**UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS**

International General Certificate of Secondary Education

# MARK SCHEME for the October/November 2006 question paper

## 0420 COMPUTER STUDIES

**0420/01**    Paper 1, maximum raw mark 100

This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination.  It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began.

All Examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes must be read in conjunction with the question papers and the report on the examination.

The grade thresholds for various grades are published in the report on the examination for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level syllabuses.

CIE is publishing the mark schemes for the October/November 2006 question papers for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level syllabuses and some Ordinary Level syllabuses.

**1** **(a)** **Verification**
any **two** points from:
check on input for errors
on screen checking/checked by human
comparing input/use of second operator/by double entry
**examples:** password entry, email entry

[2]

**(b)** **Video conferencing**
any **two** from:
meeting between two or more participants (at different sites)
using computer network/WAN/Internet
to transmit/receive audio and video data
each participant has a video camera/webcam/microphone/speaker
images appear in real time (on a window on the participant's monitor)

[2]

**(c)** **Handshaking**
any **two** from:
exchange of signals/protocols
to establish communication/readiness (to send and receive)
between two devices/computers
**examples:** printer and computer, modem and computer

[2]

**(d)** **Simulation**
any **two** from:
studying the behaviour of a system
by using a model/represents real life/mathematical representation
results can be predicted
**examples:** flight simulator, hazardous applications, training

[2]

**(e)** **Batch processing**
any **two** points from:
processing does not start until all data collected
reference to JCL
no need for user interaction
output is not time sensitive
**examples:** payroll system, electricity/gas/water (etc.) billing, cheque processing

[2]

**2** (1 mark per device and 1 mark per application)
e.g.

| device | application |
|--------|-------------|
| use of bar code readers | stock control, libraries |
| use of mark sense readers/ OMR | marking multiple-choice papers, reading questionnaires |
| use of touch screens | choosing goods online |
| use of sensors | control applications (e.g. power stations, traffic lights, chemical reactions, counting people) |
| cameras | traffic control/speeding, security |
| MICR | cheques |
| microphones | games, telephone system, security |
| magnetic strip reader | reading credit/debit cards etc. |

(need two different devices and applications)
(accept keyboards if application is appropriate)

[4]

**3** **(a)** Any **two** from:

Illegal/unauthorised copying of software/data / software piracy
sending viruses
hacking into systems/access illegally
fraud/improper transfer of funds
(industrial) sabotage/malicious damage
altering information illegally

[2]

**(b)** Any **two** from:

data encryption
use of passwords/ids/PIN/biometric software
physical locks
use of anti-virus software
log users/computer use/timed access
anti-hacking software
use call back facility for in-coming information
take/check references of potential staff
firewall

[2]

**4** Any **three** effects from:

loss of jobs
traditional shops/banks close
city/town centres become deserted as shops/banks close
gap between rich and poor grows (rich get access to savings by shopping online)
less interaction between people
increase in small businesses
less pollution/less need to travel
security fears
people will need credit cards/bank accounts/computer systems

[3]

**5** Any **two** from:

animation
editing e.g. changing colours on film
tweening
synchronising voice output with "cartoon" characters
addition of text e.g. subtitles
special effects e.g. morphing

[2]

**6** Any **four** from:

design data collection forms
design input forms
design system flowcharts/pseudocode
design output forms/reports
design/select validation rules
design/select verification methods
design testing strategy/plan
specify/select hardware
specify/select software
design the algorithms/program flowcharts
specify the data structure
design files (structure)/tables

[4]

**7 (a)** Any **three** from:

answers questions asked by the system
possible answers supplied as…..
…….rule base is looked up
…….knowledge base is searched
…….by inference engine
e.g. minerals/map of mineral deposits/% probability of finding mineral

[3]

**(b)** Any **one** from e.g.

chess
medical diagnosis
car/fault diagnostics
criminology/forensic science
careers
tax/financial calculations
weather forecasting

[1]

