

**2006****HIGHER SCHOOL CERTIFICATE**

Sample Examination Paper

# INFORMATION PROCESSES AND TECHNOLOGY

**General Instructions**

- Reading Time – 5 minutes
- Working Time – 3 hours
- Write using blue or black pen
- Write your student number at the top of this page

**Total Marks – 100****Section I****20 marks**

- Attempt Questions 1–20
- Allow about 40 minutes for this section

**Section II****40 marks**

- Attempt Questions 21–24
- Allow about 1 hour and 10 minutes for this section

**Section III****40 marks**

- Attempt TWO questions from Questions 25–28
- Allow about 1 hour and 10 minutes for this section

**Directions to school or college**

To ensure maximum confidentiality and security, examination papers used for trial examinations must NOT be removed from the examination room or used with students for revision purposes until Monday 4 September 2006.

The purchasing educational institution and its staff are permitted to photocopy and/or cut and paste examination papers for educational purposes, within the confines of the educational institution, provided that: 1. the number of copies does not exceed the number reasonably required by the educational institution to satisfy their teaching purposes; 2. copies are not sold or lent.

All care has been taken to ensure that this sample examination paper is error free and that it follows the style, format and material content of the current NSW syllabus. Candidates are advised that the authors of this examination paper cannot in any way guarantee that the actual Board of Studies Examination will have a similar content or format.

**Section I**  
**20 marks**

Allow about 40 minutes for this section

Select the alternative A, B, C, or D that best answers the question. Fill in the response sheet clearly.

1	X			
---	---	--	--	--

If you think you have made a mistake, blank out the incorrect answer and fill in the new answer.

1	X			X
---	---	--	--	---

If you change your mind and have crossed out what you consider to be the correct answer, then indicate the correct answer by writing the word *correct* and drawing an arrow.

1	X			X
---	---	--	--	---

Correct →

## Section I

20 marks

Attempt Questions 1–20

Allow about 40 minutes for this section

Use the multiple choice answer sheet

---

- 1 A student quotes material obtained from the Internet for a history essay on the Vietnam War. Which of the following statements is correct?
- A The source of the material should be researched and referenced.
  - B The material is likely to be out of date.
  - C Quoting the material will involve plagiarism.
  - D The student should not quote directly, but rewrite the material in his/her own words.

- 2 A Gantt chart has been used as a project management tool. It records:
- A anticipated commencement dates only for stages of a project
  - B actual commencement and finish dates only for stages of a project
  - C both anticipated and actual commencement and finish dates for stages of a project
  - D those stages of a project which are behind schedule and by how much

- 3 The following diagram represents the conversion between an existing system and a new system.  
Which method of conversion is illustrated here?



- A Direct
  - B Phased
  - C Parallel
  - D Pilot
- 4 Which of the following personnel would be responsible for the overall planning of a new information system?
- A Network manager
  - B Company manager
  - C Programmer
  - D Systems analyst

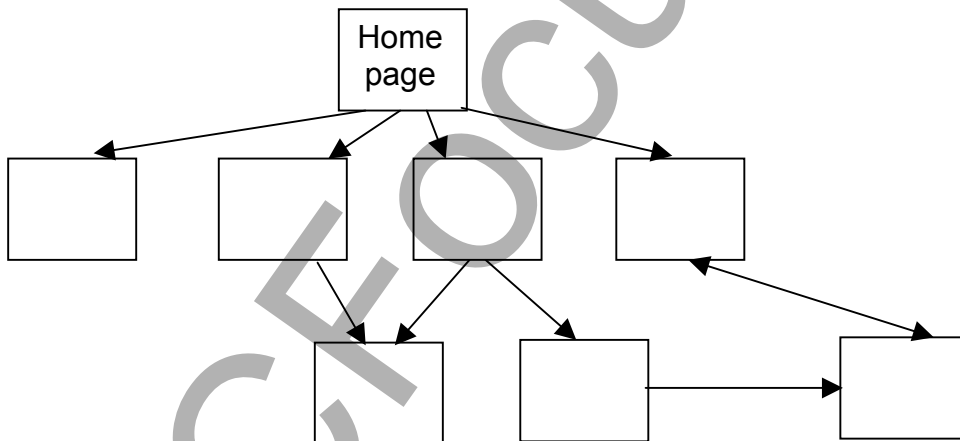
- 5 Consider the following two addresses each of which successfully loads a page with the name “Completed\_Tutorials” and displays it in a web browser:

