COMPUTER STUDIES

Paper 0420/01

Paper 1

General comments

The general standard of work from candidates was very similar this year to previous years. It was pleasing to note that there was less evidence of rote learning in the questions which required definitions and descriptions of standard processes.

There were one or two new topics in the syllabus for 2006 and these appeared to cause the candidates the greatest challenge.

Questions which involve interpreting or writing algorithms continue to cause many candidates problems. The last question on the paper, which requires candidates to write their own algorithm, can be answered either in the form of pseudocode or flowchart. Weaker candidates should consider using flowcharts if their algorithmic skills are rather limited.

Comments on specific questions

Question 1

(a) Many candidates gained one mark here for examples given or human checks/double entry. It proved more difficult to obtain the second mark since many answers were referring to validation checks rather than verification.

(b) This was generally well answered with most candidates aware of the hardware needed (i.e. webcams, microphones, speakers, etc.) and the need for a network or Internet connection. There were the usual very general answers: "it is a way of communication between people" – this could refer to a telephone system and any other communication device.

(c) This question was well answered with many candidates gaining maximum marks. The only real error was to refer to simply sending signals without mentioning that there is a need to exchange signals for handshaking to work.

(d) Again this was generally well answered. The most common example was a *flight simulator*. There was some confusion between simulations and virtual reality with many candidates not fully aware of the differences.

(e) The majority of candidates got full marks here – most were aware of the use of batch processing in utility billing and producing payslips.

Question 2

In this question, the majority of candidates named a correct direct data capture device. However, they were either unable to give a suitable application or their answer was too vague to be awarded a mark. For example: *device: bar code reader (1 mark); application: to read bar codes (0 marks since no application – such as automatic stock control system – mentioned). Device: camera (1 mark); application: to take photographs (0 marks since this is not an application – a suitable example would be a speed camera).*

Question 3

(a) This was generally well answered. The most common error was to simply give the w… rather than say that it is the planting or sending of the virus that is the crime.

(b) Again, fairly well answered with most prevention methods, such as encryption, passwords, anti-virus software, etc. chosen. However, it is still common to see candidates think back ups prevent computer crime – this simply guards against the **effect** of computer crime but does not prevent it.

Question 4

This question was not well answered with many candidates simply referring to computer use in general rather than answering the question which asked about effects on society. Therefore, answers that mentioned health risks, hacking, etc. were not valid. However, loss of jobs, less interaction between people, town centres become deserted as shops close, etc. are all valid effects.

Question 5

This was new topic and caused a few problems with many candidates. It was common to see references to word processors, CAD software, etc. without actually answering the question. Computer software is used in the film/TV industry to create animation effects, produce special effects (e.g. in science fiction/fantasy or in morphing), synchronizing voice outputs with cartoon characters, etc.

Question 6

Many of the answers given here were too vague and consequently very few candidates gained good marks. The design stage needs, for example, design input forms and NOT just *input* or select validation rules, and NOT just *validation.* Many marks were lost for non-specific answers.

Question 7

(a) Many general answers describing what expert systems were and how they were created. The question, however, was asking for HOW the expert system would be USED to identify mineral deposits. This would include a question and answer session between computer and user, searching of a knowledge base and a map of mineral deposits/probability of finding minerals.

(b) This was well answered by the majority of candidates.

Question 8

(a) (b) Generally well answered. Some candidates, however, just described general effects of introducing computer-based systems rather than made a comparison with a manual filing system. The main advantages are the reduction in paperwork, much faster search for information and ease of cross referencing. The usual effects of such a system would be unemployment, need for re-training and de-skilling.

(c) Part **(i)** of this question was well answered, but part **(ii)** caused a few problems. Some of the main areas where parallel running would not be appropriate include control applications or POS terminals.

Question 9

(a) Most candidates made an attempt at this question although very few spotted all 3 errors: product set at 0, incorrect count control and output in the wrong place. The most common error found was the initialisation of product. Several candidates thought that syntax errors were the main fault e.g. *output should be used instead of print, LET count = 0 rather than just count = 0.*

(b) No real problems here except an alarming number of candidates chose IF … THEN … ELSE as an example of a loop construct.

Question 10

This question was very well answered by the majority of candidates. The only real mistake was to the instructions in full rather than use the commands supplied.

Question 11

Generally well answered. In part **(b)** marks were lost for brackets in the wrong place or for using formulae such as AVERAGE(C2:F2)/4 – i.e. not realising that the word AVERAGE carried out the required calculation. Part **(c)** probably caused the greatest problems to candidates with very few giving a good description of the descending sort routine.

Question 12

Part **(a)** gave no problems. In the second part, most candidates gained 1 mark for general information about flights. The third part caused the most problems with some candidates believing the information kiosks would be linked into Air Traffic Control.

Question 13

(a) Many candidates gained 1 mark here for reference to a computer simulation. It is clear from this question and **Question 1(d)** (description of simulation) that many candidates are not fully aware of the differences between virtual reality and simulations.

(b) Many candidates gave the correct interface devices such as data goggles and gloves, special suits fitted with sensors etc. Unfortunately, the usual array of devices such as printers, VDUs, and keyboards appeared as well.

(c) Very few candidates understood the real advantages of virtual reality systems. The type of answers expected included: it is much safer (e.g. can view inside a nuclear reactor), the feeling of "being there", ability to perform "actual tasks" without any risk, etc.

