



HIGHER SCHOOL CERTIFICATE EXAMINATION

1997

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

Part A (20 marks)

- Attempt ALL questions.
- Mark your answers in pencil on the Answer Sheet provided.

Part B (20 marks)

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

PART A

(20 Marks)

Attempt ALL questions.

Each question is worth 1 mark.

Select the alternative A, B, C, or D that best answers the question.

Mark your answers in pencil on the Answer Sheet provided.

1. A person makes a copy of a commercial software package. The major issue in this situation is
 - (A) control.
 - (B) privacy.
 - (C) security.
 - (D) copyright.

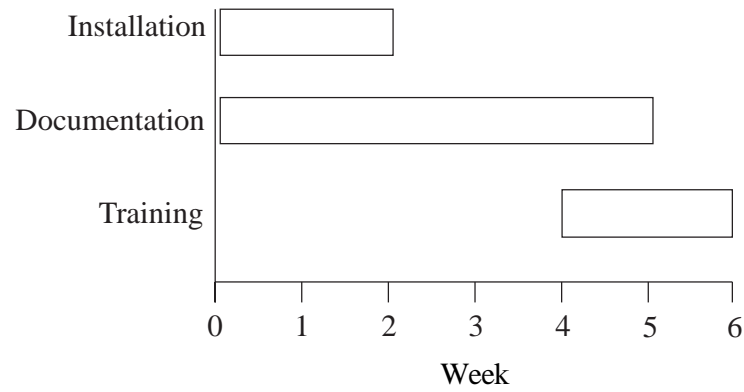
2. The diagrammatic representation of the movement of data through a system is known as a
 - (A) structure chart.
 - (B) data flow diagram.
 - (C) transit data diagram.
 - (D) data movement chart.

3. The stage of the system development cycle during which facts about the existing system are gathered is known as
 - (A) design.
 - (B) analysis.
 - (C) operation and evaluation.
 - (D) implementation and testing.

4. The purpose of a feasibility study is to
 - (A) investigate the existing system.
 - (B) review the current system in operation.
 - (C) determine the nature of the problem and make recommendations.
 - (D) obtain information required to begin the design of a new system.

5. In systems design, the systems analyst focuses on
- (A) investigating alternative designs.
 - (B) determining how the existing system operates.
 - (C) developing a system to meet user needs.
 - (D) determining the costs and benefits of the new system design.
6. The term that describes the moral principles that should be considered when using information is
- (A) ethics.
 - (B) privacy.
 - (C) security.
 - (D) copyright.
7. A limited working model of a computer-based system is called a
- (A) pre-test.
 - (B) prototype.
 - (C) data model.
 - (D) decision tree.
8. The conversion method by which a small section of the existing system is replaced while the remaining sections are kept operating is known as
- (A) direct conversion.
 - (B) serial conversion.
 - (C) parallel conversion.
 - (D) phased conversion.
9. In which phase of the system development cycle would programmers have the greatest involvement?
- (A) Analysis
 - (B) Feasibility study
 - (C) Requirements definition
 - (D) Implementation and testing

10.



The above diagram is an example of a

- (A) Gantt chart.
- (B) system flowchart.
- (C) decision table.
- (D) block diagram.

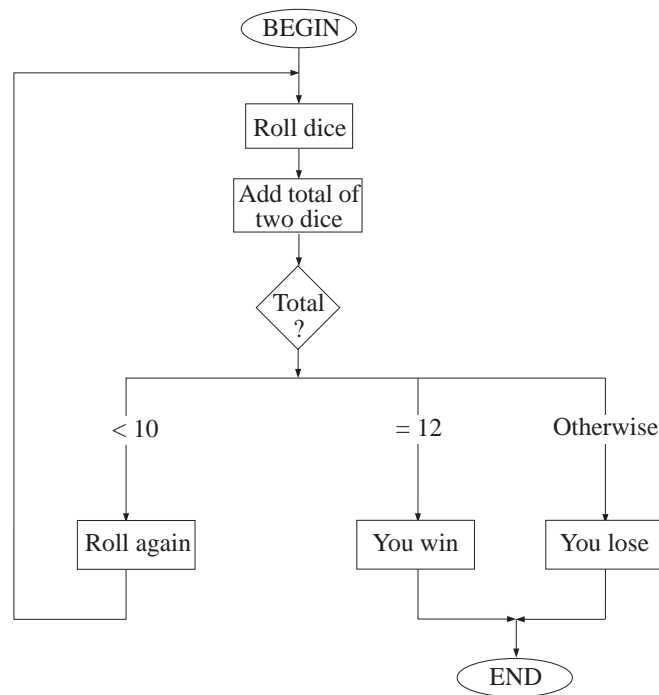
11. The values stored in an array are shown below.

