



2005 INFORMATION TECHNOLOGY STUDIES

ATTACH SACE REGISTRATION NUMBER LABEL
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QUESTION
BOOKLET

1

12 pages, 9 questions

Part A: Short-answer Questions

Wednesday 16 November: 9 a.m.

Time: 3 hours

Examination material: Question Booklet 1 (12 pages)
Question Booklet 2 (18 pages)
one SACE registration number label

Approved dictionaries and calculators may be used.

Instructions to Candidates

1. You will have 10 minutes to read the paper. You must not write in your question booklets or use a calculator during this reading time but you may make notes on the scribbling paper provided.
2. This paper consists of two parts, each printed in a separate booklet:

Part A: Short-answer Questions (Questions 1 to 9)

Answer ALL questions in Part A. Write your answers in the spaces provided in Question Booklet 1. You may write on page 12 if you need more space.

Part B: Extended-response Questions (Questions 10 to 16)

Answer ALL questions in Section 1 of Part B. Write your answers in the spaces provided in Question Booklet 2.

Answer only ONE question from Section 2 of Part B, which consists of three structured-response questions. Write your answer on pages 15, 16, and 17 of Question Booklet 2.

You may write on page 18 of Question Booklet 2 if you need more space.

3. The allocation of marks and suggested allotment of time are:

Part A	61 marks	60 minutes (approximately)
Part B		
Section 1	69 marks	85 minutes (approximately)
Section 2	30 marks	35 minutes (approximately)
Total	160 marks	180 minutes

4. Attach your SACE registration number label to the box at the top of this page. Copy the information from your SACE registration number label into the box on the front cover of Question Booklet 2.
5. At the end of the examination, place Question Booklet 2 inside the back cover of Question Booklet 1.

**STUDENT'S DECLARATION ON THE USE OF
CALCULATORS**

By signing the examination attendance roll I declare that:

- my calculators have been cleared of all memory;
- no external storage media are in use on these calculators.

I understand that if I do not comply with the above conditions for the use of calculators I will:

- be in breach of the rules;
- receive zero marks for the examination;
- be liable to such further penalty, whether by exclusion from future examinations or otherwise, as SSABSA determines.

Answer ALL questions in this question booklet for Part A in the spaces provided after each question. You should spend approximately 60 minutes on this part. The allocation of marks is shown in brackets at the end of each part of each question.

1. From the following list, select the most appropriate terms to complete the statements given below.

- | | |
|--------------------------|----------------------------|
| A Algorithm | G Graphical user interface |
| B Bandwidth | H HTML |
| C Command line interface | I HTTP |
| D Clock speed | J Information |
| E Computer system | K Information system |
| F Data | L Module |

Each statement has one missing term, indicated by three dots.

Write the letter for each term chosen in the space provided at the end of the statement under the heading 'Term'.

There are more terms than statements. Each term can be used only once.

<i>Statement</i>	<i>Term</i>
(a) An interface that combines text, graphics, and visual cues to make software easier to use is known by the term . . .	_____
(b) Words and numbers that are not organised and, by themselves, have little meaning are referred to as . . .	_____
(c) . . . is the term used for a group of statements within a program that logically belong together to accomplish a task.	_____
(d) The range of frequencies that a transmission medium can carry in a given period of time determines the medium's . . .	_____
(e) . . . consists of codes called tags that enable a web page to be created.	_____
(f) . . . is the term used for a collection of hardware, software, data, people, and procedures that is designed to generate information.	_____

TOTAL: 6 marks

2. The librarians in a school library perform the process of borrowing books for students. The school wishes to update the system to an automated borrowing system so that students can perform the process of borrowing their own books.

(a) Outline *one* advantage of an automated borrowing system for:

(i) the library.

(ii) a student.

(2 marks)

(b) Identify the data, apart from the date and time, that an automated borrowing system needs to collect when a student borrows a book.

_____ (2 marks)

(c) The library needs an automated input device that collects data from the book that a student borrows.

Suggest an automated input device and give a reason for your answer.

