Past Papers Topical
   3.2 Communication & internet technologies

9608/33/M/J/15
2 (a) Four descriptions and three types of local area network (LAN) are shown below.
   Draw a line to connect each description to the type of LAN it applies to.

Description		Type of LAN
Any packet the listening computer receives may be part of a message for itself		Bus with terminators at each end
Connection provided through an access point		Star
A process for handling collisions has to be implemented		Wireless
Listening computer only receives packets that are addressed to itself		

[4]

(b) A user downloads a file using the FTP protocol.
   Explain the function played by each of the following:
   (i) Server

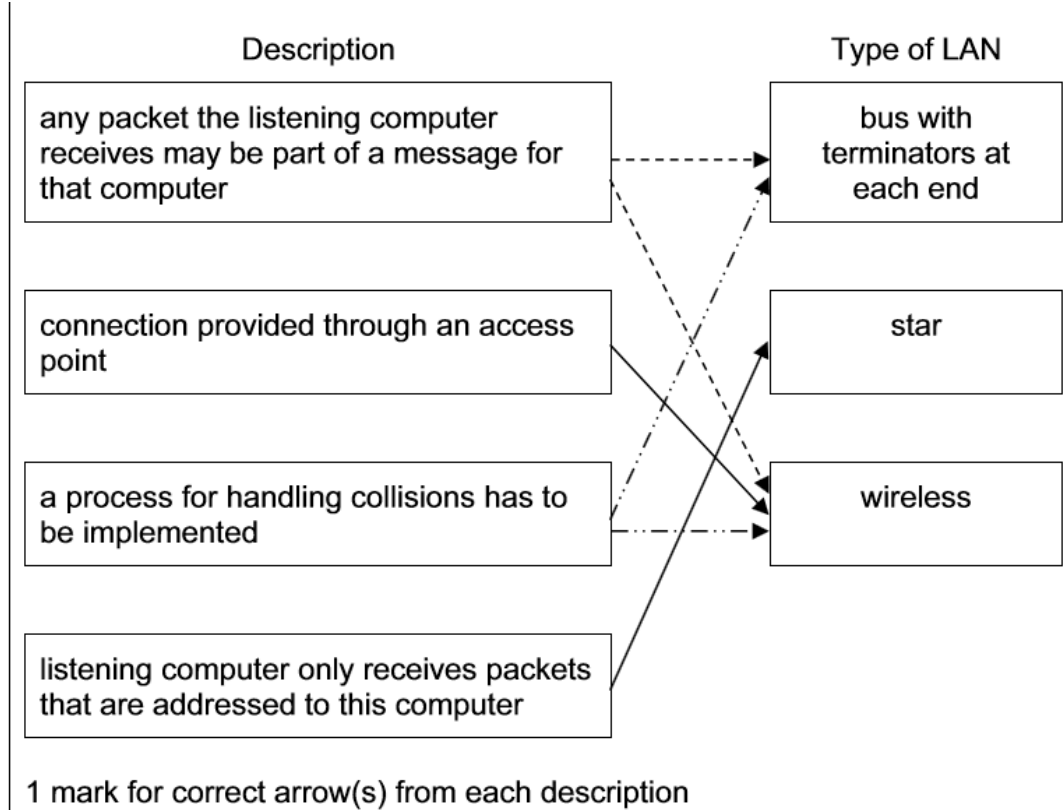   ....
   ....
   ....[2]

   (ii) Command

   ....
   ....
   ....[2]

   (iii) Anonymous

   ....
   ....
   ....[2]

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Answers

2 (a)

Description		Type of LAN
any packet the listening computer receives may be part of a message for that computer		bus with terminators at each end
connection provided through an access point		star
a process for handling collisions has to be implemented		wireless
listening computer only receives packets that are addressed to this computer		

1 mark for correct arrow(s) from each description

(b)
(i) Server: central computer stores files that are to be downloaded
(ii) Command: user can send action/instruction (or by example, e.g. change directory) that are carried out on server
(iii) Anonymous: allows user to access files user does not need to identify themselves to server

6 (a) Four descriptions and three protocols are shown below.
Draw a line to connect each description to the appropriate protocol.