**8 (a)** Any **two** from:

work can be done anywhere (at offices in different countries)
quicker transfer of files to other offices
employ fewer staff (**)
less chance of paper/file loss
less paperwork (therefore less storage requirement)
can open up files from any computer terminal linked to system
easier/quicker to search for/sort a given file
easier/quicker to cross reference files
easier/quicker to insert/reference sections of files into reports

[2]

**(b)** Any **two** from:

training/need for new skills
possible unemployment(**)
possible working from home
deskilling
health effects

[2]

(**) only allow this answer in (a) OR (b) not both

**(c) (i)** Always have a fall-back system in case of failure/problems
results from new system can be checked against known results
errors corrected before final implementation

[1]

**(ii)** Control systems
e.g. control of power station
control of chemical plant
traffic lights

[1]

**9** **(a)** error 1:  product = 0 on line 2
                     should use product = 1

     error 2:  loop control, count <= 10 on line 3
                     should use count < 10 or alternatively alter count value on line 1 to count = 1

     error 3:  print value of product inside loop on line 7
                     output should come after the endwhile statement
                                                                                    [3]

**(b)** Accept either of the following loop controls:

repeat                                    for count = 1 to 10
                         OR
until count = 10                          next count
(accept repeat

        until count ≥ 11

 if line 1 changed to count = 1)
                                                                                    [1]

**10**  LEFT 6                }
        DOWN 5                }   1 mark
        CLOSE                 }

        UP 5                  }   1 mark
        RIGHT 4               }

        DOWN 4                }   1 mark
        OPEN                  }
                                                                                    [3]

**11** **(a)** (column) A
        or Name
                                                                                    [1]

**(b)** e.g. = AVERAGE(C2:F2)  or  =(C2+D2+E2+F2)/4  or  =SUM(C2:F2)/4
                                                                                    [1]

**(c)** Highlight all data (1) Choose column E to sort (1)

OR

Click on any cell in column E(1)
select sort descending/Z to A button(1)

[2]

**(d)** PASS

[1]

**(e)** Range check OR description

[1]

**(f)** Any **one** from:

graphs/charts

[1]

**12 (a)** Any **two** input devices from:

touch screens/light pens
roller/tracker ball/mouse/joystick
microphone
touch pads (containing options shown on keys)

[2]

**(b)** Any **two** examples from:

maps/directions
prices of goods/shop products
flight details
bank statements/bills
travel offers
news updates
emails/messages

[2]

**(c)** Any **one** advantage from:

airport can advertise services/products
24/7 service
airport can get revenue from other advertisers
airport can give security information/warnings
less staff needed for information desks
quicker response to customer enquiries


Any **one** disadvantage from:

(cost of) maintenance
central computer might crash/over-reliance
hacking
viruses

[2]


**13 (a)** Any **two** points from:

3D visual world
created by a computer
computer simulation
uses special input/output devices to interact

[2]


**(b)** Any **two** examples from:

(data) gloves
(data) goggles/headsets
special suits fitted with sensor
hardware/motors to provide physical movement

[2]


**(c)** Any **two** advantages from:

safer (e.g. view inside a nuclear reactor)
can try out a dangerous task beforehand
feeling of "being there"
can perform "actual" tasks without any risk
ability to store a whole plant on computer disks
cheaper (if qualified)

[2]

**(d)** Any **one** example from:

medical field
training/teaching
investigating problems in nuclear/chemical plants
3D/arcade games
simulators e.g. flight
walk throughs e.g. virtual tour of house

[1]

**14** Any **three** benefits from:

split into small, more manageable tasks/modules
easier to debug/test
easier to modify/update
leads to a structured approach
many programmers can be used/different programmers per module

[3]

**15 (a)** Any **two** advantages from:

portable
can be used anywhere in school to link to wireless network
can be used as a standalone computer away from school

[2]

**(b)** Any **two** disadvantages from e.g.

usually more expensive to purchase/repair
difficult to use laptop keyboard/in-built mouse
laptops need re-charging from time to time
laptops more likely to be stolen/damaged

[2]

**16** **(a)** **(i)** Any **one** use from:

recording sales
keeping accounts
keeping registers
use as a mark book

**(ii)** Any **one** use from:

keeping client details
storing course details
keeping book lists

**(iii)** Any **one** use from:

designing/producing flyers
designing/producing leaflets
designing/producing presentations
designing/producing materials for websites
application forms

