INTERNATIONAL BACCALAURÉAT BACHILLERATO IBO BACCALAUREATE INTERNATIONAL INTERNACIONAL

N02/650/S(2)M+

MARKSCHEME

November 2002

COMPUTER SCIENCE

Standard Level

Paper 2

10 pages

Subject Details: Computer Science SL Paper 2 Markscheme

Mark Allocation

Candidates are required to answer ALL questions. (***[30 marks]*** for question 1, ***[25 marks]*** for question 2 and ***[15 marks]*** for question 3.) 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 penalised. However, if the incorrect answer is used correctly in subsequent parts then **follow through** marks should be awarded. Indicate this with **"FT"**.

1. (a) 34; ***[1 mark]***

(b) One solution is:

```
for S <-- 1 to 500 do
   IDCODE <--  SALES[S,1]
   HIGHEST <-- SALES[S,2]
   SUM <-- SALES[S,2]
      for M <-- 3 to 13 do
         SUM <-- SUM + SALES[S,M]
         if SALES[S,M] > HIGHEST then
            HIGHEST <-- SALES[S,M]
               MAXMONTH <-- M-1
         endif
      endfor
      output("SALES ID",IDCODE)
      output("month with highest sale",MAXMONTH)
      AVERAGE <-- SUM / 12
      output ("average sales", AVERAGE)
endfor
```

[2 marks] for initializing `SUM, HIGHEST` or equivalent;
[2 marks] for correct nested loops, ***[1 mark]*** for any attempt;
[1 mark] for correctly adding to `SUM`;
[1 mark] for correctly changing `HIGHEST`;
[1 mark] for `AVERAGE` in correct place;
[2 marks] for output in correct place (***[1 mark]*** if any item is missing or all present but in wrong place or if `MAXMONTH` is +1); ***[9 marks]***

(c) (i) Because it returns only one value; ***[1 mark]***

(ii) ID Code***;***
Pass by value; ***[2 marks]***
Accept row number.

(d) (i) 10344; ***[1 mark]***

(ii) Brenta; ***[1 mark]***

(e) One solution is:

```
procedure DISPLAYBESTMONTH(val IDCODE integer)
   declare FOUND boolean
   declare (MAX,POS,integer)
   FOUND <-- false
   POS <-- 1
   repeat
      if IDCODE # SALES[POS,1] then
      POS <-- POS +1
      else FOUND<-- true
      endif
   until FOUND or POS = 501
   if POS = 501 then
      output ("not found")
   else
      MAX <-- BEST[IDCODE]
      output(NAMES[POS],MAX)
   endif

endprocedure GETNAME
```

[1 mark] most variables declared;
[1 mark] initialize variables;
[2 marks] loop terminated when found or end of array reached
*(**[1 mark]** if only one of these.)*
[2 marks] correct call to `BEST` in correct place;
[2 marks] correct name output;
[1 mark] `MAX` output; ***[9 marks]***

(f) One solution is:

```
procedure DISPLAYLIST (val MONTH integer)
   declare POS integer
   declare FOUND boolean
      POS <-- 1
      FOUND <-- false
   repeat
      if TEMP[POS,2] = MONTH then
         FOUND = true
      else
      POS <-- POS + 1
      endif
   until FOUND or POS = 501
   while TEMP[POS,2] = MONTH do
      output (TEMP[POS,1])
      POS <-- POS + 1
   enddo
endprocedure DISPLAYLIST
```

Initialize and declare variables ***[1 mark]***;
Searching till month found ***[1 mark]*** or end of array ***[1 mark]***;
Credit stopping search if month does not exist as soon as next month passed;
Correct loop to find all in that month ***[1 mark]***;
Correct call to `TEMP` ***[2 marks]*** (***[1 mark]*** for good but incorrect attempt); ***[6 marks]***

2. (a) Because the hardware (give by example: bus, CPU, ALU *etc.*) is designed to work in whole numbers of bytes;
The extra space could be used for error checks, such as parity;
It is more convenient for calculations in software to be done using whole bytes; ***[1 mark]***

(b) Award ***[1 mark]*** *for reason and* ***[1 mark]*** *for elaboration.*
Filtering tasks are computer intensive;
Need no human intervention;
Are non urgent; ***[2 marks]***

Accept equivalent but do not credit the same reason twice, e.g. "can run overnight when no one is there" is the same as "need no human intervention".

