

MARKSCHEME

May 2007

COMPUTER SCIENCE

Standard Level

Paper 1

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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 any of the following.
simpler version of the system;
model created in the design phase; **[1 mark max]**

2. Award **[1 mark]** each for any two from the following.
control file management on disk system.
accept file delete, file copy etc.
control I/O from system unit to other systems;
control display;
manage memory usage;
manage interrupts;
manage program execution;
manage printing; **[2 marks max]**
Accept any other points that are reasonable.

3. (a) attempt to divide by zero **[1 mark]**, error occurs because this is an illegal operation for the compiler **[1 mark]**. Input is not properly provided **[1 mark]**. **[2 marks max]**

(b) test the value of divisor **[1 mark]** by providing proper input validation, if it is zero do not do division **[1 mark]**. **[2 marks]**

4. (a) method of ensuring that data cannot be read or changed by those who have no right to access it during data transmission. **[1 mark]**

(b) encrypt the data to be transmitted **[1 mark]**, if intercepted by unauthorized sources the data cannot be decrypted **[1 mark]**. **[2 marks]**

OR

use of secure line, private line, direct connection **[1 mark]**, reduced chance of interception **[1 mark]**. **[2 marks]**
Do not give credit to password protection response.

5. Award **[1 mark]** for any reasonable statement of two distinct features.
Some acceptable answers include.
support of html standards etc;
access to web pages;
display of web pages, graphics etc;
caching;
plug ins – different media;
book marking and favourites; **[2 marks max]**

6. Award **[1 mark]** if $MSB = -1$, but rest is incorrect.
Award **[2 marks]** for correct answer, no working is required.

-32	16	8	4	2	1
1	1	1	0	0	1

Correct answer = 111001₂

[2 marks]

7. (a) analog data is represented by a continuous variable quantity; [1 mark]
Accept answers which convey notion of continuousness e.g. represented as wave on a graph.
- (b) to enter and store analog voice data, the voice data needs to be sampled (also accept equivalent expression for sampled e.g. measured) [1 mark] and converted to a digital representation using an A-D converter [1 mark]. [2 marks]

8. Award [1 mark] for any of the following advantages.
 high speed (accept equivalent terms e.g. broadband) of data transmission;
 high volume of data transmission;
 vastly reduced potential for signal interference;
 vastly reduced possibility for signal interception/transmit over long distances;

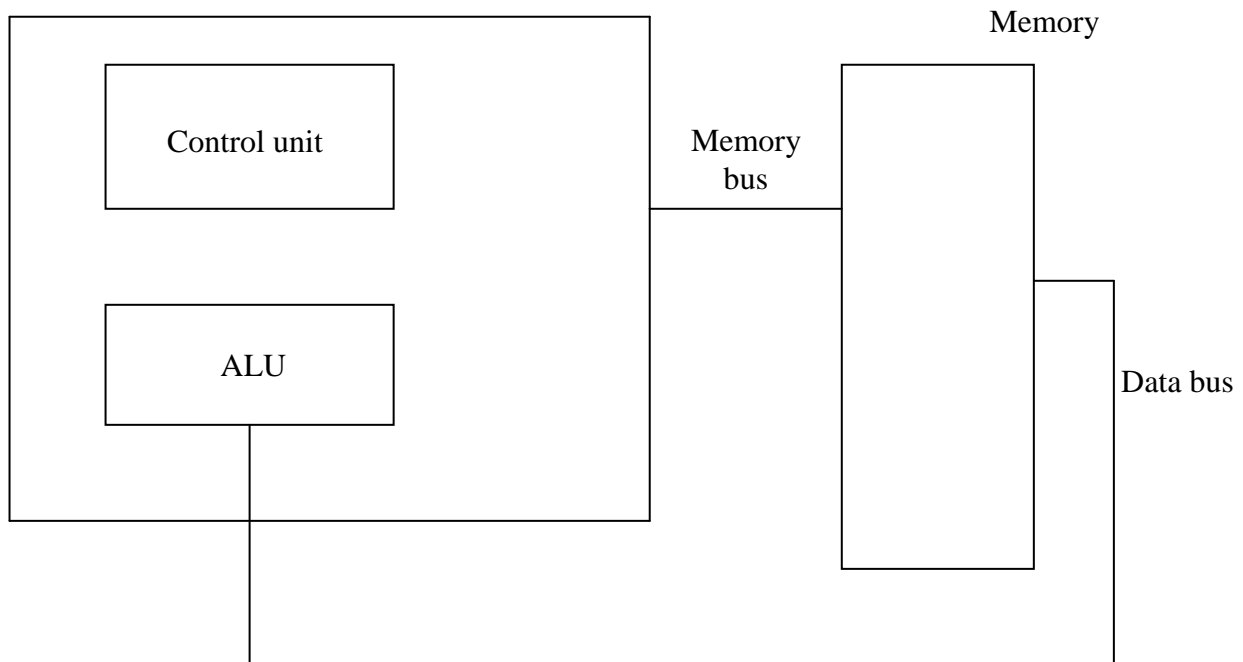
Award [1 mark] for any of the following disadvantages.

cable is costly or;
 cost associated with equipment to send and receive;

[2 marks]

9. Award [1 mark] for each of control unit, ALU, memory and at least one bus clearly labelled.

[4 marks]



- 10.** *Award [1 mark] for any equivalent statement up to [2 marks max].*
use set of test data with expected results i.e. sample output;
feed data into program and collect actual sample output;
compare actual output with expected output;
user testing and feedback on errors; *[2 marks max]*
- 11.** (a) The role of the index is to indicate the position; *[1 mark]*
(b) 67; *[1 mark]*
- 12.** *Award [1 mark] for any of the following up to [3 marks max].*
problem may not be solvable;
important aspects missed;
fail to understand problem;
failure to produce a full or working solution;
increased support to rectify errors in future;
saves time in system analysis & design part of program design, development and implementation;
[3 marks max]

SECTION B

[40 marks]

13. (a) Award **[1 mark]** for correct entries (bold italic in table) up to **[4 marks max]**.

