**Cambridge International Examinations**
Cambridge International General Certificate of Secondary Education

**COMPUTER SCIENCE** **0478/12**

Paper 1 **May/June 2017**

MARK SCHEME

Maximum Mark: 75

**Published**

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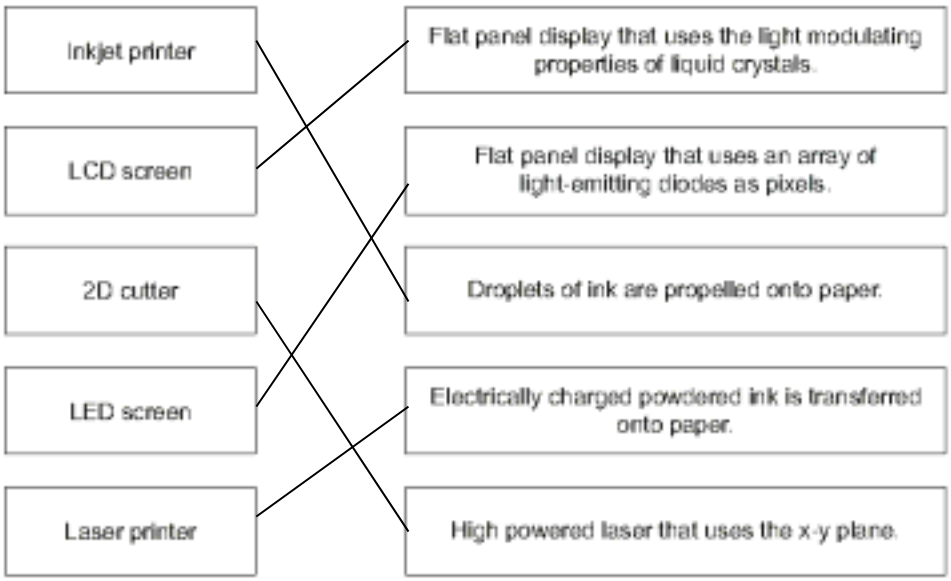
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| Question | Answer | Marks |
|---|---|---|
| 1 | • address (bus)<br>• control (bus)<br>• data (bus) | **3** |

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

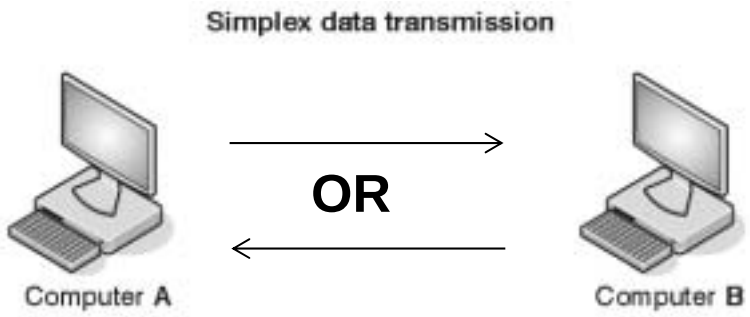
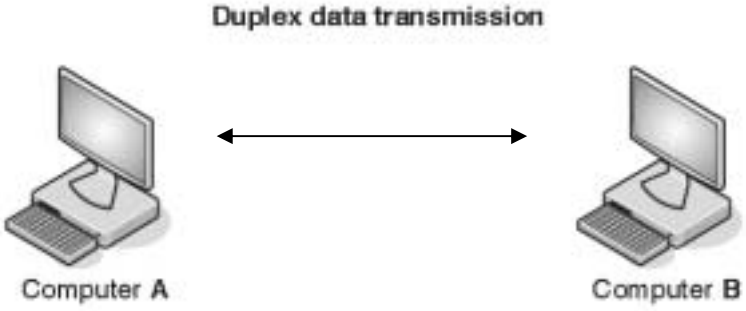
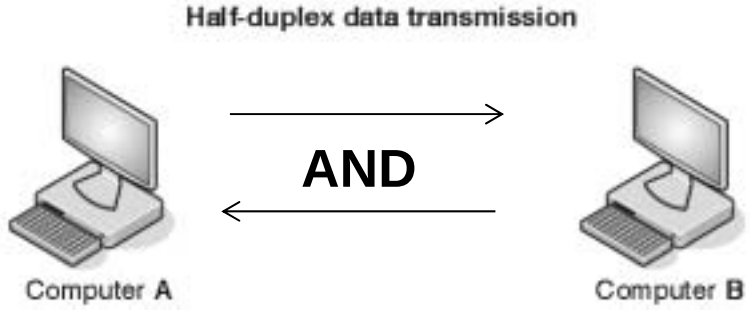
| Question | Answer | Marks |
|---|---|---|
| 3 | <br><br>1 mark for each correct line to a max of 4 marks. | **4** |

