



# Victorian Certificate of Education 2002

SUPERVISOR TO ATTACH PROCESSING LABEL HERE

## STUDENT NUMBER

Figures									Letter
Words									

# INFORMATION SYSTEMS

## Written examination

Wednesday 13 November 2002

Reading time: 11.45 am to 12.00 noon (15 minutes)

Writing time: 12.00 noon to 2.00 pm (2 hours)

## QUESTION AND ANSWER BOOK

### Structure of book

<i>Number of questions</i>	<i>Number of questions to be answered</i>	<i>Number of marks</i>
9	9	94

- Students are permitted to bring into the examination room: pens, pencils, highlighters, erasers, sharpeners, rulers, an approved graphics calculator (memory cleared) and/or 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 13 pages with a detachable insert containing a case study in the centrefold.

### Instructions

- Detach the insert containing the case study during reading time.
- Write your **student number** in the space provided above on this page.
- All written responses must be in English.

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

**Instructions**

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

Read the information provided in the detachable case study insert before you answer any questions.

You will need to refer to this information throughout the paper.

**Question 1**

- a. Explain how the implementation of the EASI Assessment System will contribute to achieving each of the aims described in the case study.

Aim	How system will help achieve aim
To take a leading role in the delivery of tests for assessment of industry certificate qualifications	<hr/> <hr/> <hr/> <hr/>
To ensure that the company's activities meet the needs of the students	<hr/> <hr/> <hr/> <hr/>
To develop the client base for the company at a national level	<hr/> <hr/> <hr/> <hr/>
To reduce the cost of providing high quality learning materials to students	<hr/> <hr/> <hr/> <hr/>

4 marks

b. Using the above aims of the organisation, propose two measurable system objectives.

Objective 1 \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Objective 2 \_\_\_\_\_

