COMPUTING

General comments

Once again, the presentation was excellent. Candidates seemed to understand the requirements of the questions and were able to produce sensible responses despite the fact that most are working in a second language. This continues to amaze the Examiners and we offer the candidates our congratulations for their efforts. There are occasions where the Examiners find difficulty in understanding the meaning of the response supplied, but we are confident that no candidates suffered because of a lack of English to express themselves. The examining team do try to ensure that candidates are credited for all the correct things they say rather than penalising them for any errors that they make.

Judging by the responses from the candidates and the lack of any comment on the discussion forum, there were no problems caused by cultural or social problems arising from the question material. This is something that we strive for every year but inevitably sometimes questions will be unfair for some candidates who come from particular cultures, but this was not true this session.

There was no evidence of candidates suffering from time problems, the final question being particularly well answered by most candidates.

All questions, even the ones that proved to be difficult, attracted the full range of the available marks from zero to maximum. The attention of Centres is drawn to the published mark scheme for a list of the expected mark points for each of the questions.

Individual questions

Question 1

(a)   Well answered except for the storage device. It was not enough to state that it 'stored data' as this is just a reworking of the words in the question.

(b)   When you consider the wide range of possible answers, the fact that the vast majority of scripts only mentioned laser, inkjet and dot matrix was disappointing. However, some distinctions were not accepted. 'Colour printer' and 'Black and white printer' were not acceptable as this describes the output rather than the type of printer. It would be nice to see some variation in future, particularly to include something like a Braille printer because the output is so different, being three-dimensional, not just visual.

Question 2

(a)   Well answered except for the desire to use 'character' as the data type rather than text or string. Character is used for single characters, like 'M' for male.

(b)   Too many candidates talked about fixed length files rather than records. This distinction is an important one and one that is not well understood by candidates.

Question 3

The wording of this question is very important. It should not cause any trouble, because it is quoted directly from the syllabus. However, most candidates found that focusing on the requirements of the question was very difficult. This is about work expectations, not about what the computer can do and certainly not about shopping on the Internet or about having more leisure time – that is 'leisure expectations'. A typical answer would be 'Work timings are less rigid and so that means that the worker can take time off when they want to in order to be with their children'. This is about leisure. 'Work timings are less rigid and so that means that the worker can job share more effectively' is about work expectations and hence is worthy of credit.

Question 4

(a)   This was very poorly answered. Most candidates seem to be unaware of the requirements of a dry run. A similar question was set recently and the same comment was made in the Examiner report. The form that the response should take can be seen clearly in the published mark scheme.

(b)   Well answered, although X=10 was often wrongly given as the condition in (i).

(c)   Similarly this was well answered except for the condition being set to 25 rather than 30.

Question 5

(a)   Menu based interface is becoming well understood, although there are still candidates who confuse it with a form based interface and also some who believe that because a GUI can have drop-down menus, it is a menu-based interface. Natural language is not very well understood and would be a useful topic for the attention of Centres.

(b)   Well answered.

Question 6

(a)   This should be the easiest four marks on the paper, but there are still an unreasonably high proportion of candidates who are not able to distinguish between the four types of transfer, many of the better candidates even getting side tracked into complex descriptions of packet switching and circuit switching.

(b)   Much better answered than in the past. The difficulty of explaining such a complex concept in a second language seems to have been overcome by the majority of candidates who are showing an understanding of the concepts rather than trying to produce a standard, rote-learned, response.

Question 7

There are basically two types of question that can be asked about an expert system. One is to ask for a description of a generic one and the other is to explain how a specific one can be used. This is an example of the latter, although most candidates simply described a generic expert system. The Examiners imagine that it was the use of the geological survey as the example that caused most problems for candidates, although it should not, because such an example is specified in the syllabus.

Question 8

(a)   The vast majority simply stated two diagrams that might be used in producing a solution to a problem. Responses that included a consideration that the question was about producing a website and correspondingly altered their responses, were rare.

(b)   Most answers were about user and technical documentation, despite the question clearly stating that it was about user documentation. The question also indicated the need to think of the two types of user of a website. There is the owner of the site who will need to carry out amendments like changing prices displayed on the site and the visitors to the site who may well need instruction as to how to use the site or fill in an application form, but would not have access to a printed version of a document and hence it would need to be on-screen. This distinction was not widely understood.

