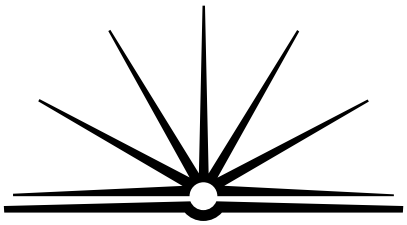

BOARD OF STUDIES
NEW SOUTH WALES

1997 HSC

EXAMINATION REPORT

Computing Studies

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1997 HIGHER SCHOOL CERTIFICATE
EXAMINATION REPORT
COMPUTING STUDIES

Introduction

In 1997 there was an increase in the number of candidates for all courses of Computing Studies, as is shown in the following table.

Number of Candidates by Course

Course		1995	1996	1997
General		3062	3681	4620
Common	2/3 Unit	7925	8064	9433
	2 Unit	6845	6636	7899
	3 Unit	1080	1428	1534
Total		**10987**	**11745**	**14053**

The quality of answers was generally slightly above that of 1996, although common errors were identified across numerous questions and across all courses. Students need to be reminded to read examination questions carefully and to answer the question asked, rather than identifying a familiar term and writing all that they know about that term. They should also be reminded to identify key words, such as *describe, explain* and *justify*. Computing Studies students have a tendency to write very generalised answers, whereas, often, the question requires them to relate their knowledge to a particular situation or, at least, to a particular topic area.

How is the paper marked?

The Supervisor of Marking (SoM), appointed by the Board, chooses a sufficient number of qualified markers from the pool of applicants to ensure that all papers can be marked within the time period allocated by the Board. Each marker is appointed to mark one question.

Markers operate in teams of five to seven, with a Senior Marker responsible for each team. The number of teams allocated to each question varies according to the estimated number of candidates attempting that question.

Senior Markers attend briefing sessions at the Marking Centre prior to the commencement of the actual marking program. During this time they finalise administrative structures and prepare a draft marking scheme for their specific question. Senior Markers read a large number of scripts in order to modify their draft marking scheme.

Once the draft marking schemes have been prepared, markers attend the Marking Centre to be briefed on the procedures and complete administrative details; they are then introduced to the draft marking scheme. As a group, all markers and Senior Markers involved with each question may modify the marking scheme.

A large number of papers are then pilot-marked in order to determine any possible variations to proposed answers which should be accepted, as well as to ensure that the marking scheme discriminates between students and ranks them according to their ability, and to verify that the scheme can be applied consistently by all markers. Papers which are used for pilot-marking are released into the actual marking process at a later date to ensure that they are marked consistently.

Once the marking scheme is finalised and meets all set criteria, it is checked by the SoM to ensure that it meets the requirements set by the Examination Committee. Marking schemes are then signed off as the official marking schemes to be used in the marking operation.

To monitor consistency, Senior Markers arrange for a number of control scripts to be individually marked by all markers of a question and then compares the way in which the marking scheme is being applied. Senior Markers also monitor the statistics which are processed each evening for each marker, each group and each question, as well as check–marking papers. This ensures that the marking scheme is consistently applied by all markers, at all times, throughout the entire marking operation.

2 UNIT GENERAL

4620 candidates presented for this paper which consisted of:

Section I	—	20 multiple choice questions
Section II	—	5 questions, each on one of the 5 topics.

Section I

Item	Correct Response
1	C
2	B
3	C
4	C
5	A
6	D
7	B
8	D
9	B
10	A

Item	Correct Response
11	B
12	D
13	A
14	D
15	D
16	C
17	B
18	D
19	A
20	C

Section II

Question 21 Spreadsheets

(a) Most students were able to provide good definitions of the five concepts in this section. Some students confused the term *cell* with *field* as well as giving definitions for *template* and *column* that related to desktop publishing and **not** spreadsheets. It must be emphasised that knowledge of terminology and of how the terms used relate to spreadsheets is required.

Other common errors included:

- Columns being seen as lines on the spreadsheet;
- Omission of the fact that an absolute cell reference does not change when copied, and
- Failure to assign a key when defining a *macro*.

b) To answer this question successfully candidates must have had extensive practical experience in the construction of spreadsheets. Those with practical experience scored well. Many, however, were unable to complete this section successfully, thus indicating a lack of this type of experience.

(i) This part of the question was poorly done, with most students being unable to visualise the result of filling down a formula where a relative cell address had been used inappropriately. This would appear to indicate that many students require more practice in the construction of spreadsheets. A number were not aware that a *copy process* is the same as a *fill down* in this situation.

(ii) Most students knew that an absolute cell reference was needed here but approximately half did not know that in the formula it should be applied to cell C4.

(iii) Students who knew that an absolute reference to cell C4 was required in the range E7:E11 were able to answer this correctly.

