
COMPUTER SCIENCE**2210/13**

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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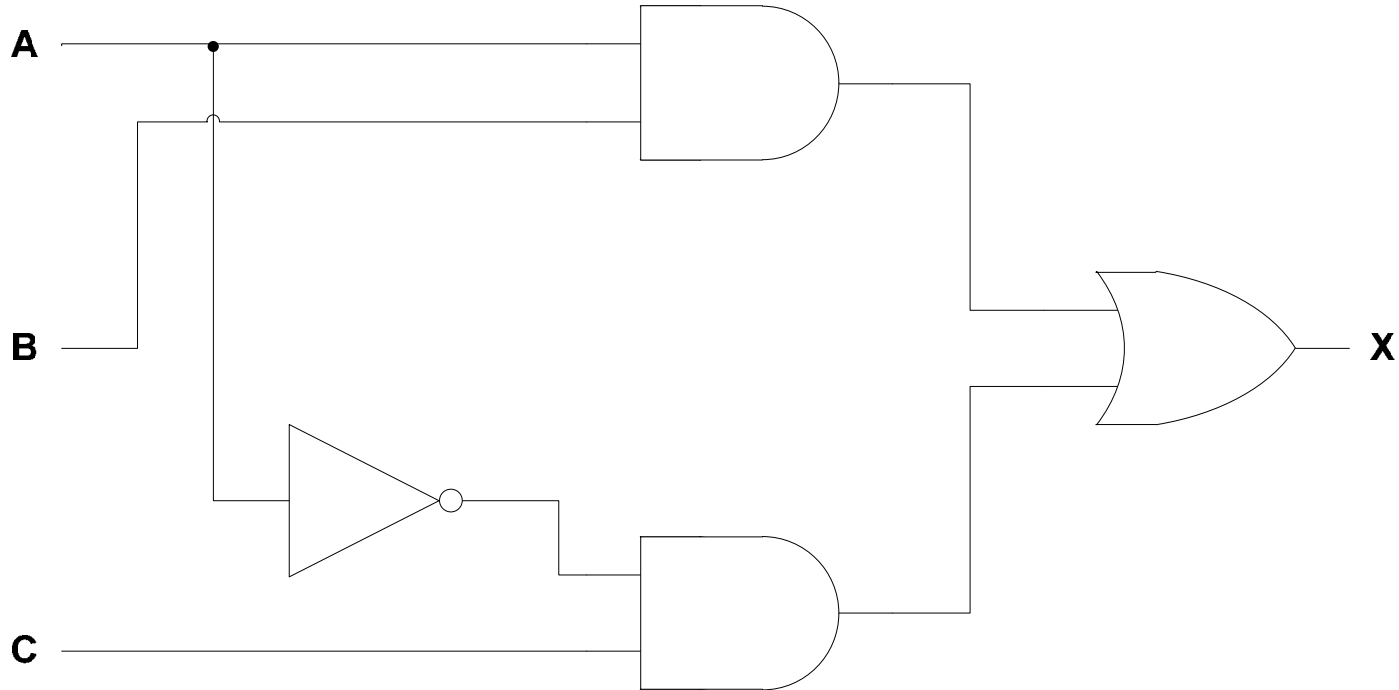
Cambridge International is publishing the mark schemes for the October/November 2017 series for most Cambridge IGCSE[®], Cambridge International A and AS Level components and some Cambridge O Level components.

