ANSWERS communication

Answer 1

Question	Answer	Marks
7(a)	**1 mark** for device, **1 mark** for matching purpose. **Max 2** devices. • Router • To connect (devices) / the servers to the Internet // to transmit data between the servers and the Internet // to forward data towards its destination • Gateway • To connect a server that uses a different protocol to the Internet // to join two different types of network • Modem • To connect (the servers) to the Internet over a telephone line • Network interface card // NIC • To enable the servers to connect to the (company) network	4
7(b)	**1 mark** per bullet point, **max 1** for benefit, **max 1** for drawback Benefit: • (Consistently) faster data transmission • More stable connection Drawback: • High initial cost as new hardware will be needed • Expertise required to complete connections	2
7(c)(i)	**1 mark** per bullet point to **max 3** • The web page may have interactive features • Created using JavaScript • E.g. text box, buttons • Validates the input client-side • Handles the data returned from the server-side script	3
7(c)(ii)	**1 mark** per bullet point to **max 3** • Database on the server is accessed • Using PHP • Searches for the data the user entered • Returns the song // Returns a message to say song not found	2
7(d)(i)	**1 mark** per bullet point to **max 2** • Prevents unauthorised access to the data • Monitors incoming and outgoing traffic • Blocks transmissions from unauthorised sources / websites / ports • Maintains an allow list / deny list of IP addresses	2

Answer 2

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>1(a)</td><td>1 mark for each correctly completed media or description

<table>
<tr><th>Type of connection</th><th>Description</th></tr>
<tr><td>Fibre-optic</td><td>Transmits data as light //
Uses (a bundle of) glass/plastic threads to transmit data</td></tr>
<tr><td>Satellite</td><td>A communication device in Earth's orbit that receives and transmits data</td></tr>
<tr><td>Radio Waves</td><td>Carries data wirelessly, often known as Wi-Fi //
Carries data in the form of electromagnetic waves</td></tr>
<tr><td>Copper cable</td><td>Carries data as electrical signals and can consist of a twisted pair</td></tr>
</table>
</td><td>4</td></tr>
<tr><td>1(b)</td><td>1 mark per bullet point to max 2

• The employees' computers are the clients
• The server hosts the (shared) files
• An employee can request a file (from the server) from any of the client computers
• Several employees can access the same file (on the server) at the same time</td><td>2</td></tr>
<tr><td>1(c)</td><td>1 mark per bullet point

• Improved security because the IP address is not visible outside the network
• An internet presence is not required for each employee computer
• Only the router needs a public IP address, as only the router needs to be externally visible
• Reduces number of (public) IP addresses needed</td><td>2</td></tr>
</table>

Answer 3

<table>
<tr><td>1(a)</td><td>1 mark for each correct indication and explanation

3A.21.2H.1 Invalid
H is not a valid hexadecimal digit

299.53.2.2 Invalid
299 is not in the correct range

192.2.1.0 Valid
Consists of four numbers in the range 0–255 separated by full stops</td><td>3</td></tr>
<tr><td>1(b)</td><td>1 mark per bullet point to max 3

□ URL is parsed to obtain the Domain name
□ Domain name is sent to the nearest Domain Name Server (DNS)
□ DNS holds a list of Domain names and matching IP addresses
□ DNS name resolver searches its database for the Domain name
□ If DNS does not find the Domain name, the request is forwarded to a higher level DNS
□ If the Domain name is found, the IP address is returned
□ If the Domain name is not found, the request is passed to a higher level server
□ If the Domain name is finally not found, an error message is generated</td><td>3</td></tr>
<tr><td>1(c)</td><td>1 mark for each correct term

Real-time

On-demand</td><td>2</td></tr>
</table>

Answer 4

Question	Answer	Marks
1(a)(i)	**1 mark** for any valid example e.g. 192.168.0.1	1
1(a)(ii)	**1 mark** for correct answer The number of IP addresses needed will exceed the number available using IPv4.	1
1(a)(iii)	**1 mark** per bullet point to **max 2** • Too many digits per group • Too many groups of digits • The address is more than 32 bits / 4 bytes • Colons are used as separators	2
1(b)(i)	**1 mark** per bullet point to **max 2** • The PSTN consists of many different types of communication lines • Data is transmitted in both directions at the same time // (full) duplex data transmission • The communication passes through different switching centres	2
1(b)(ii)	**1 mark** for benefit, **1 mark** for drawback Benefit • (Probably) faster connection / communication / transmission of data • (Usually) more consistent transmission speed • Improved security Drawback • Expensive to set-up / maintain • Disruption to the dedicated line would leave no alternative	2

