



## Western Australian Certificate of Education Examination, 2009

### Question/answer booklet

# COMPUTER SCIENCE

## Written paper Stage 3

Please place your student identification label in this box

Student Number:    In figures

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In words

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### Time allowed for this paper

Reading time before commencing work:    ten minutes  
Working time for paper:                            three hours

### Materials required/recommended for this paper

#### *To be provided by the supervisor*

This Question/Answer Booklet

#### *To be provided by the candidate*

Standard items:    pens, pencils, eraser, correction fluid, 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 attempted	Suggested working time (minutes)	Marks available
Section One: Short Answer	25	25	70	72
Section Two: Extended Answer	6	6	110	108
<b>Total</b>				180

**Instructions to candidates**

1. The rules for the conduct of Western Australian external examinations are detailed in the *Year 12 Information Handbook 2009*. 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 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 answer pages are provided at the end of this booklet. If you need to use them, indicate in the original answer space where the answer is continued, i.e. give the page number.

Section One: Short Answer

72 Marks

Answer **all** questions in the spaces provided.

Suggested working time for this section is 70 minutes.

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**Question 1**

**(1 mark)**

**How** can a stub be used in structured programming?

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**Question 2**

**(1 mark)**

**How** can a parameter be used in structured programming?

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**Question 3**

**(1 mark)**

**How** can a global variable be used in structured programming?

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**Question 4**

**(2 marks)**

Candice is writing a large, complicated program and has decided to write all the code first and then test the program as a whole. Provide **two** reasons why this is not a good idea.

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Questions 5 to 9 refer to the following Readings database table excerpt that contains information about a project control system.

**Table: Readings**

Date	Time	Temperature	Pressure	Comment
2/3/07	6am	10	100	
2/3/07	6pm	12	120	
3/3/07	6am	15	10	Valve failure
3/3/07	6pm	12	80	

**Question 5**

**(2 marks)**

The temperature field in the first record contains '10' and not '10°C'; similarly, the pressure field contains '100' and not '100 kPa'. Explain why the temperature and pressure fields do **not** contain the relevant units.

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**Question 6**

**(1 mark)**

Many databases allow you to store a date and time as one field. Provide **one** reason why the table may have been designed with these fields separate.

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**Question 7**

**(3 marks)**

Database designers use validation rules to ensure data integrity. Write a validation rule to ensure that the pressure is not negative and not more than 500 kPa.

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**Question 8****(5 marks)**

In relational database management systems (DBMS), the functions *Today()* or *Now()* return today's date. Use one of these functions to write a validation rule that could be used to ensure that the date is not more than three days before or three days after today's date.

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

A user has asked you to develop queries to extract data from the Readings table. Write an SQL statement to display all records that have a comment.

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Question 17

(2 marks)

The pseudocode below was written to input the rainfall for each month of a year and calculate the average rainfall for that year.

```
For x ← 1 to 10 do
  Input(rainfall)
  Totalrainfall ← total + rainfall
End If

Averagerain ← total / x
```

Use examples from the pseudocode to illustrate **one** syntax error and **one** logic error.

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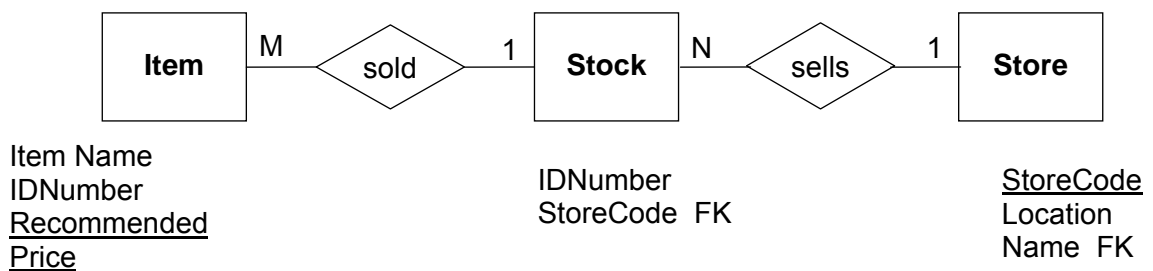
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Question 18

(2 marks)

The following Entity Relationship Diagram (ERD) was created to show that one item can be sold in many stores and one store can sell many items.



