ENDIF |

**Question 19**

Which of these devices is likely to be the central component of a star topology?

1. Router
2. Bridge
3. Switch
4. NIC

**Question 20**

Which of the following would provide the best protection against software piracy?

1. Providing the source code instead of the compiled code
2. Using the copyright symbol on the packaging
3. Using a firewall
4. Using an encryption key.

**Section Two: Short answer** 35**% (57 Marks)**

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

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.

Suggested working time: 65 minutes.

**Question 21 (2 marks)**

a) Outline the purpose of a feasibility study. (1 mark)

b) Identify the stage of the System Development Life Cycle this study would normally occur.

(1 mark)

**Question 22 (1 mark)**

Define the role of drivers in computer systems.

**Question 23 (2 marks)**

The millennium bug in the Year 2000 was a consequence of only storing the last two numbers in the calendar year.

Identify and demonstrate how this variable should have been declared at the start of any code requiring the variable ‘Year’.

**Question 24 (3 marks)**

Define the purpose of the following components in the Central Processing Unit (CPU).

a) Control Unit (1 mark)

b) Data bus (1 mark)

c) Registers (1 mark)

**Question 25 (7 marks)**

Candice wants to record the average temperature for the month of July. The temperature is taken daily at the same location and stored in a spreadsheet.

The flow chart for the algorithm used to calculate **average temperature** once all the data has been collected is below?

Set TotalTemp to 0

Begin

End

Enter Temp

Set Day to 0

Day < 31

Add Temp to TotalTemp

Increase Day by 1

Print

TotalTemp

1. What type of loop structure does this flow chart represent? (1 mark)

1. Identify two errors within this flow chart (2 marks)

1. Identify the data type for the variables (4 marks)

Temp:

TotalTemp:

AveTemp:

Day:

**Question 26 (3 marks)**

A well designed user interface should allow for:

* Minimal keystrokes
* Reduced likelihood that the wrong value being input
* Reduced mouse movements.

Identify how these considerations can be incorporated into a user interface.

**Question 27 (5 marks)**

Consider the following code:

1 Begin

2 Read X

3 WHILE X > 6

4 Output X + 3

5 X = X – 1

6 ENDWHILE

7 End

Complete a trace table for X = 8 below

|  |  |  |
| --- | --- | --- |
| Line | X | Output |
| 1 |  |  |
| 2 | 8 |  |
| 3 |  |  |
| 4 |  |  |
| 5 |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

**Question 28 (1 mark)**

Explain the difference between a syntax error and a logic error using an example.

**Question 29 (1 mark)**

What is the difference between a hard drive and a solid state drive?

**Question 30 (3 marks)**

Describe the following and identify their purpose within a computer system:

ROM:

Cache:

BIOS:

**Question 31 (3 marks)**

Marshall is considering moving to a Standard Operating Environment (SOE).

1. Explain what an SOE is. (1 mark)

1. Identify an advantage of moving to an SOE. (1 mark)

1. Identify a disadvantage of moving to an SOE. (1 mark)

**Question 32 (3 marks)**

Describe the following in reference to data security.

