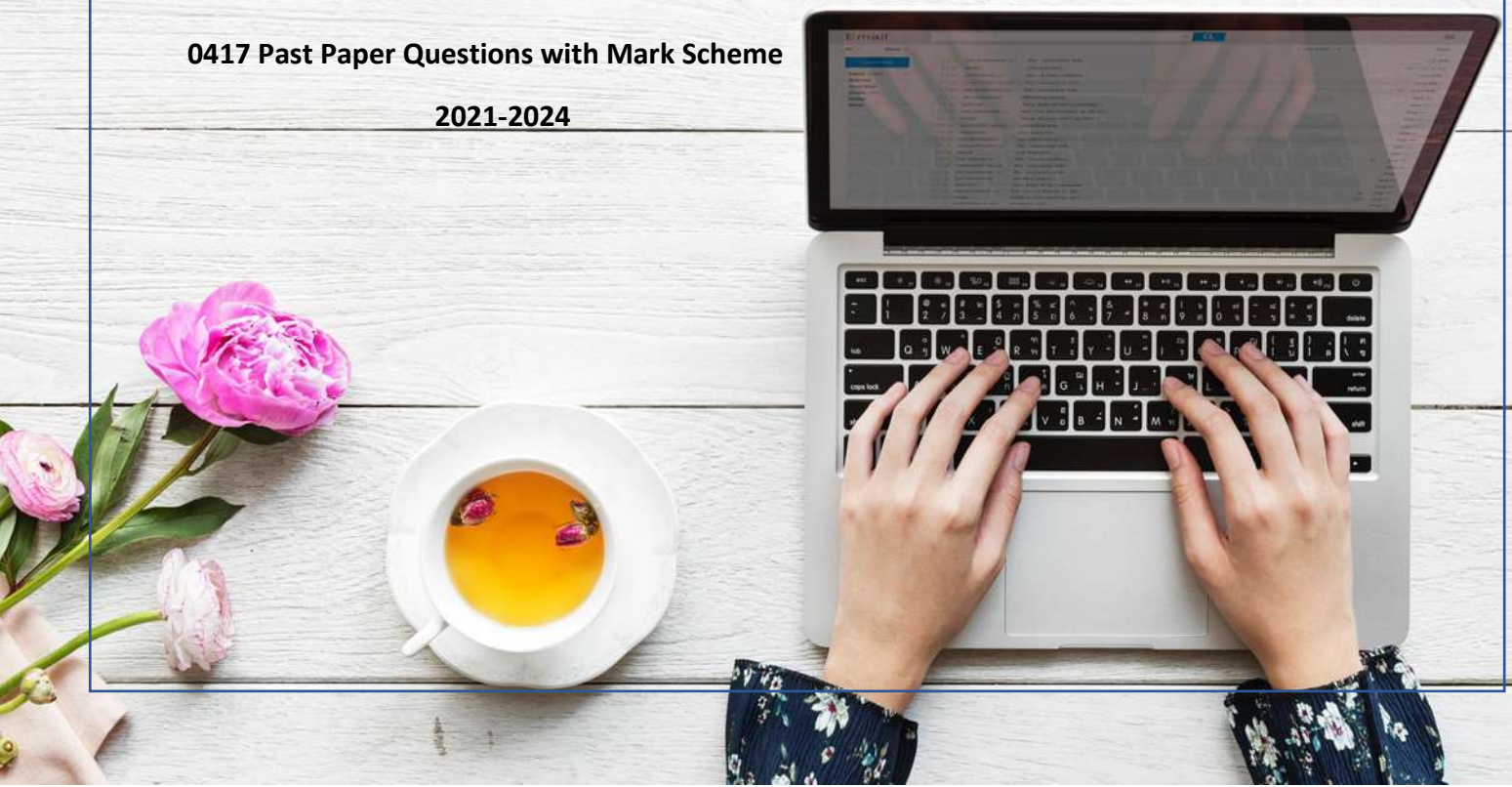# Information and Communication Technology
-0417-

Chapter Four: Networks And The Effects Of Using Them

0417 Past Paper Questions with Mark Scheme

2021-2024

1   Computer data can be stored on physical storage devices. Data can also be stored in the 'cloud'.

Explain what is meant by the cloud, giving **two** advantages of storing data in the cloud compared with physical storage devices.