Automated input device: _____

Reason: _____

_____ (2 marks)

TOTAL: 6 marks

3. (a) Identify *each* of the following types of address:

(i) mariam.case@parksidehs.edu.au

(ii) 197.85.10.15

(iii) www.adelaide.edu.au/intranet/infotech/exercises/netweb.html

(3 marks)

(b) Identify *each* part of the domain name www.tech.org.my

www _____

tech _____

org _____

my _____

(4 marks)

TOTAL: 7 marks

4. Adela is using a computer that is one of a network of computers in a library. The network is connected to a main computer that contains files and the network operating system. The network is also connected to a network printer. Darrell is using his notebook computer, which is not connected to the network.

(a) Each of the devices listed in the following table could be classified as none, one, some, or all of **client**, **server**, **node**.

Place ticks in the table to classify *each* device. (Each row may have one or more ticks, or none.)

	client	server	node
Main computer			
Adela's computer			
Network printer			
Darrell's notebook computer			

(4 marks)

(b) State the name of the geographical computer network that is located in the library.

_____ (1 mark)

(c) Explain why this is not a peer-to-peer network.

_____ (1 mark)

(d) Darrell wishes to connect his notebook computer to the network.

Identify *two* requirements for Darrell's notebook computer to enable this connection.

Requirement 1: _____

Requirement 2: _____ (2 marks)

TOTAL: 8 marks

5. The following algorithm calculates the average test result for a student. (An average is the total of the results divided by the number of tests.)

Begin AverageCalculator

counter = 0

total = 0

input **student_name**

← Arrow 1

input **test_result**

WHILE **test_result** <= 100

← Arrow 2

total = **total** + **test_result**

← Arrow 3

counter = **counter** + 1

input **test_result**

END WHILE

average = **total** / **counter**

print **student_name** 'received' **average**

End AverageCalculator

- (a) This algorithm assumes that each test result entered is a percentage (out of 100).

At Arrow 1 in the algorithm, write a line of pseudocode that would inform a user that the test result entered must be a percentage.

(1 mark)

- (b) Identify the type of control structure that begins with WHILE and ends with END WHILE.

_____ (1 mark)

- (c) Suggest a value for **test_result** that will end the WHILE control structure.

_____ (1 mark)

- (d) This algorithm will accept a negative number as a test result.

Modify the line of pseudocode indicated by Arrow 2 to prevent this.

_____ (2 marks)

- (e) Explain the purpose of the line of pseudocode indicated by Arrow 3.

_____ (1 mark)

TOTAL: 6 marks

6. A school office has been using a manual system to record receipt of money from students. The manager asks a database developer to update this system with a relational database, using a systems development approach.

Describe *two* tasks in *each* of the following phases of the systems development life cycle that the database developer will undertake.

(a) Analysis.

Task 1: _____

Task 2: _____

_____ (2 marks)

(b) Design.

Task 1: _____

Task 2: _____

_____ (2 marks)

(c) Development.

Task 1: _____

Task 2: _____

_____ (2 marks)

TOTAL: 6 marks

7. Each employee of a large company has his or her own workstation equipped with a computer that has a permanent connection to the Internet via the company's network. The company allows employees to use the computers for personal reasons during their lunch break. In recent weeks there has been an increase in the number of viruses detected in the system.

(a) Define the term 'virus'.

_____ (2 marks)

(b) State why a virus may be dangerous.

_____ (1 mark)

(c) Name *one* virus and describe its effect on a computer system.

Virus: _____

Effect: _____ (2 marks)

(d) Outline *two* ways in which viruses could infect the company's computers.

(i) _____

(ii) _____

(2 marks)

(e) State *three* practices that employees could adopt to reduce the number of virus infections.

