2003

HIGHER SCHOOL CERTIFICATE
EXAMINATION

Information Processes and Technology

General Instructions
- Reading time – 5 minutes
- Working time – 3 hours
- Write using black or blue pen
- Draw diagrams using pencil

Total marks – 100

(**Section I**) Pages 2–12

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

(**Section II**) Pages 13–16

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

(**Section III**) Pages 17–25

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

Section I

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

Use the multiple-choice answer sheet.

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

Sample: $2 + 4 =$ (A) 2   (B) 6   (C) 8   (D) 9

A ◯   B ●   C ◯   D ◯

If you think you have made a mistake, put a cross through the incorrect answer and fill in the new answer.

A ●   B ✖   C ◯   D ◯

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 as follows.

correct

A ✖   B ✖   C ◯   D ◯

1   What type of information process is capturing data from a person requesting cash from an EFTPOS terminal?

(A)   Analysing

(B)   Collecting

(C)   Organising

(D)   Processing

2   At what stage of a project would a system be measured against its design specifications?

(A)   Designing

(B)   Evaluating

(C)   Prototyping

(D)   Implementing

3   A website displays the following definition, and each underlined word is a link to another definition.

> A storage area network (SAN) is a high-speed special-purpose **network** that interconnects different kinds of storage devices with associated **servers**. Typically, a storage area network is part of the overall network of computing resources for an **organisation**.

What is the name given to this method of data organisation?

(A)   HTML

(B)   Metadata

(C)   Hypertext

(D)   Relational

4   Which of the following would be most appropriate to demonstrate screen design to users?

(A) Prototype

(B) Context diagram

(C) System flowchart

(D) Schematic diagram

5   Which of the following describes the nature of communication in teleconferencing?

(A) Same-time, same-place

(B) Same-time, different-place

(C) Different-time, same-place

(D) Different-time, different-place

6   Which terms are used to describe the structure of data stored in a database?

(A) Character, field, record, file

(B) Field name, size, type, attribute

(C) Direct, sequential, indexed sequential, random

(D) Relational, hierarchical, hypertext, hypermedia

7   Why is it important to involve users in the development of an information system?

(A) Users are best at designing systems.

(B) Users need to ensure that the development stays on track.

(C) Users always have an in-depth knowledge of the technology.

(D) Users are more likely to accept a system to which they have contributed.

8 Which pair of the following diagrams illustrates a bus network topology and a star network topology?

<u>Bus</u>   <u>Star</u>

(A)

(B)

(C)

(D)
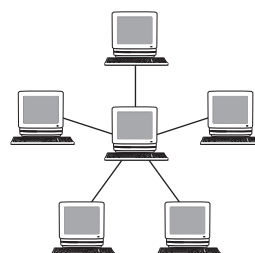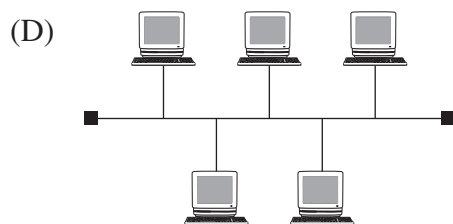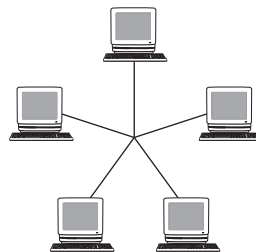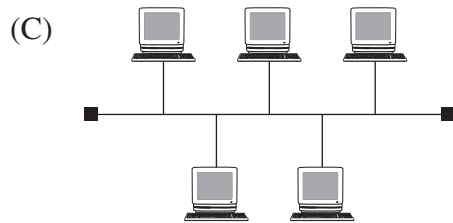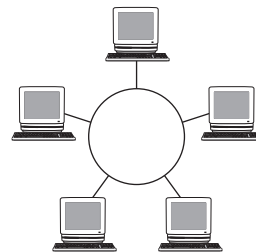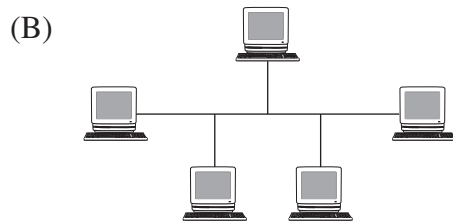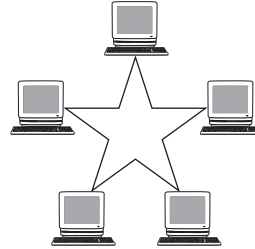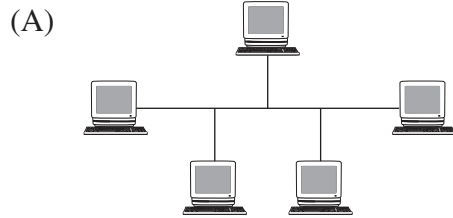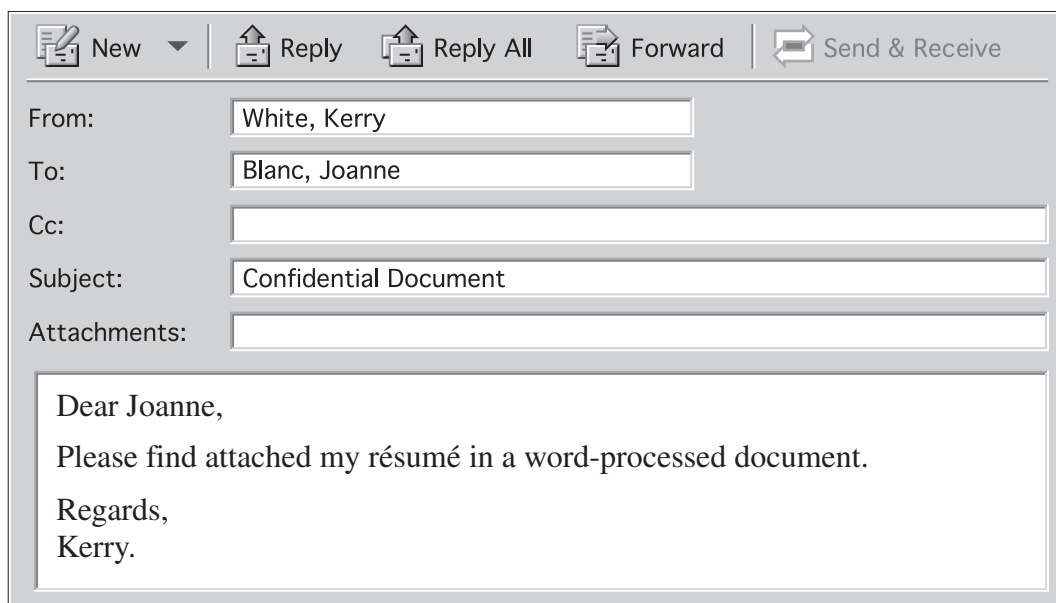
9   Wright Books has ten shops connected by a network. Each shop maintains and stores its own data about the books it sells and its business transactions. The DBMS makes this data available to all the shops on the network.

