



## ATAR course examination, 2022

### Question/Answer booklet

# COMPUTER SCIENCE

Please place your student identification label in this box

WA 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: up to three calculators, which do not have the capacity to create or store programmes or text, are permitted in this ATAR course 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	24	24	70	113	40
Section Two Extended answer	4	4	110	154	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 2022: Part II Examinations*. Sitting this examination implies that you agree to abide by these rules.
2. Write your answers in this Question/Answer booklet preferably using a blue/black pen. Do not use erasable or gel pens. 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% (113 Marks)**

This section contains **24** 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.

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**Question 1****(2 marks)**

Outline the difference between an interpreter and a compiler.

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

Outline the role of a modem.

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**Question 3****(3 marks)**

Explain a characteristic that a program's external documentation should contain to reduce user errors and enhance the user experience during operation.

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**Question 4**

**(4 marks)**

Refer to the partial pseudocode below:

```
IF a>5 AND a<25
  Print a
ENDIF
```

- (a) Describe, with an example, the test data you would use to check this algorithm for accuracy. (3 marks)

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- (b) Identify the stage of the software development cycle (SDC) at which algorithms are tested. (1 mark)

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**Question 5**

**(4 marks)**

Explain a difference between the dynamic host configuration protocol (DHCP) and domain name server (DNS).

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**Question 6**

**(10 marks)**

Outline the role of the following hardware devices in network communications.

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

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

Gateway: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

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

Firewall: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
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Question 7

(8 marks)

Write a pseudocode example for each of the following control structures and scenarios.

Sequence: (Input 2 numbers, add these together and multiple by 6, then print the result.)

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Selection: (Ticket prices differ according to age: 16 years and over pay \$35, 5–15 years pay \$20 and under 5 years pay \$10, output the price.)

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Iteration: (Total an unknown number of scores and output the total.)

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**Question 8****(6 marks)**

Review the partial pseudocode below.

```
Begin
trees ← 0
sales ← 0
bonus ← 15
    For employee ← 1 to 8 do
        input(sales)
        trees = trees + sales + bonus
    EndFor
End
```

- (a) Identify a constant and a variable in the pseudocode. (2 marks)

Constant: \_\_\_\_\_

Variable: \_\_\_\_\_

- (b) Describe why it is important to have appropriate naming conventions for variables. (2 marks)

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- (c) Outline a difference between a one-dimensional array and a record. (2 marks)

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Question 9

(9 marks)

A company keeps all employee timesheets in a single table database. Use your knowledge of databases to answer the questions below:

Employee First	Employee Surname	DOB	Week	Hours	Over time	Hourly rate	Gross Pay	Tax	Net Pay
Tran	Nguyen	30/12/2000	2	32	0	26.00	832	175	657
Max	Ossolov	18/05/1975	2	37.5	0	32.00	1200	252	948
Harold	Mansfield	11/07/1987	2	26	0	31.50	819	172	647
Jennifer	Abdul	25/05/2002	3	25	0	26.00	650	137	513
Tran	Nguyen	30/12/2000	3	37.5	2	26.00	1053	221	832
Harold	Mansfild	11/07/1987	3	34	0	31.50	1071	225	846
Jennifer	Abdul	25/05/2002	4	27	0	26.00	702	147	555
Maxine	Ossolov	18/05/1973	4	21	0	32.00	672	141	531
Harold	Mansfield	11/07/1987	4	37.5	3	31.50	1323	278	1045
Nicole	Brooks	23/05/2000	5	37.5	2	26	1053	221	832
Jen	Abdul	25/05/2002	5	15	0	26.00	390	82	308
Harold	Mansfield	11/07/1984	5	15	0	31.50	473	99	374
Tran	Nguyen	30/12/2000	6	14	0	26.00	364	76	288
Maxine	Ossolov	18/05/1975	6	31	0	32.00	992	208	784

- (a) Describe, with an example from the single table database above, the concept of an update anomaly. (3 marks)

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- (b) Describe, with an example from the single table database above, the concept of delete anomaly. (3 marks)

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- (c) Using an example from the single table database on page 8, describe the normalisation process that you would undertake to remove data redundancy. (3 marks)

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

Benchmarking is used widely within organisations.

- (a) Outline the purpose of benchmarking to determine system performance. (2 marks)

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- (b) Outline, with an example, how hardware benchmarking is used. (3 marks)

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**Question 11****(7 marks)**

Create a context diagram for the following ordering system.

