



HIGHER SCHOOL CERTIFICATE EXAMINATION

1999

COMPUTING STUDIES

2/3 UNIT (COMMON)

SECTION I—CORE

(40 Marks)

*Total time allowed for Sections I and II—Three hours
(Plus 5 minutes reading time)*

DIRECTIONS TO CANDIDATES

- No calculators are to be used.

Part A (20 marks)

- Attempt ALL questions.
- Write your Student Number and Centre Number on the Answer Sheet provided.
- Complete your answers in either blue or black pen on the Answer Sheet provided.

Part B (20 marks)

- Attempt BOTH questions.
- Write your Student Number and Centre Number in the spaces provided on the first page of each question.
- Answer the questions in the spaces provided in this paper.

PART A

(20 Marks)

Attempt ALL questions.

Each question is worth 1 mark.

Instructions for answering multiple-choice questions

- Complete your answers in either blue or black pen.
- 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

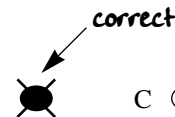
A ☐ B ☒ C ☐ D ☐

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.

A ☒ B ☒ C ☐ D ☐



- 1 The first stage of a systems project is the
 - (A) systems study.
 - (B) systems design.
 - (C) feasibility study.
 - (D) requirements definition.

- 2 Detection of errors in the program code normally occurs during which stage of the system development cycle?
 - (A) Design stage
 - (B) Analysis stage
 - (C) Operation and evaluation stage
 - (D) Implementation and testing stage

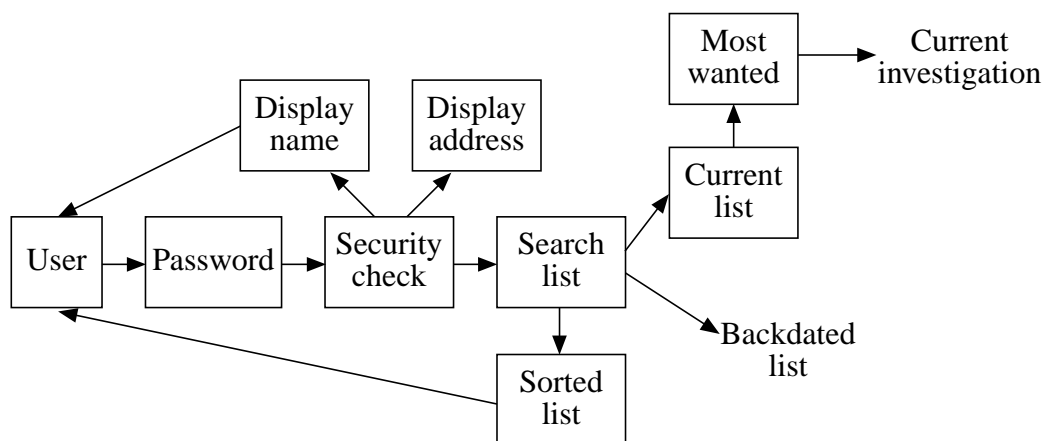
- 3 In the feasibility study, the system analyst focuses on
 - (A) alternative designs.
 - (B) the cost and benefits.
 - (C) how the existing systems operate.
 - (D) developing systems to meet the user's needs.

- 4 Files, utilities and resources that the computer needs to run are called
 - (A) system software.
 - (B) application software.
 - (C) user-controlled programs.
 - (D) off-the-shelf programs.

- 5 Part of determining the system boundary of a given project is
 - (A) conducting an implementation review.
 - (B) providing interactive user-oriented language tools.
 - (C) preparing a software design walk-through reprint.
 - (D) gathering information from sources inside and outside the organisation.

- 6 When a system fails to meet its original objectives, it is necessary to
- (A) retrain the staff.
 - (B) change the management.
 - (C) change the systems analyst.
 - (D) restart the system development cycle.
- 7 Conversions from the old to the new system generally occur in the
- (A) design stage.
 - (B) analysis and evaluation stage.
 - (C) implementation and testing stage.
 - (D) adjustment and maintenance stage.
- 8 A new computer system is developed and implemented alongside the old system until it is clear that it is working well. This type of conversion is
- (A) parallel.
 - (B) direct.
 - (C) phased.
 - (D) pilot.

9



The diagram represents a system development tool. It is called a

- (A) Gantt chart.
- (B) systems flowchart.
- (C) hierarchy chart.
- (D) data flow diagram.

10 A decision table is created to be used in the

- (A) analysis stage.
- (B) design stage.
- (C) implementation and testing stage.
- (D) operation and evaluation stage.