What type of database is being used?

(A) Localised

(B) Centralised

(C) Distributed

(D) Decentralised

10   Kerry attempted to send Joanne a copy of her résumé as an attachment to an email. This is the email that Joanne received:

New ▼	Reply	Reply All	Forward	Send & Receive

From: White, Kerry

To: Blanc, Joanne

Cc:

Subject: Confidential Document

Attachments:

Dear Joanne,

Please find attached my résumé in a word-processed document.

Regards,
Kerry.

What is the most likely explanation for the résumé file not being received by Joanne?

(A) The file was incorrectly saved.

(B) The file was in the wrong format.

(C) The file was incorrectly compressed.

(D) The file was not attached to the email.

11 A company uses a relational database to store data about employees. Which of the following would be an example of data redundancy in that database?

(A) Storing unsorted data in a table

(B) Storing inaccurate data about an employee in a table

(C) Storing data not needed for reporting in different tables

(D) Storing the same details about an employee in different tables

12
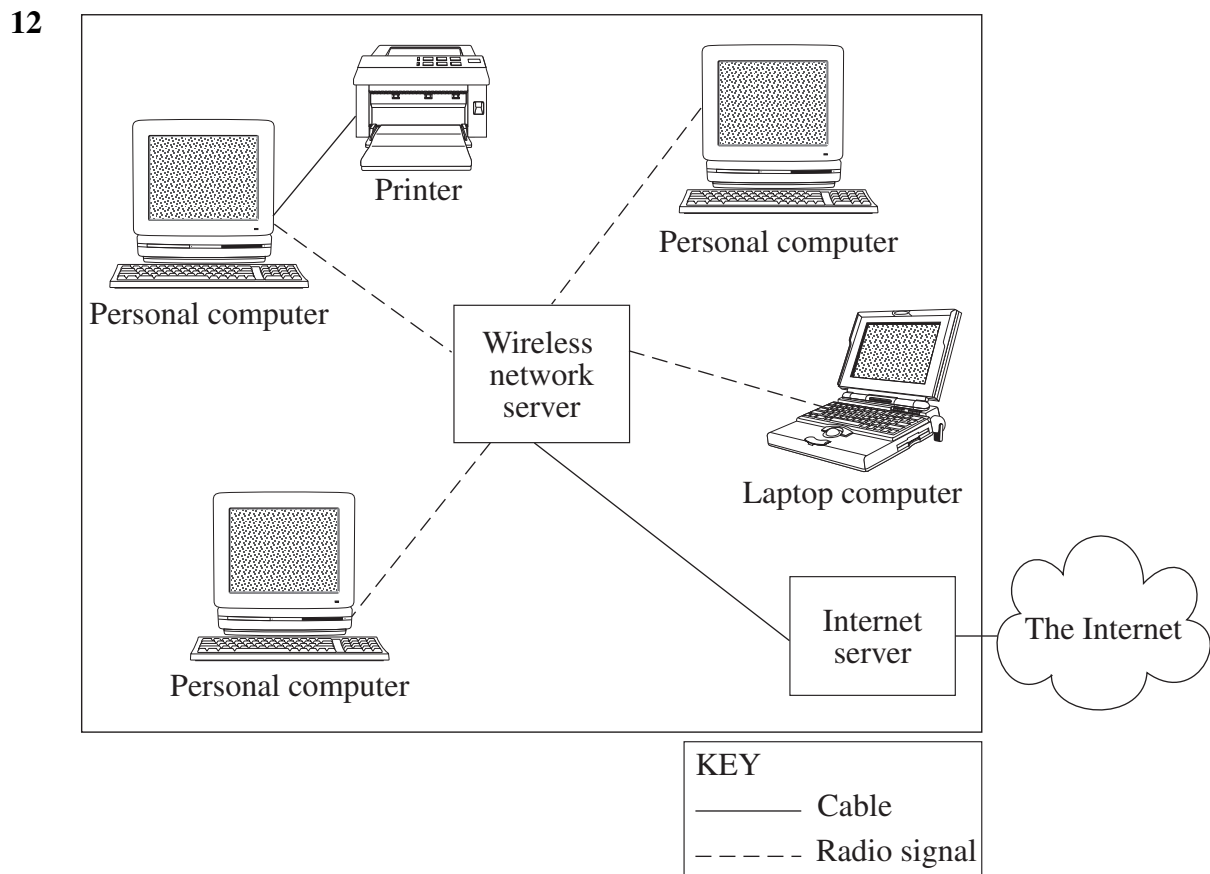
For which connection in the diagram would a broadband connection be MOST advantageous?

