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FOREWORD

This booklet contains reports written by Examiners on the work of candidates in certain papers. **Its contents are primarily for the information of the subject teachers concerned**.

UNIVERSITY *of* CAMBRIDGE
International Examinations

Computer Studies

| Paper 0420/01 |
| Paper 1 |

General comments

The standard of work from the candidates this year was similar to that in previous years. Again, **Question 17** caused problems for many candidates, but equally there was evidence that some Centres prepared their candidates very well for this type of question.

It was regrettable that an error appeared in **Question 7**. Unfortunately, the spacing in the actual records did not match up with the character allocation in the initial description. This was taken into account when the final mark scheme was developed; there was no evidence that any candidate was disadvantaged by this error on the paper.

Comments on specific questions

Section A

Question 1

(a) This was badly answered by many candidates. Most marks were gained for examples, such as medical diagnosis and mineral/oil prospecting. Common errors were to believe that expert systems learn from their mistakes; in the examples given, many candidates just gave the medical field as their answer which is too vague.

(b) This was not very well answered. Although, several candidates gained one mark for realising that electronic scabbing allows switching of computer-based tasks to another country/location.

(c) Many candidates gained one mark for the first part of the top down design definition; namely, the breaking down of a larger task. A common error was to say that the larger task was broken down into another smaller task (singular) which would not be of any great benefit.

(d) This allowed most candidates to gain one mark (i.e. break in execution of a program/operation/task). Many gained their second mark for a relevant example, such as printer out of paper.

(e) This was well answered with the majority of candidates gaining full marks for the simple definition: temporary memory.

Question 2

This question caused a few problems with a large number of candidates gaining one mark only (i.e. for mentioning that the software would be available immediately). Other points being looked for included: fully tested software, ready trained workforce, links with existing software, etc.

Question 3

(a) This was generally well answered although some interesting star networks were drawn by some candidates. Marks were frequently lost for unlabelled diagrams and for literally drawing a star.

(b) This did not cause any major problems although *cables* was frequently chosen as an example of a device.

Question 4

(a) This was reasonably well answered with several candidates gaining all four marks for viruses (and using anti-virus software) and hacking (protected by using passwords and firewalls). Many lost marks by giving hardware failure, which was an acceptable response, but suggested using back ups to prevent system failure.

(b) Many candidates gained one mark by giving reference to back up files being used. Other marks could be gained by mentioning file generation, re-loading/re-installing the software or the files.

Question 5

(a) The first part of the question was well answered with no real problem to report.

(b) The most common error was to describe real time processing (such as in chemical plant monitoring/control).

(c) Both sections were generally well answered with most candidates gaining at least half marks.

Question 6

(a) The first part of this question was badly answered with many candidates claiming an advantage over telephones is the ability to use the Internet at any time of the day and also credit card transactions can be used when ordering on-line (many call centres now offer 24 hour systems and certainly credit card transaction can be done over the telephone, so these cannot be claimed as a definite advantages any more).

(b) Many candidates got the correct type of access but the reason for their choice was often very vague. The question was looking for answers such as need to update files quickly (to stop double booking), fast access to files required (to deal with customer requests), etc.

(c) The last part was generally well answered but marks were lost by some for not reading the question properly – *different* validation checks were required for each of the three items.

Question 7

(a) Due to an error on the examination paper, two answers were possible i.e. *Finance* or *Management.*

(b) There was little evidence that the error on the paper had caused any problems to candidates with many gaining all three marks. The possible different positioning of characters in the record was taken into account when Examiners awarded marks – no candidate was disadvantaged by this error in the question.

(c) This was well answered with many candidates gaining marks for mentioning that less memory was used (although less space used was not accepted) and less typing required. It is still too common to see answers such as "it is faster" and also "coding stops hackers getting access to data". Coding is not the same as encryption but this common misinterpretation still persists.