A clothing store informs customers when a new catalogue arrives. Customers visit the clothing store to view a selection of the items to purchase. If an item is not available in the store, the customer can order the item. The store orders the item from the supplier. The supplier dispatches the item. The customer is then notified when the item has arrived in the store. The customer visits the store, tries on the item and, if satisfied, purchases the item and receives a receipt. The store then pays the supplier for the item.

**Question 12****(3 marks)**

Refer to the entity relationship (ER) diagram below.



Resolve the many to many (M:N) relationship and draw an updated diagram to reflect the change.

**Question 13**

**(4 marks)**

Outline an activity that will be used in each of the following stages of the systems development life cycle (SDLC).

Analysis: \_\_\_\_\_

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

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**Question 14**

**(5 marks)**

(a) Describe the purpose of a standard operating environment (SOE). **(3 marks)**

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(b) State **one** advantage of a SOE. **(1 mark)**

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(c) State **one** disadvantage of a SOE. **(1 mark)**

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**Question 15****(4 marks)**

Outline the role of the operating system in the following tasks:

Managing concurrency: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Managing devices: \_\_\_\_\_

\_\_\_\_\_

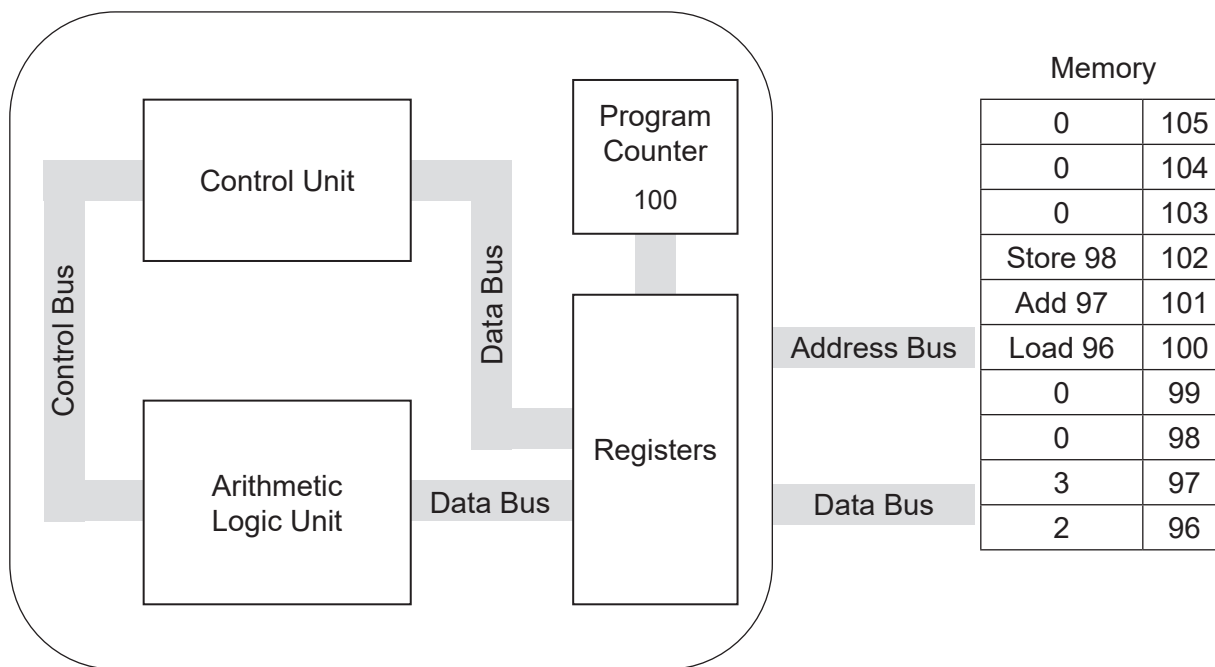
\_\_\_\_\_

\_\_\_\_\_

Question 16

(4 marks)

To begin processing, the central processing unit must first fetch an instruction to process.



Using information from the diagram above, explain the steps involved in the 'fetch' stage of the fetch-execute cycle prior to the instruction being decoded by the control unit.

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**Question 17**

**(2 marks)**

Describe an environmental issue related to the disposal of computer components.

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**Question 18**

**(4 marks)**

Compare data storage and data distribution methods for data warehouses and data marts.

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**Question 19**

**(4 marks)**

A company wishes to introduce a new business management software that all employees will need to use. Currently it has 20 employees, but this will be expanded by the end of the year to over 50.

