COMPUTER SCIENCE

ATAR course examination 2021

Marking key

Marking keys are an explicit statement about what the examining panel expect of candidates when they respond to particular examination items. They help ensure a consistent interpretation of the criteria that guide the awarding of marks.

Section One: Short answer 40% (98 marks)

Question 1 (5 marks)

There are four change-over methods used in the implementation stage of the system development life cycle (SDLC): direct cut, phased, parallel and pilot.

(a) Outline the following change-over methods. (2 marks)

Description	Marks
Outlines the Direct Cut method.	1
Outlines the Phased method.	1
Total	2
Example answer is shown below: Direct Cut A date is chosen for the shutdown of the old system, then at that time, the old system is turned off and the new system is implemented or A date is chosen for the shutdown of the old system, then at that time, the old system is turned off and the new system is implemented Phased Parts of the new system are implemented in stages or For a period of time, both the old and the new system are running together until all parts of the system are implemented.	
Accept other relevant answers.	

(b) A hospital has developed a new heart-rate monitoring system. The old system gathers critical data about patients, but is time-consuming to use; the new system will collect all data instantly. It is vital that there be no interruption to the collection of the data during the changeover period.

Given this scenario, recommend which change-over method would be best suited to ensure there is no interruption to data collection. Justify your recommendation. (3 marks)
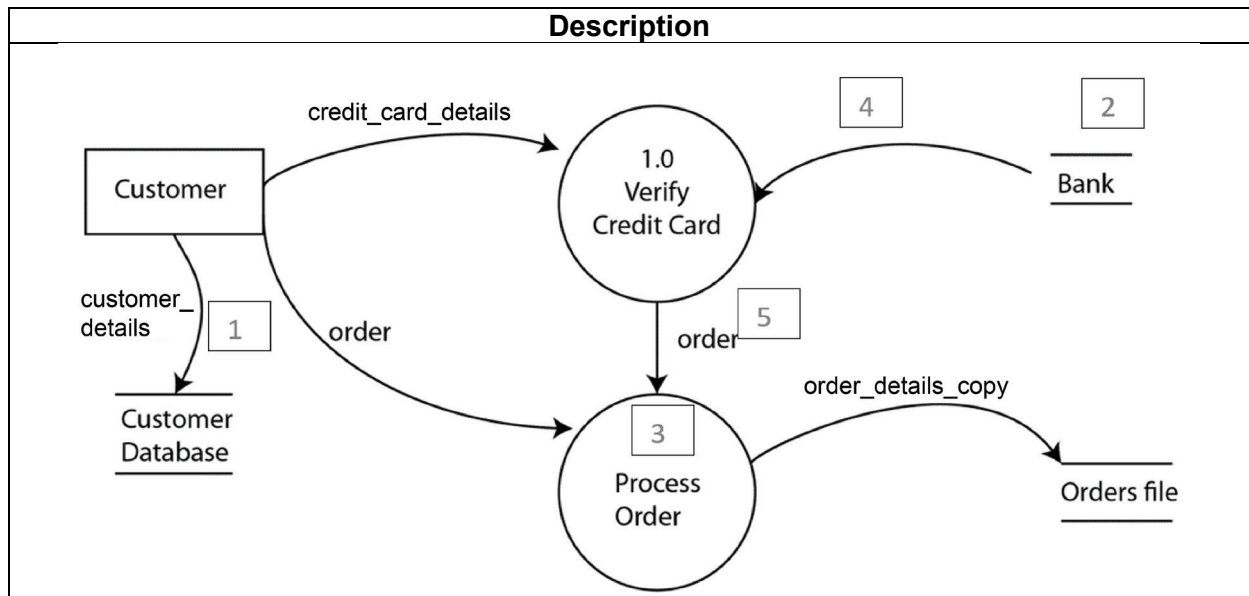
Description	Marks
Identifies correctly that the change-over method correctly.	1
Justifies choice	
Justifies clearly why the hospital should be using this method.	2
Superficial answer as to why the hospital should use this method.	1
Total	3
Answers could include: Parallel - The old and the new system can both operate which ensures no loss of data whilst the changeover is being made and any issues with the new system can be identified and solved.	
Accept other relevant answers	

Question 2   **(4 marks)**

A mail order company takes orders from customers by telephone. Customers must pay for their goods by credit card. The sales operator verifies the customer's credit card number with the bank. The operator then processes the order and stores the customer's details in the customer datastore. The following data flow diagram (DFD) is constructed poorly.

The diagram above contains at least four errors. Identify four errors and number them on the diagram. Describe in the table below why each is an error. Ensure the number corresponds to the number identified on the diagram.

Description

There are multiple errors - any four of these will be accepted

Description	Marks
Describes four errors identified in the diagram.	4
Describes three errors identified in the diagram.	3
Describes two errors identified in the diagram.	2
Describes one of the errors identified in the diagram.	1
Total	4

Answers include:

1 is entity to datastore
2 is entity written as a datastore
3 is no numbering of process
4 is no vector label for flow
5 is not clear label of vector should have details on end OR is a repetitious data flow.

Accept 4 errors.

Question 3 **(2 marks)**

While Dan was installing a new printer in his office, a message appeared on his monitor saying that the printer driver files were being updated.

Describe the role of drivers in a computer system.

Description	Marks
Describes clearly the role of drivers in a computer system.	2
Superficial answer as to the role of drivers in a computer system.	1
Total	**2**
Example of a two marks answer: A driver provides a software interface to hardware devices, enabling operating systems and other computer programs to access hardware functions without needing to know precise details about the hardware being used. Drivers are hardware dependent and operating-system-specific. They usually provide the interrupt handling required for any necessary asynchronous time-dependent hardware interface.	
Accept other relevant responses	

Question 4 **(3 marks)**

A hospital is upgrading its computer network system. There are several computers that are obsolete as their specifications are out of date. However, their hard drives contain confidential information about patients. Australian Privacy Principle 11 states that an entity must take reasonable steps to destroy personal information collected.

Describe a method for the secure disposal of data that would be appropriate for these computers.

Description	Marks
Describes a method for the secure disposal of data with relation to the hospital.	3
Outlines a method for the secure disposal of data.	2
Limited answer of why the drives need to be destroyed physically.	1
Total	**3**
Example of three marks answer: The hospital could physically destroy the hard drives of the machines As the hard drives are out of date it is unlikely that they could be recycled, therefore physical destruction would ensure the data cannot be retrieved. or The hospital could use degaussing to overwrite the hard drives This method would allow the hard drives to be securely deleted, allowing them to be recycled into other machines.	
Accept other relevant responses	

Question 5 **(4 marks)**

Data integrity in a database can be divided into three categories: referential integrity, domain integrity and entity integrity.