(iv) To obtain full marks the answer had to relate specifically to the spreadsheet provided in this question, with references to columns, cells and formulae. Care must be taken when reading each question as some students simply summed the columns which indicated a misunderstanding of the requirements of the question.

(c) (i) A large number of students completed this section correctly. Again, those who could not place the temperatures and times within the spreadsheet grid indicated their lack of practical experience.

(ii) Most students were able to provide the MAXIMUM function. Those who were able to do so also provided the correct range of cells. Functions with which students should be familiar are noted in the Software Specifications to accompany the 2 Unit Computing Studies Syllabus (second edition).

(iii) This question was well done, with most students knowing the advantages of using a dynamic link.

(iv) Students should be aware that providing answers such as *easier, faster* or *better* will not attract any marks. The advantage of using an electronic spreadsheet must be fully stated, saying, for example: *predictions can be made using different data values; charts can be simply made; or built–in functions are available to perform complicated arithmetic operations.*

Question 22 Databases

(a) (i) Most students were able to provide a general definition of both a search and a sort which, in itself, was a way of describing the difference. The better students provided an example to support their descriptions.

(ii) A hierarchical description (records contain fields and fields make up a record) was the most popular response from students. The better answers defined records in terms of an entity and fields as sub data of a record. Poorer responses described fields and records in terms of horizontal and vertical displays on the screen. Most of the correct responses supported their description of a field with an example.

(iii) This question was reasonably well answered by most students. Good answers showed a clear process description of combining database records with a word processor to produce multiple letters in which the details are changed for each record. Some students tried to combine a database with a spreadsheet and others confused a mail-merge with E-mail.

(iv) This question was poorly answered by the majority of students. It required a glossary definition but many confused the idea of distribution with sending a single database to many people.

(b) This part required students to examine an excerpt from a database and to use the displayed information to answer questions.

(i) Most candidates were able to find a field that best contained certain data types. Students should avoid giving multiple answers when the question specifically asks for a single field. The majority did not score well in the Logical/Boolean part as they appeared to lack a complete understanding of Logical/Boolean data.

(ii) A number of students understood that a search specification required combining a field, an operator and a comparison value. Many failed to use the logical operator AND to link the search together. Of those who correctly identified the need to specify a house many failed to include the field name. The *at least three bedrooms* in the question produced a variety of answers eg *>2, =>3, equal to and bigger than three.* Some students supplied the actual house that satisfied the search. There is still a need for greater attention to writing search specifications.

(iii) A large number of students realised that *form view* meant displaying details of one record only. The question required students to display all the details from one home in Epping. Many students embellished their form view with a title, help information and creative layout. Poorer answers gave a floor plan or elevation view of the house itself, which indicated their lack of understanding of what form view is all about.

(c) (i) *and* (ii) Both parts were answered correctly by the majority of students, with only a small number reversing the figures.

(iii) Students, on the whole, realised that a database sort is based on the first character. Some, however, chose to sort the *Manager* field on the surname of the Managers displayed.

(iv) There was a general misunderstanding of what the question was asking. Many students simply suggested sorting on a different field. Approximately half of the students realised the need to split the Manager field or re-enter the data with surname first. Most of these students actually supplied both answers.

(v) This part was not answered in accordance with the requirements of the question. Many students simply gave a glossary definition of the clipboard. The better students described in detail the process of selecting the required details from the database, copying, opening the spreadsheet and then pasting.

(vi) Again, students gave a glossary definition of *file conversion filter* without reference to the question. The fact that the database had to be saved in a format compatible with the spreadsheet before being opened in the spreadsheet was the required answer.

Question 23 Graphics

(a) Students were expected to show their knowledge of Computing Graphic terms. These terms are taken from the Glossary and students should be encouraged to learn and understand the concepts in this document. It was apparent that students did not fully understood many of these terms, since many were not explained adequately. The use of examples, where appropriate, enhanced students' explanations. Terms which are similar across several topic areas, such as *Cel*, caused confusion.

(b) (i) Candidates were asked to indicate, and then justify when certain graphics would be appropriate. The majority were able to do this well, although some justifications were so general they could have been used for any method chosen. For example: *Charts are used because they look good or are easy to understand*, was a poor response as it could just as easily have been used to justify diagrams or animation.

(ii) and (iii) These parts were linked as they showed differences between bit-map and vector storage. It was found that the concepts were well understood, but, again, many students relied on very basic explanations. Those for vector storage, in particular, varied greatly amongst students who tried to come to terms with this more difficult concept.

(iv) This question expected students to show their understanding of the social issues involving the use of computer graphics. The issue of copyright was discussed by the majority. The second issue caused some concern. The better responses treated the second issue as being offensive to someone, eg the photographer altering a work of art and portraying someone as having a big nose or three eyes. Some responses highlighted technical issues, such as scanning problems and file–size concerns, rather than ethical issues.

