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COMPUTING ADVANCED LEVEL

Paper 5216

Computer Systems, Communications and Software

General comments

The paper seemed to work well with all candidates being able to attempt some of the paper and even the best candidates finding some of the work challenging. The impression of the Examiners was that it was perhaps slightly more challenging than recent papers. There was no evidence that there were any inaccessible questions.

There was a small amount of evidence of time problems being experienced – this was not widespread.

There is evidence of some of the more erudite candidates giving too much information and talking themselves out of marks. A good example is in **Question 2 (a)** when a candidate says "RAM is volatile, this means that the contents are not lost when the power is switched off". This candidate has offered more information than was necessary for the mark and in doing so has slipped the word 'not' in where it should not be. They have successfully talked the Examiner out of giving the mark. This is happening on a regular basis throughout the paper and candidates are advised that once they have said something they should not elaborate where it is not needed.

Comments on specific questions

Question 1

(a) Most candidates scored both marks here, though the number of candidates using proprietary brand names is on the rise again. Please instil in candidates that there is no credit for brand names for either software or hardware.

(b) Most candidates were able to name three features but failed to describe them, hence limiting themselves to half marks. This is a case of the candidates needing to look at the mark allocation and realising that there are two marks for each and consequently something extra has to be said for the second mark.

Question 2

(a)(b) Most candidates scored well in this question. There were two areas where the candidates had difficulty. The first was that a number confused ROM with CDROM and were therefore answering the question in terms of storage rather than memory. The second problem was that a number of candidates were talking about the data being stored on ROM was the BIOS. This difficulty has been mentioned in previous reports to Centres. Part of the BIOS is specified by the user and hence cannot be stored on ROM (see the definition in the BCS computer dictionary). While accepting that a part of the BIOS is stored on ROM and crediting this as an answer, the simple thing to say is 'the boot program', over this there can be no argument.

Question 3

(a) This question has been asked more than once, and has always been a question which can be guaranteed to allow the candidates to score well – but not this time – it is difficult to know why. The question does not seem to have any hidden problems which may have been misinterpreted, it was just poorly answered. The acceptable responses are in the published mark scheme and attention is drawn to this for this and all other questions.

(b) Some excellent answers, given in a variety of guises: flowcharts, pseudo code (or an attempt), prose, diagram form… all perfectly acceptable. However, these were the exception rather than the rule. A common response was to talk about a binary search (probably because part **(a)** stated 'alphabetic order', but most had little or no idea and this question was commonly missed out.

Question 4

(a)   Well answered.

(b)   Very poor. Most candidates could not get past the idea of numbers on an ATM keyboard. There were six marks and, consequently, candidates need to say six things. There were very verbose responses which ultimately said very little. Candidates would be well advised to start by putting the numbers 1-6 down the side of the page and then trying to say six things. At least this shows an understanding of the requirements of the question and a willingness to try to plan the responses. Long winded prose simply ties their thought processes in knots, especially in the stressful environs of an examinations room.

(c)   Most demonstrated an understanding of batch and real time processing, but could not, or did not even try to, relate that understanding to the ATM.

Question 5

(a)(b) Well answered, though many only said the one thing in part **(b)**.

(c)   A very good discriminator. Many candidates did not score at all here. However, a good proportion were able to discuss the concept of a procedure, while the better candidates were able to explain how the constructs could be used in the scenario given.

Question 6

(a)   Well answered.

(b)   Well answered. Some found difficulty in giving a disadvantage, but the advantages had obviously been experienced in their own working environments.

Question 7

This question tended to be a zero or six mark question with little in between, many candidates not attempting it. Leading the Examiners to conclude that some candidates had not covered these important concepts.

Question 8

(a)   Well answered.

(b)   The first part was well answered because it was a general question, however when a context was brought in to the very last part of the question most candidates either missed it out or answered in very general platitudes which did not refer to the process control at all. This was a very good discriminator as only the better candidates were able to link the concepts to the context.

Question 9

(a)(b) Perhaps the worst answered question on the paper. Difficult for the Examiners to believe because the input method is in the syllabus, is not difficult to understand, and one would have thought that most candidates would at least have seen OMR in some context, but the evidence of the papers proved otherwise.

Question 10

(a)   Well answered, though many candidates failed to realise that there were two marks available, and consequently only said one thing.

(b)   Most candidates came up with the measures but did not describe them, hence making three of the mark points unavailable. This is not the fault of a misunderstanding of the syllabus but poor exam technique. Centres are encouraged to spend time with candidates during the course, discussing ways to answer questions and clues on the paper as to the requirements of the Examiners.

