

Communication And Network

Question 1

- 3 A mobile phone company uses circuit switching for voice calls and packet switching to send and receive other data.

- (a) (i) Describe circuit switching.

→ a dedicated ~~fix~~ circuit established at the start of the connection
→ the circuit last for the duration of the call
→ b/w two end points (Sender / Receiver)
→ ends after the call ends

[3]

- (ii) Explain why the company uses circuit switching for voice calls.

no delay, secured | dedicated line , data arrives in the order it was send ~~& with~~

[2]

- (b) (i) Describe packet switching.

→ Data is divided into smaller data packets. contains address/sequence / packet info. Data packets received out of order (not in).
→ different routes (from node to node)

[3]

- (ii) Explain why the company uses packet switching to send and receive other data.

→ data is not required ~~in~~ in real time (asynchronous)
→ doesn't matter if the data arrives out of order
→ lower bandwidth → as no dedicated lines

[2]

Question 2

3 The use of the TCP/IP protocol suite is essential for successful communication over the Internet.

(a) (i) Describe the TCP/IP protocol suite.

A layered model with 4 layers
Include → Application Layer → Transport Layer
Network Layer
Data Link Layer
It is a set of rules for transmission of data

[5]

(ii) A group of over 100 students has produced a movie. The size of the movie file is very large.

P2P -
Protocol - BitTorrent

The students would like to use peer-to-peer file sharing to share this file with friends and family.

Identify the most appropriate TCP/IP protocol for sharing this file over the Internet and describe the way this protocol works.

Protocol ... BitTorrent

Description ... A seed uploads a file which is split into smaller bits

a torrent file is used to track these files.
a user can join a swarm and download those bits. Once the file is completely downloaded it can become a seed as well

[5]

- (b) (i) Files shared over the Internet are sent using packet switching or circuit switching methods.

Identify and describe the **most suitable** method for the large movie file from part (a)(ii).

Method Packet Switching

Description → no real-time data transmission required.

lower bandwidth, → no dedicated channels.

Packet Switching is a form of buffering where a file is split into packets at source (according to the theory of the route), passed to node allowing for the data to be received in a jumbled order.

[4]

- (ii) State **one** benefit and **one** drawback of the method you identified in part (b)(i).

Benefit low bandwidth (buffering)

Drawback data can only be carried once all the packets are ready if it's not in order / delayed

[2]

Question 3

- 3 The use of protocols is essential for successful communication between computers.

- (a) Define the term **communication protocol**.

A set of rules defined b/w receiver & sender to allow for data transfer

[2]

- (b) Identify two protocols that are used in the transfer of emails **and** state the purpose of each protocol.

Protocol 1 SMTP

Purpose used to transfer email address

Protocol 2 POP3

Purpose used to download emails

[4]

- (c) Manav and Miora want to have a video conversation over the Internet using a dedicated connection.

- (i) Identify **and** describe the switching method used to implement this connection.

Method Circuit Switched
Description A dedicated circuit will be established at the start of the call & would last the duration of the call and released once the call ends. Realtime data transfer no delay.

[3]

- (ii) State **one** benefit and **one** drawback of the method you identified in part (c)(i).

Benefit Red bin date transfer no delay.
Drawback It needs a dedicated bandwidth, high bandwidth required.

[2]

Question 4

- 2 Packet switching can be used to transmit data across the Internet.

Packet switching is not always the most appropriate method of transferring data.

- (a) Name an alternative method of transferring data across the Internet.

Circuit Switching [1]

- (b) Give an example of a situation where the method you identified in part (a) is more appropriate.

Justify your choice.

Example Real time Video conference

Justification → data transfer at set time
guaranteed latency | no delays

[3]

Question 5

a set of standards
of transmission of
data

- 3 Protocols are essential for communication between computers.

- (a) Explain why protocols are essential for communication between computers.

They are a sets of rules that allow end users (receivers and senders) from different platforms to transmit data b/w each other

[2]

Question 6

- 7 (a) Identify the four layers of the TCP/IP protocol suite.

- 1 Application Layer
- 2 Transport Layer
- 3 Network Layer
- 4 Data Link Layer

[4]

- (b) The TCP/IP protocol suite is responsible for transmitting data across the Internet using packet switching.

- (i) Explain why packet switching is used when sending data across the Internet.

As it allows packets to be sent from different ports (alt routes). Low bandwidth (no direct connection)
→ is more secure / robust.

[2]

- (ii) Each packet requires a header.

Describe the purpose of a packet header.

It carries the port number of the application +
the serial no. of the packet to help with the reconnection
of the data
→ contains receiver / sender address

[2]

- (iii) Identify **three** items that should be contained in a packet header.

Item 1 *Port No.*

Item 2 *Seq No. of the packet*

Item 3 *Sender / Recv route / depth info*

[3]

Question 7

- (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 *D*
- 5 *A*
- 6 *C*
- 7 *B*

✓ [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	<i>Transport</i>
IP	<i>Network / Internet</i>
SMTP	<i>Application Layer</i>

[3]

- (ii) Peer-to-peer (P2P) file sharing uses the BitTorrent protocol.

