



HIGHER SCHOOL CERTIFICATE EXAMINATION

1995

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

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. The stage in the system-development cycle that follows the *design* stage is
 - (A) analysis.
 - (B) hardware specification.
 - (C) software development.
 - (D) implementation and testing.

2. Tools used during the *analysis stage* of the system-development cycle include
 - (A) Gantt charts, data dictionaries, and pseudocode.
 - (B) data dictionaries, flowcharts, and data-flow diagrams.
 - (C) Gantt charts, data-flow diagrams, and decision trees.
 - (D) pseudocode, decision trees, and data-flow diagrams.

3. During which stage of the system-development cycle do users have least involvement?
 - (A) analysis
 - (B) design
 - (C) requirements definition
 - (D) operation and evaluation

4. The components of a computer-based system are
 - (A) input, output, process, control, and storage.
 - (B) hardware, software, data, personnel, and processes.
 - (C) input devices, output devices, CPU, memory, and storage.
 - (D) speed, storage capacity, reliability, automation, and application.

5. In selecting the hardware to run a large microcomputer-based accountancy package, consideration should be given to
- (A) clock speed, bus width, ROM size, and maths co-processor.
 - (B) response speed, ROM size, clock speed, and hard-disk capacity.
 - (C) RAM size, maths co-processor, response speed, and hard-disk capacity.
 - (D) monitor resolution, ergonomically designed furniture, bus width, and RAM size.
6. When converting from one computer-based system to another, users are required to use both systems simultaneously until it is clear that the new system is working satisfactorily. This method of conversion is called
- (A) direct.
 - (B) parallel.
 - (C) phased.
 - (D) pilot.
7. In describing a computer system to a potential customer, the sales consultant emphasizes the word length of the system. This is done so that the potential buyer knows
- (A) the number of bits that can be processed by the registers in the CPU at one time.
 - (B) that the computer can use both floating-point and integer representation of numbers.
 - (C) the number of words that fit on a page, and thus the maximum length of a word-processed document.
 - (D) that the computer can use both ASCII (American Standard Code for Information Interchange) and EBCDIC (Extended Binary Coded Decimal Interchange Code) to represent character data.
8. A *prototype* of a computer-based system or subsystem is
- (A) a diagram showing the flow of data in the system.
 - (B) a fully working model used for training personnel.
 - (C) a document describing its operation to users and operators.
 - (D) a limited working model to allow users to get an idea of what it is like.
9. The term that describes the right of all users to access information is
- (A) copyright.
 - (B) ethics.
 - (C) equity.
 - (D) privacy.

10. The *evaluation* of a system is performed to
- (A) check the working of the system using test data.
 - (B) compare different solutions to decide the best one to develop.
 - (C) determine a detailed costing of the system for the managers.
 - (D) determine whether the system meets original goals and specifications.

11. Study the following algorithm.

```

BEGIN
IF cost < $30 THEN
    set discount to 5%
ELSE IF cost < $50 THEN
    set discount to 12%
    ELSE
        set discount to 15%
    ENDIF
ENDIF
END

```

The discount for an article costing \$30 is

- (A) 0%
- (B) 5%
- (C) 12%
- (D) 15%

12. Study the following algorithm.

```

BEGIN
set Year to 11
REPEAT
    calculate Annual Interest
    calculate New Principal
    add 1 to Year
UNTIL Year > 10
END

```

The number of times the body of the loop will be executed is

- (A) 0
- (B) 1
- (C) 10
- (D) 11

USE THIS ALGORITHM TO ANSWER QUESTIONS 13 AND 14.

```
BEGIN
Set Counter to 0
WHILE Counter < 10
    read A
    read B
    set C to A + B
    print C
    increment Counter
ENDWHILE
END
```

13. The purpose of this algorithm is to print
- (A) the numbers 0 to 9 inclusive.
 - (B) the numbers 1 to 10 inclusive.
 - (C) the sum of 9 pairs of numbers.
 - (D) the sum of 10 pairs of numbers.
14. The control structure used in the algorithm above is an example of a
- (A) pre-test loop.
 - (B) post-test loop.
 - (C) binary selection.
 - (D) multiway selection.
15. IF age <= 17 THEN
 print "No voting rights"
ENDIF
- This pseudocode contains
- (A) a Boolean operator, an output statement, and a variable.
 - (B) a relational operator, an output statement, and a variable.
 - (C) an assignment statement, a Boolean operator, and a variable.
 - (D) an arithmetic operator, a relational operator, and an assignment statement.
16. Top-down design is an approach to programming in which
- (A) a large complicated problem is solved one step at time.
 - (B) independent modules are used to build a solution to a complex problem.
 - (C) a large complicated problem is broken into a series of smaller problems.
 - (D) a series of solutions to small problems are amalgamated into the solution of one large problem.

