

# **MARKSCHEME**

**May 2002**

## **COMPUTER SCIENCE**

**Standard Level**

**Paper 1**

## 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 any three questions (10 marks each). Total 30 marks.

Maximum total = 60 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 penalised. However, if the incorrect answer is used correctly in subsequent parts then **follow through** marks should be awarded. Indicate this with ‘FT’.

**SECTION A**

1. *Allow [1 mark] for data type:*  
string;  
array of character;  
*Accept numerical storage if justified (e.g. takes less space).*  
  
*Any [2 marks] for explanation:*  
leading zeros;  
spaces; **[3 marks]**  
*No need to do arithmetic, may need to search on code (1st 5 digits).*
  
2. linear search / sequential search;  
other searches require sorted data / consecutive data not related; **[2 marks]**
  
3. *[1 mark] for each. Any [3 marks] for:*  
*temporary file*  
used to save the results of individual transactions in *real time* when  
*access to the master needs to be restricted.*  
The data from the transaction file being used later to *update the master file* in  
*batch mode.* **[3 marks]**
  
4. *Allow [1 mark] for each item, up to a maximum of [2 marks].*  
Item:  
technical specification;  
design drawings;  
pseudo-code;  
data dictionary;  
contact details *etc.*  
  
*[1 mark] for each reason, up to a maximum of [2 marks].*  
Reason:  
so that several people can work on a project at the same time;  
so projects can be maintained, updated / debugged *etc.* at a later date; **[4 marks]**
  
5. returns a string **[1 mark]**;  
which is a subset of S **[1 mark]**;  
starting at B and ending at E **[2 marks]**; **[4 marks]**
  
6. *Any three from:-*  
Top down breaks large / complex problems into a related group of smaller ones;  
which become modules;  
These smaller modules are easier to solve;  
∴ are less likely to have bugs;  
and are easier to debug;  
more logical solution to problem; **[3 marks]**

7. *[1 mark] for each.*  
parallel or modular;  
a correct description of either in the answer;  
suggestion of how it would prevent failure; *[3 marks]*
8. *[1 mark] for each.*  
both are reusable blocks of code which can be repeatedly called;  
both handle parameters in the same way allowing pass by value and pass by  
reference *[2 marks]*. Allow *[1 mark]* for incomplete but correct comparison.  
both declare local variables for use in function / procedure;  
additionally functions return a value;  
which is substituted in-line from the call; *[5 marks max]*
9. *[1 mark] for each.*  
logical errors do not give expected result;  
syntax errors break the rule of language grammar;  
run-time errors produce situations program can't handle; *[3 marks]*

**SECTION B**

10. (a) **[1 mark]** for each correct line. First 2 lines given.

I	C	D	A[]
197	0	128	1000 0000
69	1	64	1100 0000
5	2	32	1100 0000
5	3	16	1100 0000
5	4	8	1100 0000
5	5	4	1100 0100
1	6	2	1100 0100
1	7	1	1100 0101

*Least significant zeros do not need to be included.*

**[6 marks]**

(b) stores the binary equivalent of I in A[];

**[1 mark]**

(c) convert I into a pair;  
of hexadecimal magnitude values / whole number and remainder when divided  
by 16;

**[1 mark]**

*Accept any answer that shows an understanding of **mod** and **div**.*

(d) convert A and B integers;  
into hexadecimal characters;

**[1 mark]**

*Accept any answer that shows equivalent values taken from array N.*

(e) converts a short integer into a hexadecimal value;

**[1 mark]**

*Accept any answer that shows number has been split into representation of the  
two parts.*

11. (a) *Any two from the following [1 mark] each.*  
sharing of software, hardware and data (**[1 mark]** for **one** (not more) from these);  
reduces duplication;  
maintains data integrity; **[2 marks]**
- (b) *Award [1 mark] for flat bed plotter and award [1 mark] for each of the following, up to a maximum of [4 marks].*
- extremely accurate;
  - produces large format;
  - needed for intricate designs;
  - plans are often non-standard format; **[4 marks]**
- (c) *Allocate marks as follows, up to a maximum of [2 marks].*  
if files are not in standard format they cannot be used by commonly available software **[2 marks]**;  
within the office files may be used for different purposes (e.g. insert an image in a word processed document);  
therefore standard format needed **[2 marks]**; **[2 marks]**
- Accept any reasonable answer and check with Chief Examiner if in doubt.*
- (d) this is a verification since he/she is being asked to repeat the decision to update; **[2 marks]**  
*Do not accept validation.*

12. (a) *Allocate marks as follows, up to a maximum of [2 marks].*  
a direct access file is one where an algorithm;  
is applied to, for example the telephone number;  
to give the address;  
where the information is held;  
thus access is directly to the required address;  
without searching through others; **[2 marks]**
- (b) *Allocate marks as follows, up to a maximum of [2 marks].*  
process is on-line because the operator needs access to the directory;  
whilst answering the customer;  
*Accept* because two machines connected together. **[2 marks]**
- (c) *Award [1 mark] for suitable, [1 mark] for feature and [1 mark] for description.*  
*e.g.* mini because configured for multi-use. Mainframe because it can incorporate  
front end processor for input/output (or has capacity for large database). **[3 marks]**
- (d) *Allocate marks as follows, up to a maximum of [3 marks].*



- the diagram will be made up of:  
two way input from enquirer to operator;  
two way telecommunication line between central processor and operator;  
search and retrieve at central database; **[3 marks]**  
*Do not accept one-way communication.*

13. (a) *Allocate marks as follows, up to a maximum of [4 marks].*  
could have private lines which would be more difficult to hack into unnoticed **[2 marks]**;  
all data could be encrypted before sent **[1 mark]** and encryption code could be changed often. **[2 marks]** **[4 marks]**
- (b) *Allocate marks as follows, up to a maximum of [2 marks] for any of the following, properly described to be accepted.*  
  
parity bit set to 1 or 0 to ensure even or odd parity. If received data does not have the same parity then it should be sent again **[2 marks]**;  
  
hash / modules / check sum sent with data after a set number of bits giving sum of previous. If not the same then data resent **[2 marks]**;  
  
send twice and check the two are the same, else ask for resend **[2 marks]**; **[2 marks]**
- (c) *Allocate marks as follows, up to a maximum of [4 marks]. Any good point that is justified for advantage or disadvantage award a maximum of [2 marks] for either. Point with no justification only receives [1 mark].*  
  
*Examples are as follows but accept any reasonable point and check with Chief Examiner if in doubt.*  
  
a convenient way for customers as they no longer have to visit the bank;  
transfer of funds from one account to another are much quicker and therefore better if you are getting the money;  
lack of personnel should mean cheaper banking;  
  
however many precautions are taken there is still the problem of security over the Internet **[2 marks]**;  
if a problem should arise most people would still prefer to talk to a person than send an e-mail **[2 marks]**;  
we are not yet in a cashless society so there would still be a need for getting cash out somewhere, possibly another bank **[2 marks]**; **[4 marks]**
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