

COMPUTING

Paper 9691/01
Written Paper 1

General comments

The standard of the scripts remains very high. The standard of English is very high and the candidates deserve congratulations for presenting their responses clearly. There are two exceptions to this.

One is the reduction of the use of bulleted or numbered answers in candidates' scripts this year which adds a complexity to the response which is unnecessary. The use of bullets allows the candidate to concentrate on the answer points which the question is trying to elicit rather than on creating an intelligible piece of prose. They also allow the candidate to check their response against the mark allocation for the question to ensure that they have provided enough points. The candidate can, of course, still get the answer wrong but at least the loss of marks will not be because they were unable to gauge the correct volume of their response. There are questions where this advice is not sensible but **Question 8**, for example, was a perfect example of a question where the use of bullets would have helped many candidates.

The second example is in the decision made by a few candidates to answer questions in their own order rather than the order on the question paper. While this is not a requirement of the paper it is sensible to follow the order as far as possible, particularly in the second part of the paper where the questions all relate to the same scenario and some of them will lead on from previous questions/responses. Far worse is the decision to answer parts of questions in different orders and in different sections of the script. Questions are specifically intended to be considered as a whole and one part leads into another. Furthermore, the later parts of questions can often be dependent on the answers given in earlier parts and the later parts often rely for their answers on facts given in earlier parts of the question. An example would be **Question 5(b)(iii)** which was intended to be a difficult question, but many candidates made it far more difficult by divorcing it from the rest of **Question 5(b)** and answering the question elsewhere. The sensible candidate realised that the answers given in the other parts of **Question 5(b)** gave the correct responses here. **Question 4**, however, is different to the other questions, requiring different skills in the formulation of the response. For this reason, it seems very sensible to leave this one until the end of the script and to attack it in a rather different way to the others.

An area which would improve the attainment of many would be if they would only read the question carefully. Candidates should be encouraged to underline important words on the question paper – they can only do this if they read the whole thing.

There was no sign of candidates running out of time with most supplying a full response to **Question 10**. Those who did not made it apparent in the rest of the script that such an omission was almost certainly because of a lack of understanding of the question.

Comments on specific questions

Question 1

This was intended as a nice, easy starter question and so it proved.

- (a) Very few candidates had any problems here just stating the simple definitions, which was all the question required.
- (b) If the question stated 'Input' then candidates cannot score marks for giving as the answer to what a keyboard would be used for 'to input data'. Many candidates did not realise that they had to justify the uses in relation to the scenario. The storage was more difficult but most candidates were quite capable of rising to the challenge.

- (c) The question did not ask for the features of a batch processing OS, it asked for a description of what a batch processing OS is. It has nothing to do with the jobs being of similar type, or the volume of data being large, or the fact that data is collected and then processed together at a later time. Many candidates answered this question quite well but many tried to talk about the main bank OS rather than a batch processing OS. The main problem here was that the majority was able to define the different types of OS and also to say what they would be used for but found difficulty in then explaining why it would be necessary.

Question 2

- (a) Well answered.
- (b) Well answered.
- (c) Few candidates failed to give two types of error, or indeed an example of each one. However, the descriptions of the errors often fell short of the standard necessary. For example, a syntax error is not a misspelling of the keyword in a statement. It may be an example of a syntax error but it is not a description. The accepted responses are listed in the published mark scheme for the paper and the attention of Centres is directed to this document.

Question 3

- (a) It is pleasing to report that the proportion of candidates opting for BIOS being stored in ROM is continuing to fall, but the candidates who do offer this as a response is very much Centre based and Centres are asked to ensure that in their teaching they concentrate on the boot program. Another alternative response which has not been prevalent before is the Operating System. While it is possible that the OS may be stored in ROM and in the cases of embedded systems it almost certainly will be, the question was worded in such a way that the response needed to be something which would 'always' be in ROM. The wording was 'which is entirely...' and the only accepted answer was the boot.
- (b) This was much better answered than in previous years. Understandably candidates had more difficulty with the control unit than with the ALU, but Centres should be aware that 'arithmetic and logical processes' could gain no more than 1 mark.

