INSIGHT

Trial Exam Paper

2011

SOFTWARE DEVELOPMENT

Written examination

STUDENT NAME:

QUESTION AND ANSWER BOOK

Reading time: 15 minutes
Writing time: 2 hours

Structure of book

Section	*Number of questions*	*Number of questions to be answered*	*Number of marks*
A	20	20	20
B	6	6	18
C	10	10	50
			Total 88

- Students are permitted to bring into the examination room: pens, pencils, highlighters, erasers, sharpeners, rulers and one scientific calculator.
- Students are NOT permitted to bring into the examination room: blank sheets of paper and/or white out liquid/tape.

Materials supplied

- Question and answer book of 23 pages with separate insert containing a Case Study for Section C.
- Answer sheet for multiple-choice questions.

Instructions

- Remove the insert containing the Case Study during reading time.
- Write your **name** in the box provided.
- All written responses must be in English.

At the end of the examination

- Place the answer sheet for multiple-choice questions inside the front cover of this book.

Students are NOT permitted to bring mobile phones and/or any other unauthorised electronic devices into the examination room.

This trial examination produced by Insight Publications is NOT an official VCAA paper for the 2011 Software Development written examination. Every effort has been made to gain permission to reproduce any images herein; failure to do so is not intended to limit the rights of the owner.
This examination paper is licensed to be printed, photocopied or placed on the school intranet and used only within the confines of the purchasing school for examining their students. No trial examination or part thereof may be issued or passed on to any other party including other schools, practising or non-practising teachers, tutors, parents, websites or publishing agencies without the written consent of Insight Publications.
Copyright © Insight Publications 2011

SECTION A – Multiple-choice questions

Instructions for Section A

Answer **all** questions in pencil on the answer sheet provided for multiple-choice questions.
Choose the response that is **correct** or that **best answers** the question.
A correct answer scores 1, an incorrect answer scores 0.
Marks will **not** be deducted for incorrect answers.
No marks will be awarded if more than one answer is completed for any question.

Question 1

Software requirement specifications are documented during

A. design
B. validation
C. analysis
D. evaluation

Question 2

An application is being created which will let blind users put printed text on a flatbed scanner and have the application read the text aloud to them. The most important factor to keep in mind during design would be

A. portability
B. accessibility
C. efficiency
D. ease of use

Question 3

A way of remembering the layers in the OSI model is to use the mnemonic (memory aid)

A. People Damage Nails Throwing Sticks Past Ants.
B. Poor Neville Did Stop Telling Peter Angrily.
C. Anyone Playing Silly Things Does Not Prosper.
D. Programmers Do Not Throw Pizza Slices Away.

Question 4

A software developer is observing an existing system that will be modified. She is interested in the system's accuracy when processing workers' pay figures. The most efficient and effective method to acquire suitable data would be to

A. count the number of logged complaints by workers about their pay.
B. interview the programmers of the system about the accuracy of their pay calculations.
C. conduct a survey of workers, asking how satisfied they have been with the amount of their pay.
D. manually recalculate pay figures for all workers for the preceding 12 months.