- (1) *file:///HardDrive/DirectorAcademic/Learning/Completed\_Tutorials.html*
- (2) *http://www.macromedia.com/software/director//Completed\_Tutorials.html*

Which of the following statements is true?

- A Both addresses point to the same copy of the file.
  - B The first address points to a local file and the second to a remote file.
  - C The first address points to a remote file and the second to a local file.
  - D The first address points to a local file and the second to the same copy of the file via a remote server.
- 6 A website has been established for on-line registration of a software product. The company uses a check digit as part of the registration number to ensure it is genuine. This is an example of:
- A data verification
  - B data accuracy
  - C data validation
  - D data redundancy
- 7 An NIC (Network Interface Card) is a hardware component of every computer essential for network communications. Its main function(s):
- A is handshaking
  - B are establishing Ethernet protocols and a unique ID code on the network
  - C is storing often used data
  - D is to allow two computers to be connected
- 8 An information system is designed for:
- A customers
  - B managers
  - C participants
  - D users
- 9 The use of a prototype in information systems development can be beneficial because it can:
- A result in faster development of a final solution
  - B assist in the selection of software applications
  - C clarify understanding of the problem by participants
  - D assist in correcting programmers' coding errors

- 10** The information process which forms the main task of a DBMS is:
- A organising
  - B storing and retrieving
  - C displaying
  - D analysing
- 11** The schema of a database consists of:
- A entities, attributes and relationships
  - B fields, records and relationships
  - C sorting, searching and organising
  - D primary and secondary fields
- 12** Packet-switching as a method of data transmission has advantages over other methods because:
- A packaging data avoids data loss in transmission
  - B recipient addressing is more accurate when using packets of data
  - C packages of data can be sent via less busy network paths
  - D the sender is able to be traced
- 13** The following storyboard represents the navigational plan for a proposed website.



This navigational plan is inadequate because:

- A the end screen should appear on a new row
- B no graphics or buttons are shown
- C some navigation paths are ambiguous
- D there are insufficient navigational paths shown

Use the following information to answer Questions 14 and 15.

Below is a sample of data to be entered in a database called *Cellar* for a winemaker. The column marked *Ageing* indicates the number of years the winemaker recommends keeping the wine so it reaches its best. After this time the wine may deteriorate and before this time it has not acquired its best qualities.

Name_of_wine	Type	Ageing (years)	Year_of_vintage	In_stock (litres)
Woop Woop	Red	1	1999	1000
Oak Creek	Red	4	2003	200
Baysview	White	1	2005	400
Bent Creek	Red	3	2005	1500
Salisbury	White	2	2004	1100

- 14 The winemaker wishes to determine which wines are ready for sale in 2006. Which of the following SQL commands would result in Woop Woop as the only record, presuming *Year\_of\_vintage* is a number field?

- A     SELECT Name\_of\_wine  
       FROM Cellar  
       WHERE (2006 –Year\_of\_vintage) = Ageing
- B     SELECT Name\_of\_wine  
       FROM Cellar  
       WHERE (Year\_of\_vintage + Ageing) > 2006
- C     SELECT Name\_of\_wine  
       FROM Cellar  
       WHERE (2006 –Year\_of\_vintage) > Ageing
- D     SELECT Name\_of\_wine  
       FROM Cellar  
       WHERE (Year\_of\_vintage + Ageing) < 2006

