

GCE 2002

January Series



Report on the Examination

Computing



- Advanced Subsidiary
- Advanced



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Kathleen Tattersall, Director General

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Computing

CPT 1: Computer Systems, Programming and Networking Concepts

General

Candidates should be reminded that it is not acceptable to refer only to abbreviations, e.g. NIC instead of Network Interface Card, or VB instead of Visual Basic. Answers giving only proprietary names instead of generic names do not gain credit.

Question 1

- (a)(i) Most candidates correctly named one or more buses. The term ‘bus’ was enough to gain the mark, but some candidates still referred to a ‘memory bus’ which did not gain credit.
- (ii) Very few candidates seem to appreciate that secondary storage is used to save programs and data when they are not in use. Most referred to backup copies, which may well be saved on secondary storage, but is not the primary purpose of such storage.
- (ii) The fetch-execute cycle was very well explained by a few candidates, though in too much detail by some others (e.g. by those who had presumably just studied machine architecture for CPT4). The majority of answers involved fetching data from memory and then executing data which gained no credit. Correct responses stated that an instruction is fetched from main memory, decoded and executed by the processor. At this machine level of operation, the term ‘information’ is not appropriate.
- (b)(i) Assembly languages are second generation programming languages. The term ‘assembler’ was accepted this time, but candidates should be able to distinguish between the two terms and appreciate that the assembler is the translator, which converts the assembly language program into machine code.
- (ii) Many candidates lost a mark by wrongly stating that a compiler or interpreter converts an assembly language program into machine code. The terms ‘source code’ and ‘object code’ belong to the translation of high level language programs by compilers and should not be used in the context of second generation languages.
- (iii) Very few candidates could explain what the term ‘imperative’ meant in the context of high level languages. Most thought it meant important or problem oriented. Of those who were on the right track, some then confused the definitions of imperative and declarative languages. A correct response explained that the computer executes instructions in programmer-defined sequence. It was not acceptable to equate a programmer with a user.
- (iv) A great many different languages quoted here gained credit. However, Prolog or HTML were not acceptable examples.

- (v) Few candidates could state that one high level language statement would translate into one or more machine code instructions. Some candidates denied that there was any relationship.
- (vi) This was a well answered question even for middle-scoring candidates, though the answers were sometimes a little vague. ‘Hard to learn’ and ‘debug’ were probably the most common answers which gained credit.

Question 2

- (a) This question was not very well answered by the majority of candidates. A correct response was that a word is the number of bits which can be addressed or transferred as a single unit. Candidates need to understand that this is not necessarily the same as the number of bits which can be processed at the same time.
- (b) Surprisingly many answers were NOT 0 and 1 but $1/8^{\text{th}}$ of a byte or 1, 2, 4, 8 16 etc.
- (c) This question did not seem to be well understood by the majority of candidates even though a similar question appeared in January 2001 for CPT1. Candidates scored full marks if they appreciated that a 32-bit word could take 4 ASCII characters or 2 UNICODE characters, an integer or a real, an instruction or an address. 32 bits are not enough to store a bit-map, so candidates were expected to suggest part of a bit-map or pixel(s). A few candidates noticed that 32 bits was just enough to take an IP address.

Question 3

- (a) Most candidates simply quoted back the rubric of the question or a package with WP SS DB all preinstalled. Very few stated a single program and even fewer seemed to realise the possibility of easier sharing or exchange of data. Candidates need to be reminded that quoting product names is not worthy of credit. As it happened most candidates quoted MS Office rather than MS Works, which merely confirmed their misconception of what an integrated package is.
- (b) Many candidates answered this with ScanDisk or Zip, proprietary names. **Such answers do not gain credit.** Credit was given for responses such as disk scanner, compression program, virus scanner, disk defragmenter.
- (c) The two types of system software included application packages like Excel or Access or Word far too often. It was clear that system software was not a well known concept. Instead of stating operating system, MSDOS or Windows 98 etc. were often given. Answers from last summer kept appearing here – bespoke software or general purpose. Candidates need to make the distinction between library programs (a type of system software) and library software (special purpose application software).

Question 4

Some centres used the question papers which had been replaced and recalled because of a printing fault in this question. The boxes for the answers for (a)(i) and (a)(ii) were misaligned. This did not place candidates at any disadvantage as due allowance was made in the marking of these scripts.