Analyse the ERD and identify **two** errors that exist within the diagram.

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Question 21

(4 marks)

Files on your computer hard drive have become very fragmented.

(a) Explain **two** possible effects this will have on the operating system of your computer.

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(b) Explain **two** ways you could solve this problem.

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Question 22

(3 marks)

Using relevant examples, differentiate between the following terms: intranet, extranet and the Internet.

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**Question 23**

**(2 marks)**

In terms of the Internet, what do the initials DNS stand for? Outline the purpose of this service.

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**Question 24**

**(2 marks)**

What is a storage area network? Give an example of where an organisation would use this technology.

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Draw the PERT chart that would correspond to this Gantt chart.

## Section Two: Extended Answer

108 Marks

Answer **all** questions in the spaces provided.

Suggested working time for this section is 110 minutes.

**Curry in a Flurry Restaurant**

*Curry in a Flurry* is a restaurant that sells Indian food. The owners, Mr and Mrs Sharma, have been running the restaurant for almost 20 years. They pride themselves on their food, which is made daily from fresh ingredients.

**Question 26****(16 marks)**

*Curry in a Flurry* has a stock inventory system that stores inventory data. Mr and Mrs Sharma's daughter, Bishnu, has exported some inventory data for 2007 from the database into a sequential file with the following record structure:

```
StockData
  Month
  Item
  Quantity
  Cost
```

Some sample records are shown below.

Month	Item	Quantity	Cost
January	Rice	100	155.45
January	Black dhal	120	233.75
January	Spring onions	25	23.00
February	Rice	110	174.66
February	Diced pork	32	195.00
March	Rice	100	156.99
March	Carrots	19	33.40

Assume that the records have been sorted by month.

- (a) Create the pseudocode to read the records one at a time, print them out and include a total cost for each month at the end of the records for each month. An example of the report for the sample records is shown below. (8 marks)

<b>Curry in a Flurry Stock Inventory</b>			
Month	Item	Quantity	Cost
January	Rice	100	\$155.45
January	Black dhal	120	\$233.75
January	Spring onions	25	\$23.00
<b>Total for January</b>			<b>\$412.20</b>
February	Rice	110	\$174.66
February	Diced pork	32	\$195.00
<b>Total for February</b>			<b>\$369.66</b>
March	Rice	100	\$156.99
March	Carrots	19	\$33.40
<b>Total for March</b>			<b>\$190.39</b>

See next page









## Question 27

(6 marks)

*Curry in a Flurry* uses a personal digital assistant (PDA) solution for the ordering of meals in the restaurant. The PDAs use an 802.11B wireless network card to connect to the access points in the building. The wireless system was installed in 1999. The business has been experiencing difficulties with orders being corrupted or unable to be sent.

- (a) List **two** possible network-based reasons that would cause the difficulties described.

(2 marks)

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- (b) List **two** security-related reasons that would cause the difficulties described.

(2 marks)

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Recently, there have been problems at *Curry in a Flurry*, and errors have occurred within the purchase order system. For example, although an order for 10 kg of salt was placed, *Curry in a Flurry* received 10 tonnes of salt. It is suspected that the web server has been compromised by external hackers.

- (c) Describe **two** countermeasures that *Curry in a Flurry* could take to reduce or prevent this problem.

(2 marks)

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Question 28

(4 marks)

*Curry in a Flurry* has decided that they need to become more security conscious.

- (a) Explain why the owners of the restaurant should perform regular security scans on their business computers and network. (2 marks)

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- (b) Describe **two** different protocols or encryption methods that may need to be implemented to reduce any problems discovered in the security scans. (2 marks)

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## Question 29

(33 marks)

Many customers stop at *Curry in a Flurry* to pick up takeaway food. Mr and Mrs Sharma's son, Rhani, has suggested they should implement a Frequent Customer System (FCS) to reward regular customers. Storing information on customer purchases would enable *Curry in a Flurry* to customise the rewards offered. For example, a customer who always ordered Indian bread could be offered Indian bread for no charge when their tenth order was placed. The FCS will need to keep track of customers and the menu items ordered. Each order can be for several menu items, and each item on the menu can be ordered many times. The FCS will also need to keep track of the rewards given to each customer.

