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

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

Paper 1 **October/November 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.

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This syllabus is approved for use in England, Wales and Northern Ireland as a Cambridge International Level 1/Level 2 Certificate.

| Question | Answer | Marks |
|---|---|---|
| 1 | 1 mark per correct instruction:<br><br>9 – LEFT<br>1 – DOWN<br>C – OPEN<br>3 – CLOSE<br>F – UP | **5** |

| Question | Answer | Marks |
|---|---|---|
| 2 | 1 mark for each correct category:<br><br>*HDD* – Secondary<br>*RAM* – Primary<br>*ROM* – Primary<br>*CD-ROM* – Off-line<br>*SSD* – Secondary<br>*DVD-RAM* – Off-line | **6** |

| Question | Answer | Marks |
|---|---|---|
| 3(a) | Any **four** from (**Max 2** per number system) :<br><br>• A binary number system is a base-2 system<br>• A denary number system is a base-10 system<br><br>• A binary number system uses 0 and 1 values<br>• A denary number system uses 0 to 9 values<br><br>• A binary number system has units/ placeholders/column headings that increase by the power of 2<br>• A denary number system has units/ placeholders/column headings that increase by the power of 10<br><br>• Binary has more digit <u>for the same value</u>// Denary has less digits <u>for the same value</u> | **4** |

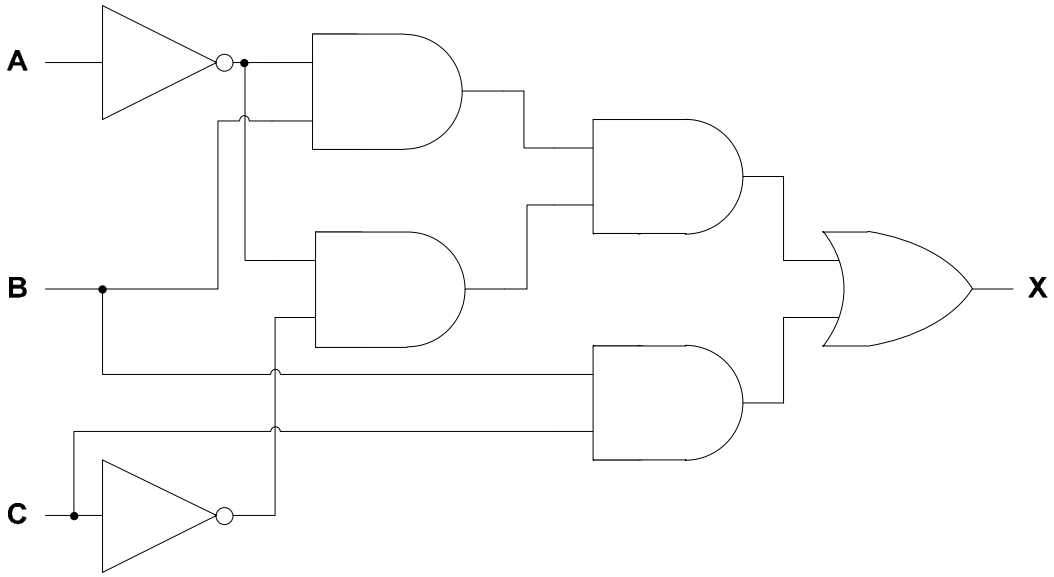
| Question | Answer | Marks |
|---|---|---|
| 3(b) | **Five** from:<br>• Correct column headings / place holders by example<br>• Correctly place a 1 or a 0 for each column<br>• Identify the columns to be added<br>• Add together the (denary) values identified …<br>• … this will give a total which is the denary number/answer<br>• Answer is 10 | **5** |

| Question | Answer | Marks |
|---|---|---|
| 4(a)(i) | <table><tr><th>Method 1</th><th>Tick (✓)</th><th>Method 2</th><th>Tick (✓)</th></tr><tr><td>Serial</td><td>✓</td><td>Simplex</td><td></td></tr><tr><td>Parallel</td><td></td><td>Half-duplex</td><td></td></tr><tr><td></td><td></td><td>Duplex</td><td>✓</td></tr></table> | **2** |
| 4(a)(ii) | Any **four** from (**Max 3** for serial):<br>• Serial has <u>less/lower</u> interference<br>• Serial is (more) reliable/accurate <u>over distances</u><br>• In serial the bits won't be skewed<br>• In serial it is easier to collate the bits together again after transmission<br><br>• Duplex transmits data in both directions <u>at the same time</u><br>• simplex/half-duplex/remaining methods won't allow read and write at same time | **4** |