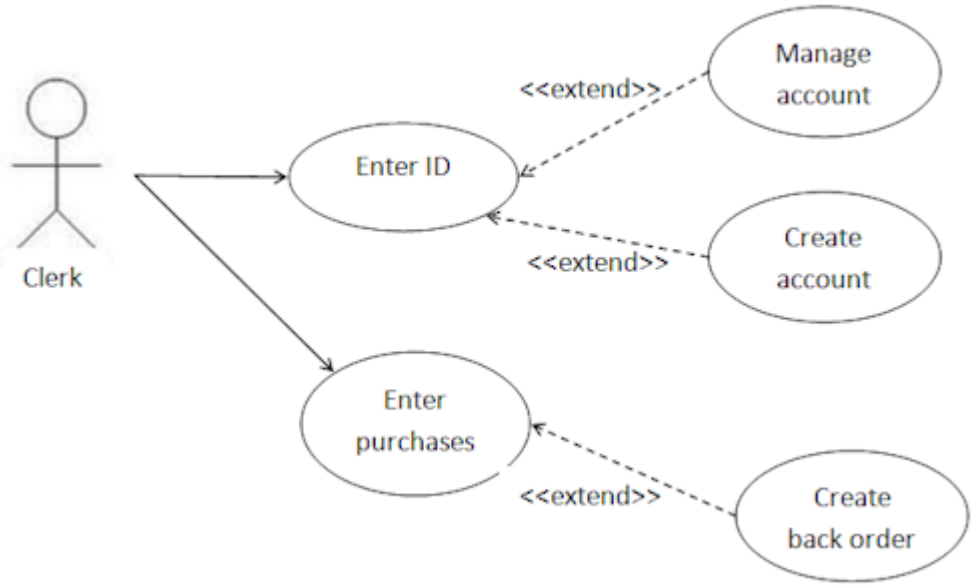
Copyright © Insight Publications 2011

Question 5

Methods of representing an algorithm include

A. IPO chart, and a context diagram.
B. Nassi-Shneiderman Chart, and a Data Flow Diagram.
C. Decision tree, and C++.
D. Pseudocode, and a flowchart.

Question 6



From the diagram above, one can say that

A. the clerk is an actor and he cannot create accounts.
B. when the clerk enters an ID, both the Manage Account module and the Create Account module are started.
C. if the clerk enters an ID that does not exist, the Create Account screen would appear.
D. back orders are created whenever purchases are entered.

Question 7

Alice is measuring the speed of a system she has recently implemented in an organisation. She wants to see if it is faster than the system it replaced. She is

A. evaluating efficiency.
B. evaluating effectiveness.
C. testing efficiency.
D. validating effectiveness.

Question 8

A compiler can detect which type of error?

A. runtime error
B. logical error
C. syntax error
D. recoverable error

Copyright © Insight Publications 2011

The following information relates to Questions 9 to 11.

A software module is being written that can pass two numeric values. Based on the values passed, the module returns one of the following values:

- -1 – the first number is less than the second number
- 0 – the numbers are identical
- +1 – the first number is greater than the second number.

Question 9

This module is a

A. function.
B. subprogram.
C. subroutine.
D. program in its own right.

Question 10

Note: In the code below, ! means NOT.

The most efficient and effective code within the module would be

A.

```
MODULE Compare(X,Y)
        IF X<Y THEN
                RETURN -1
        ELSEIF X>Y THEN
                RETURN 1
        ELSE
                RETURN 0
        END IF
END MODULE
```

B.

```
MODULE Compare(X,Y)
        IF X<Y THEN
                RETURN -1
        ELSEIF X>Y THEN
                RETURN 1
        ELSEIF (X!<Y) AND (X!>Y) THEN
                RETURN 0
        END IF
END MODULE
```

C.

```
MODULE Compare(Y,X)
        IF X<Y THEN
                RETURN -1
        ELSEIF X>Y THEN
                RETURN 1
        ELSE
                RETURN 0
        END IF
END MODULE
```

D.

```
MODULE Compare(X,Y)
        RETURN X<Y
END MODULE
```


Copyright © Insight Publications 2011

Question 11
The values X and Y in the module are referred to as
A. indices.
B. values.
C. parameters.
D. integers.

Question 12
Archie is asked to archive the files containing sales figures for the years 2001 to 2005. He was criticised by his boss because he
A. started by using Zip to compress the files.
B. deleted the original files after copying them to offline storage.
C. moved the files to offline storage, then deleted them.
D. copied the files to a USB hard disk, ran a consistency check on the offline copies, then deleted the originals.

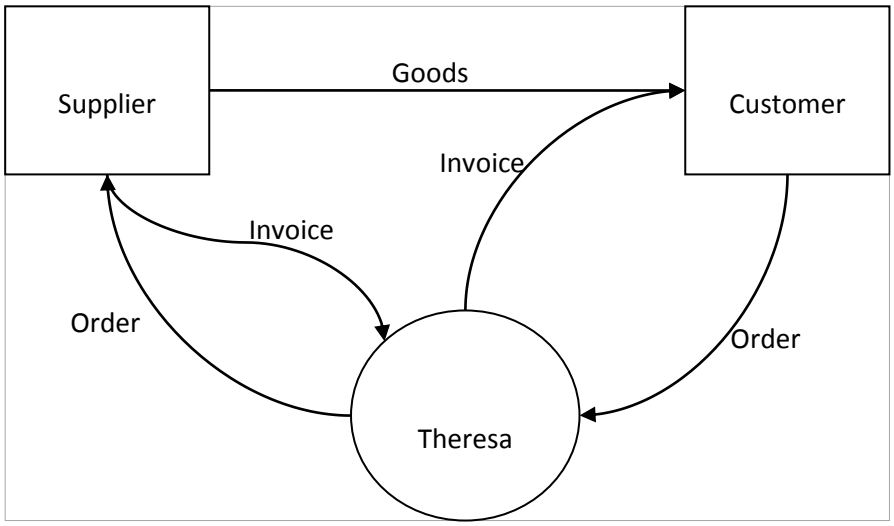
Question 13
Felix la Chat, a French programmer, is writing some embedded code for an inkjet printer. When the printer is busy it cannot accept data, so he needs a way to store data that arrives when the printer is busy and to release the stored data when the printer is ready to print. Such a structure can be called a
A. last in first out buffer.
B. stack.
C. device driver.
D. queue.

