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 2–11
20 marks
• Attempt Questions 1–20
• Allow about 40 minutes for this section

Section II Pages 12–16
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: \[2 + 4 = (A) 2 \quad (B) 6 \quad (C) 8 \quad (D) 9\]

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

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.
1. When developing a new system, a project team needs to carry out a series of interviews with the system participants.

Which is the most important set of skills to ensure effective data gathering?

(A) Negotiation skills  
(B) In-depth technical skills  
(C) Conflict resolution skills  
(D) Question preparation skills

2. What type of cable is shown in this diagram?

(A) Coaxial  
(B) Fibre optic  
(C) Shielded twisted pair  
(D) Unshielded twisted pair

3. Hypermedia, by its very nature, CANNOT be transferred to

(A) an optical disk.  
(B) another computer.  
(C) a paper document.  
(D) a computer network.
4 Which of the following storage media does NOT support direct access to data?

(A) Magnetic tape
(B) Magnetic disk
(C) Optical disk
(D) CD-ROM

5 Which of the following best describes a network operating system?

(A) Hardware needed for the operation of a network
(B) A configuration of devices to support network operation
(C) Software used to protect microcomputers on a network from virus infection
(D) Software that controls network communications and the sharing of resources

6 Which of the following would be a primary consideration when determining the economic feasibility of a proposed solution?

(A) The availability of suitable hardware and software
(B) The time taken to implement the proposed solution
(C) Whether users will be able to operate the proposed solution
(D) The purchase costs of new hardware required for the proposed solution

7 An organisation stores large amounts of data, collected by its transaction processing system, in a data warehouse.

How would the data warehouse be most effectively used?

(A) Storing data for everyday transaction processing
(B) Providing a storage facility for the organisation’s products
(C) Mining the data to find trends that identify marketing opportunities
(D) Preparing summary reports to help managers make marketing decisions
8 Which of the following is the best description of the network shown?

(A) An intranet that has strong security and a cable modem to protect against access by off-site users
(B) A small network that allows users to share files and a printer, and to access the internet using a cable modem
(C) A wide area network for a small business that allows online ordering of products from suppliers via the internet, and sharing of a printer and file server
(D) A local area network for a small business with a dedicated file server that allows sharing of database application software, online tape storage and a printer

9 A medical service has implemented an information system to collect and organise the personal information of patients.

Which of the following is NOT an ethical practice in the management of the information system?

(A) Information about patients is kept secure.
(B) Information about patients is made available to drug companies.
(C) The medical service obtains the patients’ consent to collect their information.
(D) The medical service uses the information only for the reason it was collected.
10 Which information system development approach is best described by the diagram?

(A) Prototyping
(B) Phased approach
(C) Feasibility study
(D) End-user development

11 A cat owner wants to use an internet search engine to find sites about cat health. However, many internet sites on cat health also contain information about dogs.

Which of the following would best narrow the search so that the search engine lists sites that have information focusing on cat health?

(A) +cat +dog
(B) +cat −dog
(C) +cat +health −dog
(D) +cat +health +dog
The following reply was received by a student who sent an email to a friend.

Date: Thu, 24 Oct 2002 11:44:05 +1100 (EST)
From: Mail Delivery Subsystem <MAILER-DAEMON>
To: <hsc.student@school.edu.au>
MIME-Version: 1.0
Subject: Returned mail: see transcript for details
Auto-Submitted: auto-generated (failure)

----- The following addresses had permanent fatal errors -----
<pete.hindler@hotmail.com>

Final-Recipient: RFC822; pete.hindler@hotmail.com
Action: Failed
Status: 5.0.0
Diagnostics-Code: SMTP; 554 delivery error: dd This user doesn’t have a hotmail.com account (pete.hindler@hotmail.com)

----- message -----
Hi Peter

Chris is going to meet us at the cinemas on Friday at 6:30pm.

What should the student do to ensure that the email is sent successfully to the friend?

(A) Re-send the message to pete.hindler@hotmail.com
(B) Create a new message and send it to the same email address
(C) Save the message and re-send it later to hsc.student@school.edu.au
(D) Re-send the message after checking and correcting the email address

Which of the following activities would occur when developing a project plan?

(A) Detailing the time frame of the project
(B) Determining the nature of the problem
(C) Determining if project objectives have been met
(D) Documenting the economic and technical feasibility of the project
Use this table to answer Questions 14 and 15.

