COMPUTER STUDIES

Paper 7010/01

Paper 1

General comments

Overall, there was a good spread of marks producing an expected distribution curve. Very few candidates gained marks outside the 25 to 75 range with the majority of marks between 40 and 65.

Little evidence was shown that any of the questions disadvantaged any group of candidates. There appeared to be ample opportunity for all candidates to show their knowledge of the subject.

The following comments are designed to give Centres further help in their teaching of the subject.

Comments on specific questions

Question 1

As a whole Question 1 was answered well by most candidates with very few candidates not achieving at least 1 or 2 marks.

(a) A significant number of candidates felt it necessary to introduce extensions of the word byte – such as kilobyte, megabyte and the varying storage capacities of different storage media – without actually defining clearly just what a byte is. The responses looked for included: stating that a byte is a unit of storage or memory; 8 bits in size; represents a single character. Also, an example of series of 8 ones and zeros was also sufficient to obtain a mark. "1 letter is equal to 1 byte" was considered equivalent to "a byte representing a single character", however, merely stating that a byte was a series of 1s and 0s was not considered to be not enough as an example.

(b) Many candidates scored the maximum 2 marks for this part of the question. Common errors amongst those who failed to score well in this question were to describe the physical characteristics of a CD-ROM such as, "it is a plastic disk with a hole in the centre" and to confuse the medium with the actual CD-ROM *drive*. It was enough to state that: a CD-ROM is storage medium with read only memory; that the data stored cannot be altered; and a CD-ROM can store data/programs/pictures/films, etc.

(c) Candidates generally scored at least half marks for this part of the question by either stating that an interrupt is a signal *sent by a device* **to** the computer or CPU, or that it caused the computer to stop its present task and deal with the interrupt. Two common errors which did not gain credit were those that stated the signal originated in the computer or CPU, and that the signal caused the ***user*** to stop what they were doing. Acceptable examples referred to such things as "a disk full message" or "the printer has run out of paper".

(d) Again, many candidates scored at least half marks for this part where acceptable answers included a buffer being a temporary store; it helps to compensate for speed differences between CPU and devices; it holds data being transferred between peripherals and the CPU. A typical acceptable example was to state that pages waiting to be printed were stored in a buffer.

(e) A significant number of candidates did not gain full marks for this part of the question by sometimes giving the clear impression that they were describing "a model" as opposed to a computer generated 3-dimensional simulation which required special equipment such as gloves and a helmet for the user to "enjoy" the experience. Common vague examples given which did not gain credit were of the type: "it is used in fire drill practices"; "it's used to train pilots" and "used in computer games". Examples which did gain credit were those of a more specific nature such as "flight simulator" and "***arcade*** games".

Question 2

A well answered question in which the majority of candidates scored at least half marks. The most common correct responses given to the difference between high level languages and low level languages were the closeness of a high level language to English, and that low level languages are machine-orientated whilst high level languages are problem-orientated.

Question 3

(a) Strangely, as it is a question which crops up with some regularity in various forms, this was a question not well answered by the majority of candidates. There are many simple, but excellent, examples of working expert systems which can be downloaded from the Internet and can be used to illustrate the basic principles and uses of expert systems. An expert system which identifies plants/fish/whales/dolphins, etc. could provide an interesting discussion in the classroom leading to a greater understanding of what an expert system is and for what it can be used. Common errors made around the correct answers of a knowledge base, an inference engine, a rule base, and a user interface were those that attempted to describe how an expert system is created – "collect the knowledge from experts" and "make up some questions" - and those that confused an expert system with a database - for example, "enter the information into the database".

(b) Again, a surprising number of candidates did not gain the mark here. The majority of candidates who did gain the mark were for the correct response of "for medical diagnosis". A number of candidates tried to describe this and, unfortunately, described the use of a database – for example, "a doctor can look up what disease a person has".

Question 4

(a) A well answered question with most candidates realising that customers would not have to travel to the bank or could do their banking from the comfort of their own home.

(b) The most common acceptable answers were that the bank's work force could be reduced or the bank would require fewer branches, thus saving the cost of maintaining these premises.

(c) (i) A less well answered part of the question. Many candidates continued to think about the impact on customers or banks, instead of considering the wider implications for society as a whole. The acceptable answers of less pollution or less traffic on the roads were not given by the majority of candidates.