\_\_\_\_\_

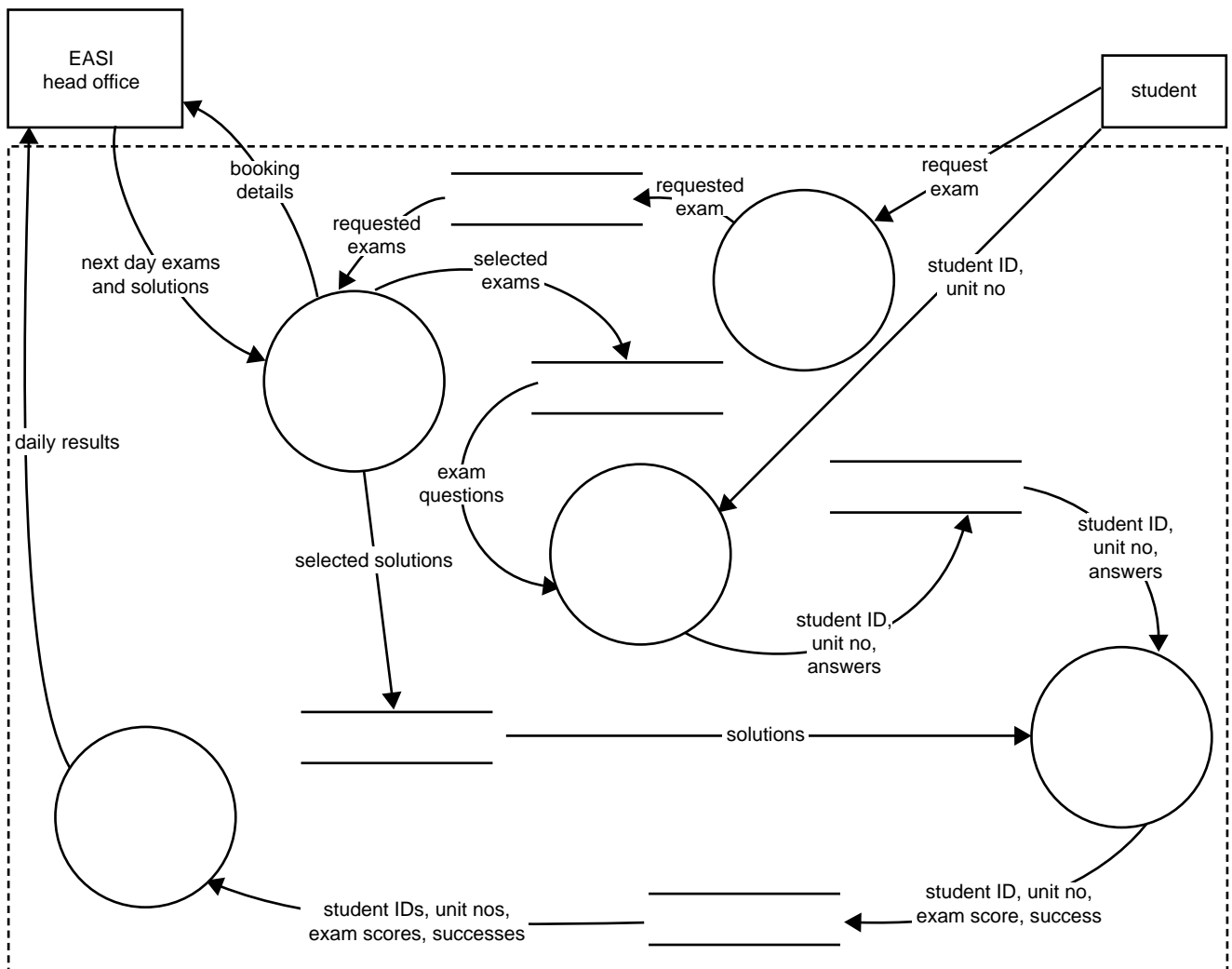
\_\_\_\_\_

2 marks

**Question 2**

Before this new system can be designed the flow of data through the system must be analysed. The manager, Stephen, has asked Antonia, the systems analyst, to document the data flow. Below is the data flow from when a student contacts an assessment centre to book an exam until the student's results are sent to head office.

Complete the data flow diagram by labelling the processes and data stores.



10 marks

**TURN OVER**

**Question 3**

In the discussions relating to the design of the assessment centres, three different types of networks are being considered.

- Bus Network
- Star Network
- Token Ring Network

a. Choose two of these networks and describe one advantage and one disadvantage of each.

Type of Network _____ Advantage <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>	Disadvantage <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
Type of Network _____ Advantage <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>	Disadvantage <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>

4 marks

- b. Which type of network would you recommend for the assessment centres? Provide two reasons to justify your choice.

Recommended network \_\_\_\_\_

Reason 1 \_\_\_\_\_

\_\_\_\_\_

Reason 2 \_\_\_\_\_

\_\_\_\_\_

3 marks

#### Question 4

To become an approved assessment centre it will be essential that students' responses to the questions are kept secure. It is also a concern that a rival company in the field, Monosoft, does not obtain copies of the exams or the solutions. After students sit an exam, their results are stored in the **results** file at the assessment centre. This file is electronically transferred to EASI head office at the end of the day. If a student fails the exam a copy of their result and their responses are also emailed to their unit tutor.

In designing the system at the assessment centre, Antonia needs to consider

- the technical specifications of the hardware required by the system
  - the functions of the software required by the system
  - procedures for ensuring the security of the system
  - communication of data between the assessment centre and EASI head office.
- a. Identify **one** way in which the hardware specifications for a **workstation** could be changed to ensure the exams are secure. Explain why this change is important. Refer to the given workstation specifications found in the Case Study Insert.

Change to hardware specification	Why this change is important
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

3 marks

- b. Identify two important technical hardware specifications of the **fileserver** and explain why these are important features.

Hardware specification 1 of the fileserver <hr/> <hr/> <hr/>	Why this is important <hr/> <hr/> <hr/>
Hardware specification 2 of the fileserver <hr/> <hr/> <hr/>	Why this is important <hr/> <hr/> <hr/>

6 marks

- c. Identify **two** important software functions of the **fileserver operating system** that will ensure that the exam data and student results are securely stored. Explain why these are important functions.