Identify an appropriate software licence for it to purchase and explain why this type of licence would be most suitable for this business.

Software licence: \_\_\_\_\_

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Explanation: \_\_\_\_\_

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**Question 20**

**(3 marks)**

A workshop has a lot of heavy machinery operating throughout the day, and requires a cable to connect a workstation to a switch.

Which of the following, unshielded twisted pair (UTP) or shielded twisted pair (STP) cable, would be the more suitable? Justify your response.

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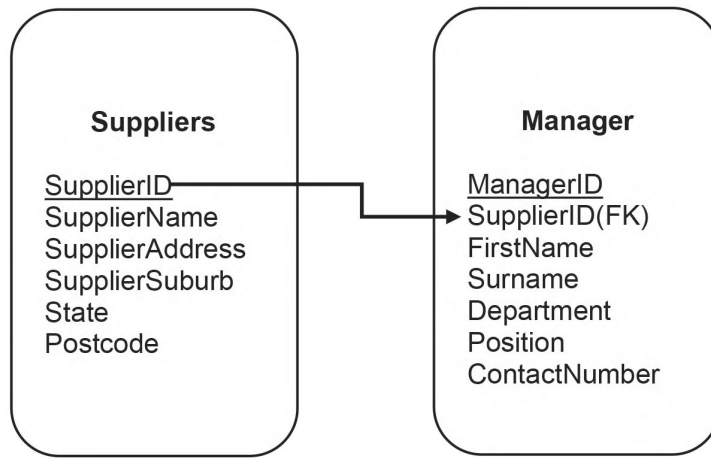
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Question 21

(7 marks)

Use the image below to answer all parts of the question.



- (a) Write a query using SQL that will list all the Supplier contact names in the city of Perth or Fremantle. (3 marks)

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- (b) Write a query using SQL that will update the ContactNumber for Steve Sales from Rafiki Building Supplies to 0410011001. Note: both tables must be used in this query. (4 marks)

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**Question 22**

**(4 marks)**

The Acme company stores data for a private scientific research group. It has recently upgraded its storage capacity and needs to dispose of its existing hard drives securely.

Outline **two** methods for the secure disposal of the data on the hard drives.

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

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

**Question 23**

**(4 marks)**

Sarah uses a range of computing devices to complete her studies, including a desktop computer at home, a laptop at school and her mobile phone.

Outline **two** advantages of cloud computing for Sarah.

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

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

**Question 24**

**(5 marks)**

(a) Outline a factor that can influence the performance of a network.

**(2 marks)**

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(b) Describe how a denial of service strategy works to compromise the security of networks.

**(3 marks)**

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**End of Section One**

**See next page**

**Section Two: Extended answer**

**60% (154 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 Source booklet to answer Questions 25 to 28.

**Question 25**

**(41 marks)**

Refer to the information on page 2 of the Source booklet to answer all parts of Question 25.

- (a) Outline why a rapid application development (RAD) methodology would best suit this online ordering system. (2 marks)

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(b) It was suggested by the chief designer that a pilot implementation should occur over the first three months.

(i) Outline why a pilot implementation would be suggested. (2 marks)

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(ii) Describe **one** advantage and **one** disadvantage of using a pilot implementation for this project. (4 marks)

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

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

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Question 25 (continued)

A Gantt chart was created for the employee part of the project.

Task Name	Start	End	Duration (days)	Predecessors	Week Beginning																								
					7 Nov 22					14 Nov 22					21 Nov 22					28 Nov 22					5 Dec 22				
					M	T	W	T	F	M	T	W	T	F	M	T	W	T	F	M	T	W	T	F	M	T	W	T	F
1 Define specifications	7/11	7/11	1		█																								
2 Data collection	8/11	9/11	2	1		█	█																						
3 Feasibility study	8/11	9/11	2	1		█	█																						
4 Analysis	10/11	15/11	4	2 3				█	█	█	█																		
5 Software Design	16/11	21/11	4	4					█	█	█	█																	
6 Interface Design	22/11	23/11	2	5									█	█															
7 Programming Development	22/11	25/11	4	5									█	█	█	█													
8 Testing	28/11	30/11	3	7															█	█	█								
9 Implementation /Evaluation	1/12	7/12	5	8																			█	█	█	█	█		

- (c) Create a program evaluation review technique (PERT) chart below from the information in the Gantt chart. (6 marks)

- (d) Describe the difference between a Gantt chart and a PERT chart. (3 marks)

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**Question 25** (continued)

- (e) Draw a Level 0 data flow diagram (DFD) to model the online grocery store requirements as described on page 2 of the Source booklet. (24 marks)



**Question 26**

**(52 marks)**

Refer to the information on pages 2 and 3 of the Source booklet to answer parts of Question 26.