11 The WHILE . . . ENDWHILE structure

- (A) is a post-test loop.
- (B) is the same as the REPEAT . . . UNTIL structure.
- (C) may never execute the loop that it controls.
- (D) should not be used in the same algorithm as the REPEAT . . . UNTIL structure.

12 The following data structure is used by a computer program.

QUILT	QUEEN SIZE	VICTORIAN	BLUE ROSE	94
-------	------------	-----------	-----------	----

This is an example of a

- (A) simple record.
- (B) key field.
- (C) complex array.
- (D) one-dimensional array.

13 The values stored in an ordered array are shown below.

18	21	27	37	38	43	47	52	59	67
----	----	----	----	----	----	----	----	----	----

The most efficient way to search for a specified data element in this array is by using

- (A) a linear search.
- (B) a binary search.
- (C) a selection search.
- (D) an insertion search.

- 14** Which type of software control construct would best describe the structured expressions: CASEWHERE, OTHERWISE, ENDCASE?
- (A) Solution
 - (B) Selection
 - (C) Sequence
 - (D) Repetition
- 15** An algorithm is best described as a
- (A) sequence of data.
 - (B) sequence of program code.
 - (C) series of protocols used to solve a problem.
 - (D) series of instructions used to solve a problem.
- 16** A well-structured algorithm should always be developed using
- (A) pseudocode.
 - (B) the correct inputs and outputs.
 - (C) top-down design methodology.
 - (D) a standard programming language.
- 17** Study the following algorithm.

```

READ A
READ B
REPEAT
    SET C TO (A+B)/2
    PRINT C
    READ A
    READ B
UNTIL A = 0

```

The following values are entered in sequence

4 6 2 0 0 8 3 5.

Which of the following shows the correct output?

- (A) 5
- (B) 51
- (C) 514
- (D) 5144

18 When desk checking, which of the following should always be tested?

- (A) Loops
- (B) Boundary conditions
- (C) Algorithm design
- (D) Division by zero

19 What will be the output produced by the following algorithm if A = 1 and B = 2?

```

read A
read B
WHILE NOT ((A<=0) AND (B<=0))
  IF A>B THEN
    PRINT 'First'
  ELSE
    IF A<B THEN
      PRINT 'Second'
    ELSE
      PRINT 'Equal'
    ENDIF
  ENDIF
  read A
  read B
ENDWHILE

```

- (A) First
- (B) Equal
- (C) Second
- (D) no visible output

20 The following algorithm processes a one-dimensional array of numbers.

```

Set active length of the array
REPEAT
  Find largest element in active part of array
  Swap this element with last element in active part
  Reduce active length by 1
UNTIL active length is 1

```

The algorithm carries out

- (A) a bubble sort.
- (B) a linear search.
- (C) a binary search.
- (D) an insertion sort.

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MARKER'S USE ONLY

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STUDENT NUMBER

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1999**HIGHER SCHOOL CERTIFICATE EXAMINATION
COMPUTING STUDIES****2/3 UNIT (COMMON)—SECTION I****CENTRE NUMBER**

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PART B**Marks**

(20 Marks)

Attempt BOTH questions.

QUESTION 21 Computer-based Systems (10 marks)

- (a) (i) What is the purpose of using decision tables in the system development cycle? **5**

.....

.....

.....

- (ii) Explain the importance of a Gantt chart to a systems analyst.

.....

.....

.....

- (iii) When should documentation of a new system begin? Explain your answer briefly.

.....

.....

.....

.....

Question 21 continues on page 10

QUESTION 21 (Continued)

Marks

- (iv) A systems analyst is preparing to meet with management and users to discuss converting from their old system to a new system. At this meeting the systems analyst wishes to discuss alternative conversion strategies that could be used. Describe TWO alternative strategies that could be used.

- 1 Description
-
-
- 2 Description
-
-

- (b) (i) A software development team has been given the following information: **5**

- Preparation of the system design documentation will take three weeks. Purchase of application software packages to be used in the system can occur at the same time. These can be supplied in one week. Coding and testing of the remaining custom software will take four weeks and this can commence once the system design documentation is completed.
- Preparation of the hardware specification will take two weeks and can only commence after the system design documentation is completed. It will take a further three weeks to obtain quotations from suppliers and another week to select suppliers and place the orders. Because of the amount of equipment involved, delivery will take four weeks.
- Laying of network and power cabling can commence immediately the hardware specification is prepared and will take six weeks. Installation of the equipment can only occur after cabling is complete. It will take one week.
- Setting up the software, system testing and training can only start after the equipment is installed. This will take two weeks, after which the new system will become operational.

QUESTION 21 (Continued)

Marks

- (ii) A range of tools can be used to help in the analysis stage. This helps others better understand the system. Some of these analysis and communication tools have been illustrated in the diagrams below.

