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COMPUTER STUDIES

Paper 0420/01

Paper 1

General comments

The standard of 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. Again, many of the weaker candidates scored well in the first few pages where the questions were testing knowledge of basic terms and not an understanding of the topic. However, the terms electronic scabbing and expert systems caused problems for a surprising number of candidates.

Questions involving programming and/or algorithms caused a definite problem with several candidates. In particular, **Question 16 (a)**, which was a standard validation technique, caused a number of candidates considerable problems.

Comments on specific questions

Question 1

(a)(b)(d) These were fairly well answered with most candidates gaining two marks here.

(c) Many candidates gained one mark for the correct numerical size of a gigabyte, but many failed to mention that this was a unit of storage. It was surprisingly common for candidates to refer to a gigabyte as a measure of speed or power of a computer.

(e) This was not well answered; the concept of GFS was known, but very few candidates understood *why* file generations were kept.

Question 2

(a) The first two parts were well answered; however, many confused the use of a scanner with that of a bar code reader. The question was looking for answers which referred to the ability to transfer printed documents into a computer file.

(b) In general, this part was well answered. Most candidates chose speakers, microphones and web cameras as the additional hardware needed for electronic conferencing.

Question 3

(a) Most candidates gained one mark here. Many, however, ignored the stem of the question and gave answers relating to changing, deleting and copying data. Accepted answers included: viruses introduced into the system, industrial/commercial sabotage, locking user out by changing passwords, etc.

(b) Again, most gained one mark here. The following answers were acceptable: use of passwords, encryption, firewalls, dial back modems, etc.

Question 4

(a) Most candidates gained marks by referring to the sharing of expensive hardware (e.g. printers) and software.

(b) This part was not particularly well answered, with the most common answer again referring to the spread of viruses. Other acceptable answers included: when the file server is down the whole system goes down, expensive wiring/cabling is required, etc.

Question 5

(a) This was not well answered, with many candidates giving PIN, balance of account and customers' names as answers. Possible items included: account/card number, expiry date, etc.

(b) This was badly answered with many candidates referring to what happens when the card is lost i.e. ring up card company and report loss, you can only try to enter the PIN three times, etc. Very few gave two correct answers from: hologram built into the card, embedded chip containing coded data, signature on the back of the card, etc.

(c) Very few gained high marks here. Most candidates gained one mark by referring to the fact that the card could be stolen. Acceptable answers included: reference to PIN as a security identifier/password and it stops unauthorised access to the account, etc.

Question 6

(a) Very few gained any marks here at all. This was a new topic for the 2003 syllabus and clearly several Centres had not covered this. Electronic scabbing refers to the ability of managers to switch computer processing from striking clerks in one office/location to non-striking clerks in another office/location.

(b) This was fairly well answered with many candidates gaining 2 marks. It was, however, common to see answers referring to hacking, power loss problems and viruses – none of which are problems when *switching* from a manual to an electronic office! Acceptable answers included: redundancies, deskilling, need for re-training, time taken to transfer documents, etc.

Question 7

Surprisingly badly answered with many answers, such as user documentation and technical documentation, given which gained no marks. The question was looking for answers which form *part* of the documentation such as specimen inputs and outputs, troubleshooting, file structures, testing strategies, algorithms, etc.

Question 8

(a) Very few candidates gained two marks here with answers such as "CD ROMs hold more data" – there is a need here to refer to the fact that it would require several floppy disks to hold the program/files/data and would be very slow to, for example, install. Several candidates also wrongly claimed that CD ROMs cannot contain viruses. Acceptable answers included: reference to access speeds, inability to alter CD ROMs, etc.

(b) Advantages of using e-mail were well answered with most referring to speed of transfer and lower costs when compared to standard postal services. The disadvantages were less well defined with answers such as "e-mails may not be opened", "customer may think it is junk mail", etc. – none of which are specific to e-mails! It was, however, acceptable to mention that people may not have e-mail addresses or that there could be problems with hacking or the size of attachments, etc.

Question 9

(a)(b) No problems here with majority of candidates gaining full marks.

(c) Marks were lost here by writing POWER(W)>70W rather than the correct statement of POWER(W)>70.

(d) Many gained full marks in this part – the only errors were giving the **Code_Num** in descending order.

Question 10

(a) This was generally reasonably well done. Surprisingly, part **(iii)** gave problems with many choosing items from column A or from row 1 which were not data items.

(b) Part **(i)** was generally alright; the only error being reversal of the formula i.e. F2/E2. Most candidates did reasonably well here with descriptions of cut and paste or drag and drop.

(c) This was well answered with SUM(B2:B7) being the most common answer. The only real error was to write SUM(B2:B7)=B8.

(d) This was poorly answered. Many candidates gave glib answers, such as draw a graph, with no explanations. There was a need to indicate how the graph would be used e.g. draw graph, extend the line for the next six months to predict the costs or double the totals in cells B8 and E8, etc.

Question 11

(a) The majority of candidates gained two marks here – many got the first answer wrong (i.e. input of 150 should give the output: abnormal reading).