Practice 1: _____

Practice 2: _____

Practice 3: _____

_____ (3 marks)

TOTAL: 10 marks

8. A computer system needs software to perform a task.

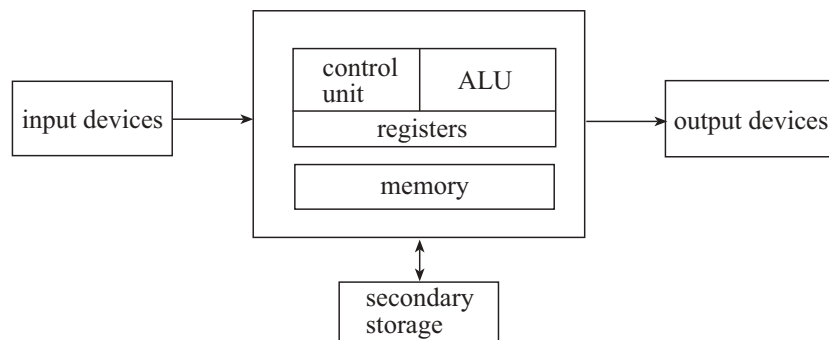
(a) Outline the difference between general-purpose and special-purpose applications software.

(2 marks)

(b) State *one* of the *main* tasks performed by a computer's operating system.

(1 mark)

(c) Refer to the following block diagram of a computer system.



(i) State the name of the component that contains the control unit, arithmetic and logic unit (ALU), and registers.

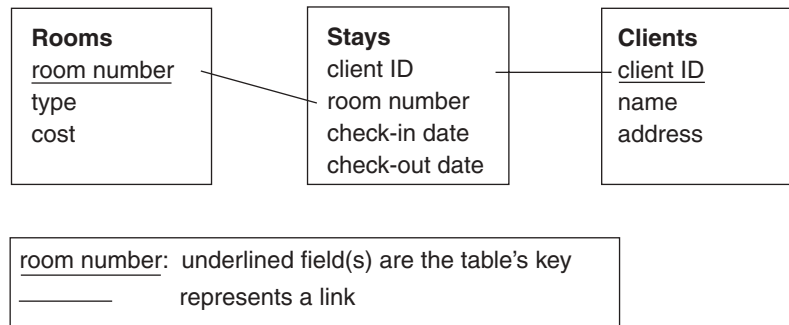
(ii) Outline the function of the component that you named in part (c)(i) above.

(iii) Identify the component that contains software as a computer system performs a task.

(3 marks)

TOTAL: 6 marks

9. A hotel stores details about its clients and their stays at the hotel in a relational database. The table relationship diagram of the database is shown below. The check-in date is entered when the client arrives and the check-out date is entered when the client leaves.



- (a) Identify the relationship between the **Rooms** table and the **Clients** table.

_____ (1 mark)

- (b) Identify the existing field or fields that should form the key of the **Stays** table.

_____ (2 marks)

- (c) Suggest how the database could be used to determine whether or not a stay at the hotel was in progress.

 _____ (1 mark)

- (d) Write a formula that will calculate the cost of a stay by a client at the hotel when the client leaves.

_____ (2 marks)

TOTAL: 6 marks



2005 INFORMATION TECHNOLOGY STUDIES

SACE REGISTRATION NUMBER

SEQ		FIGURES								CHECK LETTER		BIN

INFORMATION TECHNOLOGY STUDIES

QUESTION BOOKLET

2

18 pages, 7 questions

Part B: Extended-response Questions

Wednesday 16 November: 9 a.m.

Write your answers to Section 1 and Section 2 of Part B in this question booklet.

SECTION 1 (Questions 10 to 13)

(69 marks)

Answer ALL questions in this section in the spaces provided after each question. You should spend approximately 85 minutes on this section. The allocation of marks is shown in brackets at the end of each part of each question.

10. Ellie's 3.2 megapixel digital camera stores high-quality pictures. Each picture is 2048 pixels wide and 1536 pixels high, with each pixel requiring 32 bits of memory.

- (a) Calculate the amount of memory in megabytes needed to store *one* high-quality picture. Show your calculations.

(3 marks)

- (b) In order to take more pictures, Ellie chooses the digital camera option to save pictures in JPEG format. The camera creates a JPEG file that occupies 10% of the amount of memory needed to store a high-quality picture.

