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MARKSCHEME

May 2010

COMPUTER SCIENCE

Standard Level

Paper 1

10 pages

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 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 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. 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**".

SECTION A *Total: [30 marks]*

1. *Award up to [2 marks max].*
   A list of available tools/hardware/software *etc.*;
   Facilities;
   Communication;
   People available;
   Schedule for the next stage; *[2 marks]*

2. (a) *Any of the following would be acceptable.*
   JPEG (JPG), GIF, PNG *[1 mark]*

   (b) *Award [2 marks] for any of the following with some elaboration.*
   Size is small enough for upload/download
   Compatibility
   Quality *[2 marks]*

3. (a) 11000 *[1 mark]*

   (b) 101000 *[1 mark]*

   (c) 0101 1111 *[2 marks]*

4. *Award up to [2 marks max].*
   The ALU receives data to be processed;
   Performs arithmetical;
   And logical operations;
   (Uses logic gates) to perform the calculations;
   (Uses logic gates) to perform comparisons;
   Returns the answer to the accumulator / (output registers); *[2 marks]*

5. (a) Sequential access requires accessing one item after the other in the file; *[1 mark]*

   (b) Direct access means any item can be accessed directly without reading through
   the preceding items; *[1 mark]*

6. (a) *Award [2 marks] for the outline of a suitable application.*
   Example:
   To run a heating system which heats or not according to the ambient temperature. *[2 marks]*

   (b) *Award [1 mark] each for suitable inputs and outputs.*
   Would need to input the temperature;
   And output heater On or Off;

   Do not accept physical inputs or outputs (i.e. water instead of water level etc.). *[2 marks]*

7. Private class members can only be accessed from within the class (in which they are defined);
Public class members can be accessed from outside the class;   *[2 marks]*

8. (a) *Award [1 mark] for suitable macro and [1 mark] for appropriate package up to [2 marks max].*
Example:
A macro to clear/update entries in a spreadsheet;
A macro to type a name using a hotkey in a word processor;
Creating a circle for a given radius in a graphics package;   *[2 marks]*

(b) *Award [1 mark] for each suitable advantage.*
Example:
Saves time as code does not have to be reproduced;
Portability – can be used again (sometimes across different applications);
Adaptability – can easily be changed to suit needs;   *[2 marks]*

9. *Award up to [3 marks max].*
Groups of bits are added before transmission and the sum appended to the group;
When the data is received the actual sum is compared with the check sum;
If the two are the same it is assumed that the data has not been corrupted;
Otherwise a re-send would be requested;   *[3 marks]*

10. *Accept any reasonable answers, given that characteristics evolve rapidly.*

Award up to [2 marks max] for an appropriate application of each with reference to backup.
Example:
Tape could be used for regular backup of large amounts of data, flash memory to back up immediately when needed.

Award up to [2 marks max] for the advantages/disadvantages of each.
Example:
Flash memory is more portable between machines – tape has large capacity and can be programmed to back up as a batch job.   *[4 marks]*

SECTION B   *Total: [40 marks]*

11. (a) Card reader;
         Barcode scanner;   *[2 marks]*

  (b) Scanner barcode converted to number;
       Number related to key field of record for item;   *[2 marks]*

  (c) *Award up to [4 marks max].*
       Card swiped at checkout (could be checked that is valid – but not essential);
       Each item scanned and price and any discount returned from server;
       Total calculated;
       Bill printed with items listed;
       Price and discount against each item;   *[4 marks]*

  (d) *Award [2 marks] for a suitable suggestion elaboration.*
       Example 1:
       If prices changed whilst the store was open to customers, customers would see a
       change of prices between selecting an item and paying for it;
       Example 2:
       It would be a better use of system resources as the system would be busy when the
       store were open and idle when closed;   *[2 marks]*

                                                        Total: [10 marks]

12. (a) (i)   Ethernet or wireless within college;   *[1 mark]*

      (ii) This would depend on the connection over Internet of the student;
            (Could be ADSL via telephone line, cable, wireless to home router)   *[1 mark]*

  (b) (i)   Everything would be password protected;
            Student and teacher would have to logon to the network with username and
            password access to the students file with different permissions;
            Document read only to teacher;   *[3 marks]*

      (ii) *Award [1 mark] for a suitable system.*
            Teacher can email with comments;
            Could be a comment in the same directory;   *[1 mark]*

  (c) *Award [2 marks] for suitable method of controlling data storage and [2 marks]*
       for suitable method of controlling print services.
       Examples:

       Amount of storage allocated in advance and if this is exceeded a warning message
       is given and the student needs to delete unwanted files before able to save again.

       Log taken of print access and then analysed for amount used, once over limit
       printing is denied when the user attempts to print.

       Different types of users may have different storage needs which the server will
       meet by allocating different amounts of storage based on policies set by
       administrators.   *[4 marks]*

                                                        Total: [10 marks]

13.   (a)

name	j	c	student[c] == name	student[c]	grade[c]
Archie	0	0	false	Pietro	7
"	"	1	false	Michelle	4
"	"	2	true	Archie	5
"	2	3	false	Sol Me	2
"	"	4	false	Dyna	5
"	"	5	false	Clara	9

Award [1 mark] for each row. Accept `j=2` in the third row.   *[4 marks]*

(b)   (i)   *Award [1 mark] for either of the following.*
2nd loop will attempt to reach `student[6]`;
2nd loop will give out of bounds error;   *[1 mark]*
Also accept == cannot be used to compare strings;

(ii)   *Award [1 mark] for either of the following.*
Logical error;
Runtime error;   *[1 mark]*

(c)   Change the loop boundary;
To `c < 5`;
or
Change string comparison: `student[c].equals(name)`   *[2 marks]*

(d)   *Award [2 marks] for an improvement in efficiency.*
Example:
Stop 1st loop when found by introducing a boolean variable found.   *[2 marks]*

Total: [10 marks]

14. (a) *Award [2 marks] for a suitable method elaborated.*
Example:
Interviews with personnel;
To see how the process works at the moment/analyse the essential parts of the system;

Watch the process as it works at the moment;
To see the strong and weak parts of the current system;

Research other automated systems;
To learn from other systems;   *[2 marks]*

(b) *Award [2 marks] for a suitable description.*
Example:
More than one prototype allows the factory to choose one which is most suitable;
Means that a selection could be made from more than one – giving more flexibility;
Increased dialogue between user and computer company will improve final product;   *[2 marks]*

(c) *Award [1 mark] for each advantage up to [2 marks max]. To receive full marks, at least one of the advantages must be unique to the use of multiple (as opposed to single) prototypes.*
Example:
Large system with a lot of coding;
Makes the job quicker as more than one programmer can be used;
Helps in debugging as separate parts can be independently tested;   *[2 marks]*

(d) *Award [2 marks] for each implication.*
Example:
Employment – some people will lose their jobs;
State of job will change and need new skills;

There are many and mostly involve the well being of the people employed (changed conditions/new skills/redundancy) as opposed to increased efficiency and output for the factory.   *[4 marks]*

Total: [10 marks]