

10(a)	One mark for both declarations correct <pre>DECLARE Seconds : INTEGER DECLARE Minutes : INTEGER</pre>
10(b)	One mark per bullet point - PROCEDURE and ENDPROCEDURE naming the procedure Time with parameter - correctly calculating minutes - correctly calculating seconds - output the minutes and seconds Example <pre>PROCEDURE Time(TotalSeconds : INTEGER) Minutes ← DIV(TotalSeconds, 60) Seconds ← MOD(TotalSeconds, 60) OUTPUT "The number of minutes is ", Minutes OUTPUT "The number of seconds is ", Seconds ENDPROCEDURE</pre>

5(a)	<table border="1"> <thead> <tr> <th>Term</th><th>Definition</th></tr> </thead> <tbody> <tr> <td>current instruction register (CIR)</td><td>stores the instruction that is being decoded/executed</td></tr> <tr> <td>core</td><td>This is a processing unit within the CPU that can fetch, decode and execute instructions.</td></tr> <tr> <td>instruction set</td><td>This is a list of all the commands that can be processed by the CPU.</td></tr> <tr> <td>cache</td><td>stores frequently used data/instructions</td></tr> <tr> <td>accumulator</td><td>stores the result of interim calculations</td></tr> </tbody> </table>	Term	Definition	current instruction register (CIR)	stores the instruction that is being decoded/executed	core	This is a processing unit within the CPU that can fetch, decode and execute instructions.	instruction set	This is a list of all the commands that can be processed by the CPU.	cache	stores frequently used data/instructions	accumulator	stores the result of interim calculations
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5(b)	Control unit // CU												
5(c)	Three from: - On each clock pulse, an FDE cycle is performed. - The clock speed is the number of FDE cycle performed in a second // The clock speed is the number of times the clock pulses per second/per unit of time. - If clock speed is increased more FDE cycles can be performed in a second // If clock speed is decreased fewer FDE cycles can be performed in a second. - If clock speed is increased, it can improve the performance of the CPU // If clock speed is decreases it decreases the performance of the CPU.												

5(a)	Any two from: storing a database of URLs and matching IP addresses search its database for the matching IP address. - send the URL to another DNS if URL cannot be found. - return the IP address to the web browser
5(b)	D

5(c)(i)	One mark for each part of the diagram that shows: - A perpetrator/third party sending malware // user downloads/installs malware - Each computer is turned into a bot to create a botnet. - Third party initiates the attack. All the bots send a request at once to the web server. ... crashing the web server. Example: <pre> graph LR TP[third party] -- "Third party sends malware." --> Botnet subgraph Botnet B1[Bot] B2[Bot] B3[Bot] B4[Bot] end Botnet -- "Requests" --> WS[web server] TP -- "A perpetrator/third party sending malware // user downloads/installs malware" --> B1 TP -- "Each computer is turned into a bot ..." --> B2 TP -- "... to create a botnet." --> B3 TP -- "Third party initiates the attack." --> B4 B1 -- "All the bots send a request at once to the web server." --> WS B2 -- "All the bots send a request at once to the web server." --> WS B3 -- "All the bots send a request at once to the web server." --> WS B4 -- "All the bots send a request at once to the web server." --> WS WS -- "Web server cannot handle all the requests and crashes." --> WS </pre>
5(c)(ii)	- Hide a public IP address - Caching
5(d)(i)	B
5(d)(ii)	Any three from: Examples: - Store user's login details. - Store user's payment details. - Store user's preferences. - Use for targeted advertising.
5(d)(iii)	Any two from: Examples: - Storing bookmarks/favourites - Recording user history - Allowing use of multiple tabs - Providing navigation tools - Providing an address bar

4(a)	Any four from: - The data packet has three sections - It has a packet header that contains data such as the destination address - It has a payload that contains the main data for the email - It has a trailer that contains data such as the error detection system used
4(b)(i)	Any four from: - It sends the data multiple bits at the same time // It uses multiple wires ... so the transmission speed of the data will be fast - Data may not need to travel a long distance ... as the devices are all within a single room - It sends data in both directions at the same time ... so users on the network can send data to each other with no delay
4(b)(ii)	Any two from: - More interference/crosstalk (due to multiple wires) Data may be skewed (due to multiple bits at a time) // <u>bits</u> may arrive out of order - More chance of data collisions (as data sent in both directions at the same time) - More chance of error in the data
4(b)(iii)	Any one from: - Serial simplex - Serial half-duplex - Serial full-duplex - Parallel simplex - Parallel half-duplex

1(a)	(1) byte
1(b)	8192
1(c)	(1) Tebibyte // TiB
1(d)	One mark for each correct stage of working (max 2): 512×512 $262\,144 \times 2$ // multiplied by 16 and divided by 8 $524\,288/1024$ One mark for the correct answer: 512 (KiB)

3(a)(i)	One mark for each correct nibble, in the correct order. 1010 0010 1111
3(a)(ii)	2607
3(b)(i)	One mark for each correct character, in the correct order. 1 9 B
3(b)(ii)	411
3(c)	Any one from: - It is easier/quicker to read/understand/debug - It is a shorter representation of binary // It takes up less screen space
3(d)	Any two from: Example: HTML colour codes - URL - Memory dump - IP address - MAC address - Assembly language - Error codes/messages - ASCII/Unicode
3(e)	One mark for correct working: Example: flip and add One mark for correct answer. 11100111

5(a)(i)	Any two from: e.g. • Destination IP/address • Packet number • Originators IP/address • Error detection method																
5(a)(ii)	One mark each: • Payload • Trailer																
5(b)(i)	No mark for choice. Three from for justification that matches choice. Serial • Data arrives in order sent // does not need reordering • Less likely to experience interference • ... less likely to have errors • Can transmit over a longer distance (i.e. another room) • Still fast transmission... • ...sufficient for this purpose Parallel • Faster transmission speed than serial • ... faster response to requests • Very long connection not needed • ...next room is (likely) within distance for parallel • ... unlikely to error/arrive out of sequence/skew																
5(b)(ii)	One mark each: • Data goes in both directions... • ...at the same time																
5(c)(i)	One mark each: <table border="1"><tr><td>0</td><td>1</td><td>1</td><td>0</td><td>0</td><td>0</td><td>1</td><td>1</td></tr><tr><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr></table>	0	1	1	0	0	0	1	1	0	0	0	0	0	0	0	0
0	1	1	0	0	0	1	1										
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5(c)(ii)	One mark each: • In parity check, interchange of bits will not be detected // Parity check cannot detect even number of changes // Parity check cannot detect error if parity stays correct ... • ...the (possible) position of all changes will be highlighted // will identify the horizontal and vertical position of all differences/changes																
5(c)(iii)	One mark each: • Bit 6 • Byte 4																

5(d)(i)	Any two from: e.g. • Storing bookmarks/favourites • Storing history • Allow multiple tabs/web pages to be open • Allow movement back and forth between web pages // provides navigation tools • Allows the user to enter a URL/IP into the address bar • Manages HTTP/HTTPS protocol • Search cache for IP // Request IP from DNS // Send URL to DNS • Sends a request to the IP address/web server (to obtain the contents of a web page) • Runs active script/JavaScript/client-side script • Allows files to be downloaded from website/internet
5(d)(ii)	Any two from: e.g. • Storing preferences // so the user does not have to select their preferences each time they visit the site • Storing account details // so the user does not have to remember/enter their username and password each time they visit the site • Storing recent purchases // to allow the user to quickly re-order more items • Storing the pages visited/items selected // to display relevant adverts • Storing shopping basket // so when the user leaves the site the items are still in their basket