Cambridge O Level

Cambridge Assessment International Education
Cambridge Ordinary Level

COMPUTER SCIENCE **2210/12**

Paper 1 **May/June 2018**

MARK SCHEME

Maximum Mark: 75

Published

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 International will not enter into discussions about these mark schemes.

Cambridge International is publishing the mark schemes for the May/June 2018 series for most Cambridge IGCSE™, Cambridge International A and AS Level and Cambridge Pre-U components, and some Cambridge O Level components.

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Generic Marking Principles

These general marking principles must be applied by all examiners when marking candidate answers. They should be applied alongside the specific content of the mark scheme or generic level descriptors for a question. Each question paper and mark scheme will also comply with these marking principles.

GENERIC MARKING PRINCIPLE 1:

Marks must be awarded in line with:

- the specific content of the mark scheme or the generic level descriptors for the question
- the specific skills defined in the mark scheme or in the generic level descriptors for the question
- the standard of response required by a candidate as exemplified by the standardisation scripts.

GENERIC MARKING PRINCIPLE 2:

Marks awarded are always **whole marks** (not half marks, or other fractions).

GENERIC MARKING PRINCIPLE 3:

Marks must be awarded **positively**:

- marks are awarded for correct/valid answers, as defined in the mark scheme. However, credit is given for valid answers which go beyond the scope of the syllabus and mark scheme, referring to your Team Leader as appropriate
- marks are awarded when candidates clearly demonstrate what they know and can do
- marks are not deducted for errors
- marks are not deducted for omissions
- answers should only be judged on the quality of spelling, punctuation and grammar when these features are specifically assessed by the question as indicated by the mark scheme. The meaning, however, should be unambiguous.

GENERIC MARKING PRINCIPLE 4:

Rules must be applied consistently e.g. in situations where candidates have not followed instructions or in the application of generic level descriptors.

GENERIC MARKING PRINCIPLE 5: Marks should be awarded using the full range of marks defined in the mark scheme for the question (however; the use of the full mark range may be limited according to the quality of the candidate responses seen).
GENERIC MARKING PRINCIPLE 6: Marks awarded are based solely on the requirements as defined in the mark scheme. Marks should not be awarded with grade thresholds or grade descriptors in mind.

Question	Answer	Marks
1	1 mark for each unit, in the given order: – nibble – byte – megabyte (MB) – gigabyte (GB)	**4**

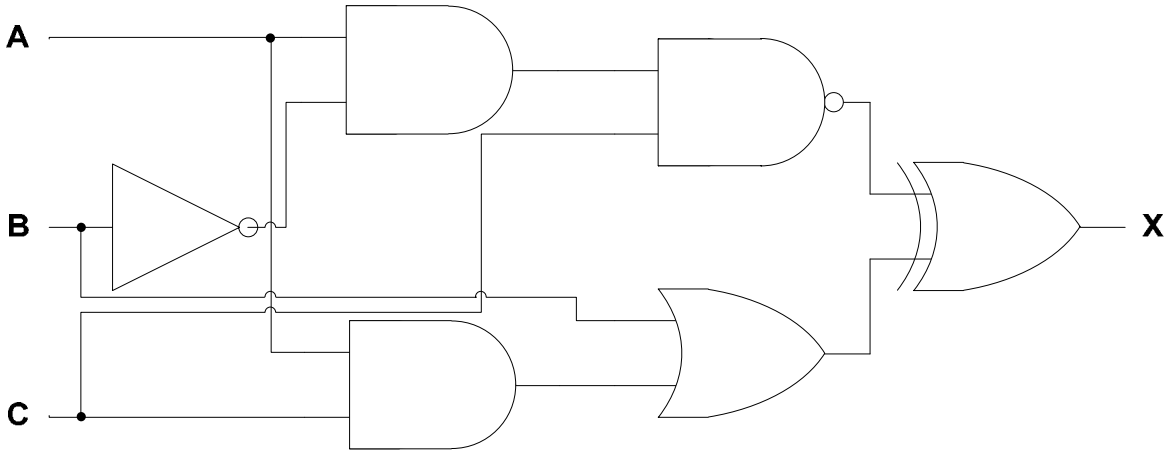
Question	Answer	Marks
2(a)	Any **four** from: – Image is converted from analogue to digital (using ADC) – Image is turned into pixels – Each pixel is given a binary value – Pixels form a grid (to create the image) – Each pixel has a colour – Pixels are stored in sequence (in a file) – Meta data is stored (to describe the dimensions/resolution of the image) // It stores the dimensions/colour depth .etc. – An example of a suitable photo file format e.g. JPEG	**4**
2(b)	1 mark for correct compression, 3 marks for explanation: – Lossy Any **three** from: – Lossy would reduce the file size **more** (than lossless) – The **redundant** data can be removed from the files // by example (must be about redundant data) – Images can still be a similar quality – There is no requirement for the files to be exactly the same as original file – Photos can be sent quick**er** // fast**er** to upload // fast**er** to download	**4**

