CONTENTS

COMPUTER STUDIES

Paper 0420/01

Paper 1

General comments

The standard or work was similar to that in previous years. Very few scripts were seen where candidates had not at least made an attempt at answering the question. Many weaker candidates did well in the early section where the questions tested knowledge of basic terms and not an actual understanding of the topic.

There was evidence that many candidates still fail to read the questions carefully and lose marks unnecessarily. For example, **Question 13** asked for a *description* of validation checks; many candidates simply gave a name and not a description, therefore lost most, if not all, of the marks for the question.

Question 19, which required the writing of an algorithm, caused a definite problem for many candidates. However, **Question 12** which involved the tracing of an algorithm, was very well answered in general.

Comments on specific questions

Question 1

Parts **(b)**, **(c)** and **(d)** were fairly well answered with many candidates gaining full marks. In part **(a)**, many candidates gained one mark for a correct application of MICR, namely the clearing/reading of cheques, but did not understand what MICR was (e.g. magnetic ink character reader/recognition allowing automatic data entry). Part **(e)** was not well answered with much confusion with hand shaking.

Question 2

Not as well answered as expected with several candidates referring to supermarket queues; the question asked about the actual stock items. The main thrust was that it allows automatic ordering of goods and automatic stock taking, reduces errors in the system, easier to change prices (e.g. can be changed on the file), etc. Many candidates thought bar codes reduced the amount of storage space occupied.

Question 3

(a) This was generally well answered. The main errors were to switch feasibility study and analysis around, and also to get implementation and evaluation in the wrong order.

(b) Many candidates did not realise that this was the design stage and referred to feasibility study, observing old system, etc. The question was looking for answers such as select/design hardware, select/design software, design screen displays, design the test plan/test strategy, etc.

Question 4

(a) Most gained one mark here by referring to the fact that more data/information could be stored on a chip rather than on a film. Other marking points were: images on chips could be manipulated/viewed straight away (i.e. no need to develop a film), other information (such as the road conditions) could be stored with the image, etc.

(b) This part was not answered very well. Many candidates did not realise the tasks as the car approached the camera that were wanted. The most common error was to say that the photograph would be taken – this would not be done at this stage since the decision whether or not a photograph should be taken needs to be made as the car approaches. The microprocessor would calculate the speed of the car, compare the speed with stored values and then decide whether or not a photograph needs to be taken. Camera settings could also be checked at this stage.

(c) Many gained one mark here by realising that the image would be stored on a chip. Most lost marks by saying the microprocessor would then warn or send a message to the police station.

Question 5

Generally well answered with many candidates referring to use of Braille keyboards, speech s… speech recognition and the use of touch screens/large screen characters.

Question 6

(a) Very well answered in general with a large number of candidates referring to temporary storage of data and the buffer is used to compensate for the differences in operating speed of the CPU and printer.

(b) Again, well answered with most candidates giving the obvious answer of the ability to store larger files/more data. Very few were aware, however, of the fact that larger buffers reduce the number of data transfers and hence lead to more efficient CPU usage.

Question 7

(a) Generally well answered but a surprising number lost a mark for writing (B2 – C2) **x** D2 rather than (B2 – C2) ***** D2.

(b) Well answered with descriptions of copy and paste and drag and drop being described.

(c) Many gained one mark here for referring to graphs or use of a formula. Few gained the second mark by describing how the chosen method would be used to allow a prediction to be done. A disappointing number of candidates did not seem to understand the main features of spreadsheets.

Question 8

(a) Fairly well answered with hacking and software piracy being the main answers. Many gave viruses on its own. This did not gain a mark since writing viruses is not necessarily a computer crime – it is the sending or planting of viruses which is the illegal act.

(b) Very well answered with many candidates gaining full marks for the common answers of data encryption, use of passwords, use of anti-virus software and firewalls. Physical locks were also quite common – this was acceptable in this question. Main marks lost were due to references to the data protection act and/or laws to protect individuals – these do not *prevent* computer crime, they simply deal with the event *after* the crime was done.