Copyright © Insight Publications 2011

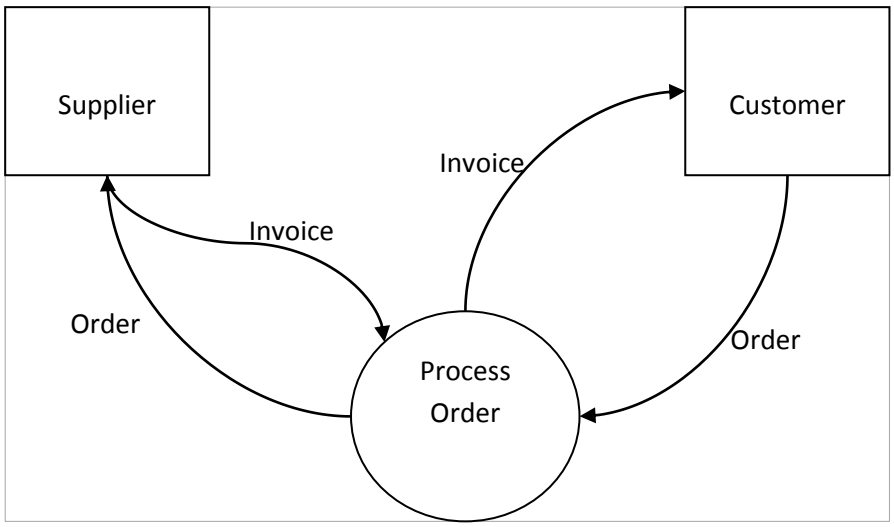
Question 14

Theresa works for Frog Paradise, a company that offers all sorts of toys, tools and equipment for owners of pet frogs. When an order comes from a customer, Theresa orders the goods from the supplier. The goods are delivered directly from the supplier to the customer, a process called *drop shipping*. The supplier invoices Frog Paradise for the goods, and Theresa invoices the customer for the cost of the goods plus Frog Paradise's profit margin.
This would best be represented as:

A.

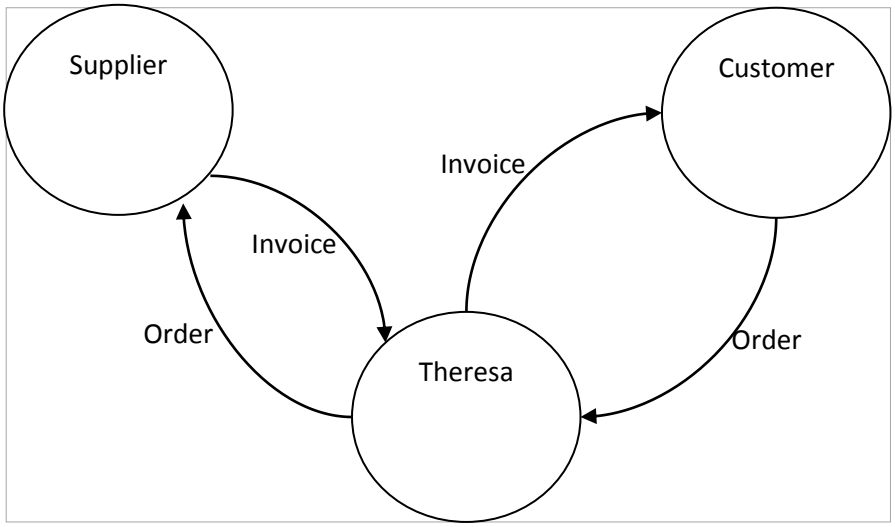


B.