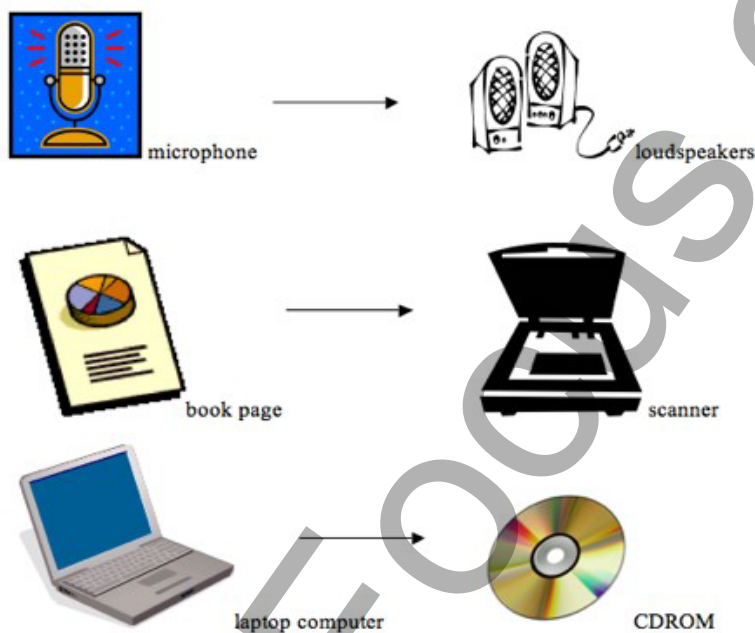
- 15 Which of the following describes a recommended selection of field types for this database?

- A     1 static text, 1 static number, 3 drop-down numeric
- B     2 static text, 3 drop-down numeric
- C     1 static text, 1 static number, 1 drop-down text, 2 drop-down numeric
- D     2 static text, 2 static number, 1 drop-down text

- 16 In checksum error detection, which of the following is sent to the receiver?
- A The data and the checksum
  - B The sum of the data and the checksum
  - C The checksum only
  - D The data only

- 17 In cyclic redundancy checking, what is the CRC?
- A the divisor
  - B the quotient
  - C the dividend
  - D the remainder

18



From top to bottom above the most likely encoding and decoding data conversions illustrated are as follows:

- A analog to analog; analog to digital; analog to digital
  - B analog to analog; analog to digital; digital to digital
  - C analog to digital; analog to digital; analog to digital
  - D analog to digital; analog to analog; digital to digital
- 19 One difference between a context diagram and a data flow diagram is that in a context diagram:
- A the entire system is represented by a single circle
  - B all flow lines are towards processes
  - C there is only one entity
  - D a complex system is shown in modular form

- 20** Which statement best describes the function of a router when compared to a switch or bridge?
- A It has greater control than a switch or bridge.
  - B It responds quicker than a switch.
  - C It responds quicker than a bridge.
  - D It is identical in operation to both a switch and a bridge.

**End of Section I**



## Section II

### 40 marks

#### Attempt Questions 21–24

Allow about 1 hour and 10 minutes for this section

Use a SEPARATE writing booklet for each question

#### Question 21 (10 marks)

Marks

Read the following extract and answer the questions below:

#### **Wharves piled high as Customs computer fails**

By Tim Dick and Joseph Kerr

*Sydney Morning Herald*

October 21, 2005

#### **Backlog ... hundreds of containers await Customs clearance at Port Botany.**

The Customs Service's new computerised system could hardly have broken down at a worse time.

Two months before Christmas the week-old system, which is meant to speed up clearance times, has managed to cause importers headaches as their orders sit on wharves, stranded by serious delays in Customs approval.

"Ships are arriving [at Port Botany] for the Christmas peak; there couldn't be a worse time to introduce a new computer system," an official said.

"The entire state relies on this port to function properly, especially at this time of year."

He said port storage was almost full, while the Australian Federation of International Freight Forwarders said even if Customs went back to its old system, it would be difficult to clear the backlog.

What used to take two minutes under the old system is now taking between five and 30 times longer, depending on the complexity of the import.

"This project has had a lead time of 10 years and blew out from \$30 million up to \$250 million, and is still far from matching industry's expectations."

A spokesman for the Minister for Customs, Chris Ellison, said he had talks in Broome with Customs and industry representatives yesterday. He insisted the Government was working hard to have the concerns dealt with, and Customs staff were trying to clear the backlog.

