



## 2003 INFORMATION TECHNOLOGY STUDIES

ATTACH SACE REGISTRATION NUMBER LABEL  
TO THIS BOX

QUESTION  
BOOKLET

1

12 pages, 9 questions

### Part A: Short-answer Questions

Thursday 6 November: 1.30 p.m.

Time: 3 hours

Examination material: Question Booklet 1 (12 pages)  
Question Booklet 2 (21 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 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 18, 19, and 20 of Question Booklet 2.

You may write on page 21 of Question Booklet 2 if you need more space.

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

Part A	54 marks	60 minutes (approximately)
Part B		
Section 1	73 marks	85 minutes (approximately)
Section 2	30 marks	35 minutes (approximately)
Total	157 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.

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 Network administrator    |
| B Arithmetic and logic unit | H Network operating system |
| C Central processing unit   | I Non-volatile             |
| D Control structure         | J Normalisation            |
| E Evaluation                | K Objective                |
| F Key                       | L Volatile                 |

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

Write the letter for each term chosen in the space provided at the end of each 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) The unit that interprets <i>and</i> carries out the instructions that operate a computer is known as the . . .	_____
(b) The type of memory that loses its contents when power is turned off is called . . . memory.	_____
(c) The process used to ensure that the data in a relational database contain the least amount of duplication is called . . .	_____
(d) The . . . organises and coordinates the activities on a network and allows its computers to communicate with each other.	_____
(e) The series of steps used to define the solution to a problem is known by the term . . .	_____
(f) One or more fields that uniquely identify a record in a database table are called a . . .	_____

TOTAL: 6 marks

2. For each of the physical impairments listed below, suggest *either one* hardware modification *or one* software modification that could be made to a computer to allow access for a person with that impairment.

Explain how this modification would benefit the person.

- (a) An inability to use a keyboard.

Modification: \_\_\_\_\_

\_\_\_\_\_

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

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ (2 marks)

- (b) Limited vision.

Modification: \_\_\_\_\_

\_\_\_\_\_

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

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ (2 marks)

TOTAL: 4 marks

3. Programming errors are classified as being syntax, logic, or execution errors.

Define each type of error, and state the impact of the error on the running of a program.

(a) Syntax error.

Definition: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

Impact: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_ (2 marks)

(b) Logic error.

Definition: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

Impact: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_ (2 marks)

(c) Execution error.

Definition: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

Impact: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_ (2 marks)

TOTAL: 6 marks

4. (a) Describe *two* features of the World Wide Web that make it easy to use.

Feature 1: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Feature 2: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ (2 marks)

(b) Explain how web-browser software is able to display an image on a web page, given that the source code of a web page is stored in a plain text file.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ (2 marks)

(c) The World Wide Web is a widely used Internet service.

Outline another Internet service.

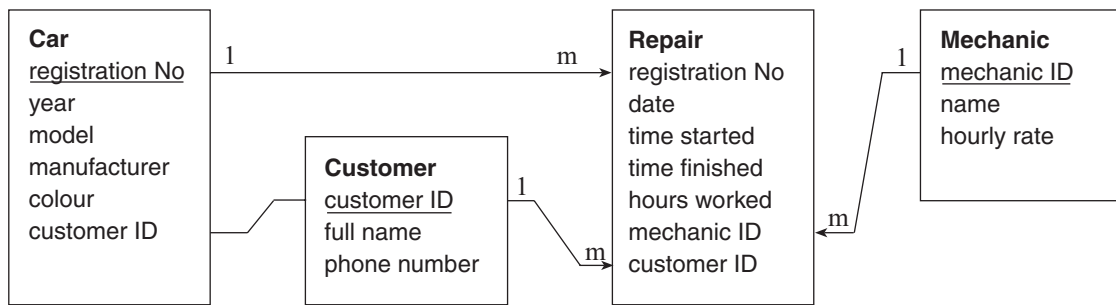
\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ (1 mark)

TOTAL: 5 marks

5. Caleb's Cars employs a number of mechanics to repair cars. A database with the following structure is used to record the repairing of cars.



customer ID: underlined field(s) are the table's key  
 1 → m represents a one-to-many relationship

- (a) On the diagram above, show the type of relationship that exists between the 'Car' and 'Customer' tables. Give a reason for your answer.