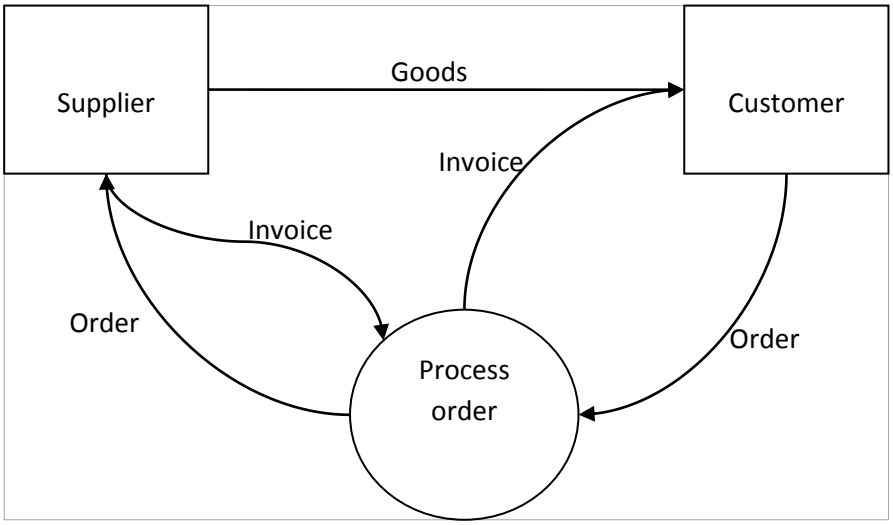


Copyright © Insight Publications 2011

C.



D.



Copyright © Insight Publications 2011

Question 15
Rosemary West puts the following code into her program. In her programming language, GET inputs a value from the keyboard.

```
DECLARE Age as INTEGER
GET Age
IF Age >=18 AND Age<=55 THEN
        CALL ProcessData(Age)
END IF
```

This code is an example of
A. validation of accuracy.
B. range checking.
C. desk checking.
D. existence checking.

Question 16
Walter codes a simple routine that works by repeatedly stepping through the list of data, comparing each pair of adjacent items and swapping them if the first item is greater than the second item. This looping is repeated until no swaps are needed. This strategy is called a
A. binary sort.
B. binary search.
C. quick sort.
D. bubble sort.

Question 17
Documentation for a new software suite included step-by-step demonstrations of how to carry out operations. This documentation is called a
A. user manual.
B. tutorial.
C. quick start guide.
D. technical reference.

Question 18
What sort of cable is used in an 802.11n connection?
A. none
B. any type
C. UTP
D. USB

Question 19
A new piece of software is aimed at increasing the efficiency of staff communication. Which of these measures would best evaluate this aim?
A. Calculate how much money was saved using the new system.
B. Ask employees if they like the new software.
C. Count the number of communications that were affected by communication errors.
D. Send a test message and see if it arrived promptly.

Copyright © Insight Publications 2011

Question 20

An employer in a software company that develops military components emails all programming staff to say that key loggers would be installed on all staff computers. These key loggers would record all key strokes and mouse movements to identify improper communications or activities by staff. This email is

A. required by the Privacy Act 1988.
B. permitted by the Copyright Act 1968.
C. pointless, since employers are not legally allowed to install keyloggers.
D. not required, but is sent as an ethical decision by the employer.

END OF SECTION A

Copyright © Insight Publications 2011

SECTION B – Short-answer questions

Instructions for Section B
Answer **all** questions in the spaces provided.

Question 1
A programmer needs to write a simple data file to store employees' records. She needs to be able to very quickly access any record in the file. She is not using a database management system.

a. What type of file should she create?

_____

_____

1 mark

b. This is some of the information about each worker. For each item, say what data type the field data should be.

Surname (e.g., Lane)	
Weekly wage (e.g. $578.44)	
Number of times disciplined for misbehaviour (e.g., 1)	
Whether they are a member of the social club or not (e.g., True)	

4 marks
1+4=5 marks total

Question 2
J. Dale, a programmer, had a brilliant idea for a revolutionary keyboard. His keyboard would monitor how often each key was used and – based on the frequency of use – remap the most popular keys to the home row of the keyboard where they would be faster to hit. Each key would have a tiny LCD display that could show the character it would produce when pressed. Keys that were rarely used, such as 'z' and 'q', would be remapped to the edges of the keyboard where they wouldn't get in the way.

Dale built a prototype which was universally hated by test users. He could not work out why. Explain why people hated Dale's keyboard.

