COMPUTER STUDIES

Paper 0420/01

Paper 1

General comments

The standard of work from candidates was, in general, significantly lower than in previous years. Whilst there were two or three new style questions this year, the answers given in some of the more "traditional questions" were very disappointing. The areas of concern are discussed later under the individual question reviews.

Candidates are reminded that the space provided on the exam paper for each question or part question is more than adequate and is a clear indication of the depth of answer required. Should a candidate make a mistake or still need more space and they need to continue their answer elsewhere then they must indicate very clearly where the rest of their answer has been written.

Comments on specific questions

Question 1

Parts (a), **(c)** and **(d)** were reasonably well answered with many candidates gaining full marks. However, **part (b)**, which required an explanation of the term *search engine*, was surprisingly badly answered. Candidates were warned on the cover of the examination paper not to use brand names in answers and the names Google, Yahoo etc. were all far too common. Marks could have been gained for reference to the Internet and that search engines locate web sites based on input criteria (i.e. key word or phrases). **Part (e)**, which required a description of the term *download,* was also very disappointing. Candidates seemed to know what the term meant but were unable to describe it in a way which would have gained them marks e.g. *it is the transfer of a file/program from the Internet to a user's computer* would have gained full marks.

Question 2

Most marks were lost here by answers that were a little too vague and didn't convince the Examiner that they really knew the benefits of using top down design. The main points were: *easier to debug, easier to update/understand, allows several programmers to work on a task since it is broken down into modules, etc.*

Question 3

This was badly answered by more than 90% of the candidates sitting this paper. It was essentially a very standard set of instructions involving a loop, input, processing and output. i.e.

```
for x = 1 to 1000
        input n
                if n < 0 then neg = neg + 1
next x
output neg
```

Candidates are showing a very poor knowledge of the concepts of pseudocode (also refer to **Question 19**). There is a strong indication that they need to have a lot more practice at writing pseudocode to solve a number of different problems to prepare themselves for examination questions of this type. Booklets have now been produced to give Centres much needed help in topics like these, and these should be available as a resource from CIE in 2009.

Question 4

This question was fairly well answered by the majority of candidates. The most common answers referenced the impact of viruses and hacking. It is worth pointing out here that the term *hacking* on its own was not enough to gain a mark. Candidates needed to indicate why hacking could cause data corruption (e.g. through deleting or changing data).

Question 5

Considering the fact that this question was very much a young person topic of the 21st century, it was surprisingly badly answered by nearly every candidate! Many just mentioned word processors helping people to spell the lyrics correctly or that downloading of music from the internet was now very common. None of these points addressed the question which asked for *ways in which computers have affected how music is written and produced.* Possible answers could have included: *use of digital sampling, mixers/samplers under computer control, electronic/digital synthesisers, musical notation generated by computer software, etc.*

This is the first time a question of this type has been asked and, although it has been on the computer studies syllabus for 2 or 3 years, there seemed to be a real lack of understanding of the topic by the majority of candidates.

Question 6

Parts (a) and **(b)** caused a surprising number of problems, with many candidates not really understanding how barcodes are used in supermarkets. In **part (a)**, the main advantage of using barcodes is that supermarkets do not have to price every item and there is no need for the till staff to remember prices. In **part (b)**, the main advantages to customers are the reduction in errors in totalling the bill and the fact that they now receive a fully itemised bill. **Part (c)** was particularly badly answered even though similar questions to this have been asked in the past. Candidates need to understand the key stages in automatic stock control since this is fundamental to the role of barcodes in many commercial applications.

Question 7

In general this question was reasonably well answered. A common mistake was to say “one of the disadvantages in internet banking is that you cannot get cash”. This statement is true of any type of banking since customers would still either need to visit a branch of the bank or go to an ATM for cash even if they were using conventional banking.

Question 8

There were no real problems with this question. However, a common error in **part (b)(i)** was to suggest passwords or firewalls would prevent data being *used* by unauthorised people. Passwords and firewalls only prevent *access* to the files/data and do not prevent the files/data being read once illegally accessed.