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(2 marks)

- (b) One of the links between two tables in the table relationship diagram above is not needed.

- (i) Cross out the link that is not needed.  
 (ii) Explain why this link is not needed.

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- (iii) Cross out the linking field that is not needed as a result of your answer to part (b)(i).

(2 marks)

(c) (i) Identify the transaction table in the database on the page opposite.

\_\_\_\_\_

(ii) State the names of the *two* source tables that this transaction table is linked to.

\_\_\_\_\_

(2 marks)

(d) (i) Identify the *non-ID* field that should not be present in the 'Repair' table.

\_\_\_\_\_

(ii) State the database design principle that is not being applied by this field being present in the 'Repair' table.

\_\_\_\_\_

\_\_\_\_\_

(2 marks)

(e) Suggest how the database could be used to calculate the cost of a repair.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ (1 mark)

(f) State the impact on the database if the following field(s) were the key to the 'Repair' table.

(i) date: \_\_\_\_\_

\_\_\_\_\_

(ii) mechanic ID: \_\_\_\_\_

\_\_\_\_\_

(iii) date and mechanic ID: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

(3 marks)

TOTAL: 12 marks

6. The computer that belongs to Caleb's Cars is stolen.

(a) Outline a sensible backup routine that Caleb's Cars should have been using.

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(3 marks)

(b) Caleb's Cars buys a new computer. The only software present on the new computer is an operating system.

List the steps that need to be followed to enable the database shown in Question 5 to be used on this new computer.

Explain the purpose of each step.

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(2 marks)

TOTAL: 5 marks

7. Computer systems store data in binary form.

(a) Explain the term 'binary form'.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ (1 mark)

(b) Explain how a character can be stored in binary form.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ (1 mark)

(c) State *two* storage characteristics of *each* of the following data storage devices.

(i) Random access memory (RAM).

(1) \_\_\_\_\_

(2) \_\_\_\_\_ (1 mark)

(ii) Floppy disk.

(1) \_\_\_\_\_

(2) \_\_\_\_\_ (1 mark)

(iii) CD-ROM.

(1) \_\_\_\_\_

(2) \_\_\_\_\_ (1 mark)

TOTAL: 5 marks

8. (a) Distinguish between the Internet and an intranet.

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(2 marks)

(b) Describe the role of an Internet service provider in enabling a home user to connect to the Internet.

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(1 mark)

(c) Suggest how using a proxy server to access the Internet would be an advantage for an Internet service provider. Give a reason for your answer.

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(1 mark)

TOTAL: 4 marks







**2003 INFORMATION TECHNOLOGY STUDIES**

SACE REGISTRATION NUMBER

SEQ		FIGURES							CHECK LETTER		BIN

**INFORMATION TECHNOLOGY STUDIES**

**QUESTION BOOKLET**

**2**

21 pages, 7 questions

**Part B: Extended-response Questions**

**Thursday 6 November: 1.30 p.m.**

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

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**SECTION 1 (Questions 10 to 13)**

(73 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. Read the following article.

**Biometrics to prove identity**

To improve security at its airports, the government of Ozland stores biometric data — that is, details of unique physical characteristics such as a person's face — in an ID chip in passports.

With the biometric data stored in the passport, all a person needs to do is

place the passport in a reader while a camera photographs the person standing there to provide a second set of biometric data. The two sets of biometric data are matched immediately, and the person can proceed straight through the immigration check.

- (a) (i) From the article, identify the *two* input devices used for the data-matching process.

\_\_\_\_\_ (1 mark)

- (ii) Suggest *two* outputs from the data-matching process.

\_\_\_\_\_  
\_\_\_\_\_ (1 mark)

- (b) Outline *one* advantage of using biometric data compared with using text-based data.

\_\_\_\_\_  
\_\_\_\_\_ (1 mark)

- (c) Outline *one* disadvantage of the use of facial biometric data.