ELEMENT 1	ELEMENT 2	ELEMENT 3	ELEMENT 4	ELEMENT 5	ELEMENT 6
26	2	18	30	80	19

The result produced by the first pass of an ascending *insertion* sort would be:

	ELEMENT 1	ELEMENT 2	ELEMENT 3	ELEMENT 4	ELEMENT 5	ELEMENT 6
(A)	2	18	19	26	30	80
(B)	2	26	18	30	19	80
(C)	80	30	26	19	8	2
(D)	26	2	18	30	19	80

12. Two dice are rolled, and their total is used to play a game. The algorithm for the game is represented by the following flowchart.



A *minimum* test set for the algorithm would be

- (A) 10, 12
 - (B) 9, 10, 12
 - (C) 10, 11, 12
 - (D) 9, 10, 11, 12
13. The most efficient way of finding a data element in a large sorted array is to use
- (A) a linear search.
 - (B) a binary search.
 - (C) a bubble search.
 - (D) an insertion search.

14. BEGIN
set A to 3
set B to 0
WHILE A < 5
 set B = A * 2
 print B
 set A to A + 1
ENDWHILE
END

The output from running the above algorithm is

- (A) 6, 8
- (B) 0, 6, 8
- (C) 6, 8, 10
- (D) 0, 6, 8, 10

15. Which of the following statements is true? A one-dimensional array

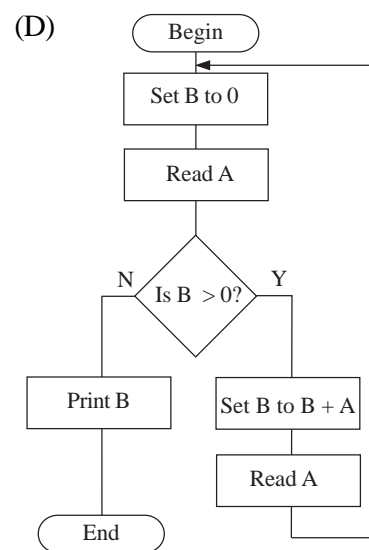
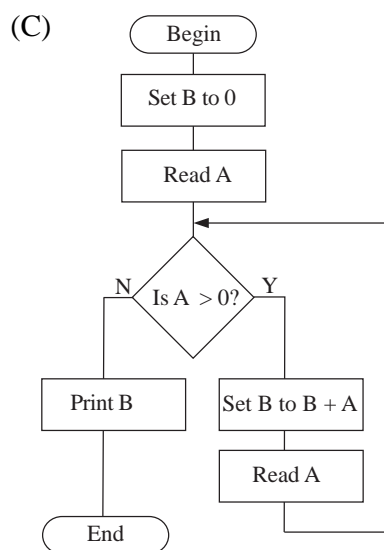
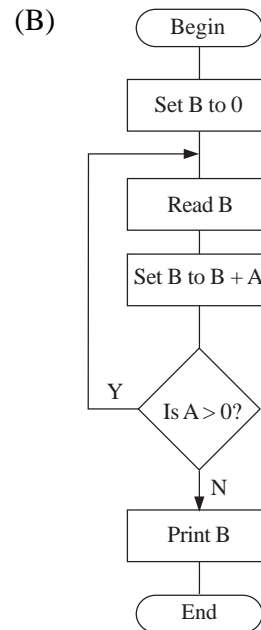
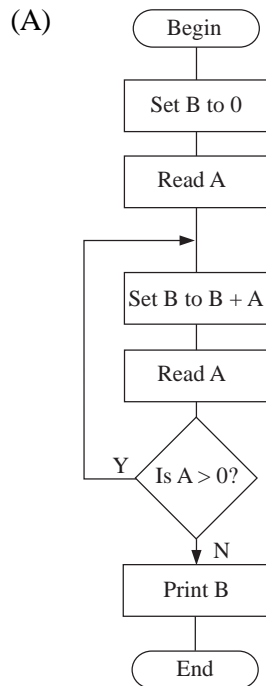
- (A) must contain only numeric data.
- (B) must contain only alphanumeric data.
- (C) can contain numeric or alphanumeric data, but not both.
- (D) can contain a combination of alphanumeric data and numeric data.

```

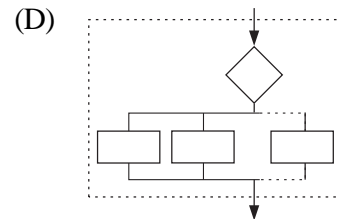
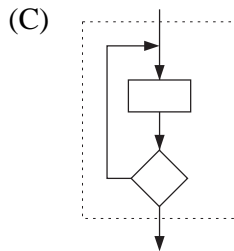
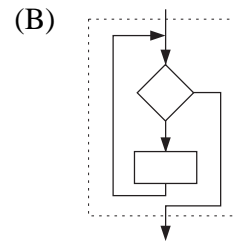
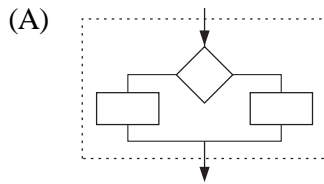
16. BEGIN
   set B to 0
   read A
   WHILE A > 0
     set B to B + A
     read A
   ENDWHILE
   print B
   END

```

The above algorithm is best shown by which flowchart?