A real estate agency has the following rental properties in its database:

<table>
<thead>
<tr>
<th>Address</th>
<th>Rent</th>
<th>Type</th>
<th>Branch</th>
</tr>
</thead>
<tbody>
<tr>
<td>19 Blewett St, Hurstville</td>
<td>270</td>
<td>House</td>
<td>Hurstville</td>
</tr>
<tr>
<td>17 Bevan Pl, Padstow</td>
<td>260</td>
<td>Flat</td>
<td>Bankstown</td>
</tr>
<tr>
<td>16 Gilchrist Dr, Allawah</td>
<td>250</td>
<td>Flat</td>
<td>Hurstville</td>
</tr>
<tr>
<td>43 Hayden Pl, Revesby</td>
<td>210</td>
<td>Townhouse</td>
<td>Hurstville</td>
</tr>
<tr>
<td>99 Waugh St, Hurstville</td>
<td>200</td>
<td>House</td>
<td>Bankstown</td>
</tr>
</tbody>
</table>

14. What would be the output from the following SQL statement?

```sql
SELECT Address, Branch FROM Properties WHERE Branch = "Hurstville";
```

(A) | Address                      | Rent | Type      | Branch |
----|------------------------------|------|-----------|--------|
(B) | Address                      | Rent | Type      | Branch |
| 19 Blewett St, Hurstville    | 270  | House     | Hurstville |
| 16 Gilchrist Dr, Allawah     | 250  | Flat      | Hurstville |
| 43 Hayden Pl, Revesby        | 210  | Townhouse | Hurstville |

(C) | Address                      | Branch |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>19 Blewett St, Hurstville</td>
<td>Hurstville</td>
<td></td>
</tr>
<tr>
<td>99 Waugh St, Hurstville</td>
<td>Bankstown</td>
<td></td>
</tr>
</tbody>
</table>

(D) | Address                      | Branch |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>19 Blewett St, Hurstville</td>
<td>Hurstville</td>
<td></td>
</tr>
<tr>
<td>16 Gilchrist Dr, Allawah</td>
<td>Hurstville</td>
<td></td>
</tr>
<tr>
<td>43 Hayden Pl, Revesby</td>
<td>Hurstville</td>
<td></td>
</tr>
</tbody>
</table>
A family wants to find a place to live where the rent is no more than $250. Both houses and flats would be suitable.

Which of these SQL statements will list suitable properties?

(A) SELECT Address FROM Properties
WHERE Type = “House” AND Type = “Flat” AND Rent <= 250;

(B) SELECT Address FROM Properties
WHERE Type = “House” OR Type = “Flat” OR Rent <= 250;

(C) SELECT Address FROM Properties
WHERE (Type = “House” AND Type = “Flat”) OR Rent <= 250;

(D) SELECT Address FROM Properties
WHERE (Type = “House” OR Type = “Flat”) AND Rent <= 250;

Protocols must be able to manage two computers on a network trying to send data at the same time.

How do the Token Ring protocol and the Ethernet protocol manage this?

(A) Token Ring detects collisions, Ethernet detects collisions.

(B) Token Ring avoids collisions, Ethernet detects collisions.

(C) Token Ring detects collisions, Ethernet avoids collisions.

(D) Token Ring avoids collisions, Ethernet avoids collisions.

A major enhancement has been planned for the information system of a department store. The diagram represents part of the existing database used by the store.

<table>
<thead>
<tr>
<th>Employee code</th>
<th>Telephone number</th>
<th>Postcode</th>
<th>Available after hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>SMIT07</td>
<td>(02) 94431112</td>
<td>2037</td>
<td>N</td>
</tr>
</tbody>
</table>

Which data types would you expect to find in the data dictionary for these fields?

<table>
<thead>
<tr>
<th>Employee code</th>
<th>Telephone number</th>
<th>Postcode</th>
<th>Available after hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>(A) Text</td>
<td>Number</td>
<td>Number</td>
<td>Boolean</td>
</tr>
<tr>
<td>(B) Alphabetic</td>
<td>Text</td>
<td>Number</td>
<td>Text</td>
</tr>
<tr>
<td>(C) Text</td>
<td>Text</td>
<td>Number</td>
<td>Boolean</td>
</tr>
<tr>
<td>(D) Alphabetic</td>
<td>Number</td>
<td>Number</td>
<td>Text</td>
</tr>
</tbody>
</table>
Use this information to answer Questions 18 and 19.

A direct marketing company proposes streamlining its inventory control system.