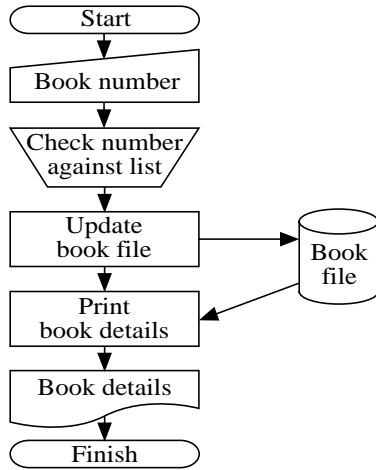


DIAGRAM 1

<i>Data item</i>	<i>Description</i>
ID	Unique code for each account three-digit number
Start	Date of commencement—dd/mm/yy
Balance	Current amount (\$) outstanding
Limit	Credit limit
Contact	Name of contact person
Address I	Number and street
Address II	Suburb/town
Postcode	Four-digit number

DIAGRAM 2

- Name the analysis tool in Diagram 1.
.....
- Explain how an analyst uses this tool to help others better understand the system.
.....
.....
.....
- Name the analysis tool in Diagram 2.
.....
- Explain how an analyst uses this tool to help others better understand the system.
.....
.....
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MARKER'S USE ONLY

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STUDENT NUMBER

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1999**HIGHER SCHOOL CERTIFICATE EXAMINATION
COMPUTING STUDIES****2/3 UNIT (COMMON)—SECTION I, PART B****CENTRE NUMBER**

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QUESTION 22 Algorithm Design (10 marks)**Marks**

- (a) An Internet service provider (ISP) has an on-line access policy that includes the following conditions: **6**

- 1 a customer is restricted to 120 minutes for each on-line session;
- 2 no more than 20 Mb of download is allowed in each on-line session.

Time is to be logged in minutes, and downloads in whole megabytes. During an on-line session a small message 'access OK' is displayed in a corner of the screen.

Once either of the above conditions has been met, the message changes to 'access terminated' and the customer is automatically logged off.

- (i) Design a set of test data that will be needed to desk check the above conditions and show the expected display.

<i>Time</i>	<i>Download</i>	<i>Expected display</i>

Question 22 continues on page 14

QUESTION 22 (Continued)

Marks

- (iii) Using pseudocode or a flowchart, rewrite the algorithm so that it correctly carries out its intended purpose. Use the space below.

- (iv) In response to complaints from customers, the ISP decides to allow downloads in excess of the 20 Mb limit but intends to charge 10 cents for each Mb downloaded above 20 Mb.

Describe a modification that would need to be made to your corrected algorithm in part (a) (iii) to accomplish this change of policy.

.....

.....

.....

.....

.....

QUESTION 22 (Continued)

Marks

- (b) (i) Complete a desk check of the following pseudocode using the data values [2, 3, 7, 5, 1, 6, 999] and a table format of: **4**

```

L = 0
read X
REPEAT
    IF X > L THEN
        L = X
    ENDIF
    read X
UNTIL X = 999
PRINT L

```

<i>L</i>	<i>X</i>	<i>Output</i>

- (ii) What is the purpose of two input statements?

.....

.....

- (iii) Write the pseudocode as a flowchart.

End of Section I



HIGHER SCHOOL CERTIFICATE EXAMINATION

1999

COMPUTING STUDIES

2/3 UNIT (COMMON)

SECTION II—OPTIONS

(60 Marks)

*Total time allowed for Sections I and II—Three hours
(Plus 5 minutes reading time)*

DIRECTIONS TO CANDIDATES

- Attempt THREE questions.
- Answer each question in a SEPARATE Writing Booklet.
- You may ask for extra Writing Booklets if you need them.

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QUESTION 23 Applied Artificial Intelligence and Expert Systems
(20 marks)

Marks

Use a SEPARATE Writing Booklet.

- (a) For each of the following parts, select the alternative A, B, C or D, that best answers the question. Write the part number and the letter of your answer in your Writing Booklet. **4**
- (i) A heuristic is a(n)
- (A) rule of thumb.
 - (B) AI application.
 - (C) knowledge base.
 - (D) speech synthesiser.
- (ii) One reason computers have difficulty processing natural language is the
- (A) lack of subsets of natural languages.
 - (B) large vocabulary of natural languages.
 - (C) limited vocabulary of natural languages.
 - (D) fact that natural languages have no syntax.
- (iii) *Syntax* in natural language is best described as
- (A) the underlying meaning of words and phrases.
 - (B) a set of rules for constructing sentences from words.
 - (C) information that incorporates the relationships between facts.
 - (D) a set of rules that defines a form of language usage acceptable for a particular audience.
- (iv) An expert system typically includes
- (A) a database and an inference engine.
 - (B) a knowledge base and an inference engine.
 - (C) a knowledge base, a database and a user interface.
 - (D) an explanation facility, a database and a user interface.