17. The flowchart structure that best shows a binary selection is



18. Typing errors in commands of a program are *most likely* to produce

- (A) syntax errors.
- (B) logical errors.
- (C) variable errors.
- (D) operational errors.

19. A control structure in which the body of the structure is executed while the termination condition is *true*, and will be executed at least once, is

- (A) an 'else do'.
- (B) a 'while do'.
- (C) a 'repeat until'.
- (D) a 'while endwhile'.

20. A programming technique is characterised by the whole program being broken down into small independent modules, each of which has a single entry and exit point. This technique is called

- (A) analysis.
- (B) synthesis.
- (C) structured programming.
- (D) structured walk-through.

EXAMINER'S USE ONLY

STUDENT NUMBER

**1997
HIGHER SCHOOL CERTIFICATE EXAMINATION
COMPUTING STUDIES
2/3 UNIT (COMMON)—SECTION I**

CENTRE NUMBER

PART B
(20 Marks)

Marks

QUESTION 21. Computer-based Systems (10 marks)

(a) (i) Complete, *in order*, the SIX stages of the system development cycle. **5**

- | | |
|---------|---------|
| 1. | 4. |
| 2. | 5. |
| 3. | 6. |

(ii) *Direct conversion* can be used in the implementation and testing stage.

1. Explain the process of direct conversion.
.....
.....
.....
2. Describe a disadvantage of using direct conversion.
.....
.....
.....

(iii) Explain the use of the following tools in the design stage of the system development cycle.

1. Data flow diagram
.....
.....
2. System flowchart
.....
.....

QUESTION 21. (Continued)

Marks

(b) A retail store has employed a system analyst to develop a new computerised point-of-sales system. **5**

(i) The system analyst has estimated the following time for activities in the design stage:

- input design 10 days;
- output design 5 days;
- file design 10 days;
- report and review 5 days.

Draw a Gantt chart in the space below for the activities in the design stage of the point-of-sales system. The activities occur in the order given above. None of the activities overlap.

(ii) The retail store is developing a new policy for its acceptance of customer cheques. Cheques will be accepted if ALL of the following conditions apply:

- cheques must be less than \$500;
- the customer must have a current driver's licence;
- cheque signature matches driver's licence signature.

Complete the following decision table for the new cheque policy.

Conditions	Rules							
Actions								

EXAMINER'S USE ONLY

STUDENT NUMBER

**1997
HIGHER SCHOOL CERTIFICATE EXAMINATION
COMPUTING STUDIES
2/3 UNIT (COMMON)—SECTION I, PART B**

CENTRE NUMBER

QUESTION 22. Algorithm Design (10 marks)

Marks

- (a) The following algorithm is to be used by a vending machine that sells cans of drink each costing 80c. The machine will accept all coins, except 5c coins. **5**

```

BEGIN COLLECT
Set amount to zero
Set change to zero
Set cost to 80
WHILE amount < = cost
    Read coin
    IF coin < 10 THEN
        PRINT 'coin rejected'
    ELSE
        set amount to coin + amount
        PRINT amount
    ENDIF
ENDWHILE
PRINT change
END COLLECT
    
```

Answer the following questions regarding the above algorithm.

- (i) Desk check the algorithm by indicating the output values printed by the algorithm for the following set of input coins.

	<i>Coin</i>	<i>Output</i>
<i>First coin</i>	50c
<i>Second coin</i>	5c
<i>Third coin</i>	50c

QUESTION 22. (Continued)

Marks

- (ii) The algorithm for the vending machine does not give change. Modify the algorithm below to store change in a variable called *change*. If lines need to be inserted, use the spaces provided.

```
BEGIN COLLECT

Set amount to zero

Set change to zero

Set cost to 80

WHILE amount < = cost
    Read coin
    IF coin < 10 THEN
        PRINT 'coin rejected'
    ELSE
        set amount to coin + amount
        PRINT amount
    ENDIF
ENDWHILE

PRINT change

END COLLECT
```

- (iii) The original algorithm on page 11 contains a logic error.

- 1. Identify the error.

.....
.....

- 2. Give a set of test data that would demonstrate the existence of the error.

.....
.....

QUESTION 22. (Continued)

Marks

- (b) (i) The greenkeeper of a golf course has decided to install an automatic watering system. The sprinklers attached to this system turn on at 9 p.m. and turn off at 4 a.m. so as not to disrupt the golfers playing on the course. **5**

Using pseudocode or a flowchart, write an algorithm that will achieve this result.

USE THE SPACE BELOW FOR YOUR ALGORITHM

QUESTION 22. (Continued)

Marks

- (ii) During wet weather, the watering system still operated and the course became waterlogged. To overcome this problem, the system has been equipped with sensors that continually monitor soil moisture.

The watering system will now only operate between 9 p.m. and 4 a.m. while the soil moisture level is less than 40 per cent.

