

Victorian Certificate of Education 1997

INFORMATION SYSTEMS

Common Assessment Task 3: Written examination

Thursday 13 November 1997: 11.45 am to 2.00 pm

Reading time: 11.45 am to 12 noon

Writing time: 12 noon to 2.00 pm

Total writing time: 2 hours

QUESTION BOOK

Structure of book

<i>Number of questions</i>	<i>Number of questions to be answered</i>
10	10

Directions to students

Materials

Question book of 8 pages.

One or more script books.

An approved calculator may be used.

The task

Please ensure that you write your **student number** in the space provided on the front cover of the script book(s).

This question book contains only one case study. Answer **all** questions in the script book(s) provided.

Students should answer **either** Part A **or** Part B in Question 10. All questions are of equal value.

All written responses should be in English.

At the end of the task

Place all other script books inside the front cover of one of the used script books and hand them in.

You may retain this question book.

CASE STUDY

Paint Spot System

The existing system

Colourful Paints (Aust) Pty Ltd own and manage a chain of shops called The Paint Spot, which sell house paints to the general public.

In each of the stores Colourful Paints have installed the Pick-A-Paint system. This is a computer system which helps customers choose paint colours for their houses. It is designed to be used by customers without any assistance from the shop's staff. Except for a touch screen, all the other parts of the system are hidden from view.

At the start of a session the system displays a number of house styles, such as Federation and Colonial, from which the customer selects the style that is most like their own house. This is done by touching the appropriate place on the touch screen. The customer can then select indoor or outdoor views of the house. For each view, they can ask the computer to colour various parts of the house in any colours they choose. They then tell the computer which colours they want. The colours presented to the customer are all taken from the Colourful Paints range of paint colours. At the end of the session a ticket is printed. The ticket printer is built into the touch-screen unit. A ticket similar to the one shown on the right is printed.

*** Pick-A-Paint ***		
Part of House	Name of Colour	Type of Paint
Eaves	Brunswick green	oil gloss
Walls	new cream	acrylic flat
Windows & Door frames	Brunswick green	oil gloss
Trim	opaline green	acrylic flat
Printed 04-Apr-97		

Question 1

The Pick-A-Paint system has most of its hardware components hidden from view. Describe the hardware components it must have if it is to operate as indicated above.

Question 2

The Pick-A-Paint system uses a Graphical User Interface (GUI).

- What is the main hardware component of the GUI in the Pick-A-Paint system?
- Why would the designers of the system have decided to include a GUI rather than a Command Line Interface (CLI)?

The problem

Colourful Paints regularly conducts surveys of its customers. For the past three years the surveys have shown an increasing dissatisfaction with the Pick-A-Paint system. Customers say that the houses displayed by the system are not similar enough to their own houses. This means that customers still have to use their own imagination, so the system is not very helpful. Many customers also report that the colours of the paint they buy do not exactly match the colours they saw on the screen.

So far this dissatisfaction has not affected sales. This is because Colourful Paints has a policy that all of its stores should have at least one qualified and experienced painter serving customers. However, in recent times, such people have been harder to hire. Also, some managers in the company want to change this policy. They think an enormous saving can be made in wage costs by hiring ordinary shop assistants instead of ‘costly’ expert painters. These managers argue that technology can be used to replace the lost expertise.

Therefore the problem is to design an information system which helps customers choose paint colours for their houses and correctly mixes the paint they need, without the assistance of a qualified and experienced painter.

The proposed new system

The General Manager of Colourful Paints has asked Lemon Computers, the computer consultancy who designed the Pick-A-Paint system, to solve the problem. Two of the design specifications provided by the general manager are listed below.

Specification 1

The system must allow customers to select colours by:

- manipulating an image of a particular house style (this happens with the existing Pick-A-Paint system)
- choosing from a Colourful Paints colour chart displayed on a screen
- manipulating a scanned photographic image of their house.