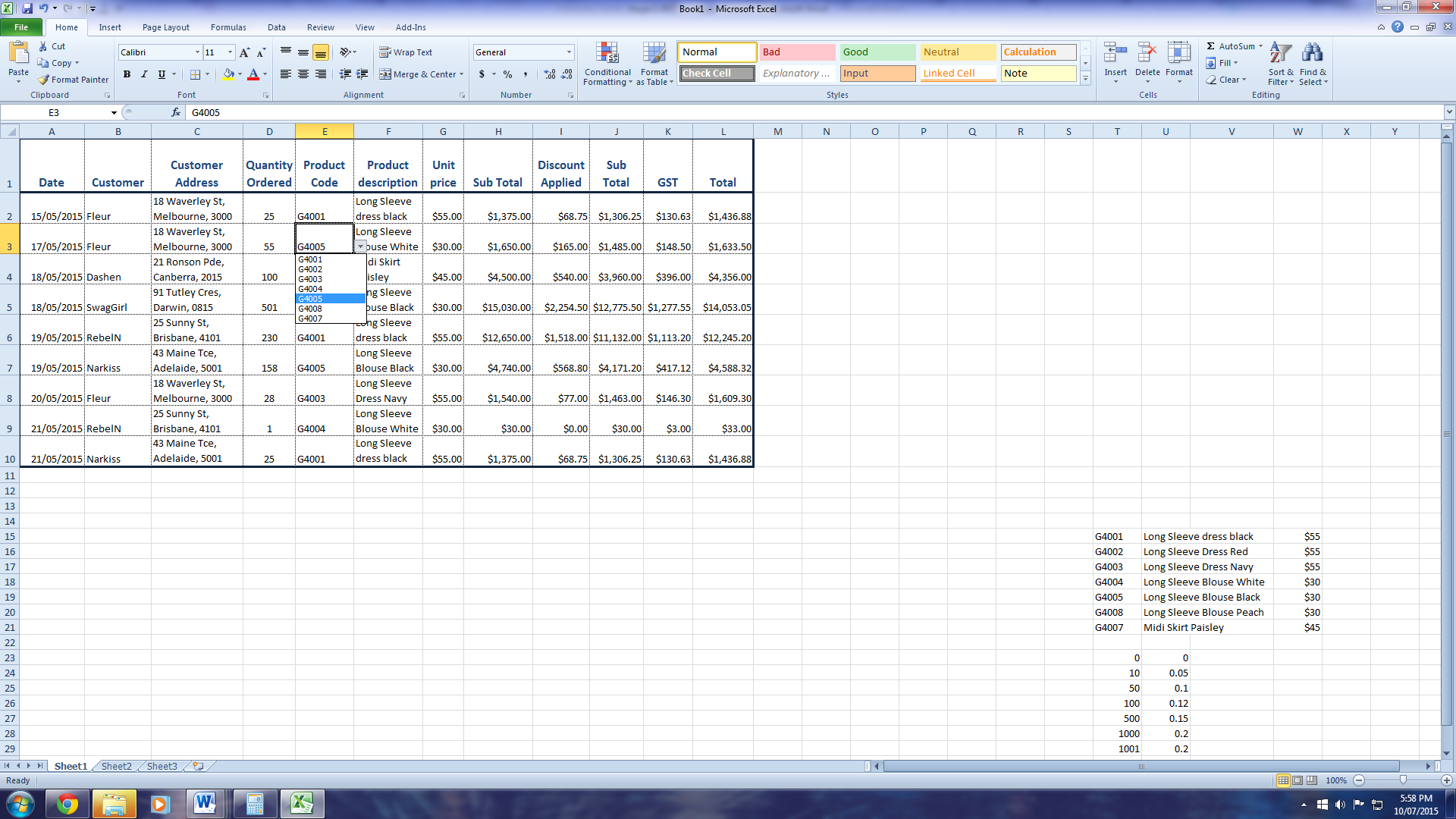
RAID 10:

Snapshot Imaging:

Uninterruptible Power Supply:

**Questions 33 to 40 relate to the following information.**

Krista owns a ladies clothing supply and manufacturing business that she operates from home. She sells a limited but popular range to many boutiques across Australia. Presently she stores all her sales data in the following spreadsheet.



**Question 33 (3 marks)**

Managing the GST is a very important part of Krista’s business. Calculated at 10% of the purchase and then added into every purchase, the business must keep track of all the GST it has charged its customers.

1. What is the likely formula for the GST column cells range (K2:K10)? (1 mark)

1. At the end of each month, the total GST value needs to be calculated. What function would be used to do this? (1 mark)

1. Identify the formula that would be contained within the cells in the range (L2:L10).

(1 mark)

**Question 34 (4 marks)**

The discount column range (I2:I10) contains a lookup that refers to the range (T22:U29) and the data in this range below.

|  |  |
| --- | --- |
| **Quantity Ordered** | **Discount applied %** |
| 0 | 0 |
| 10 | 0.05 |
| 50 | 0.1 |
| 100 | 0.12 |
| 500 | 0.15 |
| 1000 | 0.2 |
| 1001 | 0.2 |

1. Write the likely formula for the lookup. (3 marks)

1. The lookup contains an absolute reference on the row. What does this mean and why is it only on the row? (1 mark)

**Question 35 (3 marks)**

Krista has been asked if she has used data validation in this spreadsheet. She is unsure what this means.