Calculate the:

- (i) size of the JPEG file in megabytes.

- (ii) number of JPEG files that can be stored on the camera's 32 megabyte memory card.

(2 marks)

(c) Ellie's digital camera uses a flash memory card to store its pictures.

Outline *two* storage characteristics of this type of memory card, with *one* advantage of each.

(i) Storage characteristic 1: _____

Advantage: _____

(ii) Storage characteristic 2: _____

Advantage: _____

(4 marks)

(d) Ellie's digital camera contains an embedded computer system. When she presses a button on her digital camera, she sees a message on its display screen that tells her how many more pictures the memory card can store.

Outline what *each* of the following components of the camera's computer system is doing as it determines the number of pictures that can still be stored on the memory card.

(Do *not* simply write a definition of the component's function. You must relate what is happening to this specific situation. For example, the control unit organises the execution of instructions that will determine the amount of space left on the memory card.)

(i) Registers.

_____ (2 marks)

(ii) Arithmetic and logic unit (ALU).

_____ (2 marks)

(iii) Random access memory (RAM).

(2 marks)

(e) Ellie takes about 100 pictures a month and stores them on her computer.

Suggest a sensible backup procedure that Ellie should follow to ensure that she does not lose the pictures.

(2 marks)

TOTAL: 17 marks

11. Ned teaches karate. He takes a digital video camera and a notebook computer to the lessons to record the techniques of his karate students. When he comes home, he backs up the video recordings and the session notes from his notebook computer to his family's peer-to-peer local area network via a wireless connection.

- (a) Identify the hardware device that must be present in Ned's notebook computer to connect it to his family's network, and outline the function of this hardware device.

Hardware device: _____

Function: _____

_____ (2 marks)

- (b) Outline *one* advantage and *one* disadvantage of using a wireless connection.

Advantage: _____

Disadvantage: _____

_____ (2 marks)

- (c) Discuss the need for Ned's notebook computer to have a network protocol installed.

_____ (2 marks)

- (d) Ned investigates whether or not he should change his family's peer-to-peer network to a client-server network.

Outline *one* advantage and *one* disadvantage for Ned's family of changing their peer-to-peer network to a client-server network.

Advantage: _____

Disadvantage: _____

_____ (2 marks)

- (e) Ned changes his family's peer-to-peer network to a client-server network and installs a proxy server on the family's new server computer in readiness for establishing a permanent connection to the Internet.

Outline *two* advantages for Ned's family that a proxy server would provide.

Advantage 1: _____

Advantage 2: _____

_____ (2 marks)

- (f) The family's network is now permanently connected to the Internet.

Suggest how Ned could prevent a hacker from gaining unauthorised access to the network.

Explain how your suggestion would do this.

Suggestion: _____

Explanation: _____

_____ (3 marks)

- (g) (i) Identify *one* utility program that Ned could use that would enable him to identify quickly which video recordings to transfer to the network.

- (ii) Outline *one* feature of the utility program that you identified in part (g)(i) above.

_____ (2 marks)

(h) State *three* essential components, apart from sender address and receiver address, of a TCP/IP packet of data that travels from Ned's family's computer to their Internet service provider's web server.