17. A record consists of three fields: student number, student name, and address. The records for students in the class are stored in an array of records sorted on the student numbers. The fastest technique for locating the record for a particular student whose student number is known would be

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

18. Study the following algorithm.

```
BEGIN
set Count to 1
read Result[Count]
WHILE there are results
    increment count by 1
    read Result[Count]
ENDWHILE
END
```

This algorithm reads results into a

(A) data file.
 (B) simple variable.
 (C) numeric index.
 (D) one-dimensional array.

19. Study the following algorithm.

```
BEGIN
enter Age
IF Age <5 THEN
    IF Age >2 THEN
        go to pre-school
    ELSE
        stay home
    ENDIF
ELSE
    go to school
ENDIF
END
```

To test this algorithm, a minimum data set is

(A) 1 2 3 4 5
 (B) 1 2 4 5
 (C) 2 3 5
 (D) 2 5

20. Study the following algorithm.

```
BEGIN
read A
read B
REPEAT
    set C to  $A * B$ 
    print C
    read A
    read B
UNTIL  $A = 8$ 
END
```

The following values are read in sequence.

0, 1, 2, 3, 1, 8, 8, 0, 8

The output from running this algorithm is

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

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EXAMINER'S USE ONLY

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STUDENT NUMBER

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1995

HIGHER SCHOOL CERTIFICATE EXAMINATION

COMPUTING STUDIES

2/3 UNIT (COMMON)—SECTION I

CENTRE NUMBER

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PART B

Marks

QUESTION 21. Computer-Based Systems (10 marks)

- (a) During your course of study, you completed an investigation for a new computer-based system. Refer to your investigation in answering the following question.

5

Many technical factors can affect the feasibility of implementing a new computer-based system. Describe two such technical factors. Identify how these factors influenced the decision made about the feasibility of the system.

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QUESTION 21. (Continued)

Marks

- (b) (i) Describe ONE major advantage of custom-written software compared to packaged software. 5

.....

.....

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.....

- (ii) The introduction of many computer-based systems has led to employment redundancy. Name and discuss two other social implications (one negative and one positive) that are commonly associated with computer-based systems.

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- (iii) Real data are used to test a system prior to operation. What properties of the system are being tested by this strategy?

.....

.....

.....

- (iv) What FOUR elements of a system are represented in a data-flow diagram?

1.

2.

3.

4.

EXAMINER'S USE ONLY

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STUDENT NUMBER

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1995

**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 amusement-park ride requires that the rider be at least 120 cm tall *OR* weigh at least 45 kg. A machine is installed at the ride entrance that automatically measures a person's height and weight. It displays a message 'Ride OK' or 'No ride'. 5
- (i) Design a set of test data that will confirm that the machine is working correctly.

<i>Height</i>	<i>Weight</i>	<i>Expected result</i>

Question 22 continues on page 12

QUESTION 22. (Continued)

Marks

- (ii) The algorithm below was designed to program the machine. It is incorrect.

```
BEGIN
read Height, Weight
IF Height > 120 THEN
  IF Weight > 45 THEN
    print "Ride OK"
  ELSE
    print "No ride"
  ENDIF
ELSE
  print "No ride"
ENDIF
END
```

Using pseudocode or a flowchart, rewrite this algorithm so that it does the task correctly.

QUESTION 22. (Continued)

Marks

(b) A sports club has the following membership categories:

5

- junior, under 22 years old;
- senior, 22 years or older.

Each year any number of juniors may join, but only 25 senior membership places are available.

A computer program is required that will process the applications in the order they were received during the year.

The program is to read the date of birth and other details for each applicant. It then determines the correct membership category. For the first 25 seniors, and all juniors, each member's category, date of birth, and other details are to be written to the member file.

Details of those seniors who missed out are to be printed and kept as a waiting-list. After all applications have been processed, the program is to print the number of new members in each category.

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

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HIGHER SCHOOL CERTIFICATE EXAMINATION

1995

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.