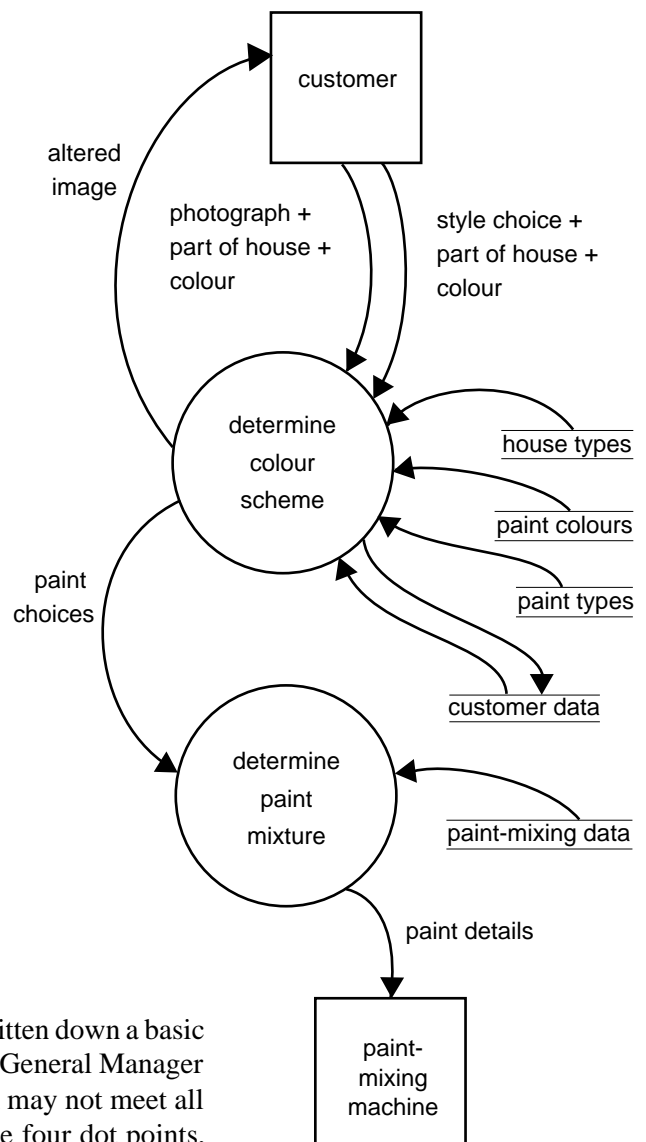
Specification 2

Once all the colours have been chosen, the system must be able to:

- print a copy of the screen showing the colours chosen by the customer
- store personal data about the customer and the colours they have selected for future reference
- calculate the amount of paint required
- mix the required paints.

Question 3

One of Lemon Computer’s design engineers has quickly written down a basic dataflow diagram of the new system, as shown above. The General Manager of Colourful Paints is concerned that the dataflow diagram may not meet all the requirements in design **specification 2**. For each of the four dot points, explain whether the dataflow diagram meets the specification.



To minimise the costs of the new system, Lemon Computers proposes to upgrade the existing system by adding a second computer. The new system will control a paint-mixing machine and any other necessary equipment, such as a scanner.

Question 4

Draw and label a diagram showing how all the existing and new equipment will be connected together.

Question 5

Colour printers with the following specifications are available for the system. Which type should Lemon Computers recommend? Justify your answer.

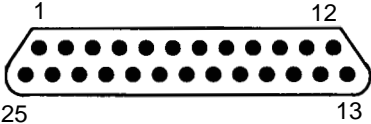
Type	Cost of printer \$	Dots per inch	Colour quality	Warm up time (sec)	Pages per minute	Cost per page (cents)
Dot matrix	250	180	fair	0	0.33	12
Ink-jet	400	360	good	0	1	60
Thermal transfer	950	360	very good	60	0.5	80
Laser	8000	600	very good	90	6	25

Di Hugh & Sons manufacture a paint-mixing machine. Lemon Computers will supply the new computer and scanner. The specifications for these items are given on page 5.

Question 6

Using the information presented on page 5, describe three possible compatibility problems.

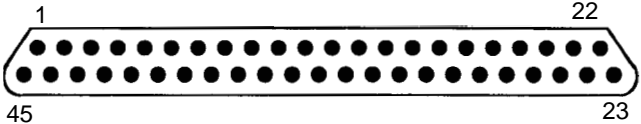
The Lemon computer

Feature	Specification
RAM	16 Mbytes
Hard disc	IDE 1.6 Gbytes
Floppy disc drive	3½ inch 1.44 Mbytes
Parallel port I/O connector	25-pin D-connector (12 volt signals) 
Serial port I/O connector	25-pin D-connector (5 volt signals)
Serial port I/O connector	9-pin D-connector (5 volt signals)
Keyboard connector	5-pin DIN (5 volt signals)
Monitor connector	15-pin D-connector (5 volt signals)

The Lemon scanner

Feature	Specification
I/O connector	50-pin SCSI connector
Colour system used	RGB (R ed, G reen, B lue – as used in computer monitors)
Resolution	1200 dpi
Time per page	30 seconds

The Di Hugh paint mixer

Feature	Specification
I/O connector	45-pin D-connector (–20 volt to + 20 volt signals) 
Colour system used	CMYK (C yan, M agenta, Y ellow, blacK – as used in high quality colour printers)
Paint bases	Able to select one of four varieties (matt, semi-matt, semi-gloss and high gloss)
Paint-mixing time	300 to 600 seconds

A special interface card has been designed for installation in the new computer. This interface card will overcome the problems of connecting the paint-mixing machine to the new computer.