There were obvious important security benefits attached to the new system, he said, and industry wanted to keep it.

- |     |  |   |
|-----|--|---|
| (a) | Identify the likely method of conversion used at Customs in moving from the old to the new system.   | 1 |
| (b) | The headline states: 'Customs computer fails'. Discuss the accuracy of this statement.   | 2 |
| (c) | Identify aspects of a feasibility study which should have been discussed when planning the new system.   | 3 |
| (d) | Suggest two conversion methods which may have overcome the problems outlined in the article and explain the benefits of each of these methods. | 4 |

**Question 22** (9 marks)**Marks**

After completing an online multiple-choice quiz the website delivers the following screen to allow individual results to be delivered to the teacher and others.

E-mail Your Results		
My name is (first last):	<input type="text"/>	
E-mail my results to:		
	E-mail address:	Send as:
<input type="checkbox"/> Me:	<input type="text"/>	Text <input type="button" value="v"/>
<input type="checkbox"/> Instructor:	<input type="text"/>	Text <input type="button" value="v"/>
<input type="checkbox"/> TA:	<input type="text"/>	Text <input type="button" value="v"/>
<input type="checkbox"/> Other:	<input type="text"/>	Text <input type="button" value="v"/>
<a href="#">Help</a>		<input type="button" value="E-Mail Results"/>

The following instructions accompany this screen in the form of online help:

<p>To specify recipients of and e-mail formats for your results</p> <p>In the dropdown box next to each name you selected, click one option to specify a way to send results to each recipient:</p> <p>A: As plain text in the body of an e-mail message</p> <p>B: As HTML in the body of an e-mail message</p> <p>C: As a text attachment to an e-mail message</p> <p>D: As an HTML attachment to an e-mail message</p>
--

- |  |          |
|--|----------|
| (a) Choices for the ways in which the results can be sent are made using dropdown boxes. Justify this approach when compared with other methods. | <b>1</b> |
| (b) Identify software applications which could be used to display the attachments described for <i>each</i> of choices C and D.                  | <b>3</b> |
| (c) Compare and contrast choice A, sending the results “using plain text” with that of choice B, “using HTML in the body of an e-mail”.          | <b>3</b> |
| (d) Suggest two improvements to the interface “E-mail your results” shown above.   | <b>2</b> |