(A) Between the Internet server and the Internet

(B) Between the personal computer and the printer

(C) Between the laptop and the wireless network server

(D) Between each personal computer and the wireless network server

13 The data flow diagram represents part of a booking system.
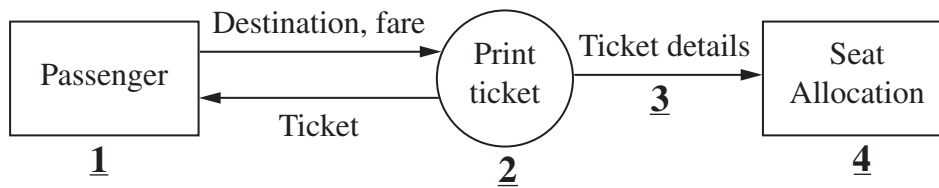
In order, what do the symbols **1, 2, 3** and **4** represent?

(A) Process, decision, link, online display

(B) External entity, process, data flow, data store

(C) Data store, process, data flow, external entity

(D) Process, direct access storage, link, paper document

14 A car dealership uses a relational database. The data dictionary for one of the database tables is as follows:

Field name	Type	Size	Description
VIN	Text	20	Vehicle identification number
Make	Text	10	Vehicle manufacturer
Model	Text	10	Model name
Price	Currency	6	Cost in whole dollars

If there were 100 records in this table, which calculation would give the approximate size (in kilobytes) for the data stored in the table?

(A) $\dfrac{20 + 10 + 10 + 6}{1024}$

(B) $\dfrac{(20 + 10 + 10 + 6) \times 100}{8 \times 1024}$

(C) $\dfrac{(20 + 10 + 10 + 6) \times 1024}{100}$

(D) $\dfrac{(20 + 10 + 10 + 6) \times 100}{1024}$

15 Which of the following is a difference between an intranet and the Internet?

(A) An intranet can only be used by people within an organisation; the Internet can be used by the world community.

(B) An intranet can be used by the local community; the Internet can only be used by people within an organisation.

(C) An intranet can only be used by suppliers and customers of an organisation; the Internet can be used by the world community.

(D) An intranet can only be used by people within an organisation; the Internet can only be used by suppliers and customers of an organisation.

16 An analogue signal is sampled once every second to convert it to a digital signal. The signal has a maximum height of 4.
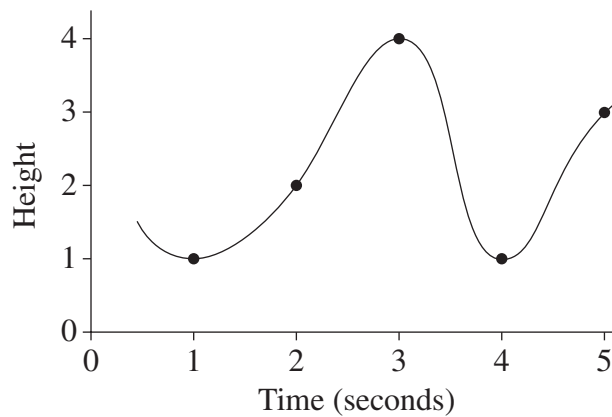
What would be the digital signal generated for samples at 2, 3 and 4 seconds?

(A) 010   011   100

(B) 010   100   001

(C) 010   011   001

(D) 010   100   100

Use the following decision table to answer Questions 17 and 18.

This decision table is used to assess insurance claims.

Conditions	Rules			
Loss is under $300	✓	✓	✗	✗
Police report submitted	✓	✗	✓	✗
Actions				
Claim accepted	✗	✗	✓	✗
Claim rejected	✓	✓	✗	✓

17 Which statement is always TRUE?

(A) A claim is accepted if the loss is $250.

(B) A claim is accepted if a police report is submitted.

(C) A claim is accepted if the loss is $300 and a police report is submitted.

(D) A claim is accepted if the loss is $250 and a police report is submitted.