Using pseudocode or a flowchart, write an algorithm that will achieve this task.

USE THE SPACE BELOW FOR YOUR ALGORITHM



HIGHER SCHOOL CERTIFICATE EXAMINATION

1997

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 **Marks**
(20 marks)

Use a *separate* Writing Booklet.

- (a) (i) Explain the following terms as they apply to Artificial Intelligence and Expert Systems. **6**

- Rules
- Heuristics
- Parse tree
- Inference engine

- (ii) Describe the process by which a neuron decides to output *EITHER* a '1' *OR* a '0' in a neural network.
- (iii) Describe the operations that occur in the process of *knowledge engineering*.

- (b) (i) A medical diagnostic decision-support system can assist a doctor by providing a patient diagnosis. It must be able to explain to the doctor how it reached that diagnosis. **7**

State whether *EACH* of the following technologies is suitable for such a diagnosis system. Give reasons for your answers.

- Expert system
- Neural network

- (ii) Choose *ONE* of the following topics:

- Intelligent robots;
- Natural language processing.

Name the area you have selected, and describe a problem for which your selected area provides a useful solution. Describe how the problem is solved.

- (iii) Describe *TWO* advantages for the use of *fuzzy logic* in neural networks.

QUESTION 23. (Continued)

Marks

Answer the following questions, with reference to the RULES and DATA LISTS on this page.

- (c) A school will pay the cost of the bus fare for an excursion if *all* of the following conditions are satisfied: **7**

- there are thirty or more authorised students;
- there is at least one male and one female teacher on the bus;
- all the teachers on an excursion are from an eligible (relevant) department.

To be authorised for an excursion, a student must have written consent from their parents or legal guardian if the student is under eighteen years of age. If the student is eighteen or over they must provide their own written permission. An expert system has been produced to provide decisions as to whether the bus fares for the excursion will be paid by the school.

The debating team wants to arrange an excursion to another school. To be eligible to go on a debating excursion a teacher must belong to the English or Drama department. The following rules and lists of data are used to make a decision as to whether the school will pay for the debating excursion.

RULES

① Pay	IF	all students on the bus are authorised AND all teachers are eligible AND there are sufficient students on the bus AND there are sufficient teachers on the bus
② Sufficient teachers on the bus	IF	number of male teachers on the bus ≥ 1 AND number of female teachers on the bus ≥ 1
③ Sufficient students on the bus	IF	number of students on the bus > 30
④ Eligible teacher	IF	teacher is from English department OR teacher is from Drama department
⑤ Authorised student	IF	student age is < 18 AND written permission from legal guardian
⑥ Authorised student	IF	student age is ≥ 18 OR written permission from student

DATA LISTS

English department teachers

A. Bloggs
F. Nelson
G. Tubb
N. Ho

Drama department teachers

G. Slavano
K. Ng
R. G. Baker

QUESTION 23. (Continued)

Marks

- (i) Answer the following, with reference to the RULES and DATA LISTS on page 18.
1. What is the minimum number of teachers required for the debating excursion?
 2. What is the maximum number of teachers who can attend the debating excursion?
- (ii) The following set of teacher test data is used on the expert system. It highlights a problem in teacher selection.

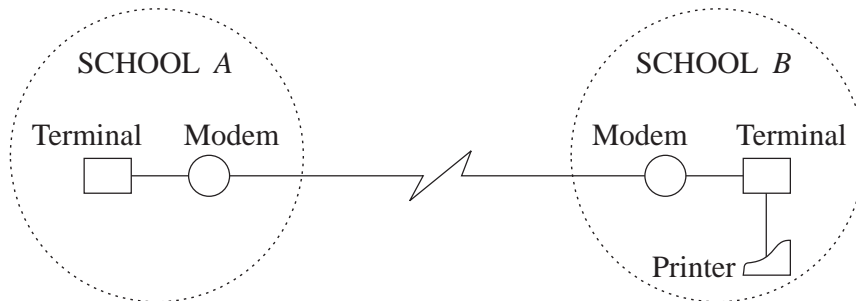
TEST DATA SET

<i>Teachers</i>	<i>Department</i>
N. Ho	English
G. Tubb	English
R. G. Baker	Drama

1. Identify the rule concerning teachers that shows the problem identified by the test data set.
 2. Explain what the problem is in teacher selection. Suggest a way of overcoming the problem.
- (iii) For a debating excursion, we need to ensure that there are at least four members of the debating team going. Write a new rule and/or modify an existing rule to accomplish this, indicating the rule number(s) affected.
- (iv) There are at least TWO errors in the original rules of the expert system. Identify TWO of these errors, indicating the rule number in which each error occurs, and rewrite the corrected rules.

QUESTION 24. Computer Communications (20 marks)**Marks**Use a *separate* Writing Booklet.

