



# **MARKSCHEME**

**November 2001**

**COMPUTER SCIENCE**

**Standard Level**

**Paper 1**

## SECTION A

1. *Award marks as allocated up to a maximum of [4 marks].*

*Award [2 marks] for any two of the following user documentations.*

instructions on how to load program;  
how to input data;  
functions that the program can perform;  
output to expect from program;  
help files;

*Award [2 marks] for any two of the following system documentations.*

system flowchart;  
variable listing/record and tables listing;  
annotated listing of code;  
details of algorithms used;  
requirements definition;  
software specifications;  
test plan *etc.*;

2. *Award marks as allocated up to a maximum of [4 marks].*

*Award [2 marks] for any two of the following local variables.*

defined within a procedure or subroutine;  
no effect outside that procedure;  
any changes do not affect the rest of the program;  
stored on stack;

*Award [2 marks] for any two of the following global variables.*

declared in the main body of the program;  
can be used and changed in any part of the program;  
any changes made anywhere are carried through to the rest of the program;  
stored in global memory space;

3. (a) *Award [1 mark] maximum for any suitable input device:*  
most likely is a voice recognition device but accept device that can be touched (such as a large push button, chord) provided it is clear that there are many, and are available from all parts of the apartment;
- (b) *Award [1 mark] maximum for any suitable output device:*  
most likely is again sound but could be flashing light;

4. *Award [1 mark] for any of the following, up to a maximum of [3 marks].*  
syntax is the grammar of a programming language;  
or set of rules that have to be followed;  
for example every **begin** must have an **end**;  
a translator checks the syntax by applying the rules;  
if rule broken the program stops (in the case of an interpreter) or is reported;

5. Award [1 mark] for each of the following, up to a maximum of [2 marks].  
does not need to type in the code or number of menu hence less chance of mistake;  
menus selected by pressing only one or two parts of screen, hence quicker;  
physically more appropriate in restaurant environment e.g. keyboard could get clogged;

*Do not accept quicker or easier unless justified.*

6. 28; [1 mark]

7. Award [1 mark] for each of the following, up to a maximum of [2 marks].  
sound is analogue;  
computer only accepts digital;  
need modem to convert from analogue to digital;

8. Award [1 mark] for each of the following, up to a maximum of [4 marks].  
transaction file sorted into the same order as the master file;  
from the beginning of each file;  
each record in turn in the transaction file;  
compared with the next record in the master file;  
copy record to new master file if not the same;  
until the same record number;  
update record to new master file;  
until end of transaction file;  
append records remaining to new master file;

9. Allocate marks as follows, up to a maximum of [2 marks].  
1.4 MB is 1433.6 KB [1 mark] so it needs 2 diskettes [1 mark];  
 $1433.6 \times 3 = 4300.8$ . Fits onto 2 diskettes;  
*if candidate assumes 1.4 = 1400 and needs 3 diskettes, award only [1 mark];*

10. [1 mark] for any logical operation, up to a maximum of [2 marks].  
**and, or, not;**

11. Award [1 mark] for each of the following, up to a maximum of [4 marks].  
protocol is a set of rules and procedures;  
followed when transmitting packets of data;  
part of this is to send information about the packet;  
such as destination;  
with the packet;  
so that the same protocol can be interpreted at the other end when unpacking;

**SECTION B**

12. (a) Bubble Sort or Exchange Sort; *[1 mark]*

(b) array of string or array of 5 characters; *[1 mark]*

(c) **procedure** ALPHA(**val** N **integer**, **ref** LETTER **string array** (1..26))  
    **declare** TEMP, COUNT1, COUNT2 **integer**  
    **for** COUNT1 $\leftarrow$  1 **upto** N-1 **do**  
        **for** COUNT2 $\leftarrow$  COUNT1+1 **upto** N **do**  
            **if** LETTER(COUNT1) > LETTER(COUNT2)  
            **then** TEMP $\leftarrow$  LETTER(COUNT1)  
                LETTER(COUNT1)  $\leftarrow$  LETTER(COUNT2)  
                LETTER(COUNT2)  $\leftarrow$  TEMP  
            **endif**  
        **endfor**  
    **endfor**

*Candidates do not need to write out all the original statements. Allocate marks as follows, up to a maximum of [4 marks].*

correct declaration of parameters *[2 marks]*;  
*[1 mark]* if at least one is of correct type;  
correct declaration of variables within procedure *[1 mark]*;  
correct change of loop terminators *[1 mark]*;