(d) Many candidates realised that "years in the company" would need to be updated every 12 months, but did not realise that by simply storing the date/year of joining the company would resolve this issue. Many thought storing a person's name would solve the problem because this would identify the employee.

Question 8

(a)   The first part did not cause any real problems with 3D imaging, use of graphics features and ability to do calculations being the most common responses.

(b)   Many lost marks for simply giving monitor as the answer in **(i)** or giving printer as the answer in **(ii)**. Both needed further enhancement (or a different choice of hardware); for example, hi resolution monitor, plotter, etc.

Question 9

A good range of marks from 0 to 6 were seen from this question. The most common error was to mix up "card retained" with "card ejected from ATM".

Question 10

(a)   It was common to get digital confused with binary and also to claim that digital systems did not need any conversion since the computer understands digital data.

(b)   This question was not particularly well answered; the majority of marks came from the understanding that digital displays are easy to understand/read. Additional mark points include: faster response to changes and more robust technology.

(c)   As in **(b)** this question was not well answered. The main advantages of analogue displays are that they are more natural to humans, readings are steadier and more accurate than digital and tend to be easier to repair.

(d)   Many candidates correctly named a device (e.g. washing machine, TV set, DVD player, etc.).

(e)   This part was not well answered. The involvement of the microprocessor was a little sketchy with answers such as "it allows the washing of the clothes", "it allows the programmes to be watched", etc. – these are far too vague to gain any marks.

Question 11

This was generally fairly well answered but many candidates did not give an example of a disability where the chosen device would be useful, e.g. "braille keyboard to allow input" – although the choice of device is correct, the reason is too weak for a mark.

Question 12

This question was not particularly well answered. Candidates still seem generally unaware of the tasks done at each stage in systems analysis. Acceptable answers include: ANALYSIS – research using interviews/questionnaires/observation, interpreting user requirements, etc. DESIGN – specify the hardware/software, design input/output screens, algorithms, validation techniques, etc. IMPLEMENTATION – install new hardware/software, transfer files/documents to new system, changeover (parallel, pilot, direct, phased), etc.

Question 13

(a)   The first part caused few problems but it was still common to see A2÷2 instead of A2/2.

(b)   Many gained one mark for drawing graphs or insert extra columns. Few gained the second mark for the next stage (e.g. read off values from the graph, use formulae to estimate new values, etc.).

(c)   This did not cause any problems but marks were still lost for writing: SUM(A2:B6) = B8.

Question 14

(a) Very few gained more than one mark. Several candidates suggested money would be saved because the managers would not have to buy computers for their employees – this clearly would not be the case since they would still need computer equipment at home.

(b) This part of the question was reasonably well answered with many candidates correctly identifying reduced travelling costs, reduced stress levels and ability to spend more time with the family.

(c) Again, this part of the question did not cause any major problems. Most candidates identified video conferencing, the Internet and emails as the main contribution to allowing working from home.

Question 15

(a) This caused few problems – the most common error was to confuse ADC with DAC.

(b) This was badly answered since many candidates attempted to describe full control systems and not just feedback as required by the question. Consequently, many candidates lost marks by referring to ADC, DAC, sensors, etc.

(c) This part was quite well answered with many candidates correctly identifying safety aspects, more consistent quality, continuous 24/7 operation and easier to modify the process.

Question 16

(a) The first part was very well answered with the main features of multimedia described i.e. sound, video, animation, hyperlinks, etc.

(b) The second part did not cause any major problems although some candidates just said "the Internet" and did not say how it was used (e.g. emails, use of web sites, etc.).

Question 17

This question caused the usual problems with many candidates simply re-wording the question without supplying an actual algorithm. Marks from 0 to 6 were seen on this question.

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Paper 0420/02
Project
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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 the previous years.