Explanation...

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Advantage 1..

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Advantage 2..

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[4]

2   Compare and contrast the features of a switch and a hub.

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[6]

3   A family has purchased a wireless router for use in their home to allow their devices to be connected via WiFi to form a wireless local area network (WLAN).

(a) When the family purchased the wireless router they were advised to change the default password.

Explain why they should change the default password.

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(b) Describe the process of using WiFi to connect to a WLAN.

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(c) Their son produces large complex diagrams on his desktop computer at home. He needs to be able to access the diagrams when he is at university. Even if reduced in file size, the diagrams would be too large to send using email.

Describe in detail how he could transfer the diagrams from his home desktop computer to be able to access them at university, without using additional hardware.

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.... [4]

(d) One of the parents in the family works for a government department and sends sensitive data from their home computer to the office. The data is encrypted before being sent to ensure it is harder to understand if it is intercepted.

Describe **four** other preventative measures that could be taken to avoid network security issues.

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4   Bluetooth is a method of communication to connect devices together.

Describe how a smartphone can use Bluetooth to connect to another device.

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.... [4]

5   Write down the most appropriate network device to match the following statements. Your answers
should be different in each part.

(a) This network device checks the data packet arriving from one computer and sends the data
to a specific computer.

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(b) This network device sends the data packet from a computer to all devices connected to it.

.... [1]

(c) This network device connects a LAN to the internet.

.... [1]

(d) This network device connects one LAN to another with the same protocol.

.... [1]

6   A family has a number of different devices connected to the internet.

(a) Identify **three** items of computer hardware that may need to be purchased in order to set up
a computer network so the devices can use the internet.

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2 ....

3 ....

[3]

Chapter Ten

(b) Arjun is a member of the family. He uses the internet to carry out research and send work to
his office.

Describe **three** other ways he could make appropriate use of the internet.

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[3]

(c) Arjun uses the internet to carry out research for his work.

Describe **two** drawbacks of Arjun using the internet for research.

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Chapter Eight

(d) Arjun can log directly into his office system from his home computer. The office system only requires users to enter their user id and a password.

(i) Explain why this is **not** very secure.

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.... [2]

(ii) Describe **two** other ways the office system could identify the user securely.

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[4]

7   Circle **two** network devices.

Actuator	Bridge	Database	DVD
Hub	Linker	Monitor	Printer

[2]

8   Network devices are used in computer systems.

Complete each sentence by identifying the most appropriate network device.

(a) The network device that is used to transmit the data along an analogue telephone line is a

.... [1]

(b) The network device that connects a LAN to a WAN is a

.... [1]

(c) The network device that allows data to be directed to a specific computer on a LAN is a

.... [1]

(d) The internal network device that allows a computer to connect to a LAN is a

.... [1]

9   (a) Explain what is meant by cloud storage and how it is used.

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(b) Describe **two** issues related to the security of data in the cloud.

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[2]

Mix Ch4 + Ch6

10   Tawara Hotel uses magnetic stripe cards to allow guests access to their bedrooms. The hotel is changing the electronic lock it uses on its bedroom doors so the lock can work with RFID cards.

Compare the use of magnetic stripe cards and RFID cards for key entry. Your answer must include similarities and differences.

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11   The Internet of Things (IoT) allows devices as well as computers to connect to the internet using a router. Each device uses an IP address.

(a) Explain what is meant by an IP address.

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(b) Explain how a router sends data packets to another network.

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Chapter Eight

(c) The network has a firewall.

Explain why a firewall is needed.

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12 According to research carried out on passwords the top three most used passwords are 12345, qwerty and sunshine.