QUESTION 23. Applied Artificial Intelligence and Expert Systems
(20 marks)**Marks**Use a *separate* Writing Booklet.

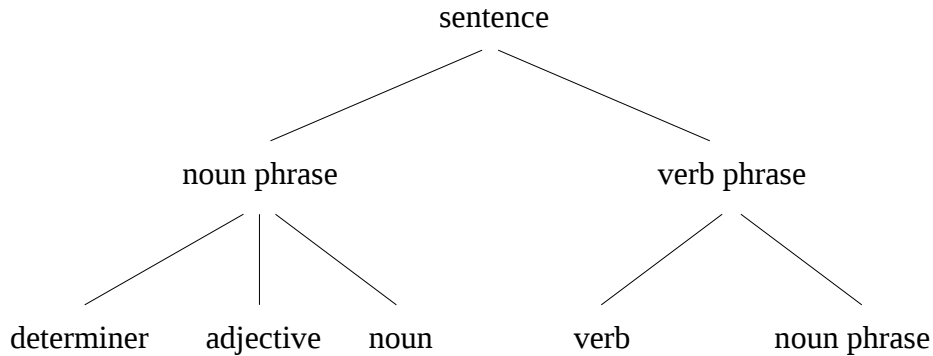
- (a) For each of the following parts, select the alternative A, B, C, or D that best answers the question. Write the part number and the letter of your answer in your Writing Booklet. **4**
- (i) Which of the following is used to handle uncertainty in artificial-intelligence applications?
- (A) fuzzy logic
 - (B) conflict resolution
 - (C) rule-based reasoning
 - (D) model-based reasoning
- (ii) Which of the following is called the data-driven strategy?
- (A) depth-first search
 - (B) breadth-first search
 - (C) forward chaining
 - (D) backward chaining
- (iii) An inference engine is something that
- (A) is required in any artificial-intelligence application.
 - (B) produces the rules and inferences found in an expert system.
 - (C) acquires the knowledge required to populate the knowledge base.
 - (D) is part of an expert system containing the logic-processing functions.
- (iv) Knowledge engineering is
- (A) the art of designing and building an expert system.
 - (B) the process of determining a conclusion from a given set of facts.
 - (C) the art of designing and building a neural network.
 - (D) building a collection of knowledge.

QUESTION 23. (Continued)

Marks

- (b) A natural-language-processing system will comprise a parse tree and a lexicon. **4**
The lexicon will give the part of speech for every word.

A simple natural-language-processing system has only the following parse tree



and the following lexicon

<i>Word</i>	<i>Part of speech</i>
a	determiner
apples	noun
ate	verb
big	adjective
bowling	adjective
flooded	verb
green	adjective
heavy	adjective
horse	noun
quickly	adverb
rain	noun
the	determiner

This system parses the following sentence correctly.

the big horse ate a green apple

- (i) What change(s) to the system are needed so that the following sentence will also parse correctly?

the heavy rain flooded the bowling green

- (ii) Redraw the parse tree so that the following sentence parses correctly.

the horse ate the apples quickly

QUESTION 23. (Continued)

Marks

- (c) (i) Select one of the following areas:

4

- robotics;
- artificial vision.

Identify a problem for which this branch of artificial intelligence can provide a solution. Describe how the problem is solved.

- (ii) In the interest of safety, it is preferable for a car driver to keep both hands on the steering wheel and eyes on the road. A car-radio manufacturer is therefore designing a voice-activated car radio.

Describe two problems with implementing this voice-recognition system.

- (d) (i) An inflatable jumping-castle is often used at fetes, shows, and shopping centres. There are government regulations that determine whether a jumping-castle is properly held down. The following set of rules stored in an expert system represents the government regulations.

8

① Government regulations met	IF	Castle on unpaved area AND unpaved conditions met
② Unpaved conditions met	IF	Large castle AND 12 large pegs used
③ Unpaved conditions met	IF	Not large castle AND 8 large pegs used
④ Unpaved conditions met	IF	Not large castle AND 12 small pegs used
⑤ Large castle	IF	Area $\geq$ 25 square metres
⑥ Large peg	IF	Diameter $\geq$ 20 mm
⑦ Small peg	IF	Diameter $<$ 20 mm

These regulations are to be changed to allow jumping-castles to be placed on a paved area if there is no unpaved area available. On a paved area, the castle must be held down by tying each side securely—either to a fixed object (such as a stationary vehicle or a fence) or to a concrete block of at least 50 kg.