18 Which decision tree is equivalent to the decision table?

Loss is under $300	Police report submitted	Action
Y	Y	Accept
Y	N	Reject
N	Y	Reject
N	N	Reject

(A)

Loss is under $300	Police report submitted	Action
Y	Y	Accept
Y	N	Accept
N	Y	Accept
N	N	Reject

(B)

Loss is under $300	Police report submitted	Action
Y	Y	Reject
Y	N	Reject
N	Y	Accept
N	N	Reject

(C)

Loss is under $300	Police report submitted	Action
Y	Y	Reject
Y	N	Accept
N	Y	Accept
N	N	Reject

(D)
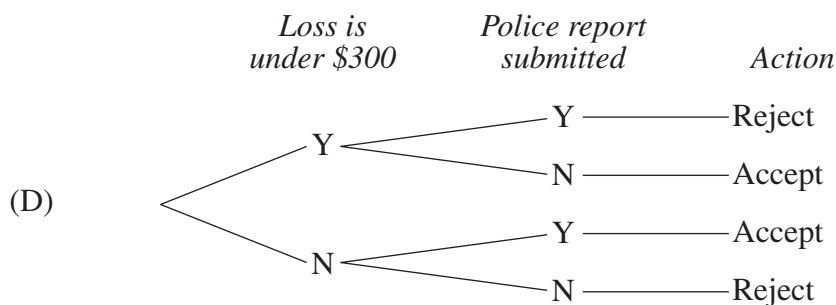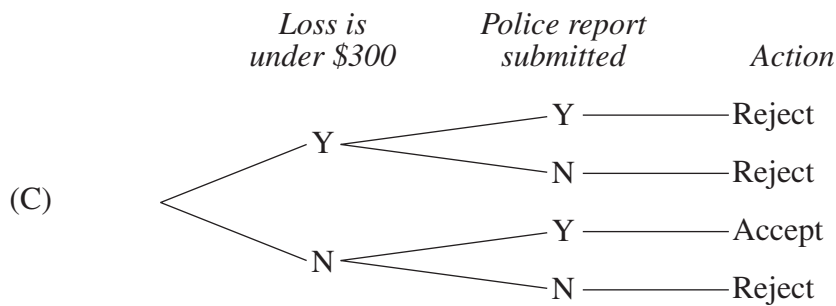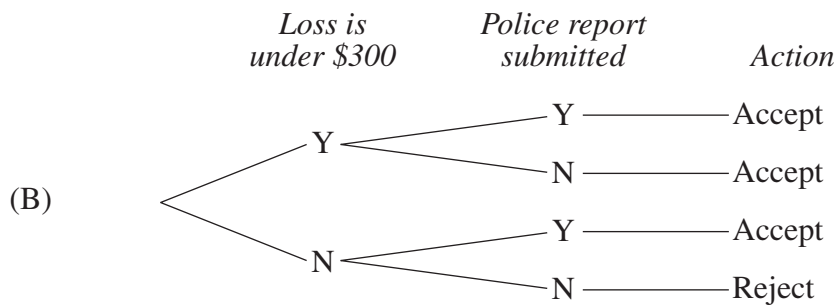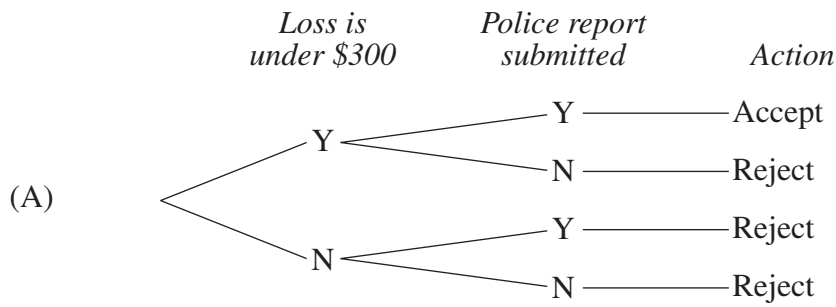
Use the following schema to answer Questions 19 and 20.

STUDENT	ENROL	SUBJECT
Stu_ID	Stu_ID	Subj_No
Stu_FirstName	Subj_No	Subj_Name
Stu_LastName	Date_Commenced	Department
Phone_Number	Result	
	Fees_Paid	

19 What keys would be used in the schema to relate the tables for students enrolled in subjects?

                    Primary keys   *Foreign keys*

(A)   ENROL.Stu_ID   and ENROL.Subj_No   STUDENT.Stu_ID and SUBJECT.Subj_No

(B)   ENROL.Subj_No   and ENROL.Stu_ID   SUBJECT.Subj_No and ENROL.Subj_No

(C)   SUBJECT.Subj_No and STUDENT.Stu_ID   ENROL.Stu_ID   and ENROL.Subj_No

(D)   STUDENT.Stu_ID and SUBJECT.Subj_No   STUDENT.Stu_ID and ENROL.Subj_No

20 A sample record in the table ENROL is

s1234567	1602	29/01/2001	76	Y

How would each field be BEST defined in a data dictionary for the table ENROL?

(A)   Text, numeric, date, text, text

(B)   Text, text, date, numeric, Boolean

(C)   Numeric, text, date, numeric, text

(D)   Numeric, numeric, date, text, Boolean

Section II

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

Answer each question in a SEPARATE writing booklet. Extra writing booklets are available.

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

Marks

Question 21 (11 marks) Use a SEPARATE writing booklet.

A group of students want to stay in contact with each other after completing their Higher School Certificate examinations. They expect that members of their group will move to locations all over Australia for employment or tertiary education. They are considering developing a website that would include the following:

* access to a database of contact information such as names, addresses, phone numbers, email addresses;
* latest news about members of the group;
* a diary of upcoming social events;
* photos and video clips from previous social events.

(a) Identify information technology (hardware, software and communications) that would be required to support the website. **3**

(b) Identify appropriate security measures, and describe how they would be implemented to prevent unauthorised access to data stored on the website. **3**

(c) Describe FOUR different aspects that the group should consider regarding the feasibility of the proposed website. **5**

Question 22 (9 marks) Use a SEPARATE writing booklet.