_____

_____

_____

_____

2 marks

Copyright © Insight Publications 2011

Question 3

A newly-hired programmer goes to his boss and says, 'Hey boss. Our style guide says we need to prefix every variable name with its type, like int_Age or float_Salary. But we already declare our variable types when we create them at the start of each program, like DECLARE int_Age AS INTEGER. Isn't that enough?'

a. What name is given to the practice of naming variables like int_Age?

_____

1 mark

b. What do you think the boss replied to the new programmer? Be sure to make his justification clear.

_____

_____

_____

_____

2 marks
1+2=3 marks total

Question 4

The leader of a software development team must have a lot of code finished within a very tight timeline. Describe **two** important techniques the leader can use to help finish the project on time.

_____

_____

_____

_____

2 marks

Copyright © Insight Publications 2011

Question 5

A public library sends book orders to a book supplier. The book supplier sends the books as well as an invoice for the goods. Library patrons can request books over the internet. The library emails patrons when their requested books are available to be collected.

Draw a context diagram illustrating these procedures.

3 marks

Copyright © Insight Publications 2011

Question 6
A mobile phone company is designing their new phone's screen.

a. They decide to use an **OLED capacitive** screen. Choose **one** of those terms and explain why it is better than alternative choices.

_____

_____

_____

1 mark

b. The display is 480 pixels wide and has a resolution of 160dpi. How wide is it in inches?

_____

1 mark

c. The screen's vertical resolution is 360 pixels, numbered 1 to 360. The phone's operating system has a function called BOX with the following syntax:

BOX(X1,Y1)-(X2,Y2),RRGGBB,FILL

where

- X1, Y1 are the coordinates of the top left corner of the box.
- X2, Y2 are the coordinates of the bottom right corner of the box.
- RRGGBB is the RGB (red-green-blue) colour of the box pixels, in hexadecimal.
- FILL is a Boolean flag indicating whether the box is filled with colour (TRUE) or unfilled (FALSE).

Write a command to draw a red, unfilled box around the outer borders of the display.

_____

1 mark
1+1+1=3 marks total

END OF SECTION B

END OF SECTION B
TURN OVER

Copyright © Insight Publications 2011

SECTION C – Case Study

Instructions for Section C

Answer **all** questions in the spaces provided. Remove the case study insert and read **all** the information provided before you answer these questions. Answers must apply to the case study.

Question 1

What phase of the Problem Solving Methodology was being carried out during the meeting?

_____

1 mark

Question 2

This is part of a document that the Professor wrote up and sent to the mayor before starting work on iPark:

2. Overall descriptions

2.1. Product perspective
2.2. Product function
2.3. User classes and characteristics
2.4. Operating environment
2.5. Design and implementation constraints
2.6. User documentation
2.7. Assumptions and dependencies
2.8. Overview of data requirements
2.9. General constraints, assumptions, dependencies, guidelines
2.10. User view of product use

3. External interface requirements

3.1. User interface
3.2. Hardware interfaces
3.3. Software interfaces
3.4. Communication interfaces

4. System features

Copyright © Insight Publications 2011

a. Name this type of document.

_____

1 mark

b. What is the purpose of this document?