Question 9

This was well answered with many candidates gaining 3 or 4 marks.

Question 10

Although this was a new scenario to most candidates, a reasonable attempt was made at answering it. **Part (a)** was looking for answers such as *traffic speed, number of vehicles, number plate identification (for traffic violations) etc.* In **part (b)**, acceptable answers include: *use of fibre optic cables linked to the computer system, use of satellite and/or microwave technology, use of radio transmitters etc.* Some candidates discussed the role of ADC and DAC (presumably because of the mention of sensors) and didn’t really understand the thrust of the question. **Part (c)** possible answers include: *fewer traffic jams, potential reduction in pollution levels, ability to re-route traffic using electronic overhead traffic signs etc.*

Question 11

The first part of this question was badly answered by nearly all candidates. Many just mentioned modems and the need to change data from analogue to digital or discussed what emails were. The question was looking for answers which explained how emails got to their destination and how the recipient accessed the email. Acceptable marking points included: *local ISP receives the message, ISP of the destination address is searched, message sent to destination ISP, recipient logs on and downloads the message and opens the attachment, etc.*

Part (b) was generally fine for one mark (usually referring to the risk of viruses). Other acceptable answers include: *time to download large attachments, inability to open/read an attachment if recipient doesn't have the right software.*

Question 12

Part (a)

It was astonishing how many candidates gave the wrong answer to **part (i)** – the most common error being 5 columns. This was very disappointing considering this type of question has been asked for a number of years. In **parts (ii)** to **(iv)** there were a number of recurring errors i.e. B3 x C3 instead of the correct response B3 * C3; the = sign on the right of the formula e.g. B3 * C3 = D3; incorrect syntax e.g. (SUM D3:D9).

Part (b)

There were no problems to report in this part of the question.

Question 13

There were no real problems worth reporting here. A full range of marks was seen.

Question 14

This question wasn't particularly well answered. It was common to see one word answers such as Knowledge Base, Rules Base etc. rather than a description which is what the question asked for. Many candidates didn't read the question properly and described *how an expert system **worked***. In reality, the question asked candidates to describe *how an expert system could be **created***.

Question 15

Parts (b) and **(d)** didn't cause any real problems for most candidates.

However, the answers given in **part (a)** were very disappointing; it was very common to see answers like 6, 10 and 54 records! As with **Question 12** this was very strange considering that very similar questions have been asked over the last few years.

Less than half the candidates answered **part (c)** correctly. It was common to see use of the **AND** operator (instead of **OR**) and to include an extra *km* in the answer i.e. (Diameter (km) > 50 000 km). It was also common to see incorrect search criteria such as (Planets with rings). The correct response is (Number of rings > 0) **OR** (Diameter (km) > 50 000).

Only about half the candidates got the correct answer to **part (e)**. It was common to see the planets in ***ascending order*** rather than descending order or to simply write down the planets in ***alphabetical order*** *i.e. Earth, Jupiter, Mars, …….. , Uranus, Venus.*

Question 16

There were no problems to report with this question; many candidates made a good attempt.

Question 17

This question proved to be a good discriminator with every mark from 0 to 6 appearing. It is worth pointing out that candidates could have just used the item numbers when completing the flow chart. This would have been easier both for the candidates and the Examiners. There was evidence that candidates confused the less than (<) and greater than (>) signs e.g. the statement "is input temperature > set temperature" was paired with "switch on heater" which would clearly be a very poor way of controlling temperature!

Question 18

Part (b) was very badly answered with many candidates scoring 0 marks. This was a new style of question and clearly caused many problems for candidates. Some of the required marking points were: *computer reads record from book file, compares due date back with 11th November 2008, if date due back < 11th November 2008 then find record on customer file …. Using the customer number, etc.*

Question 19

This question caused a number of problems for over 90% of the candidates sitting the paper. It was actually a fairly straightforward input – process – output question involving a loop, inputs and outputs , ***if … then*** statements and a summation of item costs/calculate an average.