Question 11

Once again, the candidates were let down by poor technique, they knew the three methods but tended not to answer the question which asked for an advantage. The methods tended to gain three marks but the other three marks were not generally earned.

Question 12

(a)   Examiners were surprised that so few candidates were able to answer on serial and parallel transfers of data. It is important to relate the transfer to bits rather than characters.

(b)   Having gained the mark for half duplex in part **(a)** it would seem reasonable to expect another two marks here, but, again, it was only the better candidates who were able to apply their knowledge to a context.

Paper 5217

Structured Practical Tasks

General comments

The presentation of the candidate's work was of a high standard. Most Centres followed the mark scheme closely and were not scaled. The annotation of candidates' work is to be encouraged as this helps the process of moderation. Centres with a very small entry may find it an advantage to join the discussion group available on the CIE website. Marks were sometimes awarded without sufficient evidence, in a few cases with no hard copy at all. Most candidates kept to the structure of the tasks and followed the required outputs without going too far off track. This meant that they were more focused and produced better solutions. Centres need to remember that this is a series of tasks not a full project for each task.

Centres are reminded that they must send a copy of the MS1 with the work, or a print out of electronic entry. This enables the Moderator to double check that the correct marks are in the system. Without hard copy evidence marks must not be awarded to a candidate. It was good to see less plagiarism this session and a wide range of solutions from Centres.

There were a few Centres that awarded half marks. Either a mark is awarded or not. Sometimes there are more marking points than marks for a question and a candidate does not need all of the criteria in this instance.

Centres are thanked for their hard work.

Comments on specific questions

Question 1

This question was suited to a graphics database application. Candidates should have created tables and shown evidence of field attributes and validation, where appropriate. They should then have entered a number of records to enable them to complete the task. Some candidates failed to show evidence of either of these and were scaled, some had no evidence of both.

(a)   Few candidates gained full marks here. They failed to provide hard copy of the required validation masks for those fields that required them. A number of Centres failed to realise that some marks required all criteria to be met before they could be awarded. A screen shot of the table design was sufficient yet some Centres awarded these marks with no evidence for the Moderators. It is not sufficient for teachers to see the evidence on a computer screen, Moderators need hard copy.

(b)   Most candidates scored full marks in these sections and they gave no cause for concern. Screen shots gave sufficient evidence for the Moderators.

(c)   This part again caused few difficulties for candidates or Moderators.

(d)   This question was one where there were more criteria than marks and most Centres marked correctly. The section usually earned candidates full marks and was well marked by Centres.

Question 2

This was a difficult task to moderate and, probably to mark as well. Candidates gave just a sequence of numbers which had to be worked through. Some Centres had not been careful and awarded full marks when there were mistakes. Centres must be careful in this type of question. Those Centres that used the brackets to denote correct answers, as in the mark scheme, are to be thanked. A few Centres had candidates who submitted detailed answers showing the step by step processes. This enabled a Moderator to know that the sequence had not simply been copied by candidates.

Question 3

(a)   A problem that most candidates could solve, either using a graphical interface such as VB, or a text based solution.

(b)(c) These marks were correctly awarded by most Centres and candidates scored full marks usually.

(d)   Most candidates scored only 2 marks here. Some Centres were generous when the names were not really meaningful nor was there any annotation.

(e)   Centres were usually correct in how they awarded marks for the test plan and screen shots. Centres need to show candidates' test plans with input and expected outcomes. Candidates need to provide a range of tests that are appropriate to the task. They gain no more marks for repeating the same test. Very few candidates offered a full range of tests, for example the one that resulted in a negative value.

Paper 5218

Further Systems and Software

General comments

The candidates, once again, proved that as a group their ability to convey their ideas in what for many must be a second language, did them much credit. There were a few scripts which were very difficult to decipher, but this tended to be because the candidate was somewhat slipshod in presenting the ideas or that they simply did not know and were trying to waffle their way through.

There was no evidence of candidates having time trouble, though with the shear volume of evidence that some had managed to accrue that was somewhat surprising in itself.

There were no reports of any problems with the context of the questions and the Examiners did not report any indications of this. Generally, the paper seemed to prove to be a fair test of the work in the syllabus. It was challenging to even the best candidates while allowing the weaker candidates to earn marks. All the questions and parts of questions had at least some candidates scoring 0 and some scoring maximum marks.

