Cambridge O Level

Cambridge International Examinations
Cambridge Ordinary Level

COMPUTER SCIENCE **2210/12**

Paper 1 **May/June 2017**

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.

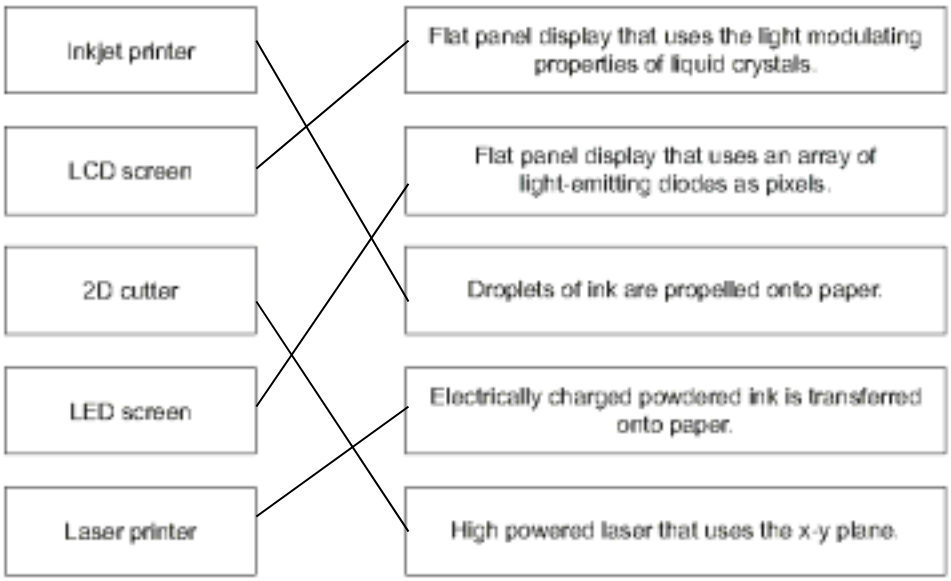
Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge will not enter into discussions about these mark schemes.

Cambridge is publishing the mark schemes for the May/June 2017 series for most Cambridge IGCSE®, Cambridge International A and AS Level and Cambridge Pre-U components, and some Cambridge O Level components.

Question	Answer	Marks
1	• address (bus) • control (bus) • data (bus)	**3**

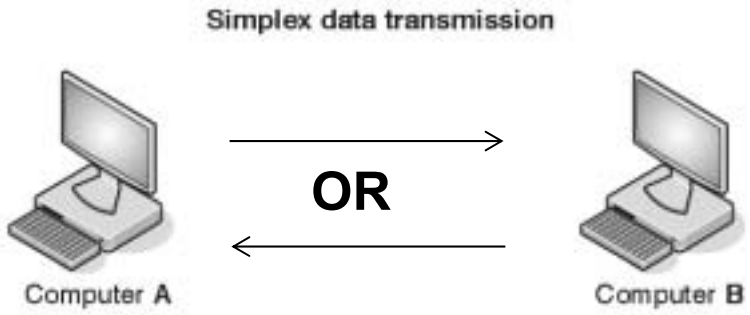
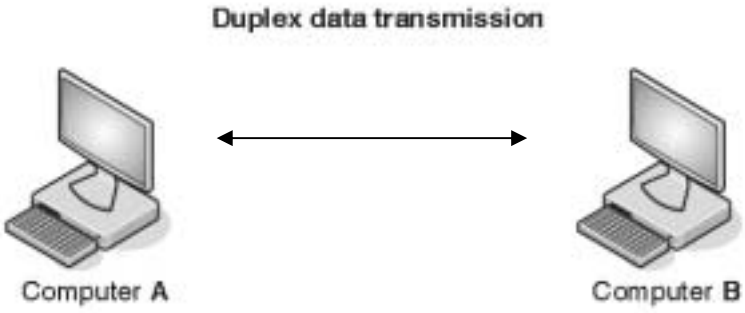
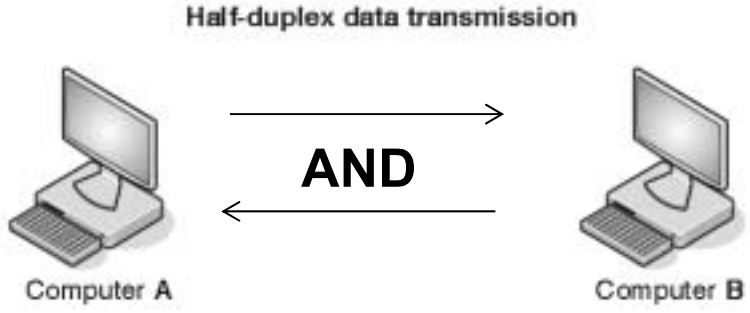
Question	Answer	Marks
2	2 marks for each type of storage **Primary storage** • RAM • ROM **Secondary storage** • hard disk drive (HDD) • solid state drive (SSD) **Off-line storage e.g.** • CD • DVD • Blu-ray • Flash memory // USB storage • removable / external / portable hard disk drive (HDD/SSD) • SD card	**6**

