MARKSCHEME

May 2006

COMPUTER SCIENCE

Standard Level

Paper 1

General Marking Instructions

After marking a sufficient number of scripts to become familiar with the markscheme and candidates' responses to all or the majority of questions, Assistant Examiners (AEs) will be contacted by their Team Leader (TL). The purpose of this contact is to discuss the standard of marking, the interpretation of the markscheme and any difficulties with particular questions. It may be necessary to review your initial marking after contacting your TL. **DO NOT BEGIN THE FINAL MARKING OF YOUR SCRIPTS IN RED INK UNTIL YOU RECEIVE NOTIFICATION THAT THE MARKSCHEME IS FINALIZED.** *You will be informed by e-mail, fax or post of modifications to the markscheme and should receive these about one week after the date of the examination. If you have not received them within 10 days you should contact your TL and IBCA. Make an allowance for any difference in time zone before calling.* **AEs WHO DO NOT COMPLY WITH THESE INSTRUCTIONS MAY NOT BE INVITED TO MARK IN FUTURE SESSIONS.**

You should contact the TL whose name appears on your "Allocation of Schools listing" sheet.

Note:
Please use a personal courier service when sending sample materials to TLs unless postal services can be guaranteed. Record the costs on your examiner claim form.

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. **Section A**: Add together the total for the section and write it in the Examiner Column on the cover sheet.

Section B: Record the mark awarded for each of the four questions answered in the Examiner Column on the cover sheet.

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 SL Paper 1 Markscheme**

Mark Allocation

Section A: Candidates are required to answer ALL questions. Total 30 marks.
Section B: Candidates are required to answer ALL questions. Total 40 marks.
Maximum total = 70 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 part of a question.

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

- Each marking 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.

- The order of points does not have to be as written (unless stated otherwise).

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

- Mark positively. Give candidates credit for what they have achieved, and for what they have got correct, rather than penalising 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. Effective communication is more important than grammatical niceties.

- 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"**.

SECTION A   *[30 marks]*

1.   *Award [1 mark] for each complete and correct definition. Award [1 mark] for each statement about the relation to programming code or correct example in each case.*

     For example

     semantics is the meaning of the words and incorrect semantics in a program will not prevent it from being compiled but may give incorrect results.
     syntax is the grammatical structure of the language statements. Incorrect syntax prevents a program from compiling.   *[4 marks]*

2.   *Award [1 mark] for each of the following points.*
     address of instruction to be fetched held in program counter;
     address bus is pathway that carries that address to memory;
     so that instruction can be fetched;
     address part of instruction carried by address bus;
     to reach address where data is to be stored/fetched;
     data bus used to carry data to memory from the accumulator for processing;
     and from accumulator to memory after processing;   *[4 marks max]*

3.   *Award [1 mark] for definition and [1 mark] for factors.*
     Data integrity is the measure of the correctness of data;

     measures to ensure this in transmission are, for example,
     quality of cables/connections;
     collision control;   *[2 marks max]*
     Only accept hacking if the candidate indicates that the data could be changed by the hacker and hence controls to prevent this are needed.

4.   *Award [1 mark] for example and [1 mark] for description.*

     For example

     running anti virus software at the same time as running a program such as Word.
     listening to a CD whilst working on the computer.
     browsing the internet whilst working on a document.   *[2 marks]*

5.   Only award marks that relate to the program being written after the design stage has incorporated modularity. Do not accept answers that relate to modifications.
     Award [1 mark] for advantage and [1 mark] for outline in each case.

     For example

     solution is logically broken down and simpler to code
     the separate modules will be easier to develop and test
     coding should be quicker and better with minimum of code repetition
     allows for incorporation of code from previous programs (reuse)   *[4 marks]*

6. *Award [2 marks] for a full explanation and [1 mark] for a partial explanation.*
    A binary search checks the middle value against the item being searched item assumed to be on one side or other if the data is not sorted it would not be possible to know which side it was.   *[2 marks]*

7. *Award [1 mark] for a reasonable explanation of how to use a macro and [1 mark] for its use in a word processor. Example is not asked for but accept as implication.*

    For example

    Any repetitive action/group of actions or processes the user makes can be recorded once as a macro and then called on with a short cut key whenever needed.   *[2 marks]*

8. Award *[1 mark]* for a clear statement that the argument value is passed to the parameter of the function by the function call.

    Award [1 mark] for a clear statement that the parameter appears on the function definition line or that the parameter allows data values to enter the function.   *[2 marks]*

9. *Award [2 marks] for a full definition and [1 mark] for a partial definition.*

    For example

    Virtual memory is the use of secondary memory as if it were primary memory.
    The paging of secondary memory so that it can be addressed in the same way as primary memory.
                                                                                  [2 marks]

10. *Award [1 mark] for a correct reason and a further [2 marks] for an expansion which gives or infers a comparison with other portable media.*

    For example

    size: small device is easier to transport than a floppy or CD and is less likely to damage.
    speed: speed of access is quicker than other portable devices and can be worked from directly without a specific instruction to save or copy.
    no need for read write devices to be present in the computer, hence less breakdown and more suitable for laptops.
    cross platform: the device can be used on different makes of machines and needs no special software to read and write – all modern computers will have the appropriate USB port.   *[3 marks]*

11. (a) *Award [1 mark] for the correct values of k and [1 mark] for the output.*

k	m	output
4	5	34

                                                                                  [2 marks]

    (b) n;   *[1 mark]*

SECTION B   *[40 marks]*

12.   (a)   *Award [1 mark] for each of the following.*
            the design can be drawn with precision on the tablet;
            which is marked with a pen like instrument;
            the image is transferred via special software;
            mapped to a special section of memory;
            contents of memory then displayed on screen;
            changes can be made on the tablet and these are reflected on screen;   *[2 marks max]*

      (b)   *Award [1 mark] for each of the following points and any other appropriate ones.*
            the designer will need to be connected to the Internet (broadband fibre optic if possible);
            secure link to server at office;
            within main building a LAN;
            linking to printers of various types;
            cable link (or any other suitable);   *[4 marks max]*

      (c)   Accept answers that make it clear that the candidate understands that this is the place to hold
            instructions which are always needed, hence refer to printer movements rather than directly
            connected with the pattern being reproduced *[2 marks]* for explaining why ROM is needed
            and *[2 marks]* for identifying what would be held.