(a) Outline the meaning of each of the following: (2 marks)

Description	Marks
Outlines the meaning of Referential integrity.	1
Outlines the meaning of Entity integrity.	1
Total	**2**
Example answers: Referential integrity Two entities that are related require that a foreign key must have a matching primary key Entity integrity Entity integrity specifies that the Primary Keys on every instance of an entity must be kept, must be unique and must have values other than NULL.	
Accept other relevant responses that are accurate	

(b) Describe how data integrity can improve the process of database management.
(2 marks)

Description	Marks
Describes with clarity how data integrity can improve the process of database management.	2
Superficial comment on how data integrity can improve the process of database management or just gives a definition of data integrity.	1
Total	**2**
Example of answer: Data integrity is the maintenance of, and the assurance of, data accuracy and consistency over its entire life-cycle and is a critical aspect to the design, implementation, and usage of any system that stores, processes, or retrieves data The overall intent of any data integrity technique is the same: ensure data is recorded exactly as intended (such as a database correctly rejecting mutually exclusive possibilities).	
Accept other relevant responses that are accurate	

Question 6 **(6 marks)**

Describe each of the following types of program errors, using an example.

Description	Marks
For each	
Describes the error and provides an example.	2
Provides an example of the error with limited or no description.	1
Subtotal	**2**
Total	**6**
Example of answers: Syntax error An error in the source code of a program like pront("Hello, " + name) instead of print Logical error A mistake in a program's source code that results in incorrect or unexpected behaviour like if age == 65: print("Eligible for a discount.") instead of using if age >= 65: print("Eligible for a discount.") Run-time error An error which occurs when a program is asked to do something that it cannot, resulting in a 'crash'. For example, asking a number to be divided by 0 such as 72/0.	
Accept other relevant responses that are accurate	

Question 7 **(3 marks)**

(a) Outline the purpose of platform virtualisation. (1 mark)

Description	Marks
Outlines the purpose of platform virtualisation.	1
Total	**1**
Its purpose is to create a virtual machine that runs multiple operating system, in order to test, run multiple applications.	
Accept other relevant responses that are accurate	

(b) Describe the process of storage virtualisation. (2 marks)

Description	Marks
Description of the process of storage virtualisation.	2
Limited description of storage virtualisation.	1
Total	**2**
Example answer: *For copyright reasons this text cannot be reproduced in the online version of this document but may be viewed at the link listed on the acknowledgements page.*	
Accept other relevant responses that are accurate	

Question 8 **(7 marks)**

The spreadsheet below shows projects being worked on by employees. Each department may have many employees, but an employee works for only one department.

(a) Define 'delete anomaly' and use the data above to give an example of a delete anomaly. (2 marks)

Description	Marks
Correctly defines delete anomaly and provides a correct example.	2
Provides only an example **or** a definition of delete anomaly.	1
Total	2
Example of answer: A delete anomaly occurs when deletion of a record results in data that is unavoidably lost because the data does not appear anywhere else. For example, if Harry Greats is removed from the Sports System project, the data about the Phys Ed department is also lost as this is the only record it appears in.	
Accept other relevant answers	

(b) Define 'update anomaly' and use the data above to give an example of an update anomaly. (2 marks)

Description	Marks
Correctly defines update anomaly and provides a correct example.	2
Provides only an example **or** definition of update anomaly.	1
Total	2
Example of answer: An update anomaly occurs when multiple instances of the same data appear in a table which results in any changes to the data requiring multiple instances to be changed. For example, if the name of the IT department was to change, it would require 4 instances of that data to be changed.	
Accept other relevant answers	

Question 8 (continued)

(c)   Normalise the data to 3rd normal form (3NF).   (3 marks)

- You need only show the relations and fields in your answer, not the actual data.
- You may need to create additional fields.

The Project table has been done for you.

PROJECT(ProjCode, ProjectName, Budget)

Description	Marks
Correctly normalises all three entities. (Department entity, Employee entity, Employee/Project entity)	3
Correctly normalises two entities. (Department entity, Employee entity, Employee/Project entity)	2
Correctly normalises one entity. (Department entity, Employee entity, Employee/Project entity)	1
Total	**3**
Example of answer: DEPARTMENT(DeptCode, DeptName) EMPLOYEE(EmployeeID, EmployeeFirstName, EmployeeSurname, HourlyRate, DeptCode FK) EMPLOYEE/PROJECT(EmpProjectID, EmployeeID FK, ProjCode FK)	
Accept other relevant answers	

Question 9 **(7 marks)**

(a) State **one** advantage and **one** disadvantage of the following system development methodologies. (4 marks)

Iterative – rapid application development (RAD)

Description	Marks
Correctly states one advantage and one disadvantage for Iterative – rapid application development (RAD).	2
May identify either one advantage **or** one disadvantage for Iterative – rapid application development (RAD).	1
Total	2

Example of answer:
Advantages include: • Development time is quick   • User heavily involved in the process   • Requirements can be changed at any time   Disadvantages include: • Needs highly skilled developers   • Not suitable for large scale projects   • Only suitable for modularised systems
Accept other relevant answers

Linear – waterfall/cascade

Description	Marks
Correctly states one advantage and one disadvantage for Linear – waterfall/cascade	2
May identify either one advantage **or** one disadvantage for Linear – waterfall/cascade	1
Total	2

Example of answer:
Advantages include: • Uses a clear structure   • End goal is identified early in the project   • Reduced number of problems as each phase is analysed thoroughly before moving to the next stage   Disadvantages include: • Making changes can be difficult because of rigid structure   • Delayed testing until after completion   • Not suitable for complex projects
Accept other relevant answers

Question 9 (continued)

(b)   A small business wants to develop an online ordering system for its website. It has a limited budget and needs the ordering system as soon as possible because it is losing customers to competitors.

Determine which system development methodology would be best suited to this scenario. Justify your choice. (3 marks)

Description	Marks
Correctly identifies the RAD methodology and provides justification in relation to the scenario.	3
Makes general comments about the RAD methodology in relation to the scenario.	2
Provides a superficial answer as to why RAD methodology is best.	1
Total	3
Example of answer: RAD would be the most suitable method as the business needs the system completed quickly. They also have a limited budget, so this method is less costly	
Accept other relevant answers	

Question 10 **(11 marks)**

Refer to the following pseudocode to answer all parts of this question.

This algorithm accepts the quantity and cost of items purchased, and then calculates the GST and shipping cost for the items.