(d) Training aspects were the most common examples here. Many candidates just wrote down *games* which is not enough on its own since many computer games do not make any use of virtual reality technology.

Question 14

No real problems here although the most common error was just to give a description rather than describe the benefits/advantages of top down design.

Question 15

Most candidates gained 1 mark for the portability aspect of laptops in part **(a)**. In part **(b)** most marks were gained for laptops being easier to damage or steal and also tend to be more expensive to buy in the first place. However, several candidates referred to wireless connections when the question was asking for differences between laptop computers and desktop computers.

Question 16

(a) Many general responses were given here e.g. *spreadsheets are used to draw graphs or can be used to teach students how to use spreadsheets,* or *DTP is used to produce leaflets*. The question was asking how these 4 packages would be used by the company to run on-line training courses. Thus, answers expected included: use spreadsheets to keep candidate marks, use a database program to keep candidate details, use DTP to design and produce training material and use an authoring package to carry out website design.

(b) This part was fairly well answered with most candidates aware of how word processed documents could be suitably modified to fit one page.

Question 17

This question proved to be a very good discriminator with marks ranging from 0 to 5 with all marks in between. The most common error was to switch items 4 (error report) and 6 (reject item) which lost 2 marks. Most candidates quite correctly used numbers in the boxes rather than try and squeeze in the full descriptions.

Question 18

Again, this was fairly well answered by most candidates. The only real problem occurred in part **(c)** where an incorrect query was supplied or an AND statement was used in error. In part **(d)**, customer or customer name was given rather than customer id or customer ref no.

Question 19

Part **(a)** caused few problems although there were a surprising number of temperature sensors given as ways of detecting cars. The third part was not very well answered. Many answers took the form: *as a car approaches the bridge the lights change to green and the other light turns red* – this would be an interesting way to control traffic! Very few candidates mentioned counting cars approaching the bridge on both sides and using the simulation results to determine the traffic light timing sequences (the number of cars in various scenarios would be stored on file and a comparison would be made to determine the lights sequence). In part **(d)**, a few candidates suggested turning off the lights altogether after a computer failure or put both sets of lights to green – neither option would be a particularly safe method. The most likely solution would be to put both sets of lights to red until the problem could be sorted or put both sets of lights to flashing amber and warn drivers to approach with caution.

Question 20

This caused the usual array of marks from 0 to 5. The better candidates scoring good marks here with well written algorithms. The very weak candidates continue to simply re-write the question in essay form only to gain zero marks. Very few candidates realise that one of the best ways of answering questions of this type is to supply a flowchart. This avoids the need to fully understand pseudocode and is also a very logical way of approaching the problem. We would advise Centres to consider this approach with their weaker candidates when preparing for this exam in future years.

COMPUTER STUDIES

Paper 0420/02
Project

General comments

The quality of work was of a slightly higher standard than 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.

The majority of Centres assessed the projects accurately according to the assessment headings. In some instances, however, marks were awarded by the 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 and full details can be found in the syllabus. A number of Centres still send the work for all candidates; this is only required where the number of candidates is ten or less. It is only necessary for schools to carry out internal moderation when more than one teacher is involved in assessing the projects. A number of Centres appear to be a combination of one or more different schools; 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.

The standard of presentation and the structure of the documentation continued to improve. Many candidates structured 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 following framework. Many of the sections corresponded on a one-to-one basis exactly to the assessment headings, some combined assessment headings and some carried no marks but formed part of a logical sequence of documentation.

Suggested framework for Documentation of the Project

ANALYSIS

- Description of the problem
- List of Objectives *(in computer-related terms or computer processes)*
- Description of Existing Solution and business objectives
- 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 Requirements *(related to their own solution)*
- Software Requirements *(related to their own solution)*

IMPLEMENTATION

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

TESTING

Test strategy/plans	Normal data *(including the expected results and the objecti tested)* Extreme data *(including the expected results and the objective to 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 AND 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

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. 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 query 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 is generally of a consistent nature and of an acceptable standard. However, there are 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 included 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 student to attempt a problem which will computerise a hospital's administration). The candidates needed to describe in detail the problem and, where this was done correctly, it enabled the candidate to score highly on many other sections. This was 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 inadvisable to set 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.

There was evidence that some candidates appeared to be using a textbook to describe certain parts of the documentation. Some candidates did not attempt to write the hardware section of the documentation with specific reference to their own problem. It is important to note that candidates should write their 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 those 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. Full marks were scored by a full technical specification of the required minimum hardware, together with reasons why such hardware was needed by the candidate's solution to his/her problem. As an example of the different levels of response needed for each of the marks, consider the following:

> *'I shall need a monitor' is a simple statement of fact and would be part of a list of hardware.*
> *'I shall need a 17 monitor' is more descriptive and has been more specific.*
> *'I shall need a 17 monitor because it provides a clearer image' is giving a reason for the choice, but I am still not at the top mark.*
> *'I will need a 17 monitor because it gives a clearer image which is important because the user is short sighted' NOW it has been related to the problem being solved.*

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 produced pages and pages of computer generated algorithms without any annotation; in these cases it was essential that the algorithms were annotated in someway in order to show that the candidates understood their algorithm. 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 have 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 email for the webmaster; in this case the work would qualify for the marks in the modules section.

The moderation team have also commented on the fact that only a small number of Centres appear to act on the advice given in the Centre reports and that candidates make the same omissions from their documentation year on year.