(c) (i) Increases in file–size and increases in colour depth both increase the size of the file. This concept was often recognised but many responses showed a lack of understanding of how these factors caused increased file–size. Too often students had the concept in reverse and tried to explain that a larger file will increase the resolution or will have more colours. The term *colour depth* was often misused. Rarely was it related to the number of bits used for each pixel or the number of colours available causing the increased or decreased file–size. The term *file–size* was also misused, with many students thinking that *file–size* is actually the size of the disk or the amount of memory used.

(ii) File compression techniques were not well explained. The idea of looking for recurring colours and patterns and replacing them to reduce the file size or colour averaging techniques so that less information needs to be stored eluded many candidates. Poorer responses used analogies such as repeating characters, as used for text or confused compression techniques from the Communications Option.

(iii) It was pleasing to find so many students who understood the concepts of *morphing* and *warping*. The use of specific examples again helped to decipher poorly expressed and very basic explanations, especially where students failed to indicate that *morphing* relates to an animation sequence to change one image into a second, different image.

Question 24 Desktop Publishing

(a) Those who knew correct definitions of terms, and how they related to desktop publishing, scored well in this section.

(i) Most students related *landscape page* to *wider* or *wider than tall*. The better candidates included page orientation and a small sketch.

(ii) This question required students either to define *white space* or to give examples of white space. Students also needed to relate non–printing characters to uses of white space in desktop publishing.

(iii) Many students incorrectly defined *master page* as being the first page or draft copy. They needed to relate it to the idea of a template for all (most) other pages or to mention consistency on pages and give examples such as headings.

(iv) Many responses incorrectly defined Typography as the typing of text. A good answer defined it as the art of designing typefaces which were easy to read, or could identify relevant features such as typeface, stroke and font.

(v) A good answer explained that screen setout matches the resulting printout, rather than giving the simple response of *what you see is what you get.*

(b) Students who knew the main components of desktop publishing and correctly explained how they enhanced the effectiveness of a publication scored well. Common errors included the mixing of terms such as *header* and *heading*, and *word wrap* and *text wrap*.

(i) This part was well answered by the majority of students.

(ii) Answers needed to identify a number of examples of the way in which a component could enhance a publication. Poorer responses chose one area of effectiveness and restated it in different ways.

(c) (i) This part was poorly answered. Many students identified *colour capabilities* only as being the range of the palette and did not relate colour to DTP. A good response related the use of colour to text or graphics and referred to its use to gain emphasis in DTP. *Ruler guides* were confused with *word processing rulers*. Good responses discussed both horizontal and vertical positioning and indicated the fact that these guides were non-printing.

(ii) Many students were able to identify two methods of modifying a graphic but experienced difficulty in relating the selected modifications to a publication.

(iii) A large number of students related *resolution* to the screen or a graphic and did not explain its importance when selecting a printer. The use of incorrect terminology such as *big resolution* or *good resolution*, indicated limited understanding of this concept.

Question 25 Computer Communications

(a) (i) This part was generally well answered, although some students simply described a LAN and a WAN. Students were required to make reference to a LAN and a WAN when stating their difference.

(ii) This part was well answered. When identifying the difference between an electronic bulletin board and a private electronic mailbox, however, answers need to be related to these two concepts.

(iii) This part was poorly answered. A large number of students were unable to describe a data compression technique, naming examples instead, such as *PKZip* and *Stuffit.* Some merely discussed the consequence of a reduction in file–size.

(iv) Only a small number of students were able to describe two problems of data compression in the detail required to answer this question thoroughly.

(b) (i) This part was generally well answered, with the given diagram assisting students in recognising that the gateway's role is to translate protocols/link dissimilar networks. Typical misconceptions included confusion with *modems* and *digital/analogue conversions.*

(ii) Most students overlooked the fact that the data was in the process of being transmitted between networks and provided *password security* as an answer instead of *data encryption*. A small number correctly suggested a more secure transmission medium, such as optical fibre.

(iii) This part was well answered.

(iv) Answers here were reasonably good, although some students incorrectly described the functions of a print server, hub or router rather than file–sharing functions.

(v) Many students recognised *logging off* only as a cost or a security measure. Better responses understood that logging off involves at least disconnection from the file–server, closing of open files and the freeing of resources.

Whilst most students answered this part correctly, many students viewed passwords only in terms of protecting the system against strangers and hackers, rather than as a legitimate means of allowing selection and access to data.

(c) (i) Although most students recognised that parallel data transmission was faster than serial transmission, they were often less sure of the reasons. Whilst there was some confusion between *parallel* and *duplex*, the better answers recognised that multiple bits sent simultaneously along multiple channels increase speed.

(ii) Whilst knowledge of, and experience in the use of E-mail, is a Syllabus requirement, it was evident that many students appeared to have little or no practical experience of this. The better answers clearly understood the use and significance of the CC (Carbon Copy) field, the need to specify exactly the attachment file name, and the importance of all parts of the given E-mail address.