(a) Identify the line which contains a constant. (1 mark)

Description	Marks
Correctly identifies line 6.	1
Total	1

(b) Lines 10 to 12 in the pseudocode has *'Will need to add code later.* Apart from modularisation, identify the type of programming concept this represents. (1 mark)
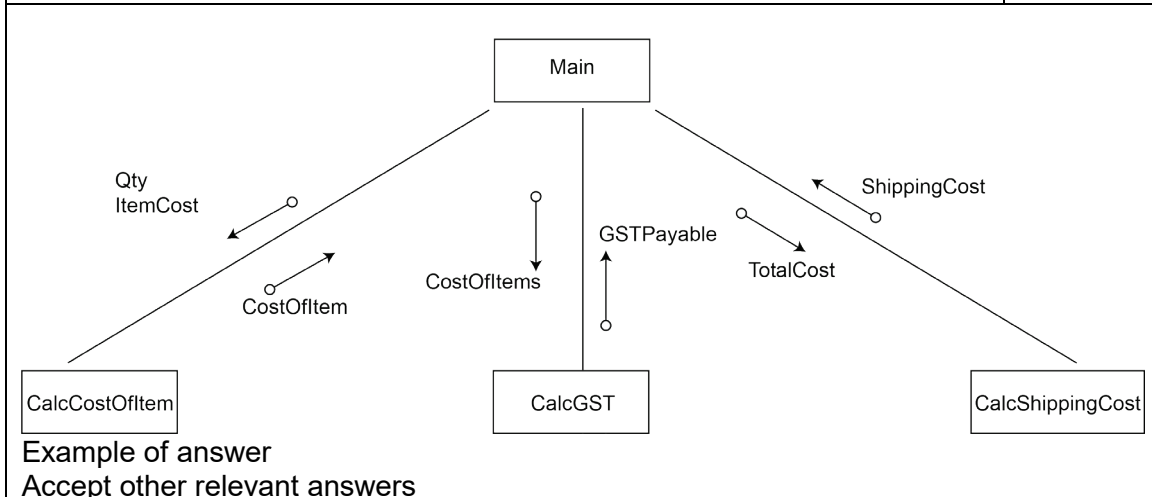
Description	Marks
Correctly identifies a stub.	1
Total	1

(c) Describe the purpose of the type of concept you identified in part (b). (2 marks)

Description	Marks
Correctly describes the purpose of the stub.	2
Provides limited information about the stub.	1
Total	2
Example of answer: Its purpose is to allow testing of the program without having to complete all the code at once.	
Accept other relevant answers	

(d) Draw a structure chart to represent the communication between the modules. (7 marks)

Description	Marks
Modules: CalcCostOfItems, CalcGST, CalcShippingCost, Main.	1–4
Parameter passing to and from Main for each module (all parameters must be present for the mark).	1–3
Total	7

Example of answer
Accept other relevant answers

Question 11 **(4 marks)**

Complete the table below to identify the missing layer names and descriptions of the DoD TCP/IP model:

Description	Marks
For each component	
Correctly identifies the missing components.	1–4
Total	**4**

Example of answer:

Layer Name	Description
Application	Defines the protocols that enable the user to interact with the network, including data representation, encoding and dialog control.
Transport	Defines routing so source packets arrive at destination independent of path and networks they took to get there.
Internet	Responsible for end-to-end delivery, responsible for reliability, flow control and retransmission.
Network	Responsible for managing how packets cross a physical link from one device to another.

Accept other relevant answers

Question 12 **(4 marks)**

The following is an example of data for an array named StudentList.

StudentList

	Nikita	Ahmed	Harry	Ling	.....	Clara
Name	0	1	2	3	.....	19

Given the array contains the names of 20 students, use the space below to write an algorithm in pseudocode to **output** the names of the students in **reverse** order.

Description	Marks
Appropriate variable used to hold iterations in for Loop (e.g. Count).	1
Iterations count down 20 to 1.	1
Correct loop structure used.	1
Correct use of Array in output statement (Student List[Name]).	1
Total	**4**
Example of answer: For Count ← 19 down to 0 Output(StudentList[Name]) End For	
Accept other relevant answers	

Question 13 **(2 marks)**

Fibre optic cable is available in either single-mode or multi-mode. Outline the characteristics of each mode.

Description	Marks
Outlines the characteristics of both single-mode and multi-mode fibre optic cable.	2
Outlines the characteristics of either single-mode or multi-mode fibre optic cable.	1
Total	**2**
Example of answers: Single-mode fibre consists of a narrow core in which all light pulses travel at the same speed and arrive roughly at the same time at the destination. or Supports higher bandwidth with less signal loss over a greater distance Multi-mode fibre consists of a larger core in which multiple light pulses can travel down the core. or Supports a smaller bandwidth and signals attenuate at a shorter distance than single mode fibre.	
Accept other relevant answers	

Question 14 **(7 marks)**

Examine the following algorithm that accepts a number of sales amounts and calculates the total sales amount:

```
TotalSales ← 0
NumSales ← 0
Input (SalesAmount)
While SalesAmount > 0
        NumSales ← NumSales + 1
        TotalSales ← TotalSales + SalesAmount
        Input (SalesAmount)
End While
```

(a)   Complete the trace table for the algorithm using the following test data: (4 marks)

25, 10, 5, 0

Alternative 1 (based on column heading − SalesAmount >=0?)

Description	Marks
1 mark for each correct row.	1–4
Total	**4**

Example of answer: 1

SalesAmount	SalesAmount >=0?	NumSales	TotalSales
		0	0
25	T	1	25
10	T	2	35
5	T	3	40
0	T	4	40

Accept other relevant answers

Alternative 2 (based on algorithm − While SalesAmount > 0)

Description	Marks
1 mark for each correct row.	1–4
Total	**4**

Example of answer: 2

SalesAmount	SalesAmount >=0?	NumSales	TotalSales
		0	0
25	T	1	25
10	T	2	35
5	T	3	40
0	F		

Accept other relevant answers

(b) Rewrite the algorithm so that it uses a test last (repeat until) loop. (3 marks)

Description	Marks
Rewrites the algorithm using all three structures (Repeat Until structure, Correct stopping condition for loop, Remainder of code is accurate).	3
Rewrites the algorithm using two of the three structures (Repeat Until structure, Correct stopping condition for loop or Remainder of code is accurate).	2
Rewrites the algorithm using one of the structures (Repeat Until structure or Correct stopping condition for loop or Remainder of code is accurate).	1
Total	**3**

Example of answer:

TotalSales ← 0
NumSales ← 0
Input(SalesAmount)
Repeat
    NumSales ← NumSales + 1
    TotalSales ← TotalSales + SalesAmount
    Input(SalesAmount)
Until SalesAmount = 0

Accept other relevant answers

Question 15 (3 marks)

Describe the role of the registers and system clock within the fetch-execute cycle.

Description	Marks
Accurately describes the role of the registers and system clock within the fetch-execute cycle.	3
Provides a limited description of the role of the registers and system clock within the fetch-execute cycle OR Provides a description of registers and system clock without reference to the fetch-execute cycle.	2
Provides information about either the role of the registers or system clock.	1
Total	**3**

Example of answer:

Registers are small amounts of memory available that hold data fetched from memory or data waiting to be stored in memory. A temporary holding place for the instruction that has been fetched.

The system clock purpose is to determine the pace of the cycle, each tick of the clock a part of the fetch-execute cycle occurs. Regulates the timing and speed of a computers systems functions.