**(iv)** Any **one** use from:

website design
multimedia material
training material
remedial lessons
interactive material
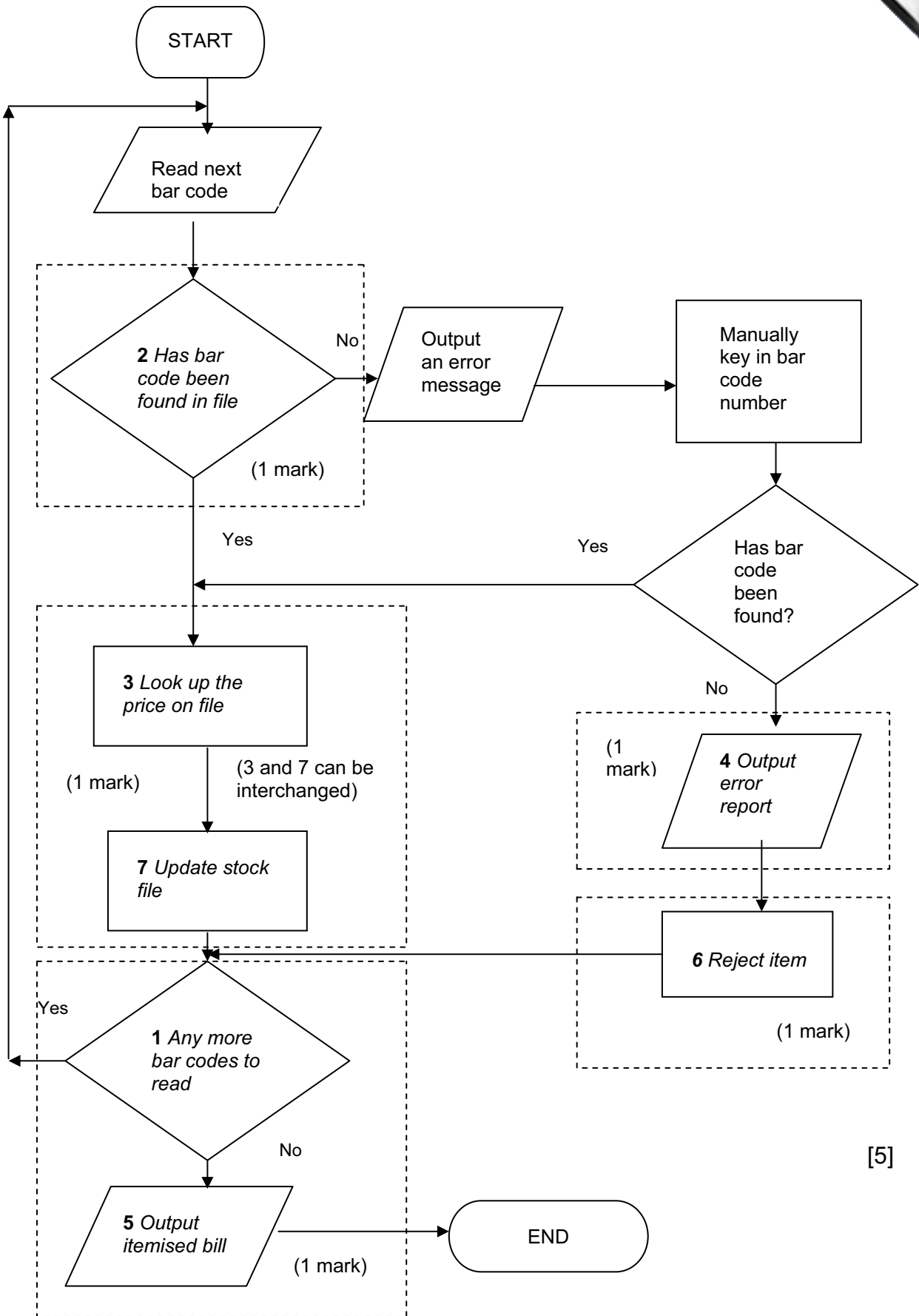(creates hypertext/hypermedia documentation)