The I/O lines on the interface card have been mapped (connected) to memory locations in the new computer, as indicated in the table below.

Symbolic memory address	Data stored at this address	Connected to pin(s)	Purpose
CYAN	Cyan colour value	1 – 8	Sends the amount of cyan needed to mixer
MAGENTA	Magenta colour value	9 – 16	Sends the amount of magenta needed to mixer
YELLOW	Yellow colour value	17 – 24	Sends the amount of yellow needed to mixer
VOLUME	Volume of paint in ml	25 – 40	Sends the volume of paint needed to mixer
TYPEOFBASE	Type of base	41 – 42	Sends type of base to mixer 0 – use matt base 1 – use semi-matt base 2 – use semi-gloss base 3 – use high gloss base
STARTMIXING	Start mixing signal	43	Changing this value from 0 to 1 sends a signal to the mixer to start mixing. If the mixer is busy this signal is ignored.
FINISHEDMIXING	Finished mixing signal	44	Signal from mixer sets memory location to 0 if mixer is busy, or to 1 if mixing has finished.

Question 7

To allow the computer to control the paint-mixing machine, you are required to provide a ‘Device Driver’ procedure called MixPaint to drive the interface card. The following parameters will be passed to the MixPaint procedure: red, green, blue, CanSize and BaseType. The procedure should monitor and/or set appropriate pins to mix a batch of paint. It should not end until the batch of paint has been mixed. Represent your procedure using an appropriate format.

To assist you in this task, two procedures named **ConvertColour** (Figure A) and **ConvertVolume** (Figure B) have already been written, as described on page 7.

The existing Pick-A-Paint program uses the following values for the BaseType parameter: 1 for matt, 2 for semi-matt, 3 for semi-gloss and 4 for high gloss. The driver procedure should take this into account.

Procedure ConvertColour (red, green, blue)

This procedure uses the parameter values red, green and blue to calculate the equivalent cyan, magenta and yellow values. It then stores these new values in memory locations CYAN, MAGENTA and YELLOW.

Figure A**Procedure ConvertVolume (CanSize)**

This procedure takes the parameter value CanSize and calculates the equivalent volume of paint in ml. It then stores this new value in memory location VOLUME. The existing paint-mixing data table uses 1 to represent a half litre can, 2 to represent a one litre can, 3 to represent a two litre can, and 4 to represent a four litre can. As an example this procedure is listed below.

Procedure ConvertVolume (CanSize)

Begin

VOLUME ← 0

If CanSize = 1 Then VOLUME ← 500

If CanSize = 2 Then VOLUME ← 1000

If CanSize = 3 Then VOLUME ← 2000

If CanSize = 4 Then VOLUME ← 4000

End ConvertVolume

Figure B**Question 8**

It will be very costly for Colourful Paints to implement the new system in all of its stores. Therefore they want to trial the system in three stores and then evaluate the success of this trial. Propose and explain a strategy to measure the success of the new system in meeting each of the following goals.

- to increase paint sales
- to increase customer satisfaction and loyalty
- to decrease staff costs

Question 9

During the trial of the new system, staff at the three Paint Spot stores were surprised to find that many customers needed to ask for assistance when using the system.

Describe two possible measures that the management of Colourful Paints could take to solve this problem.

TURN OVER

Question 10**Answer either Part A or Part B****Part A**

Until two years ago Brian was a painter with about 30 years experience in the industry. He felt that he was becoming a bit too old to go around climbing ladders and when he was offered a job at 'The Paint Spot' as the store's painting expert he took it. Brian's cheerful manner and expert advice to customers has earned 'The Paint Spot' the reputation of being the best paint shop in the Warrego district. However, if the new system is installed in all stores the customers will be able to get all the advice and information that they require from the computer, and Brian's experience will no longer be needed.

Can a machine really take the place of a human being with 30 years experience?
Discuss this in detail. At least four points should be mentioned in your answer.

OR**Part B**

Colourful Paints want as many customers as possible to use the computer system to help them choose paint colours. To make sure that this happens, Colourful Paints will instruct all stores to:

- install the touch screens so that adults must stand up to reach them. This will prevent small children from playing with the system
- display signs strongly encouraging the use of the touch screens before any discussions take place with staff.

What issues might Colourful Paints have to deal with when these instructions are carried out? At least four points should be included in your answer.

END OF QUESTION BOOK