2/3 UNIT (COMMON)

The 9433 candidates who presented for this paper comprised 7899 2 Unit students and 1534 3 Unit students. The paper consisted of:

Section I	Core — made up of:		
	Part A	—	20 multiple choice questions
	Part B	—	2 questions - one on each of the Core Topics
Section II	Options	—	7 questions, each on one of the Option Topics from which each candidate had to answer three.

Section I Core

Part A Multiple–choice questions

Item	Correct Response
1	D
2	B
3	B
4	C
5	C
6	A
7	B
8	D
9	D
10	A

Item	Correct Response
11	D
12	B
13	B
14	A
15	C
16	C
17	A
18	A
19	C
20	C

Part B Core Questions

Question 21 Computer–based Systems

(a) (i) The majority of students were capable of answering this question. Many, however, gave only five of the six stages of the system development cycle, or split up stages to make up the six stages. *Feasibility Study* was often the stage omitted.

(ii) 1 Most students could explain *direct conversion*. Some, however, did not indicate a time–frame for the conversion and thus did not clearly differentiate between other forms of conversion.

2 This part was poorly answered, with many students experiencing difficulty in identifying a specific disadvantage of using direct conversion. Many responses were vague and could have related to any type of conversion.

(iii) 1 In this part many candidates merely rewrote the question or quoted the Glossary definition without relating the data flow diagram to the design stage.

2 Some responses made reference to algorithms or merely stated the definition. Very few students could explain the use of a system flowchart in the design stage.

(b) (i) This part was well answered. Most students could produce a Gantt chart, with presentation varying from very accurate charts to lines drawn freehand. Some students confused the Gantt chart with bar and column graphs, scatter charts and system diagrams.

(ii) This question prompted a range of responses. Most students could identify the appropriate *conditions* and *actions*, although some experienced difficulty in differentiating between conditions and actions. The majority of students were able to give a variety of coding schemes within the decision table. Good answers recognised the fact that only four responses were required.

Question 22 Algorithm Design

This question was well attempted. The majority of students knew how to follow standard desk check methodology and could use algorithm control structures in either pseudocode or flowchart. Too many are still unskilled in correct algorithm design, many are unable to structure binary selections correctly and post and pretest repetitions. A large number of students incorporated an infinite loop and had no END to their algorithm.

(a) (i) This part was well answered. Some students included statements in the output column which were not classed as *output*, such as *Print 50c*, as opposed to the correct response of *50; coin rejected; 100; 0*. The most common error was the omission of 0 for change in the last output box.

(ii) The majority of candidates could write the correct expression in the correct place. Students should be reminded to use variable *names* where possible, and not *values* of variables such as *80*, as in this question.

(iii) 1 Many students incorrectly identified the *not giving of change* as the error. The question clearly asked for an error in logic.

2 Here students were required to provide discrete values which represented a total of 80 cents in individual coins, in order to show the existence of the error. Many are still describing test data in general terms rather than providing actual values which can be entered into the algorithm and processed.

(b) (i) This problem was well understood and the majority of students answered it well. Common errors included:

- vague/unclear read time statements;
- omission of terminating conditions for repetition;
- flow lines incorrectly joining back into a process box;
- the use of inappropriate terms for the situation such as Print *sprinklers*, *Repeat until'end of file'*, or *'time=25'*, and
- use of invalid structures such as WHILE ELSE statements.

Many students recognised the need for an operational loop which would allow the process to continue over a long period, but most were unable to incorporate the structure correctly. The main errors which prevented the algorithms from working logically were:

- the inability to describe the relevant time period as *time>=9pm* OR *time<4am,*and
- the absence of continual time monitoring to enable the sprinklers to turn on and off at the designated times.

(ii) Correct responses to this part needed to include a module which would continually monitor soil moisture during the time from 9pm to 4am and switch the sprinklers on and off according to the moisture level. Most students were able to read soil moisture correctly and to structure the correct condition but very few were able to achieve the repetition which would allow the sprinklers to turn on again if they were turned off before 4am.

Section II Options

Question 23 Applied Artificial Intelligence and Expert Systems

About 9% of the candidature (down from 10% last year) attempted this option. In general this question was reasonably well answered, with an improvement upon last year's responses being reported.

(a) This part was well answered. Good responses did not merely rely on repeating definitions, but offered explanations and descriptions of the terms, relating them to Artificial Intelligence and Expert Systems.

(i) 1 Many students had a general idea of the nature of rules in this context, although far too many students regarded rules as being a sequence of instructions, rather than condition/action pairs.

2 & 3 These parts were well answered.

4 Few students understood the concept of *inference engine*, offering a common sense explanation such as *the brains behind the system*.