| Question | Answer | Marks |
|---|---|---|
| 4(b) | 1 mark for error checking method, 2 marks for description:<br><br>Checksum<br>• A value is calculated from the data // Description of calculation<br>• Value is transmitted with data<br>• Value is recalculated after transmission<br>• If the values match the data is (more likely to be) accurate<br><br>Parity check<br>• A parity bit is transmitted with each byte of data<br>• Odd or even (parity can be used)<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>• (Each byte is) checked after transmission to see if it matches the odd/even parity used<br><br>Automatic Repeat Request (ARQ)<br>• Uses acknowledgement and timeout<br>• When a device detects an error in data transmission it asks for the packet to be resent / no error detected, positive acknowledgment sent<br>• The sending device resends the packet after the request to resend/ timeout received<br>• This process is continuous until the packet received is correct/until the ARQ limit is reached<br><br>Echo (check)<br>• Copy of data is sent back to sender<br>• Data is compared to see if it matches<br>• If it does not match error detected | **6** |

| Question | Answer | Marks |
|---|---|---|
| 5(a) | Any **four** from:<br>• Data / files<br>• Stored in a text file<br>• Downloaded to a user's computer when a website is visited // webserver sends to web browser<br>• Stored on a user's computer<br>• Stored by a browser<br>• Detected by the website when it is visited again | **4** |
| 5(b) | Any **two** from: e.g.<br>• To store personal information/data<br>• To store login details<br>• To save items in an online shopping basket<br>• To track/save internet surfing habits // to track website traffic<br>• To carry out targeted advertising<br>• To store payment details<br>• To customise a webpage // to store user preferences<br>• Store progress in online games/quizzes | **2** |

| Question | Answer | Marks |
|---|---|---|
| 6 | 1 mark for each correct term, in this order:<br>• Interrupt<br>• Compiler<br>• ALU/Arithmetic and Logic Unit<br>• ARQ/Automatic repeat request | **4** |

| Question | Answer | Marks |
|---|---|---|
| 7 | 1 mark for each correct logic gate with the correct input(s)<br>  <br> | **7** |

| Question | Answer | Marks |
|---|---|---|
| 8(a) | 1 mark for correct calculation method, 1 mark for correct answer:<br>• 2048/1024 (or 1024 × 2)<br>• 2 GB | **2** |
| 8(b) | • Instructions/programs/data<br>• … currently in use | **2** |
| 8(c) | Any **three** from:<br>• RAM is volatile, ROM is non-volatile<br>• RAM is temporary, ROM is (semi) permanent<br>• RAM normally has a larger capacity than ROM<br>• RAM can be edited ROM cannot be edited // Data can be read from and written to RAM, ROM can only be read from. | **3** |

| Question | Answer | Marks |
|---|---|---|
| 9(a) | • It is an input device<br>• It measures/takes (physical) readings of the surrounding environment / environment by example / physical properties | **2** |
| 9(b) | 1 mark for each sensor, 2 marks for each description:<br><br>Moisture (sensor)<br>• To measure the water content of the soil<br>• To alert when the soil is too dry or too wet/needs watering<br><br>pH (sensor)<br>• To measure how acidic/alkaline the soil is<br>• To alert when there may be something polluting the soil<br><br>Light (sensor)<br>• To measure the brightness of the environment<br>• To alert when the fruit has too little/too much light<br><br>Temperature (sensor)<br>• To measure the temperature of the environment<br>• To alert when it is too hot/too cold for the fruit to grow<br><br>Gas (sensor)<br>• To measure the amount of CO2/oxygen present<br>• To alert when too much CO2/oxygen present<br><br>Humidity (sensor)<br>• To measure the water content in the air<br>• To alert when the air is too dry<br><br>Infra-red / motion (sensor)<br>• To measure level of infra-red/microwaves deflected<br>• To alert to any intruders e.g. animals stealing the fruit | **6** |

| Question | Answer | Marks |
|---|---|---|
| 10(a) | Any **three** from:<br>• It is a (security) protocol<br>• It encrypts data (sent over the web/network)<br>• It is the updated version of SSL<br>• It has two layers<br>• It has a handshake layer<br>• It has a record layer | **3** |
| 10(b) | 1 mark for each correct application, examples could include:<br>• Online banking<br>• Online shopping // Online payment systems<br>• Email<br>• Cloud based storage<br>• Intranet/extranet<br>• VPN<br>• VoIP<br>• Instant messaging (IM) // social networking | **3** |

| Question | Answer | Marks |
|---|---|---|
| 11 | 1 mark for each correct missing word, in the correct order:<br><br>• Plagiarism<br>• Free software<br>• Freeware<br>• Shareware<br>• Ethics | **5** |