(i) _____

(ii) _____

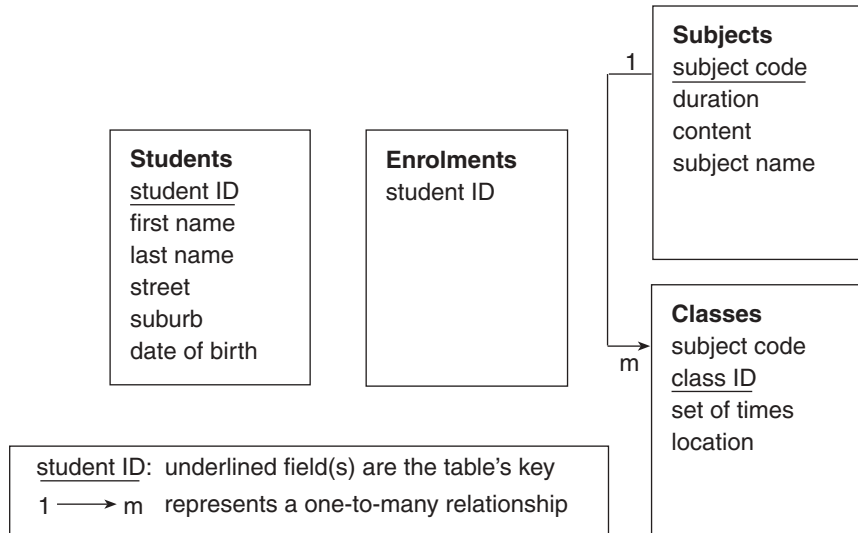
(iii) _____

(3 marks)

TOTAL: 18 marks

12. A large secondary school offers more than one class in its senior school subjects. Each class teaching the same subject is scheduled at a different set of times. Subjects may last for either one semester or two semesters. A relational database stores information about students and the classes they attend.

The incomplete table relationship diagram is shown below.



- (a) Complete the table relationship diagram to show the relationships and the links, inserting the necessary field. (2 marks)

- (b) Explain why the field 'last name' is not an appropriate choice for the key of the **Students** table.

_____ (1 mark)

- (c) Explain why the field 'subject code' is not an appropriate choice for the key of the **Classes** table.

_____ (1 mark)

- (d) A key has not been identified in the transaction table **Enrolments**.

Select a field or fields to be the key and explain your choice.

Key: _____

Explanation: _____

_____ (2 marks)

- (e) The school needs to store the names and addresses of the teachers. Each subject may have many teachers and a teacher may teach many subjects. Each class has only one teacher.

Amend the table relationship diagram to include this information. (3 marks)

- (f) The deputy principal of the school would like to find out which students use Room 12, for any class.

Complete the following structured query to find the full names of the students who attend a class in Room 12.