(ii) A large number of candidates showed a good understanding of *neural networks*. The most common problem was a confusion between a neural network and the sequence of logical gates. The notion of weighted inputs being combined and compared to a threshold needs to be reinforced.

(iii) This part was generally well answered. Some students regarded the process of knowledge engineering as starting with the formulation of rules for entry into an expert system, ignoring the processes of obtaining and structuring knowledge from an expert.

(b) This part was poorly answered. The majority of candidates had a good general idea of the concepts tested but could not provide the required detail.

(i) Most students were able to give one good reason for choosing an expert system, and an equally good reason for not choosing a neural network. Some were apparently confused about the differences between the two. The better answers described how expert systems are able to explain their reasoning, and guide the diagnostic process.

(ii) Answers to this question were very poor. Most students were able to give a reasonable example of a problem, but many of the subsequent descriptions were flights of fancy, possibly constructed from over-vivid imaginations. Rarely did students get to the core of either intelligent robotics or natural language processing. Many confused natural language processing with voice recognition, some managed to give a definition of both, but failed to tie this to a problem.

Students need to be exposed to genuine problems with which the various branches of Artificial Intelligence are dealing, and explanations of exactly how Artificial Intelligence techniques offer unique solutions to these problems.

(iii) Candidates were generally unable to give more than one advantage for the use of fuzzy logic in neural networks, with any attempt at presenting a second advantage usually being a re-write of the first.

(c) This section was very well answered, suggesting that students are becoming very comfortable with expressing and reading rules in the form expressed in this paper.

(i) 1 This part was answered well.

2 Most students answered this question correctly, although some gave the vague answer *all of them* — leaving it unclear as to whether it meant *all on the list* or *all in the school*.

(ii) This part was well attempted, although some students did not identify the particular rule. Many realised that there was a problem with identifying the gender of the teacher, but did not say how the problem could be solved.

(iii) Answers here were good. Students should be aware that when new rules are added to a system, or rules modified, the changes should reflect the same pattern as the existing rules.

(iv) Most of those who recognised the errors were able to identify the offending rule and correct it.

Question 24 Computer Communications

About 80% of the candidature (the same as last year) attempted this option. The question was generally well answered, with an obvious improvement being noted in the use and understanding of terminology.

(a) Most sections of this part were well answered.

(i) The majority of students could identify several differences between serial and parallel transmission.

(ii) *Synchronous* and *asynchronous* transmission appeared to be only superficially understood by many students.

(iii) This part was extremely well answered.

(iv) Many students did not define the two terms *upload* and *download*, clearly, often simply using the words *error*, *correction* and *detection*.

(b) (i) Most modern–day users do not have to configure modems and it appears that students have not had the practical experience in setting up modems as they have had in other areas of communication. As a result, this part was not well answered. A significant number of students identified hardware problems instead of software problems as required by the question.

(ii) Many answers included technical explanations of protocol settings rather than the process of *handshaking* in describing the establishing of the communications link to ensure that data can flow between the two devices. There was some confusion between the terms *flow control* and *handshaking*.

(iii) Most students were able to suggest some appropriate security measures and hence this part was very well answered.

(c) (i) Students had a reasonable understanding of the terms protocol and [AN but a good definition and understanding of collision detection was far less common. Many centred their discussions on *collision avoidance* rather than *collision detection.*

(ii) Answers here were good since many students could identify the functions of a repeater and related this knowledge to the question.

(iii) Students showed very little understanding of the technical difference between *baud rate* and *bps*, but many were able to give the definitions in accordance with the Glossary of Terms.

(iv) This part was well answered.

(v) This was generally well answered, although some students were confused by the unconventional diagrams.

Question 25 Computer-controlled Systems

About 7% of the candidature (down from 9% last year) attempted this option.

(a) All definitions in the five parts were reasonably good, although the description of noise reduction techniques was superficial, with *sound* being a common term used in the explanation.

(b) (i) Responses to this part indicated a general improvement in the construction of block diagrams upon that of previous years. Answers, however, also highlighted the fact that there is still a lack of thorough understanding of block diagrams.

(ii) Many students were able to identify and describe a temperature sensor, which was a suitable response for this question.

(c) (i) A number of candidates experienced difficulties with the algorithm description method. The better responses were completed as flowcharts, with pseudocode answers often being too long and confusing.

(ii) Many students were able to identify a sensor, but few could actually describe how the signal is generated. Light beams were often incorrectly identified as being sensors.

(iii) This part was well answered.

(iv) Many students were confused as to the *type of system* and gave responses such as *Batch, Continuous, Discrete, Open, Closed, Computer-controlled* and *Automated*.

Question 26 Computing Technologies

About 29% of the candidature attempted this option, with an almost even split between the alternative technologies. This percentage represented a slight increase upon that of last year, viz 26%.