Question 23 continues on page 20

QUESTION 23 (Continued)

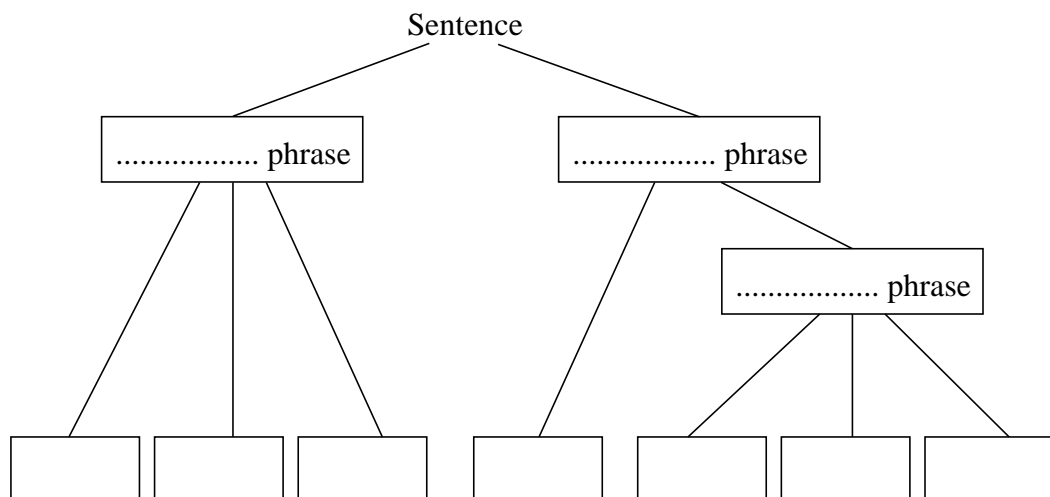
Marks

- (b) A parse tree is used to check the syntax of the following natural language sentence. **10**

‘The fat cat sat on the mat’, which is described by the following lexicon.

<i>Word</i>	<i>Part of speech</i>
The	Determiner
Fat	Adjective
Cat	Noun
Sat	Verb
On	Preposition
The	Determiner
Mat	Noun
Star	Noun
Big	Adjective
Shines	Verb
At	Preposition
Brightly	Adverb
Night	Noun

- (i) Using the above lexicon, complete the following parse tree in your Writing Booklet.



Sentence

QUESTION 23 (Continued)

Marks

- (ii) Using the lexicon on page 20, redraw the parse tree so that the following sentence parses correctly.

The big star shines brightly at night.

- (iii) Read the following narrative and write a set of rules to represent the intended knowledge in a small expert system.

If the job applicant is educated in accounting, marketing, or MIS, then she has the right education for the job. The applicant is considered to have the required experience if she has two or more years in accounting, marketing, or MIS. If the applicant does not have experience in accounting, marketing, or MIS, she must have four or more years of general experience. To qualify for the job, the applicant should have both the right education and the required experience. If the applicant does not have the right education to qualify for the job, she must have at least ten years of experience in accounting, marketing, or MIS.

Simplify the representation. You may use AND, NOT and OR to denote the connectives and to reduce the number of rules required.

- (c) (i) How can a computer become an expert in a particular field to make *human-like* decisions?
- (ii) Describe TWO ways in which expert systems differ from conventional information systems.
- (iii) What is the role of a knowledge engineer?

6

QUESTION 24 Computer Communications (20 marks)**Marks**

Use a SEPARATE Writing Booklet.

- (a) In your Writing Booklet, write the numbers 1 to 10 on successive lines. Against each number write the term that matches each definition in the table below.

5

- asynchronous • handshaking • protocol • star network
- baud • packet • repeater • start bit
- bit-rate • parallel • ring network • stop bit
- bus network • parity • serial • synchronous

<i>Definition</i>	
1	Communications in which there is one central coordinating node with connecting nodes to the central node.
2	A bit at the end of a character that signals the end of transmission of a character to the receiving computer.
3	Communications in a continuous circle with nodes represented as points on the circumference.
4	The speed with which bits of data can be transmitted or received over a communication medium. Usually measured in bits per second.
5	Data transmission in which a unit of data is independent of a time code.
6	Communications in a straight line, with nodes represented as points off the straight line.
7	A characteristic of each transmitted character or group of characters used to check the accuracy of the received item.
8	The speed of transmission, which measures the number of times per second the medium can change its state, ie. the number of discrete signals per second.
9	Data transmission in which clocks in both receiving and transmitting terminals are used to ensure that data is processed at the same rate.
10	Data transmission in which the bits of each character are transmitted sequentially, one at a time, over a single channel or wire.