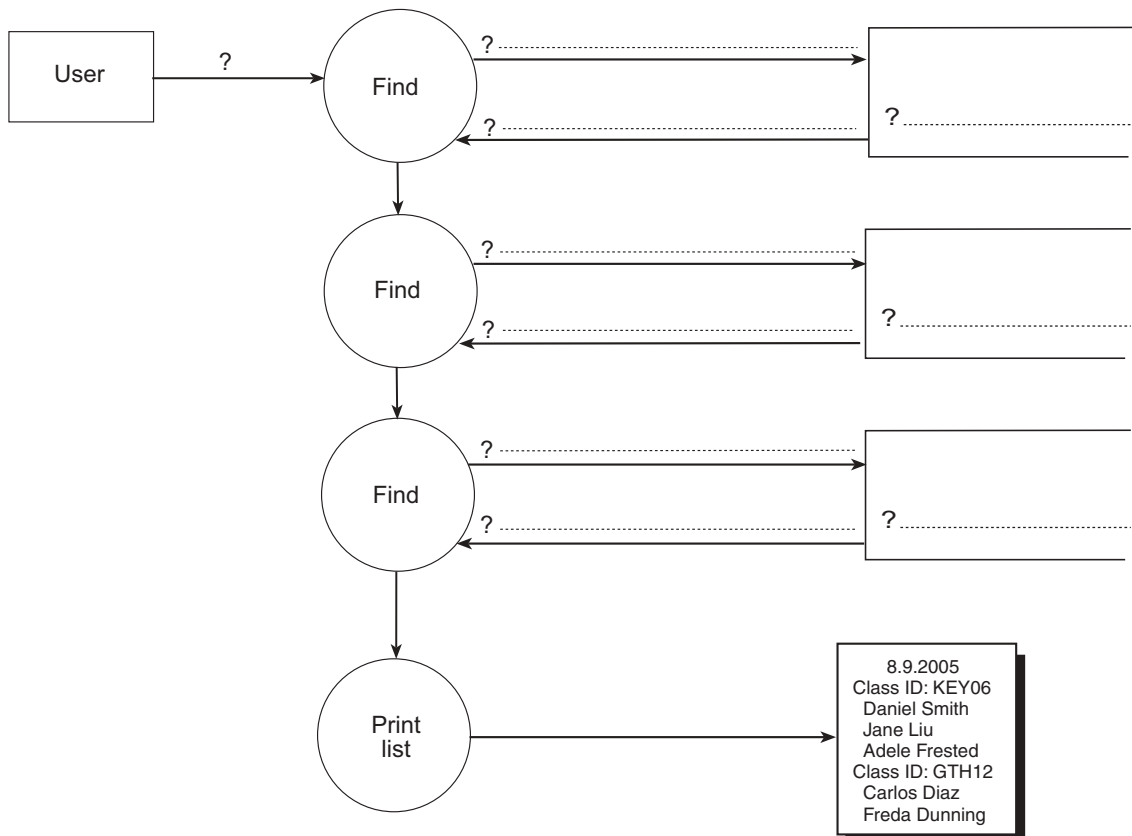
SELECT _____

FROM _____

WHERE _____

(3 marks)

- (g) Complete the following data-flow diagram to find and list the full names of the students who attend any class in a location entered by the user. Write the required *table name* or *field name(s)* next to each question mark (?).



(5 marks)

TOTAL: 17 marks

13. The following algorithm represents part of a program that checks whether or not a library book is overdue when it is returned by a borrower. The library fines the borrower 10 cents a day for every day that the book is overdue. The algorithm is run for a borrower whose ID is 1047, using today's date of 16.11.2005.

The algorithm reads the following Loans database table. The algorithm uses the naming convention *TableName.FieldName* to refer to values stored in a database table. For example, the field 'dueDate' has the name *Loans.dueDate*. Variables are shown in ***bold italics***.

Loans		
borrowerID	bookID	dueDate
1047	4432	10.11.2005
222	4567	12.11.2005
1047	2134	15.11.2005
1047	4511	19.11.2005

```

Begin Overdues
  Initialise
  ProcessLoans
  Summary
End Overdues

Begin Initialise
  . . . . . ← Arrow 1
  dailyRate = .10
  fineTotal = 0
End Initialise

Begin ProcessLoans
  input scanID
  WHILE scanID <> 0
    Find Loans.dueDate where scanID = Loans.bookID
    ProcessStatus
    input scanID
  END WHILE
End ProcessLoans

Begin ProcessStatus
  IF (today's_date > Loans.dueDate) THEN
    . . . . . ← Arrow 2
    Overdue
  ELSE
    NotOverdue
  END IF
End ProcessStatus

Begin Summary
  . . . . . ← Arrow 3
  print 'Total fine is $' fineTotal
End Summary

Begin Overdue
  fine = (today's_date - Loans.dueDate) * dailyRate
  print Loans.bookID ' overdue. Fine is $' fine
  fineTotal = fineTotal + fine
End Overdue

Begin NotOverdue
  print 'No fine for ' Loans.bookID
End NotOverdue

```

Answer parts (a), (b), and (c) on the next page and then add the lines of pseudocode required at Arrows 1, 2, and 3 (see part (d)). Write the lines of pseudocode in this box.

1 _____

2 _____

3 _____

- (a) Desk-check the algorithm on the page opposite using the following test data. (The desk-check assumes that it is Borrower 1047 and today's date.)

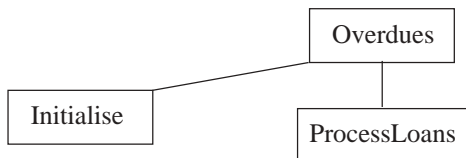
4432, 2134, 4511, 0

The values of the first *scanID* and *Loans.dueDate* have been filled in.

<i>dailyRate</i>	<i>fine</i>	<i>fineTotal</i>	<i>scanID</i>	<i>Loans.dueDate</i>	OUTPUT
			4432	10.11.2005	

(6 marks)

- (b) Complete the following structure chart of this modular algorithm. Show the flow of data between the modules for the variable *Loans.dueDate*.