Micky wants a personal information system for storing details of friends. The data dictionary for the table FRIENDS is as follows.

Field name	*Field type*	*Size*	*Description*
Friend_Id	Text	5	Primary key
Last_name	Text	25	Last name of friend
First_name	Text	25	First name of friend
Home_phone	Text	12	Home phone number including area code, eg (02)62003000
Mobile_phone	Text	10	Mobile phone number eg 0405550000
Street_address	Text	30	Street address eg 117 Clarence Street
Suburb	Text	20	Town or Suburb
State	Text	3	State where friend lives. State must be NSW, VIC, TAS, QLD, ACT, NT, SA or WA
Postcode	Text	4	Postcode
Date_of_birth	Date	10	Date of birth in DD/MM/YYYY format
Photo	Image		Colour photograph of friend
Comment	Text	256	Comment about friend

(a) Design an input screen for the system, and identify TWO major features of your design.   **3**

(b) Construct an SQL query to display a list in alphabetical order by last name of all the friends living in NSW. Show only first names, last names and home phone numbers in the list.   **3**

(c) Several of Micky's friends have requested that he email them the database once it has been completed. Outline the ethical and technical issues arising from these requests.   **3**

Question 23 (9 marks) Use a SEPARATE writing booklet.

Site Seeing Ltd is a Sydney-based company that creates websites for people and businesses all over Australia. Site Seeing Ltd uses a system that totally replaces face-to-face communication between the employees and the clients.

The initial contact with the client is through telephone, fax and email. After the design specifications for the client's new website are established, a range of communication technologies are used to support the work of the Site Seeing Ltd project team and communication between Site Seeing Ltd and the client until the project is completed. These technologies include:

• email;

• web-based file storage, retrieval and document sharing;

• Internet online discussion and chat facilities;

• teleconferencing and video-conferencing.

(a)   Identify and describe TWO transmission error-checking methods that could be used to help check for errors in Site Seeing Ltd's communication links.   **3**

(b)   Discuss the issues associated with the use of TWO of the above listed technologies for interpersonal relationships between the employees and the clients.   **3**

(c)   Describe how TWO of the technologies listed can be used to support the work of the project team.   **3**

Question 24 (11 marks) Use a SEPARATE writing booklet.

Eight businesses, each specialising in delivering freshly cooked pet food, have agreed to cooperate under the brand name Gourmet Bytes.

Currently each business receives its orders by phone and uses its own manual systems to process orders. The new Gourmet Bytes plans to use an integrated information system.

It will have a head office that takes phone orders and enters them into the new information system. The existing eight businesses will operate as eight branches. Once a delivery order is processed in the head office it will be electronically transmitted to the closest branch for delivery.

(a)   Describe TWO advantages that this new computerised record keeping system has over the existing manual systems.   **3**

(b)   As part of the project plan, the following tasks have been identified for the development of the new information system.   **3**

Reference number	Task description	Duration (weeks)
1	Creation of system specification	3
2	Purchase, customisation and testing of software (This can only start after system specification.)	4
3	Purchase and installation of equipment (This can only start after system specification.)	4
4	Software installation and system testing (This can only start after equipment is installed.)	2
5	Training of staff (This can occur at the same time as software installation and system testing.)	1

Draw a Gantt chart to show how the tasks can be completed in the minimum number of weeks.

(c)   An implementation plan needs to be developed that should include strategies for converting the existing manual systems to the computerised system proposed.   **5**

Briefly describe FOUR conversion methods. Recommend and justify an appropriate conversion method for this organisation.

Section III

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

Answer each question in a SEPARATE writing booklet. Extra writing booklets are available.

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

Question 25 — Transaction Processing Systems (20 marks)

Please turn over

Question 25 — Transaction Processing Systems (20 marks)
            Use a SEPARATE writing booklet.

(a)   (i)   Define *real-time processing*, and briefly describe a situation where   **3**
                real-time processing is appropriate.

         (ii)   Describe *bias* in data collection, and provide an example.   **3**

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

Quality Fish Farm (QFF) sells fresh fish to restaurants throughout Australia from its farm in Tasmania. All fish are shipped by express freight in special protective boxes to ensure freshness on arrival. QFF has a transaction processing system (TPS) that processes sales and tracks shipments.

This system includes a web-based facility used by restaurants to accept shipments. When a shipment is delivered to a restaurant the chef inspects the shipment for freshness. The chef then accesses QFF's website, logs onto the sales TPS, and enters the shipment number (taken from the box). The system then displays the items of the shipment. The chef accepts or rejects each item. When an item is rejected, the chef is required to enter a reason. The system uses this information to update the restaurant's bill for the shipment.

The transaction processing system also allows orders to be entered and bills to be paid online.

(b)   With reference to the information system diagram on page 19, describe the   **6**
       following components and their relationship in the context of Quality Fish
       Farm's information system:

       • purpose;
       • participants;
       • data/information;
       • information technology;
       • collecting;
       • storing and retrieving;
       • processing.