QUESTION 24 (Continued)

Marks

- (b) Diagram 1 shows three local area networks within the same building. The local area networks have been combined to form a larger network.

7

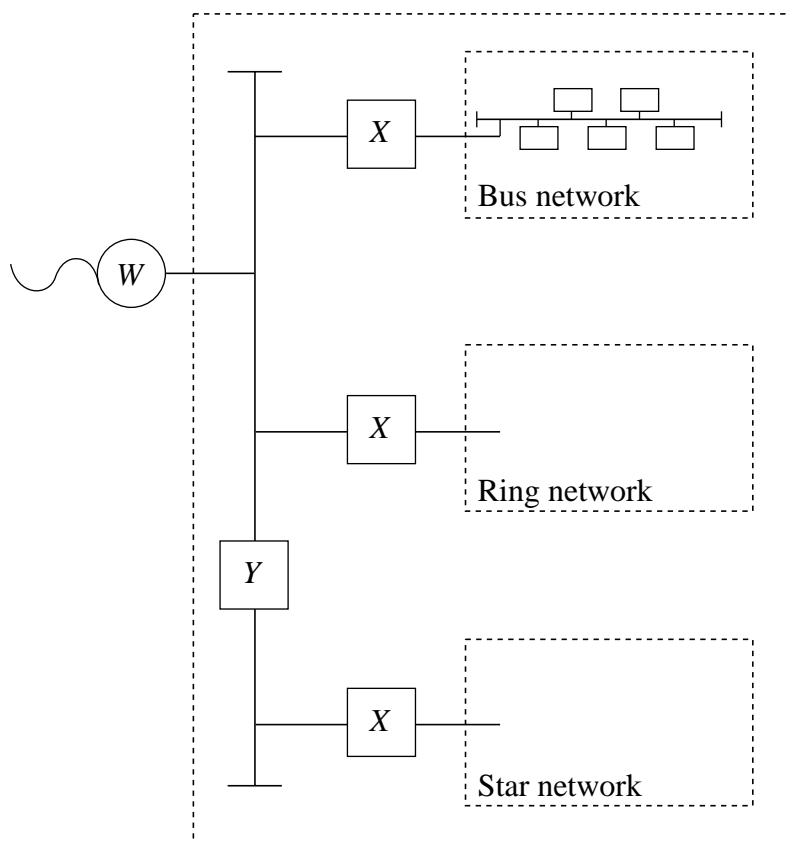


DIAGRAM 1

In Diagram 1 the bus network has been drawn. Terminals (nodes) are indicated by ☐.

- (i) In your Writing Booklet, draw a ring network with at least FIVE nodes in it.
- (ii) In your Writing Booklet, draw a star network with at least FIVE nodes in it.
- (iii) Describe the way in which the following local area networks (LAN) transmit messages:
 - 1 Ethernet;
 - 2 Token ring.
- (iv) The device marked (W) is a modem that connects the networks to a remote branch of the same organisation. Explain TWO advantages of using a leased line instead of a normal telephone line for this connection.

QUESTION 24 (Continued)

Marks

- (c) (i) Z-modem is a file transfer protocol that splits a whole message into individual packets for transmission. **8**
- 1 Describe the structure of a packet.
 - 2 Describe TWO advantages gained by transmitting the whole message in packets.
 - 3 Draw a labelled diagram to describe the process of packet switching in a large network.
- (ii) List THREE different transmission media used in data communications.
- (iii) Describe the functions of communication protocols.
- (iv) Describe the functions of a repeater in a WAN.
- (v) Explain the role of a modem in converting analog and digital signals.

QUESTION 25 Computer-controlled Systems (20 marks)**Marks**

Use a SEPARATE Writing Booklet.

- (a) (i) Describe TWO characteristics of a batch control system. **3**
- (ii) Describe what is meant by signal conditioning.
- (iii) Give TWO societal impacts of the use of traffic control systems.
- (b) A photocopier control system has the following capabilities: **7**
- measurement of the dimensions of the paper to be copied and adjustment of magnification for the copy to fit on A4 size paper;
 - adjustment of copy density to optimum;
 - counting the number of pages being copied for double-sided copying.
- (i) Identify TWO inputs and TWO outputs of the control system.
- (ii) Select and name TWO appropriate sensors, and justify your choice.
- (iii) Describe THREE tests that would be required in order to evaluate the performance of the system.