Fileserver – operating system function 1 <hr/> <hr/> <hr/>	Why this is important <hr/> <hr/> <hr/>
Fileserver – operating system function 2 <hr/> <hr/> <hr/>	Why this is important <hr/> <hr/> <hr/>

6 marks

**Question 5**

When a student logs onto the Assessment Centre Exam System the software will need to upload 100 multiple-choice questions relating to the unit detailed in the login screen. When a student completes an exam their answers will be written to the **student answers** file.

The student's answers will then be checked, and the exam data will be recorded in the **results** file.

An algorithm to mark the test and see if the student has successfully completed the exam has been written by the programmer, Li. ( See under additional information in the Case Study Insert.)

- a. Li must declare the variables used in this algorithm.

For each of the following variable types identify one variable used in this algorithm.

Variable types	Variable name
Alphanumeric	
Array	
Boolean	
Integer	

4 marks

- b. Write the missing line of the algorithm.

\_\_\_\_\_

2 marks

- c. Find and explain a logical error within the algorithm and write the correction.

Explanation of logic error \_\_\_\_\_

Correction \_\_\_\_\_

3 marks

**Question 6**

At EASI head office they need a procedure to be developed that will print out the certificates for the successful students. This information will be obtained from the **results** file uploaded from the assessment centre.

There are two types of certificates sent to the successful students.

- High distinction – if the student gets at least 95 out of 100 questions correct
- Pass certificate – if the student is successful but gets less than 95 correct

If the student is unsuccessful a letter, advising them to resit the exam after more study, is sent.

The following algorithm has been written.

Algorithm

```

START
  IF Student in Student Details File THEN
    IF Success THEN
      IF Exam_Score >= 95 THEN
        Print High Distinction Certificate
      ELSE
        Print Pass Certificate
      ENDIF
    ELSE
      Print Letter
    ENDIF
  ENDIF
STOP

```

Two sample files are needed to test the algorithm.

- a student details file
- a results file (received from the assessment centre)

The sample student details file to be used is shown below.

<b>Student ID</b>	<b>Name</b>	<b>Address</b>
GST20899	George Stewartson	37 South Road, Highville, 3193
NHA30232	Neil Hardie	1 Station St, Evensdale, 3820
SCH44209	Samantha Chang	8/83 Geode Road, Smithdate 2024
TDY67205	Terri Dyson	893 Young Drv, Jonesville, 3902

Valid units for testing purposes are

INTSYS237, GRAART247, INTGRA257, INTDES267, ADVGRA277, ADVDES287.



Create **four** test records to go into the sample results file and explain the reason for your selection of this data. Each record must test a different aspect of the algorithm.

student_ID	unit_no	exam_score	Success
_____	_____	_____	_____
<b>Reason</b>			
_____			
_____			
_____			

student_ID	unit_no	exam_score	Success
_____	_____	_____	_____
<b>Reason</b>			
_____			
_____			
_____			

student_ID	unit_no	exam_score	Success
_____	_____	_____	_____
<b>Reason</b>			
_____			
_____			
_____			

student_ID	unit_no	exam_score	Success
_____	_____	_____	_____
<b>Reason</b>			
_____			
_____			
_____			

8 marks

**TURN OVER**

**Question 7**

When the system is operational, the exams and solutions will be transferred from EASI head office to the assessment centres. Students will complete an exam, which will be corrected automatically, and the results communicated back to EASI head office. If the student does not pass, EASI will email their result and their exam responses to the unit tutor.

The systems analyst, Antonia, is considering the type of data communication link to be used between EASI head office and each assessment centre.

- a. Describe **one** advantage and **one** disadvantage for using either a direct line connection or an Internet connection.

Direct line connection

Advantage	Disadvantage
_____	_____
_____	_____
_____	_____
_____	_____

Internet connection

Advantage	Disadvantage
_____	_____
_____	_____
_____	_____
_____	_____

4 marks

- b. Which of the above connections would you recommend for the EASI system? Provide **two** reasons to justify your choice.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

4 marks

- c. Describe **two** procedures that can be used to ensure that only students enrolled by EASI are sitting exams at the assessment centres.

Procedure 1 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Procedure 2 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

4 marks

- d. The unit tutor will receive an email containing a student’s result and their exam responses from head office if a student has not been successful.