Question 25 (continued)

Information System Diagram
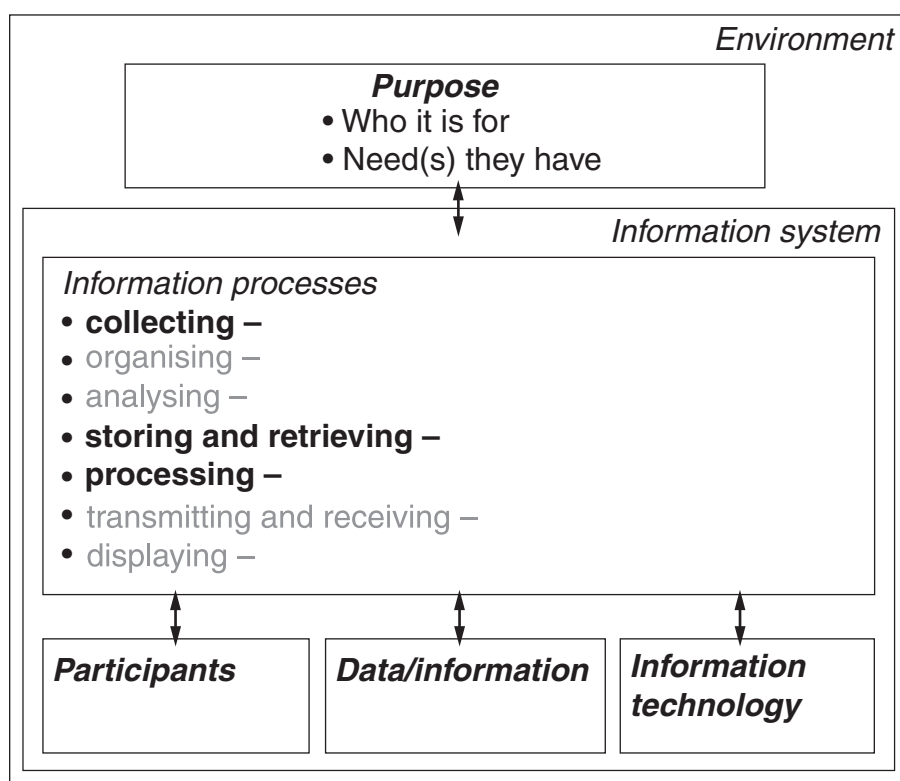
(c)   (i)   Describe measures that can assist accurate data entry by the restaurant employees.   **3**

      (ii)   Discuss the impact of the use of this information system on the employees of Quality Fish Farm and the restaurants.   **5**

End of Question 25

Question 26 — Decision Support Systems (20 marks)
Use a SEPARATE writing booklet.

(a) (i) Describe a *neural network*, and identify a situation where one would be used. **3**

(ii) Define *forward chaining*, and briefly describe a situation where it would be used. **3**

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

Petersen Market Research (PMR) has been employed by the Bertsville Local Government to collect data regarding the needs of its 50 000 residents. PMR will survey residents with a questionnaire containing 100 questions, addressing individual, community and global issues.

The data from all completed questionnaires is stored on PMR's file server. PMR also has access to the Bertsville Local Government's administration files, including data about residents, and it plans to link all this data so that data-mining can be performed at a later date.

Bertsville Local Government decides to use pre-determined criteria to automatically generate recommendations for consideration. For instance, one question in the survey asked 'Does the town need a new skateboarding facility?' If more than 50% of residents above the age of 25 agree, a recommendation is generated.

(b) With reference to the information system diagram on page 21, describe the following components and their relationship in the context of Petersen Market Research's information system: **6**

- purpose;
- participants;
- data/information;
- information technology;
- organising;
- analysing;
- processing.

Question 26 continues on page 21

Information System Diagram

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┌──────────────────────────────────────────────────────────┐
│                                            Environment     │
│   ┌──────────────────────────────────────────────┐        │
│   │                  *Purpose*                     │        │
│   │              • Who it is for                   │        │
│   │              • Need(s) they have               │        │
│   └──────────────────────────────────────────────┘        │
│                         ↕                                  │
│  ┌──────────────────────────────────────────────────┐     │
│  │                              Information system    │     │
│  │  ┌────────────────────────────────────────────┐   │     │
│  │  │ Information processes                       │   │     │
│  │  │  • collecting –                             │   │     │
│  │  │  • **organising –**                         │   │     │
│  │  │  • **analysing –**                          │   │     │
│  │  │  • storing and retrieving –                 │   │     │
│  │  │  • **processing –**                         │   │     │
│  │  │  • transmitting and receiving –             │   │     │
│  │  │  • displaying –                             │   │     │
│  │  └────────────────────────────────────────────┘   │     │
│  │       ↕              ↕              ↕              │     │
│  │  ┌──────────┐ ┌──────────────┐ ┌──────────────┐   │     │
│  │  │*Participants*│ │*Data/information*│ │*Information*│ │     │
│  │  │          │ │              │ │*technology*  │   │     │
│  │  └──────────┘ └──────────────┘ └──────────────┘   │     │
│  └──────────────────────────────────────────────────┘     │
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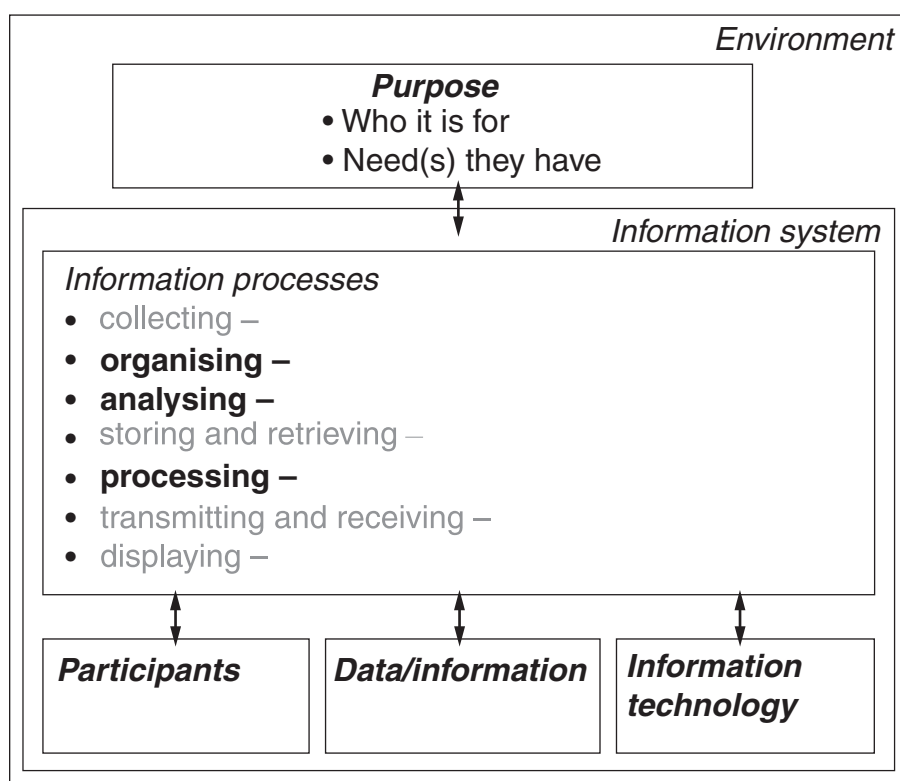
(c)   (i)   Discuss the use of pre-determined criteria on automated decision-making by the Bertsville Local Government.   **3**

