# CONTENTS

# COMPUTER STUDIES

**Paper 0420/01**

**Paper 1**

## General comments

The performance of the candidates was marginally better this year. Few candidates obtained very low marks and a number scored very high marks. Most of the candidates were able to make a sensible attempt at most of the questions.

Candidates in general seem to be getting better at **Question 1** which tests factual knowledge of computer terms, but marginally worse at questions which involve constructing algorithms using flow charts or pseudo code.

The questions that the candidates found most difficult were **Questions 2**, **5**, **9**, **13** and **14**. Weaker candidates confused a graphical user interface (GUI) with a drawing program. Many candidates lost marks because they wrote down trade names for answers instead of stating the type of software. Some of the candidates did not read the questions carefully and therefore did not answer the questions asked.

All of the candidates appeared to have had sufficient time to answer all of the questions.

## Comments on specific questions

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

### Question 1

This question was much better answered than in previous years. Many candidates gave 'text book' answers for the definitions and gained the marks easily. Simulation, however, is still not clearly understood by most of the candidates. Two examples gained two marks.

**(a)** Almost all of the candidates knew that a byte is a fixed number of bits often corresponding to a single character.

**(b)** The majority of the candidates had learnt the definition of a compiler and gained two marks easily. The fact that a compiler is a program that converts a high-level language program into machine code in one go was enough for two marks.

**(c)** Handshaking was well understood, candidates obtained full marks for stating that handshaking is the exchanging of signals between two devices to establish communication.

**(d)** Most of the candidates gained at least one mark for technical documentation. This year very few candidates confused technical documentation with user documentation. The popular correct answers were uses such as updating and error correction and examples which included file structures and program listings.

**(e)** Candidates struggled to give a coherent definition of simulation; most of the candidates gained one mark for an example such as a flight simulator. An acceptable answer for two marks was that simulation is studying the behavior of a system by using a model.

### Question 2

**(a)** Very few candidates gave both parts of the answer. Both a device and the method of transmission were required for marks to be awarded.

**(b)** Quite a few candidates gave 'no wires' as a correct benefit and 'signal problems' as a correct drawback. The majority, however, said that the device was portable and health hazards were a drawback, neither of the answers was sufficiently specific for a mark to be awarded.

**Question 3**

**(a)** Many candidates missed the word 'place' in the question and consequently gave tasks therefore losing at least one mark. A correct answer was a car factory and a chemical factory

**(b)** This question was well answered. The popular correct answers were related to costs and the ab of robots to work in dangerous conditions.

**Question 4**

**(a)** Almost all of the candidates were awarded one mark for stating that a virus erases files and many gained the second mark systems failure.

**(b)** A significant number of candidates incorrectly suggested using passwords and keeping backups as a method of protection against viruses. Two suitable correct answers were to install and use anti-virus software and firewalls.

**Question 5**

It was evident, from the answers given, that most of the candidates had rote-leant the topic and in consequence they obtained at least two marks easily. Weaker candidates confused a graphical user interface (GUI) with a drawing program. Acceptable answers were that a GUI is user-friendly, there is no need to remember commands and that selecting items using a mouse is faster than entering commands.

**Question 6**

This question was well answered.

**(a)** The correct devices that were given included washing machines and air conditioning units.

**(b)** The majority of the candidates were able to describe two different tasks that the microprocessor performs. The microprocessor in a washing machine controls the speed of wash, the temperature of the water, the amount of water and the time. For an air conditioning unit the microprocessor controls the temperature, the timing and the display panel.

**Question 7**

Most candidates had no difficulty with this question; however a small minority confused left with right. A correct answer was: F4, L90, F4, L90, F2, L90, F2, R90, F2, L90, F2, L90.

**Question 8**

**(a)** Desktop publishing software, web publishing software and presentation software were among the suitable acceptable answers. As the question had asked for a *type* of software the candidates that gave trade names/named software could not be awarded the mark.

**(b)** This was not well answered. Vague and general word processing features such as 'cut and paste' were often given. Correct answers included formatting text, inserting video clips and working with links.

**(c)** Not many candidates gained this mark. The correct answer that was usually given was 'stored on the ISP server'.

**Question 9**

**(a)** The only real error that the candidates made was to include information in the bar code (for example the product description) that is actually stored on the file and looked up when the bar code is read.