Accept other relevant answers

Question 16 (3 marks)

'Online storage is the only disaster recovery tool a company should use.'

Outline why this statement is incorrect and identify **two** other tools that could be used by a company to protect its data in the event of a disaster.

Description	Marks
Correctly outlines why the statement is incorrect and identifies two tools that could be used by a company to protect its data in a disaster.	3
Correctly outlines why the statement is incorrect identifying one tool OR Provides a limited outline identifying two tools that could be used by a company to protect its data in a disaster.	2
Outlines either of the following: Why the statement is incorrect with no mention of tools OR Identifies two tools only with no outline as to why the statement is incorrect.	1
Total	**3**

Example of answer:

Online storage does not cover every type of disaster a company could experience such as interrupted power loss.

Other tools that are accepted – incremental backup, full backup, RAID or UPS

Accept other relevant answers

Question 17 **(3 marks)**

(a)   Compare the different structure of an IP4 address with an IP6 address as shown
       below.   (2 marks)

IP4 Address	IP6 Address
192.14.17.10	3FFE:0000:0000:0001:0200:F8FF:FE75:50DF

Description	Marks
Provides a detailed comparison between IP4 and IP6.	2
Provides a limited comparison between IP4 and IP6.	1
Total	**2**
Example of answer: An IP4 address consists of a 32-bit address scheme Whereas an IP6 address consists of a 128-bit address scheme	
Accept other relevant answers	

(b)   Outline why IP6 has been introduced alongside IP4.   (1 mark)

Description	Marks
Outlines why IP6 was introduced alongside IP4.	1
Total	**1**
Example of answer: Devices with an IP4 address can still be used throughout the transition to IP6	
Accept other relevant answers	

Question 18 **(3 marks)**

There are a number of different error-checking methods available in network communication.

(a) Outline how a parity bit provides a means of error detection in network communication.

(1 mark)

Description	Marks
Outlines how parity bit provides a means of error detection in network communication.	1
Total	1
Example of answer: A check bit, either odd or even, is added to each data unit (either 7 or 8 bits) transmitted. The receiving device checks the parity bit in the received data and flags an error if the parity calculation is incorrect.	
Accept other relevant answers	

(b) Complete the first column in the table below with the correct parity bits for a transmission using **even** parity. (2 marks)

Description	Marks
1 mark for each correct row as per below.	1–2
Total	2
Example of answer:	

Parity Bit

0	1	0	0	1	0	1	1
1	0	1	1	1	0	0	0

Question 19 **(2 marks)**

Students are using their wireless notebooks to complete their work in a classroom. They will need to connect wirelessly to a printer to print their answers at the end of the lesson.

Describe how CSMA/CA operates in the above scenario.

Description	Marks
Detailed description about how CSMA/CA operates in the scenario.	2
Limited description about how CSMA/CA operates.	1
Total	2
Example answer includes the following: • All nodes 'listen' for traffic to sense when the network is idle. • When a node wishes to transmit, it transmits a 'request to send' frame' (RTS) • The intended receiving device will transmit a 'clear to send' (CTS) frame if it is available. • All other nodes 'sense' the network is busy and wait a random amount of time before trying to transmit	
Accept other relevant answers	

Question 20 **(2 marks)**

802.3 is the standard for ethernet wired networks and 802.11x is the standard for ethernet wireless networks.

Outline why standards such as these are important in the development of network devices and software.

Description	Marks
Clear outline about why standards such as these are important in the development of network devices and software.	2
Superficial description about why standards such as these are important in the development of network devices and software.	1
Total	2
Example of answer:	
Standards specify a set of rules for hardware and/or software used in network communications. Because all manufacturers must adhere to the standards when manufacturing network hardware or software, it means that all devices should be able to communicate, regardless of manufacturer.	
Accept other relevant answers	

Question 21 **(3 marks)**

The introduction of a new system involves evaluation and maintenance once the system is implemented.

Describe the evaluation and maintenance stage of the systems development life cycle (SDLC) and provide **one** example of an activity undertaken in this stage.

Description	Marks
Clear description of the evaluation and maintenance stage of the SDLC. Provides a correct example of activity undertaken in this stage.	3
Superficial description of the evaluation and maintenance stage of the SDLC. Provides a correct example of activity undertaken in this stage.	2
Correctly identifies an activity undertaken in this stage **OR** provides a description of the evaluation and maintenance stage.	1
Total	3
Example of answer:	
Continually monitoring, evaluating and updating the system once it is operational. Activities include rectify bugs, request changes, update aspects, find errors, maintain code etc.	
Accept other relevant answers	

Question 22 **(4 marks)**

(a) Identify which processor in the PC systems below is likely to process instructions more efficiently. Justify your answer. (2 marks)

Processor X:	Intel® Core™ i7 processor (3.8 - 5.0 GHz, quad core)
Processor Y:	Intel® Core™ i5 (2.9 - 4.7GHz, dual core)

Description	Marks
Correctly identifies and justifies why Processor X is most likely to process instructions more efficiently.	2
Superficial details about the processor and the different components.	1
Total	**2**
Example of answer: Processor X is likely to process instructions more efficiently as firstly it has the i7 CPU which is a faster processor as well as the quad core which processes quicker and the higher GHz versus Processor Y.	
Accept other relevant answers	

(b) Describe the difference between distributed and sequential processing on how they process instructions. (2 marks)

Description	Marks
Clear description of the difference between distributed and sequential processing.	2
Superficial description of the difference between distributed and sequential processing.	1
Total	**2**
Example of answer: Sequential processing occurs in the order that the tasks are received while distributed processing where more than one computer or CPU is used to run specific programs.	
Accept other relevant answers	

Question 23 **(3 marks)**

A company has decided to deliver its products online to international customers. It has employed you as a project manager to determine whether this is a viable business decision. You choose to conduct a feasibility study.

Outline the purpose of a feasibility study using **two** components associated with this process.

Description	Marks
Outlines the purpose of a feasibility study identifying **two** components associated with this process.	3
Outlines the purpose of a feasibility study identifying **one** component associated with this process.	2
Provides limited information about the purpose of the feasibility study and/or lists the components associated.	1
Total	3
Example of answer: It covers many aspects that will be used to decide whether to go ahead with the project or not. The main components are technical, operational, economic, legal and scheduling.	
Accept other relevant answers	

Question 24 **(3 marks)**

Data mining can be used to discover or identify similar patterns in transaction data for a given time period.

(a)   Identify an example of how this process could be used by a supermarket business.