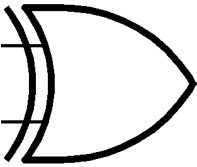
| Question | Answer | Marks | | | | | | | | | | | | | | | | | |
|----------|--|----------|---|----------|---|----------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1(a) | Output | 1 | | | | | | | | | | | | | | | | | |
| 1(b) | 1 mark for each correct conversion <div style="text-align: center;"> <table style="margin: auto;"> <tr> <td style="padding: 0 10px;"><i>E</i></td> <td style="border: none; border-left: 1px solid black; border-right: 1px solid black; width: 1px;"></td> <td style="padding: 0 10px;"><i>0</i></td> <td style="border: none; border-left: 1px solid black; border-right: 1px solid black; width: 1px;"></td> <td style="padding: 0 10px;"><i>4</i></td> </tr> <tr> <td style="border: 1px solid black; text-align: center;">1</td> <td style="border: 1px solid black; text-align: center;">1</td> <td style="border: 1px solid black; text-align: center;">1</td> <td style="border: 1px solid black; text-align: center;">0</td> <td style="border: 1px solid black; text-align: center;">0</td> <td style="border: 1px solid black; text-align: center;">0</td> <td style="border: 1px solid black; text-align: center;">0</td> <td style="border: 1px solid black; text-align: center;">0</td> <td style="border: 1px solid black; text-align: center;">0</td> <td style="border: 1px solid black; text-align: center;">1</td> <td style="border: 1px solid black; text-align: center;">0</td> <td style="border: 1px solid black; text-align: center;">0</td> </tr> </table> </div> | <i>E</i> | | <i>0</i> | | <i>4</i> | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 3 |
| <i>E</i> | | <i>0</i> | | <i>4</i> | | | | | | | | | | | | | | | |
| 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | | | | | | | | |
| 1(c) | Any one from: – Hexadecimal codes can fit in a smaller display rather than a full text based message – Smaller amount of memory needed to store the hex error messages than text based | 1 | | | | | | | | | | | | | | | | | |
| 1(d) | 1 mark for correct sensor, 1 mark for corresponding use Possible examples could include: – Temperature (sensor) – To monitor the temperature of the water – Pressure (sensor) – To monitor the level of water in the washing machine – Motion (sensor) – To monitor whether the drum is still in motion – pH (sensor) – To monitor the level of water hardness/detergent present in the water | 6 | | | | | | | | | | | | | | | | | |

| Question | Answer | Marks | | | | | | | | | | |
|-----------|--|-----------|-------------|----------|-------|------|---------------------------------------|-------|----------------------------------|-------|------------------|----------|
| 2 | 1 mark for each correct file format e.g. <table border="1" data-bbox="898 284 1368 603" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th data-bbox="898 284 1122 333">File type</th> <th data-bbox="1122 284 1368 333">File format</th> </tr> </thead> <tbody> <tr> <td data-bbox="898 333 1122 383">Pictures</td> <td data-bbox="1122 333 1368 383">.JPEG</td> </tr> <tr> <td data-bbox="898 383 1122 469">Text</td> <td data-bbox="1122 383 1368 469">.doc, .txt, .rtf, .docx, .odt .pdf</td> </tr> <tr> <td data-bbox="898 469 1122 555">Sound</td> <td data-bbox="1122 469 1368 555">.mp3, .wav, .aif, .flac, .mid</td> </tr> <tr> <td data-bbox="898 555 1122 603">Video</td> <td data-bbox="1122 555 1368 603">.mp4, .flv, .wmv</td> </tr> </tbody> </table> | File type | File format | Pictures | .JPEG | Text | .doc, .txt, .rtf, .docx, .odt .pdf | Sound | .mp3, .wav, .aif, .flac, .mid | Video | .mp4, .flv, .wmv | 3 |
| File type | File format | | | | | | | | | | | |
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| Question | Answer | Marks |
|----------|---|----------|
| 3(a) | <ul style="list-style-type: none"> – Part 1 (access) protocol – Part 2 domain (name) – Part 3 filename | 3 |
| 3(b) | Four from: <ul style="list-style-type: none"> – IP address is used to identify a device (on the Internet / network) – IP address is allocated by the network/ ISP – Can be used in place of URL – IP addresses can be IPv4 or IPv6 – IP address can be static ... – ... meaning it doesn't change each time it is connected to the Internet – IP address can be dynamic – ... meaning that it can change each time a device is connected to the Internet – Any valid example (e.g. xxx.xxx.xxx.xxx or xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx) | 4 |