Question 9

Most candidates scored for the two formats, but the question did ask for descriptions and there were two marks available for each and very few candidates gave any further information which would have deserved the second mark in either case.

Question 10

A good discriminator with most candidates being able to pick up 2 or 3 marks, but only better candidates being able to gain all the credit.

Question 11

This concept is not understood very widely, despite similar questions being asked in the past. The problems are firstly that candidates do not generally understand the difference between bit-rate and the speed of transmission of data. The second problem is that candidates naturally imagine that the size of the file is the important thing to be considered. While this has a bearing on the answer it is actually how the file of data is going to be used that is important. Imagine the largest possible video file that needs to be transmitted and it is to be sent across a communications medium with the smallest imaginable bit rate. Does it matter? The answer is 'No' unless it makes a difference as to how the file is to be used. If the video is simply going to be stored for use in the future then it can take as long as it needs to download.

Question 12

This was intended to be one of the easier questions. It was put at the end of the paper in order to make sure that there was something for less able candidates throughout the paper. **Part (a)** was well answered by most but it was surprising to see the number of candidates at this level who mixed up validation and verification. It was also disappointing to see how many suggested that the purpose of these methods of checking was to ensure that data input was 'correct'.

COMPUTING

The quality of the majority of the projects that were seen by the Moderators was very high.

Many were a pleasure to read, with thorough explanations and designs, clear, understandable coding and clear proof that the programs worked. The problems that were solved were varied and interesting.

These projects gave the sense that the candidates knew what they were doing, and could write and document their programs well. The programs would be easy to maintain and reusable in other contexts.

Overall the marking of the projects was good, with most Centres having their marks agreed by the Moderators. Thank you to all those Teachers involved.

Where the Moderators disagreed with the Teachers' marks, there were three main reasons.

The coding was sometimes overmarked, as it was poorly annotated, and difficult to follow.

The testing was not thorough, or no evidence provided, and disappointingly there were still some projects that dealt with system development, and not program development.

Overall though, the quality of the projects submitted for this paper is very high, and all the candidates must be congratulated on this.

COMPUTING

General comments

The paper did not seem to contain any problem questions. Obviously some proved more taxing than others but all questions elicited marks ranging from zero to maximum and almost all the points on the mark scheme were offered by at least some candidates. The attention of Centres is drawn to the published mark scheme for this paper to understand the expectations of the examining team.

The paper was of an appropriate length, there being no evidence of any candidates having time problems. The responses to the final question were in line with the quality of the responses for the other questions.

There appeared to be no issues caused by cultural differences adding to the difficulties of questions. At least, there were no obvious examples spotted by the examining team and no problems have been forwarded to the Examiners by Teachers on the discussion forum.

The candidates' ability with English continues to impress the Examiners and the team are confident that with very rare exceptions candidates were not penalised because of a difficulty with the language of the paper or of their scripts. Indeed the presentation of the work continues to impress: Responses are sensibly numbered; every effort seems to be made to make it easy for the reader to find the evidence and bullet pointed evidence is increasingly offered in responses. This is an excellent form of response for many of the questions because it allows the candidate to present their evidence in a realistic way and also makes the task of the Examiner easier. Such forms of response are to be encouraged along with appropriate use of diagrams, anything that makes it easier for the candidate to show the Examiner how much they know about a question.

A final word to the teachers who prepare their charges for the examination: Thank you for your efforts, the standards of presentation and of knowledge have improved considerably over the last few years and ultimately it is down to you and your efforts. Examiners feel sure that most candidates do not offer their thanks, but it is an omission that should not be made and Examiners offer it here on behalf of all the young people you have prepared for the examination.

Individual questions

Question 1

This was intended as a nice gentle starter question but it has ended up as a good discriminator. Only more able candidates scored maximum marks and there were a surprising number who could only mention one facility. One problem that candidates had was that some saw the question asking for facilities of email systems and gave lots of information. Unfortunately, they failed to see the second half of the sentence, which qualified the number of suitable responses. With a topic that is so open ended as this there will almost certainly be a qualifying statement in order to restrict the range of possible responses.

Question 2

(a) This proved surprisingly taxing for most candidates. Object-oriented was reasonably well answered, but declarative caused most candidates to revert to saying that they were languages where the variables had to be declared at the start of a program.