[4]

**(b)** Any **two** features from:

reduce font size
reduce side margins/top-bottom margins
use smaller font size/remove any bold text
reduce size of any pictures/graphs
reduce line spacing
use a larger page size / fit/scale to paper size
edit text

[2]

**17** Award marks as shown

```
                         ( START )
                             |
                             v
                      / Read next  /
                     /  bar code  /
                             |
    +------------------------|-----------------------------+
    |                        v                             |
    |                                          No    / Output    /      +------------------+
    |       / 2 Has bar      \  ---------------->   / an error  /  --->  | Manually         |
    |      <   code been      >                    / message   /         | key in bar       |
    |       \  found in file /                                            | code             |
    |        \              /                                             | number           |
    |                                                                    +------------------+
    |                       (1 mark)                                             |
    +------------------------|-----------------------------+                     v
                            Yes                                    Yes      / Has bar   \
    +------------------------|-----------------------------+  <------------<   code      >
    |                        v                             |                \  been      /
    |               +------------------+                   |                 \ found?   /
    |               | 3 Look up the    |                   |                      |
    |               | price on file    |                   |                     No
    |               +------------------+                   |    +-----------------|----------------+
    |                        |                             |    | (1      / 4 Output /              |
    |    (1 mark)   (3 and 7 can be                        |    |  mark) / error    /               |
    |               interchanged)                         |    |        / report   /               |
    |                        v                             |    +-----------------|----------------+
    |               +------------------+                   |                      v
    |               | 7 Update stock   |                   |    +-----------------|----------------+
    |               | file             |                   |    |          +------------------+    |
    |               +------------------+                   |    |          | 6 Reject item    |    |
    +------------------------|-----------------------------+    |          +------------------+    |
    +------------------------|-----------------------------+    |                                  |
    |                        v                             | <------------------+                  |
   Yes              / 1 Any more   \                       |    |                 (1 mark)         |
    <--------------<   bar codes to  >                     |    +----------------------------------+
    |               \  read         /                      |
    |                \             /                       |
    |                        |   No                        |
    |                        v                             |
    |               / 5 Output    /                        |
    |              / itemised bill/   ---->  ( END )        |
    |                      (1 mark)                         |
    +------------------------------------------------------+
```

[5]

**18** **(a)** **(i)** Reg No

**(ii)** unique identifier
 used to search the database
 used to link to other tables of data (foreign data)

[2]

**(b)** WS 46 ART
NK 55 ARM

[2]

**(c)** Either  (Engine (cc) > 1400) OR (Doors < 5)

Or      (Doors < 5)        OR (Engine (cc) > 1400)

<---- 1 mark ----><------ 1 mark ------>

[2]

**(d)** Any **one** from:

customer code
customer ref no
(NOT customer name)

[1]

**19** **(a)** Any **one** from:

pressure
infrared

[1]

**(b)** Any **one** from:

sensor signal is analogue
computers can only understand digital

[1]

**(c)** Any **three** points from:

number of cars in both directions are totalled
computer compares this total …..
….. with values stored in memory/simulation results
changes lights/takes action if necessary
if no data received, default timing is used

[3]

**(d)** Any **one** point from:

all lights change to red/amber
lights flash
automatic timing sequence

[1]

**20** **Sample program:**

```
count = 0
total1 = 0
total2 = 0
lowest = 1000                                              1 mark
while count < 200 do                                       1 mark
      input temp                                           1 mark
            if temp < 10 then total1 = total1+1            1 mark
            if temp > 20 then total2 = total2+1            1 mark
            if temp < lowest then lowest = temp            1 mark
count  = count + 1
endwhile
output total1, total2, lowest                              1 mark
```

(max of 5 marks)

**Marking points:**

Initialisation (but lowest must be set to a suitable value)
Correct loop to read in 200 temperatures
Correct input for temperatures
Check if temperature is less than 10 and increment total1
Check if temperature greater than 20 and increment total2
Identifying the lowest temperature
Output results (only give output mark if some data processing has been done, and outside loop)

[5]