Description		Protocol used

email client downloads an email from an email server

email is transferred from one email server to another email server

email client sends email to email server

browser sends a request for a web page to a web server

HTTP

POP3

SMTP

[4]

(b) Downloading a file can use the client-server model. Alternatively, a file can be downloaded using the BitTorrent protocol.
Name the model used.

....[1]

(c) For the BitTorrent protocol, explain the function of each of the following:
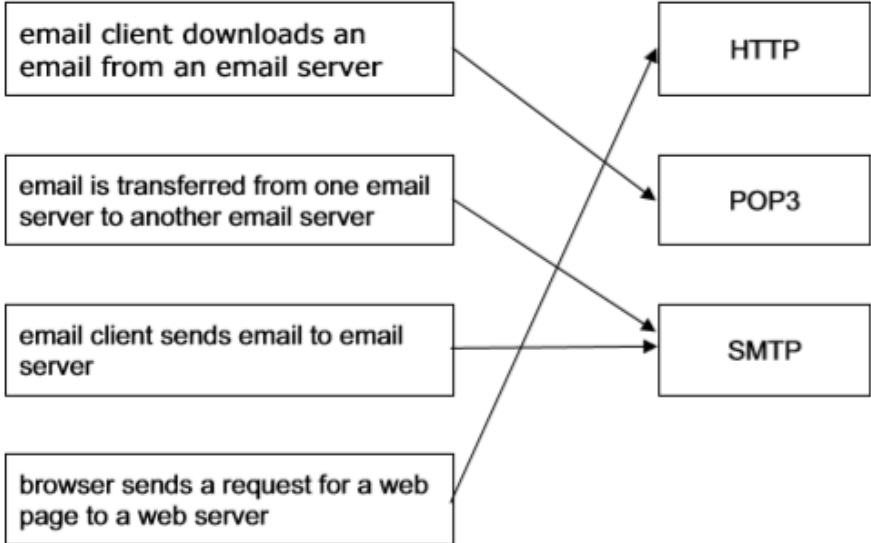(i) Tracker

....

....

....[2]

(ii) Seed

....

....

....[2]

(iii) Swarm

....

....

....[2]

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Answers

6	(a)			
		Description → **Protocol used**		1 mark for correct arrow from each description
		email client downloads an email from an email server → POP3		
		email is transferred from one email server to another email server → SMTP		
		email client sends email to email server → SMTP		
		browser sends a request for a web page to a web server → HTTP		
	(b)	peer-to-peer	1

	(c) (i)	**Tracker**: central server that:
		stores details of other computers that have all / part of file to be downloaded
		// has data on those peers downloading and uploading file
		// shares IP addresses with other clients in swarm allowing them to connect
			1
			
			1

	(ii)	**Seed**: peer computer that has 100% of file // is uploading downloaded content	1 1
	(iii)	**Swarm**: all the connected peer computers that have all or part of the file to be downloaded / uploaded // share a torrent	1 1
			Total: 11

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1 A Local Area Network (LAN) consists of four computers and one server. The LAN uses a bus topology.