_____

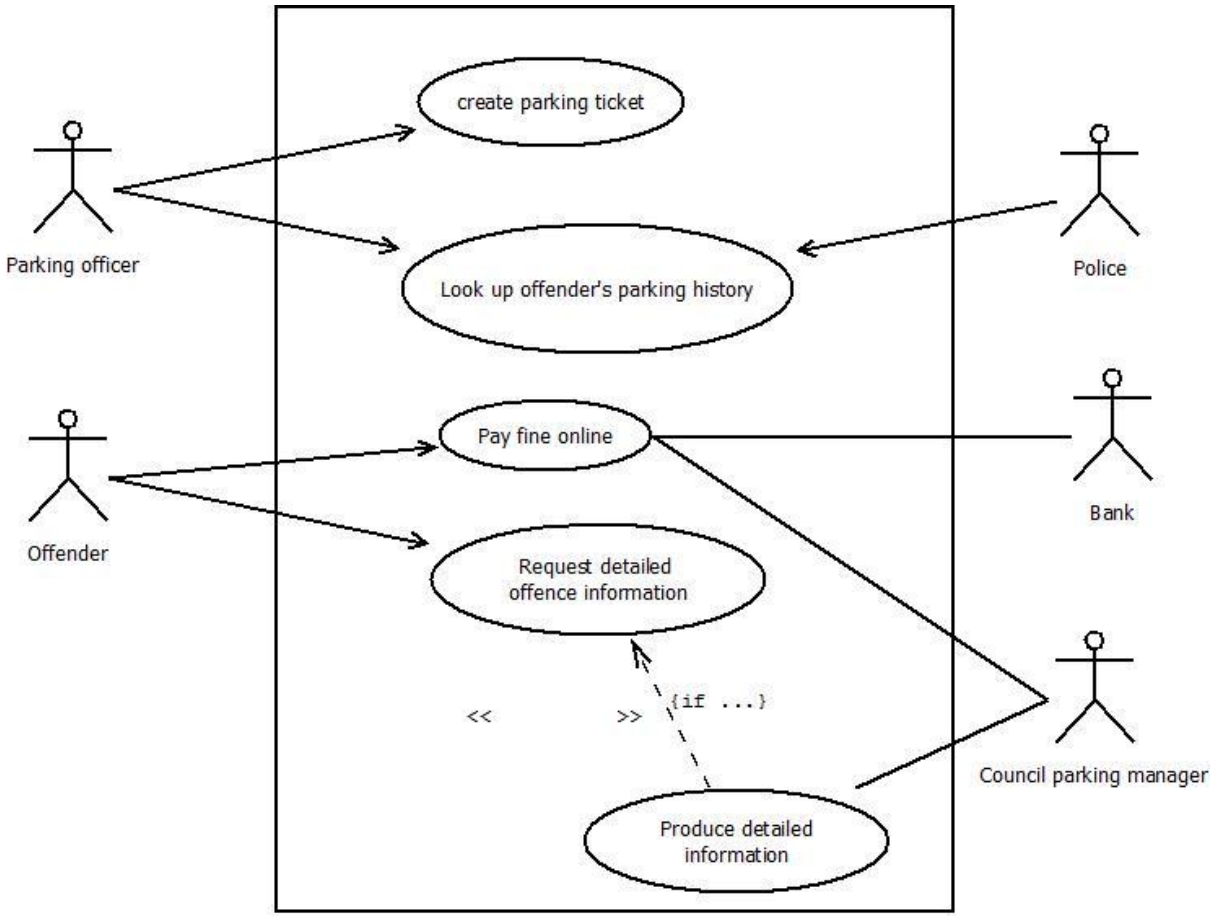
_____

_____

_____

2 marks

In order to better understand what the solution should be able to do, Professor Monroe produces the diagram shown below.



c. Name this type of diagram.

_____

1 mark

Copyright © Insight Publications 2011

d. What name is given to the stick figure people?

_____

1 mark

e. Who produces detailed offence information?

_____

1 mark

f. When is this information produced?

_____

_____

1 mark

g. The Professor has not quite finished the diagram. What should be between the << and the >> in the diagram?

_____

1 mark

h. What should follow the word 'if' in the {curly brackets}?

_____

1 mark
1+2+1+1+1+1+1+1=9 marks total

Professor Monroe gets written approval from the mayor to begin work on iPark.

Question 3

a. What stage of the problem solving methodology does the Professor now begin?

_____

1 mark

The professor realises that iPark is essentially going to be a portable computing device, and it will need an operating system (OS).

b. What role does an OS play in computing devices?

_____

_____

_____

_____

2 marks

Copyright © Insight Publications 2011

The next decision for the professor is how to acquire an OS. She could have one custom-programmed for the device, or use an OS that is already available.

c. Which option should the professor choose? Give **two** good reasons to justify your choice.

Option:

_____

Reason 1:

_____

_____

_____

Reason 2:

_____

_____

_____

3 marks

d. If the professor chose to use an existing OS for iPark, suggest an OS she could consider using.

_____

1 mark

e. Justify your choice above.

_____

_____

_____

_____

2 marks
1+2+3+1+2=9 marks total

Copyright © Insight Publications 2011

Question 4
Professor Monroe needs to ensure that the hand-held device can produce printed parking tickets on the spot using only battery power.

a. What sort of printer should she be considering, and explain why.

_____

_____

_____

_____

2 marks

The iPark unit needs to be able to record evidence of parking infringements that could later be used in court if offenders try to deny the parking offence.

b. What component could be fitted to the device to provide such evidence?

_____

1 mark

c. Describe the minimum specifications the component should have to be able to do its job satisfactorily.

_____

_____

1 mark

d. Another required feature is the ability to automatically record the location of the parking offence as further evidence. What technology could enable this feature?

