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# COMPUTER STUDIES

**Paper 0420/01**

**Paper 1**

## General comments

This year the standard of the candidate's answers was marginally better than in previous years. The paper produced a good spread of marks.

Majority of the candidates demonstrated a good knowledge of the syllabus content. Weaker candidates lost marks due to either not reading the questions properly and therefore not answering the question as asked, or not relating their answers to the information given in the stem of the question. In general the candidates used their time well.

Most of the candidates wrote their algorithm for **Question 17** in standard pseudo code. Candidates that chose to use the Case of……..Otherwise…..Endcase structure obtained full marks much more easily than the candidates that constructed their algorithm using an If…..Then……Else…..Endif structure.

## Comments on specific questions

Generally candidates were awarded one mark for each correct point/answer or example.

### Question 1

**(a)** Almost all of the candidates knew that a buffer is a temporary store and were awarded two marks.

**(b)** Very few candidates knew that a gateway allows a computer on a LAN to communicate with a computer in a WAN. Weaker candidates did not answer this question.

**(c)** Most of the candidates gained two marks for stating that validation is a check on data as it is being input, or by giving two examples of a validation check.

**(d)** Very few candidates answered this question correctly. Testing a station in a multi-access system to establish whether it is holding data for transmission/collection would have been a suitable definition of polling.

**(e)** There were many good answers, automatic capturing of data with weather forecasting as an example was an answer that gained two marks. Weaker candidates confused data-logging with monitoring people's heart or blood pressure.

### Question 2

This question was well answered by almost all of the candidates. Candidates in general appeared to have rote-learnt the tasks done by the operating system and gained two or three marks easily.

### Question 3

**(a)** Many candidates confused legal rights with data protection rules and in consequence gave incorrect answers such as the right to sue and that data must be processed lawfully. A correct answer was the right to view the data and have the data corrected.

**(b)** Weaker candidates gave incorrect answers that included back-ups and anti-virus software, neither protects personal data. The popular correct answer was password.

**(c)** The common wrong answers given were firewalls and back-ups, neither is a hardware method used to protect personal data. Correct answers included using a removable drive and locking the keyboard.

**Question 4**

This question was very well answered by majority of the candidates who had obviously learnt how a camera works.

**(a)** A few candidates confused input and output and consequently gave an image or a photograph as the input.

**(b)** This was usually answered correctly. Correct answers given included direct transfer to a home computer for printing and no need to buy a film.

**Question 5**

Many candidates obtained high marks on this question.

**(a)** A few candidates confused rows, columns and cells and consequently gave 6 or 60 as their answer. The correct answer was 10.

**(b)** This question was well answered.

**(c)** A few candidates got confused and wrote "integer real" as their answer, other than that the question was usually answered correctly.

**(d)** Fixed-length records is quite a difficult concept, therefore only a few candidates obtained this mark. An acceptable answer was that it allows an accurate estimation of the storage space required.

**(e)** Most of the candidates obtained both of the available marks.

**(f)** Common errors were to either write STOCK (rather than INSTOCK), miss out the $ sign after PRICE, or to write PRICE($)>$100. A correct answer is (IN STOCK) <16) AND (PRICE ($) > 100). Almost all of the candidates were awarded at least two of the three available marks.

**(g)** There was some confusion between "STOCK NO" and "IN STOCK", when the correct answer "STOCK NO" was given the reason given was usually correct.

**Question 6**

**(a)** A few candidates gave the wrong answer 5A.

**(b)** This was usually well answered. Common errors were to use "X" rather than "* " in the formula or to write "= F7" at the right hand end of the formula.

**(c)** A good description of replication was normally given.

**(d)** A mark was available for each of the ranges (A7:A11) and (E7:E11). Most of the candidates gained both marks, whilst a small minority gained one mark.

**(e)(i)** Very many candidates either gave vague descriptions of sorting or just repeated the words in the stem of the question and were not awarded any marks.

**(ii)** The common error was to confuse ascending order with descending order.

**Question 7**

Many candidates wrote a lot but gained few marks because their answers did not directly relate to computers. Popular correct answers included finger printing systems, number plate recognition systems and the use of evidence from security cameras/CCTV systems.

**Question 8**

**(a)** A hot wash was the correct answer given by almost all of the candidates.

**(b)** The correct answer given by the majority of candidates was:

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |

**(c)** A correct task for example spinning or drying was given by most of the candidates. Incorrect answers included actual microprocessor controlled devices such as a microwave and a digital watch.

**Question 9**

Candidates in general lost marks because they confused smart cards with credit cards.

**(a)** The question asked for the data stored on the microchip in a smart card. Majority of the candidates gave data that is stored on a credit card but not a smart card chip so they could not be awarded any marks.

**(b)** The candidate's knowledge of the effects on banks and businesses was limited. Very few candidates could give a suitable disadvantage, some acceptable answers were the high cost of replacing the cards and that point-of-sale (POS) terminals need converting to enable them to read smart cards.

**(c)** Candidates usually gained one mark for knowing that a smart card could be used as an identification card. A small number of candidates gained the second mark for knowing that it is used as a debit card or for storing medical information.

