

COMPUTING

Paper 9691/01

Written Paper 1

General comments

The standard of the presentation was, once again, very good. There were very few candidates who suffered because of a failure by the examiner to understand their intentions. There are a minority, largely Centre-based, who do make life difficult for the examiners, and the next few comments are particularly addressed at a few Centres rather than at everybody. It has been said many times during Inset courses that the order of presentation of the responses will not upset the examiners, and that the candidate will still get all the credit they deserve. However, I do add two corollaries to that statement. The first is that, particularly in the second half of the paper, the questions are meant to flow and information in one question will be important in the following questions. This is because this part of the paper is based around a scenario and candidates who attempt these questions out of order may be penalising themselves. The second is that it is not sensible to attempt the parts of a question in a different order to the one that is presented. The mere fact that they are presented as parts of the same question indicate that they are connected and, again, candidates who attempt the different parts in the wrong order will be penalising themselves. Some candidates, thankfully a very small number, go one stage further and have decided that the question numbers are irrelevant. The responses are written as one long essay divided only by paragraphs. This is difficult to follow in the best of cases, but one candidate had combined both methods and had answered the questions (and parts of questions) in their own order and had decided that question numbers were unimportant. This is a minor problem at the moment but it needs to be stopped before it spreads.

More common is the attitude prevalent among some candidates that the question has not quite been worded correctly, so the candidate decides to reword it in the way that they think it should have been worded. This obviously leads to the wrong question being answered and the chance of earning marks being minimised. Many candidates do this through a sort of pavlovian reaction to words in the question where they see a word and then write an answer based on that word rather than on the question. In **Question 1** there was an extreme example, where the question said ‘...peripheral devices...’ which lead many candidates to write about keyboard, mouse and monitor as their first three, when the question went on to say ‘...apart from keyboard, mouse and monitor.’ The candidate has seen the term ‘peripheral devices’ and simply writes down what they know about peripheral devices. In **Question 2(c)** the words ‘batch processing’ were seen which lead most candidates to describe batch processing, ignoring totally the rest of the question which went on to make clear that this was not a question about batch processing but about speed mismatch. Examples can be found in almost all questions to a greater or lesser degree. The worst case of rewording questions to their own liking was the candidate who wrote down the question before supplying the answers. This is quite common among candidates and is usually no more than a waste of the candidate’s time. However, this session there was one candidate who combined these faults and actually wrote down their versions of the questions before answering them!

The volume of responses submitted is becoming problematic. My own personal record this time was 24, closely written, sides of A4. Although this was the extreme, scripts that were over 20 sides of A4 were fairly common. This is a worrying trend because it demonstrates a lack of ability on behalf of the candidate to discriminate between what constitutes a sensible answer to the question and what does not. As those of you will know who have attended a training course, examiners are on the side of the candidate and fully realise the stressful nature of the whole process and will make allowances by finding the correct responses when the candidate has given more than one, but examiners also have a rule that the candidate who simply writes down all they know about a topic must be penalised for lack of ability to formulate an answer. A good example is **Question 2(c)** where many candidates just wrote down everything they knew about batch processing. Candidates who do this are bound to state at some point the fact that the data is collected before processing (removes human from the system) and that the processor can command a number of peripherals (balances the mismatch between processor and a single peripheral) but part of the answer to the question must be to understand that these were the important things about batch processing that relate to the question. This was intended to be a difficult two marks, aimed at the higher ability candidates. A

question asking for a list of facts about batch processing would be a lower ability question where examiners are expecting the majority of candidates to score both marks.

Comments on specific questions

Question 1

Well answered, as expected. My comment here is about the worrying number of candidates who seemed to be unable to relate anything to any application other than playing games. It just makes me wonder what sort of generation we are educating when even students of Computing are so blinkered.

Question 2

- (a) The examining team were not convinced that the term was understood. Most candidates scored here but it appeared to be because of an interpretation of the term rather than having met it before. Many confused mismatch with time lag, indicating that it was the human who was the fastest part of the system because they had to wait for the processor to boot up.
- (b) A safe mark as long as the candidate stuck to the standard answers. For too many candidates the answer was the ATM machine which is not acceptable.
- (c) In many cases it seemed that marks were gained by accident rather than through attempting to answer the question as set. However the marks were awarded if earned.

