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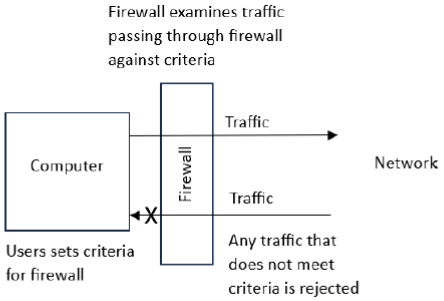
Question	Answer	Marks
6	The diagram includes (any **four** from): – Traffic passing both ways through the firewall – An indication that criteria is set for the firewall – Traffic is compared to criteria – Traffic being rejected if it does/does not meet criteria – Traffic being accepted if it does/does not meet criteria e.g. 	**4**

Question	Answer	Marks
1(a)	– A	**1**
1(b)	Any **one** from: – Spyware // Keylogger – Adware – Trojan horse	**1**
1(c)	– Anti-malware	**1**

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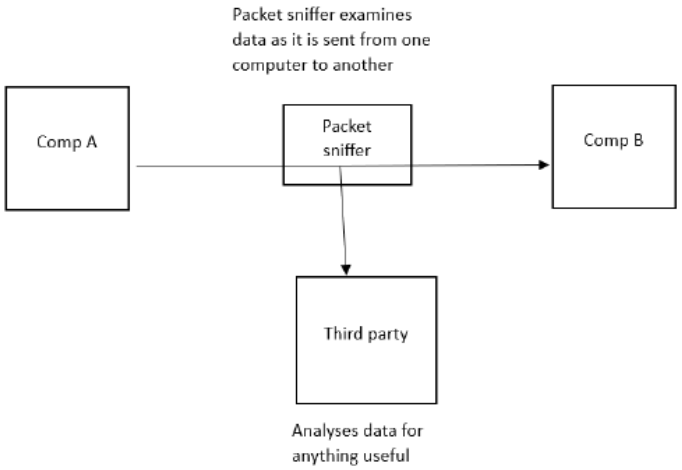
Question	Answer	Marks
8(a)	The diagram demonstrates (**One** mark for each part of the diagram): – Data is being sent from one device to another – The data is being examined **during transmission** – Packet sniffer is used – Intercepted data is reported to a third-party **during transmission** … – … and analysed for anything useful – Connection hacked to spoof destination address e.g. 	**4**
8(b)	– Encryption … – … if the data is intercepted it will be **meaningless** (because they do not have the decryption key)	**2**

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<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>9</td><td>
<table>
<tr><th>Term</th><th>Description</th></tr>
<tr><td>world wide web</td><td>the collective name for all the web pages available</td></tr>
<tr><td>cookie</td><td>a small text file, stored by the web browser, that can store a user's personal data</td></tr>
<tr><td>uniform resource locator (URL)</td><td>the text-based address for a website // It is made up of the protocol, domain name and filename/folder name</td></tr>
<tr><td>web server</td><td>Stores web pages // receives requests from clients and returns requested web page</td></tr>
<tr><td>hypertext markup language // HTML</td><td>the language used to create a website. Example tags are <head> and <body></td></tr>
<tr><td>hypertext transfer protocol // HTTP</td><td>a protocol that is used to request and send web pages</td></tr>
</table>
</td><td>6</td></tr>
</table>

Question	Answer	Marks
12(a)	Any **two** from: – Only exists electronically – Can be a decentralised system – Can be a centralised system – Usually encrypted	**2**
12(b)	– Blockchain	**1**

Question	Answer	Marks
4(a)	Any **two** from: – Display web pages – … by rendering HTML	**2**
4(b)	– Storing cookies	**1**
4(c)	Any **one** from: – Storing bookmarks – Storing favourites	**1**
4(d)	Any **one** from: – It encrypts it – Uses digital certificates	**1**

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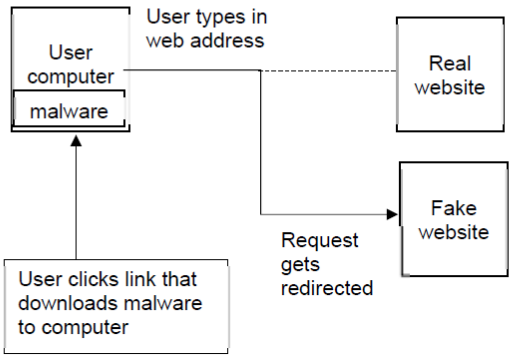
Question	Answer	Marks
8(a)	**Three** from: • Trial and error to **guess** a **password** • **Combinations** are repeatedly entered … • … until correct password is found • Can be carried out manually or automatically by software	3
8(b)(i)	Any **two** from: e.g. • Steal/view/access data • Delete data • Change data • Lock account // Encrypt data • Damage reputation of a business	2