Describe, using other examples, the difference between a weak password and a strong password.

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.... [4]

13   Workers in an office log onto the office computer network using a password.

   (a) Aaron is using his name as his password.

       Give **two** reasons why this is **not** a good idea.

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       2 ....

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       [2]

   (b) One method that hackers use to find people's passwords is to install key-logging spyware onto computers.

       Give **two** methods that could be used to safely enter passwords even if key-logging spyware has been installed on a computer.

       1 ....

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       2 ....

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       [2]

14   Many organisations store data in the cloud.

   (a) Explain what is meant by the ICT term cloud.

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(b) Explain the issues of storing data in the cloud.

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.... **[6]**

15 Describe how data is stored and managed when using cloud computing.

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.... **[4]**

16 Many organisations use audio-conferencing or video-conferencing as some employees work from home.

Discuss the advantages and disadvantages of using audio-conferencing rather than video-conferencing.

-- [6]

17 (a) Explain what is meant by electronic conferencing.

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[2]

(b) State, giving a reason for your choice, the hardware required to set up an electronic conference.

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[4]

18 A student is able to access a secure area of the school's website using zero login.

(a) Explain what is meant by zero login.

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.... [2]

(b) Biometrics could be used as another method of accessing the secure area.

State **three** examples of biometric methods.

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[3]

19 (a) Discuss the advantages and disadvantages of using web-conferencing rather than video-conferencing for meetings.

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(b) An organisation has decided to use video-conferencing for its meetings.

State the hardware and software required to set up the video-conference.

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.... [4]

20 One function of a router is to route data packets.

(a) Identify **two** other functions of a router.

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[2]

(b) Explain how a router routes data packets to a destination.

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21 A student needs to ensure her data is kept safe.

(a) When the student logs into the university computer system, a physical token is used as an authentication method.

Explain what is meant by a physical token.

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.... [2]

Ch.8 **(b)** The student has received an email with an attachment. She needs to download the attachment and store it on her hard disk.

Describe the steps that the student needs to take to ensure her data is kept safe when she downloads the attachment.

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.... [6]

22 A router can be used to connect networks and devices to the internet.

(a) Identify the other **two** operations of a router.

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[2]

(b) Explain how a router connects devices to the internet.

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23 An electronic token is used as an authentication method.

Explain what is meant by an electronic token.

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....   [4]

24 A number of different communication devices can be connected to a network.

(a) Explain how the following devices operate.

(i) Switch

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.... [4]

(ii) Router

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(b) Bridges are communication devices.

Explain what bridges are used for.

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Mark Scheme

Question	Answer	Marks
1	**Two** from: Data is stored on offsite servers Many servers in many locations Data is stored on more than one server Uses data redundancy Cloud is an <u>online</u> service/data storage **Two** from: The cloud has greater storage capacity than other methods The data could be sent directly to the cloud from any device Access the data from any device/anywhere Easier to add storage capacity Lower capital outlay The owner would only pay for the storage they used Backup up tends to be automatic Cloud is more robust Cloud is more secure as it is password protected	4

Question	Answer	Marks
2	**Six** from: *Comparison* Both are network devices Both are hardware devices Both have computers and devices connected to them Both send data to devices//Both are communication devices *Contrast* In a hub data packets/data are broadcast to every device connected to it A hub is less secure than a switch in distributing data Switch checks the data packet Switch sends to an appropriate device **To gain full marks both contrast and comparison is needed**	6

