COMPUTER STUDIES

| Paper 0420/01 |
| Paper 1 |

General comments

The standard of candidate's work was slightly lower than in June 2008. But there were areas where improvements could be seen. In particular, candidates seemed better prepared for questions involving the writing of pseudo-code or the creation of an algorithm from a given problem. It was also noted that the candidates' knowledge of databases seemed to be more robust.

However, some of the more up-to-date topics, such as the use of computers in the film and television industry, caused considerable problems for many of the candidates. Candidates need to be kept fully aware of changes in computing applications which are taking place all around them at a rapid pace.

There is also a definite move towards more understanding and application of the syllabus topics rather than just learning definitions "parrot fashion"; this has manifested itself by questions just requiring definitions being less well answered this year. This is a change in direction that should be welcomed and Centres need to build on this in future years.

Comments on specific questions

Section A

Question 1

(a)   This question was reasonably well answered. Most candidates were aware of the term batch processing and gave valid examples such as *payroll, utility billing, etc.*

(b)   Again this was reasonably well answered; although some candidates homed in on the "logging" part of the question and described how to log in to a computer system. A common error here was to choose *weather forecasting* as an example of data logging; data logging would certainly gather such information as temperature, rainfall, etc. which would be used to give weather *conditions*. Forecasting is a much more sophisticated process that goes way beyond data logging.

(c)   This question was either very well answered or badly answered. Many candidates still seem unaware of how video conferencing works and believe that a video is made which can then be viewed later by delegates. Some very good pointers can be found in the mark scheme.

(d)   There were some good answers here indicating that candidates generally understood the term *virtual reality* and also gave some good examples of its use e.g. flight simulators (training) and in 3D (arcade) games.

(e)   As expected, this question was well answered. Candidates really understand the effects of viruses – presumably since this is something they have probably encountered first hand and it is drummed into people about precautions that should be taken especially when using the Internet or opening "unknown" emails/attachments.

Question 2

This question was generally well answered, with OCR, OMR, MICR and examples of sensors being the most common correct answers. However, marks were lost by candidates just giving some vague answers like *scanner (which could be a generic term for many devices) or cameras (it would need to be specified that the cameras were either digital or video to get the mark)*.

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Question 3

(a) This was again fairly well answered. Weaker candidates just gave vague answers like *it looks after the hardware, looks after the software,* OR just gave three examples of file utilities. Stronger candidates made reference to file management, memory management, handling interrupts, servicing error messages, etc.

(b)(i) The majority of candidates supplied a suitable device here such as cameras, microwave ovens, automatic washing machines, etc.

(ii) This was a new question which was reasonably well attempted. Candidates clearly had to call on their understanding of operating systems to answer this part. Weaker candidates just quoted some of the tasks supplied in **part (a)** of the answer.

Question 4

(a) Candidates had to give the full answer here to get the mark. Many only gave part of the definition and consequently did not score any marks here.

(b) However, about half the candidates taking the exam were aware of how an interrupt can occur; for example, key presses (e.g. CTRL key), hardware (e.g. disk full, printer out of paper) or an operation naturally coming to an end (e.g. end of time slice in multi-access system).

(c) This was well answered, with the majority understanding the computer term *handshaking.*

Question 5

(a) This was fine for 1 mark but the second mark proved a little more elusive. Acceptable answers could include: special hardware (such as large hi res screens, plotters, spaceballs, etc.) and features (such as 3D, costings, zoom, etc.)

(b) This was reasonably well answered with many candidates gaining at least 1 mark. The most common error was to link CAD with creating animation (in film and television) which is an unlikely application of this software.

Question 6

This was generally satisfactory with many candidates getting half marks at least. A common error continues to be that it is *fast to send emails*; the real advantage is that it **reaches** its destination almost instantaneously. Marks were also lost for vague answers such as *can send the same message to many people (you can do that with standard mail – the point here is that it is MUCH easier to do using mail merge etc.), emails can be read any time (you can open and read a letter any time – the advantage here is that it is easier to store letters electronically for future use), etc.*

Question 7

This question was not that well answered with many candidates losing **all** their marks because they did not read the question properly i.e. candidates were asked to give four security issues. Unfortunately, many described **how to guard against** these issues e.g. *Jon would use a firewall, password, encryption and secure broadband connection* none of which answered the question i.e. risk of bogus website, people driving round looking for WiFi access (WarDriving), risk of credit card fraud, possibility of receiving viruses, etc.

Question 8

(a) No real problems to report here with most choosing unemployment, deskilling and re-training as the main issues.