(c) (i) *Accept any reasonable answer, for example:*
Transfer of file from scanner set up to University;
Transfer to high performance desktop machines (graphics);
Research results over the firewall to other computers; ***[2 marks]***

(ii) *Award* ***[1 mark]*** *for method and* ***[1 mark]*** *for elaboration.*
parity check;
check sum;
retransmission; ***[2 marks]***

(d) ***[1 mark]*** *for identifying an issue and* ***[1 mark]*** *for an elaboration × 2.*
Hacking;
– hackers may break in and do damage to research projects, causing researchers to lose many years of work;
Illegally copying CD ROMs;
– the image files are valuable and copyright to the universities;
Theft of project information;
by another research group *etc.*; ***[4 marks]***

(e) ***[2 marks]*** *for a good outline,* ***[1 mark]*** *for an answer with some credit × 2.*
The password should not be written down;
and left available;
e.g. on desk or attached to computer with yellow sticky *etc.*
The password should be changed;
on a regular basis;
The password should be of reasonable length ***[2 marks]*** – allow a figure like 6 or more;
The password should contain some non-alphabetic characters ***[2 marks]***; ***[4 marks]***

(f) ***[2 marks]*** *for each outline × 2,* ***[1 mark]*** *for an answer with some credit.*

Advantages:

Data can be displayed on a web site and viewed from anywhere;
over the Internet thus saving;
postage charges;
print costs or;
time to publication.
Data on a web site can be more easily and quickly updated;
compared to physical publications;
Web sites are interactive compared to traditional photos;
so a specimen can be viewed from different angles easily; ***[2 marks]***

Disadvantages:

The web is a poorer medium for the display of images;
compared to traditional printing;
still true for a few months yet!
Publications on a web site can be put there by anyone (*e.g.* a practical joker);
whereas conventional scientific publications have to be scrutinised carefully;
Publications on a web site can be changed by unauthorised persons;
but there is no physical evidence of the change; ***[2 marks]***

[4 marks max]

(g) ***[2 marks]*** *for a good explanation,* ***[1 mark]*** *for a weak one with some credit.*

Images are very large;
and each pixel has to be processed;
requiring a huge number of calculations to be done; ***[2 marks]***

(h) ***[1 mark]*** *for identifying a change and* ***[1 mark]*** *for an elaboration × 2, examples:*

Has to learn to work with computers;
since all data is stored / processed on them;
Has to learn to interpret 3D images on screen / CD ROM;
rather than from physically handling specimens;
May not have to travel so much;
as specimens can be viewed, downloaded via computer; ***[4 marks]***

3. (a) (i) Analog data is "continuous" data such as;
sound, picture, colour which is not measured in steps; ***[2 marks]***
[1 mark] *for a good example.*
Digital data is made up of discrete elements;
which can each be given a distinct value; ***[2 marks]***

(ii) The image is in analog format and computer can only process / store in digital format ***[2 marks]***. Hence conversion needed. ***[2 marks]***

(iii) An OCR software which detects by light intensity the text on the page;
For each letter the image is compared with stored image;
Match found and ASCII equivalent stored in file; ***[3 marks]***

(b) ALU performs arithmetic operations, logic operations and related operations, deals with all calculations and comparisons during the execution of a program ***[2 marks]***;

CU accesses instructions in sequence and then initiates the appropriate operations required. Controls the flow of data ***[1 mark]*** and instructions ***[1 mark]***;

A bus transfers data from one part of the CPU to another *e.g.* "fetch" data from memory when needed ***[2 marks]***; ***[6 marks]***