\_\_\_\_\_  
\_\_\_\_\_ (1 mark)

- (d) A person's biometric data could be stored in a centralised database, rather than on his or her passport.

Outline *one* disadvantage of storing biometric data in a centralised database.

\_\_\_\_\_  
\_\_\_\_\_ (1 mark)

- (e) Suggest whether read-only memory or random access memory would best suit the ID chip. Give a reason for your answer.

\_\_\_\_\_  
\_\_\_\_\_  
(1 mark)

- (f) The ID chip could store a photograph of a person's face as a bit-mapped image that consists of 76 800 pixels.

If each pixel occupies 24 *bits* of memory, calculate the amount of memory in kilobytes needed to store the image. Show calculations to justify your answer.

(3 marks)

- (g) Suggest a type of utility program that could be used to reduce the amount of memory needed to store such an image. Outline how it would work.

\_\_\_\_\_  
\_\_\_\_\_  
(1 mark)

- (h) A computer system performs the data-matching process described in the article on page 3. Explain the *function* of the following parts of the computer system as the two sets of biometric data are matched.

(i) Control unit: \_\_\_\_\_  
\_\_\_\_\_  
(1 mark)

(ii) Registers: \_\_\_\_\_  
\_\_\_\_\_  
(1 mark)

(iii) Arithmetic and logic unit: \_\_\_\_\_  
\_\_\_\_\_  
(1 mark)

- (i) Would it be possible for the ID chip to infect this computer system with a virus?  
Explain your answer.

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(2 marks)

TOTAL: 15 marks

11. The airport security system in Ozland uses the algorithm shown on page 7 to produce summary statistics of the people who arrive at airports in the country. The algorithm accesses a WantedPersons database, which stores the passport number, name, and photograph of wanted criminals.

(a) Explain the purpose of the statement indicated by Arrow 1 in relation to the WHILE loop.

\_\_\_\_\_

\_\_\_\_\_ (1 mark)

(b) Write pseudocode to perform the task indicated by:

(i) Arrow 2. \_\_\_\_\_

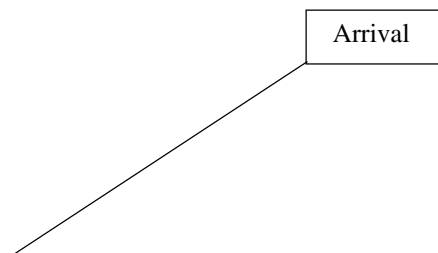
(ii) Arrow 3. \_\_\_\_\_ (2 marks)

(c) Place *four* ticks (✓) in the table below to indicate the scope and the data type of *each* of the two variables listed.

variable	Scope		Data Type		
	global	local	Boolean	number	text
<i>match</i>					
<i>arrivals</i>					

(2 marks)

(d) Complete the following structure chart of this modular algorithm. Show the flow of data between the modules *only* for the variable *wanted*.



(5 marks)

You may remove this page from the booklet by tearing along the perforations so that you can refer to it while you write your answers.

### ALGORITHM FOR QUESTION 11

```
Begin Arrival
  Initialise
  get passportNumber
  WHILE passportNumber is not blank
    arrivals = arrivals + 1
    CheckID
    CheckWanted
    get passportNumber ← Arrow 1
  END WHILE
  DisplayStats
End Arrival

Begin Initialise
  arrivals = 0
  unmatched = 0
  matched = 0
  wanted = 0
End Initialise

Begin CheckID
  read passportPhoto from passport ID chip
  get passengerPhoto from airport camera
  match = true
  IF passportPhoto different to passengerPhoto THEN
    match = false
    ..... ← Arrow 2 maintain a count of unmatched
  ELSE
    ..... ← Arrow 3 maintain a count of matched
  END IF
End CheckID

Begin CheckWanted
  Search WantedPersons database for passportPhoto
  IF found THEN
    alert = true
    wanted = wanted + 1
  ELSE
    alert = false
  END IF
End CheckWanted

Begin DisplayStats
  display 'People arrived = ' arrivals
  display 'Unmatched photos = ' unmatched
  display 'Wanted persons = ' wanted
End DisplayStats
```

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- (e) A message needs to be displayed *only when* a person's ID check fails, or his or her photograph is found in the WantedPersons database. This means that additional pseudocode needs to be placed after the CheckWanted line in the Arrival module.