In the proposed system, once a telephone order is received, the operator will enter the order details into the computer system, and check and update stock availability in the company’s central database. When the order is accepted, payment is automatically processed electronically using the customer’s banking details, and a receipt is generated.

The diagram describes part of the ordering procedures in the proposed system.
18. What symbols would be included in the areas 1, 2 and 3?

(A)  
(B)  
(C)  
(D)  

19. In the system flowchart on page 10, what does the symbol represent?

(A) Data inquiry  
(B) Online input  
(C) Direct access  
(D) Manual operation

20. The following seven-bit ASCII character and parity bit were transmitted:

0011010 0

Which of the following examples would cause the receiver to request that the message be re-sent?

<table>
<thead>
<tr>
<th>ASCII character</th>
<th>Parity bit</th>
</tr>
</thead>
<tbody>
<tr>
<td>(A) 1011010</td>
<td>1</td>
</tr>
<tr>
<td>(B) 0011011</td>
<td>1</td>
</tr>
<tr>
<td>(C) 0011011</td>
<td>0</td>
</tr>
<tr>
<td>(D) 0011010</td>
<td>0</td>
</tr>
</tbody>
</table>
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.

Question 21 (10 marks) Use a SEPARATE writing booklet.

Mr Ferrano keeps a database of the computers on his small computer network.

<table>
<thead>
<tr>
<th>Computer number</th>
<th>Computer RAM</th>
<th>Computer hard disk</th>
<th>Location</th>
<th>Phone extension</th>
<th>Room number</th>
</tr>
</thead>
<tbody>
<tr>
<td>001</td>
<td>64</td>
<td>6</td>
<td>Reception</td>
<td>3227</td>
<td>9023</td>
</tr>
<tr>
<td>002</td>
<td>64</td>
<td>10</td>
<td>Reception</td>
<td>3227</td>
<td>9023</td>
</tr>
<tr>
<td>003</td>
<td>128</td>
<td>8</td>
<td>Manager’s office</td>
<td>1859</td>
<td>9115</td>
</tr>
<tr>
<td>004</td>
<td>96</td>
<td>8</td>
<td>Manager’s office</td>
<td>1859</td>
<td>9115</td>
</tr>
<tr>
<td>005</td>
<td>256</td>
<td>40</td>
<td>Store Room 3</td>
<td>2016</td>
<td>9153</td>
</tr>
</tbody>
</table>

(a) Computer 005 is being used as a file server on this network. Describe the role of a file server on a network. 3 marks

(b) Identify data redundancy in Mr Ferrano’s database and outline the problems it may cause as the database increases in size. 3 marks

(c) Normalise this database into two tables, showing all the data and clearly identifying the primary and foreign keys. 4 marks
Jill is a travelling sales representative who sells quality wines to licensed restaurants throughout the state. She often spends a week at a time away from the office, visiting customers. At least once a day Jill logs-on to the head office network to send and receive data. She uses her laptop computer that connects to her mobile phone.

The diagram shows the typical path the data takes through the public telephone network:

![Diagram](image)

<table>
<thead>
<tr>
<th>Segment 1</th>
<th>Segment 2</th>
<th>Segment 3</th>
<th>Segment 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.5 km</td>
<td>120 km</td>
<td>260 km</td>
<td>15 km</td>
</tr>
<tr>
<td>Across a country town</td>
<td>Across mountains</td>
<td>Across rural and suburban areas</td>
<td>Across city area</td>
</tr>
</tbody>
</table>

(a) For EACH segment, identify ONE appropriate transmission medium and outline why each one is appropriate.

(b) Outline the advantages for Jill of using mobile technology to undertake her work.

(c) The standard system interface cannot always provide the correct information for Jill to answer all customer enquiries. This means that Jill often needs to write SQL queries.

Describe how a copy of the data dictionary would assist her to compose these queries.
Baksiano Pizza Delivery (BPD) is a company that makes and delivers pizzas. It has 40 outlets, a warehouse to supply ingredients to the outlets, and a head office. Until recently, BPD knew very little about its customers. The company did not keep information about:

- who was buying its pizzas;
- customer preferences;
- busy times for each outlet.

To address this issue and improve its business overall, BPD implemented a project to streamline inventory, improve customer service and reduce delivery costs. To do this:

- a computer was installed in each of the outlets, into which orders are entered when a customer phones;
- a caller-ID system linked to a database was added to the telephone system. This allows staff taking orders to view the name, address and preferences of existing customers as soon as they phone;
- a system that recommends the shortest delivery route for drivers was added;
- each outlet sends a copy of daily sales data to a large database stored on a mainframe computer at head office. The sales data includes customer names, addresses and phone numbers, along with what was ordered, when it was ordered, and the method of payment.