**Question 23** (12 marks)**Marks**

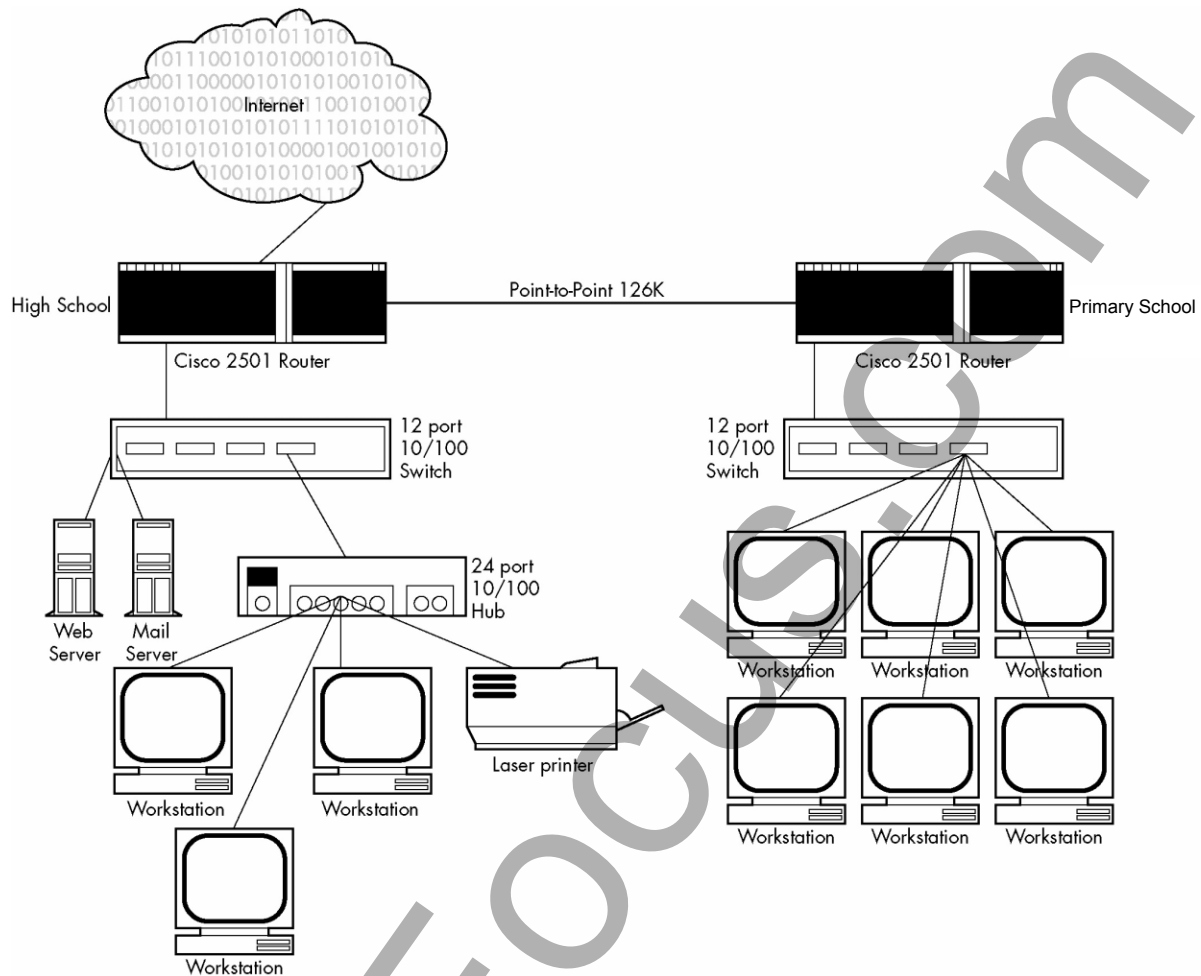
The following data extract has been exported from a school's database of enrolled students and when opened in a spreadsheet application appears as follows:

ID	Surname	Given names	Gender	Address	Year at school	DOB	Home phone	Father's work	Mother's work
1000234	Greville	Paula	F	12 Sensis Av	7	14.12.93	7891111	7895613	7893489
1000151	Edene	Sam	F	3 Lone Pine Cr	7	15.11.93	7891234	7898354	7899756
1000897	Jenkins	Jeremy	M	14 Sensis Av	7	30.9.93	7892222	7894598	7896579
1000564	Romano	George	M	114 Pacific Hwy	8	21.4.92	5612345	7893356	5223466
1000367	Park	Jason	M	76 High St	8	12.1.92	5212367	5234599	7894523
1000111	Ng	Elaine	F	34 Gratula Rd	9	17.12.91	6624172	5341423	5346342
1000199	Kim	James	M	27 Frieda St	10	15.10.91	7899085	7895433	7893333
1000908	Edene	Mariala	F	3 Lone Pine Cr	11	15.10.90	5615628	5612399	5612355
1000556	Kim	Honey	F	27 Frieda St	12	25.12.88	4425632	4423544	4426667

- (a) The field for Suburb has not been included in the extracted data shown above. Explain why Suburb should be a separate field rather than being included with the Address field. **1**
- (b) An ID (Identification number) has been included for each student. Justify the existence of this field. **1**
- (c) The data above was exported from a database and opened in a spreadsheet application. What issues should be considered in checking the data in the spreadsheet file? **3**
- (d) The data appears to have been sorted in the database prior to export. Identify three ways in which this sort could have been performed. **3**
- (e) Normalise this flat-file data into two separate database files by listing fields in each and identify any relationships, primary and secondary fields. If necessary create and describe additional field(s). Do not reproduce any data. **4**

**Question 24** (9 marks)**Marks**

The following diagram shows the network for two school LANs and their connection to the Internet.