Write the pseudocode that will display such a message.

(3 marks)

- (f) Apart from the Initialise module, identify the:

(i) module that assigns a default value to a variable. \_\_\_\_\_

(ii) name of this variable. \_\_\_\_\_

(1 mark)

- (g) Explain the impact on the algorithm if the first line of the CheckWanted module was replaced with the following line.

Search WantedPersons database for *passportNumber*

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(2 marks)

- (h) The algorithm can be modified to include a CheckDepartures module for tourists, as shown below.

```

Begin CheckDepartures
  message = 'Illegal Departure'
  Search Tourist database for passportNumber
  IF found THEN
    → Sort by arrivalDate in descending order
      get first record
      message = 'Arrived on ' arrivalDate
  END IF
  display message
End CheckDepartures

```

- (i) The CheckDepartures module reads the following 'Tourist' database table.

<i>arrivalDate</i>	<i>passportNumber</i>	<i>airportID</i>
15.2.2003	H2034X	3
10.8.2003	C8155D	4
15.8.2003	H2034X	2
8.10.2003	M5978Y	4

Desk-check the CheckDepartures module with the following test data for *passportNumber*:

**H2034X**

<i>message</i>	<i>found</i>	OUTPUT

(1 mark)

- (ii) Explain the intention of the statement indicated by the arrow in the CheckDepartures module.

\_\_\_\_\_

\_\_\_\_\_ (1 mark)

- (iii) Explain the reason for including the following statement:

get first record

\_\_\_\_\_

\_\_\_\_\_ (1 mark)

- (iv) Circle all lines of pseudocode that comprise the selection statement contained in the CheckDepartures module.

(1 mark)

TOTAL: 20 marks

12. The WantedPersons database described in Question 11 is stored in the government's computer system in Ozland's capital, Flambeau. All airports in Ozland need access to this database.

(a) Describe the network that would connect the airports to the government's computer system in Flambeau. Use *two* of the following terms in your answer: peer-to-peer, client-server, LAN, WAN.

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(2 marks)

(b) Describe how the network operating system allows Elise, an airport security officer, to log on to the government's computer system in Flambeau and access the WantedPersons database.

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(3 marks)

(c) A wireless method of transmission, such as microwave or radio, could be used in this network to connect the airport and government computer systems.

Outline *one* advantage and *one* disadvantage of *each* method of transmission.

(i) Microwave.

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

\_\_\_\_\_

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

\_\_\_\_\_

(2 marks)

(ii) Radio.

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

\_\_\_\_\_

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

\_\_\_\_\_

(2 marks)

(d) Packet-switching is used to transfer data between nodes on the network.

(i) List *four* necessary elements of a packet, apart from its data.

Element 1: \_\_\_\_\_

Element 2: \_\_\_\_\_

Element 3: \_\_\_\_\_

Element 4: \_\_\_\_\_

(2 marks)

(ii) Explain how packet-switching enables the transmission of a record from the WantedPersons database to a computer at an airport.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

(2 marks)

(e) Ensuring the security of data is an important aspect of this network.

(i) Outline *one* security procedure that airport employees could follow to prevent another person from using their terminal to gain unauthorised access to the WantedPersons database.

\_\_\_\_\_

\_\_\_\_\_

(1 mark)

(ii) Describe how a firewall on the government's computer system in Flambeau could be used to prevent unauthorised access to the WantedPersons database.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

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\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

(2 marks)

- (f) Immigration personnel in Ozland can check whether or not the name of a tourist appears in the WantedPersons database by using a form on a website with the following URL:

<http://www.ozland.gov.oz/wanted/check.html>

State the meaning of the following parts of the URL.