- (a) Describe the differences between the following pairs of terms. **4**
- (i) *Serial* and *parallel* transmission
 - (ii) *Synchronous* and *asynchronous* transmission
 - (iii) *Error detection* and *error correction*
 - (iv) *Upload* and *download*
- (b) There is a dial-up communications link between two schools, A and B, as shown in the diagram below. **6**



- (i) The communication link is not working correctly. Name and describe **THREE** software communication settings that you may need to investigate to ensure correct operation.
- (ii) A printer is shown connected to the terminal at school B. Explain the term *handshaking* in the context of data transmission between the terminal at school B and the printer.
- (iii) School A and school B need to exchange confidential student information using the communications link. Name and describe **TWO** methods of improving the security of the data during transmission.

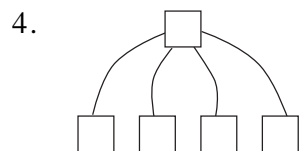
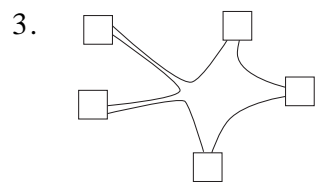
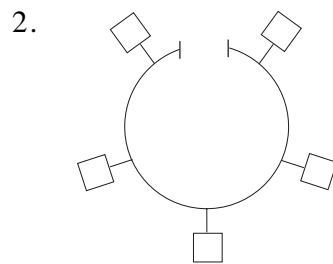
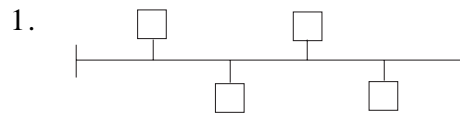
QUESTION 24. (Continued)

Marks

- (c) (i) Explain the following statement, ensuring that the terms *protocol*, *LAN*, and *collision-detection* are defined. **10**

'Ethernet' is a *protocol* used on many *LANs* and incorporates a *collision-detection* mechanism.

- (ii) A repeater is used to join two lengths of cable. What is a potential problem in replacing this system with a single length of longer cable?
- (iii) *Baud* and *bps* are terms often incorrectly used interchangeably to describe data transmission rates. Explain how a 1200 baud modem might transmit at 2400 bps or 4800 bps.
- (iv) Why might encryption be used in the transmission of a message from one node to another in a LAN?
- (v) Name each of the following topologies, in which each node is represented by a symbol.



QUESTION 25. Computer-controlled Systems (20 marks)**Marks**Use a *separate* Writing Booklet.

- (a) (i) What is meant by the term *noise* as it relates to signals in computer-controlled systems? **6**
- (ii) Describe TWO techniques for reducing the effect of noise in signals.
- (iii) What is meant by the term *critical damping*?
- (iv) Name TWO actuators that are used in computer-controlled systems.
- (v) Describe the difference between an *actuator* and a *sensor*.
- (b) An automatic fan for removing hot air from the roof space of houses has been developed. It is electrically operated, using either its own solar power device, or house electric power when insufficient solar power is generated. The fan normally operates only when the temperature in the roof space is above the set point, but it does have a manual override switch. **4**
- (i) Draw a block diagram for this system.
- (ii) Describe a suitable temperature sensor for use with the fan.
- (c) An office building has four lifts that are computer controlled. Top and bottom floors only need a single button. All other floors are equipped with an *up* and a *down* button. The first lift to arrive at the floor travelling in the right direction will take the waiting passengers. If no lift is travelling in the required direction, the nearest stationary lift will be moved to the floor. When all passengers have left a lift it will remain on that floor with doors open until a passenger enters, or it is required elsewhere. **10**
- (i) Using *EITHER* pseudocode *OR* a flowchart, write an algorithm for the movements subsystem to efficiently position a lift to a floor where passengers are waiting.
- (ii) For safety reasons a lift will not move from a floor if the weight of its contents is greater than the permitted weight, or there is an obstruction that prevents the lift doors from closing. For this safety subsystem, select ONE appropriate weight sensor and ONE appropriate obstruction sensor, and describe how each works in generating a signal for the subsystem.
- (iii) The cable that the lift compartment hangs on stretches as the lift moves further away from the roof of the building. Also, damage to the cable can occur if the lift stops suddenly. Select a suitable sensor, or sensors, and describe how it would signal to the stopping subsystem when to commence slowing down and when to stop level with the required floor.
- (iv) For the lift control system, name the type of system, and describe TWO essential matching features to explain your choice.

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QUESTION 26. Computing Technologies (20 marks)**Marks**Use a *separate* Writing Booklet.

- (a) (i) Describe how binary multiplication may be performed by means of *shift* and *add* operations. Use the example of ' $11_{10} \times 5_{10}$ ' to illustrate each step of your description (11_{10} represents 11 decimal). **10**
- (ii) The following bit pattern represents a 16-bit integer:

0110111010110011

Each of the statements below refers to this bit pattern. For *each*, indicate if you agree or disagree with the statement, and briefly justify your answer:

1. It represents an odd integer.
 2. It can be represented by $6EA3_{16}$ (hexadecimal).
 3. It is half of the binary integer represented by 1101110101100110.
 4. It can be represented by 335311_8 (octal).
 5. The integer can also represent an ASCII character.
- (iii) On a *3-bit two's complement* system, the operation ' $5_{10} - 1_{10}$ ' cannot be performed. Briefly explain why, illustrating your answer using *binary* representation of the process.
- (iv) What is the maximum integer that can be represented by a 5-bit binary code?