(ii) Job losses, increased fraud or "hacking" were the most common correct responses. Another correct response was the loss or reduction of social interaction. A number of candidates, whilst on the right track, did not quite convince Examiners that they understood the wider implications, giving answers such as, "people would get lonely", without then going on to elaborate by saying "because they would interact less face-to-face with other people" which would then have been enough to gain the mark.

(d) A majority of candidates scored half marks for this part of the question – simply saying that "it might be a scam" was not enough to warrant a mark being awarded; some elaboration of the word "scam" was needed for the mark to be gained. The most often given correct answer was "concern about fraud" with fewer correct responses of "concerns about computer viruses" or "concerns about bogus sites".

Question 5

(a) (i) Well answered by most candidates with “using passwords” and “a firewall” being the commonest correct answers given

(ii) Slightly less well answered. Candidates should remember that “coding”, which was the most common inaccurate response, is not the same as “encryption”.

(b) A very poorly answered question by a majority of candidates. A typical misconception of many candidates was that a Data Protection Act would be written detailing the exact type of security methods which had to be taken in order to ensure the security of any data being held. A considerable number of candidates failed to gain any marks for the question by not stating the *principle* of data being kept secure, but by giving three examples of *methods* of securing the data – firewall, virus checker, locking doors and security guards, etc. It would also not be necessary to acquire permission from data subjects to hold data concerning them. Those candidates who did score marks on this question correctly identified the actual principles which a Data Protection Act would take into account – data must be up-to-date; accurate; used only for the stated purpose; obtained and used legally/lawfully; be adequate, relevant and not excessive; kept no longer than necessary; must not be transferred to countries with inadequate data protection; data holders must register with their intention of holding data; that the data subject should have the right to have incorrect data removed or corrected, and also have the right to see a copy of their own data.

Question 6

Most students obtained at least half marks for this question, but then failed to obtain the remaining marks by simple restating the question, “Thular would use a pen drive to save his work *and then take it home and continue his work on his computer at home”*. More detail was looked for by Examiners about *how* the information would be transferred to the home computer, and the possible problems which would need to be considered in order to use the particular method. So using email was a correct method but Thular would attach his work to an email, or he would need his own email address in order to use this method. Saving his work on a pen drive or a CD-R or floppy disk, etc. was another correct method, but he would need the same type of device on his computer at home, or mentioning that the medium was a portable medium and, therefore, easy to take home would have sufficed for the second mark. Thular could print out his work at school but in order to continue his work at home he would need to type, or scan, the information onto his computer at home. He could access his work from the Internet but in order to use this method he would need access to the school web site, and he would need Internet access at home too. It was surprising to find that some candidates thought CD-ROMs could be used to store the information and store their changes when they worked at home

Question 7

A common incorrect type of answer given by many candidates for this question was that more people can buy the book as people from all over the world can access it on the Internet. It is just as possible for people all over the world to buy a paper-based book. Only a few candidates realised that the distribution of the book would be very much quicker and cheaper, as it would be available worldwide as soon as it was placed on the Internet without the need to physically ship copies of the book to distribution points. Those candidates who did score marks on this question realised that the production costs would be cheaper as multiple physical copies would not have to be printed. It was felt that the supposed environmental advantage of the saving of trees, etc. was not sufficient for the mark as the cost to the environment in the manufacture and use of computers was at the very least comparable to any savings gained by not using paper.

Question 8

Generally a well answered question with most candidates scoring 1 or 2 marks out of 3. Over-simplifications such as “it manages system resources” failed to gain marks. The more specific correct responses included memory management, multi-tasking, security management – including virus checking, loading/running programs, error reporting, etc.

Question 9

(a) Candidates who scored full marks for this question often gained the marks for mentioning that video-conferencing needs the use of the Internet and hardware such as webcams, microphones and speakers. Common incorrect answers given included "video-conferencing allows people to communicate with other people located in different places", which could equally describe the use of a telephone. It was necessary to state that a ***meeting*** between two or more participants at different sites took place, that audio and video data was transmitted and appeared in real time on participants screen(s).

(b) Examiners often felt that candidates knew the answer to this question but then gave answers which were too vague to be awarded a mark – correct responses included the cost and time savings made in not having to travel long distances to the conference, but candidates often gave answers such as "the people don't have to travel to the meeting". "Meetings can occur immediately" was another response which did not gain credit when considered alongside the correct response of meetings being able to occur at short notice (because of the reduction of travelling time).

