CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the October/November 2012 series

0420 COMPUTER STUDIES

0420/12 Paper 1, maximum raw mark 100

This mark scheme is published as an aid to teachers and candidates, 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, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge will not enter into discussions about these mark schemes.

Cambridge is publishing the mark schemes for the October/November 2012 series for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level components and some Ordinary Level components.

1 Any **three** from:
- data shall be processed/obtained fairly/lawfully
- data shall only be used for the specific purpose for which it was collected
- data shall be adequate/relevant/not excessive
- data shall be accurate/up to date
- data shall not be kept any longer than necessary
- individuals have the right to see data about them (and have it changed if inaccurate)
- sufficient means taken for security/integrity of data
- data shall not be transferred to a country with lower protection laws
- data users must be registered [3]

2 Any **four** from:
- gather information from human experts
- populate/create/design the knowledge base
- create/design the inference engine
- create/design the rules base
- create/design the user interface
- create/design output formats
- create expert system shell
- test system with data with known outcomes [4]

3

List of hardware items	Application
webcam, microphone, speakers	– video conferencing/chat
barcode reader, POS terminal	e.g. – supermarket checkout – shop sales point – stock control system – library systems
pressure sensor, ADC, lights, siren	– burglar/intruder alarm
data gloves, data goggles	– virtual reality (applications) **(NOT VR)** – simulation – e.g. motor racing simulator
light pen, plotter, 3D printer	– CAD (applications) – e.g. designing buildings/cars

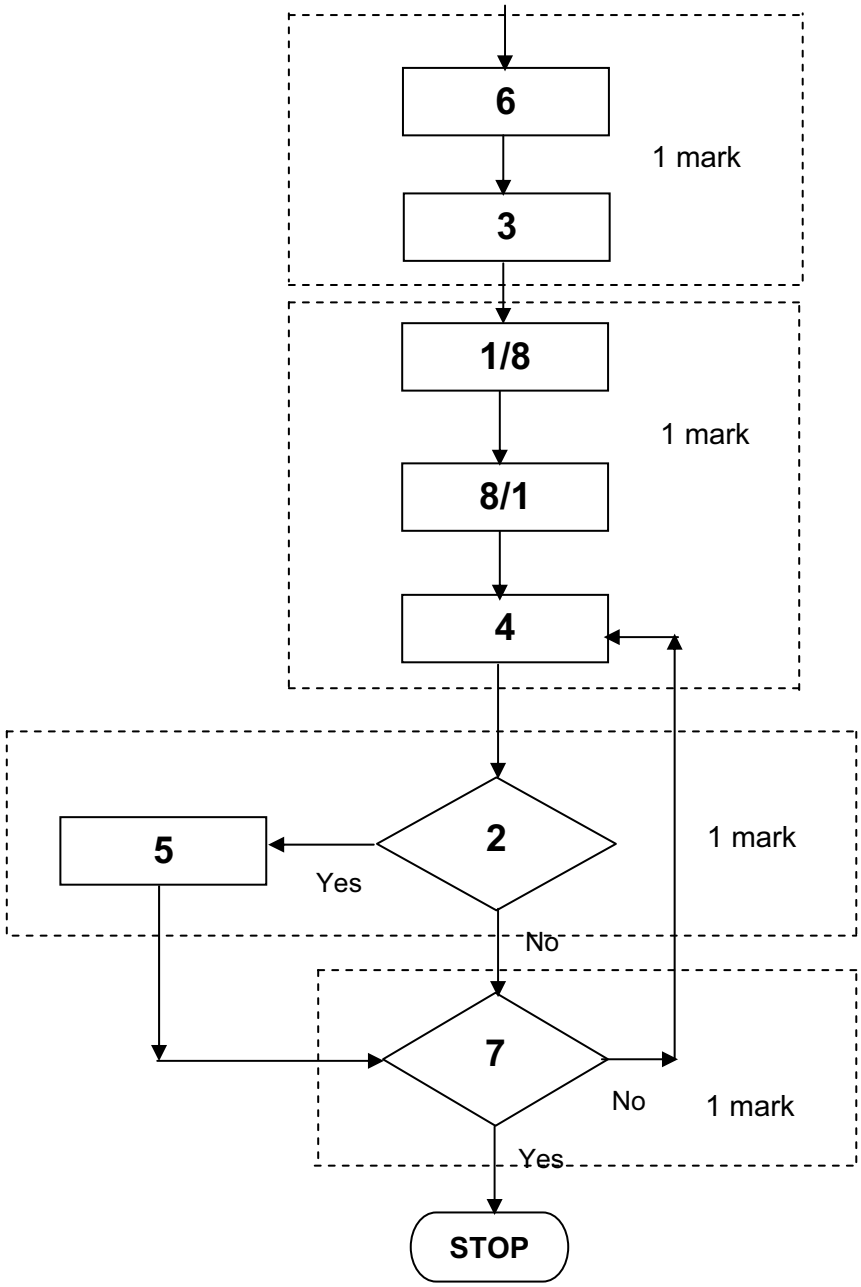
[5]