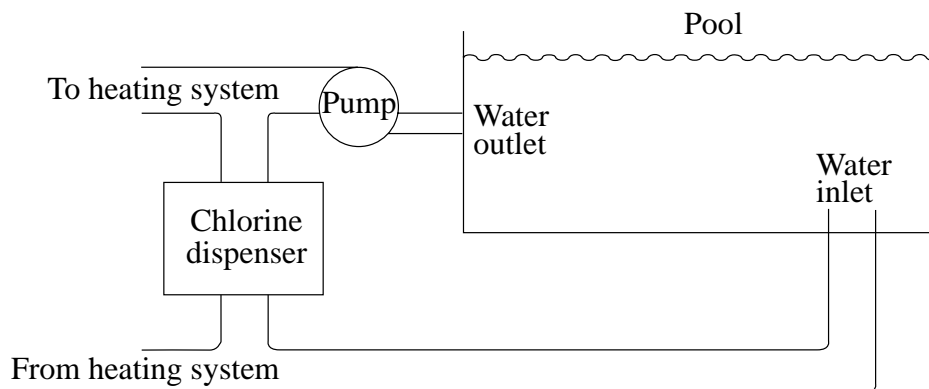
Question 25 continues on page 26

QUESTION 25 (Continued)

Marks

- (c) A computer-controlled system is used to control the operation of a swimming-pool. It consists of two subsystems: **10**

- *Heating*—The water temperature is controlled between upper and lower limits. The main heat source is circulation of the pool water through solar panels. When the pool water temperature goes above the upper temperature limit of 28°C , circulation through the solar panels ceases. If the temperature drops below the lower limit of 18°C , electrical heating commences. Electrical heating ceases once the temperature goes above the lower limit, and solar heating resumes.
- *Chlorine content*—The subsystem attempts to control chlorine content to a set level by continually varying the dosage. There is a range of chlorine content within which it is safe for people to use the pool. If the chlorine content goes outside this range, an alarm is sounded to notify people to come out of the water and the subsystem is shut down. The subsystem must be restarted manually when the problem has been fixed.



- Draw a block diagram for the chlorine content subsystem.
- For ONE subsystem, name ONE suitable sensor, justify its use, and describe its operation.
- For ONE subsystem, name ONE suitable actuator, justify its use, and describe its operation.
- Using pseudocode or a flowchart, write an algorithm for the operation of the *heating* subsystem.

QUESTION 26 Computing Technologies (20 marks)**Marks**

Use a SEPARATE Writing Booklet.

- (a) Copy Table 1 and Table 2 below into your Writing Booklet. Complete the blank spaces in each table. **10**

(i) TABLE 1

<i>Decimal</i>	<i>Binary</i>	<i>Hex</i>
77		
78	0100 1110	
79		
80		50

(ii) TABLE 2

<i>Positive binary number</i>	<i>One's complement</i>	<i>Two's complement</i>	<i>Sign and modulus</i>
10110101			
00110101			

- (iii) Using Table 3, calculate the expressions below. Show all working in binary.

- 1 $A + B$, using two's complement;
- 2 $C - B$;
- 3 $C * B$, using shift and add;
- 4 A / B , using shift and subtract.

TABLE 3

	<i>Binary</i>
<i>A</i>	0111 1111
<i>B</i>	0000 1010
<i>C</i>	1111 1111

Question 26 continues on page 28

QUESTION 26 (Continued)

Marks

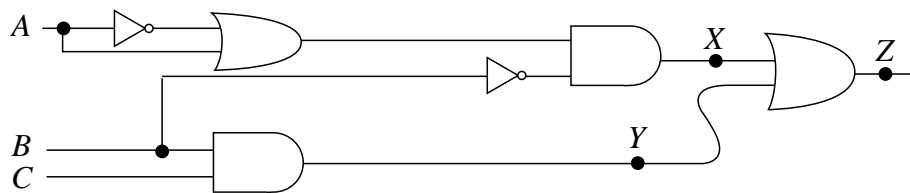
Answer EITHER part (b)—Theory and Construction of Integrated Circuits
OR part (c)—Optical Technologies

EITHER

(b) Theory and Construction of Integrated Circuits

10

- (i) What is a *flip-flop*?
- (ii) How can a flip-flop store a bit of data?
- (iii) Consider the following circuit diagram.



A truth table for the circuit has been started below:

<i>A</i>	<i>B</i>	<i>C</i>	<i>X</i>	<i>Y</i>	<i>Z</i>
0	0	0			
0	0	1			
0	1	0			
0	1	1			
1	0	0			
1	0	1			
1	1	0			
1	1	1			

Copy the truth table for the circuit into your Writing Booklet and complete the table.