QUESTION 26. (Continued)

Marks

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

EITHER

(b) **Optical Technologies**

10

- (i) 1. State a significant property of laser light that makes it different from the light emitted from an ordinary light globe.
2. Describe ONE use of lasers in optical technology.
- (ii) Describe TWO situations in which you would recommend the use of optical fibre, as opposed to twisted pair, as a transmission medium. For *each* situation, give ONE reason to justify your recommendation.
- (iii) Answer the following questions in relation to CD-ROM technology.
1. Describe the format of data on the CD.
2. Describe the spin rate of the CD as information is accessed.
3. Explain ONE advantage of CD-ROM technology compared to a hard-disk drive.
4. Explain ONE disadvantage of CD-ROM technology compared to a hard-disk drive.
- (iv) Describe how magnetic and optical principles work together in *magneto-optical* devices to:
- store data on a disk;
 - read data from a disk.

OR

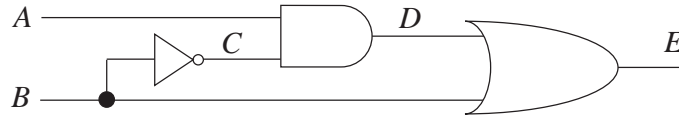
QUESTION 26. (Continued)

Marks

(c) Theory and Construction of Integrated Circuits

10

(i) Look at the following circuit diagram.



A truth table for the circuit has been started below:

<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>	<i>E</i>
0	0			
0	1			
1	0			
1	1			

1. Copy the truth table for the circuit into your Answer Book and complete the table.
2. Use the completed table to assist you in redrawing the circuit in its simplest form.

(ii) A large government organisation processes and stores the following different types of documents:

- A* classified policy documents;
- B* national security documents;
- C* private health documents;
- D* social security documents.

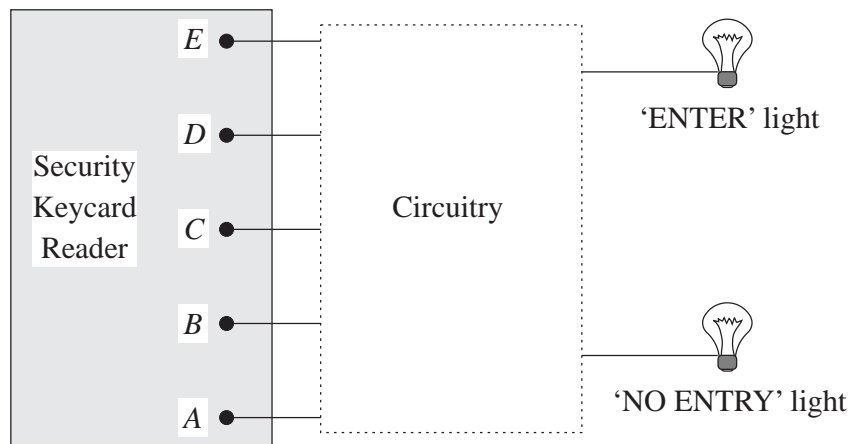
Each document class is given a separate security classification so that, for example, only staff who have a *class A* clearance may enter areas containing *class A* documents.

Some areas contain a mixture of document types, so only people who are cleared for *all* of those documents may enter. For example, a room that is used for processing both *class A* and *class B* documents may only admit staff who hold *both class A* and *class B* security clearance. Staff with the security classification *class E* have unlimited security clearance and may travel *anywhere* in the building.

QUESTION 26. (Continued)

Marks

A security keycard is used, with hidden markers for each security classification. This is read by a keycard reader near each door. A marker generates a '1' (HIGH signal) if it is present; otherwise a '0' (LOW signal) is generated. Two lights above the door will indicate whether or not the user of the keycard is permitted to enter a room. Each light is turned on by a '1' (HIGH signal).



1. Every time a security keycard causes the 'NO ENTRY' light to turn on, it *remains* on until cleared by security staff, even after the keycard has been removed. Name the piece of circuitry that could be used for this task, and justify your answer.
2. Draw a truth table to indicate the desired outcomes for a room that contains *class A* and *class B* documents.
3. Draw the circuitry between the 'Security Keycard Reader' and the lights ('ENTER', 'NO ENTRY') that would function as expected for a room containing *all* of the following documents:
 - A classified policy documents;
 - C private health documents;
 - D social security documents.

QUESTION 27. Database Design (20 marks)**Marks**Use a *separate* Writing Booklet.