Question 3

- (a) Candidates do understand the need for a well defined problem before a solution can be attempted, but the role of the different people involved was less well stated.
- (b) Two methods did not cause a problem. However most candidates went on to give a description of the method rather than an advantage of using it. Those who did give advantages found the advantage of an interview difficult to define, tending to say things like ‘...allows detailed explanation.’ This is probably truer of a questionnaire because it gives time to consider responses whereas an interview does not.

I particularly liked the suggestion of one candidate that the analyst should carry out ‘opinionated surveys.’

- (c) Most candidates gave the same answer for both. They are obviously not very worldly wise yet. The examiners were looking for a distinction between the requirements of the two people involved. The user is interested in it being useable, whereas the analyst is interested in the contract being completed, signified by the agreed objectives being met, so that they get paid. For the list of acceptable responses to this and all the other questions on the paper, Centres’ attention is directed to the published mark scheme.
- (d) A difficult question which discriminated well at the top end of ability.

Question 4

- (a) Too many candidates think that a disk formatter will delete unwanted files from a disk. In other words it will be discriminating about the files to be deleted.
- (b) Most candidates were able to state two purposes, but the other marks, for the descriptions, were usually less well earned.

Question 5

- (a) Well answered.
- (b) Many used the example of changing a password, but too many were content to just state an application with no reason as to why the data would have to be verified. It should be noted that full verification is an expensive process, and it is important to justify why it should be used, rather than to expect that it will be.

Question 6

This question was poorly attempted. Many did not attempt it at all, those that did failed to do a proper dry run, while few were able to give sensible test data. When the length of paper was changed by adding an extra 30 minutes to it, the intention was that the time would be necessary in order to answer questions like this one properly. The examiners have the impression that the candidates are not using their time wisely when attempting this type of question.

Question 7

The candidates read this question as 'Write down everything you know about the Internet' and totally ignored the important 'social and ethical' part of the question. This should not have been a surprise to them as the concepts are taken straight from the syllabus. There were lots of answers about being able to shop on the Internet, for example, but this is not worth a mark because it does not answer the question. If the candidate went on to say that the effect of people buying electrical goods on the Internet was that they were cheaper and so people were able to afford more and so the standard of living had gone up, this is a social point, as is the point that the local shop has been forced to shut, putting three local people out of work. The fact that lots of information can be found is not worth credit, the fact that some of that information is about other cultures which may be counter to the local culture and is used by the young to inform their opinions, is an ethical point. Undermining the local religious beliefs would be another, and so on.

There was confusion among some candidates over the distinction between ethical and ethnic, leading some thoughtful candidates to stray from the point.

Question 8

- (a) Some candidates muddled up the relationships. My comment would be that a candidate who does not know the relationship between field, record and file should not be taking an A Level paper. Thankfully, the numbers in this category are low. This particular question, however, went further in that the candidate was expected to relate the answers to the application of the car file. This made the question demonstrably harder. Many candidates decided to write their own question and use the customer file rather than the car file, which was a shame and meant that they could not score in part (a).
- (b) Definitely a top end question, but very well answered by some candidates. The biggest error was in thinking that the record was limited to a specific size, rather than the fields which make up the record.
- (c) Well answered although too many are content to say 'number' rather than being more specific and using 'integer' or 'currency'.

Question 9

The idea of an integrated software package was well understood, although the reasons why the garage would want to use one was not so well understood. Again, candidates have a problem with being able to apply their knowledge to real situations. One situation was given to them in part (b) and proved highly problematic both to describe and explain. Yet all these candidates must surely have used a mail merge. This question was originally aimed at the lower end of the ability range, the expectation being that the majority of candidates would score well, but that was not the case and, apart from the imposition of a particular application, I am at a loss to suggest why it should have proved so problematic.