The majority of Centres assessed the projects accurately according to the assessment headings. However, we are recommending more changes than in previous years. Centres should note that half marks are not allowed. *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. 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 failed to use the correct assessment criteria and, in these cases, the work had to be marked by the Moderator and the marks increased or decreased accordingly. Centres should ensure that copies of all syllabus for previous years have been destroyed, together with all copies of the marksheets which are dated 2004 or before. Centres should only use the forms taken from the current syllabus or those provided by CIE for the current examination. A small number of Centres also failed to include a copy of the MS1 for the Moderator. Also, it is a requirement that the marks entered on the MS1 should be after any teacher deduction and after any internal moderation, i.e. the marks must be the candidates' final mark. Centres should also note that it is no longer a requirement to send all the projects for external moderation. The exact number of projects to be submitted will vary with the number of candidates. Details of the sample size can be found in the syllabus. It is recommended that as a part of the sample, the Centre should automatically include the highest and lowest mark, together with a representative sample of the other marks awarded by the Centre.

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; 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 wordprocessed. It is recommended that candidates make use of appropriate screen dumps and include these in their documentation to show the use of a computer. If necessary, the teacher should verify that these screen dumps are accurate.

The standard of presentation and the structure of the documentation have been maintained. However, Examiners do see projects which contain several hundred pages and this should not be necessary. Candidates should be advised to number their pages and to provide an index. 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.

The assessment forms for use by Centres do not allow for a deduction for the trivial nature of any project. If this is the case, the Centre is using the wrong form and must stop marking immediately, obtain the correct form and re-mark the projects. One of the Moderator's roles is to make such a deduction. Therefore, if the Centre thinks that a deduction should be made 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 retains 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 Cambridge International Examinations by separate means. It was pleasing to note that the 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. The syllabus states that disks should not be sent with the projects but 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 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, software, 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 (this should be interpreted as a business aim/objective). 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 criterion for 2004 places a clear emphasis on setting objectives in business and computer-related terms. If this is not done, then the candidate cannot score full marks in several of the later sections. Candidates are often awarded full marks incorrectly especially in those sections where the final mark demands that the test strategy, test results, evaluation, etc. must be linked to the original objectives. Many candidates fail to make these links and so marks have to be deducted by the Moderators.

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. Similarly, candidates need to describe and justify their use of software.

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 between worksheets and any macros used 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 this 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 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 *must* include the predicted results and output, both before and after any test data. Such printouts should be clearly labelled and linked to the test plans. This will make it easier 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. In this case, the work would qualify for the marks in the modules section. Candidates might also consider designing an online form or questionnaire for submission which can then be tested.

Other areas for improvement include the inclusion of a time scale for the overall plan in Section 7. Many candidates do already include a Gantt chart for this purpose. This is something that other candidates would be advised to do. Most candidates do not number their objectives. Even where they do, they do not often refer back to these objectives when they are supposed to. It is recommended that all candidates number their objectives and use this numbering system when linking back to these objectives (see assessment criteria sections 7, 12, 13, 14 and 17). In order to explain that the solution is related to the candidate's own problem, it is highly recommended candidates annotate any coding whether written by them or software generated.

Tests strategy and test result is one area where many candidates could gain extra marks. In forming a test plan candidates should specify which objective is being tested, what data is being used, which type of data is being tested (normal, extreme or abnormal, NOT text/currency/date, etc.) and what is the expected result. It is also expected that candidates will produce hard copy evidence of their actual results.

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.

Objective 1

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 an alphabetic entry, with a validation rule that it should be limited to five characters in length.

Objective 3

Data	Type	Expected result	Notes
A	Extreme	accepted	Length 1 character
Any	Normal	accepted	
apple	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 online form. The website should include links between pages and these would need to be tested by linking to the previous, next and home pages.

Objective 1

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.

If one of the objectives is to add, edit or delete records from a database then the candidate should provide off records before making a change, create the addition/amendment/deletion, and print off the records after the change. The candidate should then highlight the relevant records so that the changes are easily recognised.

If the project involves the use of spreadsheet, the candidate must print off the formulas together with an explanation of how they work. Any linking of worksheets must also be explained.