Candidates are clearly not getting enough practice with this type of question (also see comments against **Question 3**). Whilst these questions are aimed at grade A/B, weaker candidates should still be able to manage 1 to 3 marks by learning the fundamental stages in algorithm design.

COMPUTER STUDIES

Paper 0420/02

Project

The quality of work was of a similar standard to last year. There were fewer inappropriate projects which provided limited opportunities for development and therefore did not qualify for one of the higher grades. Such projects included word-processing/DTP projects of a theoretical nature. However there were still a number of projects which were not documented to the required specification with a corresponding lack of detail.

The majority of Centres assessed the projects accurately according to the assessment headings, except in those projects where documentation was lacking, in which case the projects were often overvalued to a large extent. In some instances marks were awarded by a Centre where there was no written evidence in the documentation. Marks can only be awarded where there is written proof in the documentation. It is important to realise that the project should enable the candidate to use a computer to solve a significant problem, be fully documented and contain some sample output that matches their test plans. A significant number of Centres failed to provide the correct documentation for external moderation purposes. Firstly the syllabus requires a set number of projects to be provided as a sample, full details of which can be found in the syllabus. A small number of Centres still send the work for all candidates; this is only required where the number of candidates is ten or fewer. A number of Centres appear to be a combination of more than one different School; it is vital that internal moderation takes place between such joint Schools. In these cases Schools need to adjust the sample size to reflect the joint total number of entries.

However, overall the standard of presentation and the structure of the documentation continue to improve. Many candidates structure their documentation around the broad headings of the assessment scheme, and this is to be commended. Candidates might find it useful to structure their documentation using the framework given at the end of this report. Many of the sections correspond on a one-to-one basis exactly to the assessment headings, some combine assessment headings and some carry no marks but form part of a logical sequence of documentation.

The assessment forms for use by Centres should not allow for a deduction for the trivial nature of any project. One of the Moderator's roles is to make such a deduction. Therefore, if the Centre thinks that a deduction should be made in this section then that particular project **must** be included in the sample. Centres should note that the project work should contain an individual mark sheet for every candidate and one or more summary mark sheets, depending on the size of entry. It is recommended that the Centre retain a copy of the summary mark sheet(s) in case this is required by the Moderator. In addition the top copy of the MS1 mark sheet should be sent to Cambridge International Examinations by separate means. The carbon copy should be included with the sample projects. It was pleasing to note that the vast majority of the coursework was received by the due date. However, in some cases the external moderating process was hindered by the late arrival of projects from some regions. It causes some considerable problems in the moderation process when Centres fail to meet this deadline. Although the syllabus states that disks should not be sent with the projects, it is advisable for Centres to make back up copies of the documentation and retain such copies until after the results enquiry deadlines. Although disks or CDs should not be submitted with the coursework, the Moderators reserve the right to send for any available electronic version. Centres should note that on occasions coursework may be retained for archival purposes.

The standard of marking was generally of a consistent nature and of an acceptable standard. However there were a few Centres where there was a significant variation from the prescribed standard, mainly for the reasons previously outlined. It is recommended that when marking the project, teachers indicate in the appropriate place where credit is being awarded, e.g. by writing in the margin 2,7 when awarding two marks for section seven.

Areas of relative weakness in candidate's documentation include setting objectives, hardware, algorithms, testing and a lack of references back to the original objectives. Centres should note that marks can only be awarded when there is clear evidence in the documentation. A possible exception would be in the case of a computer control project where it would be inappropriate to have hard copy evidence of any testing strategy.

In this case it is perfectly acceptable for the teacher to certify copies of screen dumps or photographs to prove that testing has taken place.