- (a) (i) Define the following terms: **4**
1. record;
 2. file.
- (ii) What is a DBMS? State THREE of its functions.
- (iii) Explain ONE advantage of an electronic database compared to a manual filing system.
- (b) The Hardbound Adventures organisation conducts adventure holiday camps in various localities for people 15–25 years of age. A number of activities are available during the camp but some activities have age restrictions. Campers may choose an activity on the conditions that: **8**
- they are the correct age for the activity;
 - if they are under 18 years of age and parental permission is required, they have that permission;
 - the group size limit for the activity has not been reached.

The database used to store information about the camps includes a CAMPER FILE and an ACTIVITY FILE. The contents are as follows:

CAMPER FILE

- | | | |
|-----------------|--------------------|-------------------|
| • camper_id | • first_name | • last_name |
| • home_address | • gender | • age |
| • date_of_birth | • medical_problems | • medications |
| • camp_fee | • amount_paid | • camp_start_date |
| • camp_locality | • telephone_number | |

ACTIVITY FILE

- | | | |
|--------------------|-----------------------|-------------|
| • activity_code | • activity_name | • age_limit |
| • group_size_limit | • permission_required | |

Each person is assigned a unique camper_id.

- (i) For the ACTIVITY FILE:
1. name a field that would be best stored as a logical value;
 2. name a field that should be stored as an integer value.

QUESTION 27. (Continued)

Marks

- (ii) For the CAMPER FILE:
1. name a field that should be stored as a currency value;
 2. name a field that would be best stored as a single character code;
 3. name a field that could be determined from the value in other fields of the record;
 4. name a field that contains a primary key;
 5. state TWO methods of preventing unauthorised access to the CAMPER FILE data;
- (iii) Campers can pay the cost of the camp in instalments. Using the CAMPER FILE, write a search specification that would find the records of all campers who still owe money for camps.
- (iv) Below are the first ten lines of a sample report.

Camper_ID	Name	CampLocality	CampStartDate	CampFee	AmountPaid
ARD005	Alan Ardent	NAMOI	10/12/97	\$480.00	\$400.00
BRI071	Alan Bridges	NAMOI	10/12/97	\$480.00	\$425.00
CAU118	Stevan Caulitz	BYRON	17/12/97	\$480.00	\$300.00
DEL076	Toni Delose	COLO	03/12/97	\$375.00	\$350.00
FAW001	Basil Fawltly	COLO	03/12/97	\$375.00	\$370.00
GAL112	Maria Galione	BYRON	17/12/97	\$480.00	\$420.00
GOR007	Rene Gordon	BYRON	17/12/97	\$480.00	\$360.00
NGU050	Tony Nguyen	BYRON	17/12/97	\$480.00	\$380.00
PHA101	Vivian Pham	COLO	03/12/97	\$375.00	\$360.00
RAZ002	Ahmed Razul	NAMOI	10/12/97	\$480.00	\$440.00

To make the report more meaningful, it was decided that the above data should be sorted by `camp_start_date` (ascending order), `camp_locality` (ascending order), and `amount_paid` (descending order).

What is the name of the camper that would appear first on the report after completion of the sorting process?

QUESTION 27. (Continued)

Marks

- (c) A database has been developed for a school art exhibition. The database contains information on each artist and the painting to be exhibited. The following information is a sample of the data from the EXHIBITION FILE database. **8**

EXHIBITION FILE

<i>Fname</i>	<i>Lname</i>	<i>Sex</i>	<i>Address</i>	<i>DOB</i>	<i>Died</i>	<i>Title of painting</i>	<i>Type</i>	<i>Frame</i>	<i>Price</i>
Anthony	Kelly	M		20/10/81		Iron Maids	Water-colour	Y	\$200
Anthony	Kelly	M		20/10/81		Wildlife in Action	Oil	N	\$600
Helen	Daddo	F	536 Station St	3/7/36		Orion Night	Water-colour	Y	\$120
Bill	Manzoni	M	21 Circle Dr	17/11/80		Seasons	Oil	Y	\$110
Janice	Nafir	F	1a Plane St	5/9/22	25/6/95	Awakening	Oil	Y	\$410
Jai	Xu	F		12/3/46		Harvest Ball	Pastel	Y	\$690
Kim	Ho	M		5/6/11	23/2/37	Army Dawn	Oil	Y	\$1500
Kim	Ho	F	7 Tower St	30/8/66		Fallen Idol	Charcoal	N	\$80

- (i) Describe the differences between a flat file database and a relational database.
- (ii) Write a search specification to find all the paintings that need to be framed for the exhibition.
- (iii) Write a search specification to find all the artists that are still alive.
- (iv) Construct a relational database from the above EXHIBITION FILE database. The relational database is to contain an ARTISTS table containing SEVEN fields, a PAINTINGS table containing FIVE fields, and the details of ONE artist.

QUESTION 27. (Continued)

Marks

- (v) The following information regarding an artwork completed by a team of three students needs to be entered into the relational database that was created in part (iv).