- (a) Outline **one** legal **or** ethical responsibility for customers using the online ordering system. (2 marks)

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- (b) The online ordering application requires its customers to be at least 18 years of age. (5 marks)

Write the function CHECKAGE in pseudocode that:

- asks customers to input their date of birth (day, month and year)
- calculates their age based on the current day, month and year parameters being received
- returns the Age to the main module.

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Question 26 (continued)

- (c) As part of the application for the online ordering system, a login module is required for customers.

Write the module CHECKLOGIN in pseudocode to allow a customer to have **three** attempts to log in. If they fail to log in correctly after the third time, they are locked out. After each attempt, they receive a message stating they only have so many attempts left. Once locked out, they are informed they need to email the IT Administrator at itadmin@onlinesystem.com.au. If password is correct print 'Welcome to the online grocery store'.

(9 marks)

Module CHECKLOGIN()

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**See next page**

**Question 26** (continued)

- (d) Using Chen's notation, draw an entity relationship (ER) diagram that represents the database for the online grocery store.

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

(27 marks)

Note:

- one customer can place many orders
- many orders can have many items
- a customer can create many notes
- equally, an employee can create many notes
- many external delivery companies deliver many orders
- one role can have many employees
- one employee can pick many orders.

Include the following in your diagram:

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

Draw your ER diagram below.

**See next page**

Question 26 (continued)

- (e) A manager has reported that someone has accessed the database without authorisation. You realise that you have not included any security rules in the database.

Outline **two** potential security risks that could occur if this mistake is not corrected.

(4 marks)

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

\_\_\_\_\_

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

\_\_\_\_\_

- (f) The data entry forms for the customers and items tables have been provided in the Source booklet.

Create **one** validation technique to help reduce errors for each form.

- (i) Customer data entry form (1 mark)

Field: \_\_\_\_\_

Validation technique: \_\_\_\_\_

\_\_\_\_\_

- (ii) Items data entry form (1 mark)

Field: \_\_\_\_\_

Validation technique: \_\_\_\_\_

\_\_\_\_\_

- (iii) Describe how validation techniques help reduce errors. (3 marks)

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**Question 27**

**(31 marks)**

Refer to the information on page 4 of the Source booklet to answer all parts of Question 27.

- (a) Refer to the incorrect network diagram of the independent grocery store as illustrated on page 4 of the Source booklet.

Analyse the issues in the existing network diagram. (5 marks)

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- (b) Explain a method the internet café could use to ensure its network is secure. (3 marks)

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- (c) Describe which protocol the wireless access point uses to detect collisions. (2 marks)

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Question 27 (continued)

- (d) Outline **one** reason for how the network design makes the data vulnerable. (2 marks)

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- (e) Explain why the Point of Sale (POS) system in relation to the network diagram in the Source booklet on page 4, may be experiencing slower network performance on weekends and school holidays. (3 marks)

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- (f) Describe **two** security methods the owners could implement to ensure internet café customers are unable to access their data. (4 marks)

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

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

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- (g) After receiving your feedback, the grocery store has asked you to redesign their network to improve its performance and security.

Design and draw using CISCO symbols an improved network for the company. Include in your answer the transport medium and network segmentation. (12 marks)

**Question 28**

**(31 marks)**

Refer to the information on page 5 of the Source booklet to answer all parts of Question 28.

- (a) Draw a Level 1 data flow diagram (DFD) for the Hazard Reporting System. (7 marks)

(b) Write the Module *WorkCompleted* in pseudocode. This module allows for the manager to:

- input yes or no to identify if the work has been completed
- output "Hazard is no longer a risk" if it has been completed
- output "Hazard is still a risk" if the work is incomplete.

(5 marks)

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**Question 28** (continued)

- (c) Write the Module *ActionControl* in pseudocode as a Case statement. This algorithm decides the action based on the hazard. (10 marks)

Hazardtype	Action
1	Block and clean up area
2	Call 000
3	Call electrician
4	Call manager
5	Block and clean up area
6	Block and clean up area
7	Manager decides

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- (d) Create a structure chart for the algorithm in part (c). Include all passing parameters.  
(8 marks)















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