COMPUTING ADVANCED LEVEL

Paper 8959/5216

Computer Systems, Communication and Software

General comments

The paper worked well at discriminating between candidates of differing abilities. All questions attracted the full range of marks available, so no marks were inaccessible to all candidates.

The questions appeared to be fair and were unambiguously worded. There were questions, notably 3 and 9, where candidates wrote down everything that they knew on the topic and then found themselves in the uncomfortable position of having nothing to say in later parts.

The use of proprietary brand names, particularly for software suggestions is beginning to creep back into responses and should be stopped. Examiners do not penalise this except to the extent that such responses are not worthy of credit. On a similar tack, there were many candidates who failed to answer much of the second half of the paper within the context of the oil exploration scenario. Hospitals, banks and even chess playing were used as examples rather than the scenario given and could not gain the marks available. Centres have to use example applications in their teaching but candidates should be aware that other scenarios exist which are sensible and that the scenario used in the examination paper is unlikely to be the one that was used when they were being taught.

Some candidates appeared to run out of time although it is possibly a failure to be able to respond to the later questions rather than a lack of time. Some candidates spent too long attempting the algorithm question and this made them short of time towards the end of the paper. It is important that candidates understand that some of the skill in sitting an exam paper is exam technique and these candidates were demonstrating a distinct lack of that technique. The advice with the algorithm question is that it should be attempted at the end of the examination, or the candidate should restrict themselves to the extra half hour that was the time which was allocated to the question when it was introduced.

Comments on specific questions

Question 1

(a) Mainly well answered. Some candidates simply said that a form-based computer interface has a form. This is obviously not worthy of credit and candidates should beware of simply copying the question down as the answer. A full set of acceptable responses is available to Centres in the published mark scheme to which their attention is drawn.

(b) Too many 'drawing' applications were given without a justification. The form-based application was better answered despite the fact that it is actually the more difficult one.

(c) The question asked for the hardware and software of the HCI, not of the entire computer system. When considered in context there is only one acceptable response for each.

Question 2

(a) Well answered, though a significant number failed to add the leading 0 and some candidates put the 0 at the wrong end of the number.

(b) The question was clearly about stock control in a warehouse. It had nothing to do with POS or prices or sell by dates. Whilst some of the marks were available if a candidate answered in this way, they had not read or answered the question as printed on the question paper.

Question 3

(a) Well answered, although a single line of answer was all that was expected some answers went on for half a page.

(b) Many candidates do not realise that programs/OS are data.

(c) Software is not stored on ROM so that it is on there when the power is off. It is stored on ROM so that it is there when the power is switched on. These are two very different things!

The second part of this was considered the hardest question on the paper. The answer relies on candidates understanding that instructions can be given to the washing machine and that the processor cannot use ROM only RAM.

Question 4

(a) Well answered.

(b) Many described the entire systems life cycle. Others described as many information collection methods that they could think of. These responses did not answer the question. Very few mentioned the other elements of the analysis stage.

Question 5

Well answered.

Question 6

Very poorly answered. The algorithm question on this paper was intended to be more difficult and so it proved. Very few were able to demonstrate an ability to use the basic structures of language that are expected by the syllabus and most were content to either use IF (both wrongly and with the incorrect structure for the statement) or to copy down the question or to use long wordy prose statements. The Examiners are not looking for perfection, this is a difficult question, but they did expect some type of recognisable algorithm from the candidate.

Question 7

(a) Quality of answers was very much Centre based. Either almost all the candidates got 5 or 6 marks or they got very few.

(b) Candidates must read the whole question including the scenario. This one clearly describes the oil exploration scenario. It also states that the rest of the questions refer to this information, hence it is important to relate this answer to the scenario given, not to medical diagnosis.

Question 8

(a) Answers were very poor. The answers just gave the normal hardware for a computer system. This question must be answered in terms of the data collected at the survey site and then sent to head office. There is nothing in here about any processing at the site or communications from head office or the need for electronic mail. In essence this is a data logging example.

(b) The plotter was poorly answered probably because it was out of the experience of most of the candidates. The second part is a standard question on output formats, straight out of the syllabus, yet it was poorly answered. Candidates who read the scenario were even given ‘numeric’ in the stem.

Question 9

The responses to **(a)** and **(b)** were confused. Again, this is lack of exam technique. The first part asked for basic definitions of the processes while the second referred to context. The backing up of data is not done by the company in case the head office burned down, it is done because the data is valuable, because it would cost too much to do all the site surveys again, and so on. The answer must be in relation to the question.

