|  |  |  |
| --- | --- | --- |
| **Question** | **Answer** | **Marks** |
| 1(a) | − 5− 32− 26− 171 | 4 |
| 1(b)(i) | − 00100101 | 1 |
| 1(b)(ii) | − 00011011 | 1 |
| 1(c)(i) | Any one from:− To represent HTML colour codes− In error messages |  1 |
| 1(c)(ii) | Any one from:− Assembly code/language− Memory address locations− In error messages− Memory dump | 1 |
| 2 | Any three from:− Password− Add a biometric device to the laptop // set biometric password− Use two-step verification // Use two factor authentication− Physically lock the laptop away in a secure cupboard // Taking laptop with him at all times | 3 |
| 3(a) | • Low-level language | 1 |
| 3(b) | • Assembler | 1 |
| 3(c) | Any two from:• He can directly access the hardware• He can use special machine-dependent instructions• There is no need for the program to be portable• Smaller file size // takes up less storage space• More efficient use of memory• Programs will be more time efficient when running | 2 |
| 3(d) | Any two from:• Programs are not portable• It is complex to learn• Difficult to debug | 2 |
| 4(a) | One mark for identification of the method (max 2), one mark for describing how the method could be used• Phishing• A legitimate looking email is sent to her, asking her to click a link• … this takes her to a fake website where she enters her bank details• Pharming• She accidentally downloads malicious software onto her computer• … this redirects her legitimate website requests to a fake website where she enters her bank details• Hacking• A person gains unauthorised access to her computer• .. they steal/view a data file that contains her bank details• Spyware• Records the key presses on her computer• … this data is analysed for patterns and her bank details are identified | 4 |
| 4(b) | Any five from:• Web browser sends request to web server• … to view the digital certificate• Web server sends the digital certificate to the web browser• Web browser checks the certificate for authenticity• If certificate is authentic a secure connection is created• Any data sent is encrypted• If certificate is not authentic the connection is rejected• Uses a protocol such as SSL/TLS | 5 |
| 4(c) | Any two from:• A (small) text files• … that is stored by the browser• … sent between web server and browser when user visits the websiteAny two from e.g.:• To track users browsing habits• To store personal details• To tailor web page to user's presentation requirements• To store items in a virtual shopping cart• To tailor adverts to a user | 4 |

|  |  |  |
| --- | --- | --- |
| **Question** | **Answer** | **Marks** |
| 5 |

|  |  |  |
| --- | --- | --- |
| **Statement** | **true (****)** | **false (****)** |
| 47KB is larger than 10MB. |  |  |
| 250bytes is smaller than 0.5MB. |  |  |
| 50GB is larger than 100MB. |  |  |
| 1TB is smaller than 4GB. |  |  |

1 mark per correct tick | **4** |
| **6** |

|  |  |  |
| --- | --- | --- |
| **Statement** | **True** | **False** |
| Data is transmitted in one direction only, one bit at a time. |  |  |
| Data is transmitted in both directions, multiple bits at a time. |  |  |
| Data is transmitted in one direction only, multiple bits at a time. |  |  |
| Data is transmitted in both directions, but only one direction at a time. Data is transmitted one bit at a time. |  |  |
| Data is transmitted in both directions, but only one direction at a time. Data is transmitted multiple bits at a time. |  |  |

 | **5** |
| 7(a) | 1 mark per correct tick | **3** |
| 7(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 acknowledgment 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 | **4** |
| 8 | 1 mark for appropriate device name and 1 further mark for appropriate purpose.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 | **6** |
| 9(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** |
| 9(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** |
| 10(a) | Two from:• Smaller file to transmit• The file is transmitted quicker• Uses / requires less bandwidth | **2** |
| 10(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** |
| 10(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** |
| 11(a) | One mark for each correct stage of working (max 2):• 512 x 512• 262 144 \* 2 // multiplied by 16 and divided by 8• 524 288/1024 | **3** |
| 12(a)(i) | An IP address that has numerical values separated by dots that follows the format with a max value of 255 in any xxx xxx.xxx.xxx.xxxExample: 10.245.3.99 | **1** |
| 12(a)(ii) | Any two from:• 128-bit // 16 bytes• Hexadecimal• Separated by colons• Characters in groups of 4• Has 8 groups of characters• Double colons can be used for sets of (consecutive) zeros (only once) | **2** |