Question 10

- (a) Well answered.
- (b) Despite being clearly stated on the syllabus that candidates should understand the relationship between the bit rate and the data transmitted, and that the concept of 'the larger the volume of data/time sensitivity the larger the bit rate' being straight forward, this was undoubtedly the worst answered question on the paper, with no more than a handful of candidates scoring more than the mark for the definition of baud. The second part, about the interface, was well answered except by a minority, who, despite being told in the question that a menu-based system was being used, decided that it was not and talked about a different type of interface altogether.
- (c) Well answered, as was expected. There were some rather frightening suggestions of health and safety issues, my personal favourite being 'passive electrocution'.

Question 11

This was meant to be a difficult question and so it proved, although there were some very good answers. The bit that was missing from all the answers was the idea of compression of the data, which seems strange because normally compression is a favourite response of candidates, often in inappropriate places.

Question 12

- (a) This was not intended to be as difficult as it proved to be. All that was asked for was a definition of each, and yet the terms seemed not to be understood.
- (b) The question asked for a method of accessing records in this particular file, not, for instance for the details of an algorithm to access records forced into the bucket by collisions. The hashing algorithm was well done by the majority of candidates who came up with a way of allocating locations to records. Most used six digits, although some restricted themselves to the last three digits. Most were able to describe a way to handle collisions.

COMPUTING

Paper 9691/02

Practical Programming Project

General comments

It was good to find that so many of the projects submitted for this paper were of such high quality. All were well presented, but many showed the candidates' good design skills, good programming skills and thorough testing. The wide variety of topics was also very interesting, most giving the candidates good scope to show their abilities.

The majority were accurately marked. Where there were detailed individual mark schemes plus notes from the teacher, it was very clear how and why marks had been awarded. This was much appreciated by the moderators.

Although this is the third time that this paper has been set in the present form, there are still many Centres whose candidates' work resembles the type of projects asked for in Paper 4. It is not necessary to do interviews with an end user, to find alternative ways of changing a system, nor to evaluate a system. The Programming Project is not about designing a new system, and none of the features mentioned can gain any credit here.

It was good to find that only a very few Centres are suggesting that candidates write programs to solve an essentially mathematical problem. These rarely give a candidate scope to show their ability in programming files and records.

With the best projects it was possible to look at the design and see it reflected in the code. The code was well laid out, and because of the detailed annotation, often on every line, it was clear what the code did and how it related to the design. It is not good practice to write some 10 pages of detailed and clever code if it is impossible to see what the code does without hours of expert knowledge to analyse it.

A major weakness was testing. There were three poor styles. The first listed a set of theoretical ways of testing a program; this is worth no marks. The second gave a very detailed test plan, with expected outcomes, but no evidence of these outcomes. This is worth no marks, unless the teacher has actually seen these results on screen when they can gain a maximum of two marks. The third tested the various validation methods imposed upon the input data, but nothing else. This is rarely worth more than two marks.

What is wanted is a series of tests, set out in a test plan and accompanied by screen shot evidence, that show that all aspects of the program work, and do what the programmer set out to do.

It was difficult to moderate work where the mark sheet was not enclosed with the projects and the moderator had no idea of the mark that he or she was moderating.

Overall the quality of the majority of the projects made them a pleasure to read and examiners trust that the candidates gained satisfaction from the hard work that they had put into them.

COMPUTING

Paper 9691/03

Written Paper 3

General comments

Once again, thank you to the candidates for their efforts in making the presentation as good as they could. It makes the task of examining so much easier for the examiners if the evidence is laid out properly, and it benefits the candidate because it makes it far less likely that some important evidence will be missed if the work is set out properly. There are no indications of the poor presentation which blighted some of the Paper 1 responses that have been submitted this session. It will be interesting to see if these candidates have grown out of the problems by the time they do the Paper 3 next year.

There was general agreement among the examining team that the paper was slightly harder this session. While the candidates obviously will not suffer in their results because of this, it was felt that it was not all the fault of the paper. The problem seemed to be that candidates considered that there were no 'really simple' sections of the paper this year. I would take issue with this as the comments in the main body of the report will testify, but would agree that there were particular areas of the paper which were based on unfamiliar areas of the syllabus and perhaps these turned what should have been very straight forward questions into more difficult ones.