Question	Answer	Marks
3	 1 mark for each correct line to a max of 4 marks.	**4**

Question	Answer	Marks
4	**Two** marks for each correct description **Parity Check** • Checks a byte of data • Check is performed when data is received • A parity bit is added (to the parity byte) • Counts / checks number of 1's // counts / checks to see if 1's are even // counts / checks to see if 1's are odd • Can be even or odd • If parity is incorrect, error is detected **Check digit** • A digit that is calculated from the data // uses modulo to calculate digit // valid description of modulo • It is appended / added to the data • Digit is recalculated when data is entered • Digits are compared to check for error **Checksum** • A value is calculated from the data // Valid description of calculation • It is transmitted with the data • Value is recalculated after transmission • Values are compared after transmission to check for error **Automatic Repeat reQuest** • Uses acknowledgement / request and time-out • Error control protocol • Check performed on receiving data // error is detected by e.g. parity check, check sum • If error detected, request is sent to resend data // negative acknowledgement is used • Resend request is repeated till data is sent correctly / requests time out / limit is reached • Send acknowledgement that data is received // positive acknowledgement is used • If acknowledgement not received in set time data is resent	**8**

Question	Answer	Marks
5(a)	1 mark for correct method, 1 mark for correct answer 32 + 16 + 8 + 1 (00)111001	**2**
5(b)	registers **must** have leading zeros, allow follow through from 5(a) for an incorrect value 1 mark for each correct register. **0 0 1 1 1 0 0 1** **0 0 0 0 0 0 0 0 0 0 1 1 1 0 0 1**	**2**
5(c)	**Two** from: • data • ASCII value / Unicode value / character • number • part of image / small image • a sound / sound sample / small sound track • instruction	**2**
5(d)	3A	**1**

Question	Answer	Marks
6	1 mark for correct name of code, up to a further 3 marks for appropriate explanation • Quick response (QR) Code **Three** from: • Barcode is captured / scanned / imaged, by a camera / scanner / barcode reader / QR code reader • Read using a laser • Processed by an app • Light is reflected back • Black squares reflect less light than white squares • Modules are used for orientation / alignment • Squares / data are decoded	**4**

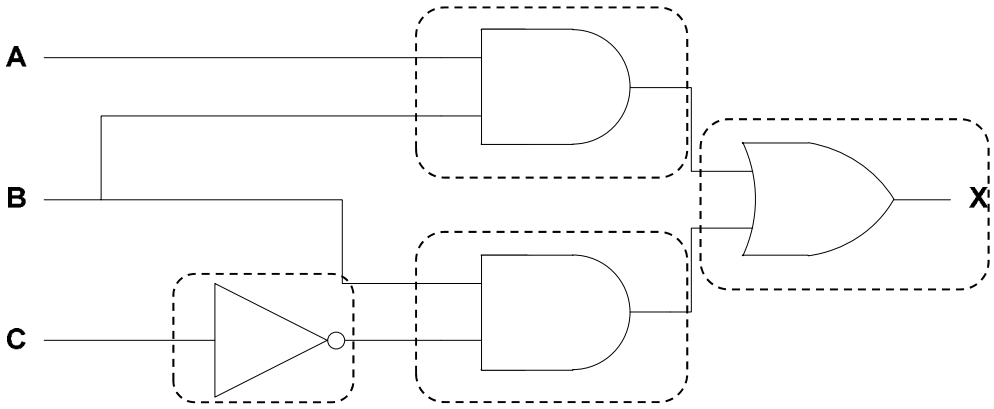
Question	Answer	Marks
7(a)	1 mark for correct arrow(s), one mark for correct description  (Direction of data is) one way only // unidirectional  (Direction of data is both ways) <u>at same time</u> / <u>simultaneously</u> / <u>concurrently</u>  (Direction of data is both ways) but at different times / <u>not at the same time</u> / <u>not simultaneously</u> / <u>not concurrently</u>	**6**