Question	Answer	Marks
1(c)	**1 mark** per bullet point to **max 4, max 3 for router, max 3 for gateway** Only award the repeated bullet points (1 to 5 in each section) once Router: • Connects two (or more) networks • Can connect a network to a WAN // acts as the single access point for… • Receives packets and forwards towards the destination • …using the IP address of the destination • Assigns private IP addresses • Operates between similar networks // networks using the same protocol • Can be used to segment a network Gateway: • Connect two (or more) networks • Can connect a network to a WAN // acts as the single access point for… • Receives packets and send packets towards the destination • …using the IP address of the destination • Assigns private IP addresses • Connects two dissimilar networks // networks that use different protocols	4
1(d)	**1 mark** per bullet point to **max 3** for any valid answer For example: • File server • Print server • Proxy server • Web server • Application server	3

Answer 5

Question	Answer	Marks
4(a)(i)	**1 mark** per bullet point to **max 3.** If no application to the bank **max 2** • The bank's server holds the customer account data / website • ... and performs the requested tasks / processes. The computers used by the **customers** are the clients ... • ... that send requests to the server • ... which returns the results of the request • ... E.g. a customer asks for a list of recent transactions on their account.	3
4(a)(ii)	**1 mark** per example to **max 2** e.g. • Sending and receiving email • A company or school centrally storing files • Using a print server • Using a file server	2
4(b)	**1 mark** per bullet point to **max 3** • All data is held on the server // All processing is performed on the server • The server only sends the results of the query to the client • The client does not have access to all the data • ... which keeps the data more secure / consistent • Customers can be identified when they log in • ...from a database of usernames and passwords	3

Question	Answer	Marks
4(c)(i)	**1 mark** per bullet point to **max 2** • Less interference in the signal • The signal does not degrade as quickly // Needs less signal boosting • More secure // more difficult to hack • Greater bandwidth // <u>Faster</u> transmission speeds possible	2
4(c)(ii)	**1 mark** per bullet point to **max 2** • Initial installation cost is higher // Cable / hardware is more expensive to buy per metre • Specialists / trained personnel are needed to install / maintain • Difficult to terminate // The electronics at both ends are more complex • Fibres can break <u>when bent</u> • Only transmits data in one direction // Cannot transmit power, only data	2

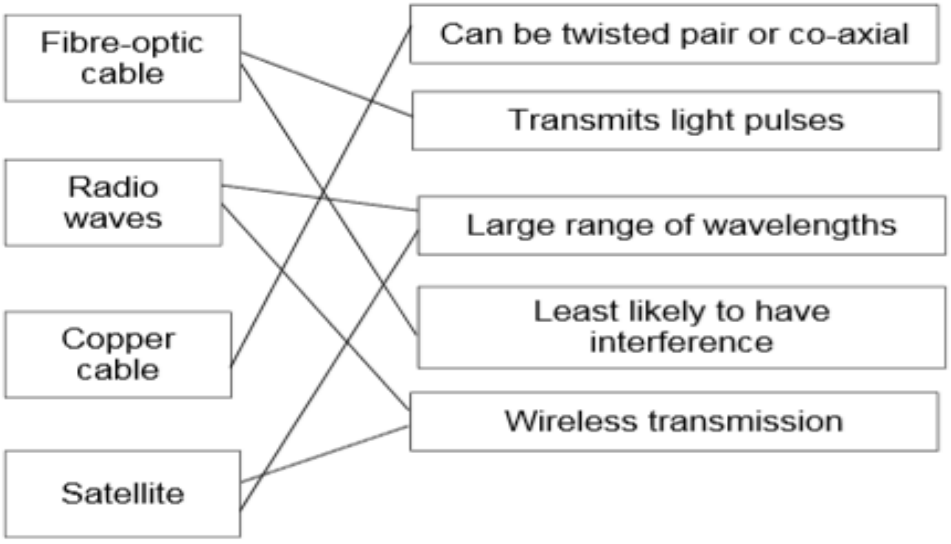
Answer 6

Question	Answer	Marks
6(e)(i)	**1 mark** per bullet to **max 3** □ The data is compressed before transmitting □ The video is transmitted continuously as a series of bits □ The video is hosted on a media server □ On download, the server sends the data to a buffer on the client computers // The buffer stores the data from the server □ The recipient / user's software receives bit stream from the buffer	4
6(e)(ii)	**1 mark** for: On-demand **1 mark** for justification from: □ The video does not need to be broadcast live // the video is already recorded □ Dominic's colleagues will watch the video at a later date // at their convenience	2