Question 4

- (a) This is the question for which the extra time for the paper was given because it was felt that extra reading and planning time was vital for a good response. To that end it would be more sensible if candidates saved this question until the end of the paper so that they were aware of the amount of time that was available to them before they started to answer it.

The main problem at the moment is that a significant proportion of the candidates simply copy out the facts that are given in the question. This will not gain them marks. The point of the question is for the candidate to show that a complex set of conditions can be arranged into a logical set of steps rather than facts.

- (b) There was a poor response to this question, with candidates giving generic answers referring to things like 'the interface must be fine/striking or the operator will get bored' or 'the interface should include some games...'. Such responses were not accepted. Instead of saying that graphics could be used to show the depth of the water in diagrammatic form, candidates were saying the interface should be graphical user interface.

Question 5

- (a) Well answered, although too many got the order wrong and also forgot the start pointer.
- (b) Part (i) was fine and many candidates went on from that to give an advantage and a disadvantage in (ii). These were standard responses, but when (iii) came most candidates were unable to answer sensibly because, apart from the fact that the list is a dynamic structure, there was not a standard response for them to make. The answer to this question relies on the fact that the list is always, whether reading or writing, started from the same end, as is a stack and that consequently they mirror each other.

Question 6

This was very well answered in the cases where a diagram was drawn to accompany the explanation. However, candidates who relied on their descriptive abilities in prose invariably scored few or no marks. Common for the written description was that for a bus topology 'computers are connected to a single wire/linear wire'. This is not accepted because the wire could well be in a loop. Descriptions like this are very difficult to get right because they must discount any possible alternatives. Centres should encourage the use of diagrams to illustrate, or fully answer, questions.

Question 7

- (a) The capturing and editing of the picture were well described, though simply saying that it is edited is not enough. However, that is where most candidates stopped. There were few who described it being pasted into software together with the customer details and barcode and then printing it off altogether. Most described it being printed and pasted onto the card, which is very different.
- (b) The first part was aimed at a middle ability candidate and that is how it worked out, while the last part was accessible to all.

Question 8

Some candidates answered this very well while others decided that it was about the data protection legislation which so many questions have been about in the past. While past questions are obviously useful in preparing candidates for the examination, candidates need to ensure that they are not simply substituting the question that they want to answer for the one that is actually asked.

Question 9

Candidates who had been taught about operational/condition driven/strategic information found little difficulty here, while those who had not found the question understandably challenging.

Question 10

- (a) This was very similar to **Question 9**, in that candidates who had been taught the different maintenance requirements of an operational system found these to be 4 easy marks; those who had not, found it difficult to formulate an answer with backup and archive being a common incorrect response.
- (b) It is a pity that the almost universal response here was that advances in hardware and software were happening all the time and because there would be something new on the market, it had to be bought and the old one thrown away (despite the fact that there was probably nothing wrong with it and it was working perfectly). In reality, a commercial organisation needs more than this to prompt them to spend a lot of money on producing a new system, which once again will be full of bugs just like the previous one was to start with. The reasons need to be sensible, and commercially supportable. On a more general note Centres may find it useful to spend a lesson discussing the needs/desires to continually update such systems. A good analogy to use is something in the home, for instance a cooker. When was the last time the family bought a new cooker; the companies bring out new models every year? When it was changed, what were the reasons for spending all that money, was it because the old one was broken, or the supply of fuel changed forcing a new model to be bought? Or was it because it was a newer version?

COMPUTING

<p>Paper 9691/02 Practical Programming Project</p>
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The number of very good pieces of work seen by the Moderators increased considerably in this examination session.

Most candidates produced projects based on a suitable problem, showed clearly their design ideas and followed those ideas into their programming. Their program code was well laid out, and it was clear to any reader what the code did. This was partly accomplished by the well-structured layout, but also by the many comments attached within the code.

Candidates' testing was thorough and showed that the code did what was required in solving the problem. The whole report should take no more than 30-40 pages.

It is still disappointing to find Centres where the guidelines are completely overlooked. The main causes for concern are those Centres that still send in projects that follow the syllabus for Paper 4. It is unlikely that such projects can pass as they contain very little programming.

A few Centres send in projects of 200 or more pages. This is unnecessary and almost certainly the candidates have taken more time than they needed on this one subject area.