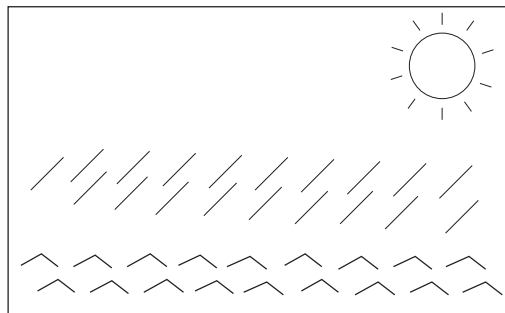
<i>Fname</i>	<i>Lname</i>	<i>Sex</i>	<i>Address</i>	<i>DOB</i>	<i>Died</i>	<i>Title of painting</i>	<i>Type</i>	<i>Frame</i>	<i>Price</i>
Peta	Riley	F	15 Lemon St	21/7/79		Green Poles	Oil	N	\$200
Leonie	Ignatz	F	46 Miles St	17/4/78		Green Poles	Oil	N	\$200
Martin	Laparge	M	89 Border Cr	31/11/79		Green Poles	Oil	N	\$200

Explain why the new data above requires the establishment of a third table in the relational database, and name the fields it must contain.

Please turn over

QUESTION 28. Graphical Techniques (20 marks)**Marks**Use a *separate* Writing Booklet.

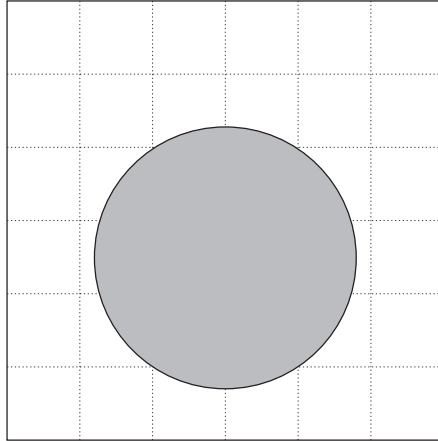
- (a) (i) Define the following terms: **7**
1. aspect ratio;
 2. dithering;
 3. coordinates;
 4. gradient fill.
- (ii) Describe the difference between a *spline* and a *Bezier curve*. You may use diagrams to support your answer.
- (b) Computers have changed the way graphics are produced and used in business, entertainment, and simulations. Select ONE area and **6**
- (i) describe how TWO graphic input devices are used in that area;
 - (ii) describe how TWO graphic output devices are used in that area;
 - (iii) describe TWO technical factors regarding the improvements in hardware that have made the area you have selected more stimulating.
- (c) (i) Discuss the difference between *vector graphics* and *raster graphics* in the way information is stored in memory. **7**
- (ii) Describe how data compression could be used on the graphic below to reduce storage space.



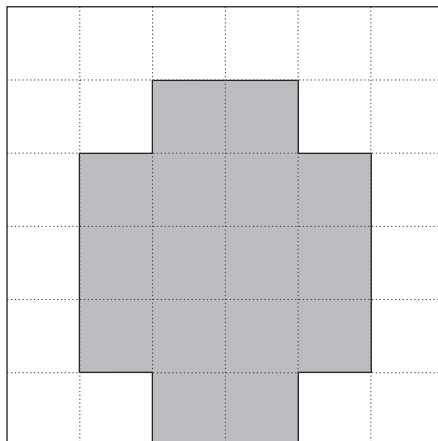
QUESTION 28. (Continued)

Marks

- (iii) An attempt is made to represent a circular plate (as shown in the following diagram) on a computer display. Squares indicate the relative pixel size in relation to the plate.



Using a single bit-plane, the computer representation of the plate is shown below:



1. Describe how the computer representation has been derived from the initial representation of the plate.
2. Describe TWO ways of improving the appearance of circularity in the computer representation. *In each case* discuss the implications for memory usage.

QUESTION 29. Multimedia (20 marks)**Marks**Use a *separate* Writing Booklet.

- (a) Define the following terms: **6**
- (i) mask;
 - (ii) hypertext;
 - (iii) cross-fade;
 - (iv) titling;
 - (v) tweening;
 - (vi) composite video.
- (b) (i) Sound can be represented in both analog and digital form. State which form is better for use in multimedia, and explain why. **6**
- (ii) A personal computer includes a MIDI interface. Describe the purpose and operation of this interface.
- (iii) State ONE advantage and ONE disadvantage of a CD-ROM for multimedia use, compared to non-optical technology media.
- (c) (i) Text and graphics are two of the components of multimedia. Outline how they *each* can enrich a multimedia production. **8**
- (ii) Discuss TWO factors to be considered when evaluating the effectiveness of a multimedia production.
- (iii) You are required to produce a multimedia-based, self-learning package on the operation of a CD-ROM drive.
1. What is the purpose of a storyboard?
 2. Create the first FOUR frames of a storyboard to be used in this multimedia production.
 3. What components of multimedia would you use in your production? Explain your answer.