- (a) The majority of candidates correctly converted 25 to pure binary integer and BCD. However, when asked how this would be stored in a 16-bit word, candidates were expected to write down leading zeros to make up 16 bits. To help candidates with this, boxes to complete the bit pattern were provided.
- (b)(i) Even with the clue in the question a large number of the candidature did not give 53 as the ASCII code for '5'. A very common wrong answer was 85.
- (ii) Few included the pair of 11s in the left hand nibble of each number character. The right hand side of each pattern was correct but obviously incomplete, i.e. 0000 0010 0000 0101. Again, a similar question had been set in previous papers.

Question 5

- (a) Correct responses were 1024 x 1024 or 1,048,576 or 2^{20} . However, a substantial number of candidates gave 1,000,000 or even 1024.
- (b) Surprisingly, a pixel was rarely described correctly – ‘a tiny dot on the screen’ is not an adequate description. Acceptable responses included Picture Element or the smallest addressable part of an image. The description of an image divided into a grid and each square of that grid being a pixel was also worthy of credit.
- (c)(i) Many candidates requoted the question, some stated this means high resolution, a response which did not gain credit. Candidates who elaborated to explain that this meant there were 1024 rows and 1024 columns of pixels gained the mark.
- (ii) Very few candidates managed to calculate this correctly, even when they had correctly stated that 1Mb was 1024 x 1024 bytes. The answer ‘1 byte’ ought to have been reasonably straightforward.
- (iii) Again simple arithmetic evaded many candidates. Instead of 256, the numbers quoted ranged from 2 to millions.

Question 6

- (a) Most candidates correctly stated that sound is analogue in form, although some were under the impression that it is inherently digital.
- (b) Again most candidates could describe that an A-to-D converter converts analogue signals to digital signals. However, some described instead the action of a modem and did not gain the mark for suggesting that the signal was also converted back to analogue.

Question 7

- (a) Parts (i), (ii), (iv), (vi) and (vii) were more often answered correctly than the other parts. Very few candidates seemed to understand the term ‘parameter’. Surprisingly, ‘local variable’ was also not very well known. A considerable number also gave an IF... statement as the answer to iteration.

- (b) The difference between a function and a procedure was known by only a few candidates. A function always returns a value and therefore a function name can be used in an expression or on the RHS of an assignment statement. Clearly the majority of candidates would have benefited from more programming practice.

Question 8

- (a) This question was not answered well, even though similar ones appeared in both last winter's and last summer's CPT1 paper. Candidates need to make it clear that several **bits** are transmitted down several wires simultaneously. The more general term of data or information being transmitted does not gain credit. Some candidates still confuse parallel transmission with full duplex transmission.
- (b) Handshaking was either very well answered or badly answered and the variation was often between whole centres. A correct response was exchange of signals between devices to establish their readiness to send or receive data.

Question 9

- (a)(i) Most candidates gained one or two marks here. Sharing data or the database or the need to only update a single database on the server were all answers which gained credit. However some candidates referred to Wide Area Network advantages or compared WANs and LANs, and not LAN and stand-alone operation as the question stated.
- (ii) A modem appeared too frequently here. Networking, even at this quite basic level, is not a well-known topic.
- (b)(i) The idea of a cable failure not taking down the whole net was reasonably well known but many candidates stated "if the Computer fails..." which did not gain credit.
- (ii) Almost all candidates realised the Bus network used less cable. However, some candidates still only stated "The bus network is cheaper". Without further qualification this response did not gain credit.
- (c)(i) This was very poorly answered; usually candidates only referred to an address of a site. Very few candidates understood the idea of a name of a site, which the domain name server resolves into a site address.
- (ii) Most candidates gave a suitable example of a domain name, but some candidates quoted an e-mail address, which did not gain credit. The mark scheme this year was very generous, accepting answers where candidates underlined just the company name part of a domain name, insisting that this was the domain name. Candidates need to appreciate that www.name.co.uk may belong to a different organisation than www.name.com and these are two different domain names. The whole expression is the domain name. Just as domain names can have different suffixes (such as .co.uk or .com) they can have different prefixes such as wap. or ftp.