_____

1 mark

The parking officer wanted an automated way of taking vehicle registration information without having to write it down. Professor Monroe knows of software that can interpret images of text and convert it to digital text.

e. What is the name of this text-identification technology?

_____

1 mark
2+1+1+1+1=6 marks total

Copyright © Insight Publications 2011

The professor enlists one of her IT students to produce the software to operate the iPark.

Question 5
The student's first question is what programming language he should use. Suggest an appropriate language for this task and justify your answer.

Language:

_____

Justification:

_____

_____

_____

_____

1+2 marks=3 marks total

Question 6
While her student begins his programming, the Professor considers the iPark's controls. She has a big decision to make: whether to use a lot of physical buttons and keys, or whether to have a purely touch screen interface and very few dedicated physical buttons and switches. Suggest which option the Professor should choose and give your reasons.

_____

_____

_____

_____

_____

_____

3 marks

Question 7
The Mayor is concerned about security. He says that there have been cases of parking officers being assaulted by offenders and having their ticket books stolen or destroyed to get rid of evidence. The Professor suggests that when a ticket is issued, the data could be sent immediately to the council's parking offence database. No parking ticket data would be stored on the device at all.

a. What wireless technology would enable data to be sent directly to the council database which could be kilometres away?

_____

1 mark

Copyright © Insight Publications 2011

b. Comment on the suitability of sending ticket data directly to the central database and not storing the data on the device at all.

_____

_____

_____

_____

2 marks

c. The Professor wonders whether to use WAV or MP3 file formats for storing the audio. Which would you recommend, and why?

_____

_____

_____

_____

2 marks
1+2+2=5 marks total

Question 8

Professor Monroe's student programmer, Clive Sinclair, is coding one of the device's key features. When the parking office takes a photo of a parked vehicle, the location of the vehicle is stored along with the time and the vehicle's registration. When the officer passes by later on and takes another photo, the device will alert the officer if the vehicle has been in that location more than the time allowed. The officer will not have to chalk tyres or remember which cars were parked where, and when.

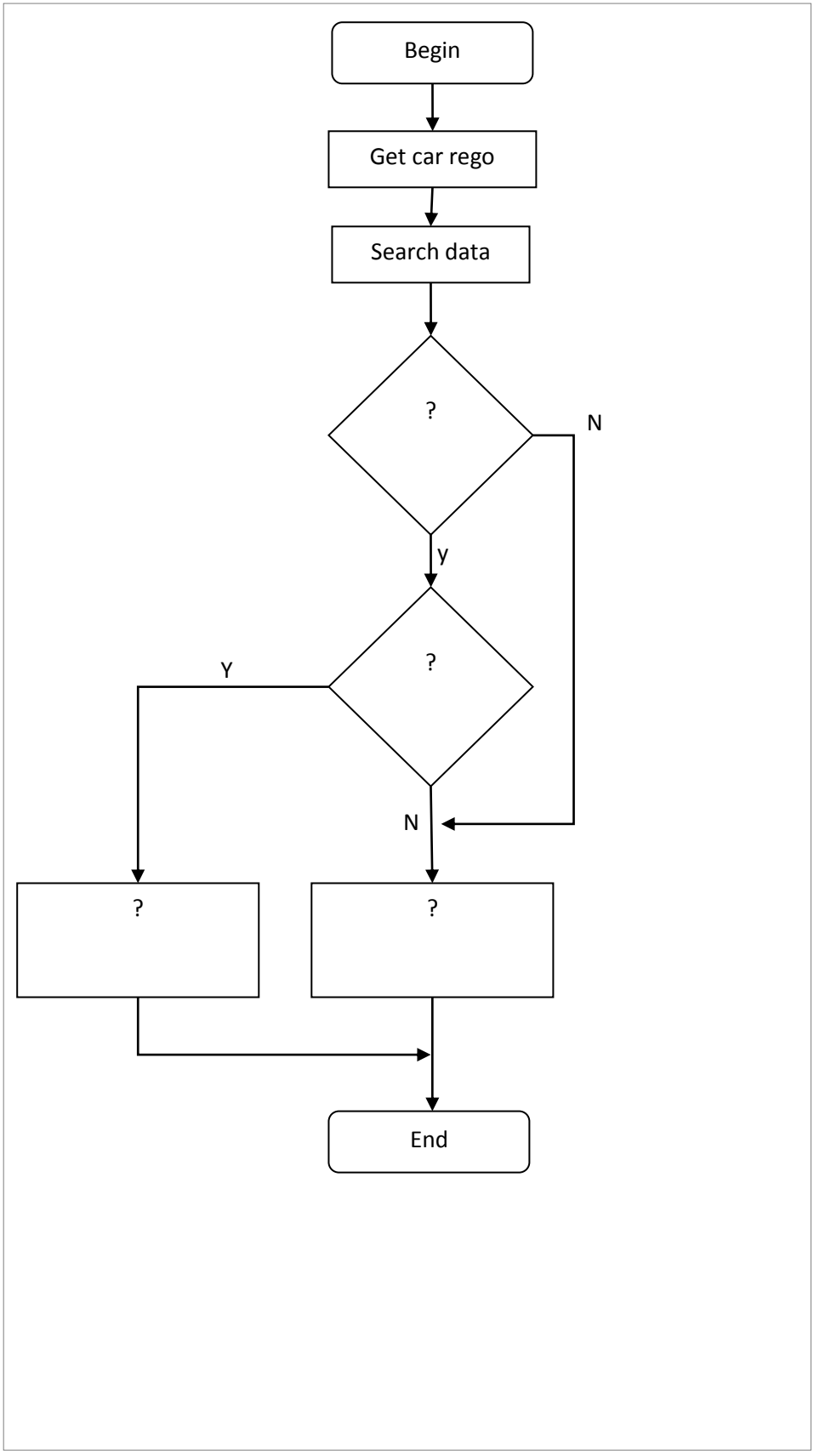
When a photo is taken, the module *TakePhoto* is called.