Question	Answer	Marks
8(b)(ii)	Any **three** from: e.g. • Virus • Worm • Trojan horse • Spyware • Adware • Ransomware	3
8(c)	Any **two** from: • Two-step verification//Two-factor authentication//by example • Biometrics • Firewall // Proxy-server • **Strong/complex** password // by example • Setting a limit for login attempts • Drop-down boxes • Request for partial entry of password	2

Question	Answer	Marks
10(a)	• To obtain **personal** data/details // by example	1
10(b)	**One** mark for each correct part of the diagram. Diagram shows: • User clicks/opens attachment/link that triggers download • Malicious software downloaded onto user's computer • User enters website address • User is **redirected** to fake website e.g.  	4

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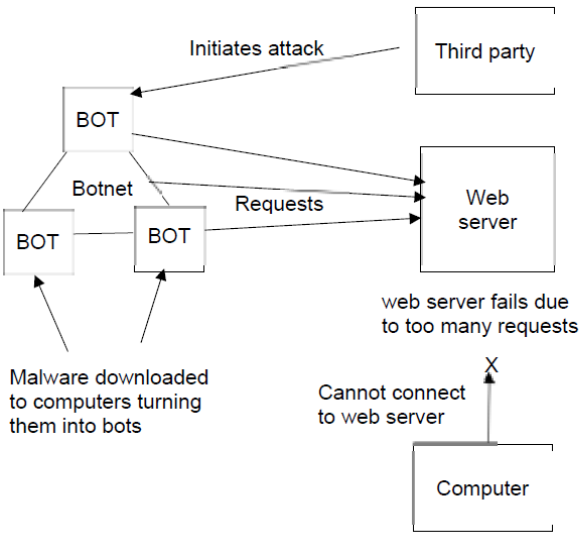
Question	Answer	Marks
10(c)	**Two** from: Displays web pages … by rendering HTML	2
10(d)	Any **three** from: e.g. • Storing bookmarks/favourites • Recording user history • Allowing use of multiple tabs • Providing navigation tools // by example • Providing an address bar • Managing protocols // by example // checking digital certificate • Send URL to DNS • Sends a request to the **IP address/web server** (to obtain the contents of a webpage) • Runs active script/JavaScript/client-side script • Allows **files** to be downloaded from **website/internet**	3
10(e)	Any **four** from: • Session cookies are stored in memory/RAM • … whereas persistent cookies are stored on the hard drive/secondary storage • When the browser is closed a session cookie is lost • … whereas a persistent cookie is not lost • … until deleted by the user/they expire	4

Question	Answer	Marks
6(a)	**One** mark for each correct term. • Text • Web browser // web server • Web server // web browser • Session • Session • Persistent	6
6(b)	Any **three** from: e.g. • Saving personal details • Storing login details • Tracking user preferences • Holding items in an online shopping cart	3

Question	Answer	Marks
7(a)	**One** mark for each part of the diagram (MAX six). The diagram demonstrates: • Malware downloaded to several computers • … turning it into a bot/zombie • … creating a network of bots/zombies • Third party/hacker initiating the attack • **Bots** send requests to a web **server** at the same time • The web **server** fails due to the requests • Legitimate requests cannot reach the web server 	6

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Question	Answer	Marks
7(b)	Any **two** from: e.g. • Revenge • To affect a company's reputation • Entertainment value • To demand a ransom to stop it • To test a system's resilience	**2**
7(c)	Any **two** from: • Proxy server • Firewall • Users scanning their computers with anti-malware	**2**

Question	Answer	Marks
6(a)	Any **three** from: e.g. • Checking the spelling and tone of the email/website • Checking the URL attached to a link • Scanning a download with anti-malware • Only downloading data / software from trusted sources • Never providing personal details online • Install a firewall to check if the website is valid	**3**

Question	Answer	Marks
6(b)	**Two** marks for description, **one** mark for example: • Manipulating / deceiving / tricking people … • … to obtain data // to force them to make an error • Any suitable example of social engineering	**3**
6(c)	Any **three** from: • Providing users with different **permission** for the data • Limiting access to reading data limiting the data that can be viewed • Limiting access to editing data // limiting the data that can be deleted / changed • Normally linked to a username	**3**

Question	Answer	Marks
8	**One** mark for each correct term in the correct order: • Malware • Bot • Botnet • Web server • Website	**5**