- (a) The diagram illustrates the positioning of various items of hardware. Compare and contrast the functions of a switch, hub and router. 3
- (b) Analyse the point-to-point connection between the High school and Primary school, referring to both the likely media and issues of speed. 2
- (c) Discuss the various ways possible for connecting the network to the Internet, and refer to downloading and uploading speeds. 2
- (d) The laser printer shown is connected to a print server controlled by the Web server shown. Outline the functions of a print server. 2

**End of Section II**

### Section III

40 marks

Attempt TWO questions from Questions 25–28  
Allow about 1 hour and 10 minutes for this section

Answer each question on a SEPARATE page/booklet.

If you include diagrams in your answer, ensure that they are correctly labelled.

Question 25 – Transaction Processing Systems (20 marks)			Marks
(a)	(i)	Define the term <i>data warehousing</i> and give an example.	3
	(ii)	Define the term <i>differential backup</i> and give an example.	3

Use the following information to answer parts (b) and (c).

*AnimationWorld* is a company selling animation tutorials which exists only in the form of a website. Customers may select a product (one of a series of tutorials in the form of downloadable QuickTime movies) and pay online via credit card.

*AnimationWorld* uses a second company, *PayEasy*, which specialises in online credit card transactions to receive the payment and issue a uniquely addressed link to allow the download of the tutorial files. This address expires after 48 hours and is limited to two downloads.

**From:** order@payeasy.com  
**Subject:** Order Info | Animation\_Tutorials  
**Date:** 21 April 2005 12:12:20 PM  
**To:** wdisney@oze-mail.com.au  
**Reply-To:** AnimationWorld@lonelyplanet.com

Thanks!!!!  
 Your AnimationWorld download links are below.  
 -----  
 USER LICENSE...  
 By downloading these files you agree they are licensed on a single-user basis. You also agree that reassembling, redistributing, or reselling these tutorials or flash files in any way is strictly forbidden.  
 -----

Here's your Download URL. This is your personal download spot, so SAVE THIS LINK....

IMPORTANT: The Downlinks below will expire in 48 hours and is limited to a maximum of 2 downloads. You will need to request additional downloads after that time period. Please keep this e-mail for your reference.

**Product:** Animation\_Tutorials  
**Download Link:** [http://payeasy.com/d1?txn\\_id=8R3421876TM456342](http://payeasy.com/d1?txn_id=8R3421876TM456342)

Transaction ID: 8R3421876TM456342  
 You can view the details of this transaction at:  
[http://payeasy.com/buy/my?txn\\_id=8R3421876TM456342](http://payeasy.com/buy/my?txn_id=8R3421876TM456342)

- (b) (i) Design a web-based data entry screen for users to choose a selected tutorial and provide credit card details. Clearly indicate the position and nature of all screen elements and justify your choices. 4
- (ii) Explain the reasons for limited downloads and the time expiration requirements. Discuss which company, *PayEasy* or *AnimationWorld*, is likely to have imposed such requirements? 3
- (iii) Outline the processing of a single transaction. 2
- (c) Identify this system as real-time or batch processing and compare and contrast this transaction system to a mail order system in which CDs are mailed to users in response to either phone, mail or online enquiries. 5

**Question 26 – Decision Support Systems (20 marks)****Marks**

- (a) (i) Describe and provide an example of the characteristics of an *artificial neural network*. 3
- (ii) Define an *inference engine* and provide a practical example to illustrate its role in a specific expert system. 3

Use the following information to answer parts (b) and (c).

The following decision table has been constructed to assist help-desk employees to answer computer printer problems. The company wishes to convert this known data into a more convenient expert system tool for these employees.