1. Define data validation and explain why it is used. (1 mark)

1. Identify two data validation techniques that could have been used in this spreadsheet.

(2 marks)

**Question 36 (3 marks)**

Krista has been advised that the business needs to move away from a spreadsheet and toward a Relational Database Management System (RDBMS)

1. Describe in detail two advantages of moving to an RDBMS. (2 marks)

1. Identify and describe a disadvantage of moving to an RDBMS. (1 mark)

**Question 37 (1 mark)**

It has been advised that the field ‘Customer Address’ lacks atomicity. What does this mean and what can be done to overcome this problem?

**Question 38 (1 mark)**

Krista has been advised to develop an Entity Relationship Diagram (ERD) before developing the database

What is an ERD and why is it important?

**Question 39 (7 marks)**

Krista has sketched and ERD below.

Customer

Product

Orders/

ordered by

M

N

Customer Name Product Code

Customer Address Product Description

Unit Price

1. Identify two issues with this ERD. (2 marks)

1. Complete the ERD below. Part of it is done for you. You must identify all primary/foreign keys and cardinality. (5 marks)

has

Customer

has

Product

**Question 40 (1 mark)**

Krista is unsure what to do with the fields ‘Sub Total’; ‘GST’; ‘Discount’ and ‘Total’.

Why would they not be included in the ERD?

**End of section two**

**Section Three: Extended answer 55% (76 Marks)**

This section contains **seven (7)** questions. You must answer **all** questions. Write your answers in the spaces provided.

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.

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Suggested working time: 110 minutes.

Questions 41 to 47 rely on the following information

Krista’s home business has grown and she now is considering expanding her current computing arrangements. At present, she has one computer. An analyst has advised that she needs

* 3 computers
* Internet access
* Wireless networking option for mobile devices
* Office-like applications
* An operating system for all 3 computers.
* A fashion computer assisted drawing application for patterns.

**Question 41 (11 marks)**

1. Identify one other hardware device that Krista will need to set up a network within her home. Explain why she needs this. (2 marks)

1. Krista is unsure what topology means. Explain this term and suggest which topology would be suitable for this situation. (2 marks)

1. Her system analyst has suggested a combination of wired and wireless communication medium would be best. (3 marks)
   1. What would the physical wired solution likely be?

* 1. Identify a protocol that the wired solution would use.

* 1. Identify a protocol that the wireless solution would use

1. The system analyst has suggested that Krista needs to secure her home network from her neighbours as well from online threats. (4 marks)
   1. What is the threat from her neighbours? What can Krista do to minimise this type of threat?

* 1. What is an online threat? What can Krista do to minimise this type of threat?

**Question 42 (21 marks)**

Krista has assessed the software she requires and has found the following:

* The operating system requires
  + 1GB RAM and at
  + 16GB of hard drive space.
  + graphics card with a specialist driver
  + Dual-core processor
* The Computer Aided Design software company is recommending
  + 16 GB Ram (minimum 4 GB)
  + 250GB Hard Drive (installation requires 500MB). Preferable over 500GB of SSD
  + 24 inch monitor
  + Graphics card with 2GB of VRAM (Video Random Access Memory)
  + Multi-core processor preferred, dual-core minimum.
* Office software
  + 1GB RAM
  + 3GB Hard Drive

1. Identify the following terms and explain their purpose within a unit (4 marks)

RAM:

`

Hard Drive:

Graphics Card:

Driver:

1. Krista is deciding between these two systems (10 marks)

|  |  |
| --- | --- |
| **Computer 1** | **Computer 2** |
| Intel i7 2.8GHz  8 GB RAM  250GB Hard drive solid state drive  Graphics card 2GB VRAM   4MB cache LVL 3 | AMD Athlon Dual core 3.8GHz  16GB RAM  500GB hard drive  Graphics card 2GB VRAM  4MB cache LVL 2 |

Justify which of these systems be best suited to Krista’s purpose by referring to the RAM, Hard drive and processor requirements of the software.

RAM:

Hard Drive:

Processor:

Cache:

Final selection:

1. If Krista has all applications open at once, explain what is likely to happen to the system performance. (1 marks)

1. Krista has been advised that the Office application software is open source. What does this mean? (1 mark)

1. When purchasing the hardware, the salesperson advised Krista that it is important to undertake regular preventative maintenance. Identify two measures that could be considered preventative maintenance. (2 marks)

1. There are concerns that the Design files are eventually going to consume available storage. To prevent this, Krista is considering ‘cloud storage’. Identify cloud storage and discuss briefly one advantage and one disadvantage. (3 marks)

Cloud storage:

Advantage:

Disadvantage:

**Question 43 (6 marks)**

Krista is concerned that she does not understand the sequence of the boot process. Label the below table cells in the boot process sequence (1 through to 6)

|  |  |
| --- | --- |
| **Process** | **Sequence (1 to 6)** |
| Processor/hardware checked to be in order |  |
| Load BIOS |  |
| Operating system loaded from RAM |  |
| Power on Self-Test (POST) |  |
| Power on, CPU initialises |  |
| Bootstrap loaded |  |

**Question 44 (14 marks)**

The system analyst that Krista hired has found this out about the business.