4 Any **three** benefits and **one** drawback from:

benefits:
- greater productivity
- robots are not paid/humans need wages
- less expensive in the long term
- more consistent product produced
- don't go on strike/holidays/breaks/become ill/feel tired
- no need for expensive re-training programmes
- can put more people into quality control/research/more interesting jobs
- no need for high quality lighting/air con systems in factories (no people!!)
- work in extreme/hazardous conditions

drawbacks:
- expensive initial outlay/maintenance
- introduces new hazards into work place
- programming/robot errors lead to faulty production runs
- cost of redundancies/retraining
- robot breaks down production is halted [4]

5



[4]

6 **one** mark for name of method + **one** mark for corresponding benefit

emails:
- fast delivery of messages (to recipient's mail box)
- able to send attachments
- can store messages for later use
- auto-translation no language problems
- can open email at a convenient time

video conferencing/calling/chat:
- removes need to travel (saves time and money)
- allows face to face discussions
- works in real time (only allow once)

VoIP:
- much cheaper than normal international calls
- direct communication between people
- works in real time (only allow once)

chat rooms/instant messaging:
- instantaneous reply
- anyone can join in

social networking:
- can ensure only your "friends" are in communication
- usually free to join and use
- talk to (multiple) friends at the same time [6]

7 **(a)** Any **two** from:
- she had actually described *verification*
- data could be incorrect, therefore same incorrect data typed in twice
- accept description of validation process e.g. range check [2]

(b) **(i)** Any **one** from:
- the computer appears to "freeze"/"hang"
- computer won't respond
- failure of hardware (stops computer normal functioning)
- failure of software (stops computer normal functioning) [1]

(ii) Any **one** from:
- back up her files (onto CD/DVD/memory stick)
- send files to a central database on the Internet
- cloud computing [1]

(c) Any **one** from:
- file too large
- she didn't have correct software on her computer to open the attachment
- the file was somehow corrupted during transfer
- person forgot to attach file
- password protected
- encrypted
- invalid digital signature
- rejected by virus checker [1]

(d) Any **one** benefit and **one** drawback

benefit:
- no trailing wires
- no restriction on movement of mouse
- can work anywhere (as long as in range)

drawback:
- restricted range of operation
- needs batteries
- possible interference [2]

NOT WiFi security

8 **(a)** Any **two** from:
- poor/low resolution
- low bit map image
- insufficient pixel density/picture has less pixels [2]

(b) Any **two** from:
- as picture is enlarged covers larger area .....
- ..... so pixel density gets smaller and sharpness of image is lost
- pixels become too big [2]

(c) Any **one** from:
- printer (e.g. dot matrix)
- television/monitor/screen
- projector [1]

(d)
- uses up large amount of memory/<u>storage</u> space
- download/upload takes longer [1]

9 **(a)** Any **two** from:
- lower costs in wages
- lower rental costs (for office)
- better coverage of time zones
- work can be done in the developing counties when there are strikes in Europe
- creation of new jobs in the <u>developing counties</u> [2]

(b) Any **two** from:
- problems with dialects/accents/language
- different cultures
- stick to “scripts” so can be frustrating to the customer
- long distances may lead to poor reception
- negative public reaction to overseas call centres
- time e.g. to set up centres, train staff
- cost of setting up new centres/training staff
- be aware of European legislation (e.g. Data Protection Acts) [2]

(c) Any **two** from:
- potential job losses (in Europe)
- de-motivation of remaining work force
- re-training of some staff
- relocation for some staff [2]