		A	B	C	D	E	F	G	H
Conditions	Printer does not print	Y	Y	Y	Y	N	N	N	N
	Red light flashing	Y	Y	N	N	Y	Y	N	N
	Printer unrecognised	Y	N	Y	N	Y	N	Y	N
Actions	Check power cable			✓					
	Check printer-computer cable	✓		✓					
	Ensure software installed	✓		✓		✓		✓	
	Check/replace ink	✓	✓			✓	✓		
	Check paper jam		✓		✓				

- (b) (i) You have been asked to construct the rules to create a knowledge base for use by the expert system. Write rules for each of the columns **E** and **H**. 2
- (ii) Construct a decision tree to represent all data in the table. 4
- (iii) Describe two main characteristics of an interface suitable for this system. 2
- (c) Over time, help-desk employees realise that some of the conditions above are far more likely to affect the outcome than others and far more likely to occur. Explain how a neural network decision support system could be created to include this knowledge and discuss how this expert system and a neural network could effectively work together. 6

**Question 27 – Automated Manufacturing Systems (20 marks)**

**Marks**

- (a) (i) Define the terms *CAD* and *CAM* and provide an example of the application of CAM in automated manufacturing systems. **3**
- (ii) Describe the function of a *microprocessor* as a component in automated manufacturing systems and provide another common term used to describe this component. **3**

**Use the following information to answer parts (b) and (c).**

A Riverina bottling company, JUICY, is owned by an orchardists' co-operative and provides a bottling service to regional orange growers. The oranges are delivered to the cannery, washed, juiced and sugar is added. The plastic bottles are washed, filled, sealed and tested for leakage and incorrect filling. Finally, they are labelled and packed in boxes.

- (b) (i) Represent these automated processes as three separate systems using three separate block diagrams. **3**
- (ii) Draw two diagrams representing two different methods of organising the three separate systems into a single system. **2**
- (iii) Underdamping is observed to be a regular problem. Explain the nature of underdamping and discuss how this issue of incorrect filling could be corrected. **3**

- (c) Local orchardists have decided to ask JUICY to distribute and dispatch orders of juice to retailers throughout Australia.

JUICY proposes integrating production with an automated inventory tracking system where the manager can find out at any time:

- the number of items in stock
- the number of items ordered
- the movement of items from storage to delivery dock
- the movement of items from delivery dock to the customer.

Critically analyse the JUICY system in terms of the information processes of collecting and displaying, with particular emphasis on the process of collecting.

**6**



### Question 28 – Multimedia Systems (20 marks)

### Marks

- (a) (i) Define *video compression* and outline one method for achieving it. 3
- (ii) Define *sound notes* and provide an example of their use. 3

**Use the following information to answer parts (b) and (c).**

Sarah has selected contemporary youth culture as her topic for an interactive multimedia project. She has decided the purpose of her project will be to allow users to examine the three themes: “Body brainwash”, “Fashion victim” and “Friends and fun”, allowing users to explore at their own pace. The screenshot below shows the menu for her project created using authoring software.

There are two other windows shown superimposed on Sarah's project stage: a Cast window and the Score window.



- |     |       |  |   |
|-----|-------|--|---|
| (b) | (i)   | Identify three possible media types in the Cast and state which of these multimedia types appear as part of the menu page shown.               | 3 |
|     | (ii)  | Identify the type of multimedia storyboard layout Sarah should select for her project and state the reasons for your answer.                   | 2 |
|     | (iii) | Discuss ways in which Sarah could effectively use navigation and hypermedia in her project to explore her three chosen themes.                 | 3 |
| (c) |       | Critically examine three social and/or ethical issues Sarah should consider in her project if she plans to display it on her personal website. | 6 |

## End of paper

**This page has been intentionally left blank**

**Section I – Multiple choice****Answer sheet**

Place an **✕** in the response box for the alternative A, B, C or D that best answers the question.

	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
<b>1</b>				
<b>2</b>				
<b>3</b>				
<b>4</b>				
<b>5</b>				
<b>6</b>				
<b>7</b>				
<b>8</b>				
<b>9</b>				
<b>10</b>				
<b>11</b>				
<b>12</b>				
<b>13</b>				
<b>14</b>				
<b>15</b>				
<b>16</b>				
<b>17</b>				
<b>18</b>				
<b>19</b>				
<b>20</b>				

**This page has been intentionally left blank**