Answer 7

Question	Answer	Marks
1(c)(i)	**1 mark** per bullet point to **max 3** plus **1 mark** for suitable example □ When a barcode on an item is scanned □ … the server performs any requested tasks // the server looks up the details of the product □ The self-checkout machine is a client □ … that send requests to the server // the self-checkout machine asks for, e.g. the price of the item □ The server returns the results of the request // the server returns e.g. the item price □ Self-checkout machine displays e.g. price to the user	4

Answer 8

Question	Answer	Marks
1	**1 mark** for a correct line from each communication media, **max 6** 	6

Answer 9

Question	Answer	Marks
5(a)	**1 mark** per server e.g. • E-mail • Print • Web	**2**
5(b)	**1 mark** for the indicating the statement is false: <table><tr><td>True</td><td>False</td></tr><tr><td></td><td>✓</td></tr></table> **1 mark** per bullet for justification to **max 4**. • Internet is the infrastructure / global collection of networks • World Wide Web is the (multimedia web) pages / content • The World Wide Web is accessed over the Internet • Webpages are written in HTML • HTTP protocol used to transfer web pages • Internet uses IP protocol	**5**
5(c)	**1 mark** per bullet to **max 4** • The browser requests the web page • The web server accesses the page • The web server processes / executes the code • The web server produces the HTML for the web page / generates the web page • The web server returns the web page to the client • The client browser displays this web page	**4**

Answer 10

6(d)(i)	Client-side	**1**
6(d)(ii)	**1 mark** per bullet to **max 3** • Client-side (script) is run on the computer making the request • …when the (web page) data is received by the computer • Server-side (script) is run on the web server • The results are sent to the computer that made the request	**3**

Answer 11

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>2(a)</td><td>Use the IP address instead of the URL</td><td>1</td></tr>
<tr><td>2(b)(i)</td><td>1 mark per correct answer

<table>
<tr><th>IP Address</th><th>Valid or invalid</th></tr>
<tr><td>21E5:69AA:FFFF:1:E100:B691:1285:F56E</td><td>Valid</td></tr>
<tr><td>::255.255.255.255</td><td>Valid</td></tr>
<tr><td>59FB::1005:CC57:6571</td><td>Valid</td></tr>
<tr><td>56FE::2159:5BBC::6594</td><td>Invalid</td></tr>
</table></td><td>4</td></tr>
<tr><td>2(b)(ii)</td><td>1 mark per correct row

<table>
<tr><th>Statement</th><th>Public</th><th>Private</th></tr>
<tr><td>192.168.2.1 is an example of this type of address</td><td></td><td>✓</td></tr>
<tr><td>Assigned by the Internet Service Provider (ISP)</td><td>✓</td><td></td></tr>
<tr><td>IP address cannot be duplicated in different networks</td><td>✓</td><td></td></tr>
<tr><td>Network Address Translation (NAT) is necessary to access the Internet directly</td><td></td><td>✓</td></tr>
</table></td><td>4</td></tr>
<tr><td>2(c)</td><td>1 mark per example to max 2

 Fibre-optic
 Wi-Fi / Radio waves
 Microwave
 Infrared</td><td>2</td></tr>
</table>

Answer 12

2(a)	**1 mark** for **1 correct** answer, **2 marks** for all **3 correct** answers 1 Gopal types into the web browser **2** **B** (Web browser sends URL to Domain name Service (DNS)) 3 DNS looks up URL in a table **4** **A** (DNS finds corresponding IP address) **5** **C** (DNS returns IP address to web browser)	**2**

Question	Answer	Marks
2(b)	**1 mark** per bullet point to **max 2** • Gives each device on a network an identifier // IP address used to locate a device on a network • Each address is unique within the network • Allows a device/gateway/node to send data to the correct destination / a specific device/gateway/node	2
2(c)(i)	**1 mark** per bullet point to **max 3** • Less interference in signal • Signal does not degrade as fast // Needs less signal boosting • More difficult to hack // more secure • Greater bandwidth // Faster transmission speeds possible	3
2(c)(ii)	**1 mark** per bullet point to **max 2** • (Initial) installation cost is higher // Cable / hardware is more expensive to buy (per metre) • Specialists / trained personnel needed to install / maintain • Difficult to terminate // Electronics at both ends are more complex • Fibre-optic cables can break when bent • Only transmits data in one direction • If a fibre-optic cable connection fails, many more services can be affected	2

Answer 13

Question	Answer	Marks
6 10 4(a)	**1 mark** for **1 letter** in correct space **2 marks** for all **3 letters** in correct places 1 C 2 URL goes to Domain Name Service (DNS) 3 **B** 4 **A** 5 DNS returns IP address to client	2
4(b)(i)	**1 mark** per bullet point • 258 is too large/largest individual numbers is 255 • 4 numbers needed/1 number missing/only 3 groups of numbers given	2