Write the extra rules that must now be added to the expert system.

- (ii) A jumping-castle with an area of 10 square metres is placed on an unpaved area, and held down with 12 pegs each with a diameter of 15 mm.

Using the above expert system, determine whether this jumping-castle meets government regulations. List the rules and the reasoning used by the system to reach this answer.

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

Use a *separate* Writing Booklet.

- (a) (i) Describe the function of a modem in the transmission of data. **4**
- (ii) What is the purpose of *handshaking* when establishing a communications link?
- (iii) Cyclic redundancy checking is an error-checking procedure used when transmitting computer files.
1. Explain 'cyclic redundancy checking'.
 2. Name ONE other method of error checking.
 3. State ONE advantage of cyclic redundancy checking over the other method named.
- (b) You are a subscriber to an electronic information service that provides the following facilities: **6**
- electronic mail
 - bulletin boards and message areas
 - file libraries.

You connect to the service from your personal computer via standard telephone lines, a modem, and communications software.

- (i) To establish your communications link, you set parameters in your software. Describe the purpose of setting each of the following communications parameters:
1. terminal emulation;
 2. number of data bits.
- (ii) Describe the X-modem file-transfer protocol used to transfer files from the file library to your computer.
- (iii) After establishing a communications connection, the user is required to log in giving a user name and a password. Give TWO reasons for using a log-in procedure.

QUESTION 24. (Continued)

Marks

- (c) The Internet consists of computer networks globally connected using *gateways*. The Internet is used for information sharing and for communications. **10**
- (i) Discuss the function of a gateway in this communications system.
 - (ii) One network on the Internet uses a token-ring topology. Sketch a token-ring topology showing five nodes.
 - (iii) Describe token passing as a method of accessing a ring network.
 - (iv) Access to the Internet will have many effects on education. Discuss TWO of these effects in terms of:
 - equity of access;
 - technological limitations.

In your answer, provide both positive and negative effects.

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

- (a) (i) A controller is one of the general components of a control system. Name and describe TWO other components. **4**
- (ii) Give ONE use for each of the following:
- a reed switch;
 - a relay.
- (b) The ignition sequence of a gas room-heater has two requirements for gas flow: **6**
- the pilot light is burning;
 - the temperature is below the set point of the controller.

An override switch is provided to allow the heater to operate for a period of time if the room temperature is above the set point.

- (i) Using either pseudocode or a flowchart, write an algorithm for the ignition sequence.
- (ii) A control system exists to protect against both:
 - the flame blowing out in the burner;
 - lack of ignition of the main burner on start-up.

List the sensors and actuators required, and *describe* the function of each.
- (iii) Draw a block diagram for this system.

QUESTION 25. (Continued)

Marks

- (c) A nursery uses a computer-based system to control the environment of its tropical-plant glasshouses. The plants grow best within a certain range of temperature and light intensity. **10**

The temperature subsystem attempts to keep the glasshouse temperature within a given range.

- If the temperature in the glasshouse gets too hot, ventilators in the roof are opened. Once the temperature falls within range the ventilators are closed.
- If the temperature in the glasshouse gets too cold, an electric heater turns on to warm the air. Once the temperature rises within range the heater is turned off.

The light intensity subsystem gradually opens and closes metal louvres on the outside of the glasshouse to control the amount of light in the glasshouse.

- (i) For each of the two subsystems, state whether it is an open or closed loop.
- (ii) Draw a block diagram for the temperature subsystem.
- (iii) For the temperature subsystem, select appropriate sensors and actuators. Justify your selection.
- (iv) For the light intensity subsystem, what damping adjustments could be made to ensure operational stability?

QUESTION 26. Computing Technologies (20 marks)**Marks**Use a *separate* Writing Booklet.Answer part (a) and *EITHER* part (b) *OR* part (c).

- (a) (i) The character A is represented in ASCII as 65 decimal. What character is represented by the binary pattern 01000101? **6**
- (ii) Convert the binary pattern 01000011 to:
1. octal.
 2. hexadecimal.
- (iii) A computer has a word length of 8 binary digits and uses two's complement. Translate each of the following two numbers into the form the computer would use.
1. 42
 2. -42
- (iv) Carry out the following operation using the binary number system. Divide the binary number 1001101 by the binary number 1011, showing all working.