- (d) The idea that an intranet was ‘internal’ or company-wide was less well known than the answer that it was ‘like the Internet’. Many candidates set out their answers in terms of a LAN definition, which on its own was not enough to gain credit. Some candidates thought that the intranet consists of just one web page available to employees only. It is actually a communication system providing similar services to the Internet.

Question 10

- (a) The tree was generally well created. A few candidates produced mirror images, which were accepted this time. However, candidates need to be aware that a binary search tree stores lower values in the left sub-tree and higher values in the right sub-tree. A few candidates produced a balanced binary tree with each node having two sub nodes, which was not correct.
- (b) Only the better candidates seemed to score full marks here. Dry-running an algorithm does not seem to have received sufficient attention in the preparation of a number of candidates. The fact that ‘Item’ did not change its value seemed to be noticed by only a few candidates. Candidates did not appear to appreciate that the algorithm was using the binary search tree, which the candidates had drawn in part (a).

CPT 2: Principles of Hardware, Software and Applications

General

Many candidates demonstrated familiarity with the detail of the specification for CPT2. However, some candidates fell short of achieving success because of a lack of depth, accuracy and precision in their answers. For example, several candidates gave CD as their answer to Question 1 where the expected responses were CD-ROM or CD-R. In Question 8(g), several candidates substituted their own field names for the data fields that were adaptations of those specified in the question. In Question 5, several candidates wrote Project.Pas when the filename was clearly given as Project1.Pas in the question itself. Candidates should appreciate that the nature of this subject requires its practitioners to be aware of the need to be precise, accurate and disciplined in their approach to problem solving if problems are to be solved successfully by computer. Other candidates lost marks because mistakenly they assumed that credit would be given if they gave a list of possible answers where one was required. Often the additional answers contradicted the one that was correct.

Many candidates' understanding of file processing was weak. These candidates in their responses to Question 8 showed a lack of insight into how transaction data is processed against a master file. Many candidates did not appreciate the benefit of sorting the transaction file records and placing them in the same order as the master file. Many responses for 8(g) were vague and superficial because they were expressed from the viewpoint of a user of the system, not from that of the computer system itself. There were, however, some outstanding solutions that could have been programmed successfully.

Pleasingly, candidates' grasp of database theory was good and there were many excellent answers to Question 9. Some candidates did not appreciate that an index is used to reduce the time the computer takes to look up a datum. Many thought that an index was used to place the data in order. Query By Example (QBE) still causes difficulty to some candidates. All too often, candidates interpreted this as meaning to give an actual example of the expected result, filling in all the boxes in the template as a consequence.

The spreadsheet question was answered quite well but many candidates still experience difficulty with the correct syntax of the If function call.

Very few candidates understood the difference between archiving a file and backing up a file. Also file access rights in a directory listing were not well interpreted. Many candidates experienced difficulty interpreting the content of a directory listing. The same candidates often failed to specify pathnames correctly for the given directory structure. Candidates must have the opportunity to specify pathnames in the course of their studies in Computing and to view detailed directory listings.

Question 1

Most candidates were guided by the storage requirement specified in the question to conclude that the most appropriate medium was a CD-ROM or a CD-R. Several failed to gain credit because they were not precise enough and simply stated CD. Answers that were rejected were 'floppy disk' because of its limited storage capacity and 'hard disk' because it would have been impractical to send a hard disk through the post in this application.

Question 2

The emphasis in this question was on information gathered about specific customers shopping on a regular basis at a supermarket chain that could be used for more than just sales accounting. Popular answers for items of information that gained credit were spending power, daily/weekly movements, purchasing habits and telephone number. By specifying a related purpose candidates were able to gain further credit. “The direct marketing of goods/services that a customer could afford to buy”, for example, was correctly related to purchasing power by several candidates.

Candidates whose answers related to the transactions of many customers, e.g. total sales of a particular product, or whose purpose was unconnected to the specified item of information, failed to gain credit.

Question 3

Many candidates correctly identified to monitor criminal activity and to monitor terrorist activity. Some candidates answered quoting a specific example, “to catch paedophiles at work exchanging child pornography”, which also gained credit.