* Customers apply for an account with Krista’s business by providing their business details
* Krista will then approve the application and put the Customer details on file.
* The Customers will order the clothing items they require and these orders are put into the accounts file.
* It takes Krista 10 days to manufacture these clothing items which are then despatched with an invoice and a despatch notice, both of which are put onto the accounts file. Customers pay on receipt of invoice. Receipt of payment will also go onto the Accounts file.
* Krista orders her material and other sewing stock from a variety of suppliers.
* The suppliers send her an invoice with her stock. Krista files the invoice in the Suppliers file and pays it at the end of the month.
* Krista emails all her clients a monthly newsletter with a discount coupon to be used with the next purchase. Customers complete the discount coupon and return it to be stored with their accounts for the next order.

1. The following is a Context Diagram that Krista received from the Systems Analyst. Krista is unsure if it is entirely accurate. Locate three errors in this Context Diagram. (3 marks)

**Customers**

CustomerApplication\_Details

**Customer**

ApprovedCustomer\_Details

**Customer**

**Supplier**

InvoiceandStock\_details

CustomerAccount\_details

Clothing

CustomerInvoice/despatch\_details

Error 1:

Error 2:

Error 3:

1. Now that the errors have been located, Krista is keen to develop a Level 1 Data Flow Diagram. Please complete the DFD following to reflect the business rules and the correct Context Diagram. Some parts have already been completed for you. (11 marks)

CustomerApplication\_Details

ConfirmedSupplierInvoice/Goods\_Details

SupplierOrder\_Details

Newsletter\_details

ApprovedCustomer\_details

**Question 45 (4 marks)**

1. Krista is very keen to go ahead and upgrade to her new system. She has some concerns about here employees (there are two) and how they use the new system and the new hardware.

What could Krista use to advise and encourage her employees to manage the new hardware and software responsibly? (1 mark)

1. There is also some concern about who is accessing the system and when. Explain a method that Krista could implement to keep a track of each person’s usage? (1 mark)

1. Krista has been advised to start using some disaster recovery tools. Identify two of these and explain how they could assist Krista in the event of a disaster. (2 marks)

**Question 46 (16 marks)**

Krista wants an added security feature for her system as she is encouraging her customers to use her system online.

To place an order, current, approved customers will be given a password. They have three attempts to correctly input the password before the system can accept the order. After three attempts, the message “Contact Krista” will be displayed and Krista will reissue a password.

A flow chart of the algorithm is represented below

False

Print

Contact Krista

Password ==Password

Enter your customer Password

Begin

End

Print

Try Again

Set Try to 0

Try < 4

Try = Try + 1

Print

Proceed to Order

Set Try to 0

End

1. Identify the following three structures with labels (3 marks)

* Sequence
* Selection
* Loop

1. The loop in this flow chart is a Test before loop. Describe how this chart would change if it was a test last loop. (2 marks)

1. Krista is keen to change this algorithm to a ‘for’ loop with a count. Complete the pseudocode below for this change. (8 marks)

Begin

Try 0

For Try

1. Krista may decide to sell the business in the future. She has been told that it is important that all software solutions have been tested and contain internal documentation. (3 marks)
2. What two testing procedures could Krista do on these solutions to ensure they are correct?

1. What is meant by the term internal documentation and why is it important?

**Question 47**

**(4 marks)**

1. The new software solution for customers ordering online is working well. Krista is concerned that someone may intercept the financial data being exchanged. Describe how public/private key encryption can help in this situation. (1 mark)

1. Krista realises that communication over the internet with her customers must be done in an extremely professional manner. She is conscious of ensuring her employees are also aware of this and she has heard of the term Netiquette. Identify three things she may wish to consider when developing a staff policy on etiquette specifically covering electronic communication with her customers. (3 marks)

**End of questions**

Question number:

**Additional working space**

**Additional working space**

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