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

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| Question | Answer | Marks |
|---|---|---|
| 5(a) | 1 mark for correct method, 1 mark for correct answer<br><br>32 + 16 + 8 + 1<br>(00)111001 | **2** |
| 5(b) | registers **must** have leading zeros, allow follow through from 5(a) for an incorrect value<br>1 mark for each correct register.<br><br>**0 0 1 1 1 0 0 1**<br><br>**0 0 0 0 0 0 0 0 0 0 1 1 1 0 0 1** | **2** |
| 5(c) | **Two** from:<br><br>• data<br>• ASCII value / Unicode value / character<br>• number<br>• part of image / small image<br>• a sound / sound sample / small sound track<br>• 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<br><br>• Quick response (QR) Code<br><br>**Three** from:<br>• Barcode is captured / scanned / imaged, by a camera / scanner / barcode reader / QR code reader<br>• Read using a laser<br>• Processed by an app<br>• Light is reflected back<br>• Black squares reflect less light than white squares<br>• Modules are used for orientation / alignment<br>• Squares / data are decoded | **4** |

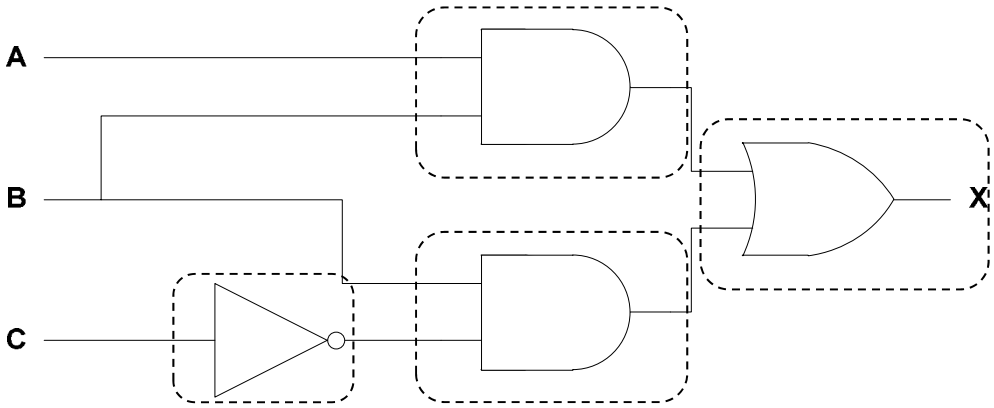
| Question | Answer | Marks |
|---|---|---|
| 7(a) | 1 mark for correct arrow(s), one mark for correct description<br><br><br><br>(Direction of data is) one way only // unidirectional<br><br><br><br>(Direction of data is both ways) <u>at same time</u> / <u>simultaneously</u> / <u>concurrently</u><br><br><br><br>(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.<br><br>**Simplex** e.g.:<br>Microphone to computer<br>Sensor to computer<br>Computer to printer<br>Computer to speaker<br>Computer to monitor<br>Webcam to computer<br>Sending data to a device // sending data from a device<br><br>**Duplex** e.g.:<br>Telephone call<br>Voice over IP<br>Computer to printer (only award once)<br>Instant messaging<br>Broadband connections<br>Video conferencing<br>Sending data to and from devices e.g wireless technology<br>Computer to modem | **2** |
| 7(c) | 2 marks for IC, 2 marks for USB<br><br>**IC**<br>• parallel transmission // description of parallel<br>• for sending data internally<br><br>**USB**<br>• serial transmission // description of serial<br>• for sending data externally (to and from peripherals / between devices) | **4** |

| Question | Answer | Marks |
|---|---|---|
| 8(a) | 2 marks for SSL, 2 marks for Firewall<br><br>**SSL protocol**<br>**Two** from:<br>• uses encryption<br>• encryption is asymmetric / symmetric / both<br>• makes use of (public and private) keys<br>• data is meaningless (without decryption key / if intercepted)<br><br>**Firewall**<br>**Two** from:<br>• helps prevent unauthorised access // helps prevent hacking<br>• checks that data meets criteria // identifies when data does not meet criteria<br>• 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:<br><br>Encrypt the data …<br>… so it cannot be understood by those not entitled to view it<br><br>Password protected / biometrics …<br>… to help prevent unauthorised access<br><br>Virus checking software …<br>… helps prevent data corruption or deletion<br>… identifies / removes a virus in the system<br>… scans a system for viruses<br><br>Spyware checking software …<br>… helps prevent data being stolen/copied/logged<br>… scans a system for spyware<br><br>Drop-down input methods / selectable features …<br>… to reduce risk of spyware / keylogging<br><br>Physical method e.g. locked doors / CCTV timeout / auto log off<br>… to help prevent unauthorised access<br><br>Network / company policies // training employees<br>… to educate users how to be vigilant<br><br>Access rights …<br>… allows users access to data that they have permission to view<br>… prevents users from accessing data that they do not have permission to view | **6** |

| Question | Answer | Marks |
|---|---|---|
| 9 | **Six** from:<br><br>• temperature sensor<br>• analogue data / temperature is converted to digital data (with an ADC)<br>• sensor sends signal to the microprocessor<br>• microprocessor compares input values with stored values/pre-set values …<br>• … if the temperature value input is too high/low …<br>• … a signal is sent from the microprocessor to turn on / off / up / down the cooling unit<br>• … if temperature matches the stored values …<br>• … no action is taken<br>• an actuator is used to turn the cooling unit on / off / up / down<br>• 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)<br>
</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>
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</table>
4 marks for 8 correct outputs<br>3 marks for 6 or 7 correct outputs<br>2 marks for 4 or 5 correct outputs<br>1 mark for 2 or 3 correct outputs</td><td>4</td></tr>
</table>

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

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