EITHER

- (b) **Theory and Construction of Integrated Circuits** **14**
- (i) Describe the uses of computer-aided design in the manufacture of an integrated circuit.
- (ii) In the manufacture of an integrated circuit, the process of etching may take place many times. What is the etching process? Why may it be done more than once?
- (iii) Dust can destroy components on a silicon chip. What precautions can be taken during manufacture to create a dust-free environment?
- (iv) Consider the three logic gates:

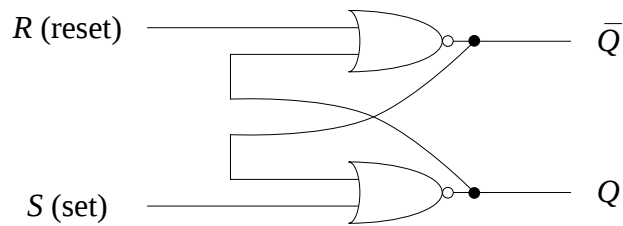
AND OR NOT

1. Which of these logic gates will produce output that is the complement of the input?
2. Which of these logic gates will produce output logic 1 when either of the inputs is logic 1?

QUESTION 26. (Continued)

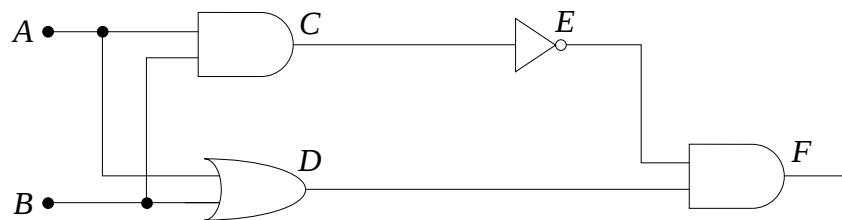
Marks

(v) The following diagram represents an electronic circuit.



1. What name is given to this device?
2. Explain how this circuit is usually used in computers.

(vi) The following diagram represents an electronic circuit.



Inputs		Outputs			
A	B	C	D	E	F
1	0				

Copy the table into your Writing Booklet. Complete it to show the outputs for the above electronic circuit.

- (vii) Explain what is meant by a 'half-adder'.
- (viii) The circuit in part (vi) above can be modified to form a half-adder. Redraw the circuit, showing the modifications needed.

OR

QUESTION 26. (Continued)

Marks**(c) Optical Technologies****14**

- (i) A laser is the preferred source of light for use in optical-fibre transmission. Give TWO reasons for this.
- (ii) Draw and label a diagram to show the construction of a single-mode optical-fibre cable.

Refer to your diagram. Discuss the purpose of each of the identified components.
- (iii) Data transmission using optical fibres has technological advantages over using metallic conductors. Give FOUR different technological advantages.
- (iv) Describe TWO functions of RAM in a laser printer.
- (v) Describe how data are *written* to a magneto-optical disk.
- (vi) Give ONE similarity and ONE difference between CD-ROMs and hard disks as *storage* devices.

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

- (a) Video-rental shops using computer-based systems are able to keep a history of borrowings for stock-control purposes. The file VIDEOS BORROWED can be linked to the file BORROWER INFORMATION. **4**

This means that shop staff can trace the history of videos borrowed by a particular person as well as the address of that person.

The availability of the address in the BORROWER INFORMATION file allows data-matching with local government and census data.
 - (i) What ethical problems does the identification of borrowers with the videos rented pose to the video-rental shop?
 - (ii) The shop uses a large number of relatively untrained assistants. The borrowing system must be easy to use and this could mean easy access to borrowing-history data. Comment on the security versus ease-of-use issue.
- (b) **6**
 - (i) Define the term 'database'.
 - (ii) Explain what is meant by the term 'data redundancy'.
 - (iii) Describe ONE of the roles of the database administrator.
 - (iv) Describe ONE of the uses of a secondary key.
 - (v) How does a relational database differ from a flat file?
 - (vi) Give ONE advantage of a relational database over a flat file.

QUESTION 27. (Continued)

Marks

- (c) A school library uses a computer database containing two files. The BOOK file contains seven fields: **10**

- book number
- book title
- author
- publisher
- date of purchase
- subject area
- number of times borrowed.

NOTE. If a second copy of a book is held, a separate record is created in which the book number is different.

The BORROWER file contains five fields:

- borrower number
- surname
- given name
- borrower type
- location.

NOTE. Borrower type is either S for student or T for teacher. Location is either roll class for students or faculty for teachers.