            For example

            ROM is needed to hold basic information and instructions for the printer that cannot/should
            not be change *[2 marks]*.
            instructions that indicate colour almost finished, material blocked etc… *[2 marks]*.   *[4 marks]*

13.   (a)   *Award [1 mark] for an advantage and [1 mark] for an elaboration.*

For example

The travel agent will have input into the design and hence the program should satisfy needs *[2 marks]*.
If things go wrong they will be able to call on the software house to troubleshoot *[2 marks]*.
Could have implementation and training so that users are at ease with the software *[2 marks]*.
Since it will be professionally designed there should be less likelihood of errors *[2 marks]*.
[2 marks max]

(b)   *Award [1 mark] for method of collection and [1 mark] for an elaboration.*

For example

By talking to the travel agent and finding out what the needs are, and how the current system does not meet them *[2 marks]*.
By watching the travel agency at work and noting how the system could incorporate all the things done now as well as the new requirements *[2 marks]*.   *[2 marks max]*

(c)   *Award [1 mark] for a factor and [1 mark] for how this affects the type of storage.*

For example

The number of customers *[1 mark]* if there are a lot then direct access could be better since a sequential search through a large number would be slow *[1 mark]*.
The way in which they need to be accessed *[1 mark]* i.e. all at the same time – sequential or one particular one searched – direct *[1 mark]*.   *[2 marks max]*

(d)   *Award [1 mark] for each cyclical part of the process and [1 mark] for an explanation*

For example

During the design the user would have an input and the system is likely to be redesigned many times *[2 marks]*.
Once implemented problems may come to light which would involve further modifications and re-implementation *[2 marks]*.
After a certain time the system will be outdated or new needs come to light and the whole software cycle will start again *[2 marks]*.   *[4 marks max]*

14. (a) *Award [2 marks] for a description of advantage and [2 marks] for a description of disadvantage.*

For example

Advantage of online help is that it should be easily available for the feature which is being used at the time – i.e. is quickly relevant to needs.
Also easier to search via links in an index.
If linked to the Internet then it is up to date *[2 marks]*.

Disadvantage by reading the manual through the user may come across features that would not have been evident whilst using, since all the features are explained in the manual *[2 marks]*.
printed documentation can be read away from the camera - when filming away from home this may be needed. *[4 marks max]*

(b) *Award [1 mark] for each specification and [1 mark] for expansion in each case.*

For example

video needs a lot of space for storage (hard disk – flash memory etc.)
for manipulation – large amount of RAM and cache.
fast processor or even second processor if the video is not to be too stilted
connection point for the video camera. *[4 marks]*

(c) *Award [2 marks] for any appropriate problem which is well discussed and [1 mark] for a partial answer.*

there could be problems if the person at the event does not have the facility to see the video – for example, adequate internet connection / browser / video player *[2 marks]*.
the video is available to a wider public which may not be desirable since some may not wish to have themselves regarded by everyone – a privacy issue *[2 marks]*.
could be downloaded and manipulated by outsiders – ethical issue *[2 marks]*.
space on web server could cause problems if size of file exceeds the allocation on server *[2 marks]*. *[2 marks max]*

15. *Award **[2 marks]** for a definition that includes the decrypting and **[1 mark]** for its use in this case. Award the mark for decryption in this part if appropriate.*

(a) For example

Encryption involves coding the data to be transferred;
so that only the person for whom it is intended is able to decrypt, and hence use the information.
the data sent between the bank and customer, such as passwords, account balance etc. will be encrypted because it is sensitive data.   ***[3 marks]***

(b) *Award **[1 mark]** for each valid point. There must be at least one for access and one for denial to other accounts.*
by ensuring that usernames and passwords are unique;
by demanding complicated passwords;
asking for password in different order;
these combinations linked to the account;
access on account denied if the unique combination not entered.   ***[3 marks max]***

(c)
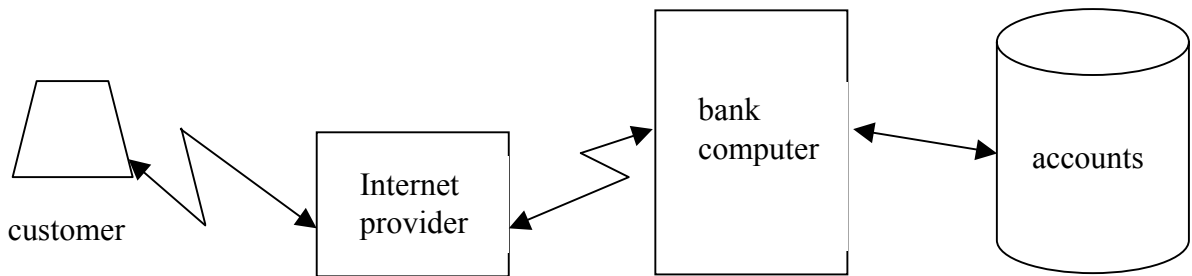
Award marks as follows.

two way communication lines;
pc and bank mainframe;
Internet provider;
backing store with account **and** two way communication between backing store and mainframe;   ***[4 marks]***