Published

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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.

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<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1(a)</strong></td>
<td>1 mark for any two correct values, 2 marks for all 4 correct values. 29FC</td>
<td>2</td>
</tr>
</tbody>
</table>
| **1(b)** | Two from:  
- Easier/quicker to understand/read  
- Easier to debug/identify errors  
- Fewer digits are used / shorter // takes up less space on screen // more can be shown on screen / page | 2 |
| **1(c)** | Two from:  
- Notations for colour in HTML // HTML colour (codes)  
- Error messages  
- MAC address // IP address  
- Locations in memory  
- Memory dump | 2 |
| **2(a)** | Two from:  
- Closer to human language // closer to English  
- Independent of a particular type of computer/device/platform // portable language  
- A language such as Python, Java, Pascal, etc. (any suitable example) | 2 |
| **2(b)** | One from:  
- Compiler  
- Interpreter | 1 |
| **2(c)** | Must relate to answer given in 2b. No follow through for incorrect answer in part 2b.  
**Compiler** – Three from:  
- Translates the whole program as a complete unit / at once  
- Creates an executable file / object code  
- A report / list of errors in the code is created  
- Optimises the source code (to run efficiently)  
**Interpreter** – Three from:  
- Translates a program one line of code at a time  
- Machine code is directly executed // The interpreter is used each time the program / code is executed  
- Will identify an error as soon as it finds one in a line of code | 3 |
### Question 3

<table>
<thead>
<tr>
<th>Statement</th>
<th>true</th>
<th>false</th>
</tr>
</thead>
<tbody>
<tr>
<td>47KB is larger than 10MB.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>250bytes is smaller than 0.5MB.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>50GB is larger than 100MB.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>1TB is smaller than 4GB.</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

**Marks:** 4

### Question 4

<table>
<thead>
<tr>
<th>Statement</th>
<th>True</th>
<th>False</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data is transmitted in one direction only, one bit at a time.</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Data is transmitted in both directions, multiple bits at a time.</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Data is transmitted in one direction only, multiple bits at a time.</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Data is transmitted in both directions, but only one direction at a time. Data is transmitted one bit at a time.</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Data is transmitted in both directions, but only one direction at a time. Data is transmitted multiple bits at a time.</td>
<td>✓</td>
<td></td>
</tr>
</tbody>
</table>

**Marks:** 5
### Question 5(a)

<table>
<thead>
<tr>
<th>Received byte</th>
<th>Corrupted during transmission (✓)</th>
<th>Not corrupted during transmission (✓)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10110100</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>01101101</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>10000001</td>
<td></td>
<td>✓</td>
</tr>
</tbody>
</table>

1 mark per correct tick

**Marks:** 3

### Question 5(b)

**Four from:**
- Uses acknowledgement and time out
- Check performed on received data // error is detected by e.g. parity check, check sum
- If error detected, request sent to resend data // negative acknowledgement is used
- If no acknowledgement is sent that data is received // positive acknowledgement is used
- Data is resent / Resend request repeated, till data is resent correctly …
- … or request times out // limit is reached

**Marks:** 4

### Question 6

1 mark for correct bus name and up to 2 further marks for appropriate purpose.

**Address (bus)**
**Two from:**
- Carries / transports an address / location …
- … of the next item to be fetched
- Data travels one way (unidirectional)

**Data (bus)**
**Two from:**
- Carries / transports data / example of data …
- … that is currently being processed // that will be / has been processed
- Data can travel in both directions (bidirectional)

**Control (bus)**
**Two from:**
- Carries / transports signals
- Control / directs the actions of the CPU / processor
- Can be either Unidirectional or Bidirectional

**Marks:** 6
<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td><img src="image" alt="Diagram" /></td>
<td>5</td>
</tr>
</tbody>
</table>

1 mark for correct line till 5 marks given.

<table>
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| 8 | - Secondary  
- HDD/SSD  
- SSD/HDD  
- Primary  
- ROM/RAM  
- RAM/ROM | 6 |
Question | Answer | Marks
---|---|---
9 | 1 mark for appropriate device name and 1 further mark for appropriate purpose. | 6

**Input devices**
Two from:
- Keypad / Keyboard …
- … e.g. to allow customer to input the quantity of an item
- Touchscreen …
- … e.g. to allow a customer to select a payment method
- Barcode scanner / Barcode reader …
- … e.g. to allow a customer to scan in their shopping
- Card reader // Cash deposit / intake …
- … e.g. to allow a customer to pay for their shopping
- Weighing scales …
- … e.g. to allow a customer to weigh fresh produce

**Output devices**
One from:
- Display / Touchscreen …
- … e.g. to allow a customer to see the running total of their shopping
- Speaker …
- … e.g. to give audio instructions to a customer about how to use the self-checkout
- Printer …
- … e.g. to print a receipt for the customer

| Question | Answer | Marks
---|---|---
10(a) | 1 mark for four correct outputs only | 1

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

10(b) | 1 mark for each correct section of the statement | 3
- (A AND B)
- AND
- (C OR NOT B)
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| 11       | **Three** from e.g.:  
• (Provides an) interface  
• Loads / opens / installs / closes software  
• Manages the hardware // manages peripherals // spooling  
• Manages the transfer of programs into and out of memory  
• Divides processing time // processor management  
• Manages file handling  
• Manages error handling // manages interrupts  
• Manages security software  
• Manages utility software  
• Manages user accounts  
• Multitasking  
• Multiprogramming // time slicing  
• Batch processing | **3** |
| 12(a)    | 1 mark for appropriate sensor and 1 further mark for appropriate use.  
Two from:  
• **Gas (sensor)** ...  
• ... e.g. to measure the levels of oxygen/carbon dioxide / nitrogen in the factory to make sure they are not too high / low  
• **Temperature (sensor)** ...  
• ... e.g. to measure the temperature of the chemicals to make sure it is not too high/low  
• **Motion / Infra-red (sensor)** ...  
• ... e.g. to detect any persons in an unauthorised area of the factory  
• **Pressure (sensor)** ...  
• ... e.g. to measure the pressure of chemicals flowing through pipes to check that level are not too high / low  
• **pH (sensor)** ...  
• ... to measure the pH to make sure the acidity / alkalinity of the chemicals is correct  
• **Light (sensor)** ...  
• ... to measure the level of light to make sure it remains at a constant level for the chemical process | **4** |
| 12(b)    | **Five** from:  
• Sensors send signals to microprocessor  
• Analogue signals are converted to digital (using ADC)  
• Microprocessor compares value to stored value ...  
• ... If out of range / matches stored values ...  
• ... signal sent to alert workers (e.g. sound alarm)  
• ... microprocessor send signal to cause an action to occur e.g. cool a process down, heat a process up, add a chemical  
• ... no action taken  
• Output/record readings  
• Monitoring is continuous | **5** |
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</thead>
</table>
| 13(a)    | Two from:  
• Smaller file to transmit  
• The file is transmitted quicker  
• Uses / requires less bandwidth | 2 |
| 13(b)(i) | • Lossless (compression) …  
• … It is important the code must be (exactly) the same as the original file  
• … If it does not match the original file it will not work | 3 |
| 13(b)(ii)| • Lossy (compression) …  
• … It would make the file smaller than lossless compression / the file would stream faster than lossless compression  
• … The quality of the video can be reduced but it can still be viewed | 3 |