This module:

- Determines the vehicle's registration number.
- Searches the day's stored data to see if the vehicle has been recorded earlier in the same location.
- If the registration is found in the records, it compares the time of the previous recording with the current time.
- If the vehicle has been in that spot longer than allowed, an alert is given.
- If no alert is given, the data of the current parking event is stored for later reference.

a. Complete the flowchart on the opposite page.

Copyright © Insight Publications 2011



4 marks

SECTION C – continued
TURN OVER

Copyright © Insight Publications 2011

Question 9
After questioning Mr Hunt, Professor Monroe finds that a parking officer would store about 480 vehicles' data in an 8-hour-shift. She calculates that each stored parking event would take about 101 kilobytes for the data and photo.

a. How many megabytes of storage would be required in the device for this data?

_____

1 mark

b. What sort of non-volatile storage (the type that will not lose data when the power is turned off) would you recommend for the iPark? Give **one** good reason for your choice.

_____

_____

2 marks

Professor Monroe wonders whether to store the parking data in RAM or to a file in non-volatile storage.

c. **Excluding the fact that RAM loses its data when power is lost,** give **one** advantage of RAM and one advantage of a data file for storing the parking data.

	Advantage
RAM	
File	

2 marks
1+2+2=5 marks total

Question 10
Clive is programming the module that calculates the penalty for an offence. In Manangatang, penalties can change according to the time of day, or day of the week.

For example, double parking during the furiously busy Manangatang peak hours (8am – 10am Monday to Friday) gets 10% added to the penalty.

Copyright © Insight Publications 2011

Days of the week are coded numerically: Monday = 1 to Sunday = 7.

Hours are also coded numerically on a 24 hour basis: 0000 = midnight, 1202 = 2 minutes past noon, 2318 = 11:18PM.

```
// Officer enters code for the offence
// e.g. 102 = double parking,
// e.g. 105 = parking over a driveway
GET PenaltyCode

// Get the cost of the fine from the penalty database in the device
Cost = LOOKUP(PenaltyCode)

PEAK_START ← 0800
PEAK_END ← 1000
PEAKHOUR = FALSE

IF (CurrentTime >= PEAK_START AND CurrentTime <= PEAK_END) THEN
        PEAKHOUR = TRUE
END IF

IF PEAKHOUR = TRUE THEN
        Cost = Cost + 10%
END IF
```

When the system went live, some Manangatang parking offenders were laughing and others were complaining very loudly.

a. Which offenders were getting off with a penalty that was too light?

_____

_____

_____

2 marks

b. Which people were getting a penalty that was too harsh?

_____

_____

_____

2 marks

c. Rewrite the appropriate code so those who were treated too lightly now get the proper penalty.

_____

1 mark
2+2+1=5 marks total

END OF SECTION C
END OF QUESTION AND ANSWER BOOK

Copyright © Insight Publications 2011