- (i) http:

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- (ii) ozland.gov.oz

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- (iii) wanted

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- (iv) check.html

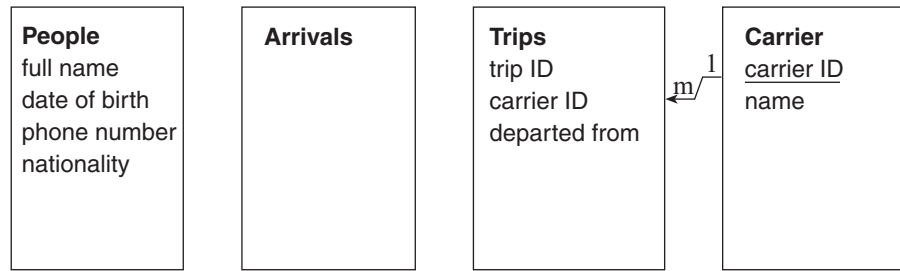
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(2 marks)

TOTAL: 18 marks

13. Ozland needs a database to record the details of all people who arrive in the country. The partial table design for the database, as shown below, includes a ‘Carrier’ table, which stores the names of companies that provide trips that bring people to Ozland.



carrier ID: underlined field(s) are the table’s key  
 1      m      → represents a one-to-many relationship

(a) (i) Describe the relationship between the ‘People’ and ‘Trips’ tables.  
 \_\_\_\_\_ (1 mark)

(ii) State the purpose of the ‘Arrivals’ table in terms of your answer to part (a)(i).  
 \_\_\_\_\_ (1 mark)

(b) The ‘Arrivals’ table must be able to record an arrival such as that by Ly Hun, who departed from Mayland on Zenith Airlines and arrived in Ozland on 4.11.2003.

- (i) Underline the field that should form the key to the ‘Trips’ table.
- (ii) Create a key for the ‘People’ table.
- (iii) Add fields to the ‘Arrivals’ table to record an arrival such as that by Ly Hun.
- (iv) Link the ‘People’, ‘Arrivals’, and ‘Trips’ tables, and indicate the type of relationship between them.
- (v) Underline the field or fields that should form the key to the ‘Arrivals’ table.  
 Justify your choice of field or fields.

\_\_\_\_\_  
 \_\_\_\_\_  
 (7 marks)

(c) The design of the database shown above requires the nationality field to store the full name of a country. This wastes storage space.  
 Modify the table relationship diagram so that it stores the nationality of people in an efficient way.  
 (2 marks)

(d) Additional data need to be stored in this database. Amend the table relationship diagram to store:

(i) the place of entry into Ozland (e.g. George airport). (1 mark)

(ii) all departures from Ozland, without adding another table.

Explain this amendment.