(1 mark)

Description	Marks
Identified how a supermarket business can use data mining.	1
Total	1
Example of answer:	
The supermarket business can use the data to see what people have been searching in ways of loans etc. and target them directly with marketing to purchase from them. Credit card marketing is also a good example of using the process by a supermarket business.	
Accept other relevant answers	

(b)   Outline a legal and an ethical consideration that the supermarket business needs to be aware of. (2 marks)

Description	Marks
Outlines a legal and an ethical consideration that the supermarket business needs to be aware of.	2
Only outlines either an ethical or a legal consideration that the supermarket business needs to be aware of.	1
Total	2
Example of answer:	
Ethical consideration that people may not be aware that their information is used for this purpose.	
Legal consideration that people need to be able to opt out of direct marketing (principle 7 of privacy act).	
Accept other relevant answers	

Section Two: Extended answer **60% (124 Marks)**

Question 25 **(33 marks)**

(a) Complete the context diagram below for the EmergWA system outlined on page 2 of the Source booklet. (8 marks)

Description	Marks
Diagram includes appropriate data flows: VOLUNTEER (drawn in correct direction and labelled appropriately).	
VOLUNTEER entity	1
Appropriate data flow/s in: new volunteer details, volunteer qualification details, new qualification details, volunteer response details, and out volunteer ID details, detailed event details, allocated event task details – 1 mark for ins and 1 mark for outs.	1–2
Subtotal	3
Diagram includes appropriate data flows: RTO (drawn in correct direction and labelled appropriately).	
RTO entity	1
Diagram includes appropriate data flow/s ins and outs: volunteer qualification details, updated volunteer qualification details verified volunteer qualification details, verified updated volunteer qualification details.	1
Subtotal	2
Diagram includes appropriate data flows: INCIDENT CONTROLLER/AUTHORITY (drawn in correct direction and labelled appropriately).	
INCIDENT CONTROLLER/AUTHORITY entity.	1
Diagram includes appropriate data flow/s ins and outs: emergency event details, responding volunteer details.	1
Subtotal	2
Name of System correctly labelled.	1
Total	8

Note to markers:

The below example is just one version of the context diagram. Accept other relevant context diagrams as they relate to the question.
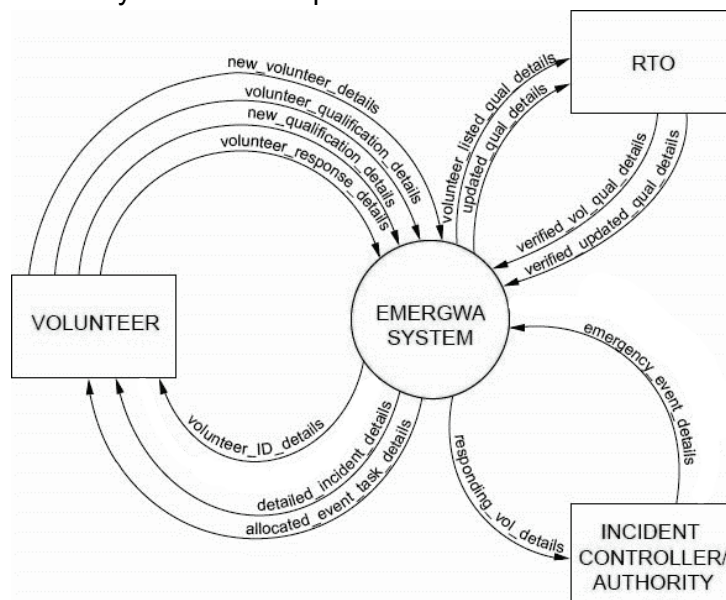
Question 25 (continued)

(b)   Draw the Level 0 Data Flow Diagram (DFD) for the EmergWA system.   (15 marks)

Description	Marks
Draws a Level 0 data flow diagram that features:	
Entities	
• VOLUNTEER • RTO • INCIDENT CONTROLLER/AUTHORITY	1–3
Subtotal	**3**
Data store (named appropriately)	
• Incident response data store.	1
• Qualification data store.	1
Subtotal	**2**
Processes (must include number and verb)	
• 1.0 Register new volunteer • 2.0 Verify qualifications • 3.0 Update qualifications • 4.0 Respond to incident • 5.0 Allocate incident tasks	1–5
Subtotal	**5**
Appropriate data flows (drawn in correct direction and labelled appropriately)	
1.0 Register new volunteer	
Appropriate data flow/s in: new volunteer details, volunteer qualification details. Appropriate data flow/s out: volunteer ID details, volunteer qualification details.	1
2.0 Verify qualifications	
Appropriate data flow/s in: volunteer qualification details, verified volunteer qualification details. Appropriate data flow/s out: volunteer listed qualification details.	1
3.0 Update qualifications	
Appropriate data flow/s in: new qualification details, confirmed updated qualification details. Updated qual details Appropriate data flow/s out: updated qualification details.	1
4.0 Respond to incident	
Appropriate data flow/s in: emergency event details, volunteer response details. Appropriate data flow/s out: responding volunteer details (to incident response data store), responding volunteer details (to incident controller/authority entity), stored responding volunteer details, detailed incident details.	1
5.0 Allocate incident tasks	
Appropriate data flow/s in: event volunteer response details. Appropriate data flow/s out: allocated event task details.	1
Subtotal	**5**
Total	**15**