There were a few instances of candidates apparently having time problems, where script responses stopped before the end of **Question 11** for instance. While accepting that this would restrict the marks for those candidates, it was apparent that poor examination technique had been used in the earlier parts of the paper which had taken disproportionate amounts of time. The management of time, in so far as it extends to the ability to be discriminating in responses, is a part of all examination and candidates who have used a scatter gun approach to questions, where they have written down as much as they could think of about a topic on the basis of 'the right answer has to be in there somewhere', cannot be surprised if they do not earn the credit they were hoping for and also cannot be surprised if they run out of time. The worst example in this session was a candidate who wrote a one and a half page essay about banking for **Question 5(a)** which was only worth one mark and the examining team were expecting simple one or two word answers.

There are still a number of candidates who should not be taking the examination. Any candidate entered for an examination who scores a single figure mark is either not intellectually capable of sitting the paper, or has not been properly prepared for what they are going to see. Either way, it is a disheartening experience for the examiners to be faced with their paper and it must be worse for the poor candidate sitting the examination knowing that they cannot answer the questions.

Comments on specific questions

Question 1

- (a) This is an example of what was designed as a simple question to allow candidates to accrue some marks. However, candidates did not find it simple because the terminology was not what they were used to. One examiner commented that the responses were better than when the question had been asked in the past, but that they were not as good as they should be for what are, after all, simple definition questions. The lesson for teachers is that the whole syllabus should be covered and that it is dangerous to try to predict what will be on the paper. The most common response for transparency was that nothing was hidden from the user and that they had control over everything on the network. This was a reasonable guess if you did not know the term.

- (b) Generally considered to be a more difficult question than part (a), but the responses were much better. The suspicion must be that the reason is that this was more familiar territory. Many showed poor examination technique again and did not see, or take notice of, the restriction 'two'. Teachers should by now be aware of the examiners' philosophy that we will try to find the best if an extra option is given by the candidate, but that this does not extend to multiple alternative answers. Some candidates exhibited the Pavlovian reaction so common in the stress of an exam room, where the candidate latches on to a word in the question. Many candidates here saw the word 'components' and described two of the components of the CPU. Although this type of error is expected when candidates sit a paper, this particular error was more common than is usual and lead to an inspection of the question. After thinking about it carefully, I do not think there is anything wrong with the question, and simply urge candidates, as generations of teachers have done before me, to read the whole of the question.

Question 2

Answers were very often superficial. 'Keyboard and mouse' are hardly A Level types of responses. However, they could be considered more preferable to the type of response that decides that the 'RAM should be 512 gazillion bytes because we need to do a lot of word processing'. This type of question does not want candidates to be so specific. To start with changing 'norms' for hardware specifications make such an answer unreasonable while different norms in different parts of the world make such specific answers unmarkable. The examiners are looking for an indication that candidates understand that the requirements of word processing an essay are different from the requirements for streaming a video of a drama production from the server across the terminals on a network.

For a list of the expected responses to this and to all the other questions please refer to the published mark scheme

Question 3

- (a) Well answered.
- (b) Very badly answered. Most candidates were quite happy with part (a) and consequently they must have understood the concept of using a list rather than an array. However, when they got here they went straight back to the array and gave algorithms for that.

Question 4

A surprising number did not identify the data very well, while most were unable to see further than the inevitable 'hacking'. However, most candidates managed to contrive a healthy score from these bare facts.

Question 5

Most were able to give an example of data, though the suspicion was that they hit upon one worthy of credit more by luck than by judgement. However, few were able to explain what made data valuable to that organisation. While agreeing that this is one of the areas of the syllabus which is, perhaps, leaning toward IT, it is on the syllabus and is fairly simple to cover.

Question 6

The best answered question on the paper, with many candidates scoring full, or nearly full, marks.

- (a) Well answered by most.
- (b) There are still candidates who write down that a global variable can be used around the world, but thankfully it has become the exception rather than the rule, and responses were, again, good.

- (c) Because of the type of question, that there must be a distinct difference, it is difficult for the examiners to interpret a candidate's answer in any other way than literally. Consequently, this question does catch some candidates out whose command of English is not good enough to explain the very difficult concepts involved. However, this is becoming rare and the majority of candidates scored well here.
- (d) Well answered by all but those who demonstrated a lack of preparation for the exam.