**Question 10**

**(a)** Candidates in general showed a good understanding of the advantages and disadvantages of using the Internet to search for information and usually obtained two or three marks.

**(b)** Most of the candidates knew that Broadband gives faster access and gained one mark. Very few candidates gained a second mark. Other suitable answers would have been that Broadband is not metered and that the telephone can be used whilst accessing the Internet.

**(c)** This question was well answered. The benefits given included less cables and that a student can sit anywhere in the library that is within range. The disadvantages focused on the limited range and blocked signals.

**(d)** A variety of correct answers were given which included a DVD, Zip disk and CD.

**(e)** Generally well answered. Popular correct answers were a screen filter and a chair that had good support for the back.

**Question 11**

**(a)(b)** Both of the questions were not well answered. Parts **(a)** and **(b)** were muddled, hardware was confused with software and the answers that were given were too vague to be awarded any marks.

**Question 12**

**(a)** Many of the answers given focused on the introduction of the computerised system rather than the final analysis that includes costs, benefits and whether the proposed system will meet the objectives.

**(b)** Almost all of the candidates gave interviews and questionnaires as answers and obtained full marks.

**(c)** Most of the candidates tried to rephrase the question and were not awarded any marks. A correct answer given by the minority was that the results from the new system can be checked against the old system.

**(d)** This question was not well answered. Almost all of the candidates gave a suitable example of technical documentation. Very few candidates could explain what user documentation was or give an example of it. Weaker candidates confused technical documentation with user documentation.

**Question 13**

**(a)** Candidates usually realised that the loop would not end, but many failed to give a reason w

**(b)** The candidates that answered part **(a)** correctly also did well in part **(b)**.

A correct answer is:

```
set     X = 0
while   X < 8  do
        X = X + 2
        print  X
endwhile
```

**Question 14**

**(a)(b)** Many of the candidates were able to give a type of program that should be written in assembly language, for example an operating system or a game, but very few were able to explain why assembly language is used to write it.

**Question 15**

Majority of the candidates showed a good knowledge of real-time processing. An airline booking system was the popular correct application that was given by almost all of the candidates.

**Question 16**

**(a)** Candidates either gave reasons why the current system needed updating or the benefits of a computerised system, either was awarded the mark.

**(b)** Almost all of the candidates knew direct access would be used to retrieve a patient record.

**(c)** A new patient being admitted was the common correct reason given for inserting a record. Weaker candidates gave incorrect reasons for updating a record, a suitable answer was a change of address.

**(d)** Most of the candidates were awarded one mark for stating that the backup file(s) would be used, but very few gained the second mark that was awarded for an explanation of how the file(s) would be used to restore the system after a failure.

**(e)** The question explicitly asked for two tasks other than storing patient records that the hospital could use the computer system for. A significant number of candidates however, gave tasks that involved storing patient records and they lost marks accordingly. Suitable tasks were, for example, stock control of the medicines in the pharmacy, monitoring patient conditions and the employee payroll.

**Question 17**

This question was attempted by almost all of the candidates. Very few remembered to initialise all of the variables. Many did not increment the results. Weaker candidates could not construct the loop correctly.

A correct algorithm is:

```
d = 0, m = 0, p = 0, f = 0, counter = 0
repeat
        input mark
        if mark > 69  then d = d + 1
        if mark > 59  and < 70 then m = m + 1
        if mark > 49  and < 60 then p = p + 1
        else f = f + 1
        counter = counter + 1
until counter = 25
print d, m, p, f
```

**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. Examiners 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 syllabuses for previous years have been destroyed, together with all copies of the marksheets which are dated 2003 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. 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 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 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. 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 see projects which contain several hundred pages, and this should not be necessary. 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 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 it is the case that the form contains a section for the trivial nature, then 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 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 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. It causes some considerable problems in the moderation process where Centres fail to meet this deadline. Although the syllabus states that disks should not be sent with the projects, it is advisable for Centres to make back-up copies of the documentation and retain such copies until after the results query deadlines. Although disks or CDs should not be submitted with the coursework, the Moderators reserve the right to send for the electronic version. Centres should note that, on occasions, coursework may be retained for archival purposes.

The standard of marking is generally of a consistent nature and of an acceptable standard. H[illegible] are a few Centres where there was a significant variation from the prescribed standard, ma[illegible] reasons previously outlined. It is recommended that when marking the project, teachers indica[illegible] appropriate place where credit is being awarded, e.g. by writing in the margin 2,7 when awarding two [illegible] for section seven. A small number of Centres are beginning to adopt this convention and it is hoped [illegible] 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. 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. If this is not done, the candidate cannot score full marks in several of the later sections.

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 and 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 a spreadsheet, modules can be achieved by exporting data from one worksheet and importing it 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 and 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 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.

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 where they are supposed to. It is recommended that 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 would help candidates if they would annotate any coding, either 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 m solution is employed the data could be tested as follows for a numeric entry with a validatio 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 5 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 on-line form. The website should include links between pages and these would need to be tested by linking to the previous, next and home pages.

**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 print off records before the change, make 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.