      (ii)   Discuss the responsibilities of Petersen Market Research in relation to the collection and use of survey data, access and use of administration files, and data mining.   **5**

End of Question 26

Question 27 — Automated Manufacturing Systems (20 marks)
        Use a SEPARATE writing booklet.

(a)   (i)   Distinguish between *critical damping* and *overdamping*, using an example. **3**

       (ii)   Describe an automated manufacturing *batch system*, and provide an example. **3**

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

Mahogany Tables (MT) is a furniture company that mass produces wooden tables. The tables are designed with the help of a CAD/CAM system. Tables are made to a standard design but the design may be altered to suit the needs of the customer.

The CAD system stores the three-dimensional designs of the tables, together with relevant sizes and heights, widths and lengths of the tables. The weight of each table is calculated by the CAD package. This information is made available to a DBMS. Data in the system is used by employees who work in inventory, marketing, production and quality control sections of the company.

The CAM system cuts and shapes the wood required for the tables. Tables of standard designs are assembled in computer-controlled processes and others are assembled by hand.

(b)   With reference to the information system diagram on page 23, describe the following components and their relationship in the context of Mahogany Tables' information system: **6**

- purpose;
- participants;
- data/information;
- information technology;
- collecting;
- processing;
- displaying.

Question 27 continues on page 23

Question 27 (continued)

Information System Diagram
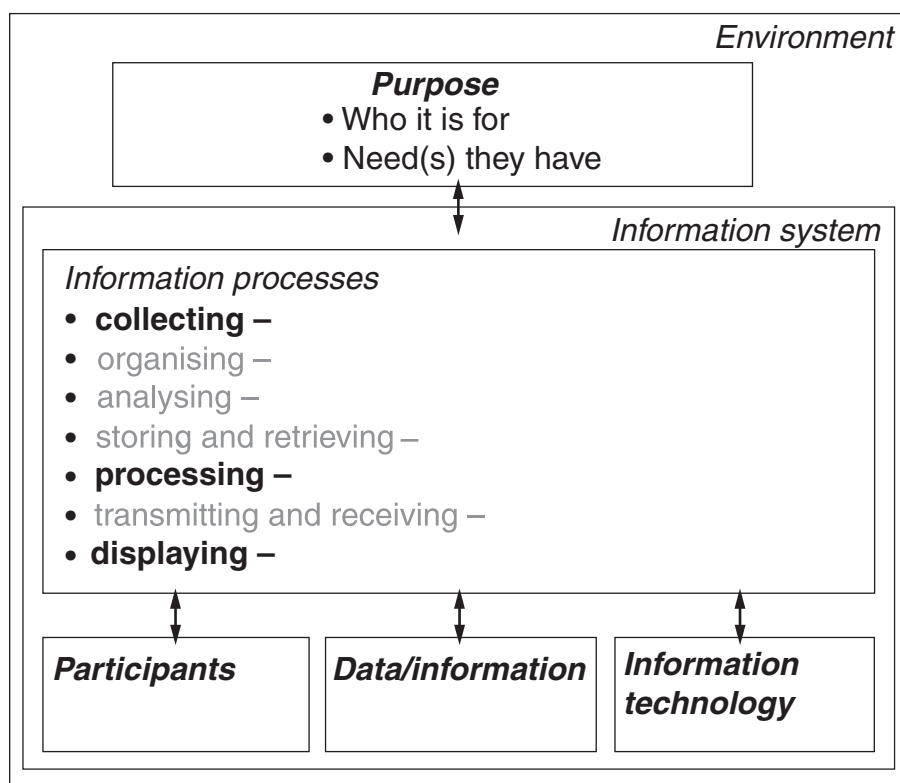
(c)　(i)　Describe the impact of automated manufacturing on the nature of work for the employees of Mahogany Tables.　**3**

(ii)　Discuss how the automated manufacturing system at Mahogany Tables affects reliability, quality and safety in the production of tables.　**5**

End of Question 27

Question 28 — Multimedia Systems (20 marks)

Use a SEPARATE writing booklet.