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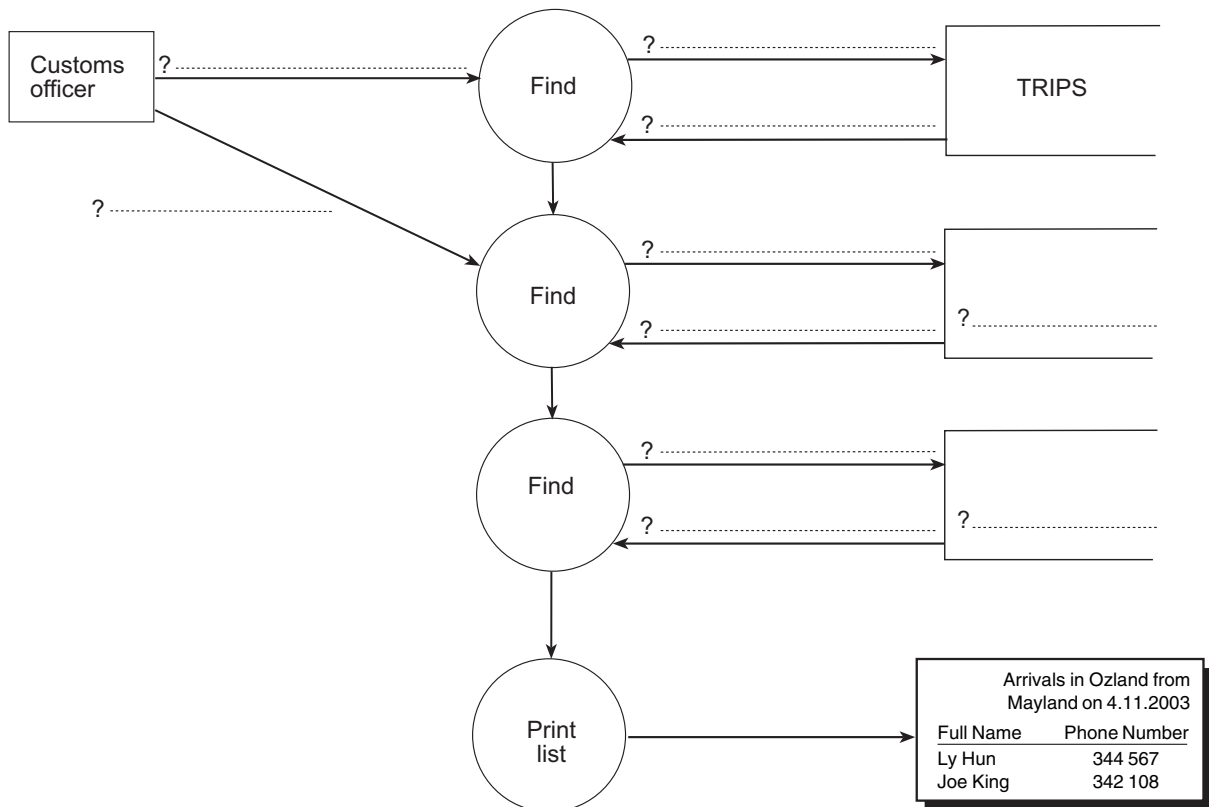


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(2 marks)

(e) A list is needed of all people who arrived in Ozland on 4.11.2003 on a trip that departed from Mayland, showing their full name and phone number.

Complete the following data-flow diagram for producing this list by writing the required field name(s) or table name next to each question mark (?).



(6 marks)

TOTAL: 20 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 18, 19, and 20 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.

### Wireless waiters

Waiters holding wireless hand-held PCs are increasingly appearing in restaurants to take orders, relay orders to the kitchen, and prepare bills for customers. The system is faster than a pen and paper method for taking orders, and can help management to track staff performance, order stock, and prepare wages.

Discuss the role of new technologies in restaurants.

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

- The ability of the wireless system to process data faster than a manual system. (5)
- The type of network that would be needed in such a restaurant. (6)
- The flow of data from the moment a waiter takes an order to the production of a customer's bill. (7)
- The implications of tracking the performance of staff. (6)
- The advantages of the wireless system to the management of the restaurant. (6)

15. Read the following extract.

### Storing precious memories

In the summer bush fires, families barely had time to escape before their houses burned down. The destruction of family photographs was by far the most devastating loss experienced by families. However, family photographs that were stored in digital form were saved more often than those that were not stored in digital form.

Discuss the process of digitising photographs for safer storage.

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

- Ways in which a photograph can be digitised. (6)
- Storage devices that can be used to store digital photographs, with a recommendation of the most appropriate device. (8)
- The process of storing digital photographs on a website. (6)
- The advantages and disadvantages of storing digital photographs on a website. (6)
- A sensible procedure that families should use to protect important digital data. (4)

16. Read the following extract.

**Email minefield**

Email, one of the most widely used modern communication systems, can be fraught with peril. Employers need to be aware that an email received by an employee could slow the operation of their business's network, or even destroy vital files stored on its servers, making them inoperable.

Discuss the impact of the widespread use of email in a business.

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

- The reasons for the widespread use of email as a communication system in a business. (6)
- How an email could slow the operation of a network. (6)
- How an email could destroy data. (6)
- Sensible procedures that should be used to prevent damage that could be caused by an email. (6)
- The economic and psychological implications of emails that cause damage. (6)