**(b)** This was not well answered. There were many descriptions of how bar codes are read, not how the check digit is used to validate the code.

**(c)** Surprisingly serial access, an incorrect answer, was often given. The correct answer was random, direct, or online.

**(d)** Most of the candidates were awarded one mark for decreasing the number in stock. Very few candidates gained the second mark which was awarded for searching the file. Quite a few candidates incorrectly suggested that the item was removed from the file once it was sold.

**(e)** Generally well answered with automatic updating of the stock file, less staff or itemised receipts.

**Question 10**

**(a)** Lengthy essays on the systems analysis life cycle were very common. Nevertheless as t of the candidates had included the design and implementation stages in the latter part answer they were awarded all or almost all of the available marks for the question.

**(b)** A large number of candidates correctly suggested changes in technology or company expansion a a reason for modifying the system in the future. Many candidates incorrectly thought that when a supermarket changes what it sells it would need to modify its system.

**Question 11**

**(a)** Many candidates just described what RAM was without explaining how it would be used when buying over the internet. Conversely the majority of the candidates knew how the hard disk drive, DVD writer and modem would be used for buying goods and services over the internet.

**(b)** Candidates usually gained at least one mark. Acceptable answers seen were either dial up software or ISP software for logging and a browser or search engine for searching.

**(c)** This question was well answered by almost all of the candidates. A correct advantage and disadvantage often given was 'no need to go to the shop' and 'hackers could retrieve the credit card numbers and use them to buy goods'.

**(d)** Very few candidates gained more than one mark. Loss of jobs and less social interaction were the common correct answers seen.

**Question 12**

This question was a straightforward question for most of the candidates, even so two marks for part **(e)** was rare.

**(a)** This was usually answered correctly with text, alphanumeric, or centred.

**(b)** A small number of candidates lost marks because they used an **X** rather than a * in the formulas, or they gave wrong answers such as SUM (B3*B7:B4*C7). Acceptable answers were $B$3*B7 + $B$4*C7, B3*B7 + B4*C7 or B7*3 + C7*2.

**(c)** Most of the candidates were awarded one mark for 'selecting D7'. Many candidates gained the second mark for a description of copying the formula into cells D8, D9, and D10 using 'fill down' or 'drag and drop'.

**(d)** Almost all of the candidates gave the correct answer =IF (D10 > E10, Profit, Loss). A few candidates confused the symbols '<' and '>'.

**(e)** A correct answer was A7 : A10 and D7 : E10 or the individual cells listed e.g. A7, A8, A9, A10 and D7, D8….E10. One mark was awarded for each part of the answer. Many candidates omitted the cells A7 : A10 therefore they could only be awarded one mark.

**Question 13**

This question was not well answered, even though traffic light systems are clearly in the syllabus.

**(a)** Many candidates confused traffic lights with robots, so the incorrect answers given were usually 'no need to be paid' and 'they work 24 hours a day without getting tired'. Correct answers seen were improved traffic flow and accident and pollution reduction.

**(b)** Processing was not well understood. Most of the candidates thought that the computer compared the pressure on pressure pads in the road with data stored in memory in order to determine the light sequence. They did not realise that pressure pads send a signal each time a vehicle passes over them; hence the number of vehicles are counted not the weight.

Correct answers for the input were 'data from sensors' and 'camera images'; for the processing 'analyse the data from the sensors', 'calculate the average traffic flow/speed' and 'send signals to change the lights/timing', for the output 'change the lights at the junction' or 'change the timing plan'.

**(c)** Most of the candidates gained one mark for stating 'turn all the lights to red', 'give an uninterrupted path through the system of linked traffic lights/green link' or 'activate an emergency generator'.

**Question 14**

This question was generally well answered. Weaker candidates confused a star network with either a bus network. Some of the candidates confused a star network with the stars in the sky and drew a six point star that had computer terminals attached to the points.

**(a)** Most of the candidates knew that if one computer in a star network goes down the others can still be used.

**(b)** Many candidates gained one mark for the correct network and a further one or two marks for a labelled server and/or printer. Very few candidates added a modem, bridge or gateway to their diagram.

**(c)** Most of the candidates knew that the staff could access the database from any LAN machine, but very few realised that there would be only one database to backup.