(d) Risk + reason **one** mark any **two** from:
- RSI/ carpal tunnel syndrome from using keyboard continuously/long time periods
- RSI/carpal tunnel syndrome from repeated clicking of the mouse buttons
- headaches/eye strain/dry eye from screen glare/staring at the screen
- back/neck problems from poor seating position/sitting for long periods of time
- electric shock from cables, water etc.
- potential for heavy equipment falling if desks used are inadequate
- trip hazards from trailing wires [2]

10 **one** mark for naming security risk + **one** mark for a correct description

viruses:
- malicious code which self replicates
- designed to delete, alter or corrupt files

phishing:
- sending emails to recipients claiming to be a legitimate company
- when email opened, recipient is directed to a bogus website/gets details about customer

pharming:
- malicious code installed on PC or a server
- code misdirects user to a fraudulent website (without their knowledge)

hacking:
- unauthorised access to a computer system
- in an effort to use data illegally (e.g. fraud)
- to change/delete/corrupt data on a computer

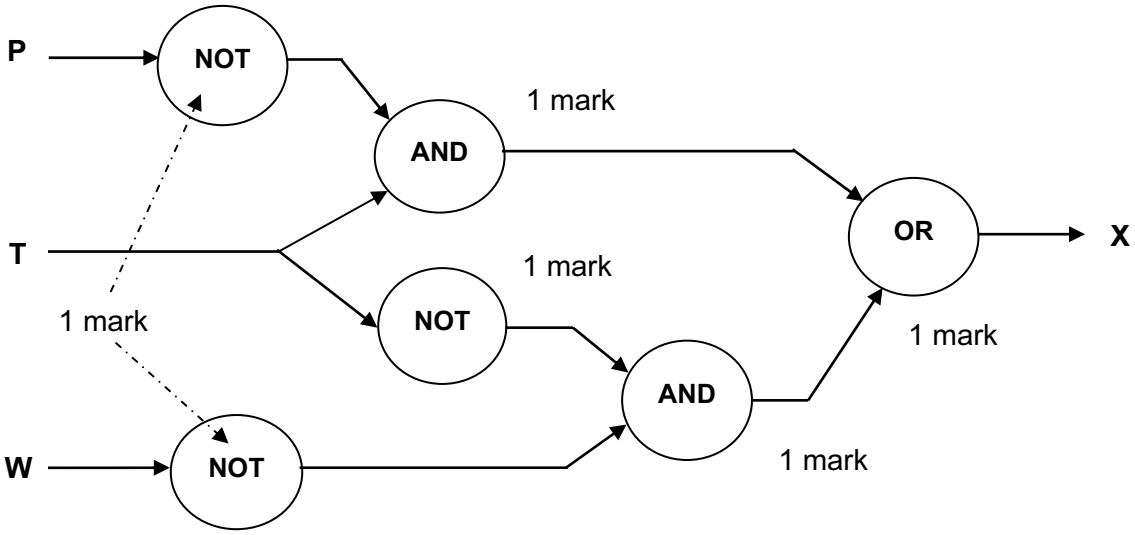
key logging/spyware
- program installed on a computer to monitor all key presses
- each key press is relayed back to the program writer

or spyware
- scan files on hard drive
- 'snoop' applications

shoulder surfing:
- the act of watching a person key in secure data (e.g. PIN, password, etc.)
- stealing security data by using binoculars, CCTV near ATMs etc. to watch key presses etc.

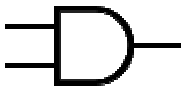
war driving:
- locating a wireless network by touring round an area
- requires a laptop, special software and an antenna [6]

11 (a)



Note: accept answers using MIL symbols e.g.

AND



[5]

(b)

P	T	W	X
0	0	0	**1**
0	0	1	**0**
0	1	0	**1**
0	1	1	**1**
1	0	0	**1**
1	0	1	**0**
1	1	0	**0**
1	1	1	**0**

1 mark

1 mark

1 mark

1 mark

(NOTE: 1 mark per pair of rows)

[4]

12 (a) Any **two** from:
- sequence of digital signals/bits
- over a communications path/the Internet
- transfer of data at a high speed ....
- ..... so there appears to be no time lag
- requires reliable/fast broadband
- reference to buffering of data/complete file not required [2]

(b) (i) Any **two** from:
- don't have to wait for whole file to be downloaded to watch film
- no need to store large files
- on demand playback/watch films at any time [2]

