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

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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]

(b)

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

[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]

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

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

176 400 bytes (1 mark)

[2]

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

$\frac{4 \times 60 \times 176400}{1024 \times 1024}$

one mark for numerator
one mark for denominator [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]

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

Activity	Ethical	Unethical
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]

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 [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]

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]