(a) Complete the diagram below to show how the computers and the File server could be connected.
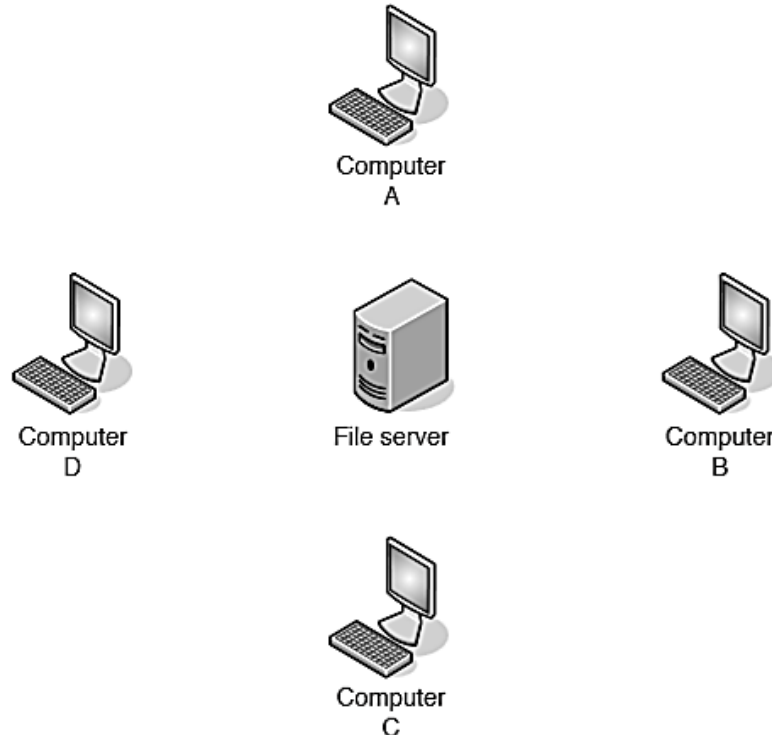
[2]

(b) Computer C sends a data packet to Computer A.

Three statements are given below.

Tick (✓) to show whether each statement is true or false.

Statement	True	False
Computer C uses the IP address of Computer A to indicate that the packet is for Computer A.		
Computer B can read the packet sent from Computer C to Computer A.		
The File server routes the packet to Computer A.		

[3]

(c) Computer A starts transmitting a packet to Computer C. At exactly the same time, the File server starts transmitting a packet to Computer D. This causes a problem.

(i) State the name given to this problem.

....
....[1]

(ii) Give three steps taken by both Computer A and the File server to allow them to transmit their packets successfully.

Step 1

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Step 2

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Step 3

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....[3]

(d) Adding a switch to the LAN changes its topology. Explain how the use of a switch removes the problem identified in part **(c)(i).**

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....[4]

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Question	Answer	Marks
1 (a)	Single line joining all four computers and file server One "terminator" at each end	1 1
(b)		

Statement	True	False	
Computer C uses the IP address of Computer A to indicate that the packet is for Computer A.	✓		1
Computer B can read the packet sent from Computer C to Computer A.	✓		1
The File server routes the packet to Computer A.		✓	1

Question	Answer	Marks
(c) (i)	Collision	1
(ii)	Both stop transmitting Each uses a random time Wait for time period Check for bus status Attempt to re-transmit	1 1 1 1 1 Max 3
(d)	Star topology created A switch has a number of <u>ports</u> Each connects to a single device (using a dedicated cable) Switch provides direct transmission/path from device to device Collisions are no longer possible There are dedicated links from Computer A to Computer C AND from the Server to Computer D	1 1 1 1 1 1 Max 4

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5 (a) A web browser is used to request and display a page stored on an internet web server. Explain how each of the following items is used in this event. (i) Packet:

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....[2]

(ii) Router:

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....[2]

(iii) TCP/IP:

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....

....[2]

 (b) The Internet can be used for video conferencing. Data can be transmitted over the

Internet using either packet switching or circuit switching. (i) State two problems that

could arise if video conferencing were to use packet switching.

Problem 1

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Problem 2

....

....[2]

(ii) Explain what is meant by circuit switching.

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....[2]

(iii) Explain how the use of circuit switching overcomes the problems you have identified

in part (i).