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>4(b)(ii)</td><td>1 mark per bullet point

• L not a valid hexadecimal number
• Only one double colon is allowed</td><td>2</td></tr>
<tr><td>4(c)</td><td>1 mark per row

<table>
<tr><th>Description</th><th>Public</th><th>Private</th></tr>
<tr><td>The address can be reached over the Internet.</td><td>✓</td><td></td></tr>
<tr><td>The address is more secure.</td><td></td><td>✓</td></tr>
<tr><td>The address can only be accessed through the same LAN.</td><td></td><td>✓</td></tr>
<tr><td>The address can be duplicated in different networks.</td><td></td><td>✓</td></tr>
</table>
</td><td>4</td></tr>
</table>

Answer 14

Question	Answer	Marks
7(a)	**1 mark** per benefit to **max 3** • Devices can be more mobile as they do not have to be connected to cable • Easier to set up // no cables need to be installed • Add additional devices is easier • Many different types of device can be connected at the same time	3
7(b)	**1 mark** for a drawback from the following: • Easier to hack • Interference • Signal degrades quickly	1

Answer 15

7(a)	**Two** from: □ The user's web browser is the client software 1 □ The requested web page has program code / script embedded within it 1 □ This code is interpreted by the web browser 1	**2**
7(b)	**Four** from: □ The browser parses the URL to obtain the Domain Name 1 □ The browser software passes the Domain Name to the nearest Domain Name Server (DNS) 1 □ The DNS stores a list of Domain Names and matching IP addresses 1 □ The DNS Name Resolver looks for the Domain Name in its database 1 □ If found the corresponding IP address is returned to the originator 1 □ If not found the request is forwarded to another higher level DNS 1 □ The original DNS adds the returned IP address to its cache 1 □ The original DNS returns the IP address to the originator 1 □ The browser uses the IP address to request the required web page from the web server 1 □ The web server retrieves the page and delivers it to the originator 1 □ The browser software interprets the script and displays the web page 1	**Max 4**

Answer 16

6(a)	**Two** from: □ The file is made available from a web/email/FTP server 1 □ The user's browser is the client software 1 □ The client (software browser) requests the file from the server 1 □ The desired file is returned to the client computer 1	**Max 2**
6(b)	1. The user keys in the Uniform Resource Locator (URL) into the browser Software. 2. **E** // The Domain Name Service (DNS) uses the domain name from the browser to look up the IP address of the web server. 1 3. **D** // The web server retrieves the page 1 4. **F** // Sends the web page content to the browser 1 5. **B** // Browser software renders the page and displays 1	**4**

Answer 17

6 10

(a) Internet Protocol **[1]**

(b) **[4]**

Address	Denary / Hexadecimal	Valid or Invalid	Reason
3.2A.6AA.BBBB	Hexadecimal	Invalid	**One** point from: • This is more than 32 bits • 6AA /BBBB in Hex is bigger than FF / 255 in denary • 6AA / BBBB uses more than 8 bits / a byte • The third / fourth group is bigger than FF / 255 in denary • The third / fourth group uses more than 8 bits / a byte
2.0.255.1	Denary	Valid	There are 4 bytes, each 255 or below // All the values are in the range 0 - 255
6.0.257.6	Denary	Invalid	257 is above 255 // The third group is above 255
0A.78.F4.J8	Hexadecimal	Invalid	J is not a valid hexadecimal digit // J8 is not a valid Hex number

One mark for each combination of valid or invalid **and** the reason.

(c) Two points from: **[2]**

- Public address can be reached across the Internet.
- Private address can only be reached internally/through the LAN/Intranet // private address cannot be reached across the Internet.
- NAT (Network Address Translation) is necessary for a private IP address to access the Internet directly.
- A private address is more secure than a public address // A public address is less secure than a private address.
- Public addresses are provided by ISP / assigned by InterNIC // Private addresses are assigned by the router (of the network concerned).
- Public addresses are unique (to the Internet) // Private addresses (are unique within their network, but) can be duplicated within other (discrete) networks.
- 10.0.0.1 to 10.255.255.254 and 172.16.0.1 to 172.31.255.254 and 192.168.0.1.to 192.168.255.254 form the private address space // IP addresses from the private address space are never assigned as public.

