

## **CAMBRIDGE INTERNATIONAL EXAMINATIONS**

Cambridge International Advanced Subsidiary and Advanced Level

### **MARK SCHEME for the October/November 2015 series**

#### **9608 COMPUTER SCIENCE**

**9608/12**

Paper 1 (Written Paper), maximum raw mark 75

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- 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]

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**(b)**

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

[5]

**3 (a) (i)** 4 6 C

[1]

**(ii)** 1 0 1 0 0 0

[1]

**(b) (i)** 1 bit

[1]

- (ii)**
- 8 bits are needed
  - Each colour is represented by one of 256 values
  - values 0 to 255/0000 0000 to 1111 1111
  - $256 = 2^8$

[2]

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**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 [4]

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

$$\frac{44100 \times 16 \times 2}{8} \quad (1 \text{ mark})$$

**176 400** bytes (1 mark)

[2]

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

$$\frac{4 \times 60 \times 176400}{1024 \times 1024} \quad \begin{array}{l} \text{one mark for numerator} \\ \text{one mark for denominator} \end{array} \quad [2]$$

**(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 [3]

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**5** One mark for each correctly placed tick.

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

[7]

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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]

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**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 [4]

**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 [4]

**(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 [2]

**(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 [4]

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**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

[2]

**(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

[6]