(b) Perhaps it was the term 'stepwise refinement' that put people off. Had the question asked about top-down approaches then past experience says that all candidates would score full marks. This term is used in the syllabus.

(c)   In the past, the tree question has been worded so that the candidate had to create a tree from given data. The Examiner would have thought that this way round was harder, but no, most candidates scored really well here, whereas when asked to do the example all sorts of errors creep in. Note that the form of the algorithm was irrelevant to the success or otherwise of the response.

(d)   A really good discriminator, with able candidates scoring full marks, weaker candidates managing two marks by describing the two words 'linker' and 'loader' and others not offering answers.

Question 3

(a)   Many candidates strayed from the concepts surrounding ecommerce and described working from home and video conferencing and all the other topics around this subject. Those who remained focused scored well.

(b)   Some very good responses, but most candidates were only able to mention cost cutting by reducing staff and premises.

Question 4

This question was answered particularly well. There were the occasional problems with the ER representations and particularly with secondary keys, but it was evident that most had used these concepts in their practical work and consequently were working from experience rather than simply from the point of view of theory. As would be expected, the essay type of question in **part (d)** proved a good discriminator. Although most candidates chose to answer this in prose form, it was a good example of a type of question which lends itself to the response being presented in the form of bullets or numbered points. Candidates should be aware that there are no marks to be gained for using excellent prose.

Question 5

(a)   The definition was well known.

(b)   Most candidates answered these two situations well, although weaker candidates were not able to explain the Jump instruction.

Question 6

Candidates tend to find this sort of question difficult. The question is asking for some explanatory work to be done rather than a simple production of learned facts.

(a)   These are fairly straight forward tasks; surprisingly, the one that caused the problems was the sign and magnitude representation.

(b)   Candidates struggled to explain the two terms which is surprising because they are simple definitions, although perhaps it is the inclusion of the words 'floating point' which worries candidates so much that they are put off making a serious attempt at the question itself. It was obvious from the responses given that many candidates were unaware that there are a number of floating point representations for any given value, only one of them being the normalised version. Out of all the questions on this session's paper, this one was the one that pointed to a need for the topic to be looked at again and to consider how Teachers teach it. Examiners have said before in these reports and also on other forums that if the topics that candidates find difficult can be turned into diagrams then it suddenly becomes more accessible. There were very few candidates who tried to draw column diagrams as part of their explanations. Without these it was very difficult to formulate a convincing argument as to why the number represented was 10 ¾.

Question 7

(a)   Many candidates were able to gain most of the marks. Again, this was a question where a little sketch of what a Gantt chart would look like, with a few labels would earn all the credit. The Examiners thought that candidates would find no difficulty here as they almost certainly drew one of these diagrams as part of the documentation for their projects.

(b)   Similarly, candidates must have produced a user guide for their project; so this question should have been well within their experience. It was disappointing that a significant proportion of candidates seemed unable to describe what they had produced.

Question 8

A difficult question. This was intended to be aimed at the more able candidates as it not only required knowledge about simulations but also needed that knowledge to be applied to a given situation. It was encouraging to see not only some very impressive responses but also to note that even less able candidates were able to give an account of themselves and earn some credit here.

Question 9

Very well answered by most candidates. However, most could have done better. The typical answer consisted of a prose explanation of interrupt handling, most of which made sense and was credited accordingly, though not in full because not enough points had been made. This sort of question is asking for a series of points to be made and a sensible response will have a list of bulleted or numbered points. The candidate knows from the examination paper that there are 6 marks for the response and hence 6 points must be made, if the response is in prose form it is very easy to lose sight of the number of actual points that have been made.

COMPUTING

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. Most of the projects seen were developed using Microsoft 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 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; or complete unnecessary work, such as feasibility studies and costings.

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 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. Essential evidence should not be relegated to appendices. This allows both teachers at the Centres and Moderators to check easily that work for all sections has been included. Also, it is essential that all 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**

       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. 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 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. Many candidates proposed data structures and designs for input screens but then forgot 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.

       Full marks for this section cannot be awarded without candidates supplying evidence for (i) and (ii).

(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 the 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, not just provide a list. As well as the log of any problems encountered, there should also 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. Also good on-screen help should exist where this is a sensible option.

(e) Evaluation

Centres are again 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 identified possible extensions but did not always identify the good and bad points of their final system.