Answer 18

6 (a) Two from: **[2]**

- WWW is a collection of interlinked, hypertext documents/webpages/multimedia resources (accessed via the Internet) //WWW is content from web servers organised as web pages
- Internet is the global connection of interconnected computer networks
- The Internet uses TCP/IP protocol / WWW uses http protocols to transmit data

(b) **[5]**

Description	Fibre-Optic cables	Copper cables	Radio waves
'Wireless' media			✓
Twisted-pair is an example		✓	
Uses light waves	✓		
WiFi			✓
Fastest transmission media	✓		

(c) One pair from: **[2]**

- Real-time - a live stream of an event that is currently taking place
- On-demand - streaming of an event/programme that has taken place in the past

- Real time – the event is captured live with a video camera connected to a computer
- On-demand – Existing media are encoded to bit streaming format and uploaded to a server

- Real-time – cannot be paused / rewound etc
- On-demand – can be paused / re-wound / fast forwarded etc

(d) Two marks for description, **one mark** for correct example. **[3]**

- Four numbers separated with '.'
- Each number is between 0 and 255 / 00 and FF in Hex / stored in one byte.
- 32 bits long
- Correct example

(e) Four from:

- URL is a reference address to a resource on the Internet.
- The URL is passed to the nearest Domain Name Server (by browser software).
- DNS server stores a database / list of URLs and matching IP addresses.
- DNS (Name Resolver) looks for the URL in its database.
- Finds the matching IP address and returns it to the originator.
- Or if it cannot find it, it forwards to another Domain Name Server at a higher level.
- (Original) DNS server adds the returned IP address to its cache.
- (Original) DNS server returns the IP address to the browser.

Answer 19

6 Any **four** from:

- User needs high-speed broadband (connection)
- Data is streamed to a buffer (in the computer)
- Buffering stops video pausing as bits streamed
- As buffer is emptied, it fills up again so that viewing is continuous
- Actual playback is (a few seconds) behind the time the data is received by computer [4]

Answer 20

(a)

Description	Conventional telephone using PSTN	Internet-based system
connection only in use whilst sound is being transmitted		✓
dedicated channel used between two points for the duration of the call	✓	
connection maintained throughout the telephone call	✓	
encoding schemes and compression technology used		✓
lines remain active even during a power outage	✓	

[5]

(b) **maximum** of **two marks** for Internet references and **maximum** of **two marks** for world wide web references

Internet

- massive network of networks/interconnected network of computer devices
- Internet stands for Interconnected Networks
- uses TCP/IP protocol

World Wide Web (www)

- is a collection of (multimedia) web pages/documents
- ...stored on websites
- http/protocols used to transmit data
- web pages are written in HTML
- URLs specify the location of the web pages
- web documents are accessed using browsers **[3]**

(i) router **[1]**

(ii) gateway **[1]**

(iii) server **[1]**

Answer 21

1 **(a)** any **two** from:

- sequence of digital signals / bits
- over a communication path / Internet
- transfer of data at high speed
- requires fast broadband connection
- requires some form of buffering
- bits arrive in the same order as sent [2]

(b) **(i)** any **two** from:

- no need to wait for a whole file to be downloaded
- no need to store large files on user's computer
- allows on demand playback
- no specialist software is required for playback in browser [2]

(ii) any **two** from:

- video stops / hangs if very slow Internet / broadband speed low
- video stops / hangs if inadequate buffering capacity
- loss of Internet means can't access films / files
- may require specific software to run the files / films
- viruses can be downloaded from the websites [2]

(c) 2 marks for on-demand and 2 marks for real-time

on-demand

- digital video tape, analogue video tape, or digital files are converted to bit streaming – format for broadcasting on the net; this is known as encoding, these encoded streaming video files are then uploaded to a dedicated server
- a link for the encoded video is placed on a web site
- a user clicks on the link to download the encoded streaming video; the streamed video is
- then broadcast to the user as and when they require it
- can be paused / can go back and re-watch / fast-forward, etc.

real-time

- an event is captured live with a video camera
- the video camera is connected to a computer
- the video signal is converted to streaming media files (encoded) on the computer
- the encoded feed is then uploaded from the computer to a dedicated streaming server via cable, DSL, or a high-speed internet connection
- the server then sends the live images it to all users requesting it as real-time video streaming
- cannot be paused etc. [4]

Answer 22

(a)

Statement	True (✓)
The IP address consists of any number of digits separated by single dots (.)	
Each number in an IP address can range from 0 to 255	✓
IP addresses are used to ensure that messages and data reach their correct destinations	✓
Public IP addresses are considered to be more secure than private IP addresses	

accept words TRUE or FALSE in right hand column
1 mark per tick, –1 mark for each wrong tick if more than 2 [2]