Question	Answer	Marks
3(a)	1 mark for each correct register Hours: 0 0 0 0 0 0 1 0 Minutes: 0 0 0 1 1 1 1 1 Seconds: 0 0 1 1 1 0 1 0	3
3(b)	1 mark for each correct section: 0 5 : 2 6 : 5 5 Hours Minutes Seconds	3

Question	Answer	Marks
4	1 mark for each correct section: 1 1 0 1 | 0 0 0 0 | 0 0 1 1 ← 1 mark → ← 1 mark → ← 1 mark →	3

Question	Answer	Marks
5	1 mark for correct register, 3 marks for reason: – Register Y Any **three** from: – Count the number of 1/0 bits (in each byte/register) – Two bytes/registers have an odd number of 1/0 bits // Two have odd parity – Even parity must be the parity used – One byte/register has an even number of 1/0 bits // One uses even parity – The two with an odd number of one bits/odd parity are incorrect // Register X and Z should have even parity	**4**

Question	Answer	Marks
6	1 mark for each correct missing word, in the given order: – fetches – immediate access store // IAS – program counter // PC – memory address register // MAR – memory data register // MDR – executed – arithmetic logic unit // ALU – accumulator // ACC	**8**

Question	Answer	Marks
7(a)	1 mark for each correct logic gate with correct direct of input(s):  	**6**
7(b)	4 marks for 8 correct outputs 3 marks for 6 or 7 correct outputs 2 marks for 4 or 5 correct outputs 1 mark for 2 or 3 correct outputs	**4**

A	B	C	Working space	X
0	0	0		1
0	0	1		1
0	1	0		0
0	1	1		0
1	0	0		1
1	0	1		1
1	1	0		0
1	1	1		0

Question	Answer	Marks
8	1 mark for correct translator, 3 marks for explanation: – Compiler Any **three** from: – Does not require recompilation // compiled program can be executed without a compiler … – ... therefore, allows faster execution – Provides an executable file … – … therefore, allows him to just send machine code – **Dimitri's friend** does not need translation/compilation **software** to execute the program	**4**

Question	Answer	Marks
9(a)	QR/Quick response	**1**
9(b)	Any **four** from: – Read/scanned using **app** (on mobile device) – It is the **camera** that is used to scan/capture the image – The three large squares are used to define the alignment // uses alignment targets/modules – Black squares reflect less light // white squares reflect more light – The app/device processes the image – Each small square/pixel is converted to a binary value	**4**

Question	Answer	Marks
10(a)	Any **four** from: – Conductive layer – An electrostatic/electric field is created – **Sensor(s)** (around the screen) monitor the electrostatic field – When touched (electrostatic) charge is transferred to finger – Location of touch is **calculated** // Co-ordinates used to **calculate** touch	**4**

Question	Answer	Marks
10(b)(i)	Any **two** from: – Gloves are not conductive // Gloves are an insulator – Block current/charge from finger / body / person – Stop the electrostatic field being disturbed/changed	**2**
10(b)(ii)	Any **two** from e.g. (1 mark for method, 1 for expansion): – She could use a (conductive) stylus… – … this will allow the charge to be charged/disturbed – She could use capacitive gloves… – … this will allow the charge to be charged/disturbed – She could use a natural language interface/voice operated interface … – … she could give vocal commands to the device	**2**

Question	Answer	Marks
11	Any **six** from: – Suitable sensor (motion/infra-red) – Data converted (from analogue) to digital (using ADC) – Data sent to microprocessor – Data is compared to stored value/range … – … if data matches/out of range data security light turned on … – … waits for suitable period/until no motion detected … – … light turned off – Continuous loop/process	**6**

Question	Answer	Marks
12(a)(i)	Encryption	**1**

Question	Answer	Marks
12(a)(ii)	Any **five** from: – Her personal details before encryption is the plain text – The plain text/her personal details is encrypted using an encryption algorithm – The plain text/her personal details is encrypted using a key – The encrypted text is cypher/cipher text – The key is transmitted **separately** (from the text) – The key is used to decrypt the cypher text (after transmission)	**5**
12(b)	Any **three** from a single error method: – Checksum – Calculation carried out on data – (checksum/calculated) value sent with data – recalculated after transmission **and** compared to original – If they do not match an error is present – ARQ – uses acknowledgment **and** timeout – A request is sent with data to acknowledge all data is received – Acknowledgement sent back to say all data is received – If no acknowledgement is received in a time frame an error in transmission detected / data automatically resent.	**3**