Question	Answer	Marks
3a	**Two** from: So that other people cannot access the router using the known default password As it is wireless the password could be cracked from outside easily and then used for free by others So that people cannot make changes to/access personal data on the router It would increase security of the data	2
3b	**Four** from: The computer/device sends data to its wireless adapter The data is converted into radio waves The radio waves are transmitted A wireless adapter receives the radio waves Radio waves are converted into data The computer initiates a handshake with the wireless router The wireless router responds Establishes a session/pairing Wireless router checks the password/key is correct Data is transmitted User has to enter a password/passkey/automatic entry of key for known connections	4
3c	**Four** from: Create a cloud storage account Ensure sufficient storage in the cloud account Log into the cloud at home Upload/transfer the diagrams from his home computer to the cloud At university: access/login to his cloud storage account At university: download/access the stored diagrams	4
3d	**Four** from: Install security devices/firewalls Use a VPN Install security software/anti-virus/anti-spyware Set up security settings in the router/operating system Data backup in case of data loss/corruption Restrict access to the network infrastructure Train the family in the safe and secure use of the equipment Not opening emails/attachments from unknowns/phishing emails Not downloading files from unknowns/phishing emails Use a dongle to restrict use of software	4

Question	Answer	Marks
4	**Four** from: Smartphone sends data to its Bluetooth connector Data is converted to radio waves The smartphone automatically detects nearby devices The smartphone pairs to the other device if in range The smartphone randomly chooses one of 79 possible channels If the channel is in use, it randomly chooses another The connection changes channels, every few seconds Sends the radio wave to the other device	4

Question	Answer	Marks
5a	Switch	1
5b	Hub	1
5c	Router	1
5d	Bridge	1

Question	Answer	Marks
6a	Network cards Router Switch/hub	3
6b	**Three** from: Email Online chat//Instant message VOIP Online conference Streaming music/video/TV on demand Gaming Use of the Cloud Newsgroups FTP	3
6c	**Two** from: Information can be unreliable Unregulated so anyone can post anything More difficult to find what you are looking for Vast amount of information//Information overload Information can be biased/inaccurate Its slower to find relevant information Data may be out of date	2

6d(i)	**Two** from: User id and password can sometimes be easily guessed Passwords can be hacked with key logging software Passwords can be hacked by using random password generators Others can see the details being typed in If the home computer saves the log in information, then anyone can access If the user does not logout, then others can access data	2
6d(ii)	**Way 1:** One-use code/token Arjun logs in then software generates a one-use code/token Arjun enters the code/token into the system Even if hacker intercepts code/token is no use as can only be used once Token is time limited **Way 2:** Card/dongle The user has a dongle/card which is inserted into the computer The dongle/card is read by the computer The dongle/card data is unique **Way 3:** Biometrics Using biometric scanner to capture digital image of fingerprint/retina/iris/face Each biometric is unique Biometrics are nearly impossible to forge **To gain full marks the answers must correctly describe two ways**	4

Question	Answer	Marks
7	Hub Bridge	2

Question	Answer	Marks
8a	Modem	1
8b	Router	1
8c	Switch	1
8d	Network interface Card/NIC	1

Question	Answer	Marks
9a	**Six from:** **What it is:** Cloud storage involves storing data in a remote physical location Online storage platform Cloud storage systems use hundreds of interlinked data servers Storage system that requires access to the internet **How is it used:** User accesses the cloud storage using the internet Cloud data can be accessed from any device Clients send files to a data server The server is maintained by a cloud provider Data can be shared with other users Cloud storage automatically backs up data If one server fails there are others used as backup Users pay a monthly/annual fee for storage used **To gain full marks the explanation must have correct answers for both what it is and how it is used**	6
9b	**Two from:** Easier to hack as data is always available Lose control of your data More than one copy available to access therefore security is reduced More difficult to delete all copies of the data	2

Question	Answer	Marks
10	**Six from:** **Similarities** Both have improved security by using encryption Data cannot be read by eye so more secure Data can be re-written Direct data entry Both allow fast access to the room Both are read by a reader/scanner Both can be easily damaged **Differences** RFID is contactless therefore has less wear and tear whereas magnetic is placed in reader RFID reads the data faster More data on RFID card RFID cannot be left in the lock accidentally RFID cards can be read by others from a distance using a device Easier to clone a magnetic stripe card Magnetic cards can only be read in one direction whereas RFID are only tapped Magnetic stripe can be affected by magnets/mobile phones RFID cards are more robust **To gain full marks the comparison must have correct answers for both similarities and differences**	6