(b) (i) http – enables browser to know what protocol is being used to access information in the domain

cie.org.uk – cie.org.uk is the domain name

computerscience.html – actual web page / file being viewed [3]

(ii) **%20** – because <space> not allowed in a URL, %20 is the coding for a space (32 in denary)

? – separates the URL from all parameters or variables [2]

Answer 23

6 any **four** points from (maximum 3 marks per type of cable):

- fibre optic cables have greater bandwidth
- fibre optic cables need less signal boosting // can transmit over longer distances
- fibre optic cables have greater security (more difficult to "tap" into)
- fibre optic cables are immune to electromagnetic and other effects
- fibre optic cabling is lighter in weight (easier to install)
- fibre optic cables consume less power
- copper cabling is less expensive to install
- copper cable is easier to install <u>because</u> it is more flexible
- it is easier to make terminations using copper cabling
- the expertise in use of copper cabling is more extensive
- has been around for years … so very little is "unknown" about installations using this type of cabling [4

Answer 24

(a) **(i)**
- at least one computer used to "serve" …
- … other computers are referred to as "clients"
- server provides services / applications etc. …
- … which may be requested by clients [2]

(ii) any **two** from:

- files and resources are centralised
- creation of security / manage security
- user needs user name and password to access network
- centralised back-up
- intranet capability
- Internet monitoring
- clients can be less powerful machines, therefore less expensive to buy
- saving resources on server reduces the burden on the client [2]

(b) router [1]

(c)

Statement	Sequence number
The requested web page is displayed on the client computer	5
The user clicks on the hyperlink and the web page is requested from the web server	1
The requested web page content is transmitted to the client computer	3
The client computer processes the JavaScript code using the web browser software	4
The web server locates the requested web page	2

[5]

Answer 25

(i) 2 Any **two** from:

circuit switching
- path decided on before data transmission starts
- system decides in which route to follow …
- … and transmission goes according to this path/route
- for whole length of communication session, route is dedicated exclusively
- route only released when data transmission stops

packet switching
- data is broken up into packets
- packets are reassembled at destination
- packets are sent towards destination independent of each other
- each packet has to find its own route to destination
- decision as to which path to take is decided when each node is reached
- nodes are switches, routers, etc.
- each packet finds its way based on information it carries [2]

(ii) Any **two** from:

baseband
- data sent as digital signals …
- … through the media as a single channel
- … that uses entire bandwidth of the media
- it is bi-directional
- (frequency-division) multiplexing is not possible

broadband
- data sent in form of analogue signals
- each transmission is assigned to a portion of the bandwidth …
- … thus multiple transmissions are possible at the same time
- communication is uni-directional
- to send and receive needs two pathways …
- … either by assigning a frequency for sending and a different frequency for receiving
- … or by using different communication paths
- multiplexing is possible using this method [2]

(iii) Any **two** from:

ring topology

or if diagram described
- faulty connections can cause whole network to fail
- it is difficult to expand this type of network
- works well under heavy loading
- possible to form very large networks
- no server
- less secure (because data passes through all computers)

star topology

or if diagram described

- failure in any connection doesn't necessarily stop the rest of the network from working
- if the central hub/switch fails then the whole network fails
- it is easier to identify faults in this arrangement
- it is easier to expand this type of network
- needs server
- more secure (nodes contact each other directly through the hub) [2]

Answer 26

(b) Any **two** points from:

serial

- bits of each character/byte are sent one after the other …
- along a single communication path/wire
- works well over long distances

parallel

- each bit in a character/byte is transmitted along individual channels/wires
- works well over a short distance … but over longer distances the bits can get skewed (bits arrive out of order) [2]

Answer 27

(a) 1 mark per point. Maximum of 3 marks for baseband and maximum of 3 marks for broadband