Note to markers: Can use fewer or more processes, as long as logic is clear and works. The Data Flow Diagram is just one example of a DFD that could be drawn for EmergWA. Accept other relevant DFDs.
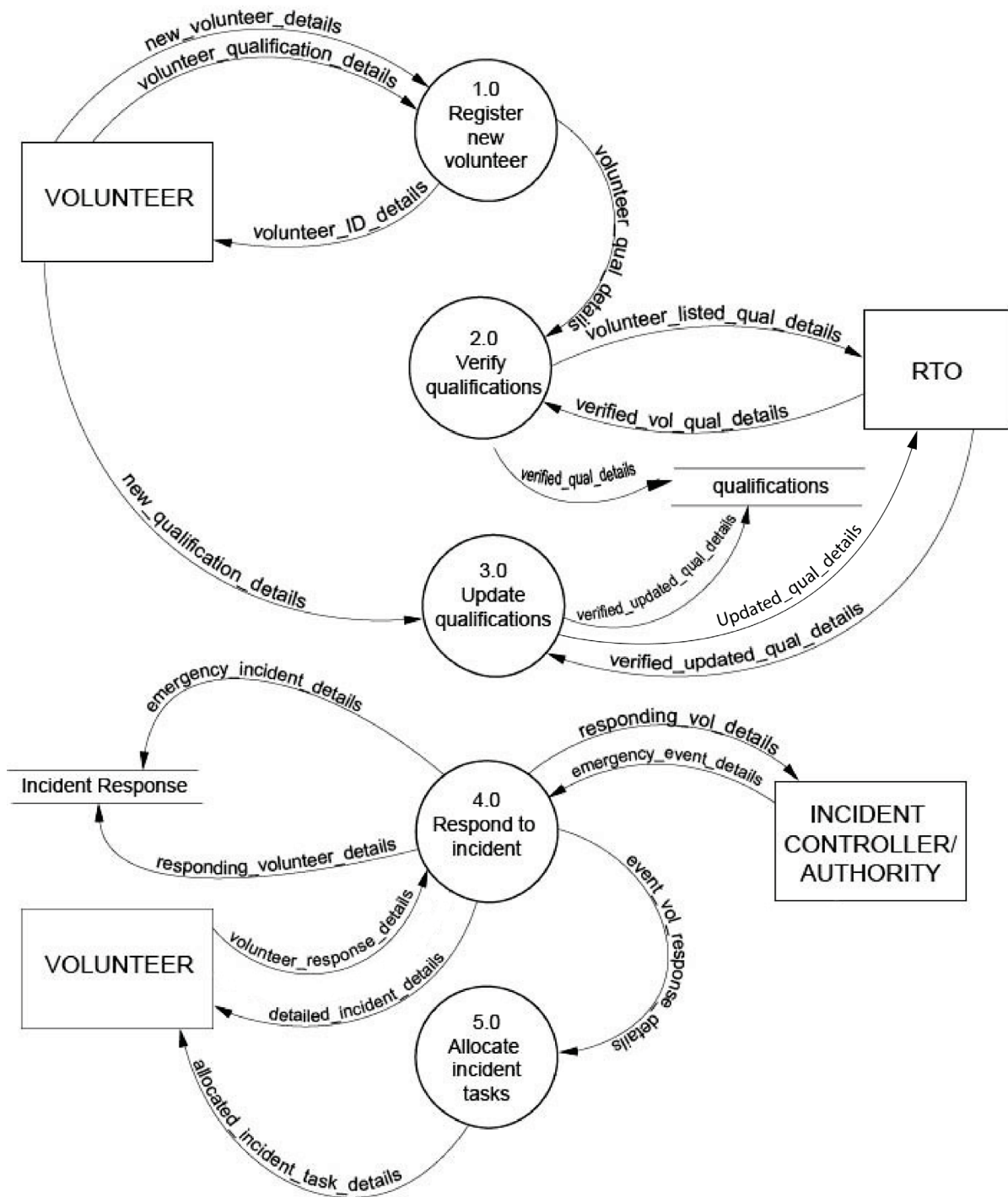
Question 25 (continued)

(c) Debriefing is an important process that needs to occur after each incident. Use the information below to draw a Level 1 Data Flow Diagram (DFD) for the debrief process.

(7 marks)

Description	Marks
Draws a L1 data flow diagram that features:	
Appropriate sub processes; must include number (x.x) and verb	
Request debrief Collect debrief responses Access debriefs	1–3
Subtotal	3
Data stores	
One data store: Debriefs	1
Subtotal	1
Appropriate data flows: Request debrief	
Appropriate data flow/s in: completed event details Appropriate data flow/s out: event debrief question details	1
Subtotal	1
Appropriate data flows: Collect debrief responses	
Appropriate data flow/s in: event debrief question details Appropriate data flow/s out: stored debrief details.	1
Subtotal	1
Appropriate data flows: Access debriefs	
Appropriate data flow/s in: requested debrief details, access debrief details Appropriate data flow/s out: accessed debrief details	1
Subtotal	1
Total	7

Note to markers:
The below example is just one version of the L1 data flow diagram. Accept other relevant L1 DFDs diagrams as they relate to the question.
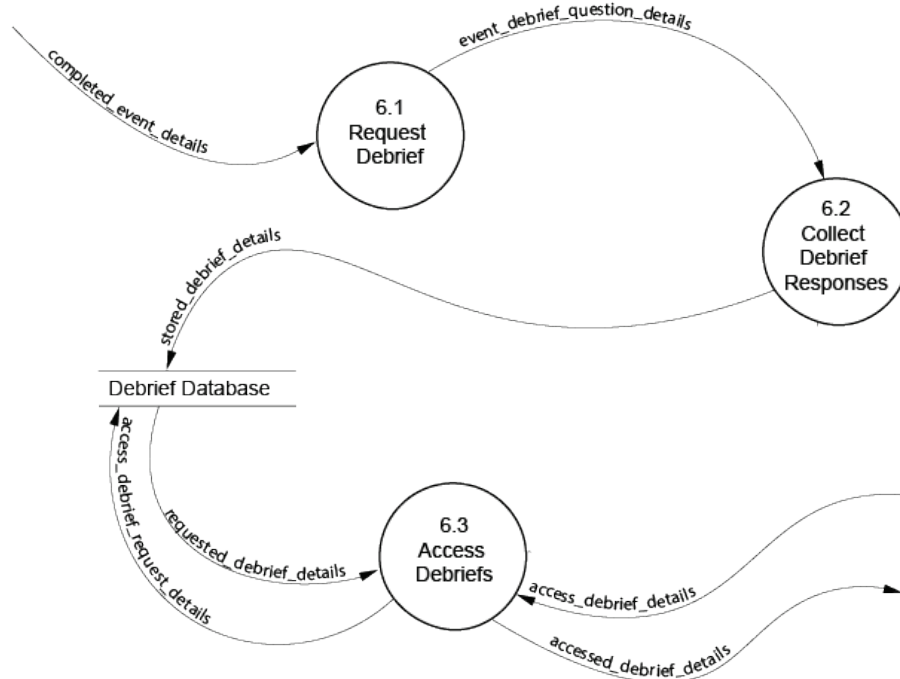
(d)   EmergWA is concerned that the debriefing process might be ignored by some volunteers once the incident is completed. Recommend and identify **one** data gathering technique that could be used to understand the incident.   (3 marks)

Description	Marks
Accurately recommends one recommendation of a data gathering technique that could be used to understand the incident.	3
Provides superficial information about one recommendation of a data gathering technique that could be used to understand the incident.	2
Provides information about one recommendation of a data gathering technique with no mention about its use to understand the incident.	1
Total	3
Example of answer: Interview the volunteers at the end of the incident to find out if they have debriefed. If not, ask them why not. This could highlight issues with the system – it might be difficult to use, the volunteer would prefer to speak with someone, they don't see the need to debrief. This is an easy-to-use method that will allow volunteers to give quick responses.	
Accept other relevant answers: survey, observation, questionnaire	

Question 26 **(35 marks)**

Refer to the image of the Database Dashboard available to volunteers in the Source booklet on page 3.

(a) Using Chen's notation, draw an Entity Relationship (ER) diagram that represents this part of the database. (23 marks)

Include the following:
- names of all primary keys
- names of all foreign keys
- relationships
- cardinality.

Your diagram will need to resolve all many-to-many relationships.