(b) There were some very vague answers here such as *saves costs (but no reason **why** given) and staff could now work from home (and no reason given why this was an advantage) etc.* Only about a third of the candidates scored any marks here for answers such as: can offer 24/7 service, reduced cost since there is a reduction in the number of staff employed etc.

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(c) This question got some average answers with only the better candidates realising that the response would be quicker (no need to wait in a telephone queue waiting to be answered) and that users could contact the company at any time they wished.

Question 9

(a) This question was really badly answered with very few gaining any marks at all. Similar questions have been asked in the past with equally poor responses. Many vague answers were given such as *less expensive, less paper used, etc.* none of which really got to the core of why computers are used e.g. improvement in realism in the animation, use of avatars, tweening and morphing, faster/easier to edit animations, etc.

(b) This saw much better responses than **part (a)**. The only real criticism was that some candidates missed out the memory units so they lost one of the allocated marks. It was pleasing to see that the majority showed all their working so it was possible to award one mark even if the final answer was incorrect; Examiners could follow the candidates' logic and give this credit if they showed some understanding of the problem.

Question 10

As with previous years this question caused a few problems for many candidates who insisted on describing **how** the expert systems would be **used** and **not how it was created.** Accepted answers could include: get information from experts, create/populate the rules base, create human-machine interface, etc.

Question 11

(a)-(e) No real problems here; marks were lost for careless writing of formulae e.g. *C2 – B2 = D2 or D2 + D3 + D4 + D5 + D6 + D7 + D8 + D9/8 (i.e. no brackets), etc.* But generally these five question parts caused no real problems for the majority of candidates.

(f) This question was not particularly well answered. Those who did offer valid answers usually chose *24/7 monitoring, no need for humans to take readings, fewer errors expected, etc.*

Question 12

(a) This was generally well answered, but there were also some very vague responses offered such as: *factories, manufacturing and nuclear plants* – these answers were worth zero marks since they needed to be a little more specific. For example: car assembly lines, bomb disposal units, working in dangerous environments (e.g. nuclear plants, underwater exploration, etc.). Candidates also had to give a matching reason; again answers such as *faster, cheaper etc.* were given which were totally insufficient to gain a mark. Acceptable answers include: faster in operation than humans (therefore higher productivity), can work without breaks – 24/7, reduces the danger to human life, etc.

(b) Not at all well answered but there were some interesting responses given!! This was a difficult question requiring answers which referred to creativity (creating art, writing prose, etc.), areas where logic can not be applied or one-off tasks (such as bespoke glass blowing) where programming had not been done to allow for the task to be done.

Question 13

(a) This was not very well answered at all. The question was asking for features such as *shopping basket, secure credit card buying, interactive seating plans, hyperlinks to other websites etc.* General answers such as *price of tickets (the **feature** would be the drop down boxes showing the different prices), how to contact the company, navigation buttons (to do what??)* were all too common and did not gain the candidates any marks unfortunately.

(b) The majority of candidates got this right.

(c) About half the candidates realised that having different bar codes or serial numbers on each ticket would make the ticket unique. However, **part (ii)** caused real problems for over 90% of the candidates. They needed to give answers which referred to the bar code or serial number being linked to the customer's credit card or that some form of id was needed when presenting the ticket at the concert. It was very common to see responses such as: *a hologram would be on the ticket to show it was authentic* – unfortunately the candidates had not read the question, since it stated quite clearly that customers printed out their own tickets thus rendering their answer void.

Question 14

(a) Most candidates got the second answer right but found problems tracing the algorithm for the input value of 5. There was no pattern to the incorrect answers so it would seem that many candidates just guessed the answer. Centres should encourage candidates to draw up a trace table when doing this type of question – it would help them considerably to follow the logic.

(b) Although only about one third of the candidates answered this question correctly, the number of good attempts was significant when compared to other years. This was actually a huge improvement compared to previous attempts by candidates, and is strong evidence that many Centres are coming to grips with these questions involving pseudo-code.

Question 15

(a) Those candidates who realised this was actually a straightforward sensors/ADC question did well. Others did not do so well!

(b) According to many candidates we should be pleased that computers exist!! The number of pilots who fall asleep, panic if something goes wrong or make massive errors was quite disturbing! The question was looking for something slightly less dramatic such as: *computers do not get tired and can work 24/7, they are **less likely** to make mistakes and can respond more quickly to error conditions.*

(c) This was reasonably well answered with many candidates realising that pilots handle emergency or unusual situations better than most computers.

(d) This question was really badly answered with many referring to auto pilots and flight simulators. The expected developments included things like: faster processors, improved component reliability, increased complexity of aeroplane design, etc.

(e) Very few candidates realised that this was a GPS question under a very thin disguise!! Answers which referred to how satellites are used to keep the aircraft on course would all gain marks here.