BPD is now collecting valuable data about customers and orders.

The diagram on page 15 summarises some aspects of the new information system used by Baksiano Pizza Delivery.
Question 23 (continued)

(a) Identify the information technology (hardware, software and communication technologies) used by Baksiano Pizza Delivery's new information system.

(b) Propose and outline TWO different types of information systems that could be used to analyse Baksiano Pizza Delivery’s purchasing trends. Recommend which of the systems is the most appropriate for Baksiano Pizza Delivery and justify your recommendation.

End of Question 23
A supermarket is planning to expand its operations by creating an online store using internet technology. The online store will allow customers to browse the product information, place orders, make payments using credit cards and arrange for delivery.

Deliveries from the online store may attract a charge, depending on:

- whether the delivery contains perishable items;
- the delivery distance;
- the order value.

This decision tree is used to determine if the delivery charge applies:

<table>
<thead>
<tr>
<th>Contains perishable items</th>
<th>Delivery distance</th>
<th>Order value</th>
<th>Delivery charge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>&gt; 10 km</td>
<td>&gt; $100</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>≤ 10 km</td>
<td>≤ $100</td>
<td>Yes</td>
</tr>
<tr>
<td>No</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(a) Translate this decision tree into a decision table.  
(b) Discuss the importance of user documentation for this online store.  
(c) When designing the new online store, developers should consider the social and ethical impacts that the new system will have.

Identify TWO social or ethical issues associated with the design of the system and propose how they could be addressed in the design of the online store.
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)

(a) (i) Define batch processing, and briefly describe a situation where batch processing is appropriate.

(ii) Distinguish between data accuracy and data integrity, using an example that illustrates the difference.

(b) A video store is considering installing a ‘self-checkout’ system where customers can borrow videos by scanning their membership cards and videos and pay by EFTPOS.

A ‘self-checkout’ transaction has three steps:

- membership validation;
- borrowing limit check;
- payment processing.

For membership validation the barcode on the membership card is used to access the member database to find a match. The customer proceeds to the scanning of videos if the membership is valid, otherwise a message is displayed.

Using the video barcode data and details from the member database, the system checks that no more than six videos are borrowed. A message is displayed if the limit is exceeded.

Payment processing involves the calculation of borrowing charges, the scanning of the customer’s EFTPOS card, the entry of a personal identification number and the electronic communication of these details to the financial institution. Video charges are obtained from the video database via the video barcodes. Transaction details are written to the transaction file for each video borrowed.

(i) Draw a dataflow diagram with the three processes that represents this proposed ‘self-checkout’ system, ensuring that you show external entities and data stores.

(ii) Discuss appropriate backup procedures for the proposed system.
Web-Ticket allows customers to purchase tickets for major theatre and sporting events over the internet.

When customers visit the company’s website they can choose an event, view the seating arrangements, see what seats are available, choose their seats and purchase tickets.

For the business to run successfully it is essential that the seating details supplied to any customers at any time in any location, are correct and up-to-date. There is no margin for error or system failure.

Describe and analyse the ticketing system in terms of the information processes of:

• collecting;
• storage and retrieval;
• processing;

with particular emphasis on the process of storage and retrieval.

End of Question 25
Question 26 — Decision Support Systems (20 marks)

Use a SEPARATE writing booklet.

(a) (i) Define the term *structured problem* and provide an example of such a problem.

(ii) Define the term *certainty factor* in regard to decision-making situations and provide an example of a situation where one would be used.

(b) Gertrude’s mobile phone contract is about to expire and she needs to choose a new plan. She has identified three plans for people who already own their own phone.

The first plan is from Toady Phones. The monthly connection fee is $0, and each call costs 1 cent per second. This plan has no free calls per month.

The second plan is from Monopoly Mobile. The monthly connection fee is $14.50, and each call is charged at 0.75 cents per second. This plan includes $10 of free calls per month.

The third plan is from Shakey Service. The monthly connection fee is $28.50, each call costs 0.5 cents per second, and $15 of free calls per month are included.

Monthly charges are calculated by adding the monthly connection fee to the monthly call cost. The monthly call costs are calculated by subtracting the free call amount from the actual call costs (time × cents per second). However, if the actual call cost is less than the free call amount the monthly call cost is $0.00.