Question 10

(a) The scenario told candidates that the data was numeric, so candidates should have used this in their answer. Many did not.

(b) Well answered by many.

Question 11

(a) For students who were aware of parity checking this was an easy 4 marks.

(b) Very poorly answered. Most candidates talked of check digits or of adding the bits. This whole area of error checking techniques is a relatively simple part of the syllabus but is very poorly answered.

COMPUTING ADVANCED LEVEL

Paper 8959/5215

Practical Programming Project

The number of good and very good projects increased this year. Many were more realistic in terms of the problem they were trying to solve. Many had clear indications of where the programming skills were to be found, how the programming style was developed, and with enough annotation within the coding to make it very clear just what the program was doing. More, also, were less than 30 pages long and not bound in hard covers, which are best kept for the return of the project.

The accuracy of the marking also improved, but there were some common concerns.

A common problem is where a Centre gives all the projects a high mark, but only one of the projects has any annotation. The differences are clear, and many of the marks for this project depend on the coding being well annotated.

Another concern is the Centres where Database Application Software, such as Access is used. The candidates use wizards and auto code to produce their files and screen layouts, but are credited with the design and programming marks as if they had done the work themselves. In this project Examiner are interested in how well the candidate can design and test a program they have written, not how they can use Access.

There are also, sadly, Centres where the candidates enter work under the heading of Paper 2 when the contents all indicate that they are following the Paper 4 requirements. As there is so little programming in their work, it is not possible to do well on this paper when that sort of project is entered.

Overall, though, more Centres this time had their marks agreed by the Moderators, and more Centres gave us comments as to where the marks had been found. Examiner thank all those Teachers and hope that the quality will continue to rise.

COMPUTING ADVANCED LEVEL

Paper 8959/5218
Further Systems and Software

General comments

There were too many candidates who had not been adequately prepared for this examination. The difference between this paper and 5216 is that this paper expects many of the answers to be given in context and the questions are considerably harder than their counterparts in 5216. It becomes apparent when marking responses from many candidates that they will fail to acknowledge the real question and will try to respond to their own interpretation. For example, **Question 1** was clearly about system implementation in a specific environment. The 5216 version of the question would be the generic explanations of the different methods and the accompanying advantages and disadvantages but in this question the whole answer needed to be designed around the bus company which many candidates failed to do. **Question 7** asks how a variable is dealt with by a compiler. Most candidates were happy to ignore that and just wrote down the material that they had been told to learn. This rote learning and the reproduction of what is learned is simply not appropriate to the questions that a candidate can expect to meet on this paper.

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. The basic work is taken straight from the ***Section 1*** syllabus, which is repeated in ***Section 3*** around the basis of applying the generic information to real situations. Very few of the candidates treated this as any more than a generic response question and consequently the marks awarded were very disappointing.

Question 2

This question was a good discriminator with lower ability candidates being able to pick up some marks because the concepts were obviously known but only the better candidates were able to produce a suitable link table between TEAM and PLAYER. Many candidates did not label the tables correctly but insisted on placing an ‘s’ at the end of TEAM in order to make it plural.

Question 3

Candidates picked up marks for generic answers about the Internet where the remarks were appropriate to the question. Once again, there were few who limited their responses to the uses which the Internet could be put to by the souvenir business.

Question 4

There were two aspects of the question which most candidates ignored. The first was that the question was asking about working patterns and the second was that it was about the use of computerised communications. The majority of candidates simply came out with the same ‘advantages and disadvantages’ of technology in the work place. Responses such as this are simply not appropriate to this level of qualification which asks questions with a much restricted focus. Centres are advised to study the acceptable responses which are published in the mark scheme for this, and all other questions.

Question 5

(a) Well answered. There is an issue with some of the names being suggested but as long as the meaning was clear the candidate did not suffer for producing a non standard response.

(b) The problem is simply that those candidates who understand about interrupts tend to think that the interruption of the present task is automatic and few candidates understand the process of prioritising tasks. There were, however, some exemplary answers to the question and Centres should be congratulated whose candidates had this deep understanding and also for being able to put such complex ideas across to their students. This was not an easy question.

Question 6

Part (a) was almost universally answered correctly while **part (b)** was poorly understood. Some candidates tried to copy the original algorithm for producing the tree in some way, but this did not answer the question. Others had learned the different traversals off by heart and simply chose one, almost always choosing the wrong one.