(f) This was basically alright with many candidates offering acceptable reasons for incorporating bar codes on airport luggage.

Question 16

This question gave the full range of marks from 0 to 5. The main errors were:

- swapping items 3 and 4; card removed (item 3) would not happen until the later stages
- items 10 and 9 were reversed; candidates should have realised this was wrong from the box shapes in the flowchart
- items 3 and 8 swapped; again candidates should have realised their error if they had checked the shape of the flowchart boxes

Question 17

(a) Most candidates got this question right; this was an improvement on November 2008 when a similar question caused numerous problems.

(b) This caused no problems with the majority of candidates.

(c)   Not as well answered as expected. A very common error was to suggest that the data was coded as a security issue. Marks were also lost for "*saves space*" since this is far too vague (acceptable answer would be saves memory/uses less memory). Other acceptable answers include: faster to type in, leads to fewer errors being made and easier to validate the data.

(d)   Many candidates got the first mark for giving details from tables 1 and 2 but forgot that *LIST OF EXTRAS and COST PRICE($)* from table 3 would also be output. Candidates also lost marks for just listing fields or just listing field contents when the question clearly asked for both.

(e)   This was really badly answered with some very vague answers such as: *faster to find information, can not lose information, etc.* Acceptable answers include: can send out new product information, safety/service reminders, etc.

Question 18

There were some really good attempts at this question this year, especially considering that these algorithm questions are primarily aimed at grade A to C candidates. Centres are clearly getting to grips with the requirements of this type of question. Many candidates gained 4 or 5 marks and clearly showed a logical solution to the problem. Looping constructs were generally correct and calculations such as the % of each flight company were in the correct place and correctly written. All in all a good effort this year and Centres are to be congratulated on improving candidates performance in what was hitherto a very weak area of the paper.

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The quality of work was of a similar standard to previous years. A small number of Centres failed to realise that there had been changes to the assessment, including revised forms. This necessitated some additional changes to the scaling as a result of this error. It is vital the correct assessment criteria and documentation have been used. Centres are urged to look carefully at the specification and re-cycle any old paperwork and forms prior to this year. All candidates' work was therefore assessed according to the new criteria, some candidates marks were reduced to take this into account. A number of Centres put each candidate's project in a separate envelope, this is not necessary and is a waste of natural resources.

Most Centres assessed the projects accurately according to the assessment headings. Overall the standard of assessment by teachers is improving and Examiners are recommending fewer changes than in previous years. **Marks can only be awarded where there is written proof in the documentation.** In some instances marks are awarded by the Centre where there is no written evidence in the documentation. One or two Centres submitted no hardcopy but sent candidates' work on CD's. This is clearly not allowed in the specification and where this happened Centres were contacted to provide hardcopy evidence. Moderation of these Centres is therefore delayed until this can take place, this may affect the publication of candidates' results. Centres should note that assessment of the project can only be by reference to the criteria in the syllabus and that Centres must not devise their own mark schemes. There are still a small number of Centres that award half marks, which is not allowed by the syllabus.

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. Some projects do 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 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 Schools 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. Where it is found that candidates use large sections of identical wording then all credit will be disallowed for these sections for all candidates in the Centres and this will be reflected in the scaling recommended by the Moderator.

Centres should note that the project work should contain copies of the MS1 forms, 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 MS1 mark sheet should be sent to CIE by separate means. 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 archive 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

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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. This is an area for improvement by many candidates whereby they do not specify their objectives in computer-related terms, e.g. to make a certain process faster. 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.. The revised assessment criteria for 2004 place a clear emphasis on setting objectives in business and computer-related terms.

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 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. Some candidates produce pages and pages of code, usually auto-generated, which does not serve a useful purpose and could easily be omitted. Any such code will not score credit unless it is annotated. 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, links and any macros should be included. Centres may wish to know that the use of modules when using a database package should include the use of linked tables. Similarly when using spreadsheet modules can be achieved by exporting data from one worksheet and importing into another spreadsheet, i.e. the spreadsheets are linked together. Centres might wish to encourage the candidates to use validations checks, lookup tables and what-if analysis.

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.

One of the changes in the assessment criteria for this year included the inclusion of contents pages. A large number of candidates did not include any contents page and therefore should not have been awarded any marks in the technical documentation section. A contents page should ideally be the first page of the report listing the main headings and subheadings together with the page number for each section. At the very least the technical documentation section should be a separate section and this must have its own contents page. Without either of these two acceptable contents pages the candidate must not be awarded any marks for technical documentation.

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, in this case the work would qualify for the marks in the modules section. Candidates might also consider designing an on-line form or questionnaire for submission which can then be tested.

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