CONTENTS

Group V

Creative, Technical and Vocational

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 *serial access, handshaking and formatting* caused problems for a surprising number of candidates.

Questions involving programming and/or algorithms caused a definite problem with several candidates. In particular, **Question 19** which was a standard sorting technique, caused a number of candidates considerable problems.

Comments on specific questions

Question 1

Parts **(b)**, **(c)** and **(d)** were fairly well answered with most candidates gaining one or two marks here. However, a surprising number thought serial access referred to the type of input/output ports at the back of a computer. Part **(a)** was not particularly answered well with the term *data logging* appearing to be alien to many candidates.

Question 2

Most candidates managed to gain one mark here with reference to security aspects (e.g. passwords). Better candidates gave answers such as *data must be used only for stated purpose, data must be accurate, data must be relevant, data must not be kept longer than necessary,* etc.

Question 3

(a) This was fairly well answered with many candidates choosing correct sensors such as *temperature, water level, weight/pressure* etc. Answers such as “thermometer” and “heat sensors” were quite common; neither of which was acceptable since a thermometer isn’t a sensor and heat sensors do not exist.

(b) Not many candidates gained both marks here. There appeared to be very little understanding of the concept of storing values to compare against the data values being received from the sensors. Many candidates referred to ADC and DAC which did not answer the question which asked *how the data collected would be used by the control program*. The question did not ask for how the washing machine itself was controlled.

Question 4

(a) Well answered for at least one mark where passwords were chosen as the way of preventing hacking. Other answers could have included: *use of firewalls, anti-virus software, use of encryption, etc.* Several candidates referred to anti-hacking software (!!) whatever that is.

(b) Many candidates were aware that fingerprinting systems worked because fingerprints were unique to each person. However, a large percentage failed to gain both marks since they did not mention any involvement of a computer system which was a fairly key component to this question.

Question 5

(a) This was well answered with several candidates mentioning painting, assembling/welding car parts or lifting heavy components.

(b) Not many good answers here with several candidates referring to sensors with no mention of type of sensor or how the sensor was used to prevent the robot bumping into things. Others referred to the use of tracks or coloured lines to guide the robots around the factory.

(c) Fairly well answered with most giving answers such as *loss of jobs, need for re-training,* and *de-skilling.* Several candidates referred to saving money because robots do not need paying - this did not answer the question.

Question 6

(a) Many candidates gained both marks here by referring to buffers being used to temporarily save the data and also to compensate for the differing speeds of computer components.

(b) The simple answer here was *to store more data/allow larger files to be transferred*. A surprising number missed the point here and just gave general descriptions of buffers.

(c) Very few good answers here with only a small number of candidates aware of the purpose of interrupts i.e. *to stop data being transferred, when the processor discovers errors, e.g. printer out of paper, etc.*

Question 7

Surprisingly badly answered with many candidates writing about how the data was imported from the digital camera and what the data could be used for (e.g. in posters). The question wanted ways in which the digital images could be used *with* graphics software i.e. *changing colours, rotating the image, scaling/resizing the image, changing resolution, cropping, etc.*

Question 8

(a) Generally well answered with most candidates correctly identifying a root directory and a sub-directory.

(b) Several candidates indicated that formatting caused any data on the disk to be lost but did not actually understand what else formatting did e.g. *writes tracks and sectors, sets up root directory, puts index/title on the disk, etc.*

(c) This question was well answered by the stronger candidates who gave responses such as *memory management, multi-programming, error reporting, file management, etc.* The weaker candidates tended to give trivial answers such as “looks after the computer”, “allows user to use the computer”, etc. - none of which were sufficiently specific to gain any marks.

Question 9

(a) Surprisingly badly answered with too many candidates explaining feasibility study, fact finding and evaluation. Acceptable answers included: *decide on hardware and software, design input and output formats, design file structures, produce flowcharts/algorithms, etc.*

(b) Again, not particularly well answered with too many candidates describing phased introduction, parallel running and immediate introduction -these are methods used and not stages. The question required a description of two of the stages which are part of the actual implementation process such as: *writing the program/coding, transfer of files, installing hardware, testing the system, etc.* i.e. what needs to be done at this stage of the process.