(a) (i) Define a *storyboard*, and describe its purpose. **3**

(ii) Describe the tasks undertaken by technical staff in the development of multimedia applications. **3**

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

Anna has applied for a job at a multimedia design company as a designer. The company requires that applicants submit and demonstrate a portfolio of their work at an interview.

To showcase her work, Anna plans to develop an interactive multimedia presentation of her work for her portfolio. It will include the best examples of her original computer generated artworks, pencil and charcoal sketches, still photographs, animations and short movie segments with sound tracks. Descriptions of each piece of work will be included to explain the ideas behind her designs. Anna plans to save copies of her multimedia presentation onto CD-ROMs, and will give each member of the interview panel a copy. She will use another copy to demonstrate her work at the interview.

Anna has been told that a projector that displays computer output will be available during her interview and demonstration, but she will need to bring her own computer to connect to the projector.

(b) With reference to the information system diagram on page 25, describe the following components and their relationship in the context of the creation of Anna's multimedia portfolio: **6**

- purpose;
- participants;
- data/information;
- information technology;
- organising;
- storing and retrieving;
- displaying.

Question 28 (continued)

Information System Diagram

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┌──────────────────────────────────────────────────────────────┐
│                                              Environment        │
│      ┌──────────────────────────────────────────┐              │
│      │                 Purpose                    │              │
│      │            • Who it is for                 │              │
│      │            • Need(s) they have             │              │
│      └──────────────────────────────────────────┘              │
│                           ↕                                     │
│   ┌──────────────────────────────────────────────────────┐     │
│   │                                  Information system     │     │
│   │  ┌────────────────────────────────────────────────┐   │     │
│   │  │ Information processes                           │   │     │
│   │  │   • collecting –                                │   │     │
│   │  │   • organising –                                │   │     │
│   │  │   • analysing –                                 │   │     │
│   │  │   • storing and retrieving                      │   │     │
│   │  │   • processing –                                │   │     │
│   │  │   • transmitting and receiving –                │   │     │
│   │  │   • displaying –                                │   │     │
│   │  └────────────────────────────────────────────────┘   │     │
│   │        ↕              ↕              ↕                  │     │
│   │  ┌──────────┐  ┌──────────────┐  ┌───────────────┐    │     │
│   │  │Participants│ │Data/information│ │ Information   │    │     │
│   │  │          │  │              │  │ technology     │    │     │
│   │  └──────────┘  └──────────────┘  └───────────────┘    │     │
│   └──────────────────────────────────────────────────────┘     │
└──────────────────────────────────────────────────────────────┘
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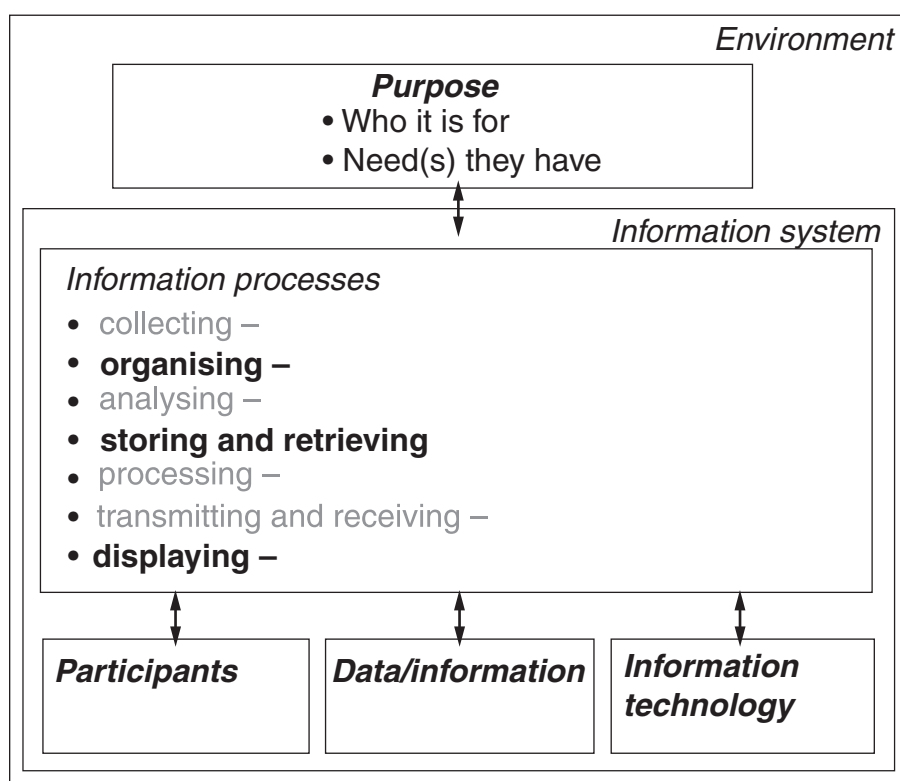
(c)   (i)   Outline the reasons why copyright is a relevant and important issue for Anna when creating the multimedia portfolio and distributing it to the interview panel.   **3**

    (ii)   Describe the different types of media that Anna could use in her multimedia presentation, and discuss factors that may have affected her choice of a multimedia portfolio rather than a paper-based portfolio.   **5**

End of paper

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