Question 7

Very well answered with **b(ii)** proving to be a good discriminator at the top end.

Question 8

Many scored full marks in part **(a)** and then struggled in part **(b)**, probably because candidates are not used to being asked why you do not do something.

Question 9

This was another good discriminator. Most were able to give an authoritative answer in **(a)**, though often their authority was based on guessing which way round the answers should be. Very few were able to give the right answer in part **(b)**, the majority giving the answer 64. While understanding where this came from, it is disappointing that candidates at this level cannot answer what is a very simple piece of floating point arithmetic. Some candidates were able to give full and convincing explanations in part **(c)**, and these candidates should be congratulated for their understanding of what is a difficult concept to explain in the stressful circumstances of an examination room.

Question 10

Remember that all parts of the syllabus must be examined from time to time. Candidates are obviously more schooled in BNF than they are in syntax diagrams. The majority did not even bother to attempt a diagram, but instead produced BNF to define a variable name. This is a shame because most students find concepts easier to understand when they are presented in the form of diagrams and this question was aimed at a lower level than the equivalent BNF question would have been, although that is not how it turned out. Some candidates who attempted the diagram failed to use arrows to show an indication of the direction of the flow of the logic.

Question 11

- (a) Very Centre-based. If the candidates had covered the work this was three easy marks, but too often the candidates were reduced to trying to guess from the words what they might mean, with many talking about physically outside and inside the computer for the first and last. Others tried to suggest users such as the technician, the operator and the management. Such guesses, when common across a Centre, lead one to imagine that the work has not been covered.
- (b) Same again. If the work had been covered then candidates were scoring most of the marks, but too often the candidates were back to trying to guess, which some were successful in doing, particularly for the 'manipulation'.

Question 12

This was meant to be a nice finishing question allowing candidates to explore the concept of training using computer systems, and for many that is how it turned out with some very perceptive and high scoring responses. However, for many this was another of those Pavlovian questions. Perhaps candidates were getting tired by now but many candidates saw the word 'implement' and wrote a long answer based on direct, phased...implementation methods.

COMPUTING

Paper 9691/04

Project 2

General comments

This report provides general feedback on the overall quality of project work for GCE Advanced Level Computing candidates. In addition, all Centres receive specific feedback from their Moderator in the form of a short report that is returned after moderation. This reporting provides an ongoing dialogue with Centres giving valuable pointers to the perceived strengths and weaknesses of the projects moderated.

The projects submitted covered a wide variety of topics with better candidates again showing evidence of researching a problem beyond their school or college life. The majority of projects were developed using Access.

In order to have the full range of marks available to the candidate, the computing project must involve a third party end-user whose requirements are considered and clearly documented at all stages of the system development. Centres are reminded that the project work is designed to test the candidates' understanding of the systems life cycle, not just the use of software to solve a problem. The requirements are clearly set out on pages 30 to 34 of the syllabus in 'The Guidance on Marking the Computing Project' section. Also these requirements can also act as a useful checklist, for both teachers and candidates, setting out the expected contents of each section.

Centres are also reminded that candidates should use this guidance for the expected contents of their reports rather than some of the popular A Level textbooks available for project work, which do not cover the full requirements of the CIE syllabus. Candidates who prepare their work only using text books and not the syllabus for guidance may miss out vital sections of their reports; this reduces the marks available to them.

Project reports and presentation

As usual, the presentation of most of the reports was to a very high standard, with reports word-processed and properly bound. However, candidates should ensure that only material essential to the report is included so that there is only one volume of work submitted per candidate. Candidates are reminded that authentic letters from end-users are essential to provide evidence for the Evaluation and Investigation and Analysis sections; these letters must not typed out by the candidate.

It is strongly recommended that the structure of the candidate's report follows that of the mark scheme set out in the syllabus. This allows both teachers at the Centres and Moderators to easily check that work for all sections has been included. Also it is essential that the pages of the report are clearly numbered by the candidate.

Project assessment and marking

Unfortunately few Centres provided a breakdown of marks showing the marks given for each sub-section of the syllabus. Centres are reminded that they must use the mark scheme as set out in the syllabus and also include a detailed breakdown of the marks awarded for each sub-section together with a teacher commentary as to why the marks awarded fitted the criteria for that sub-section. This commentary should include references to the appropriate pages in the candidates' reports.