None of the plans have a flag fall (cost to establish each call) or allow unused monthly free calls to be carried over.

(i) Gertrude’s use of her mobile phone varies greatly from month to month. Design a spreadsheet that would assist Gertrude to explore a range of usage alternatives and select the cheapest plan. Show all relevant data and formulae.

(ii) Outline how different types of graphs could assist Gertrude’s decision making.

Question 26 continues on page 21
Question 26 (continued)

(c) Deciding which university degree to apply for can be a long and frustrating process.

Kim and Hendra have developed a Decision Support System (DSS) that will assist their fellow Year 11 and Year 12 students identify university degrees that suit their needs and abilities.

Kim and Hendra have used the following decision criteria:
- The student’s area of interest
- The Universities Admission Index (UAI) the student expects to obtain
- Whether the student wants to study at a local university
- Whether a small or large university is preferred.

The information for the system was collected from university websites and includes degree name, degree detail, the UAI required for each degree in the previous year, and the university location, size and distance from Kim and Hendra’s high school.

Describe and analyse the decision support system in terms of the information processes of:
- organising;
- analysing;
- processing.

End of Question 26
(a)   (i)  Describe Computer Aided Design, using an example.  

(ii)  Identify TWO actuators and describe a situation in which each would  
      be used.

(b)   In an automated mail-sorting facility, letters are sorted by a scanning machine  
      into two broad categories:
      • letters with preprinted barcodes;
      • letters without barcodes.

The barcoded letters can then be directly sorted into postcode areas. The other  
letters are scanned by an OCR device. The system finds the matching barcode  
for the address and then prints a barcode on the bottom of the letter. These letters  
are then sorted into their postcode areas. Examples are given below:

(i)   Draw a block diagram of the automated letter-sorting system.

(ii)  Explain advantages and disadvantages of using barcodes in commercial  
      applications, such as mail sorting.

Question 27 continues on page 23
(c) Get-it-Quick is the automated warehouse system used by a large clothing wholesaler that supplies fashion items to retail stores. Orders from the retailers go direct to the warehouse. Get-it-Quick then picks, packs and dispatches the orders. Get-it-Quick also tracks goods from storage in the warehouse until delivery.

Using the automated warehouse system, the manager can find out at any time:

- The number of fashion items in stock;
- The movement of items from storage to dispatch;
- The movement of items from dispatch to delivery to the customer.

Describe and analyse the Get-it-Quick system in terms of the information processes of:

- collecting;
- processing;
- displaying;

with particular emphasis on the process of collecting.

End of Question 27
**Question 28 — Multimedia Systems** (20 marks)

Use a SEPARATE writing booklet.

(a)  
(i) Distinguish between LCD screens and CRT monitors.  

(ii) Distinguish between path-based and cell-based animation.  

(b) Sunny Ishida is creating a website with highlights of Australia’s success at the 2002 Winter Olympics in Salt Lake City.

He has identified three events that he wants to feature:

- Steven Bradbury’s gold medal in the 1000-metre short-track speed skating;
- Alisa Camplin’s gold medal in the aerial skiing event;
- Jacqui Cooper’s recovery from a fall during training.

He has obtained permission from each of his heroes to use video footage, an audio interview, several photos and a brief biography.

(i) Draw a storyboard for this website using good design principles. 
Clearly label the major elements for each page.  

(ii) One of Sunny’s photos is of Jacqui Cooper at the World Championships.  
The photo has 16 colours and is 600 pixels by 400 pixels.

Demonstrate how he could calculate the file size in kilobytes for this photo. Explain what each number in the calculation represents.

**Question 28 continues on page 25**
(c) The website for a newspaper www.regionalclassified.com.au displays advertisements for individuals and companies. It targets country areas of New South Wales.

Advertisements can be submitted by fax, email or post. They may contain contact details for the seller, item descriptions, photos and other graphics. The advertisements are charged by the number of words, with photos and graphics attracting an additional fee.

Interested buyers need to contact the seller direct because the newspaper does not process sales. Advertisements are displayed for 28 days. They are automatically removed at the end of that time, or at the request of the advertiser.

Advertisements are arranged into categories to make finding an item easy. Search facilities are available to search all the advertisements on the website.

Many users of the website access the internet using a dial-up connection and long-distance phone calls to their Internet Service Provider.

Describe and analyse the system in terms of the information processes of:

• collecting;
• organising;
• displaying;

with particular emphasis on the process of displaying.