- (i) The library is to keep a record of books taken out by each borrower and the due date for each loan. What changes must be made to the database?
- (ii) What is the appropriate data type for each of the following fields?
 1. borrower number
 2. subject area
 3. number of times borrowed
 4. date of purchase
- (iii) The library needs to remove books to make space on the shelves for new titles. Books that are no longer useful may be removed. Which fields in the database should be used to select records of books that may be suitable for removal? Explain your choice.
- (iv) A mail-merge facility is to be used to print reminder notices to borrowers with overdue books.

Explain the procedures needed to do this.

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

- (a) (i) Explain the term 'raster'. **6**
- (ii) Some devices using the raster technique also use interlacing. What is 'interlacing' and why is it used?
- (iii) How many colours could be represented using six bits per pixel?
- (iv) State how you would calculate the size (in kilobytes) of a frame buffer for a screen with a 320×256 resolution if four colours are allowed?
- (v) Monitors can be greyscale or colour.
1. Explain the term 'greyscale'.
 2. How are shades achieved with a greyscale monitor?
- (vi) Explain how different shades are achieved with a one-colour printer.
- (b) You studied the nature and role of computer graphics in one of the following areas: simulations, entertainment, or business graphics. **4**

Describe the major graphics functions used in the area you studied. In your answer, include:

- the area you studied;
- what the graphics software was used to produce;
- the essential characteristics of the graphics software used (e.g. bit map or vector, static graphics or animation);
- the limitations of the software and the additional features that would be needed to overcome them;
- how the use of graphics software compares with the use of traditional methods.

QUESTION 28. (Continued)

Marks

- (c) (i) Explain the term 'dithering'. **10**
- (ii) 1. Explain how the data for a vector representation of an object are stored in memory.
2. Contrast this to the method of storing a bit-mapped display.
- (iii) A graphic screen contains a number of items, including a rectangle. The size of the rectangle needs to be changed. Explain the problems you would have if the graphic was drawn using a paint-based program.
- (iv) 1. Describe TWO factors of a computer system that affect the quality of a high-resolution animation. The screen resolution is not to be considered.
2. Explain how each factor affects the quality of the display.
- (v) 1. Describe the function of a digitizer.
2. Give an example of a digitizer and describe its operation.
- (vi) Compare and contrast the operation of a flat-bed plotter with that of a drum plotter.

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

- (a) (i) *Sound* is one of the major components of multimedia presentations. Name the others. **4**
- (ii) How is the *sound* component of a multimedia presentation recorded and stored?
- (b) (i) Explain what is meant by 'hypertext'. **6**
- (ii) The major problem in the use of video in multimedia productions is the storage capacity required. Give TWO ways in which the need for storage can be reduced.
- (iii) A video store is planning a 'recent releases' multimedia display that could be either an interactive or non-interactive display. Excluding the matter of cost, state the advantages and disadvantages for the store owner and for the customers of each of the modes. Lay out your answer in the following manner in your Writing Booklet.

		<i>Advantages</i>	<i>Disadvantages</i>
<i>Interactive</i>	Owner		
	Customer		
<i>Non-interactive</i>	Owner		
	Customer		

QUESTION 29. (Continued)

Marks

- (c) A shopping centre has a customer-service board that displays the name of each shop and its location. The centre is changing to a multimedia presentation that will include extra facilities. From the customer-service menu screen, customers can select and display the following information: **10**
- Shop names in alphabetical order;
 - selection of a name will then display a map of the shop location and display location.
 - Shop names in location order:
 - selection of a name will then display the same type of map as for the selection from alphabetical order. Thus only one map for each store location is required.
 - A list of types of products:
 - selection of a product type will then display a list of shop names (in location order). Selection of the name will then display the location map.
 - A list of shops having special sales offers:
 - selection of the shop name will then display the location map.
- (i) Sketch the layout of the customer-service menu screen.
 - (ii) Draw a storyboard diagram to show the paths taken by customers in moving through all the facilities of the display.
 - (iii) Describe TWO ways in which customers could select an option from the menu. For *each*, give an advantage and a disadvantage.
 - (iv) The shopping-centre management also wishes to have a continuous display of advertisements about coming centre attractions and shop 'specials'. The display could have up to two minutes of material before it repeats. Changes to the display material would be made daily. Describe TWO ways in which the display could be produced, and give an advantage and disadvantage of each.

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