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MARKSCHEME

SPECIMEN

COMPUTER SCIENCE

Higher Level

Paper 3

General Marking Instructions

1. Once markscheme is received mark in pencil until final markscheme is received.

2. Follow the markscheme provided, do **not** use decimals or fractions and mark only in **RED**.

3. Where a mark is awarded, a tick (✓) should be placed in the text at the **precise point** where it becomes clear that the candidate deserves the mark.

4. Sometimes, careful consideration is required to decide whether or not to award a mark. Indeed, another examiner may have arrived at the opposite decision. In these cases write a brief annotation in the **left-hand margin** to explain your decision. You are encouraged to write comments where it helps clarity, especially for moderation and re-marking.

5. Unexplained symbols or personal codes/notations on their own are unacceptable.

6. Record subtotals (where applicable) in the right-hand margin against the part of the answer to which they refer. Show a mark for each part question (a), (b), *etc.* Do **not** circle sub-totals. Circle the total mark for the question in the right-hand margin opposite the last line of the answer.

7. Where an answer to a part question is worth no marks, put a zero in the right-hand margin.

8. **Total:** Add up the marks awarded and enter this in the box marked TOTAL in the Examiner Column on the cover sheet.

9. After entering the marks on the cover sheet check your addition of all marks to ensure that you have not made an arithmetical error. Check also that you have transferred the marks correctly to the cover sheet. **We have script checking and a note of all clerical errors may be given in feedback to all examiners.**

10. Every page and every question must have an indication that you have marked it. Do this by **writing your initials** on each page where you have made no other mark.

11. A candidate can be penalized if he/she clearly contradicts him/herself within an answer. Once again make a comment to this effect in the left-hand margin.

Subject Details: **Computer Science HL Paper 3 Markscheme**

Mark Allocation

Candidates are required to answer **all** questions.
Maximum total = *[30 marks]*.

General

A markscheme often has more specific points worthy of a mark than the total allows. This is intentional.
Do not award more than the maximum marks allowed for that part of a question.

When deciding upon alternative answers by candidates to those given in the markscheme, consider the
following points:

- Each statement worth one point has a separate line and the end is signified by means of a
  semi-colon (;).

- An alternative answer or wording is indicated in the markscheme by a "/"; either wording can
  be accepted.

- Words in (…) in the markscheme are not necessary to gain the mark.

- If the candidate's answer has the same meaning or can be clearly interpreted as being the
  same as that in the markscheme then award the mark.

- Mark positively. Give candidates credit for what they have achieved and for what they have
  got correct, rather than penalizing them for what they have not achieved or what they have
  got wrong.

- Remember that many candidates are writing in a second language; be forgiving of
  minor linguistic slips. In this subject effective communication is more important than
  grammatical accuracy.

- Occasionally, a part of a question may require a calculation whose answer is required for
  subsequent parts. If an error is made in the first part then it should be penalized. However, if
  the incorrect answer is used correctly in subsequent parts then **follow through** marks should
  be awarded. Indicate this with "**FT**".

1. (a) *Award up to [2 marks max].*
        Data/text placed on the computer by a web browser;
        Used for session management/personalization/tracking, *etc*;
        Data that relates a user to a particular site;   *[2 marks]*

    (b) This is disk space left over;
        Between the end of the data and the end of the last cluster/sector of a file;   *[2 marks]*

2. (a) *Award up to [4 marks max].*
        A normal formatting will only modify the FAT/root directory;
        To make available all disk space / to show "no files" are saved;
        The actual data will still be present (in the sectors):
        Which can be retrieved with special software;
        A "forensic wipe" will erase all data;
        By writing (a series of zeros) over every sector;   *[4 marks max]*

    (b) *Award up to [4 marks max].*
        Use of personal data/passwords to compromise the previous owner financially;
        By means of identity theft / use of bank passwords for fraud;
        Publishing of confidential data to embarrass the owner;
        Such as criminal record/details of affairs, *etc*.
        Use of medical data against owner;
        By insurance company to increase premiums / affect job applications, *etc*.   *[4 marks max]*

3. *Award marks as follows up to [6 marks max]:*
    Award [1 mark] for a descriptive of each distinctly different type of evidence, and [1 mark] for an explanation of its importance. Only allow [3 marks] for different types of evidence.