(d) *Award marks as allocated, up to a maximum of [4 marks].*  
add SWAPS as Boolean type variable *[1 mark]*;  
set SWAPS to **false** between the two **for** statements and **if** SWAPS=**true** or  
COUNT1=1 **then** *[1 mark]*;

add SWAPS=**true** between **then** and **endif** *[1 mark]*;  
add **if** not SWAPS **then**

and an extra **endif** at the **end** *[1 mark]*;

One example is:

```
for COUNT1  $\leftarrow$  1 upto N-1 do
  swaps  $\leftarrow$  false
  for COUNT2  $\leftarrow$  COUNT1+1 upto N do
    if LETTER(COUNT1) > LETTER(COUNT2) then
      swaps  $\leftarrow$  true
      . . . .
    endif
  endfor
if swaps then return
endfor
```

13. (a) Optical Character Recognition. *[1 mark]*
- (b) *Award [1 mark] for each of the following, up to a maximum of [3 marks].*
- optical reader senses amount of light in each of the 35 squares;
  - if shaded in square then 1 allocated to the memory map;
  - otherwise 0;
  - each letter has pattern of 1 and 0 in memory;
  - software compares the read pattern with those for each letter in alphabet;
  - until exact or near match found;
  - ASCII code for that letter stored;
- (c) *Award [1 mark] for each of the following points, up to a maximum of [2 marks].*
- different fonts would cover different squares;
  - for the same letter;
  - difficult to compare against the same standard;
- (d) *Award [2 marks] for a valid difference or similarity, up to a maximum of [4 marks].*
- OCR uses light to distinguish the shape of the letter;
  - MICR uses magnetic attraction to do the same;
  - once the pattern is picked up by the input device the conversion is the same;

14. (a) *Award [1 mark] for description of HTML and [1 mark] for use of editor.*
- HTML (hyper text mark up language) is universally recognised code for screen display and insertion of images from text;
  - HTML editor allows the user to change the code and hence the visual display;
- (b) *Digital camera: [1 mark] for advantage and [1 mark] for reason, up to a maximum of [4 marks].*
- better quality:
- image better for screen display;
  - since already digitised;
  - whereas scanner has to digitise image from photograph;
- easier to use:
- simpler to insert diskette with JPEG file;
  - rather than spend time with scanner getting the balance correct;
  - and saving in appropriate format;
- (c) *Award [2 marks] for description of web browser and [2 marks] for use of search engine.*
- web browser:
- interprets the HTML code;
  - converts to screen image;
  - inserting objects as directed in code;
  - different browsers give separate defaults for unknown elements;
- search engine:
- takes key words entered by user *e.g.* holiday Spain;
  - searches for pages/sites that have these words as keywords or in title;
  - returns a list of sites found with addresses for viewing;

15. (a) *There are many possible solutions. Accept any reasonable answer. Award [1 mark] for suitable method [1 mark] for way in which device read and [1 mark] for validating and opening barrier.*
- bar code/magnetic strip on badge fitted to windscreen;
  - read by bar code scanner/ magnetic reader as car passes;
  - barrier opened if valid;
- (b) *Award [1 mark] for method of counting those with device [1 mark] for counting those who pay or [2 marks] for counting both in the same way.*
- cars fitted with device simply have a count incremented each time a car passes;
  - for those who stop either the person who takes the money presses a button for each vehicle that passes;
  - or calculation made from money at end of day;
- Alternatively,
- sensor fitted at strategic part of road;
  - triggered when car passes;
  - converted to digital incrementation;
- (c) *Award [1 mark] for correct understanding of integrity and [1 mark] for identifying a problem.*
- loss of data integrity would mean wrong values sent across WAN;
  - wrong figures could mean no reaction to critical situation;
  - or over reaction and cost when not required;
- (d) *Award [1 mark] for a suitable method and [2 marks] for description.*
- check sum digit incorporated into transmission;
  - after a set number of bits / bytes send the sum of preceding transmission;
  - check that sum of digits sent is the same as the sent sum;
  - odd or even parity check;
  - use one digit in transmission to maintain parity;
  - in case of even parity set to one or zero to ensure that an even number of bits for each byte is sent. In the case of odd the reverse;
-