Give **two** ways that the data in these emails can be protected. Briefly explain how each way will protect the data.

Method of protection	Explanation
_____ _____	_____ _____ _____
_____ _____	_____ _____ _____

6 marks

- e. The assessment centre system will also need to be protected from other possible security breaches. Describe **two** physical security measures that can be implemented once the test files have been downloaded from the EASI head office to prevent the rival company from obtaining the files.

Physical security measure 1 \_\_\_\_\_  
 \_\_\_\_\_

Physical security measure 2 \_\_\_\_\_  
 \_\_\_\_\_

4 marks

**TURN OVER**

**Question 8**

After the new system has been fully installed EASI will need to employ people to maintain and operate the system.

List **three** different types of people who will need to be involved at either head office or the exam centres and outline the role of these people.

Title \_\_\_\_\_

Role \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Title \_\_\_\_\_

Role \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Title \_\_\_\_\_

Role \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

9 marks

**Question 9**

After the Assessment Centre Exam System has been implemented there will be a need to evaluate all aspects of the system to ensure that it is working to design specifications. Methods of evaluation need to be set up and regularly monitored.

Describe a method of evaluating the following aspects of the system. (Use a **different** method for each aspect.)

Aspect of the system	Method of evaluation
Running costs	<hr/> <hr/> <hr/> <hr/>
User friendliness of student interface	<hr/> <hr/> <hr/> <hr/>
Reliability of data transfer	<hr/> <hr/> <hr/> <hr/>
Disaster recovery plan	<hr/> <hr/> <hr/> <hr/>

8 marks

## CASE STUDY INSERT

Please remove from the centre of this book during reading time.

### Case study

Stephen Holding has seen a business opportunity to develop an open-learning and online assessment system for existing industry certificate qualifications, as other testing organisations use paper-based systems. He has created a new company called Electronic Assessment Software Inc (EASI) which has the following aims.

- to take a leading role in the delivery of tests for assessment of industry certificate qualifications
- to ensure that the company's activities meet the needs of students
- to develop the client base for the company at a national level
- to reduce the cost of providing high quality learning materials to students

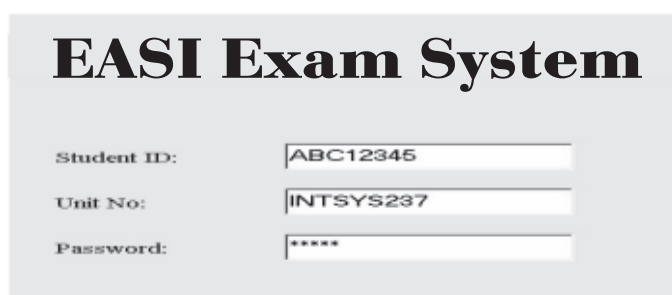
Stephen has the following ideas on how the new system could be developed. Students will enrol in courses containing up to six separate units, through head office in Melbourne, where they will be allocated a student ID number and password. This will allow students to have access to a protected web site where written course material can be downloaded. The students would then complete the activities in the course material in their own time. Students will also be given the name and email address of a unit tutor who will provide additional assistance if required.

Students will be assessed at approved assessment centres located across Australia. Each assessment centre will have a minimum of 20 workstations available for students to attempt EASI exams. When a student believes that they are ready to sit an exam in a unit, they will contact their closest assessment centre to book in for the specific unit exam, by giving their student ID and the unit no.

When a student contacts an assessment centre, the details of their booking will be recorded onto a purpose built Assessment Centre Exam System. Each evening, the exam system will connect to the EASI head office to automatically complete the following.

- send the results of that day's testing
- send the booking details for the next day's testing
- download the exams and the exam answers for the next day's testing

When a student arrives at an assessment centre to attempt an exam they will be required to log on to a computer and provide the following details.