Several candidates answered that the reason was “to look out for viruses” which was not quite enough to gain credit. Those candidates that answered more fully “to detect and prevent viruses from causing economic harm to the country” did gain credit. Often a candidate’s response to a “give reasons” type question falls short of the expected answer because the detail is missing. “To look for criminals” would not be enough whereas “to look for criminal activity” would be.

The majority of the candidates gave the creditworthy answer ‘encryption’ as their response to part (b). A few wrongly suggested using a password.

Question 4

Most candidates could distinguish a batch processing system from a real-time system but fewer could define each accurately.

The commonest correct answer for batch processing was “processing which takes place without user intervention”. Some candidates appended to this answer the phrase “which allows job to be done in the background” thus showing a clear understanding of batch processing. Some candidates concentrated their answer on the “batch” part of “batch processing” and failed to adequately answer the question. Typically, the response of these candidates was along the lines of “where data is collected in batches before processing.” This is true, but it doesn’t rule out the processing of the batches of data interactively. Also, the terms batch and processing already appear in the question. An answer that stated that processing was delayed until all the data have been **entered** into the computer system conveys more and as such gained full credit.

Explaining real-time processing proved quite difficult for some candidates. Many candidates conveyed the idea that real-time systems processed inputs immediately or in a timely manner but several overlooked the second stage which is also important. In real-time systems the second stage is a response which is generated immediately or in a timely manner. For example, an engine management computer system in a car will read a change in the position of the accelerator pedal as soon as it happens then calculate the change in petrol/air volume required to match this pedal change. It will then produce this change in the petrol/air volume mixture which should result in the expected acceleration of the car. Even, if the real-time system is a pseudo real-time system, e.g. an airline reservation system, the two stages are still applicable. If an input is created to reserve a seat on a

particular flight, the computer system cannot ignore the request if it can be satisfied, i.e. is a valid request. Therefore, the request must be validated – the first stage - and the booking applied – the second stage - to the relevant part of the computer system, a database, perhaps, before another booking can be processed for the same flight. Chaos would result if a booking request was accepted – the input – but the actual booking not applied to the database immediately. To other requests, a particular seat will still appear to be available.

There were several alternative responses that satisfied the examiners. For example, candidates who responded with “system processes the data it receives instantly so it can react to it immediately” also gained credit.

Part (b) was well answered with the majority of candidates able to identify which was a real-time system and which was a batch processing system.

Question 5

In part (a) the majority of candidates correctly identified that backing up a file involved making a copy of the file but fewer were able to accurately explain archiving. In archiving the file is moved onto a removable medium. Usually, this involves copying the file from on-line storage, e.g. magnetic hard disk, to magnetic tape/cartridge. The magnetic tape/cartridge will be on-line while the copying is taking place but once done the tape/cartridge is removed and placed off-line. So far, this is similar to the process of backing up. However, the next stage crucially distinguishes file backing up from archiving. The on-line copy of the archived file is now deleted freeing up on-line storage. Archiving is applied to files that are no longer in everyday use but might be needed at some time in the future, e.g. a company’s accounts from last year must not be destroyed for legal reasons. However, last year’s accounts are history and will not be required for day-to-day processing this year.

The examiners were looking for answers that stated that in file archiving a file is removed from on-line storage or a file is taken off-line or archiving is the keeping of information for long-term reference while freeing on-line storage. Some candidates may have been wrongly influenced by the use of the term archive in Microsoft’s operating systems. This is a non-standard use of the term. The answer given here is the traditional meaning of the term in data processing.

Part (b) (i) and (ii) were answered reasonably well but several candidates lost a mark or two because of carelessness. In part (i), the expected answer `/Project1.Pas` became `/Project.Pas` for some candidates. Candidates are reminded that accuracy is important. A computer will not interpret instructions as a user/programmer intended but only as presented to the computer. Some candidates appeared by the responses given to have little experience of pathnames. Part (iii) also revealed a lack of experience, in this instance with detailed directory listings. Candidates must have exposure to more than an icon structured view of directories/folders/files. Field 2 in part (iii) caused difficulty for some candidates. This field referred to file access rights. The acronym `rw` indicated that a user has both read and write access to the file. The acronym `r` indicated that a user has read only access rights to the file. Field 3 indicates the size of the file. Field 4 and field 5 refer to a date and a time. Several candidates simply gave just this as their answer. However, to gain credit a candidate had to qualify each. The date/time could have been the file’s creation date/time, last modified date/time or last accessed date/time. Many candidates gave creditworthy answers for these two fields.