    Programs/files running in main memory may not have been saved and will be lost if the computer is switched off. They may contain incriminating data or messages.

    There may be secondary memory away from the computer, *e.g.* flash memory, disks, which contain vital files.

    Passwords may have been written on "sticky notes" or notepads, which would speed up access to computer files.

    Print-outs should be collected as they may contain evidence of files no longer on the hard drive.

    Telephone answering machines should be checked for incriminating messages.

    Photographing the scene may provide clues later on that were initially missed.   *[6 marks max]*

4.   *Answers may include:*

<u>Measures:</u>

1.   Steganography

This refers to the hiding of information or files inside other innocent appearing files, *e.g.* text within a graphic file or a picture within a video file. This is better than encrypting files as attention will not be drawn to an ordinary document or file, whereas an encrypted file will certainly be noticed. Image files are particularly good as they are relatively large, and by the alteration of a few specific bytes a message can be included without adversely affecting the actual image.

2.   Changing the file extension

When files are saved, the program being used saves the file with the appropriate file extension *e.g.* a word-processing file might be given the extension .doc, a graphics file the extension .jpg, *etc*. However, these extensions can be manually changed, thus circumventing any search based upon that particular file extension. So, changing all image files to have a .doc extension would suggest at first glance suggest that no images are present. Changing the file extension also causes the operating system to display the appropriate (but incorrect) icon (including a thumbnail).

3.   Renaming of files

File names can be changed to suggest more innocent sounding subjects than their contents might actually merit. Points 2 and 3 together mean that time consuming counter measures must be taken.

<u>Counter measures:</u>

1.   Steganographic software has been developed which searches for hidden files (steganalysis). One such technique would be to compare a known good copy of the file with the suspect one.

2/3.   Search for images by the contents of the file.

File signatures can be searched for. Each file type has a specific file signature that is unaltered by any manual changing of the file extension or renaming of the file. This signature will be positioned as the header or footer in the file. The signature is normally 1 byte.

Hash analysis, which does not include the file's metadata can be used when searching for a specific file. For this type of analysis the hash is created by adding together all of the bytes that code the data in a file. If a specific file is being searched for then its hash value will be known and can be checked against the hashes of the file present. This procedure is also useful for eliminating known files from the search. The fact that the metadata is **not** included in the hash counteracts any changing of the filename or extension.

Markbands

There must be evidence of independent research and investigation for students to reach the top level.

Marks	Level descriptor
No marks	• No knowledge or understanding of the relevant issues and concepts. • No use of appropriate terminology.
Basic 1–3 marks	• Minimal knowledge and understanding of the relevant issues or concepts. • Minimal use of appropriate terminology. • No reference is made to the information in the case study or independent research. • The answer may be little more than a list.
Adequate 4–6 marks	• A descriptive response with limited knowledge and/or understanding of the relevant issues or concepts. • A limited use of appropriate terminology. • There is limited evidence of analysis. • There is evidence that limited research has been undertaken.
Competent 7–9 marks	• A response with knowledge and understanding of the relevant issues and/or concepts. • A response that uses terminology appropriately in places. • There is some evidence of analysis. • There is evidence that research has been undertaken.
Proficient 10–12 marks	• A response with a detailed knowledge and clear understanding of the relevant issues and/or concepts. • A response that uses terminology appropriately throughout. • There is competent and balanced analysis. • There is clear evidence that extensive research has been undertaken. • Conclusions are drawn that are linked to the analysis.

[12 marks]

Total: [30 marks]