(c) Being able to send emails without the recipient being online at the time, and the possibility of sending attachments as well were the two most common correct responses to this question.

Question 10

(a) Very few candidates gave the correct response of "by the use of voice recognition software" but a large number of candidates still scored 2 marks for the other correct responses of typing in the documents (using a keyboard) and scanning the documents into the computer. Many vague answers such as "enter the data into the computer" were given – these were too vague to be given any credit.

(b) Both first parts of the question were well answered. The most common error was to give Technical documentation/System guide instead of User documentation/guide and visa versa.

(c) Neither of the parts was well answered. Candidates often made the mistake of simply stating that an item in the User guide would tell the user how to use the system. For the Technical documentation items candidates often repeated the question stating that an item would explain how to update (or maintain) the system. What Examiners were looking for were more specific items such as how to load software; how to run software; how to log in (and out); how to save files; sample runs, etc. for the User guide, and program listings; flowcharts; file structures; hardware requirements etc. for the Technical guide.

(d) Many candidates scored half marks for this question correctly giving 2 of the 4 correct methods but then going on and describing not the reason for using that method but what that method was. So, for example, using parallel implementation is a correct method but 'is a method whereby the two systems are run side-by-side' did not gain credit for the actual reason of allowing a back up in case of failure.

Question 11

All parts of this question were well answered with very few candidates not scoring at full marks.

Question 12

(a) (b) Some knowledge regarding the usual information stored in bar codes would have helped candidates in this question. Many candidates did not give correct responses to either (a) or (b) often confusing the two. Common incorrect answers for (a) were "the price of the item" and "the date last checked", and for (b) "expiry date" and "age of equipment". Examiners were looking for: in (a) the equipment identification number or the date of purchase; and in (b) the date/time the equipment was checked, the person who had done the checking, whether the equipment passed or failed the check, and some reference to the maintenance history.

(c) Many candidates scored half marks for this question. The most incorrect answer referred to "the labels falling off" with candidates failing to realise that the bar codes would also be stuck onto the equipment as well as so could just as easily "fall off".

(d) Well answered by most candidates. The observant candidates noticed that there was a bar code on the front of actual examination paper, but many candidates correctly stated that they would be found on items in supermarkets.

Question 13

(a) Generally well answered with the commonest correct response referring to the programming of the robot. A common misconception was that a controller would be operating the robot.

(b) Often candidates gave a type of sensor for the answer to this question, e.g. a movement sensor, a laser sensor, etc. which *may* have created a little doubt for the Examiner, however, recognition that "a sensor" was the essential component was enough for the mark to be awarded.

(c) Not a well answered question. Common misconceptions were to state "the windows might be sprayed over" and "the conveyor belt has stopped". Correct responses relating to the contents of the spray can running out or some form of foreign object appearing between the spray gun and the vehicle usually led to an accurate description of a solution to the problem.

Question 14

This question was well answered in general. However, the following comments about use of formulae are worth noting. In the parts of the question which specifically ask for formulae, the responses need to be correct formulae. Common errors included giving the wrong cell references, and, where an = sign was included, placing it in a position which would make the formula incorrect, for example B8 = SUM(B2:B7) was acceptable and gained credit, but SUM(B2:B7) = B8 was not accepted.

Question 15

(a) Needing less space to store the details and fewer errors occurring were the commonest correct responses. Many candidates scored half marks for this part of the question.

(b) (i) Very poorly answered. Many candidates either gave a response which described some form of *validation*, or simply stated *proofreading*. Proofreading does not include comparing what has been entered into the computer to the original document. Double-entry or visual check by comparison with the original were the two correct responses expected.

(b) (ii) This was well answered by most candidates.

Question 16

(a) Very few candidates failed to score the mark for this question.

(b) Many candidates did not score well on this question. Confused logic seemed to be the main problem, for example: collecting input from outside any attempted loop without doing the same within the loop would result in very few responses being output; failing to increment any counter used to control the number of times a loop is executed would equally result in very few, if any, outputs; carefully initialising variables, setting up a correct loop and inputs gained credit, but then to merely state "calculate the best/worst fuel economy" was insufficient for a mark to be awarded for that part of the algorithm. It was common to see a count statement inside a **for … to** loop which would cause it to fail.