Part (iv) caused more difficulty for candidates. Field 1 entries were the directories `Project` and `Homework`. However, a significant number of candidates were unable to deduce this from the evidence provided.

Question 6

Most candidates were able to correctly identify the legislation as the Copyright, Designs and Patents Act although only a few gave it its full title. However, fewer were able to apply this satisfactorily to the given scenario. Several candidates thought that the Act was broken by the sale of the training videos whereas the infringement occurred because both music and software were copied without authority or permission or a licence.

Part (b) was answered well with candidates losing a mark because of imprecision, stating CD/DVD for medium and not CD-ROM or CD-R or DVD-ROM or DVD-R; losing a mark for stating CD/DVD and not CD/DVD drive/player. The most popular correct answer was “DVD/CD player” followed by “speakers” then “sound/video card”.

In part (c) few failed to name the Data Protection Act. Several candidates ignored the requirement of the question to state the principle that applied to security of personal data and instead supplied a method of securing data such as passwords.

A few candidates wrongly quoted the Computer Misuse Act.

Question 7

Part (a)(i) caused difficulty to some candidates and others no difficulty at all. Candidates’ responses to the rest of this question indicated that those candidates who had studied a spreadsheet had little difficulty picking up marks.

Part (a)(ii) was answered well by the majority of the candidature. However, several candidates stated the obvious, i.e. that the answer was set to display to two decimal places, without stating how this might have happened. The examiners were looking for the concept of *formatting* or the use of the *round* function in the relevant cell. This is a Computing examination and wherever possible candidates are expected to demonstrate knowledge of Computing in their answers. To the layperson it is obvious that the value has been set to two decimal places.

Part (b) was answered well by the better candidates. The syntax of successful answers was broken into an “If” command, followed by a condition, followed by the result if the condition was true and the result if the condition was false, e.g. If(D4 < \$H\$2, 2, 4) was one possible correct answer. A common error was to write H4=2 and H4=4 in the If expression.

Question 8

A surprising number of candidates had difficulty recognising the two techniques for encoding data referenced in this question and therefore failed to identify the correct reading device. Both are in common use though candidates may have greater experience of the use of barcodes. Barcodes must be a daily feature of most candidates’ lives.

Many candidates identified the last digit in the borrower code as a check digit and many candidates explained that it was a calculated digit calculated from the other digits in the borrower code. However, some candidates could not explain precisely enough why it is used. The check digit is there so that corruption of the borrower code can be detected when it is entered into the library’s computer system. Several candidates thought that the check digit checked the whole card, i.e. checked that the card belonged to a valid user of the library.

Part (c) was well answered with the most popular answer being to key in the code if the reader fails to read the code.

The term *primary key* gave few candidates any difficulty. The better candidates answered part (e)(iii) correctly. The Loans file uses serial file organisation.

Part (f) caused some difficulty for the weaker candidates, many answering from the perspective of the layperson. For example, the commonest incorrect answer for sort field for the Books file was DateBookToBeReturnedBy. In part (g), other candidates ignored the Books file altogether and referred only to the Loans file when stating the processing steps. In fact, in many instances the required processing steps were described not stated, the candidates' responses appearing as a narrative that could not have been used to program a computer. Narratives scored zero marks. Previous reports have made reference to this and the advice given has been similar. If a question asks a candidate for the processing steps then a sequence of steps is required. Candidates are advised to use a linear layout that lists the steps in logical sequence. For example,

```

Open Books file
Repeat
  Read next record
  If LoanStatus = OnLoan
  Then
    If DateBookToBeReturnedBy < CurrentDate
    Then Write Details to OverdueBooks File
  Until End Of Books File

```

The majority of the candidature was able to correctly identify the data to be extracted – BookCode, BorrowerCode, DateBookToBeReturnedBy. Some candidates lost marks here because they failed to state these fields accurately. Others failed to gain marks because they invented irrelevant fields. ISBN, Title and Author were accepted because these might well have been present in the Books file.