The main concern is the lack of annotation within the program code. It is too common to see pages of detailed program code which is almost indecipherable. It is doubtful that the candidate would be able to say what the code does within a few months of writing it. It is essential that the code is annotated with more than the occasional comment at the beginning of a block of code. It needs to be understandable and maintainable.

Even more unfortunate is that a number of Centres give full marks for programming development when the essential aspect of the majority of the marks is for the annotation which is not present.

Generally though, the marking is accurate and many of the projects are a pleasure to read.

COMPUTING

Paper 9691/03
Written Paper 3

General comments

The work of almost all candidates was well presented and understandable. Responses showed little or no confusion caused by language use. There was no evidence of any candidates having time problems and the examining team thought that the paper had been equivalent in difficulty to those of previous sessions. The questions were fair, were all directly related to the syllabus and there seemed to be a good mix of relatively easy questions with others which were gradually more challenging.

There are still a few candidates who score single figure marks for the paper, despite there being plenty of marks available for less able candidates. This raises a question as to what possible educational value a candidate who is so poorly prepared for the paper can get from the experience. Indeed the whole experience must be truly dispiriting for the candidate. Happily, the vast majority of candidates produce admirable responses and there are many scripts that are truly outstanding, showing a maturity and an understanding of the subject matter beyond the candidates' years.

There was a feeling that some of the candidates do much of their learning by studying the answers to previously set questions and then regurgitating them as though the mark scheme has been learned by rote. Such a strategy rarely works as the questions do change from session to session and although some points may be common to questions and these points may be earned by the candidate, many others are not. The candidates using this strategy are demonstrating a lack of understanding of the subject matter and it is hardly surprising when the results of their efforts are poor.

Comments on specific questions

Question 1

This question was intended to be the easy starter question which would settle the candidates down and calm some nerves at the start of the assessment and so it proved for many candidates, whose understanding of the advantages of relating tables in a database structure was very good. It was surprising, then, to see so many responses where the candidate scored 1 out of 3 for **part (a)** and full marks on **part (b)**. Most were able to say that a flat file was a single table/file, but a lack of good exam technique then made candidates ignore the fact that there were 3 marks available and that they had only said one thing about a file. The other two marks were trivial points, for example simply to say that it was made up of records and fields; this is certainly lower level knowledge than would normally be required for this paper but it was the starter question. Centres are advised to ensure that all candidates are coached in the necessary techniques of taking an exam otherwise they are not going to do themselves justice.

Question 2

Most candidates were able to score well here, though the question proved a good discriminator at the higher marks. Most candidates were happy to pick up the marks in **part (a)**. However, the need to relate the choice which the candidate had made to the medical centre system proved more difficult. As usual, the introduction of another level of difficulty by having to relate points to a scenario made the question suddenly more demanding. **Part (b)** caused problems among candidates who had the wrong concept of the Internet. There was an unexpectedly large number of candidates who suggested that it would be costly for the medical centre to 'make an Internet'. However, most understood the concepts and earned a typical 2 or 3 marks, though many could have earned more, but for the poor exam technique being demonstrated. For example, there were relatively few who answered in the form of bullet points, or numbered points, a method which is of assistance to candidates.

Question 3

Most candidates scored well in what was a fairly straightforward question. The only difficulty in **part (a)** met by candidates who insisted on giving unrealistic sensors, 'dirt sensor' being the most common. There were lots of examples for candidates to choose from, the full list of accepted responses can be found in the published mark scheme, to which the attention of Centres is directed. The point about the robot working in real time was that decisions need to be made in real time because the environment in which it is working is a real time environment. Most candidates managed to say something sensible about working in real time but only the most able candidates realised the importance of the working environment.

Responses to **part (b)** suffered either from being trivial (such as 'a machine to wash plates') or from candidates giving two reasonable examples which, in essence, were the same.

Question 4

Most candidates scored very well here. It was common to see full marks in **part (a)**. Those candidates who used the examples from **part (a)** to explain the connections scored well in **part (b)**.