| Question | Answer | Marks | | | | | | | | | | | | | | |
|------------------------------|---|-----------|-------------|-----------------------------|--|-------|---|-------------------|---|------------------------------|--|--------------|---|-----------|--|---|
| 4 | <p>1 mark for each correct line up to a total of 5 marks</p> <table border="0"> <thead> <tr> <th data-bbox="376 256 831 288">Component</th> <th data-bbox="831 256 1126 288">Description</th> </tr> </thead> <tbody> <tr> <td data-bbox="376 312 611 427">Arithmetic Logic Unit (ALU)</td> <td data-bbox="831 312 1126 427">Used to connect together the internal components of the CPU.</td> </tr> <tr> <td data-bbox="376 488 611 603">Buses</td> <td data-bbox="831 488 1126 603">Used to carry out calculations on data.</td> </tr> <tr> <td data-bbox="376 663 611 778">Control Unit (CU)</td> <td data-bbox="831 663 1126 778">Used to temporarily hold data and instructions during processing.</td> </tr> <tr> <td data-bbox="376 839 611 954">Immediate Access Store (IAS)</td> <td data-bbox="831 839 1126 954">Used to allow interaction with the computer.</td> </tr> <tr> <td data-bbox="376 1015 611 1129">Input/Output</td> <td data-bbox="831 1015 1126 1129">Used to hold data and instructions before they are processed.</td> </tr> <tr> <td data-bbox="376 1190 611 1305">Registers</td> <td data-bbox="831 1190 1126 1305">Used to manage the flow of data through the CPU.</td> </tr> </tbody> </table> | Component | Description | Arithmetic Logic Unit (ALU) | Used to connect together the internal components of the CPU. | Buses | Used to carry out calculations on data. | Control Unit (CU) | Used to temporarily hold data and instructions during processing. | Immediate Access Store (IAS) | Used to allow interaction with the computer. | Input/Output | Used to hold data and instructions before they are processed. | Registers | Used to manage the flow of data through the CPU. | 5 |
| Component | Description | | | | | | | | | | | | | | | |
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| Question | Answer | Marks |
|----------|--|-------|
| 5(a) | <p>1 mark for each correct logic gate</p>  <p>The diagram shows a logic circuit with three inputs: A, B, and C. Input A is connected to the top input of the first AND gate. Input B is connected to the bottom input of the first AND gate. Input C is connected to the bottom input of the second AND gate. Input B is also connected to the input of a NOT gate, whose output is connected to the top input of the second AND gate. The outputs of both AND gates are connected to the inputs of an OR gate, which produces the final output X.</p> | 4 |

| Question | Answer | Marks |
|----------|--|----------|
| 5(b) | <p>1 mark for correct logic gate symbol:</p> <div style="text-align: center;">  </div> <p>Any four from:</p> <ul style="list-style-type: none"> – similar to an OR gate – It has (at least) two inputs – Output will be high/1 if both inputs are different – Output will be high/1 if either input is high – Output will be low/0 if both inputs are high – Output will be low/0 if both inputs are low | 5 |

| Question | Answer | Marks |
|----------|---|----------|
| 6 | <p>Any six from:</p> <p>2D</p> <ul style="list-style-type: none"> – (Scanner) shines a light onto the surface of a document // Light moves across document – Reflected light is captured – Uses mirrors and lenses – Captured image is converted into a digital file – Produces a 2D digital image <p>3D</p> <ul style="list-style-type: none"> – Scanners shines a laser (or light) over the surface of a 3D object – Records measurements of the geometry/dimensions of the object – Measurements are converted to digital file – Produces a 3D digital model | 6 |