Question 9

On the whole this was answered well by the majority of the candidates with many achieving full marks. Some candidates experienced difficulty explaining accurately the meaning of the term “foreign key”. An answer that stated that it links two tables was not credited with any marks. The examiners were looking for the statement “a foreign key is an attribute in one table which is a primary key in another table”. A pointer can be used to link two tables but a pointer is not a foreign key.

An index is used to speed up searching. Several candidates simply answered, without gaining credit, that it made searching easier without drawing the conclusion that less time would be taken looking up an individual competitor's information. Most candidates correctly stated that the index on RacingDivisionId was a secondary index.

Part (e) was not answered particularly well. Many candidates assumed that Query By Example (QBE) meant literally to put an example of the result expected into the QBE template. Thus “868 Smith 412 Cat1” appeared many times. Those candidates who could not make up their minds put both examples of the result into the template. The correct answer is as follows:

CompetitorId	Name	PointsAccumulated	RacingDivisionId
		>300	=Cat1

CPT 4: Processing and Programming Techniques

General

The range of responses showed that candidates with good knowledge and understanding of the content of Unit 4 were successful in meeting the demands of this paper. It was pleasing to note that many candidates had benefited from the guidance given to centres during the phase 3 training sessions. Good use appears to have been made of the resources that were provided at these sessions.

Candidates who scored well on this paper clearly had read the questions carefully and answered the questions set, rather than writing generally what they knew about a topic. They did not assume that the examiner would reward responses that remained implicit in nature. If they knew something, they spelt it out. They also used terminology correctly and precisely.

Question 1

Too many candidates simply did not know what an inheritance diagram looked like. Those who gained full marks for this part of Question 1 placed the classes in the correct relative position and joined them by arrows pointing to the base class, **Creature**. The property of a class is comparable to a field, so ‘number of legs’ was acceptable, but ‘8 legs’ was not. For the method, acceptable answers were commands such as ‘eat’ or ‘spin web’.

Question 2

- (a) All that candidates were asked to do in this part was to define clock speed as ‘the frequency at which a clock pulse occurs.’ Many did not recognise the system clock as a distinct component and used the term ‘processor speed’. Some had difficulty distinguishing between the frequency of the clock pulses and the speed of the pulses. Others explained factors which depended on the clock speed, such as the rate at which the fetch-execute cycle was executed. A few good answers described electronic pulses emanating from a crystal and related the clock speed to their frequency.
- (b) Here the candidates were asked to say what effect increasing (or decreasing) clock speed will have on the speed at which instructions are executed. Again, it is important to note that this question did not ask about how fast the processor worked or the effect on the cycle.

Question 3

Clearly, some candidates lost marks on this question because they did not read it properly. It asked about registers which were involved in the fetch part of the fetch execute cycle. Most answers correctly identified three registers, but a common fault was in terminology. Candidates used the word ‘location’ for a Memory cell, for the address of a Memory cell and for the contents of a Memory cell. It was sometimes apparent from their remaining answers what was meant, but in many cases it was not and was sometimes contradictory. Another example of laxity was in ascribing an activity to a passive storage device such as ‘The Program Counter passes the address to the Memory Address Register’.

Question 4

- (a) In this part, the essential idea that JCL commands are presented as part of a single job yet to be carried out was lacking, so information such as ‘memory used’ or even ‘Order in which jobs are carried out’ was suggested. A few candidates noticed that one example of information which might be specified in Job Control Language script for a particular job was actually given in 4(b). They were given credit for observation!
- (b) Unfortunately, in response to this part, too many candidates wrote generally about batch processing, without suggesting what piece of information would be used by the operating system for setting the priority of the job. Many talked about time slices.

Question 5

Few candidates could really define a client server system for this question, or give benefits for one. What was lacking here was the notion that the server provides services to the client workstations, such as managing the printer queue, or internet access. Many answers were in a general network context, or were too vague to be worthy of credit. Others confused the system with terminals, keyboards and monitors, which used the main computer’s processing power.

Question 6

There were some excellent answers to this question, with a standard definition, ‘a signal from a device seeking the attention of the processor’ followed by a detailed explanation as to how an interrupt from an input or output device would be handled. Candidates from some centres seemed to think that the processor decided on the priority of an interrupt once it had occurred, rather than the priority being an inherent property. Some candidates again wrote what they knew about the priority of I/O interrupts rather than how these were handled. A few wrote from the user view of interrupts, with messages appearing saying that the printer was out of paper, and so on.