Question	Answer	Marks
7(b)	1 mark each use, must be different. **Simplex** e.g.: Microphone to computer Sensor to computer Computer to printer Computer to speaker Computer to monitor Webcam to computer Sending data to a device // sending data from a device **Duplex** e.g.: Telephone call Voice over IP Computer to printer (only award once) Instant messaging Broadband connections Video conferencing Sending data to and from devices e.g wireless technology Computer to modem	**2**
7(c)	2 marks for IC, 2 marks for USB **IC** • parallel transmission // description of parallel • for sending data internally **USB** • serial transmission // description of serial • for sending data externally (to and from peripherals / between devices)	**4**

Question	Answer	Marks
8(a)	2 marks for SSL, 2 marks for Firewall **SSL protocol** **Two** from: • uses encryption • encryption is asymmetric / symmetric / both • makes use of (public and private) keys • data is meaningless (without decryption key / if intercepted) **Firewall** **Two** from: • helps prevent unauthorised access // helps prevent hacking • checks that data meets criteria // identifies when data does not meet criteria • acts as a filter for (incoming and outgoing) data // blocks any unacceptable data //allows acceptable data through	**4**

Question	Answer	Marks
8(b)	**Six** from: Encrypt the data … … so it cannot be understood by those not entitled to view it Password protected / biometrics … … to help prevent unauthorised access Virus checking software … … helps prevent data corruption or deletion … identifies / removes a virus in the system … scans a system for viruses Spyware checking software … … helps prevent data being stolen/copied/logged … scans a system for spyware Drop-down input methods / selectable features … … to reduce risk of spyware / keylogging Physical method e.g. locked doors / CCTV timeout / auto log off … to help prevent unauthorised access Network / company policies // training employees … to educate users how to be vigilant Access rights … … allows users access to data that they have permission to view … prevents users from accessing data that they do not have permission to view	**6**

Question	Answer	Marks
9	**Six** from: • temperature sensor • analogue data / temperature is converted to digital data (with an ADC) • sensor sends signal to the microprocessor • microprocessor compares input values with stored values/pre-set values … • … if the temperature value input is too high/low … • … a signal is sent from the microprocessor to turn on / off / up / down the cooling unit • … if temperature matches the stored values … • … no action is taken • an actuator is used to turn the cooling unit on / off / up / down • the process is a continuous loop	**6**

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>10(a)</td><td>1 mark for each correct gate, with the correct input(s)
 
</td><td>4</td></tr>
<tr><td>10(b)</td><td>
<table>
<tr><th>A</th><th>B</th><th>C</th><th>X</th></tr>
<tr><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>0</td><td>0</td><td>1</td><td>0</td></tr>
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</table>
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</td><td>4</td></tr>
</table>

Question	Answer	Marks
11	**Seven** from: **Requested** • a web browser is used • user enters the URL / web address (into the address bar) // clicks a link containing the web address // clicks an element of the webpage • the URL / web address specifies the protocol • protocols used are Hyper Text Transfer Protocol (HTTP) / Hyper Text Transfer Protocol Secure (HTTPS) **Sent** • the URL / web address contains the domain name • the Internet Service Provider (ISP) looks up the IP address of the company • the domain name is used to look up the IP address of the company • the domain name server (DNS) stores an index of domain names and IP addresses • web browser sends a request to the web server / IP address **Received** • Data for the website is stored on the company's web server • webserver sends the data for the website back to the web browser • web server uses the customer's IP address to return the data • the data is transferred into Hyper Text Mark-up Language (HTML) • HTML is interpreted by the web browser (to display the website)	**7**