Question 9

Quite well answered with file management, security controls, memory management and input/output management being the most common responses.

Question 10

(a) Generally alright with saving time/travelling costs and wider choice available being the most common answers.

(b) Again, most gained one mark here for referring to a larger customer base, reduction in the need for shops and hence fewer staff. Marks were lost for simply saying costs would be reduced – this would need to be qualified (e.g. no need to produce flyers, etc.).

(c) The largest response here was to refer to credit card fraud. Also a large number referred to the need for a computer/access to the internet as a disadvantage – this is a valid concern.

Question 11

This was generally well answered, although very few came up with more than two valid answers. The only main reason for losing marks was to refer to storage size. This is a difficult area since it depends on a number of factors and therefore was not accepted as a valid answer unless fully justified by the candidate.

Question 12

Very well answered indeed. Some candidates gave b, c, b as the answers – this was accepted.

Question 13

(a) Not very well answered. Many candidates ignored the question which asked for descri validation checks. Just naming a validation check gained no marks unless the candidate w to give a description (e.g. length check to ensure up to 30 letters only were input, character ch to ensure numeric characters were not input, etc.)

(b) The same comments in **(a)** (see above) apply to this part. Acceptable answers include: range check to ensure marks were between 0 and 100, length check to ensure no more than three digits were input, etc.

Question 14

(a) Reasonably well answered with saving on time and money being the most common responses.

(b) Many lost marks here for simply saying e-mails were faster or e-mails were cheaper. Such answers are worthless unless they are qualified e.g. e-mails are faster than the standard mail deliveries, e-mails are cheaper because there is no need to buy stamps, etc.

(c) Not very well answered at all with the majority of candidates failing to understand the point of the question. Many candidates said more e-mails are now sent therefore more are printed out – this is not necessarily true. The main points are that people print out e-mails for meetings, destroy the copies and then print out the e-mail again for subsequent meetings. It is also true that many people do not like to read long or technical e-mails on the screen and therefore print them out first. Certain documents also need to be printed to give a permanent copy e.g. legal documents, etc.

Question 15

(a) Several candidates described how expert systems were used and therefore gained no marks. The question asked for how an expert system was produced e.g. create the knowledge base, input data into the knowledge base, create the rule base, design the question and answer interface/inference engine, etc. Several candidates described the full systems analysis approach which was too general unless it referred to the above marking points.

(b) Many candidates gained one mark for greater consistency of diagnosis. Very few candidates mentioned other points such as there is no need for an expert to be present, quicker response than a human being in complex situations, etc.

(c) The most common expert systems were medical diagnosis and mineral prospecting. Others included chess, financial systems and engine fault diagnosis.

Question 16

(a) Generally well answered with most referring to library of parts, 3D imaging and manipulation (e.g. zoom, crop, rotate, etc.)

(b) Very badly answered with answers being much too general to gain any marks. For example:

graph plotter – produces a print out (this type of answer would require some qualification e.g. make reference to high quality drawings produced in various paper sizes, etc.)

graphics tablet – used to draw graphics (this type of answer is much too vague – need to refer to the fact that it acts as an interface to allow drawing on the screen, for example, to gain the mark)

light pen – can be used to do drawings (this answer is not sufficient to gain the mark. Light pens are used to make alterations on the screen directly, they allow free hand drawing directly on to the screen, etc. – any of these points would have gained the mark)

trackerball – this is like an upside down mouse (it is unclear where this definition came from. Tracker ball is used like a mouse to select options, draw on screen, etc.)

Question 17

(a) Poorly answered in many cases. The main mistake was to repeat the three examples gi loosing all the marks. Also, it was very common to see unrealistic field sizes e.g. colour of v with a field size of two characters only.

(b) Generally well answered apart from the first part (amendment). The main confusion was to think the database referred to a car manufacturer rather than a dealership.