(c) This part was reasonably well answered with many candidates gaining one mark for answers such as *how to load/run the system, troubleshooting guide, interpretation of error messages, etc.*

Question 10

(a) In general, this was well answered. The only real problem was that some candidates gave PRICE when the actual field name was PRICE($) which unnecessarily lost them a mark. The most common response was to correctly choose CODE as the field name.

(b) This was fairly well answered with most candidates choosing *range check, length check and presence check.* Some candidates described the validation checks rather than naming them which was perfectly acceptable in this case.

(c) Very well answered with well over half the candidates correctly choosing *M018* as [illegible] output.

(d) Many candidates gained two marks here for correctly giving *(PRICE($)>50)* and the operator as part of the search conditions. Very few gave a correct search condition for the date which could have been either *(DELIVERY DATE>30/09/02 AND DELIVERY DATE<01/11/02)* or *(DELIVERY DATE between 30/09/02 AND 01/11/02)*.

Question 11

(a) This part was generally well answered. Many candidates lost marks because they did not make it clear that they were producing a computer form - the forms looked as if they could have been filled in manually.

(b) Not very well answered with most candidates wrongly stating that "there was no need to travel/can work from home" (which was already stated in the question!) and "will give immediate feedback" (which was unlikely to happen since the tutor wouldn't respond straight away).

(c) Again, poorly answered. Most candidates who gained a mark referred to the reduction of paperwork. Other acceptable answers included: *no need to set aside rooms for exams, more accurate data entry, automatic marking of papers, etc.* A common error here was to say that the computer would *correct* the papers when, in fact, the computer would simply mark the papers.

Question 12

(a) Surprisingly few correctly shaded the spreadsheet area A2 to B5.

(b) Generally well answered with a variety of acceptable answers given.

(c) Several candidates gained 1 mark here with few managing both marks. The correct cells were: *E3, F3, E6* and *C6.*

Question 13

(a) This part was surprisingly badly answered with less than half the candidates gaining two marks. The question simply required the summation of all the positive numbers (i.e. 13) and all the negative numbers (i.e. -8).

(b) On the whole, this was probably the worst answered question on the Paper with the majority of candidates either missing it out altogether or simply copying out the original algorithm with no worthwhile changes made. All four marks could have been gained for a simple algorithm such as:

```
total = 0
input number
while number <> -300000    (or some equivalent rogue value)
        total = total + number
        input number
endwhile
output total
```

Question 14

(a) Generally fairly well answered with most candidates aware of the function of a modem (i.e. interconverts digital to analogue to allow signals to be sent down telephone lines) and ISP (i.e. allows connection to internet etc.).

(b) Most candidates correctly suggested the use of on-screen forms or questionnaires. It was also fairly common to see the use of e-mails as a way of collecting information from customers.

Question 15

Several candidates gained one or two marks here with very few managing three or four marks. It was very common to see answers suggesting that a "leaf/flower was scanned in and the expert system then recognised the plant" - this was clearly guess work by candidates who did not actually understand how expert systems worked. Acceptable responses included: *computer asks questions, user inputs information, knowledge base searched, use of rules/inference engine, etc.*

Question 16

(a) The most common answers here were "electricity failures" and "viruses" - both of wh… acceptable. Most candidates managed to gain one mark here.

(b) Again, the majority of candidates gained one mark here for either "use of UPS" or "use anti-virus software". Several candidates referred to use of passwords and backing up data - neither of which would guard against a systems failure occurring.

Question 17

(a) This was not very well answered with many candidates giving very vague answers such as "sensors". Acceptable responses here included: *use of pressure pads, induction loops and push buttons for pedestrians.*

(b) Not as well answered as expected with several candidates talking about monitors, printers and other computer equipment. The most obvious answers that were expected here were: *traffic lights* and *beeping noise/flashing green man.*

(c) Very few candidates gained any marks here. Many simply said that a timing circuit was used to change the lights at regular intervals. This would not be an acceptable way of controlling traffic at a busy junction. The answers expected were: *counting numbers of cars in all directions and changing lights accordingly, testing to see if the pressure pad had registered any vehicles, etc.*

Question 18

Most candidates gained either 1 mark (usually for *customer orders*) or all four marks.