Question	Answer	Marks
11a	**Three** from: Internet protocol address Assigned to your computer/NIC/device when it connects to a network Uniquely identifies NIC/device on an IP network/unique number Locates individual devices on a network/internet Can show/indicate/track the physical location of the device	3
11b	**Three** from: The router creates data packets The router receives the data packet The data packet contains the destination/IP address The router looks at the destination/IP address in the packet The router uses its/has a routing table Router compares the destination address in the packet with the addresses in its routing table The router then determines the best route to the next router/network/destination	3
11c	**Four** from: It is needed for network security It controls/checks the incoming and outgoing network traffic A firewall is a barrier between a trusted secure internal network and the internet//network and the user It can log incoming and outgoing traffic It stops malicious traffic/cyber attacks/checks incoming data against criteria It prevents computers connecting to unwanted sites It prevents untrusted/un-recognised/un-authorised computers/users accessing data on the system Protects data Sends warnings/alerts the user	4

Question	Answer	Marks
12	Max **three** from: Weak password is easy to guess Weak passwords consist of all letters or all digits or all digits with one letter/all letters with one digit//words found in a dictionary//Strong passwords use a mixture of upper case, lower case, symbols and digits Weak password is one that has less than 8 characters Weak password has repeated characters Weak password has characters next to each other on a QWERTY keyboard Weak passwords are ones that are similar to the username Weak passwords can use personal information All of the examples given in the question are weak passwords Max **two** from: A good example of a strong password A good example of a different weak password	4

Question	Answer	Marks
13a	**Two** from: Password is too short Easy to guess Contains personal information Doesn't contain a mixture of uppercase, lowercase letters, numbers, and symbols Contains repeated letters	2
13b	**Two** from: Use drop-down lists Use biometric passwords Use one use tokens/OTP Use a device instead of a password	2

Question	Answer	Marks
14a	**Three** from: Cloud consists of large groups of remote networked servers They allow centralised data storage Offsite data storage/servers owned by a third party Accessed from any internet compatible device Access from anywhere with an internet connection	3
14b	**Six** from: Loss of control of the data as the data is controlled by a data storage provider Data can be affected without the user knowing The data remains on the server for a long time therefore more chance of it being hacked Many copies of the data made therefore easier to compromise Users must use strong passwords/authentication methods as hackers have longer time to be able to crack the password If internet connection is lost, then the cloud cannot be accessed If internet connection is lost when data is saved, then data could be lost A subscription needs to be paid whereas an HDD is one fee Difficult to delete all copies of a file as it is in multiple locations	6

Question	Answer	Marks
15	*Stored* Max **three** from: The data gets stored on remote servers accessed by the cloud within data centres The server is leased/rented on a monthly basis to the user A user's data is stored in logical pools *Managed* Max **three** from: The data is managed by a third-party cloud provider Cloud service providers manage and maintain data transferred to the cloud This usage can be increased/decreased and the customer is billed according to the usage only	4

Question	Answer	Marks
16	Max **five** from: **Advantages** Simpler interface for employees Less equipment is required therefore it is cheaper More flexibility/can dress casually for the employee as they do no need to be in front of a camera No issues with lip sync Can do other tasks as there is no camera/cannot be seen More privacy as the viewers cannot see inside your home/office Max **five** from: **Disadvantages** Doesn't let you have visual aids during calls Cannot see the body language of the people in the conference Cannot tell if the employees are paying attention Fewer features than video-conferencing Less personal as you cannot see the person Harder to control the meeting as you do not know who is speaking next	6

Question	Answer	Marks
17a	**Two** from: This is a communication system A structured discussion between two or more people This is carried out virtually/online/over the internet Involves video, web and audio	2
17b	Max **three** marks for any devices in the answer Max **two** marks for <u>linked</u> reasons: Computer/smartphone … …to connect the peripherals used in the conference Camera/webcam… …to capture moving images of the conference/participants Monitors… …to view the participants/contents/web page of the conference Microphone… …to capture the audio of the conference/participants Speaker/headphones… …so participants can listen to others in the conference Router… …to connect to the internet	4