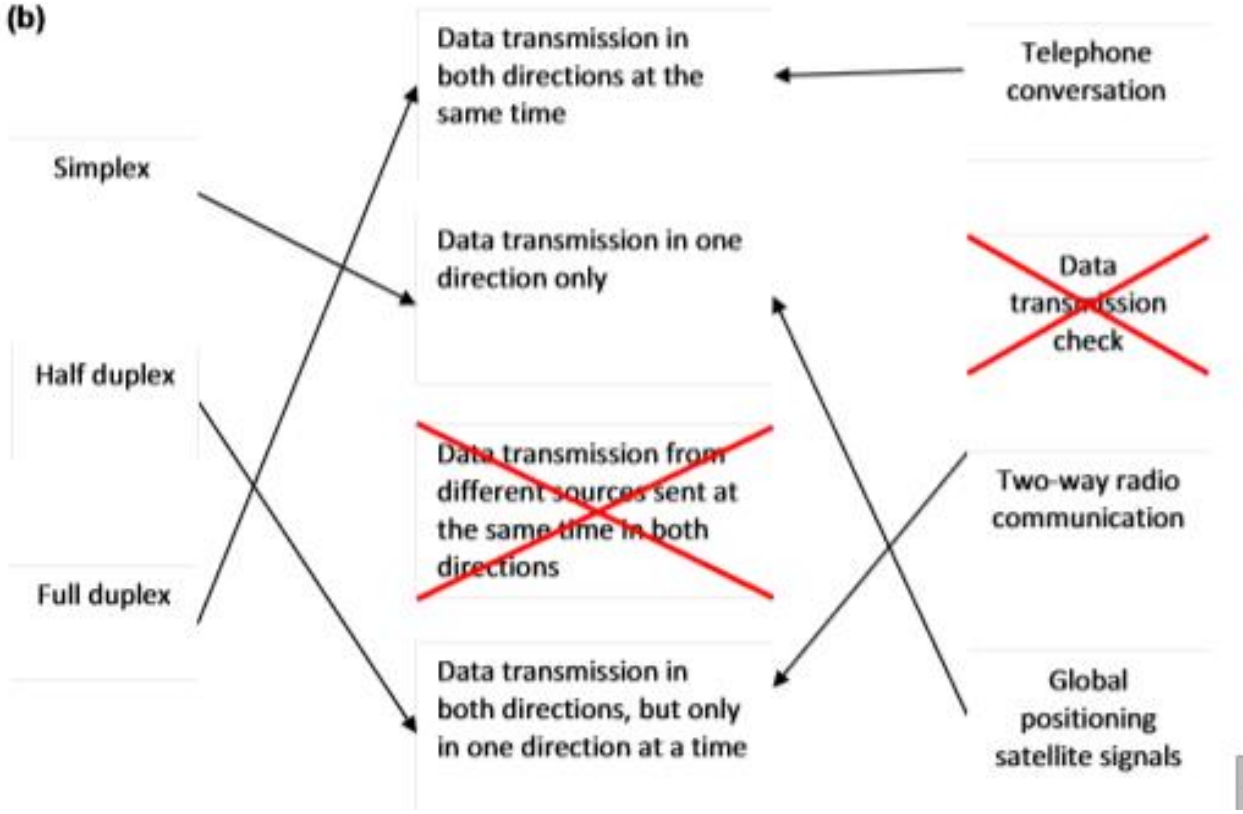
baseband

- data sent as digital signals
- through the media as a single channel
- that uses entire bandwidth of the media/one frequency
- it is bi-directional
- (frequency-division) multiplexing is not possible

broadband

- data sent in form of analogue signals
- each transmission is assigned to a portion of the bandwidth
- thus multiple transmissions are possible at the same time
- communication is uni-directional
- to send and receive needs two pathways
- either by assigning a frequency for sending and a different frequency for receiving
- or by using different communication paths/wires
- multiplexing is possible using this method **[4]**

(b)



Answer 28

(a) (i) 3 marks maximum for circuit switching and 3 marks maximum for packet switching.

circuit switching

- path decided on before the data transmission starts
- system decides on which route to follow / reserved
- and transmission goes through this path/route / one route
- for whole length of communications session the route is dedicated and exclusive
- route only released once data transmission stops

packet switching

- packets are reassembled / reordered at the destination
- packets include destination / senders address
- packets include a sequence number
- packets are sent towards destination independent of each other
- each packet has to find its own route to the destination
- decision as to which path/route to take decided when each *node* is reached
- nodes are switches, routers, etc.
- each packet finds its way based on the information it carries

[4]

(ii) - packet switching

[1]

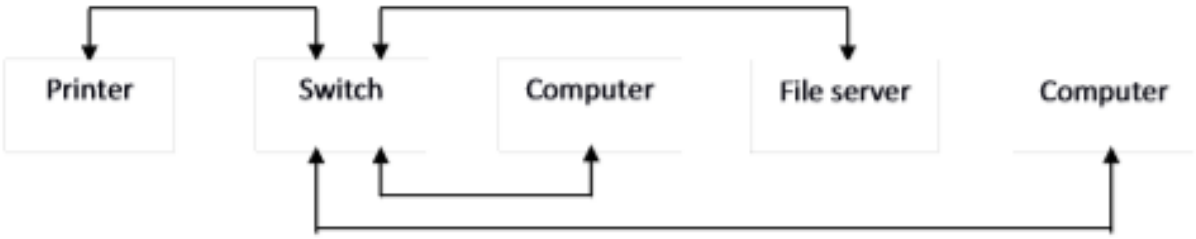
(iii) Any **three** from:

- can multi-task
- easier to have conferencing calls /or comparison to phones
- video calls are possible

- drop out / loss of packets
- echoing

[3]

(b) (i) 1 mark for lines from switch to the 2 computers, 1 mark for line from switch to printer and 1 mark for line from switch to file server



[3]

(ii) Any **one** from:

- each device could use a different type of line / cable
- if one segment goes down the rest of the network is not affected
- it is easier to track down a fault
- it is easier to expand a star network if required
- better security

[1]

Answer 29

(a) 1 mark for each benefit and 1 mark for each drawback

benefit	drawback
bus	
– requires less cabling than the – other topologies – cheapest system to set up	– if there is a fault in the central cable, whole system affected – doesn't work well under heavy loading – less secure
star	
– failure in any connection and network still functions – easier to identify faults – easier to expand network – each node can have different kind of cable – a more secure network	– if central hub fails, whole network fails – more expensive to set up
ring	
– works well under heavy loading – possible to form very large networks	– faulty connection can cause whole network to fail – difficult to expand this type of network – less secure **[6]**

(b) 1 mark per point

LAN

- hub
- (cat 5) network cabling
- network interface card (NIC)
- gateway
- server
- bridge
- switch

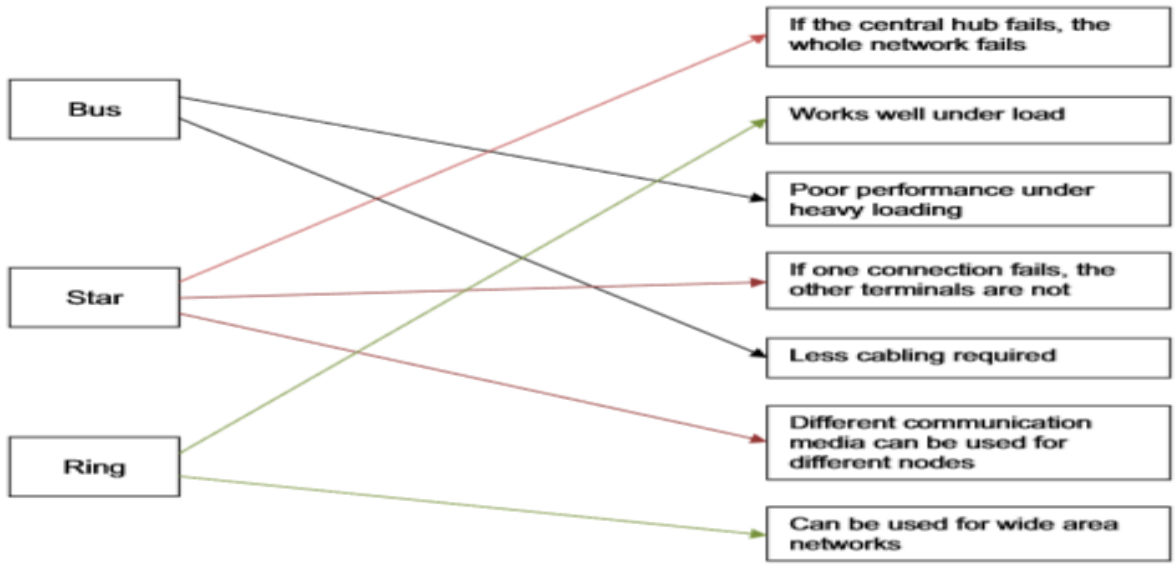
WAN

all the above plus:

- broadband modem
- telephone cabling/radio links/satellite links
- router **[3]**

Answer 30

(a)



[7]

Answer 31

(b) -Cables or wireless/to carry signals from one machine to the other.
-N.I.C/to interface between cable and motherboard
-Modem or Router/to connect two computers on a WAN
-Hub or switch/to connect computers in a star LAN
(2 per -, max 2 -, max 4)

Answer 32

4 **(a)** -Set of rules...
-to control the transmission of data

(b) **(i)** Packet Switching:
-Blocks of data find own way through network and...
-are reordered when they reach the destination
Circuit Switching
-Route is reserved for the duration of the data transfer
-Message simply needs to be reconstructed at destination
General points:
-The transmission of data from one node to another over a network
-Message is split into (standard sized) blocks of data
-each has label attached showing destination and block number
(1 per -, max 5) [5]

(ii) Advantage:
-Difficult to intercept message/network not tied up/all possible routes available
Disadvantage:
-Message must be reordered at destination/message sent at speed of slowest block [2]