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Question	Answer	Marks
1(a)	D	1
1(b)	**One** mark for identification. E.g. **One** mark per bullet for description to **max two** each. Virus • Software/code that replicates • …when the user runs it // with an active host • Deletes/damages/corrupts data/files // takes up storage/memory space Worm • Software/code that replicates itself on a **network** • …without user input // without active host • Takes-up bandwidth • Deletes/damages/corrupts data/files // takes up storage/memory space • Opens back doors to computers over the network • Used to deposit other malware on networked computers Trojan horse • Software/code that is hidden within other software // Software that is disguised as authentic software • …when **downloaded/installed** the other **malware/by example** it contains is **installed** Adware • Software/code that generates/displays (unwanted) adverts on a user's computer • Some may contain spyware/other malware • Some when clicked may link to viruses • Reduces device performance // reduces internet speed • Redirects internet searches/user to fake websites Ransomware • Software/code that stops a user accessing/using their computer/data • …by encrypting the data/files/computer • A **fee** has to be paid to decrypt the data // A **fee** has to be paid to 'release' the computer/device/data	6

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Question	Answer	Marks
1(c)	**One** mark for each similarity to **max two**. **One** mark for difference (both sides needed unless clearly and accurately implied). Similarities e.g. • Check incoming and outgoing signals // filter traffic • Store whitelist/blacklist • Block incoming/outgoing signals • Both block unauthorised access • Keep a log of traffic • Both can be hardware or software (or both) Differences e.g. • Proxy can hide user's IP address, firewall does not hide the user's IP address • Proxy intention is to divert attack from server, firewall is to stop unauthorised access • Proxy protects a server, firewall protects individual computer • Proxy examines/processes requests for a website but a firewall does not (checks type of signal) // Proxy **processes** client-side requests whereas firewall **filters** packets • Proxy transmits website data to the user, but a firewall does not (it allows valid signals) • Proxy allows faster access to a web page using cache, but a firewall does not (allow faster access or have cache) • Proxy can hide internal network from internet, but a firewall cannot	3

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Question	Answer	Marks
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**	**2**
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	**2**

Question	Answer	Marks
4(a)	**One** mark for identification of the method (max 2), **two** marks 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	**6**
4(b)(i)	• The data will be **meaningless** if it is stolen	**1**
4(b)(ii)	**One** from: • Data is **encrypted** and **decrypted** using the **same** key/algorithm Any **three** from: • Data before encryption is known as plain text • Data after encryption is known as cypher text • Key is sent to receiver (to allow data to be decrypted) // Values are sent to receiver that are used to generate key	**4**

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Question	Answer	Marks
4(b)(iii)	Any **three** from: • Firewall // proxy server • Password • Biometric device • Virtual measure e.g. onscreen keyboard • Two-step verification // two factor authentication • Physical methods • Antimalware // Antispyware // Antivirus	3

Question	Answer	Marks
8(a)(i)	Any **two** from e.g.: • Background colour • Font colour • Font size • Font style	2
8(a)(ii)	Any **two** from e.g.: • Placement of text • Placement of image	2
8(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

Question	Answer	Marks
8(c)	Any **two** from: • A (small) text files • … that is stored by the browser • … sent between web **server** and **browser** when user visits the website Any **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
8(d)	**One** from: • Proxy server Any **three** from: • It examines the incoming traffic to server • It limits the number of requests to the website • … preventing too many requests that could overwhelm the server • Block multiple requests from the same IP within a timeframe	4

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Question	Answer	Marks
6(a)	Any **two** from: • Check if web address starts with HTTPS • Check if there is a locked padlock • Check the digital certificate for the website	**2**
6(b)	• Transport layer security // TLS	**1**
6(c)	Any **four** from: • To act as intermediary between browser and web server • to filter/examine/monitor traffic to the web server • to help stop malicious traffic to the web server • To cache frequently viewed web pages • to allow faster response time for requests • to reduce the number of requests the server needs to process • To help prevent DoS • stopping the webserver being overloaded with requests • by redirecting away from server // by stopping DoS attack reaching server • To act as a firewall	**4**
6(d)(i)	• Spyware	**1**