**(d)** Candidates in general continue to give vague and confused answers for data protection rules. Many candidates incorrectly thought that the patient must give their permission before their record could be accessed. Correct answers seen on the better scripts were that the data must be accurate, be used for the purpose that it is registered for and kept no longer than needed.

**(e)** The majority of the candidates gained one mark for backups of files. Very few candidates were awarded the second mark which was for re-running the old master file with the transaction file, or switching to a hot standby computer.

**Question 15**

**(a)** Candidates who answered this question correctly usually obtained at least half the marks available for part **(b)**. The correct answers were **(i)** 33.8 and **(ii)** 41.

**(b)** Good candidates answered this question correctly. The most common errors were **(i)** writing 'IF temp > MAX then temp = MAX' when it should have been 'THEN max = temp' and **(ii)** calculating the average temperature by adding the maximum and minimum temperatures and dividing the result by two. Very few candidates initialised the variables correctly. The loop was not always in the correct place; it was often at the end of the algorithm.

One mark was awarded for each correct step/stage in the algorithm, up to a maximum of five marks.

Initialise variables

Loop each temperature

Input temperature

Convert to Fahrenheit

Find maximum and minimum

Calculate average

Output maximum, minimum, average

An example of a correct algorithm is:

```
sum = 0
min = 100
max = 0
count = 1
while count < = 24 do
      input temp
      F = (temp*1.8) + 32
      sum = sum + F
      if F < min then min = F
      if F > max then max = F
      count = count + 1
endwhile
average = sum/24
print average, min, max
```

**Question 16**

This question was well answered by all but the weakest candidates.

**(a)** Weaker candidates confused the number of fields with the number of records. The correct answer is 6.

**(b)** Most of the candidates gave a correct data type, usually text or alphanumeric.

**(c)** Many thought that coding 'reduces the memory size' which is not true. Coding reduces the amount of memory used. Correct answers given were that there are fewer input errors, less storage space is required and it is easier to validate the data.

**(d)** The majority of the candidates gave the correct answer M1057 and M1124.

**(e)** Many of the candidates just repeated the question and therefore gained no marks. A suitable correct answer was 'select the surname field and then click on the sort A to Z icon'.

**Paper 0420/02**

**Project**

**General comments**

The quality of work was of a broadly 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 smaller than in previous years. The introduction of the new assessment criteria provided candidates with an opportunity to enhance their work by the inclusion of a greater emphasis on the setting of objectives. Centres will need to obtain the moderation report for specific details of candidates' performance and the Centre's assessment of the projects.

Overall the standard of assessment by Centres is reasonably accurate. However there are some occasions where credit appears to have been awarded when there is no relevant work in the documentation. Credit can only be awarded when there is documented evidence. There are also occasions where a higher mark has been awarded than that warranted by the work. The new assessment criteria have helped to reduce these latter cases. The largest area of discrepancy is concerned with the objectives and the links with later sections. Analysis of the new assessment 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 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 candidates should not rely exclusively on the use of screen dumps. The better candidates produce actual results from the live running of their solution and often include user feedback as to the effectiveness and ease of use.

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.

The assessment forms for use by Centres should not allow for a deduction for the trivial [illegible] project. Centres should not make any deduction in this section. One of the Moderator's roles [illegible] such a deduction. Therefore if the Centre thinks that a deduction should be made in this section [illegible] particular project *must* be included in the sample. Centres should note that the project work should [illegible] an individual mark sheet for every candidate and one or more summary mark sheets, depending on the [illegible] 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 some considerable problems in the moderation process when 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. 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 candidates' 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. 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 candidates 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. It would be helpful if candidates were to annotate any coding, queries, macros and sql listings. 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 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. 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 did not produce test plans by which the success of their project could be ev... results of a test strategy should include the predicted results, output both before and after any test... printouts should be clearly labelled and linked to the test plans. This will make it easy to eva... success or failure of the project in achieving its objectives.

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.

| **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.

| **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.

| 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.

**Test results**

Screen dumps could be used to show the actual data being input into the system and the output produced. Similarly screen dumps can be used to show the error message produced by abnormal data. In some cases, particularly website, the teacher should authenticate the relevant documentation to show that the links have actually worked.

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. Candidates might also consider designing an on-line form or questionnaire for submission.