Sample answer 1

Description	Marks
1 mark for each correct Entity – Event, Job, Volunteer, Training, Event/Volunteer, Event/Job. Volunteer/Training.	1–7
1 mark for each correct primary key of the Entities.	1–7
1 mark for each foreign key of the associate Entities.	1–3
1 mark for each relationship/cardinality between Entities.	1–6
Total	**23**

Example of answer:
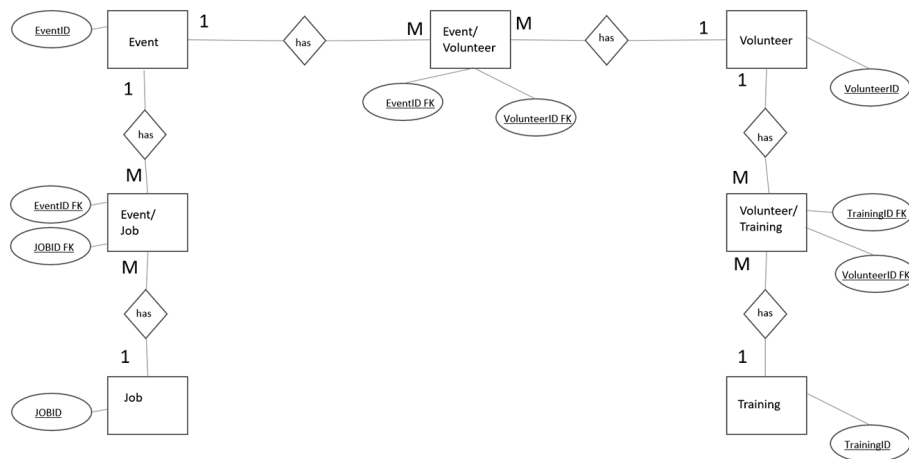
Accept other relevant answers

Sample answer 2

Description	Marks
One mark for each correct entity – Event, Job, Volunteer, Training, Event/Volunteer, Job Allocation (or similar name).	1–6
One mark for each correct primary key for the Entities.	1–6
One mark for each correct foreign key of the associate Entities.	1–5
One mark for each correct relationship/cardinality between Entities.	1–5
Correct use of Chen's notation.	1
Total	**23**

Example of answer:
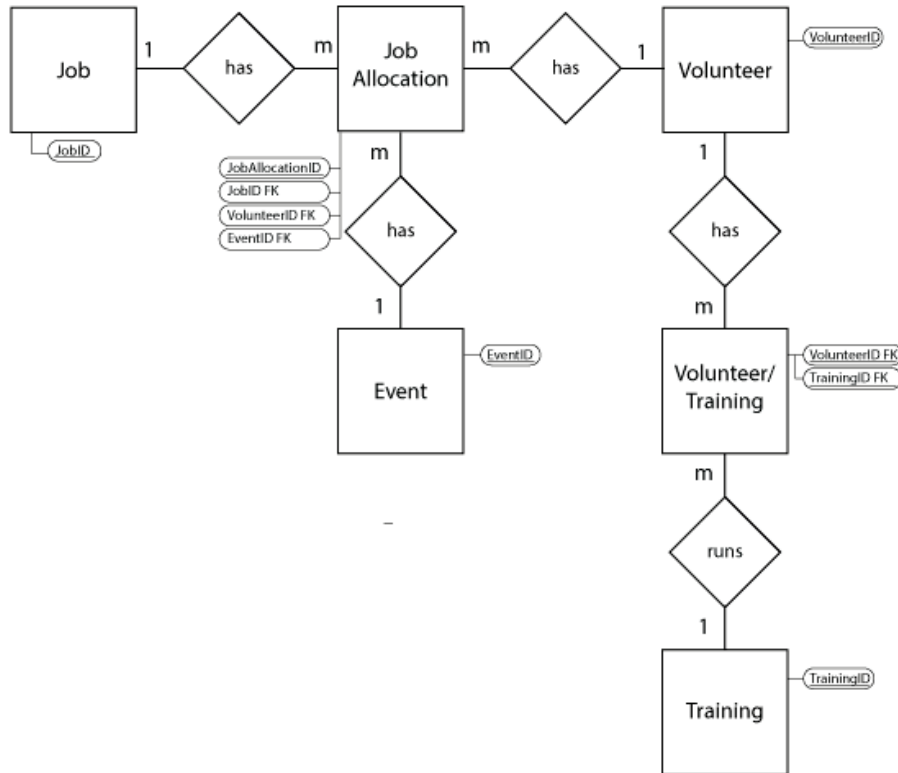
Accept other relevant answers

Question 26 (continued)

(b)   (i)   Design the visual interface for the following screens on page 25:   (4 marks)

- Emergency Incidents
- Training

Ensure that you include at least **four** different aspects over the two screens that assist the volunteers in using the system.

Description	Marks
Designs the visual interface using 4 different aspects over the two screens that assist the volunteers in using the system. Different aspects used to assist the volunteers in using the system.	4
Designs the visual interface using 3 different aspects over the two screens that assist the volunteers in using the system.	3
Designs the visual interface using 2 different aspects over the two screens that assist the volunteers in using the system.	2
Designs the visual interface using 1 different aspects over the two screens that assist the volunteers in using the system.	1
Total	**4**
Example of answer: Should include: • title of page • space to fill in details and/or display details • buttons for action • help button/icon • back and forward buttons to help with the navigation of the system • must include the following as these are essential for the screens to work as per information in question: • emergency incidents – includes incident details, job details and button for respond/not respond • training – training details, date & time and register Note: aspects should address readability, navigation, inclusivity and logical order.	
Accept other relevant answers	

(ii) Explain how the features and components you included in the design of the visual interface will enhance the user experience. (3 marks)

Description	Marks
Explains how the different features and components will enhance the user experience.	3
Describes how the different features and components will enhance the user experience.	2
Outlines either the features or components will enhance the user experience.	1
Total	3

Example of answer:

Each component adds to the user experience. The title clearly shows which page of the app the volunteer is viewing. Colours are not clashing and are clearly contrasting with the background. Buttons are large and clear as to what the function will do. The fields are large enough so the volunteer can read without necessarily increasing the font size. Back and forth buttons to allow navigation to each page plus a home page to go to the volunteer dashboard. Help button allows volunteer to check for further information.

Note: features and components should address readability, navigation, inclusivity and logical order.

Accept other relevant answers

(c) Describe **two** factors that can affect the development and success of the EmergWA mobile application (app). (2 marks)

Description	Marks
Describes two factors that can affect the development and success of the EmergWA mobile application.	2
Describes one factor that can affect the development and success of the EmergWA mobile application.	1
Total	2

Example of answer:

Answers should include any 2 out of the following factors:
User needs, user interface, processing efficiency, development time and technical specifications.

Accept other relevant answers

Question 26 (continued)

(d)   On launch, the app will ask volunteers to agree to a code of conduct before loading the main screen.