Explain how the BitTorrent protocol allows files to be shared.

a file is uploaded by a seed
file split into small bits. A user can download and
download others bits. Once the file is desired
he ~~then~~ becomes a peer to upload his.
Then his are taken by the tracker servers.

[3]

Question 8

- 4 The TCP/IP protocol suite is used on the Internet.

- (a) The table has statements about transmitting data across the Internet.

Put a tick (✓) in each row to identify whether the responsibility belongs to TCP or IP.

Responsibility	TCP	IP
Correct routing		
Host to host communication		
Communication between networks		
Retransmitting missing packets		
Reassembling packets into the correct order		

[5]

- (b) Identify **two** other internet protocols. State a use for each protocol.

Protocol 1

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Use

.....

Protocol 2

.....

Use

.....

[4]

- (c) State the name of the TCP/IP layer that uses IP addresses.

..... [1]

- (d) Emails are transmitted across the Internet using packet switching and routing tables.

- (i) Give **four** items of data in an IP data packet.

1

2

3

4

[4]

- (ii) Describe **two** benefits of using packet switching.

Benefit 1

.....

.....

.....

Benefit 2

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[4]

- (iii) Give **two** items of data stored in a routing table.

1

2

[2]

Question 9

(b) The network uses the TCP/IP protocol to transfer files across the network.

(i) State **three** functions of the **TCP** part of this protocol.

1

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2

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3

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[3]

(ii) State **two** functions of the **IP** part of this protocol.

1

2

[2]

(iii) Identify **one** other common protocol that could be used to transfer files across the college network.

.....[1]

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

Give an appropriate protocol for each layer in the table.

Layer	Protocol
Application	
Transport	
Internet	

[3]

- (d) The TCP/IP protocol is used to send an email message from one node on a LAN to a node on a different LAN.

State the steps that take place when the email message is sent and received.

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[4]

Question 10

- (b) (i) Describe what is meant by **circuit switching**.

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[2]

- (ii) The table shows statements that relate to circuit switching, packet switching or both.

Tick (**✓**) **one or more** boxes in each row to show whether the statement applies to circuit switching, packet switching or both.

Statements	Circuit switching	Packet switching
Shares bandwidth		
Data may arrive out of order		
Data can be corrupted		
Data are less likely to get lost		

[4]

Question 11

- 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

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[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).

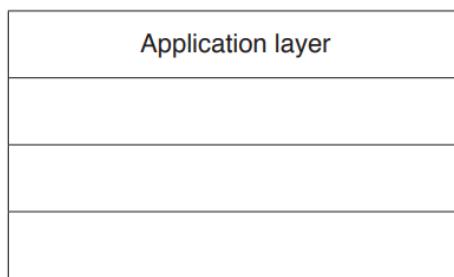
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[3]

Question 12

- 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.



[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

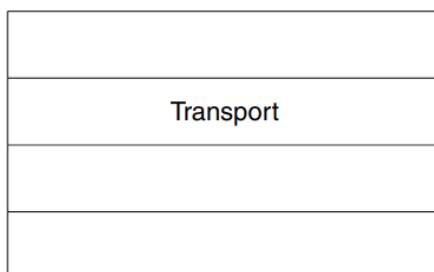
Example

[4]

Question 13

- 5 The TCP/IP protocol suite can be viewed as a stack with four layers.

- (a) (i) Complete the stack by inserting the names of the three missing layers.



[3]

- (ii) State how each layer of the stack is implemented.

..... [1]

- (b) A computer is currently running two processes:

- Process 1 is downloading a web page.
- Process 2 is downloading an email.

- (i) Describe **two** tasks that the Transport layer performs to ensure that the incoming data is downloaded correctly.

1

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2

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[4]

(ii) Name a protocol that will be used by Process 1.

..... [1]

(iii) Name a protocol that will be used by Process 2.

..... [1]

Question 14

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	HTTP
email is transferred from one email server to another email server	POP3
email client sends email to email server	SMTP
browser sends a request for a web page to a web server	

[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

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[2]

(ii) Seed

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[2]

(iii) Swarm

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.....

[2]

Question 15

(b) A user downloads a file using the FTP protocol.

Explain the function played by each of the following:

(i) Server

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[2]

(ii) Command

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.....

[2]

(iii) Anonymous

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[2]

Question 16

3 An email is sent from one email server to another using packet switching.

(a) State **two items** that are contained in an email packet apart from the data.

1

2 [2]

(b) Explain the role of routers in sending an email from one email server to another.

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[3]

(c) Sending an email message is an appropriate use of packet switching.

Explain why this is the case.

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[2]

(d) Packet switching is not always an appropriate solution.

Name an alternative communication method of transferring data in a digital network.

..... [1]

(e) Name an application for which the method identified in **part (d)** is an appropriate solution.
Justify your choice.

Application

Justification

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[3]

Question 17

- 3 (a)** Explain what is meant by circuit switching.

[2]

.[2]

- (b)** There are many applications in which digital data are transferred across a network. Video conferencing is one of these.

For this application, circuit switching is preferable to the use of packet switching.

Explain why this is so.

[6]

.. [6]

- (c) A web page is transferred from a web server to a home computer using the Internet.

Explain how the web page is transferred using packet switching.

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..[3]