Question 18

(a) The more vigilant candidates realised the sensors required were already in the stem of the question i.e. pressure sensors and temperature sensors. It was encouraging to see that very few candidates now refer to heat sensors.

(b) The only accepted answer here was Analogue to Digital Converter (or ADC).

(c) Many candidates gained one mark for referring to control of the gases through the reactor. The main marking points were:

- data from sensors sent to computer
- data compared with stored values
- computer sends signal to valves (etc.) to control gas flows
- loop continues as long as reactor operates
- output from system affects what input will be received.

(d) Many candidates referred to continuous monitoring/control and the faster response to hazardous scenarios.

Question 19

This question was not particularly well answered with many candidates simply re-wording the question or giving an essay rather than an algorithm. The main point was to calculate the number of stations and hence the cost (a common mistake was to omit the number of passengers travelling when calculating cost), decide if three or more passengers were travelling and hence multiply costs by 0.9 to get the discount. Finally, calculate the change (where applicable) and print the required number of tickets. Candidates were required to show exactly how the system would print the correct number of tickets using a loop.

Paper 0420/02

Project

General comments

The quality of work was of a broadly similar standard to previous years, however some candidates fail to specify any real objectives at the beginning of the project. This is an extremely important omission since the new assessment criteria places emphasis on these objectives and requires the candidate to document their project in such a way that the candidate needs to refer back to these objectives on a number of occasions. It is for this reason that the number of Centres' marks which had to be scaled was higher than in previous years. The number of inappropriate projects which provided limited opportunities for development and, therefore, did not qualify for one of the higher grades again continues to decline. The introduction of the new assessment criteria provided candidates with an opportunity to enhance their work by the inclusion of a greater emphasis on the setting of objectives. Centres will need to obtain the moderation report for specific details of overall candidates' performance and the Centre's assessment of the projects.

Overall the standard of assessment by Centres is reasonably accurate. However, there are so... where credit appears to have been awarded when there is no relevant work in the documentation. ... also occasions where a higher mark has been awarded than that warranted by the work. The larges... discrepancy is concerned with the objectives and the links with later sections. Analysis of the... assessment will show that section 7, section 12, section 13, section 14 and section 17 all contain links b... to the objectives. It is vital, therefore, that the candidates specify their initial objectives. It would be useful i... these were numbered in some way so that it becomes easier to refer back to these in the later sections.

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 substantial sample output from their proposed system. Testing should include full test plans with expected results which can then be compared with the actual results. Moderators would also expect to see labelled printouts which clearly match the test plans. Many candidates failed to include the expected results in their test strategy. Some projects do not demonstrate that they have actually been run on a computer. Software advances and the use of 'cut & paste' can give the impression that the results have simply been word-processed. It is recommended that candidates make use of appropriate screen dumps and include these in their documentation to show the use of a computer.

However, 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. It would appear that many Centres provide their candidates with a framework for documentation. This can be considered part of the normal teaching process but the candidates do need to complete each of the sections in their own words. Each project must be the original work of the candidate. It is most useful if all candidates provided an index page. Marking would be more accurate if the candidates annotated their work, and moderation would be improved, if Centres could clearly indicate where credit is being given for each section.

A number of Centres failed to provide the correct documentation with their moderation sample. The sample should contain the individual candidate record cards, the coursework assessment summary form and a copy of the MS1 form. It would be helpful if the candidates were listed in candidate number order on the summary form and if the candidates in the sample were highlighted in some way. The assessment forms for use by Centres should not allow for a deduction for the trivial nature of any project. Centres should not make any deduction in this section. 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 marksheet(s) in case this is required by the Moderator. It was pleasing to note that the vast majority of the coursework was received by the due date. It causes some considerable problems in the moderation process where 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 query deadlines. Although disks or CDs should not be submitted with the coursework, the Moderators reserve the right to send for the electronic version. Centres should note that on occasions coursework may be retained for archival purposes. It was also the case that some Centres appeared to have failed to carry out internal moderation. Such internal moderation must take place when more than one teacher is responsible for marking the coursework.