Question 17

The first three parts were very well answered with very few candidates not scoring the maximum three marks on offer. The fourth part was not answered so well. The correct response being looked for was the fact that data is collected about wages over a period of time and does not need processing straight away.

Question 18

(a) Not well answered by many candidates. Correct answers fitted around the idea that the outputs were used for different purposes – the graphical form to allow trends to be shown and the numerical form to display actual values.

(b) The mark for this element was awarded for the recognition that the heartbeat would be compared with some predetermined and set values before issuing any warning of abnormal readings.

(c) Many candidates scored one of the two marks on offer here, usually for recognising that a nurse or doctor would not need to be physically present taking the readings; that the readings would be more accurate; that it would be quicker to pick up any problems regarding the patient's condition; or, that it is easier to obtain trends/analysis of the readings. A common incorrect response was the idea that nurses or doctors would become unemployed because of this automatic monitoring.

(d) Not well answered. Examiners expected candidates to state that the monitoring system had no output influencing the input, that no equipment was controlled or that no changes to the system being monitored was occurring. A number of candidates stated the obvious: "the monitoring system just monitors but the control system controls the system". This was not enough for a mark to be awarded, as it was not clear whether the candidate understood how the monitoring system differed from a control system.

COMPUTER STUDIES

Paper 7010/02

Project

General Comments

The quality of work was of a broadly similar standard to previous years; however, some candidates failed to specify any real objectives at the beginning of the project. This is an extremely important omission since the assessment criteria place emphasis on these objectives and require 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 remained at a similar level to previous years; this was a problem for some candidates and some Centres. Some candidates produced some very good work which was based on a template found in specific textbook for a different examination; unfortunately this is not the correct documentation needed for this examination and, consequently, these projects did not score as many marks as they could if they had been documented according to the specific criteria for this examination. Where candidates and Centres find such a template, they need to check very carefully it allows the candidate to document those aspects required by the assessment criteria.

Overall, the standard of assessment by Centres is reasonably accurate, though there are some occasions where credit appears to have been awarded when there is no relevant work in the documentation. Also, sometimes a higher mark has been awarded than that warranted by the work. The largest area of discrepancy is concerned with the objectives and the links with later sections. Analysis of the assessment criteria will show that ***Section 7***, ***Section 12***, ***Section 13***, ***Section 14*** and ***Section 17*** all contain links back to the objectives. It is vital, therefore, that the candidates specify their initial objectives. It would be useful if these were numbered in some way so that it becomes easier to refer back to these in the later sections. It is also important that the candidates do not attempt to produce a solution to a problem which is beyond their scope, ‘an international airline booking system, ‘a database management for patients of a nation's hospital service' or ‘the administration of an international chain of hotels'. Teachers have a duty to advise their candidates as to the suitability of their chosen projects. Similarly, it is advisable not to impose a type of problem and then ask the candidates to find a suitable business for such a problem.

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 and Examiners 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 did not demonstrate that they have actually been run on a computer. Software advances and the use of ‘cut and 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 that the candidates had used a computer to solve their problem.

The standard of presentation and the structure of the documentation continue to improve. Many candidates structured their documentation around the broad headings of the assessment scheme and this is to be commended. It would appear that many schools provided their candidates with a framework for documentation. This can be considered part of the normal teaching process, but the candidates need to complete each of the sections in their own words. Each project must be the original work of the candidate. In cases where templates have been used and the candidates have simply reproduced a set piece of text, any credit awarded by the Centre will be reduced as part of the external moderation process. Candidates should provide an index page. Marking would be more accurate if the candidates annotated their work and moderation would be improved if Centres would 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 do not allow for a deduction for the trivial nature of any project. Centres should not make any deduction in such cases. 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 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 in the Centre is responsible for marking the coursework.

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. 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 continued to include setting objectives, plans, 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 candid+ates and they described/evaluated a system which was not the existing system. Credit can only be given in these *Sections* (***3*** and ***4***) for the current existing system. The method of solution must be explained in order to gain credit in ***Section 11***. In order to gain credit for test results (***Section 14***) candidates must include their test strategy including expected results. If a candidate scores no marks for a test strategy (***Section 13***) then they will 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 that they should supervise the candidate's work and that the candidate must verify that the project is their own work.

The hardware section often lacked sufficient detail; 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 produced 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.

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