(ii) Any **two** problems from:
- Internet/broadband connection not very fast (then quality is poor)//requires high speed internet connection
- inadequate buffering of data stream
- if website/Internet down, can't access film files
- websites can withdraw film files without notice
- may require specific software to work [2]

(c)
- webcam sending images
- videoconferencing
- listening to music
- online game playing
- rolling news from a website [1]

13 (a) Any **five** points from:
- sensors send information to the computer
- converted to a digital signal by an ADC
- data compared to stored data (sound level) in computer memory
- if it is identified as a drip in the outer pipe .....
- ..... a signal is sent out by the computer (to the actuators)
- use of DAC to convert signal to analogue
- actuator/motor used to close valve in the inner pipe
- message sent to screen in control room/alarm sounds [5]

(b) Any **two** points from:
- computer response is much faster than a human
- 24/7 monitoring is possible/no breaks taken
- a human may miss "signs of leakage"/computer doesn't get tired
- no/removes human errors (therefore safer)
- automatic graph/generation of a spreadsheet [2]

14 **one** mark per correct column in the table

S	C	N	T	OUTPUT
0	**1**	15	0.15	
1	2	8	0.08	
	3	251	2.51	
	4	35	0.35	
2	5	60	0.60	
3	6	3	0.03	
	7	2	0.02	
	8	1516	15.16	
	9	19	0.19	
4	10	55	0.55	
5	11			
				5

[5]

15 **(a)** Minus **one** mark for each different error

	E
1	**Minimum number of nights**
2	(=)(E2 =) B2/(C2 * D2)
3	(=)(E3 =) B3/(C3 * D3)
4	(=)(E4 =) B4/(C4 * D4)
5	(=)(E5 =) B5/(C5 * D5)
6	(=)(E6 =) B6/(C6 * D6)

[2]

(b) (=)(C7 =) SUM(C2:C6)/5
OR
(=)(C7 =) AVERAGE(C2:C6)
OR
(=)(C7 =) (C2 + C3 + C4 + C5 + C6)/5 [1]

(c) Any **two** from:
– add 0.5 to the number .....
– ..... format cell and choose *number, 0 decimal places*
OR
– use the INT function .....
– ..... and add 1
OR
– use INT(E2+0.9)
(**one** mark for correct term INT and **one** mark for correct values in brackets)
OR
– use ROUNDUP(E2, 0)
(**one** mark for correct term ROUNDUP and **one** mark for correct values in brackets) [2]

16 (a) (i) 44 100 × 16 × 2 = 1 411 200 bits/second
1 411 200/8 = **176 400 (bytes)**
(**two** marks for correct answer. If answer is incorrect, award **one** mark for a good attempt at the calculation.) [2]

(ii) 3 minutes = 180 seconds
176 400 × 180 = 31 752 000 bytes
= 30.281 (megabytes) (allow 0, 1, 2 or more decimal places)
(**two** marks for correct answer. If answer is incorrect, award **one** mark for a good attempt at the calculation, allowing follow through from **(i)**) [2]

(b) Any **one** from:
– similar to how ZIP/Jpeg files work
– file is compressed
– lossless compression
AND
Any **one** from:
– using perceptual music shaping
– uses human ear characteristics to remove unneeded data//removes sounds that the human ear can't hear
– only keeps the sounds that the human ear hears better than others
– if 2 sounds played together, human ear can only hear louder one and not the softer one which is consequently discarded [2]

17 (a) sample program:

```
x = 0: y = 0                                          (1 mark)
input number                                          (1 mark)
while number < > -1 do                                (1 mark)
    if number > 1000 then x = x + 1                   (1 mark)
        else if number < 1000 then y = y + 1          (1 mark)
    input number
endwhile
print x, y                                            (1 mark)
```

marking points:

– initialisation of variables
– first and subsequent inputs in the correct place
– correct loop control (only **repeat** or **while** loops work here)
– check if number > 1000 and increment total
– check if number < 1000 and increment total
– output totals outside the loop [4]

(b) sample program

```
T = 0
for N = 1 to 50                                       (1 mark)
    read D1, D2, D3, D4                               (1 mark)
        if D1 = D4 and D2 = D3 then T = T+1           (2 marks)
next N
percent = T * 2   }
print percent     }                                   (1 mark)
```

marking points

– correct loop (for, repeat or while loops all work)
– correct input
– check whether D1 = D4 and D2 = D3
– summation if D1 = D4 and D2 = D3
– calculate percentage and output the value outside the loop [4]