(5 marks)

- (c) State whether the following variables are global or local.

fine _____ *fineTotal* _____ (1 mark)

- (d) Three lines of pseudocode need to be inserted in the algorithm so that it counts and displays the number of overdue books in the output.

In the box provided on the algorithm page (page 10), write the lines of pseudocode required at Arrows 1, 2, and 3.

(3 marks)

- (e) The Overdue module (reproduced below) calculates a fine, starting from the date that a book is overdue.

Begin Overdue

```
fine = (today's_date - Loans.dueDate) * dailyRate  
print Loans.bookID ' overdue. Fine is $' fine  
fineTotal = fineTotal + fine
```

End Overdue

Modify this module in the space below so that for the first three days that a book is overdue a warning is printed, but from the fourth day a fine of 10 cents a day is calculated for the whole time that the book is overdue.

Begin Overdue

(2 marks)

TOTAL: 17 marks

SECTION 2 (Questions 14 to 16)

(30 marks)

Read Questions 14, 15, and 16 carefully, then choose ONE question. Write a structured response to the question of approximately 500 words on pages 15, 16, and 17 of this question booklet. You should spend approximately 35 minutes on this section. The mark allocation below is a guide to the depth of discussion needed. Credit will be given for clear, well-expressed answers that are well organised and relevant to the question.

14. Read the following extract.

PDA's help hotels to help you

Personal digital assistants (PDAs) are the latest in hotel networking technology. Hotel service staff carry PDAs to record client purchases such as souvenirs or room service meals, and the cleaners use them to receive messages and record jobs completed. Electronic cards issued to clients act both as keys and as ID for hotel services. PDAs are used in addition to computer technology that enables the hotel's administration office to make bookings and manage accounts, and the reception desk to record arrivals and departures.

Discuss the role of technology in helping administration in large hotels.

Refer in your discussion to each of the following points and relate all facts to the situation above:

- The hardware and software needed for such a network. (6)
- The type of data recorded by the service staff, and the type of communication needed for their PDAs. (5)
- The type of storage on the electronic cards, what is to be recorded, and how this is linked to a particular client. (5)
- The flow of data from when a client makes a purchase using room service to the production of his or her bill when leaving. (7)
- The advantages of a computerised system for hotel management, employees, and clients. (7)

15. Read the following extract.

Malware on the increase

Recent figures indicate that family computers are under attack more than ever before from malware (malicious software such as viruses, worms, spyware, and adware). Most families have a computer that they use for their business, pleasure, and email. Recent publicity about malware has increased their concern over the vulnerability of their computer, even when it has up-to-date antivirus software installed.

Discuss the procedures necessary to keep family computers protected and fully functional.

Refer in your discussion to each of the following points and relate all facts to the situation above:

- What malware is, and why it is a problem. (4)
- What spyware and adware are, why they exist, and why they are a problem. (7)
- How a person becomes a victim of spyware, and how it affects the user of a family computer. (7)
- Beneficial types of background programs. (6)
- Safe computing practices needed to minimise the problem of malware. (6)

16. Read the following extract.

New computer program to revolutionise doctors' practice

A pharmaceutical company wishes to develop a medical management program for use by doctors, whose computers would be permanently connected through the program to the company over the Internet. This would allow the company to advertise new products to doctors and to extract data on the way its products are prescribed. The company would guarantee patient privacy. The program would include a patient records section, a database of the company's products, and a disease treatment procedures section.

Discuss factors that a programmer would need to consider when developing the medical management program.

Refer in your discussion to each of the following points and relate all facts to the situation above:

- Data management issues that a programmer would have to consider in developing this program. (5)
- The type of program that this might be, and how a program like this could be tested. (7)
- The advantages and disadvantages of having such a program permanently connected to the company over the Internet. (6)
- Potential sources of error, and how a user interface can act to validate data entry. (6)
- Who should be able to access the information in the patient records section, the database of the company's products, and the disease treatment procedures section, and what access rights they should have. (6)