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. A small number of Centres are beginning to adopt this convention and it is hoped that more Centres will use this method of demonstrating where credit has been awarded.

Areas of relative weakness in candidate's documentation continue to include setting objectives, hardware, algorithms and testing.

The mark a candidate can achieve is often linked to the problem definition. The candidates need to describe in detail the problem and, where this is done correctly, it enables the candidate to score highly on many other sections. More candidates than in previous years did set themselves aims and objectives. For some candidates these were restricted to business aims and it will be a natural progression to include computer-related objectives. 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.

Description and/or evaluation of the existing system were misinterpreted by some candida... described/evaluated a system which was not the existing system. Credit can only be given in the... (3 and 4) for the current existing system. The method of solution must be explained in order to gain... section 11. In order to gain credit for test results (section 14), candidates must include their test st... including expected results. If a candidate scores no marks for a test strategy (section 13), then they... automatically score no marks for test results (section 14). It is not sufficient to produce some output and... expect to score marks.

There was evidence that some candidates appeared to be using a textbook, or the teacher's notes, to describe certain aspects of the documentation, especially the hardware section. Some candidates did not attempt to write this section of the documentation with specific reference to their own problem. 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 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. Many candidates described the software to be used but did not justify its use. Where software was justified, it was the operating system which was justified and this is not the justification which is required.

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. It is possible for some applications to generate the algorithms; these should be clearly annotated by the candidates to score any marks. Algorithms must clearly relate to the candidate's solution. If a candidate uses a spreadsheet to solve their problem, then full details of the formulae and any macros should be included. Many candidates produce page after page of software generated macro listings. It would be preferable if they concentrated on providing annotated queries (at least one simple and at least one complex query), an annotated form and an annotated report.

Many candidates did not produce test plans by which the success of their project could be evaluated. The results of a test strategy should include the predicted results, 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.

Examples of testing strategy:

1. There are three types of data to be tested: normal, extreme and abnormal. Whichever method of solution is employed, the data could be tested as follows for a numeric entry with a validation rule that it should be between 0 and 100 inclusive.

Data	**Type**	**Expected result**
0	Extreme	accepted (if this was part of a calculated formula then the result could be predicted and inserted here)
56	Normal	accepted
100	Extreme	accepted
101	Abnormal	rejected
–1	Abnormal	rejected
Any letter or character	Abnormal	rejected

2. Whichever method of solution is employed, the data could be tested as follows for [illegible] entry with a validation rule that it should be limited to 5 characters in length.

Data	Type	Expected result	Notes
A	Extreme	Accepted	Length 1 character
Any	Normal	accepted	
apply	Extreme	accepted	length 5 characters
letter	Abnormal	rejected	Length 6 characters, too long
27	Abnormal	rejected	Wrong data type

3 Website design could use a similar technique to test strategy 2 for any alphabetic input into an on-line form. The website should include links between pages and these would need to be tested by linking to the previous, next and home pages.

Data	Type	Expected result
Next page	Normal	accepted
Previous	Normal	accepted
Home	Extreme	accepted

4. If one of the objectives involving a database project is to delete records, then the strategy would be to specify the record which is to be deleted. The test results would be to print the table before the deletion, highlighting the record to be deleted. Produce a screen dump of the screen where the record is on-screen and ready for deletion, and now print out the table highlighting where the deleted record has been deleted.

Test results

Screen dumps could be used to show the actual data being input into the system and the output produced. Similarly screen dumps can be used to show the error message produced by abnormal data. In some cases, particularly in regard to websites, the teacher should authenticate the relevant documentation to show that the links have actually worked.

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 or submit details to an on-line database. Candidates might also consider designing an on-line form or questionnaire for submission.