Question	Answer	Marks
18a	**Two** from: It is a security method to protect the resources/data that the user can access It is an authentication method Ability to pass through security information from initial login to host PC It requires no manual input from the user	2
18b	**Three** from: Voice recognition Fingerprint scanning Facial recognition Iris recognition Hand geometry recognition Typing recognition	3

Question	Answer	Marks
19a	Max **five** from: *Advantages* Reduced cost as less extra hardware/ dedicated software is needed Far simpler interface for employees Fewer issues with lip sync/video lag/buffering Can be used on more devices Increased privacy as there is no camera More flexibility for the employee as they do not need to be in front of a camera Max **five** from: *Disadvantages* Requires internet connection and it must be stable/reliable Cannot see the body language of the people in the conference Cannot tell if the employees are paying attention/or even there Fewer features than video-conferencing Less personal as you cannot see the person	6

19b	Max **three** from: *Hardware* Camera Monitor Microphone Speakers Router Max **three** from: **Software** Software/hardware drivers Video conferencing software CODEC Echo cancelling software	4

Question	Answer	Marks
20a	Two from: Connecting networks and devices to the internet Storing computer addresses Forward packets based upon a routing table	2
20b	Four from: The data packet contains an IP address of the computer / network The router reads the data packet The data packet contains the IP address of the destination The router searches the IP address with its routing table The data packet is forwarded to the next router / network The data packet continues being sent to subsequent routers until it reaches the target device The router will use the IP address to work out the best route If the destination address is unknown it uses its default route Stores the IP address for future use	4

Question	Answer	Marks
21a	Two from: A physical token is a small hardware device Authorises access to a system It generates / uses a single-use code to use when accessing a platform Provides an extra security layer	2

21b	Six from:
	
	Download an anti-malware software ensure the anti-malware software is up to date
	Set the email account to scan any email / attachments automatically
	Scan the email / attachment for viruses / malware
	If no virus found (1st)
	    download the attachment (1)
	If a virus is found (1st)
	    delete the email / attachment without opening / downloading it (1)
		6

Question	Answer	Marks
22a	**Two** from: Storing computer addresses Routing data packets	2
22b	**Four** from: A router connects to a modem using an Ethernet cable Receives data packets from the internet/other devices Transmits data packets to the internet/other devices The data packet contains an IP address The router reads the data packet The router reads the destination IP address The router stores IP addresses in its routing table Checks/searches for the IP address in its routing table Finds the best path for each packet to reach its destination uses routing table The router will use the IP address to work out the best route If it cannot find the best route it uses the default one Uses an IP address with each of the devices on the network The router sends/forwards the packet to the next router The data packet continues being sent to subsequent routers until it reaches the destination router Manages data flow	4

Question	Answer	Marks
23	**Four** from: A piece of software/data Authorises access to a network The token is sent to the user after they log in It sends a single-use code this token is active for a short period of time Provides an extra security layer	4

Question	Answer	Marks
24a(i)	**Four** from: A switch connects a number of computers together to make a LAN Each device has a unique MAC address The switch receives a signal from one device The signal contains the MAC address of the sender and receiver Reads the recipient's MAC address Sends data to the specific device	4
24a(ii)	**Four** from: A router connects to a modem The router splits the data into packets Each packet contains the IP addresses and the data A router sends data packets to different networks A router receives data packets from different networks All devices within the network contain unique IP addresses The router stores IP addresses in its routing table The router reads the destination IP address Checks the IP address against its routing table Finds the best / fastest route to the device using the routing table If it cannot find the best route it uses the default one The router forwards the packet to the appropriate network segment Directs incoming and outgoing internet traffic to the device with the local IP address The router can store a route to the target device	4
24b	**One** from: Used to connect LANs together Connects different types of network so they act as one single LAN	1