Question 19

Generally badly answered - the question was a simple sort routine using only three input numbers. Very few candidates gained more than one mark usually obtained for a correct input statement). The majority of candidates seemed to have little, if any, concept of *nested if* statements.

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 approximately the same as last year but still included word-processing/DTP projects of a theoretical nature. Such projects are not a valid use of a computer to solve a problem, they simply describe some aspect of computing or computers. In one particular case a candidate submitted an evaluation of a software application, this is another example of an inappropriate project. A number of Centres assessed the work correctly and then entered the marks onto the MS1 form as a percentage, this should not be done. The marks which are entered onto the MS1 form should be the mark, out of fifty, which is an exact copy of the marks on the individual record card.

The majority of Centres assessed the projects accurately according to the assessment headings. Overall the standard of assessment by Teachers is improving and there are 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. 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. Half marks are not allowed by the syllabus.

It is important to realise that the project should enable the candidate to use a computer to solve a problem, be fully documented and contain substantial sample output from their proposed system. This should include full test plans with expected results which can then be compared with the actual results. we 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 use of a computer.

However the standard of presentation and the structure of the documentation continues to improve. Many candidates structure their documentation around the broad headings of the assessment scheme, and this is to be commended. For those candidates who do not devise any structure they might find it useful use the following framework. Many of the sections correspond on a one-to-one basis exactly to the assessment headings, some combine assessment headings and some carry no marks but form part of a logical sequence of documentation.

Suggested framework for documentation of the project

ANALYSIS

- Description of the problem
- List of Objectives *(in computer-related terms or computer processes)*
- Description of Existing Solution
- Evaluation of Existing Solution
- Description of Other Possible Solutions
- Evaluation of Other Possible Solution

DESIGN

- Plan *(including a time scale)*
- Method of Solution including the algorithms
- System Requirements (Hardware)
- Software Requirements

IMPLEMENTATION

- Method of Solution *(related to the individual problem, including any algorithms, flowcharts, top down designs or pseudo-code.)*

TESTING

- Test strategy/plans
  - Normal data
  - Extreme data
  - Abnormal data
- Test Results
  - Normal data
  - Extreme data
  - Abnormal data

DOCUMENTATION

Technical Documentation and System Maintenance

User Documentation/User Guide

SYSTEM EVALUATION AND DEVELOPMENT

Evaluation *(must be based on actual results/output which can be assessed from the written report)*

Future Development/Improvements

The assessment forms for use by Centres should not allow for a deduction in section 23 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 think 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 addition the MS1 mark sheet should be sent to 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 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 for section seven.

Areas of relative weakness in candidate's documentation 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 data processing or computer-related terms, e.g. they merely state that they want to make a certain process faster, this is really an aim and the candidate should give an indication of how they will make the process faster. If a faster processing time was an objective then in order to test whether or not they have been successful then the candidate would need to time the process before and after the solution and compare the two times. 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. With effect from 2004 the scheme of assessment will be revised to put more emphasis on the setting of objectives in the first place and then ensuring that subsequent sections of the documentation refer back to these objectives (testing and evaluation).

There was evidence that some candidates appeared to be using a textbook 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. Unfortunately there was an increase in the number of projects where candidates had produced almost identical work. 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 a user could solve the problem by any appropriate method, either programming or using application packages. It is possible for some applications to generate the algorithms, these should be clearly annotated to allow 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 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. A significant number of candidates do not test their input data. Documentation should include the data designed to test the three types of data, the expected results and then the actual results. The test data and expected results should be numbered in the same way as the objectives and they should be linked together to show how each objective is being tested. Difficulties are experienced by some candidates in the use of extreme and abnormal data. Knott & Waites (1999) define the different types of data as being.

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, that data which the program is not designed to handle, the program should be capable of rejecting it rather than attempting to process it.

Many candidates did produce excellent test plans with expected results but failed to actually provide evidence that results had been obtained, most of these candidates included their actual results in the same table as their test plans and expected results. When testing their solutions it is important that candidates test each data type with normal, extreme and abnormal data, rather than repeatedly testing all occurrences of the same data type.