(a) (i) Many students described the standard long multiplication algorithm but did not indicate the computer process used to carry out the operation. Some were confused by the wording of the question which specified binary multiplication and, instead, suggested a decimal example.

(ii) 1 This question was poorly attempted. Many students were confused between odd integers, odd parity, and sign bits (positive and negative). A conversion to decimal was inappropriate, unnecessary and seldom correctly done.

2 Here students were able to convert correctly and draw the correct conclusion.

3 Candidates appeared to be unsure which integer was supposed to be the larger. Very few used the simple *shift* explanation of multiplying or dividing by 2 (102).

4 Students generally knew how to convert to octal but many started from the wrong end, thus arriving at the wrong conclusion.

5 This question was misread and misunderstood by many students. *An* was not interpreted as meaning *one*. Many actually agreed, stating that all ASCII characters begin with 011, or manufactured answers to suit their interpretations.

(iii) Most students could find the 2s complement of 001 and interpreted the process of subtraction as being the addition of the 2s complement. Very few, however, understood that this was a meaningless process in a 3 bit 2s complement system since 5 can not be represented at all.

(iv) Most candidates gave the correct answer $1\ 1111_2$ or 31. Many assumed a system with negative numbers and gave the answer $0\ 1111_2$ (15). Students must be encouraged to include the base subscript in all numerals in this section.

EITHER

(b) Optical Technologies

(i) 1 Although most students were able to state the words *monochromatic* or *coherent*, many showed in their further explanation that they had no real understanding of the meaning of either.

2 An appropriate use was given by the majority of candidates. Some were unable to *describe* this use adequately and many did not limit their choice to the use of lasers in computing technologies.

(ii) The characteristics of optical fibre which give it an advantage compared with twisted pair were well described. The question required however, that specific situations be stated in which that advantage applies, and this was often not done.

(iii) 1 Pits and lands were mentioned by most students. The majority still do not understand that the flat surfaces of both pits and lands are read as *0s* and the transition from a land to a pit or vice versa is read as a *1*.

2 This part was poorly attempted. Few students understood the concept of constant linear tracking which results in a variable spin rate that is slower when giving access to outer portions of the spiral track. Many of those who gave a variable spin rate answer stated that it was slower towards the centre.

3 Some students did not compare CD-ROM with a hard drive. Advantages were well stated but poorly explained.

4 It is apparent that emerging technologies related to CD-ROM are known to students. Although this caused some confusion with the question, it was generally well done.

(iv) The process of storage on a MO disk was generally understood and adequately described. The reading of data was, however, very poor. Most students did not understand that the reflected polarised light represents a 1. The terms *polarisation*, *magnetic alignment* and *Curie point* were not understood.

OR

(c) Theory and Construction of Integrated Circuits

(i) 1 The truth table was filled in accurately by a large number of the candidates.

2 A high percentage of students correctly recognised the *OR* relationship between the inputs *A* and *B* and the output *E* and drew a correct diagram. Some students failed to label the diagram with correct inputs and outputs.

(ii) 1 Naming the device as a *flip flop* or *latch* or a *bistable device* was very well done. Many students were also able to justify their choice correctly by relating the characteristics of the device to the requirements of the situation.

2 A correct truth table for *A* and *B* inputs was drawn by a large proportion of the students. Many neglected to include *E* as a necessary input. The required relationship was *(A **AND** B) **OR** E.*

3 Very few students were able to draw a completely correct circuit diagram which satisfied the required relationship. Many displayed a knowledge of components which satisfied part, *(A **AND** C)* but failed to synthesise the parts into a complete solution, *(A **AND** C **AND** D) **OR** E.*

Question 27 Database Design

About 74% of the candidature attempted this option.

(a) (i) 1 This part was answered poorly, as many students confused the definition of a database record and a data structure record. Students also misused the terms attributes and tuples.

2 Students incorrectly referred to file as being the whole database or as being something that is saved to disk.

(ii) Students gave the meaning of the acronym rather than an explanation of a Database Management System. They often confused the role of a Database Administrator with a DBMS.

The functions listed should apply to all types of DBMSs rather than examples specific to relational databases. Use of the term *manage* (which is part of the definition) is not counted as a separate function. Functions given need to be distinct, for example *enter*, *add* and *insert* would be only one function. Poorer responses gave *input*, *process* and *output* as the three functions.

(iii) The answer to this part needed to be a clearly explained comparison between electronic databases and manual filing systems. Many students gave a good explanation of an electronic database but did not contrast or describe the parallel operation in a manual database. Terms such as *easier, faster* and *smaller* should be avoided unless fully qualified.

(b) (i) *and* (ii) In general these parts were well answered.

(ii) Methods of security needed to be related to the wording of the question in terms of *prevention*, rather than detection. Students should avoid giving more than one possible field when only one is required.