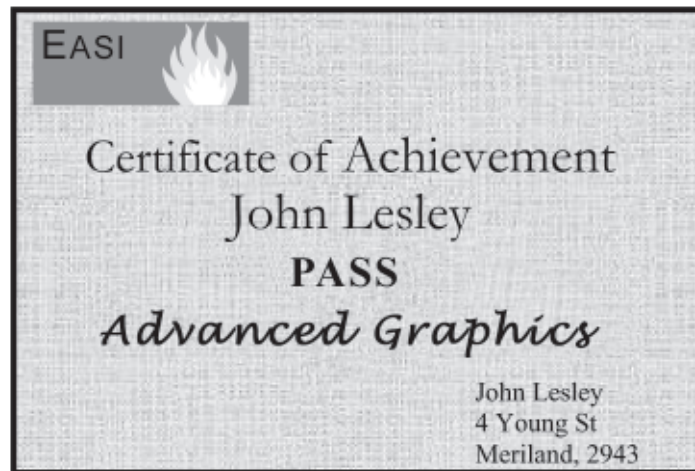


The image shows a login form for the EASI Exam System. The title 'EASI Exam System' is displayed in a large, bold, serif font at the top. Below the title, there are three input fields, each with a label to its left. The first field is labeled 'Student ID:' and contains the text 'ABC12345'. The second field is labeled 'Unit No:' and contains the text 'INTSYS237'. The third field is labeled 'Password:' and contains six asterisks '\*\*\*\*\*'. The form is set against a light gray background.

The unit exam that was downloaded from the EASI head office during the previous night will be accessed by the student. The student will then answer the exam questions by selecting the correct choice of A, B, C or D. These answers, as well as the student's ID and the unit number, will be sent to a **student answers** file.

The student's answers will be automatically compared with those in the **solutions** file. The student will be notified on the screen if they are successful or not. The exam score, whether the student is successful or not, the student ID and the unit number will be stored in a **results** file.

The **results** file containing all the exam data of the day would then be sent back to EASI head office where the file would be processed and certificates sent out to successful students. The students must gain at least 80% on each exam to be successful and gain a certificate. A high-distinction certificate will be awarded to students who gain at least 95%. The students must successfully complete each unit exam before receiving a password to download the material for their next unit. Students who are not successful receive a letter telling them to resit the exam.



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#### **Additional information required for Question 4**

Proposed workstation specifications for each student computer at the assessment centres.

800 MHz CPU  
64 MB RAM  
4 GB HDD  
3.5" FDD  
CD-RW drive  
15" colour monitor  
network card 10/100 Mbps  
101 keyboard  
3 button mouse  
laser printer  
video card  
sound card and speakers

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### Additional information required for Question 5

When a student logs onto the Assessment Centre Exam System the software will need to download 100 multiple-choice questions relating to the unit detailed in the login screen. When a student completes an exam their answers will be written to the **student answers** file.

The student's answers will then be checked, and the exam data will be recorded in the **results** file.

A procedure to mark the test and see if the student meets the requirements to pass must be written. The programmer, Li, has created the following algorithm. It contains errors and a missing line.

#### **PROCEDURE Check Responses** (student\_ID)

##### **START**

pass\_mark  $\leftarrow$  80

exam\_score  $\leftarrow$  0

Openfile (student\_answers)

Reset (student\_answers)

##### **REPEAT**

    Read (student\_answers, next\_student)

**UNTIL** next\_student = student\_ID {this finds the correct Student}

    Read (student\_answers, unit\_no)

    LoadSolutions (unit\_no) {Load correct answers into correct\_response}

**FOR COUNTER**  $\leftarrow$  1 TO 100 **DO** {Each test contains 100 questions}

    Read (student\_answers, choice) {reads next student response into variable choice}

**IF** choice = correct\_response[counter] **THEN**

        \_\_\_\_\_

**ENDIF**

##### **ENDDO**

Closefile (student\_answers)

Write ('You have', exam\_score, 'correct')

**IF** exam\_score = pass\_mark **THEN**

    Write ('Congratulations you have passed')

    Success  $\leftarrow$  True

##### **ELSE**

    Write ('Sorry, you need to resit the exam for', unit\_no)

    Success  $\leftarrow$  False

##### **ENDIF**

Openfile (results\_file)

Move to the end of the file

Write (results\_file, student\_ID, unit\_no, exam\_score, success)

**Closefile** (results\_file)

##### **STOP**

**END OF CASE STUDY INSERT**