Comments on specific questions

Question 1

Candidates must realise that simply using the word in the question is not enough to earn marks. Many candidates were satisfied to say that text only format was a format where you could only use text. However, this was a generally well answered question, with nearly all candidates able to say something sensible. Another failing of many candidates is that they try to say too much. It perhaps comes as no surprise to hear that rich text format allows for colour/bold/.. etc. The list of acceptable responses is available in the published mark scheme which is brought to the attention of Centres for this and all the other questions.

Question 2

The responses to this question were very varied. Many provided extremely good responses which were only spoiled by a desire to ignore the jump instruction and insist that the accumulator had to do some arithmetic. However, there are a number of cases where the responses were not so good, being limited to 'The computer fetches (something) and then decodes it and executes it'. Examiners would suggest that candidates who were producing that sort of response are not showing evidence of having studied the syllabus sufficiently.

Question 3

(a) Candidates found this part unexpectedly difficult. This part was intended to be aimed at the typical E candidate. The insertion sort is the easiest of all the sorts to explain and to get full marks candidates only had to write down the numbers in the list after each stage of the sort.

(b) Equally poor. This is simply the merge that candidates used to have to describe in order to update a sequential file, but it proved beyond most. The point being that most candidates made an attempt at the question but made the response far more complex than a simple merge. There were other candidates who tried to produce pseudo code algorithms to describe their thoughts. While accepting that this was slightly harder than the insertion sort it was certainly not aimed at the A and B candidates who seemed to be the only ones who could explain it.

Question 4

This question was well answered. Far better than last time a similar question was asked, when Examiners mentioned in the report that the candidates were refusing to think in context. The Examiners were pleasantly surprised to see that step up from the simple AS type question on this topic to read some very well considered responses. The only problem was caused by the failure of many of the candidates to be able to distinguish between phased and pilot implementation.

Question 5

(a) The Examiners were disappointed that the responses here were not better than they were. The question, at no point asked for any HTML code, simply to suggest three ways in which HTML could be used to make the boring style of free text look more appealing. As with **Question 1** there was a tendency to go over the top and candidates should be warned against doing so.

(b) Some good answers. Many candidates found difficulty in distinguishing between routers and bridges but this is hardly surprising as the terms are, to a very great extent, interchangeable. However, there are standard definitions which can be called upon when needed and many candidates were able to do so.

(c) These terms are not so readily understood and gave rise to much guessing along the lines of 'transparency makes the user see everything'. Again, these are terms from the syllabus and the candidates should have discussed their meanings.

Question 6

(a) It is not good enough to say that an interpreter translates a program line by line (they both do) while a compiler translates it all at once (impossible). These are simple, standard, definitions which too many candidates cannot adequately explain. Examiners do try to understand what a candidate is trying to say and act accordingly, but if a response is simply wrong there is nothing they can do about it, even though they may have a suspicion that the candidates know the answer.

(b)(c) Either the answers were very good or the topics had not been understood by the candidates.

Question 7

(a) Generally well understood, though arguably the easiest of the three, the BCD, proved the hardest for the candidates.

(b) It was not intended as such, but in effect this question became a 3 or 0 mark answer for almost all candidates with roughly half of the candidates getting each of the two marks.

(c) Most managed the 2's complement representations, fewer managed to add them together and only the very best candidates got 2 marks for the final part. In that respect the question worked extremely well.

Question 8

(a)   Many candidates produced excellent responses and gained full marks, but many had evidently not studied the concepts and were left to guess at what the answer could possibly be.

(b)   Most candidates were able to come up with a rule to define grandmother but even the better candidates seemed to miss the wording of the question which clearly asked for an explanation of how David's grandmother would be found.

Question 9

The question was intended to be a difficult 4 marks at the end of the paper about the need for parallel processing. Most candidates latched on to the final word and made it a question about simulation and the need to simulate things because of cost and danger and… etc.

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Paper 5219

Programming Project
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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 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 pages 25 to 31 of the syllabus. The guidance on marking projects on pages 32 to 40 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. Candidates are also reminded that the submission of magnetic or optical media is not required and the Moderators do not consider it.

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 very few 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 they 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

In some cases the standard of teacher assessment was close to the agreed CIE standard. However, as in previous sessions most assessment was generous particularly where evidence of user involvement and the identification and production of library elements were not evident in the candidate's report.

Centres must 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. This greatly aids the moderation of the projects allowing Moderators to identify why marks have been awarded. Moderators cannot make informed comment on the Centre's report form as to the accuracy of the Centres' marking of each section without this breakdown of marks.

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 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) 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 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.

(ii) **Implementation**

Not all 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 still 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 and 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 the good and bad points; few candidates identified limitations and possible extensions but to obtain top marks the candidate needs to indicate how the extensions would be carried out.