(iii) Responses to this question indicated that students need more experience in wafting search specifications involving different data types. An algorithm or prose is not acceptable as a search specification.

Students need to reproduce the field names exactly as stated in the question.

(iv) This part was poorly answered. Students did not always distinguish between ascending and descending order. The question specified that the name of the camper was to be provided, **not** other details of the record.

(c) (i) More than one difference was required to answer this question adequately. Attention should have been given to describing differences between a flat file database and a relational database, rather than providing a list of features. In answering this question many students confused the terms *table, file* and *database*, as well as incorrectly describing a *flat-file database*.

(ii) *and* (iii) Once again students experienced difficulties in writing search specifications, hence this part was poorly attempted. Field names should be written exactly as given, and candidates should recognise the syntax required for different data types. Students often misused quotations, particularly in relation to field names and it was obvious that the concept of a null value in a field was poorly understood.

(iv) Possibly because of inexperience in the practical use of relational databases, few students included the concept of an ID-code as a unique identifier.

(v) Students found this question challenging and interpreted it poorly. Many stated more than the minimum number of required fields.

Question 28 Graphical Techniques

About 79% of the candidature attempted this option.

(a) (i) This part was well answered by students who knew the Glossary definitions, as well as the List of Required Terms.

(ii) This question was poorly answered. Students should be able to quote the definitions given in the Glossary, and, from their practical experience, they should have been able to describe a Bezier Curve.

(b) All answers for this part needed to relate specifically to the area students had studied rather than being generalised responses. The *System Case Study* was used by many students; this might not have been graphically orientated, however, and, therefore, was not suitable to be used as a basis for answering the question.

(i) *and* (ii) These parts were poorly attempted as many students simply described hardware devices without relating the specific device to the input and output of graphics in the chosen area The examples given were very generalised. Some students appeared not to know the difference between *input* and *output* devices.

(iii) Many responses to this part referred to software. Answers that did refer to hardware simply named hardware devices such as scanners or digital cameras, rather than describing the technical factors.

(c) (i) This part was well answered, although some students confused *frame buffer* with *RAM*.

(ii) Most students could name methods of compression, but many could not apply such knowledge to the graphic given in the question. Some students gave a description of the *purpose* of compression rather than *how* compression takes place, while others confused making the size of the graphic smaller and compression.

(iii) 1 Many students mistook the first diagram to represent a vector graphic and the second to be a bit-mapped graphic. It was necessary for students to recognise the fact that even partially covered pixels must be turned on.

2 Good responses to this part usually provided a detailed description of increased resolution and anti-aliasing. Many students, however, failed to realise that, in order to carry out anti-aliasing, the number of bit-planes had to be increased from the single bit-plane mentioned in the question.

Question 29 Multimedia

About 22% of the candidature attempted this option, answers to which appeared to be of a higher standard than that of previous years.

(a) Many of the terms in this question were generally not well known. The meanings of *mask* *hypertext* and *tweening* were adequately defined by most students. Very few, however, were able to make any attempt at defining *cross-fade*, *titling* and *composite video*.

(b) Responses to this part suggested that knowledge of the sound capabilities of a computer were not particularly well understood; but that, nevertheless, students would be able to use these capabilities.

(i) Most students knew that *digital* was the sound type that was required and a good proportion could also explain that this was because the computer is a digital technology. Answers generally were not well related to multimedia although some students wrote about the greater clarity of digital technology and its advantages for storage and manipulation.

(ii) It was obvious that most students were familiar with the practical tasks of using MIDI but did not understand how it works. The purpose of the interface was described well, but the description of the operation was poor. Many students indicated that they knew how MIDI events are stored, but very few showed a full understanding of MIDI as a system.

(iii) Most answers for this part were too brief. The better responses indicated the difference between different storage technologies, often citing specific examples to clarify the explanation.

(c) Answers to this part indicated that most students had been well prepared for issues of designing and evaluating multimedia presentations.

(i) There was a lack of specific examples to back up claims such as *I'd use text for information,* or *graphics to make it more interesting.* Students should have given examples such as: *text has a particular part to play in the communication process - that of defining terms, or of conveying shades or nuances of meaning in ways that graphics cannot.* Examples of the place of graphics were slightly better described. Many students did not describe how both components can enrich multimedia production.

(ii) There were some very good answers here, but many students simply listed examples of what they would have in their presentation and their answers were simply repeated in (iii) The question required a discussion of design principles such as *suitability to audience, sound screen design features, consistency of interface and ease of navigation.*

(iii) This question was well answered by most students.

3 UNIT ADDITIONAL

1534 candidates presented for this paper which consisted of:

Section I — 20 multiple-choice questions

Section II — 2 questions, each on one of the compulsory topics.