Question	Answer	Marks
6(d)(ii)	**One** mark for a correct method, **one** mark for a corresponding description • Drop down boxes • this means that the keypresses cannot be recorded • Onscreen/virtual keyboard • this means that the keypresses cannot be recorded • Biometrics // by example • this means that the keypresses cannot be recorded • no password entered to be gathered • Anti-malware // anti-spyware • this will **scan for**/**remove** any malware that could be recording keypresses • Random/select values requested from password • this means that full password cannot be obtained (in a single login) • Firewall • to prevent the **download** of any malware that could gather keypresses	**6**
6(e)	**One** mark for each correct term in the correct order • URL • IP address • Web server • Web pages • HTML • Browser	**6**

Question	Answer	Marks
10(a)(i)	Any **three** from: • It is a secure protocol // hypertext transfer protocol secure • It is a set of rules for data transmission • It combines HTTP and SSL/TLS to transmit data • It encrypts data for transmission	**3**
10(a)(ii)	Any **one** from: • Look for a locked padlock • Check the digital certificate	**1**
10(b)	Any **three** from: • Hacking • Virus • Malware **Note**: If three different types of correct malware are given, they can be awarded.	**3**

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<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>9(a)</td><td>One mark for each correct row:

<table>
<tr><th>Statement</th><th>Browser (✓)</th><th>IP address (✓)</th><th>URL (✓)</th></tr>
<tr><td>it contains the domain name</td><td></td><td></td><td>✓</td></tr>
<tr><td>it is a type of software</td><td>✓</td><td></td><td></td></tr>
<tr><td>it converts Hypertext Markup Language (HTML) to display web pages</td><td>✓</td><td></td><td></td></tr>
<tr><td>it is a type of address</td><td></td><td>✓</td><td>✓</td></tr>
<tr><td>it stores cookies</td><td>✓</td><td></td><td></td></tr>
</table></td><td>5</td></tr>
</table>

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>3(a)</td><td>One mark for the correct term or definition

<table>
<tr><th>Term</th><th>Definition</th></tr>
<tr><td>browser</td><td>Software/application that allows users to view web pages / render HTML</td></tr>
<tr><td>Internet Service provider // ISP</td><td>this is the company that provides a user with a connection to the Internet</td></tr>
<tr><td>HTTP // HTTPS</td><td>this is a protocol that is used to send data for web pages across the Internet</td></tr>
<tr><td>Uniform Resource Locator (URL)</td><td>a text-based version of a web address</td></tr>
<tr><td>cookie</td><td>a text file (stored by web browser) that contains data about a user's browsing habits/details/preferences</td></tr>
</table></td><td>5</td></tr>
<tr><td>3(b)</td><td>• Hardware or software based</td><td>1</td></tr>
<tr><td>3(c)</td><td>Four from:

• (The parent can) set criteria for the websites she is allowed to visit
• … such as a whitelist/blacklist of websites
• The firewall will examine the data/traffic incoming and outgoing from her computer
• If data is sent from a website that is not allowed, it will be blocked</td><td>4</td></tr>
</table>

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>6(a)</td><td>One mark for identifying the attack, two marks for the description

• Phishing
• Email is sent to user to encourage them to click link
• … that takes user to fake website

Pharming
• Email is sent to user to encourage them to click link/download attachment
• … that triggers download of malicious code that will redirect user to fake website

Virus/malware
• Email is sent to user to encourage them to click link/download attachment
• … that triggers download of virus/malware

Denial of service // DoS
• A very large number of emails are sent to a server/network at the same time
• … crashing the server/network</td><td>6</td></tr>
</table>

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<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>11</td><td>One mark per each correct term.

<table><tr><th>Terms</th><th>Description</th></tr><tr><td>HTML</td><td>the language used to create a web page</td></tr><tr><td>Browser</td><td>the type of software application used to display a web page</td></tr><tr><td>IP address</td><td>an address given to a computer, by a network, to allow the computer to be uniquely identified</td></tr><tr><td>Cookie</td><td>a text file sent by a web server to collect data about a user's browsing habits</td></tr><tr><td>Internet Service Provider // ISP</td><td>the company that provides a connection to the Internet</td></tr></table></td><td>5</td></tr>
</table>

Question	Answer	Marks
10(a)	– To disrupt the operation of a web server/network	**1**
10(b)	– To obtain a user's **personal** data	**1**
10(c)	Any **three** from: – Hacking // Cracking – Virus – Spyware – Malware	**3**

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Question	Answer	Marks
3(a)	One mark per each correct term in the correct order. – Software – Network – Criteria – Accept // reject – Reject // accept – Hacking	**6**

Question	Answer	Marks
4(a)	– Legitimate looking/fake email sent to user – … that contains a link to a fake website – User **clicks link** and enters personal details (into fake website)	**3**
4(b)	Any **two** from: – Pharming – Spyware – Hacking/cracking	**2**