- (a) Draw an Entity Relationship Diagram (ERD) to represent the data required for the Frequent Customer System in third normal form. Ensure that the ERD has all the many-to-many relationships resolved. Do not show any attributes on the diagram.

(9 marks)







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**See next page**

## Question 30

(31 marks)

*Curry in a Flurry* uses a PDA system for the ordering of meals in the restaurant. Part of the functionality of this PDA system is that it automatically tracks and maintains ingredient levels. When a meal is ordered, the ingredients used are read from the meal table. This information is then used to update the ingredients table.

The automatic ordering of ingredients is a three-step process:

1. Each time a meal is ordered, quantities in the ingredients table are decreased by the amount of raw ingredients used. For example, when a medium rice is ordered, the quantity for rice in the ingredients table is decreased by 250 grams.
2. At the end of the day, the computer system automatically runs an application that checks the quantity field for each of the raw ingredients. If a field shows less than the required minimum amount, an order for that ingredient is created.
3. The orders are stored in an order table on the database so they can be checked when supplies arrive at the restaurant. The orders are printed out and sent to the suppliers.

When the orders are delivered, Bishnu checks the received ingredients against the order for accuracy.

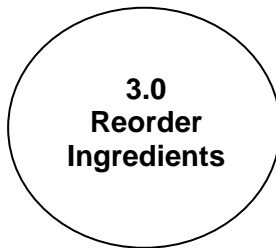
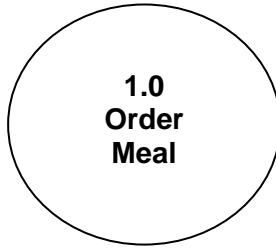
- If the order is correct, Bishnu updates the order in the orders table as being received and complete. Details from the order are used to update the ingredients table with the amounts received.
- If an incorrect item has been supplied, Bishnu notifies the supplier and requests that they collect the incorrect item. She also confirms non-payment for the incorrectly supplied item.
- If the order is incomplete, i.e. one or more items are missing, Bishnu records the details. A backorder is created that contains details of the missing item(s), and is stored in a separate table. Backorders are checked against the original orders. Hence, when a supplier delivers an item on backorder, both the backorder file and the order file are updated to confirm that the item has now been received. The ingredients table is updated.
- Bishnu records if a supplier delivers less than the ordered quantity of ingredients. The order is marked as received, a backorder is created for the outstanding amount, and the ingredients table is updated.

(Note: You do not need to consider how *Curry in a Flurry* pays for the ingredients ordered.)

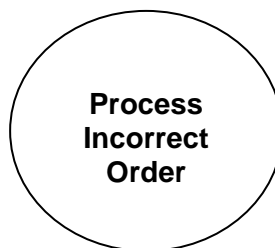
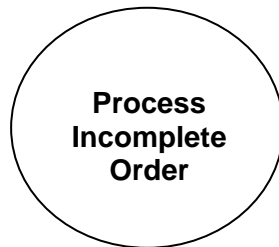
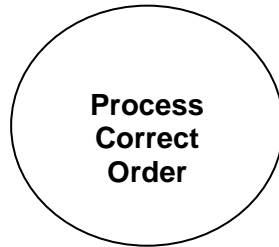
(a) Draw a context diagram for the *Curry in a Flurry* stock inventory system.

(5 marks)

- (b) For the *Curry in a Flurry* stock inventory system, complete the Level 0 DFD below.  
(11 marks)



- (c) Complete the process '4.0 Process Received Ingredients', using the incomplete Level 1 DFD below. (10 marks)





## Question 31

(18 marks)

*Curry in a Flurry* is expanding its operations. The owners plan to open another two stores and a new warehouse for the storage of stock. An information technology consultant has recommended the use of wireless links to form a WAN between the new stores and the warehouse. However, their ISP has recommended a fixed fibre link connection instead.

- (a) Why the ISP fibre linked connection preferable to the wireless solution? (3 marks)

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Each new store has a firewall, router and store-based switch that connect the access points. The access points connect to the PDAs. The new warehouse has a firewall, switch and router that connect to the database server and mail server.

- (b) Draw a network diagram for *Curry in a Flurry*, that includes one store and the new warehouse. Ensure that your diagram is supported by a legend and includes WAN and LAN elements. (15 marks)

**End of questions**

*Check that you have written your Student Number on the front cover of this booklet.*











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