Question 5

(a) This was a very good discriminator. The question rubric did give indications as to how the response should be structured and the better answers tended to follow that lead. Some candidates were obviously floundering, having little or no idea as to the meaning of 'standardisation' and consequently they were unable to offer any sensible points. However, some candidates were able to write lengthy, cogent responses, full of good points that showed a deep understanding.

(b) This possibly proved to be the hardest two marks on the entire paper. In retrospect, it may well have had to do with the asking of a negative, which candidates do find difficulty with. Having said that, it was not a specific negative like '...not...' and it was the other side of the coin to a question already asked about the positive points of standardisation. It is also a very important idea, that candidates should be aware of, that standardisation does have its downside.

Question 6

Some candidates are still prepared to state that a program counter 'counts the number of programs'. A basic understanding of the requirement for the processor to have a fetch execute cycle should mean that a candidate cannot make this mistake, and a basic understanding of the fetch execute cycle is surely the minimum that should be expected of an A level candidate. Having said that, the question quite specifically did not ask for a description of the cycle, in fact it specifically ruled out the need for such a description. The candidates who approached the question in this way were not only going to earn very few marks but they were demonstrating that they had no understanding of the concepts, just a generic answer which had probably been rote learned; not acceptable at this standard particularly for such a core concept.

Question 7

The majority of candidates scored full marks or close to it. Those that did not, either became confused by failing to find the precision of expression needed to explain the concepts in a vacuum, or failed to use the example which had been given, a full working of which would earn full marks.

Question 8

This question was well answered by most candidates, **part (a)** being surprisingly less well answered than **part (b)**. **Part (b)** tended to be very Centre based with candidates either scoring 6 marks or nothing at all. Some candidates seemed to have the basic idea but then gave as their answers FIFO and LIFO and then tried to justify them.

Question 9

This question was very poorly answered. In **part (a)** candidates seemed to ignore the fact that the question specifically asked for an explanation of '...how' errors were spotted during compilation. This is a high level question and the responses from the candidates supported that view. **Part (b)** was slightly better answered except that many decided to start from the beginning and wasted a lot of time going through the whole compilation process.

Question 10

Three types of answer were seen here. There were many candidates who could not offer a sensible response and the supposition must be that this was the first time that they had seen this type of question. Then there were the candidates who obviously had some idea and tried determinedly to try to explain in prose what they were thinking; these candidates tended to earn some of the marks. Then there were the few who used the example expressions `fresh(x)`, `salt(x)` and `eats(x,y)` which were supplied in the question to illustrate their thoughts. These candidates tended to score well.

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 the 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. These requirements can also act as a useful checklist, for both teachers and candidates, setting out the expected contents of each section.

Again Centres are 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; or complete unnecessary work e.g. feasibility studies and costings.

Project Reports and Presentation

As usual, the presentation of most of the reports was of 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 be 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 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. These comments are not a guide to the required contents of each section.

(a) Definition, Investigation and Analysis

(i) Definition - nature of the problem

Most 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. 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 reminded that candidates do not need to research the history or structure of the organisation 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

Candidates should describe the benefits of their intended system, not just a list of general statements that could apply to any system.

(iii) Limits of the scope of solution

Candidates should describe the limitations of their intended system, not just a list of general statements that could apply to any system.

(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. Yet 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

It was pleasing to see more candidates providing a detailed implementation plan that contained details of user testing, user training and system changeover. However for top marks to be awarded there should be evidence to show that this has been agreed with the user.

(iii) Appropriateness of structure and exploitation of available facilities

For good marks here candidates need to discuss the suitability of both hardware and software. They should not just provide a list. Also as well as the log of any problems encountered together there should be details of how these problems were overcome.

(d) Documentation**(i) Technical Documentation**

The standard of work provided for this section is high.

(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 how to install the new system, backup routines and a guide to common errors. Good on-screen help should exist where this is a sensible option.

(e) Evaluation

Centres are reminded that there are 8 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. Many candidates provide scant evidence for this section; if this is the case then there are few marks that can be awarded.

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

Candidates need to consider each objective set and explain how their project work met the objective or explain why the objective was not met. This exam session it was pleasing to see more candidates including 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 from the end-user showing that they have used the system, not just reported by the candidate. The candidate should then evaluate their end-user's response. Evidence for this section must include 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 do not always identify the good and bad points of their final system.