- (iv) The production of integrated circuits involves five main steps—packaging, etching, testing, CAD, and photomasking.
- 1 Arrange the five main steps into the correct sequence as used in the production process.
 - 2 Explain the role of photo-resist.
 - 3 Explain why it is necessary for integrated circuits to be manufactured in clean rooms that are much cleaner than hospital operating theatres.

OR

QUESTION 26 (Continued)

Marks

(c) **Optical Technologies****10**

- (i) How do fibre optics and metal conductors differ in their transmission characteristics?

Ensure you cover FOUR of the following topics in your answer.

- data capacity
- data security
- transmission velocity
- data storage life
- social costs
- environmental aspects

- (ii) You have researched the adoption of an optical technology within your local/national or global community. Using ONE of the optical technologies listed below

- Fibre optics
- Laser printing
- CD-ROM
- Magneto-optical technology

answer the following questions:

- 1 State the industry and/or community researched.
- 2 State the optical technology that you researched.
- 3 With the aid of annotated diagram(s), describe how this technology works.
- 4 What was used in the industry/community *before* the introduction of the optical technology?
- 5 What are TWO limitations in this *old* technology that are addressed by the optical technology?
- 6 What are TWO technical problems/technical limitations yet to be addressed by the optical technology you have nominated?

QUESTION 27 Database Design (20 marks)**Marks**

Use a SEPARATE Writing Booklet.

- (a) In your Writing Booklet, write the numbers 1 to 10 on successive lines. Against each number write the term that matches each definition in the table below.

5

- binary search • data independence • hierarchical database
- data bias • data integrity • linear search
- data dependency • data processing • logical operand
- data dictionary • data redundancy • network database
- data hierarchy • distributed database • relational database

<i>Definition</i>	
1	An element that evaluates to one of the values true or false.
2	A term used to describe the reliability of data, eg. its correctness and currency.
3	The classification of data order, eg. from the lowest to the highest level—character, field, record, file, and database.
4	An algorithm used to search structured data. The data must be arranged in either ascending or descending order. The algorithm repeatedly divides the data to be searched into two parts, discards one part and searches the other until either the target is found or it is determined that the target is not present.
5	A comprehensive description of each field in the database.
6	Undesirable duplication of data within a database.
7	An algorithm used to search structured data. The data need not be ordered. The algorithm compares each item of data with the target until either the target is found or it is determined that the target is not present.
8	A database in which data is organised in a series of relationships, or two-dimensional tables, where the columns represent data fields and the rows represent records.
9	A database in which data is organised as a series of nodes linked by branches. Each node can have many branches and each lower level node (child) may be linked to more than one higher level node (parent). More than one data path can lead to a particular record.
10	A database in which data is organised in a series of levels, in a top-down structure consisting of nodes and branches. Each node can have many branches but each lower level node (child) is linked to only one higher level node (parent). Only one data path exists to a particular record.

QUESTION 27 (Continued)

Marks

- (b) The Olympic Games committee has set up a seat booking system for all of its events. Part of the database is as follows. **9**

PERSON	EVENT_SEATS	EVENTS
<ul style="list-style-type: none"> • Family_name • Given_names • Address • Events_required • Priority • Age • Disability_type • Health_card • Disability_permit_number • Medicare_number • Group_code • Deposit_amount • Credit_card_number • Valid_credit_card? 	<ul style="list-style-type: none"> • Event_number • Seat_number • Disability_access • Person_name • Group_code 	<ul style="list-style-type: none"> • Event_number • Event_title • Venue • Date • Time

- (i) What is the primary key of the EVENT_SEATS file?
- (ii) Why is Family_name in the PERSON file not suitable as a primary key?
- (iii) For the PERSON file:
- 1 give an example of a logical field;
 - 2 give an example of a numeric field;
 - 3 why is Age a poor choice for a field? What would be a better field to use?
 - 4 if selection and mail-merge are to be used for sending out information to applicants, why would it be better to split Address into more fields? Give names to these fields that suggest the contents;
 - 5 people apply for seats in a number of events. In the current PERSON data structure all these events are in one field, Events_required. What would be a more appropriate database solution?
- (iv) Sponsors are allowed a certain number of seats for the events they sponsor. The organiser would prefer that applications for seats by sponsors be available electronically. Specify the type of file you would require. What processes would need to be carried out to place the data in the PERSON file?

Question 27 continues on page 32

QUESTION 27 (Continued)

Marks

(c) Bob's Book Company offers an Internet service for customers who can: **6**

- register preferences for categories of books they prefer to buy;
- place orders for books using their credit card.

The company stores the data in a database.

- (i) Discuss TWO methods that could be used to keep customer credit card details secure against unauthorised access.

The customer preference file in the database has the following fields:

- Customer_number;
- Books_category_preference.