Question 7

This was very poorly attempted. The question expected the candidate to be able to talk, not about the whole process, but about how the process affected one important part of the code. This question, as much as any other, showed the difference in expectation between the candidate and the Examiner. Candidates should realise that at this level the simple regurgitation of knowledge is rarely appropriate.

Question 8

(a) The question included the requirement 'Using an example application', many candidates simply ignored this.

(b) Some easy marks to pick up here. However, most candidates think that simply because it is parallel processing it is going to be necessary for everything to be super-sized. It is not necessary to have large storage for instance. Not all parallel processing examples use a lot of data.

Question 9

Very poor. Yet again, many candidates simply produced an account of the place of the MAR and what it needs to store. Candidates were awarded appropriate marks but most were unable to say what the contents actually were that were being stored.

Question 10

Most candidates were unable to score any marks for this question. This is clearly a fundamental part of the syllabus, and is not that difficult. The first part of the question only asked for the column headings, the failure to be able to do this simply pointing to the conclusion that this work has simply not been covered.

Question 11

There were many Centres where every candidate was able to score close to full marks, while there were an equal number where the concepts simply were not recognised.

Question 12

As with **Question 11**, candidates from some Centres scored very well while others were floundering and suggesting that algorithms should be used.

Question 13

This was not a question about ring and bus networks. It was however a question about ring and bus networks being used in the example application given. The question carefully drew a picture of a scenario where it was necessary to network machines and yet very few candidates took any notice and once again just produced the standard answer that would have been appropriate to the generic question.

COMPUTING ADVANCED LEVEL

Paper 8959/5219
Programming Project

General comments

This report provides general feedback on the overall quality of project work for the Diploma in 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.

Centres are again reminded that the programming project must involve the use of an object-oriented programming language and may also involve the choosing and installing of hardware. Centres are also reminded that candidates need to identify opportunities to develop and deploy a limited set (5-6) of library elements in their solution. Also the project work is designed to test the understanding of the systems life cycle, these requirements are clearly set out on in the syllabus. The guidance on marking projects in the syllabus can also act as a useful checklist setting out the expected contents of each section.

The selection of an appropriate problem by the candidate is extremely important, as the analysis, design and implementation of a computerised system should always involve consultation with a user, ideally a 'third party' user throughout the development of the system.

Project Reports and Presentation

The presentation of most of the reports was to a very high standard, with reports word-processed and properly bound. However, the use of proofreading and a spell checker is to be recommended.

It is recommended that the structure of the report follows that of the mark scheme, this gives a clear outline as to contents for the candidates to consider and also aids the assessment by teachers and moderation of the work.

The use and development of library elements, set out in the separate sections required in the report, is essential to the object-oriented approach required for this component. Unfortunately, this session only two Centres had ensured that their candidates had made good use of library elements and followed this approach.

Candidates can use library elements in different ways they can make use of pre-prepared libraries e.g. a library of date functions, they can identify new functions that the wish to use and either customise an existing library by adding new functions to it or set up a separate library of functions that is required for this particular system.

Project assessment and marking

Most assessment by Centres was too generous, particularly where there was no evidence of user involvement and no evidence of the use of library elements in the candidate's report.

Centres should use the mark scheme set out in the syllabus and include a detailed breakdown of the marks awarded section by section together with a commentary as to why marks fit the criteria set out in the syllabus. This greatly aids the moderation of the projects allowing Moderators to identify why marks have been awarded.

The requirements are clearly set out in 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.

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 some described the methods used but only the better candidates identified the origins and form of the data. Centres are reminded that a detailed description of the organisation covering many pages is not required here just a short paragraph covering the appropriate areas.

(ii) Investigation and Analysis

Candidates should clearly document user involvement and agreed outcomes. Better candidates clearly showed evidence of observation, interviews and investigation of documents currently in use. A detailed requirements specification based on the results of the candidate's investigation should be produced.

Also alternative approaches need to be discussed in depth and applied to the candidate's proposed system in order to obtain high marks.

(b) Design of the Library Elements

This section was not present in the majority of reports. It should include the following elements.

(i) Nature of the solution - A clear set of objectives with a detailed and complete design specification, which is logically correct. There are also detailed written descriptions of all processes/sections and a clear, complete definition of any data structures. The specification is sufficient for someone to pick up and develop appropriate library elements. The library elements have been designed to be reusable and easily configured.

(ii) Intended benefits of the library elements have been identified and explained.

(iii) Limits of the scope of the library elements.