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....[3]

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Question	Answer		Marks
5(a)(i)	Packet: Both web page and web page request are split into packets Each packet is sent individually from device to device	1 1	2
5(a)(ii)	Router: Transmit packets Contain connections to many other routers When packets arrive at router, router decides where next to send packet 1 mark for any valid point		Max 2
5(a)(iii)	TCP/IP: Is the protocol Rules for communication between web server and browser	1 1	2
5(b)(i)	**Two** from: Picture and sound not synchronised Interruptions // video not continuous Can be degraded by other competing traffic	1 1 1	Max 2
5(b)(ii)	<u>Dedicated</u> communications channel between the two communicating devices Established prior to start of communication // removal of links at end of communication	1 1	2
5(b)(iii)	In packet switching, packets can take different routes and may not arrive in order Will arrive in order (only one route) As packets can take many different routes / share paths with others can be delayed Dedicated circuit has full bandwidth No loss of synch 1 mark for any valid point		Max 3

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5 The TCP/IP protocol suite can be viewed as a stack with four layers. (a) Complete the stack by inserting the names of the three missing layers.
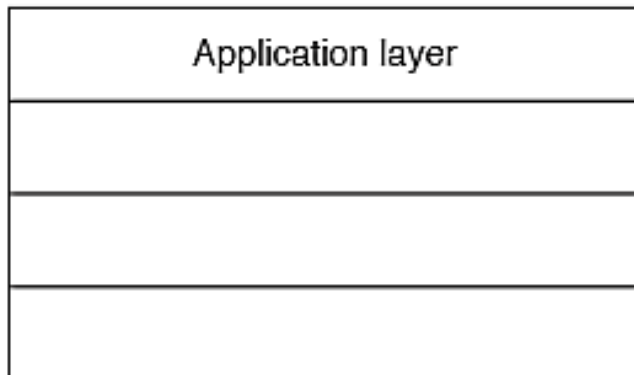
Application layer

[3]

(b) BitTorrent is a protocol used at the Application layer for the exchange of data.   (i) State the network model used with this protocol.

....[1]

(ii) State the use of BitTorrent.

....[1]

(iii) Explain how the exchange of data is achieved using BitTorrent.

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....[4]

(c) State two additional protocols that are also used at the Application layer for the exchange of data.   For each protocol, give an example of an appropriate exchange of data.

Protocol 1

....

Example

....

....

Protocol 2

....

Example

....

....[4]

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Question	Answer	Marks
5(a)	<table><tr><td>Option 1</td><td colspan="2">Option 2</td></tr><tr><td>Application Layer</td><td>Application Layer</td><td></td></tr><tr><td>**Transport**</td><td>**Transport (Layer)**</td><td>1</td></tr><tr><td>**Internet**</td><td>**Network (Layer)**</td><td>1</td></tr><tr><td>**Network Interface**</td><td>**(Data) Link (Layer)**</td><td>1</td></tr></table>	3
5(b)(i)	Peer-to-peer	1
5(b)(ii)	File sharing	1

5(b)(iii)	Any four points from the following: • Torrent descriptor file is made available • File to be shared is split into pieces • BitTorrent client software made available to other peers / users / computers Allowing them to work as seeds or leeches. A peer can act as a 'seed' – used to upload pieces of a file Peer downloading file can get pieces from different seeds simultaneously • Once a peer has a piece of the file it can become a seed for the parts downloaded Leeches download much more than they upload • Central server called a tracker keeps records of all the peers ('swarm') and the parts of the file they have Can pause and restart at any time.	Max 4
5(c)	Any two protocols from: HTTP/HTTPS … 1 Used for transfer of web pages from server to client 1 FTP … 1 Used for interactive file transfer 1 SMTP … 1 Used for sending email messages 1 POP3 … 1 Used for incoming email messages 1	Max 4

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3 Star and bus are two types of topology that can be used in a Local Area Network (LAN).