Centres that provide a commentary are far more likely to have accurately assessed the project work of their candidates.

Comments on individual sections

The comments set out below identify areas where candidates' work is to be praised, or areas of concern, and are not a guide to the required contents of each section.

(a) Definition, Investigation and Analysis**(i) Definition - nature of the problem**

Nearly all candidates described the organisation and the methods used but only the better candidates identified the origins and form of the data.

(ii) Investigation and Analysis

In order to gain good marks candidates must clearly document user involvement and clearly state agreed outcomes. Candidates need to consider carefully the evidence obtained from interviews, observation of the existing system and user documents, and then ask follow-up questions to fill in any gaps in the knowledge obtained about the current system or requirements for the new system. Also alternative approaches need to be discussed in depth and applied to the candidate's proposed system. A detailed requirements specification should be produced based on the information collected. Centres are again reminded that the system proposed does not have to cover more than one area of the business or organisation chosen.

(b) Design**(i) Nature of the solution**

Centres are again reminded that the requirements specification set out in the analysis needs to be discussed with the end-user and a set of measurable objectives agreed. These objectives will then form the basis for the project evaluation. Often, candidates propose data structures and designs for input screens but then forget to provide a detailed description of the processes to be implemented and designs for the required outputs.

(ii) Intended benefits

Most candidates described the benefits of the intended system. However some Centres did not provide evidence for this sub-section so the candidates should not have been awarded any marks.

(iii) Limits of the scope of solution

Some Centres did not provide evidence for this sub-section so the candidates should not have been awarded any marks.

(c) Software Development, Testing and Implementation**(i) Development and Testing**

Evidence of testing needs to be supported by a well-designed test plan that includes the identification of appropriate test data, including valid, invalid and extreme cases, together with expected results for all tests. The test plan should show that all parts of the system have been tested. Again, many candidates only tested the validation and navigation aspects of their system, and omitted to test that the system did what it is supposed to do, thus not being able to gain marks in the highest band for this section.

(ii) Implementation

Again, many Centres marked this sub-section too generously, as high marks cannot be given unless there is written evidence from the end-user that they have used the system and agree with the strategy for implementation. The implementation plan should contain details of user testing, user training and system changeover that have been both discussed and agreed with the user.

(iii) Appropriateness of structure and exploitation of available facilities

It was pleasing to see that most candidates are discussing the suitability of both hardware and software and that better candidates provided a log of any problems encountered together with details of how these problems were overcome.

(d) Documentation

(i) Technical documentation

The standard of work provided for this section is high, with most candidates producing a stand-alone technical guide that includes most of the following: record, file and data structures used; database modelling and organisation including relationships, screens, reports and menus; data dictionary; data flow (or navigation paths); annotated program listings; detailed flowcharts; details of the algorithms and formulae used. Better candidates also included specifications for the hardware and software on which the system could be implemented.

(ii) User documentation

This section was completed to a good standard by most candidates. Centres are again reminded that for full marks the candidate must include an index and a glossary, and the guide needs to be complete including details of backup routines and common errors. Also good on-screen help should exist where this is a sensible option.

(e) Evaluation

Centres are reminded that there are eight marks for this section and in order to gain high marks candidates need to provide a detailed evaluation that includes the content set out in the guidance for marking projects section of the syllabus.

(i) Discussion of the degree of success in meeting the original objectives

It was pleasing to see more candidates considering each objective in turn but not all indicated how their project work met the objective or explained why the objective was not met. Centres are reminded that for high marks to be obtained candidates need to include results from the use of user defined, typical test data as part of this discussion.

(ii) Evaluate the users' response to the system

Again Centres are reminded that this response needs to be clearly provided by the end-user showing that they have used the system, not just reported by the candidate. The candidate should then evaluate that response. Evidence for this section must be original letters, preferably on headed notepaper, signed by the end-user and not typed out by the candidate.

(iii) Desirable extensions

Most candidates identify possible extensions but then sometimes forget to identify the good and bad points of their final system.