- (ii) Write a statement to select all customers who might be interested in buying a new book about Asian politics.

Research has shown that book preferences are a good indicator of customer preferences for types of music and videos.

- (iii) What are the ethics of a book company passing on data about customers and their book preferences to video and music companies?

QUESTION 28 Graphical Techniques (20 marks)**Marks**

Use a SEPARATE Writing Booklet.

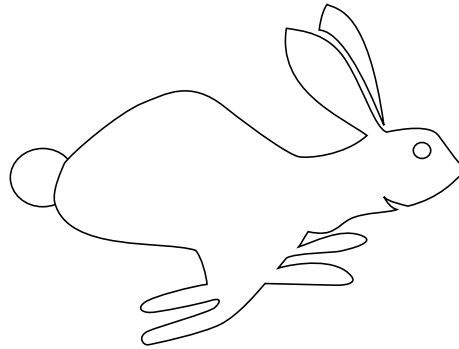
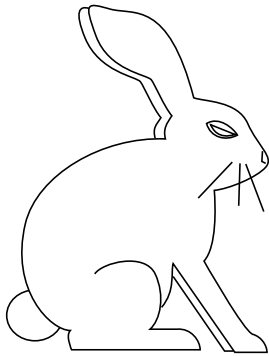
- (a) Using a computing example, explain the following: **7**
- (i) The effect on an image of changing the aspect ratio.
 - (ii) Rendering a wire frame.
 - (iii) Why a colour laser printer might be used in preference to a colour inkjet printer.
 - (iv) Why a vector display monitor might be used in preference to a raster monitor.
 - (v) How dithering could be used to reduce the number of bit planes.
 - (vi) The effect of applying data compression to a computer graphic.
 - (vii) The effect of anti-aliasing on a computer graphic.
- (b) Computer graphics are now used extensively in the areas of art and sport. **6**
- (i) Describe ONE change that has occurred in either art or sport by the use of computer graphics.
 - (ii)
 - 1 Name ONE graphical input device (not a mouse, keyboard, trackball, joystick or scanner) that has allowed computer graphics to be used in either art or sport.
 - 2 Explain how this device has been used in either art or sport.
 - 3 Explain how the device operates.
 - (iii) Describe TWO technological advances that have occurred in computer processing or storage to make it feasible for computer graphics to be used in art and sport.

Question 28 continues on page 34

QUESTION 28 (Continued)

Marks

- (c) A computer animator wishes to use the following line drawings to create a short computer-animated sequence. The two drawings represent the first and last frames of the sequence and are to be scanned into a graphic software package and saved. 7



- (i) Describe the operation of a scanner in digitising these images into a file.
- (ii) The file that results is monochrome and bit-mapped. Explain how this file is stored in RAM.
- (iii) The animator wishes to add colour and decides to increase the number of bit-planes from 1 to 8. How many colours or tones will the animator be able to use?
- (iv) The coloured image occupies 40×20 pixels on the screen. Show how you would calculate the minimum memory in kilobytes required to store the image.
- (v) The animator decides to use an animation package to create ten intermediate images to smooth the animation. Name this process.
- (vi) The completed animation is to be displayed on a number of different computer systems. Discuss the effect that the memory size, processing speed and resolution of a system will have on the display of the animation.

QUESTION 29 Multimedia (20 marks)**Marks**

Use a SEPARATE Writing Booklet.

A local Sydney band would like to create a multimedia presentation of their material. The presentation is to include selected songs, live video clips and interviews with band members.

- (a) The storage of sound and musical information can be made in analog or digital formats. **8**

- (i) Name and describe the technique that should be used to represent the band's performances on a CD-ROM.
- (ii) With the technique described above, state TWO advantages and TWO disadvantages of using this technique over an alternative technique.

A band member who is up to date with computing technologies has suggested recording their music in MIDI format.

- (iii) What hardware would be needed to listen to the band's songs?
 - (iv) Explain how MIDI works.
 - (v) Describe TWO major differences between MIDI and digital waveform sound files.
- (b) Due to the large amount of data to be recorded on the CD-ROM, compromises need to be made without reducing the content of the material. **4**
- (i) Name TWO techniques that can be applied to the video sequences to reduce the amount of video data.
 - (ii) Name TWO techniques that can be applied to the sound/music so that the amount of audio data is reduced.
 - (iii) Explain which of the two methods, reducing video data or reducing audio data, will maximise the CD-ROM's storage capacity.

- (c) It has been decided to use a storyboard layout for this presentation. **8**
- (i) State the FOUR possible storyboard layouts that can be used in multimedia.
 - (ii) Prepare a storyboard layout that can be used for this presentation.

End of paper

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