(c) Software Development, Testing and Implementation of the Library Elements

This section was not present in the majority of reports.

(i) Development and Testing of the library elements - the Examiner must be left in no doubt the library elements actually work in the target environment. Candidates should provide program listings in the form of printouts. Data structures should be illustrated as part of the listings where appropriate, detailing their purpose. There should be a full set of printouts showing input and output as well as data structures. All hardcopy should be fully annotated and cross-referenced. A full test plan, with evidence of each test run should be present in the report, together with the expected output for each library element. The test plan should cover as many different paths through the system as is feasible, including valid, invalid and extreme cases.

(ii) Appropriateness of structure and exploitation of available facilities used in the production of the library elements - some discussion of the suitability of methods used for the particular system should be included. Some recognition and discussion of the problems encountered and actions taken when appropriate should also be included. A log of such problems should be kept.

(d) Documentation of the Library Elements

This section was not present in the majority of reports. As many programmers work as part of a programming team, the documentation for the library elements is intended to be allow the candidate to demonstrate their ability to work as a part of such a team.

(i) Technical - Much of the documentation will have been produced as a by-product of design and development work and also as part of writing up the report to date. However a technical guide is a standalone document produced to facilitate easy maintenance and upgrade of a system. The contents of the guide should, where relevant, include 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. Candidates should include a guide to the interface to the library routines - parameters, public and private data structures, formats etc. All parts of the guide should be fully annotated since this is important for subsequent development of the system. The specifications of the hardware and software on which the system can be implemented should be included.

(ii) Candidates must complete the User Documentation it is not sufficient to state that library routines 'work in the background'. Clear guidance, as friendly as possible, should be given to allow the incorporation of the library elements in other solutions. Details of the public interface should be provided for each of the library elements. Some mention here of the relationship between the elements and the data they deal with may be relevant. The user guide should be well presented with an index and, where necessary, a glossary of the terms used.

(e) Design of the main solution

(i) Nature of the solution

Centres are again reminded that the requirements specification set out in the analysis needs to be discussed with the user leading to a set of achievable, measurable objectives that have agreed with the user. These objectives will then form the basis for the project evaluation. Candidates often clearly set out proposed data structures and designs for input screens but then forgot to provide a detailed description of the processes to be implemented and designs the required outputs.

(ii) Intended benefits

Candidates need to clearly identify the merits of the intended system.

(iii) Limits of the scope of solution

Candidates need to discuss the limitations of the intended system and estimate the size of the files required.

(f) Software Development, Testing and Implementation of the Main Solution

(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, and expected results. In order to gain high marks in this section, candidates need to included evidence that that show the tests were completed as well as detailed test plans

(ii) Implementation

Few candidates included an implementation plan. This should contain details of user testing, user training and system changeover that have been discussed and agreed with the user. These details need to be clearly related to the candidate's own project not discussed in general terms.

Evidence of user testing is essential if high marks are to be awarded for this section. Better candidates included photographs of the user testing the new system, printouts of the testing together with signed comments from the user and/or a letter from the user commenting on the tests and their results.

(iii) Appropriateness of structure and exploitation of available facilities

Candidates should discuss the suitability of both hardware and software at this stage. Few candidates kept a log of any problems encountered together with details of how these problems were overcome. Any system developer encounters problems; these problems need to be noted together with the corrective action taken.

(g) Documentation of the Main Solution

(i) Technical

Very few candidates produced a stand-alone technical guide including 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. Candidates need to annotate all parts of this guide since this is important for subsequent development of the system. The specifications of the hardware and software on which the system can be implemented should also have been included.

(ii) User

For full marks the candidate needs to include an index and a glossary, 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.

(h) Evaluation

This section is very poorly completed by many candidates, with many trying to attempt an evaluation without evidence provided from their end users. End user involvement is clearly required in (i) and (ii) of this section. There are detailed guidelines, for this and all sections, clearly set out in the guidance for marking projects section of the syllabus.

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

Very few candidates considered each objective in turn and indicated how the project met the objective or explained why the objective was not met. Even fewer candidates included use of user defined, typical test data as part of this discussion.

(ii) Evaluate the users' response to the system

Many candidates did not provide clearly recorded evidence from their end user, this is essential. Candidates need to obtain the users response to how the system developed meets the agreed specification and evaluate this response as to the satisfaction with the system developed.

(iii) Desirable extensions

Some candidates identified limitations and possible extensions but sometimes forgot to identify the good and bad points of the final system.