Question 7

Many high marks were gained on this question, but some candidates did not list all the clauses involved and failed to gain full credit as a consequence. In part 7(b), any group of clauses that worked was credited, but not if they had the result of making an invalid number valid. So, for example, sign (+/-.) was not accepted.

Question 8

- (a) Candidates found it very difficult to explain the terms mantissa and exponent in this part. Many answers were weakened by reference to a decimal point.
- (c) Here, it was disturbing that some candidates interpreted ‘subtract 3 from 5’ as 3-5. Candidates who showed their calculation in 3 bit binary were apparently showing the addition of two negative numbers, which was not correct.
- (d) In this part the advantage of floating point representation over fixed point representation is the increased range of numbers that can be represented in a given number of bits, not the accuracy of the number.

Question 9

For this question, a surprising number of candidates knew direct, indirect and even relative addressing, but not immediate.

Question 10

- (a) This part asked what result would have been returned by the specified function calls. So Tail (Ports) would have returned [Barcelona, Athens, Alexandria, Tunis, Lisbon] with the brackets being part of the correct answer. Head(Tail(Tail(Ports))) would have returned Athens, without brackets and the answer to the last part was True, not [True] or True [].
- (b) Most candidates could say what *recursively defined* was, although some answers were barely sufficient and 'It calls itself' was deemed insufficient.
- (c) Explanations of why a stack was necessary to execute procedure P recursively frequently missed the point.
- (d) Full marks were gained for this part by an answer of:
Lisbon Tunis Alexandria Barcelona Southampton,
or even of:
LisbonTunisAlexandriaBarcelonaSouthampton,
as no punctuation was printed. A list of:
Lisbon
Tunis
Alexandria
Barcelona
Southampton
was also accepted.
- (e) Candidates who did not score full marks for 10(e) mainly numbered the ports in alphabetical order, rather than using the pointers to point to the next port in the list, or gave inadmissible or absent end-of-list markers.

Mark Ranges and Award of Grades

Unit/Component	Maximum Mark (Raw)	Maximum Mark (Scaled)	Mean Mark (Scaled)	Standard Deviation (Scaled)
CPT1	65	65	30.9	10.9
CPT2	65	65	33.3	9.2
CPT4	65	65	26.8	10.9

For units which contain only one component, scaled marks are the same as raw marks.

CPT1 (5333 candidates)

Grade	Max. mark	A	B	C	D	E
Scaled Boundary Mark	65	44	38	32	27	22
Uniform Boundary Mark	105	84	74	63	53	42

CPT2 (2128 candidates)

Grade	Max. mark	A	B	C	D	E
Scaled Boundary Mark	65	44	37	34	30	26
Uniform Boundary Mark	105	84	74	63	53	42

CPT4 (2855 candidates)

Grade	Max. mark	A	B	C	D	E
Scaled Boundary Mark	65	42	36	30	24	19
Uniform Boundary Mark	90	72	63	54	45	36

Advanced Subsidiary award

Provisional statistics for the award (527 candidates)

	A	B	C	D	E
Cumulative %	18.6	37.0	57.7	80.6	95.1

Definitions

Boundary Mark: the minimum (scaled) mark required by a candidate to qualify for a given grade.

Mean Mark: is the sum of all candidates' marks divided by the number of candidates. In order to compare mean marks for different components, the mean mark (scaled) should be expressed as a percentage of the maximum mark (scaled).

Standard Deviation: a measure of the spread of candidates' marks. In most components, approximately two-thirds of all candidates lie in a range of plus or minus one standard deviation from the mean, and approximately 95% of all candidates lie in a range of plus or minus two standard deviations from the mean. In order to compare the standard deviations for different components, the standard deviation (scaled) should be expressed as a percentage of the maximum mark (scaled).

Uniform Mark: a score on a standard scale which indicates a candidate's performance. The lowest uniform mark for grade A is always 80% of the maximum uniform mark for the unit, similarly grade B is 70%, grade C is 60%, grade D is 50% and grade E is 40%. A candidate's total scaled mark for each unit is converted to a uniform mark and the uniform marks for the units which count towards the AS or A-level qualification are added in order to determine the candidate's overall grade.