The mark a candidate can achieve is often linked to the problem definition. It would be in the candidate's interest to set themselves a suitable project and not one which is too complex (for example it is far too complex a task for a candidate to attempt a problem which will computerise a hospital's administration.) The candidate needs to describe the problem in detail, and where this is done correctly it enables the candidate to score highly on many other sections. This is an area for improvement by many candidates. If the objectives are clearly stated in computer terms then a testing strategy and the subsequent evaluation should follow on naturally, e.g. print a membership list, perform certain calculations etc. Candidates should note that they should limit the number of objectives for their particular problem; it is advisable to set no more than 7 or 8 objectives. If candidates set themselves too many objectives then they may not be able to achieve all of them and this prevents them from scoring full marks.

It is important to note that candidates write their own documentation to reflect the individuality of their problem and that group projects are not allowed. Where the work of many candidates from the same Centre is identical in one or more sections then the marks for these sections will be reduced to zero, for all candidates, by the Moderators. Centres are reminded of the fact that they should supervise the candidate's work and that the candidate verifies that the project is their own work.

The hardware section often lacked sufficient detail where full marks are scored by a full technical specification of the required minimum hardware together with reasons why such hardware is needed by the candidate's solution to his/her problem. Candidates need to provide a detailed specification and justify at least two hardware items in this way to score full marks.

Often the algorithms were poorly described and rarely annotated. Candidates often produce pages and pages of computer generated algorithms without any annotation. In these cases it is essential that the algorithms are annotated in some way in order to show that the candidates understand their algorithm. Coding without annotation should not be awarded any marks. Candidates should ensure that any algorithm is independent of any programming language and that another user could solve the problem by any appropriate method, either programming or using a software application. If a candidate uses a spreadsheet to solve their problem then full details of the formulae and any macros should be included.

Many candidates did not produce test plans by which the success of their project could be evaluated. It is vital that candidates include in their test strategy the expected result. This is the only way in which the actual results can be judged to be successful. If these expected results are missing, then the candidate will automatically score no marks in the evaluation section. The test results should include output both before and after any test data; such printouts should be clearly labelled and linked to the test plans. This will make it easy to evaluate the success or failure of the project in achieving its objectives. Such results must be obtained by actually running the software and not the result of word-processing. The increasing sophistication of software is such that it can sometimes be difficult to establish if the results are genuine outputs which have been 'cut and pasted' or simply a word-processed list of what the candidate expects the output to be. Candidates need to ensure that their documentation clearly shows that the output is the result of actually using the proposed system. The use of screen dumps to illustrate the actual sample runs provides all the necessary evidence, especially in the case of abnormal data where the error message can be included.

An increasing number of candidates are designing websites as their project. Candidates must include site layout and page links in their documentation. The better candidates should include external links and possibly a facility for the user to leave an e-mail for the webmaster; in this case the work would qualify for the marks in the modules section.

Suggested framework for Documentation of the Project

ANALYSIS

Description of the problem

List of Objectives *(subdivided (and numbered) into computer-related terms/computer processes and general business objectives)*

Description of Existing Solution

Evaluation of Existing Solution

Description of Other Possible Solutions

Evaluation of Other Possible Solution

DESIGN

Action Plan	*(including a time scale or Gantt chart)*
Hardware specification	*(related to their own solution)*
Software specification	(*related to their own solution)*

IMPLEMENTATION

Method of Solution	*(related to the individual problem, including any algorithms, flowcharts, top down designs or pseudo-code.)*

TESTING

Test strategy/plans	Normal data *(including the expected results and the objective to be tested.)*
	Extreme data *(including the expected results and the objective to be tested.)*
	Abnormal data *(including the expected results and the objective to be tested.)*
Test Results	Normal data *(including the objective to be tested.)*
	Extreme data *(including the objective to be tested.)*
	Abnormal data *(including the objective to be tested.)*

DOCUMENTATION

Technical Documentation

User Documentation/User Guide

SYSTEM EVALUATION & DEVELOPMENT

Evaluation	*(must be based on actual results/output which can be assessed from the written report and referenced to the original objectives)*

Future Development/Improvements