Explain how the use of a code of conduct protects both EmergWA and the volunteers using the system. (3 marks)

Description	Marks
Explains how the use of a code of conduct protects both EmergWA and their volunteers.	3
Describes how the use of a code of conduct protects both EmergWA and their volunteers.	2
Outlines how a code of conduct protects users/company.	1
Total	**3**
Example of answer: A code of conduct is a set of rules which is commonly written for employees of a company, which protects the business and informs the employees of the company's expectations. It helps all users understand their obligations and how it protects EmergWA and the volunteers by understanding what they can and cannot do.	
Accept other relevant answers	

Question 27 **(25 marks)**

(a) Use the CISCO network diagrammatic conventions to represent the topology for the network described in the scenario. Draw a topology diagram on page 29, indicating where fibre optic cable/s and ethernet cable/s will be used. Ensure that your diagram is labelled clearly. (15 marks)

Description	Marks
1 mark for each correct placement of the cloud, modem.	1–2
1 mark for each correct firewall between modem & router and servers & router.	1–2
The core switch.	1
1 mark for each other switch.	1–2
1 mark each for the wireless access points.	1–2
Ethernet connection between modem and router.	1
Fibre connection between router and switch.	1
Ethernet connection between servers and router.	1
Ethernet connection between core switch and floor switches.	1
Ethernet connection between WAPs and switches.	1
Cisco conventions used	1
Total	**15**

Example of answer

Fibre optic
Ethernet

Accept other relevant answers

(b) Describe why fibre optic cable would be used for the backbone of the network. (2 marks)

Description	Marks
Clear description as to why fibre optic cable would be used for the backbone of the network.	2
Limited information as to why fibre optic cable would be used for the backbone of the network.	1
Total	**2**

Example of answer:

Fibre optic cable would be used because it has a higher bandwidth, allowing faster communication in the main part of the network. It is also more secure as it cannot be tapped.

Accept other relevant answers

Question 27 (continued)

(c)   Describe how the firewalls can ensure the security of the EmergWA network.   (2 marks)

Description	Marks
Clear description as to how the firewalls can ensure the security of the EmergWA.	2
Limited information as to how the firewalls can ensure the security of the EmergWA.	1
Total	**2**
Example of answer: Firewalls filter the data in and out of a network. Each packet is examined against the filter rules and if a packet is flagged, it is dropped. Only data packets that satisfy the filter rules are allowed through the firewall, thus providing a layer of security for the network.	
Accept other relevant answers	

When an emergency, such as a bushfire, occurs, a mobile command centre housed in a caravan is used for communication between the headquarters and the volunteer crews. If the emergency is in a remote location, cellular communication is used. However, this system is not always reliable.

(d)   Describe a transmission media that would work better in remote areas.   (3 marks)

Description	Marks
Describes and identifies that a satellite transmission media can be used in remote areas.	3
Identifies and makes general comments that a satellite transmission media can be used in remote areas.	2
Limited information that a satellite transmission media should be used in remote areas.	1
Total	**3**
Example of answer: A satellite system would be better as it does not rely on wifi, cellular etc. It is not subject to interference and is reliable in remote conditions.	
Accept other relevant answers	

The volunteers assisting in an emergency all wear personal protection equipment (PPE) that has an RFID tag sewn into the collar so that they can be tracked if they become lost in a remote location.

(e)   Identify what RFID is and outline how it works.   (3 marks)

Description	Marks
Correctly identifies what RFID is and outlines in detail how it works.	3
Identifies and briefly outlines how RFID works.	2
Superficial outline of how RFID works or identifies what RFID is.	1
Total	**3**
Example of answer Radio-frequency identification (RFID) uses electromagnetic fields to automatically identify and track tags attached to objects. An RFID system consists of a tiny radio transponder, a radio receiver and transmitter. When triggered by an electromagnetic interrogation pulse from a nearby RFID reader device, the tag transmits digital data, usually an identifying inventory number, back to the reader. This number can be used to track inventory goods.	
Accept other relevant answers	

Question 28 **(31 marks)**

Refer to the information in the source booklet on page 4 to answer this question.

(a)   Write an algorithm in pseudocode to complete Module *GetType* to ensure that only a valid vehicle type is entered. The message 'Incorrect type code, try again' should be displayed if the user inputs an invalid type code.   (5 marks)

Description	Marks
Module name and parameter	1
Input of Type	1
Loop structure condition	1
Output statement	1
If statement condition	1
Total	5

Example of answer:
 	
 Module GetType (Type)
    Repeat
       Input (Type)
       If Type NOT in ["P", "C", "T"] then
          Print ("Incorrect type code, try again")
       End If
    Until Type in ["P", "C", "T"]
 End Module	

Accept other relevant answers	

(b)   Write an algorithm in pseudocode to complete Module *GetRate*. Your algorithm should use a case structure to determine the Rate/kg payable.   (5 marks)

Description	Marks
Module name and parameters	1
Case structure including End Case	1
Assignment of rates (1 mark each correct line)	1–3
Total	5

Example of answer:
 	
 Module GetRate (Type, Rate)
    Case Type of
       "P" : Rate ← 23.64
       "C" : Rate ← 5.91
       "T" : Rate ← 11.82
    End Case
 End Module	

Accept other relevant answers	

(c)   Describe how the parameter *Type* is used in Module *GetType* and Module *GetRate*.
     Include information on value parameter and reference parameter in your answer.

     (2 marks)

Description	Marks
Correctly describes Type as a reference parameter in Module GetType and Module GetRate with a clear description of both reference and value parameters.	2
Correctly describes Type as a reference parameter in Module GetType **or** Module GetRate with a clear description of reference **or** value parameters.	1
Total	2
Example of answer: The parameter Type in Module GetType is a reference parameter that returns a value to the calling module, Module Main. In Module GetRate, the parameter Type is a value parameter as it receives a value but does not return a changed value to the calling module, Module Main.	
Accept other relevant answers	

(d)   All modules are called by the *Main Module*. Write the Main module below. Include all
     variables and parameter passing. The *TotalPayable* needs to be calculated and output
     at the end of the module.   (19 marks)

Description	Marks
Constant used for RecordingFee	1
Input, Weight, RegistrationPeriod variables	1–2
Correctly calls 5 modules: GetType, GetRate, CalcLicenceFee, CalcMII, GetPrescribedFee	1–5
Correct assignment of parameters in call statements	1–5
TotalPayable calculation	1–4
Assigning calculation to TotalPayable	1
TotalPayable output	1
Total	19

Example of answer:
 	
Module Main
    RecordingFee = 10.30
    Input (Weight)
    Input (RegistrationPeriod)
    Call GetType(Type)
    Call GetRate(Type, Rate)
    Call CalcLicenceFee(Weight, Rate, FeePayable)
    Call CalcMII(Type, InsurancePayable)
    Call GetPrescribedFee(RegistrationPeriod, PrescribedFee)
    TotalPayable ← FeePayable + InsurancePayable + Prescribed Fee + RecordingFee
    Print (TotalPayable)
End Module	

Accept other relevant answers	

ACKNOWLEDGEMENTS