Star topology
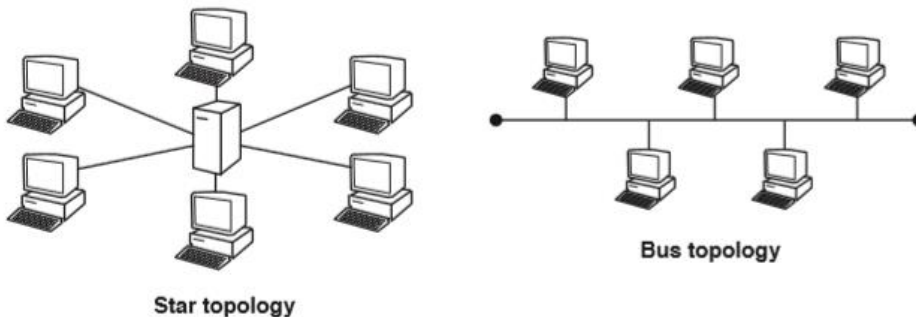
Bus topology

(a) (i) State one benefit and one drawback of the star topology. Benefit

....

....

Drawback ....

....[2]

(ii) State one benefit and one drawback of the bus topology. Benefit

....

....

Drawback ....

....[2]

(b) The sequence of steps 1 to 7 describes what happens when the LAN transmits data from Computer X to Computer Y using circuit switching. Four statements (4 to 7) are missing from the sequence.

A	Computer X sends the data.
B	The sender signals node to deallocate resources.
C	Computer Y sends a receipt signal.
D	If available, Computer X sets up path between nodes.

Write one letter (A to D) in the appropriate space to complete the sequence.

1 Computer X sends a connection request to Computer Y.

2 Computer Y sends ready or busy signal.

3 If busy, Computer X waits and then resends the connection request to Computer Y.

4 ……………

5 ……………

6 ……………

7 ……………   [3]

(c) (i) Protocols are essential for successful transmission of data over a network. The TCP/IP protocol suite operates on many layers.

State the appropriate layer for each protocol in the following table.

Protocol	Layer
TCP	
IP	
SMTP	

[3]

(ii) Peer-to-peer (P2P) file sharing uses the BitTorrent protocol.   Explain how the BitTorrent protocol allows files to be shared.

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....
....
....[3]

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Answers

Question	Answer	Marks
3(a)(i)	**1** mark per bullet, max **1** benefit, max **1** drawback Benefits ☐ Signals only go to destination//secure ☐ Easy to connect/remove nodes or devices/trouble shoot. ☐ Centralised management helps in monitoring the network. ☐ Failure of one node or link doesn't affect the rest of network. ☐ Performance does not degenerate under load ☐ Connections may use different protocols ☐ Fewer collisions Drawbacks ☐ If central device fails then whole network goes down. ☐ Performance is dependent on capacity of central device.	2
3(a)(ii)	**1** mark per bullet, max **1** benefit, max **1** drawback Benefits ☐ Easier to set-up/extend. ☐ Less cable required Drawbacks ☐ If the main cable breaks, network performance badly degraded. ☐ Difficult to detect and troubleshoot fault at an individual station. ☐ Efficiency reduces as the number of devices connected to it increases. ☐ Collisions // not suitable for networks with heavy traffic. ☐ Security is lower (because several computers receive the sent signal from the source.)	2

Question	Answer	Marks
3(b)	1 mark for each correct pair of letters in the right order max 3	3

1	Computer X sends a connection request to Computer Y.
2	Computer Y sends ready or busy signal.
3	If busy, Computer X waits and then resends the connection request to Computer Y.
4	D
5	A
6	C
7	B

Question	Answer	Marks
3(c)(i)	1 mark for each layer	3

Protocol	Layer
TCP	Transport
IP	Internet/Network
SMTP	Application

Question	Answer	Marks
3(c)(ii)	Any **three** points from: ☐ BitTorrent client software made available ☐ One computer must keep a complete copy of the torrent/file to be shared ☐ Torrent/file is split into small pieces ☐ A computer joins (a swarm) by using the BitTorrent software to load a torrent descriptor file ☐ The computer can now download a piece of the file ☐ Once a computer has a piece it can become a seed and upload (to other members of the swarm) ☐ Pieces of the torrent are both downloaded and uploaded (by each member of the of the swarm) ☐ A server called a tracker keeps records of all the computers in the swarm ☐ The tracker shares their IP addresses allowing them to connect to each other	3