

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;
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