MARK SCHEME for the October/November 2015 series

9608 COMPUTER SCIENCE

9608/12 Paper 1 (Written Paper), maximum raw mark 75

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 2015 series for most Cambridge IGCSE®, Cambridge International A and AS Level components and some Cambridge O Level components.
1 (a) Hard disk – magnetic (storage media)
   DVD-RW – optical (storage media)
   Flash memory – solid state (memory device) [3]

(b) DVD-RW
   – uses a single spiral track
   – only allows write OR read operation to occur as separate operations
   – requires special packet reading/writing software
   – in order to write new data to the disc the existing data must be completely erased
   – performance degrades/becomes unreliable after 1000 record/erase cycles
   – single sided, 4.7 Gb capacity
   – disc rotates at different speeds/constant linear velocity

DVD-RAM
   – uses several concentric tracks
   – allows simultaneous read/write operations
   – requires no special read/write software
   – makes use of sectors to store data
   – repeatedly read, write and erase/100,000 record/erase cycles possible
   – single or double sided, 4.7 Gb capacity per side
   – disc rotates at a constant speed/constant angular velocity [4]

2 (a) – laser/light shines onto a surface
   – through a (polished) ring at the base
   – the light is reflected from the surface through the ring
   – sensor detects reflected light
   – capturing details/photograph of surface (under the ring)
   – at about 1500 times per second
   – as the mouse moves the sensor detects changes in the surface detail/photograph
   – which are translated into movement (change of x and y co-ordinates)
   – the computer/software updates the position of the cursor on the screen [3]
(b)

<table>
<thead>
<tr>
<th>Statement</th>
<th>Sequence number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paper feed stepper motor activated; sheet of paper fed from paper tray</td>
<td>3</td>
</tr>
<tr>
<td>Printer driver translates data into a suitable format for the printer</td>
<td>1</td>
</tr>
<tr>
<td>The print head moves across page; ink is sprayed each time the print head pauses for a fraction of a second</td>
<td>4</td>
</tr>
<tr>
<td>Paper feed stepper motor advances paper a fraction of a cm after each complete head pass</td>
<td>5</td>
</tr>
<tr>
<td>Printer receives data from the computer and stores the data in the printer's buffer</td>
<td>2</td>
</tr>
</tbody>
</table>

3  (a)  (i)  4 6 C  
(ii)  1 0 1 0 0 0  

(b)  (i)  1 bit  
(ii)  – 8 bits are needed  
– Each colour is represented by one of 256 values  
– values 0 to 255/0000 0000 to 1111 1111  
– $256 = 2^8$
4  (a)  **Sampling resolution**  (two marks)

- representation used to write samples in digital sound recording
- resolution is the number of distinct values available to encode/represent each sample
- specified by the number of bits used to store/record each sample
- sometimes referred to as bit depth
- the higher the sampling resolution the smaller the quantization error
- a higher sampling resolution results in less distortion of the sound
- usually 8 bit, 16 bit, 24 bit or 32 bit

**Sampling rate**  (two marks)

- number of times that the amplitude of (analogue) sound wave is taken/measured
- per unit time/per second
- higher sampling rate results in more accurate digital representation  

(b)  (i)  **one mark**  for correct calculation,  **one mark**  for the answer

\[
\frac{44100 \times 16 \times 2}{8} = 176400 \text{ bytes}
\]

(ii)  Allow follow through from part (i) on 176 400

\[
\frac{4 \times 60 \times 176400}{1024 \times 1024} = \frac{176400}{1024} \times \frac{4\times60}{1024} \times 1024
\]

(c)  any three from:

- mp3 is a **lossy** compressed format
- uses psycho-acoustic modelling
- and perceptual music/noise shaping
- certain parts of the music can be eliminated without significantly degrading the listener’s experience
- removes sound that the human ear can’t hear
- only keeps sounds human ear can hear better than others
- discards softer sound if two sounds played together
5 **One mark** for each correctly placed tick.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Ethical</th>
<th>Unethical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gives away passwords used in the intruder detection software</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Uses source code developed at the software house for the software he develops for his own company</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Insists that staff work to deadlines</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Turns down training opportunities offered by his employer</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Writes and sells software that reads confidential data from client computers</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Fakes test results of safety-critical software</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Has the software applications developed overseas for sale in his own country</td>
<td></td>
<td>✓</td>
</tr>
</tbody>
</table>
6 (a) Any three from:

- program must be resident in (main) memory to be executed
- program consists of a sequence of instructions
- which occupy a (contiguous) block of main memory
- instructions and data are indistinguishable
- each instruction is fetched, (decoded) and then executed
- instruction fetch and data operation cannot occur at the same time [3]

(b) (i) one mark each:

- control bus
- data bus
- address bus [3]

(ii) generates the timing signals/generates the signals to synchronise events in the processor / fetch–(decode)–execute cycle [1]

7 (a) lines 8–15 [1]

(b) (i) one mark each:

- groupSize
- groupPrice [2]

(ii) lines 10–13 [1]

(c) (i) outputs a prompt for user input/prompts the user for input
- returns an input value [2]

(ii) declares
- a (local) variable [2]
8 Verification (one mark for description, one mark for explanation of need)

– needed to ensure that the data entered exactly matches the original source/data is consistent
– comparison of two versions of the data
– examples include double entry, visual checking, proof reading etc...
– does not check data is sensible/acceptable

Validation (one mark for description, one mark for explanation of need)

– needed to check that the data entered is sensible/reasonable/acceptable/matches required criteria
– automatic check by computer
– examples include range, type, length, etc.
– does not check data is correct

9 (a) (i) 0B . 4 0 . F F . 5 A

1 mark per byte, deduct one mark if no dots or if alternative separator used

(ii) Any two from:

– composed of four (denary or Hexadecimal) integers
– each in the range 0–255/00–FF
– each stored in 1 byte/8 bits/stored in 32 bits
– (in IPv4) separated into network ID and host ID

(b) Maximum 3 marks for URL and maximum 3 marks for DNS

– URL = uniform resource locator
– reference address to a resource/website on the Internet
– includes protocol used /includes domain name

– browser software sends URL to DNS

– DNS = Domain name system // Domain name service // Domain name server
– the true domain name (e.g. cie_exams.co.uk) is resolved/turned into an IP address by DNS
– DNS server stores a database/list of URLs with matching IP address
– a DNS server may need to pass a request onto another DNS server, (if URL not in its database)
– DNS server adds returned IP address and URL to its cache/database
– DNS server may return an error message if requested domain name is invalid or does not exist
– the DNS service has a hierarchy/or by example
– DNS server returns IP address to browser
10 (a) Any two from:

– To configure the disc for use / initialise tracks and sectors
– To initialise a file system (e.g. FAT, NTFS) / create a file directory
– To install a boot sector (if creating a bootable disk)
– To check all sectors and mark bad sectors

(b) One mark each named program + one mark for need

Defragmenter

– To rearrange blocks that are used for each file to make blocks contiguous (so that file reading is faster)
– To reduce head movements

(Disk) contents analysis/(disk) repair software/Disc checker

– To identify bad sectors so that they can be marked as unusable
– Verifies file system integrity and fixes logical file system errors

(Disc) compression/file compression

– To compress/decompress the contents of the disc, thus increasing capacity

Backup software

– To store disk contents (somewhere else) in case of disk failure

Anti-malware program

– To scan for/remove/quarantine viruses and/or other malware

(Disc) cleaner

– Finds redundant/unnecessary files, gives the user the option of deleting them if disc getting full

Disc space analysis

– Visually demonstrates the disc usage by showing sizes of files/folders