| Question | Answer | Marks | | | | | | | | | | | | | | | | | | | | | |
|---|--|--------------|-------------|--------------|--|---|--|---|---|--|---|--|---|---|---|--|--|--|---|---|---|--|--|
| 7 | 1 mark for each correct tick | 6 | | | | | | | | | | | | | | | | | | | | | |
| | <table border="1"> <thead> <tr> <th>Statement</th> <th>true (✓)</th> <th>false (✓)</th> </tr> </thead> <tbody> <tr> <td>Firewalls can monitor incoming and outgoing traffic.</td> <td>✓</td> <td></td> </tr> <tr> <td>Firewalls operate by checking traffic against a set of rules.</td> <td>✓</td> <td></td> </tr> <tr> <td>Firewalls cannot block access to a certain website.</td> <td></td> <td>✓</td> </tr> <tr> <td>Firewalls can be software and hardware.</td> <td>✓</td> <td></td> </tr> <tr> <td>Firewalls can act as intermediary servers.</td> <td></td> <td>✓</td> </tr> <tr> <td>Firewalls can block unauthorised traffic.</td> <td>✓</td> <td></td> </tr> </tbody> </table> | Statement | true (✓) | false (✓) | Firewalls can monitor incoming and outgoing traffic. | ✓ | | Firewalls operate by checking traffic against a set of rules. | ✓ | | Firewalls cannot block access to a certain website. | | ✓ | Firewalls can be software and hardware. | ✓ | | Firewalls can act as intermediary servers. | | ✓ | Firewalls can block unauthorised traffic. | ✓ | | |
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| Question | Answer | Marks |
|----------|--|-------|
| 8(a) | Any three from: <ul style="list-style-type: none"> – Human error (e.g. deleting/overwriting data) – Physical damage – Power failure/surge – Hardware failure – Software crashing | 3 |
| 8(b) | Any three from: <ul style="list-style-type: none"> – Online shopping // Online payment systems // Online booking – Email – Cloud based storage – Intranet/extranet – VPN – VoIP // video conferencing – Instant messaging (IM) // social networking // online gaming | 3 |

| Question | Answer | Marks |
|----------|---|----------|
| 8(c) | <p>1 mark for identifying, 1 mark for description</p> <ul style="list-style-type: none"> – Strong password – To make it difficult to hack an account – Biometric device – To use data that is difficult to fake as a password – TLS // Encryption – To make data meaningless if intercepted – To encrypt data that is exchanged (TLS only) – More secure than SSL (TLS only) – Anti-spyware (software) – To find and remove any spyware that is installed on a computer – To help stop key loggers recording key presses – Firewall – To help prevent unauthorised access to an account – Blocks any requests that do not meet/match the criteria – Authentication (card reader at home)/mobile security code app/two-step verification – To add another level of identification of the user – Use of drop-down boxes (or equivalent) – So key loggers cannot record the key presses – Proxy server – To divert an attack away from the main system | 6 |

| Question | Answer | Marks |
|----------|---|----------|
| 9(a) | Any four from: <ul style="list-style-type: none"> – (Red) laser is used – (Laser beams) shines onto surface of the disk – It is rotated (at a constant speed) to be read – Surface is covered in a track (that spirals from the centre) – Data is represented on the surface using pits and lands – Pits and lands represent binary values – Pits reflect light back differently (to the area in between/land) – Optical device can determine the binary value from the light reflection | 4 |
| 9(b) | 1 mark for calculation, 1 mark for correct answer: <ul style="list-style-type: none"> – 1000×16 – $16000/8$ – Answer is 2000 bytes | 2 |
| 9(c) | Four from: (Max 2 for either primary or secondary) <ul style="list-style-type: none"> – Primary RAM and ROM – Secondary HDD and SSD – Primary is directly accessible by CPU – Secondary is not directly accessible by CPU – Primary is internal to computer – Secondary can be internal or external to the computer – Primary stores boot up instructions and can hold data whilst being processed – Secondary stores files/software – Primary has faster access speed – Secondary has a slower access speed – Primary has both volatile and non-volatile – Secondary is non-volatile | 4 |

| Question | Answer | | | Marks | |
|---|------------------------------|--|---------------------|----------|----------------------|
| 10 | 1 mark for each correct tick | | | 6 | |
| Statement | | | true (✓) | | false (✓) |
| Assembly language uses mnemonic codes. | | | ✓ | | |
| Assembly language programs do not need a translator to be executed. | | | | | ✓ |
| Assembly language is a low-level programming language. | | | ✓ | | |
| Assembly language is specific to the computer hardware. | | | ✓ | | |
| Assembly language is machine code. | | | | | ✓ |
| Assembly language is often used to create drivers for hardware. | | | ✓ | | |