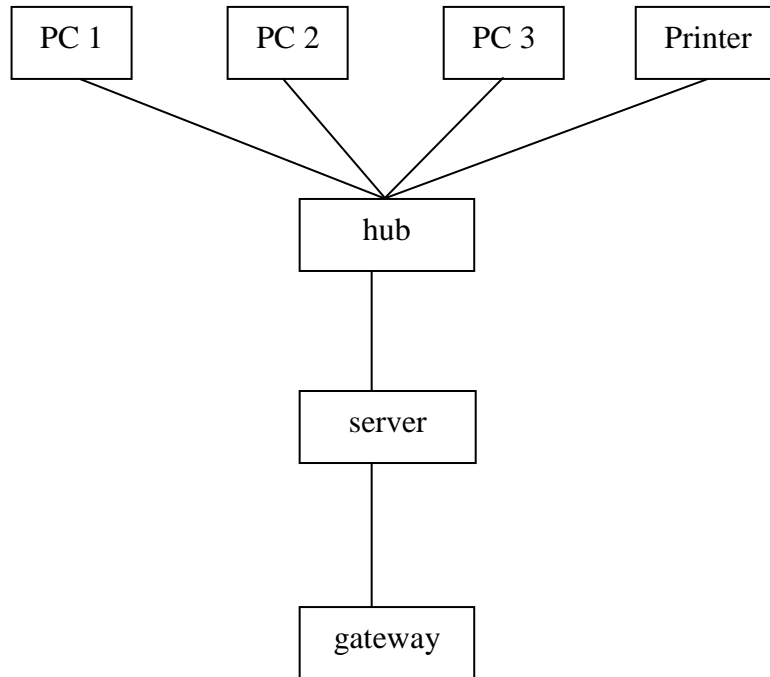
line	d	p	n	c	if (c==n)	return
1	03	543123	7			
2				6		
3					false	
7						<i>error</i>
1	90	6431231	7			
2				7		
3					true	
4	<i>(90)</i>					
5		<i>643-1231</i>				
6						<i>(90)643-1231</i>

[4 marks max]

- (b) method `formatPhoneNumber()` returns a value **[1 mark]** that is assigned to a variable of data type `String` i.e. `s`. The value returned must have a data type so that the assignment can be executed correctly **[1 mark]**. **[2 marks]**
- (c) Award **[1 mark]** to validate data, **[1 mark]** to format phone number. **[2 marks]**
- (d) the method `formatPhoneNumber` has a list of three input parameters **[1 mark]**, initial values must be passed when the method is called **[1 mark]**. **[2 marks]**

14. (a) the valid codes are stored in the array codes *[1 mark]*.
search the array to find a match *[1 mark]*.
if a match is found the code is valid, otherwise if no match is found the code is invalid
[1 mark]. *[2 marks]*
- (b) get customer code;
search the complaints file sequentially;
check each record to see if a match on the customer code exists; *[2 marks max]*
- (c) direct access is fast *[1 mark]* as it does not require other records in the customer file to read to
access the desired customer record *[1 mark]*. *[2 marks]*
- (d) get the product code;
set a counter to zero;
search the complaints file sequentially;
for every record that matches the product code add 1 to the counter; *[4 marks]*

15. (a) *Accept gateway / router / modem;* **[1 mark]**
- (b) *Award [1 mark] for correct star configuration, [1 mark] for correct hub and [1 mark] for correct gateway configuration.
Accept reasonable alternatives.*



[3 marks]

- (c) LAN connection to the Internet invites hackers to attempt to crack the system **[1 mark]**.
 LAN connection to the Internet enables Trojans, spyware etc. all of which pose potential security problems **[1 mark]**.
Award [1 mark] for any reasonable similar point.
- (d) *Award [2 marks] for any of the following.*
 a firewall can be used to prevent hackers accessing.
 virus checkers can be loaded.
 spyware program run to check for spyware. **[2 marks]**
Do not accept password protection.
- (e) *Award [1 mark] for relevant comment about viruses damaging files and file system, thus compromising data integrity.* **[2 marks]**
Do not accept answers that deal only with data security.

16. (a) Online or Interactive; **[1 mark]**
Many students will use the term real time, but this is incorrect according to the IB syllabus.
- (b) web server is a multi-user, multi tasking environment **[1 mark]** using a multi-user operating system, which timeshares its resources amongst the users and processes demanding service **[1 mark]**. **[2 marks]**
- (c) batch; **[1 mark]**
- (d) Award **[1 mark]** for each reasoned point up to **[3 marks max]**.
 reasonable business practice;
 provided users are given the option to opt-in or opt-out and control if their details are to be traded it is a reasonable business practice;
 where sensitive data is concerned e.g. medical, it is normally illegal to trade this data in a way where individuals can be identified;
 most countries have laws protecting privacy of personal data, however, non-attributable data can be often traded; **[3 marks max]**
- (e) Award **[1 mark]** for some form of backup only.
 Award **[3 marks]** for some form of redundant system, with an appropriate backup system.
 full backup, stored off site once per cycle (e.g. per week);
 incremental backups of data per night, stored in safe place on-site;
- However backups need to be restored and this takes considerable time in terms of hotels and airlines with customers waiting or the website down, customers may simply go elsewhere.
- A better design would be to suggest duplicate disks or duplicate processors, with an appropriate backup system. **[3 marks]**
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