Section I

Item	Correct Response
1	A
2	C
3	C
4	D
5	B
6	C
7	D
8	C
9	B
10	A

Item	Correct Response
11	D
12	C
13	B
14	A
15	B
16	C
17	A
18	B
19	D
20	B

Section II

Question 21

As in previous years, many students took advantage of the occurrence of a familiar term in a question to write down all they knew about the concept, without applying their knowledge to the requirements of the question. In addition, many failed to relate their answer to the stimulus material, especially in the latter section of the question.

(a) Students failed to distinguish between WWW customers/users and employees in terms of the tasks they performed, finding it difficult to differentiate clearly between the two types of users and their documentation requirements. They often identified and/or described the documentation they would recommend, but did not always give the reasons for their recommendation - the question asked for two reasons for recommendations.

(i) Students often correctly identified the need for on-line documentation for customers of a company marketing on the WWW, but naively relied on the markers' interpretation of their answer rather than on proving their own elaboration. Students did not give good reasons for the use of on-line documentation, concentrating, instead, on describing the different types of on-line documentation

(ii) The need for employees to undertake computer–based and non-computer tasks was missed by many students, who failed to realise that employees had sometimes to work off–line. There was a lack of analysis of the stimulus material. Some students identified documentation that is unlikely to be used by employees in their *daily* work, such as intrinsic documentation that is within code. Many of the reasons given for recommending the type of documentation were superficial.

(b) The majority of students, in the main, were able to answer this question fairly well. Some, however, did not appear to understand the difference between *screen design principles* and *screen design elements*, on occasions transposing their responses for parts (i) and (ii). A number of students failed to tackle the question, identifying principles or elements of screen design that did not improve the design and some concentrated on interface design rather than screen design. Very general responses were sometimes given, like *the need for user-friendly screens*, without any identification of how or why this would be done.

(c) (i) This question required students to identify features of the prototyping method, but some used the opportunity to write definitions, or anything they knew about prototyping. A number of students thought prototyping was a debugging tool!

Some candidates launched into a general description of prototyping without relating it to the system discussed. Many failed to realise that a design process is made up of a number of steps; if they had done so, identifying the steps would have helped them to answer this question. If they did recognise the benefit of describing stages, it was not unusual for them to give *build a prototype* as one of the stages.

Some answers concentrated on a description of the stages in the *System Development Life Cycle*, displaying a lack of understanding of prototyping. Answers that did not address the question at all were those that described the ordering process over the World Wide Web, for example, saying: *Get the customer's name, credit card details and desired purchases, check the credit limit and send the order to dispatch department*.

(iii) Students seemed to have trouble in understanding this question. Many answers provided were vague, while others suggested tests for checking program logic or algorithms, eg. deskcheck, structured walk-through. *Black box* and *white box* checking were common expressions, but students did not relate these checks to the question.

Some students carried the idea of prototyping through from parts (i) and (ii). This part, however, required students to suggest testing methods for *the system* described in the stimulus material.

Question 22

(a) This part was generally well answered. Many students confidently described one advantage well; some, however, had difficulty in describing a second advantage.

A number of students correctly mentioned a possible advantage but failed to describe that advantage satisfactorily.

(ii) The majority of students answered this question well and were aware of the major difference between the two translation methods.

(b) (i) Although most students scored well in this section, it was surprising to note how many were unable to deskcheck the algorithm successfully. A written deskcheck should be shown by students in this type of question.

Many students were not aware that a *space* was indeed a *character* and should be read like any other character.

Some students assumed that the loop continued down to line 16, which incorrectly resulted in output for every character in the data set. Other students missed the fact that the iteration was to stop when *position = max* and hence continued the processing until an *a* was encountered.

(ii) Students were required to rewrite the algorithm using a pre-test loop. Most were aware of the criteria for a pre-test (the condition test comes first); many students, however, had difficulty in maintaining the algorithm's function.

To change the loop to pre-test involves reversing the conditions. A large percentage of students did not realise the need for the *OR* to change to *AND*.

To maintain the algorithm's function correctly also required a *read character* or equivalent outside the loop, to allow control to pass initially into the loop. The majority of students neglected to implement this common distinction between pre-test and post-test repetition.

(c) The standard of answer for this algorithm question has improved compared with that for last year. It was noticeable, however, that students using flowcharts tended to produce more algorithms structured incorrectly than those opting for pseudocode.

A large number of students did not see the possibility of a player other than the spinner scoring over 50 as a result of an *All win* spin. This resulted in the application of trivial loop conditions.

Scoring for the *All win* and *All lose* also presented problems for candidates. It was necessary to give full details of these modules. Many, however, simply accounted for these situations by writing generalised statements, such as *Add 10 to all but the spinner*, which was merely restating the question.

Other common errors for this question included the failure to set the player number back to 1 after the fourth player's spin and the incorrect implementation of the CASEWHERE structure.

The better responses included algorithms which were flexible for any number of players and made use of arrays rather than simple variables to hold each player's score.

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