(b) This part was not well answered. A number of possibilities existed here, for example: variable *whole* would not be defined, algorithm would fail/crash, etc.

Question 12

(a) This was well answered. The only errors were to give YF as the answer or to put a 1 in front of the answers i.e. 14 and 1F.

(b) This was generally satisfactory with the majority of candidates giving the correct response.

(c) This part was not well answered with few candidates understanding the concept of analogue and digital displays. Many referred to the need for ADC/DAC etc. which missed the point of the question. The advantages of analogue displays included: steadier readings, easier to understand, can see trends, etc. Disadvantages of analogue displays included: not as easy to read as digital, needs interpretation by user, etc.

Question 13

(a) Badly answered with most candidates ignoring the fact that the questions wanted to know the steps in *creating* an expert system. Many described how to use/interrogate an already existing system. There was a need to refer to collecting data from experts in the field, creating a knowledge base, create the interrogation technique, refer to inference engine, etc.

(b) This was not particularly well answered with general, vague answers being given e.g. “would give the name of the mineral”, etc. Acceptable responses included: simple yes/no questions, use of menus/icons/windows, help facilities, etc.

Question 14

(a) Many candidates scored two marks here for temperature sensor and pH/ acidity sensor. Quite a few just gave the word "sensor" which was not worth any marks. Other answers could include: ADC, DAC, actuators, etc. No marks were awarded for items such as heaters, printers, screens, etc. which did not answer the question.

(b) This was not well answered – even though feedback has been on a number of papers in the past. Comparison to stored values, outputs affect the inputs, etc. were all acceptable responses.

Question 15

Many candidates gained full marks here. There were few problems to report with this question. The concept of updating a payroll system was clearly well understood.

Question 16

(a) This question was not particularly well answered with many candidates simply re-wording the question or giving an essay rather than an algorithm. The question was a simple range validation check with the main requirement to do the following check:

If number<1000 **or** number>9999 **then** …….

(b) Very few candidates gained more than two marks here. A common error was to give a range check in spite of it being given in the question. Acceptable validation checks included length check, character check and type check.

Paper 0420/02

Project

General comments

The quality of work was of a similar standard to previous years. The number of inappropriate projects which provided limited opportunities for development and therefore did not qualify for one of the higher grades was fewer than in previous years.

The majority of 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.* Some Centres are awarding half marks and these are not allowed by the scheme of assessment. In these cases the marks had to be corrected by the Moderators. In some instances marks are awarded by the Centre where there is no written evidence in the documentation. 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. A small number of Centres are awarding high marks to projects which are poorly documented and lacking in substantial detail. Consequently the marks for these Centres have had to be reduced by a substantial number of marks.

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 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.

One or two Centres used the wrong form to record the assessment of the candidates' projects. 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. In addition, the MS1 mark sheet should be sent to the University of Cambridge International Examinations by separate means. It was pleasing to note that the vast majority of the coursework was received by the due date. 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.

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 projects, 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. 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. It is particularly important that candidates evaluate the success of their project against the original objectives they set themselves. This will be an important part of the new assessment scheme from 2004 onwards. It is therefore vital that the candidates set their objectives in terms of the computer processing requirements, as well as any overall business objectives.

There was evidence that some candidates appeared to be using a textbook, or the Teacher's notes, to describe certain aspects of the documentation. 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.

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, links and any macros should be included. Many candidates failed to include hard copy of prints using the display formula option. 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 packages, modules can be achieved by exporting data from one worksheet to importing into another spreadsheet, i.e. the spreadsheets are linked together. Centres might wish to encourage the candidates to use validation 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. There was some misunderstanding concerning the three types of test data. Normal data must be of the correct type and within the defined upper and lower limits. Extreme data is data of the correct type which is located inside and precisely at the upper and lower limits. Abnormal data is any data that includes data of the incorrect type and data of the correct type but outside the defined limits.

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1.Normal data.

2.Extreme data. These test the behaviour of the program when valid data at the upper and lower limits of acceptability are used.

3.Exceptional (abnormal) data. Programs are usually designed to accept a certain range or class of inputs. If invalid data is used, data which the program is not designed to handle, the program should be capable of rejecting it rather than attempting to process it.

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.

Centres should note that the syllabus changes for 2004 include a revision of the assessment criteria for the coursework project. It is hoped that the new arrangements provide more structured guidelines on the awarding of marks in each section. Centres might wish to archive any documentation/forms relating to 2003 or earlier and to ensure that only the new assessment criteria and relevant forms are used. The assessment forms and guidance can be found in the 2004 syllabus starting on page 17. *The most significant aspect is the emphasis on the setting of objectives. If candidates are to score marks in the testing and evaluation sections then the objectives need to be set in data-processing and/or computer-related processes which can easily be tested and evaluated. It is recommended that these objectives are numbered in order to make it easy for candidates to keep referring back to them in the test strategy, test data and evaluation sections.* Exemplar projects and their assessment, together with suggestions for improvement can be found in the Distance Training Pack available from CIE. Teachers of IGCSE Computer Studies who are already accredited do not need to be re-accredited and so there is no need for them to complete part 2 of the training pack.