Total No. of Questions – [4]

Total No. of Printed Pages: 14

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OCTOBER 2019/ INSEM (T1)

T. Y. B. TECH. (COMPUTER ENGINEERING/INFORMATION TECHNOLOGY)

(SEMESTER -I)

COURSE NAME: COMPUTER NETWORKS

COURSE CODE: CSUA31171/ITUA31171

(PATTERN 2017)

SOLUTION

Time: [**1 Hour**]

[Max. Marks: **30**]

(*) Instructions to candidates:

1) **Answer Q.1 OR Q.2 and Q.3 OR Q.4.**
2) **Figures to the right indicate full marks.**
3) **Use of scientific calculator is allowed**
4) **Use suitable data where ever required**

Q.1) a Discuss the term Internet. Differentiate between LAN, MAN and WAN. [6]

MS:

Internet Definitions: 2 Marks

Differentiate between LAN, MAN and WAN: 4 Marks

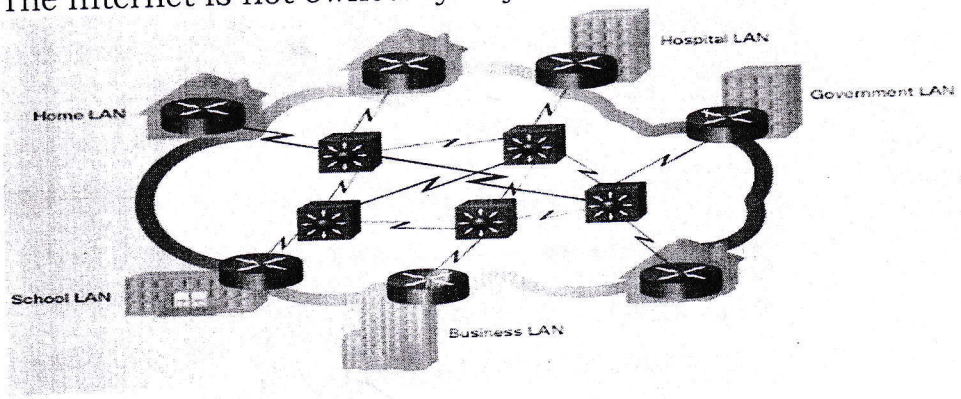
Ans:

The Internet is a worldwide collection of interconnected LANs and WANs.

LANs are connected to each other using WANs.

WANs are then connected to each other using copper wires, fiber optic cables, and wireless transmissions.

The Internet is not owned by any individual or group(IETF)



	group of computers in a small geographical area.	large region such as cities, towns.	connects countries together. Example Internet.
Ownership of Network	Private	Private or Public	Private or Public
Design and maintenance	Easy	Difficult	Difficult
Speed	High	Moderate	Low
Fault Tolerance	More Tolerant	Less Tolerant	Less Tolerant
Congestion	Less	More	More
Used for	College, School, Hospital.	Small towns, City.	Country/Continent
Allows	Single pair of devices to communicate.	Multiple computers can simultaneously interact.	A huge group of computers communicate at the same time.

b Explain the concept of addressing with following addressing schemes [6]
i. Physical address
ii. Logical address
iii. Port address

MS:

Each addressing scheme: 2 Marks each

Logical Address: An IP address of the system is called logical address. This address is the combination of Net ID and Host ID. This address is used by network layer to identify a particular network (source to destination) among the networks. This address can be changed by changing the host position on the network. So it is called logical address.

Physical address: Each system having a NIC(Network Interface Card) through which two systems physically connected with each other with cables. The address of the NIC is called Physical address or mac address. This is specified by the manufacturer company of the card. This address is used by data link layer.

Port Address: There are many application running on the computer.

Each application run with a port no.(logically) on the computer. This port no. for application is decided by the Kernal of the OS. This port no. is called port address.

c What is message timing? Mention the various message delivery options. [4]

MS:

Message Timing definitions: 2 Marks

Message delivery options: 2 Marks

Ans:

Message timing

i.Access Method

Hosts on a network need to know when to begin sending messages and how to respond when collisions occur.

ii.Flow Control

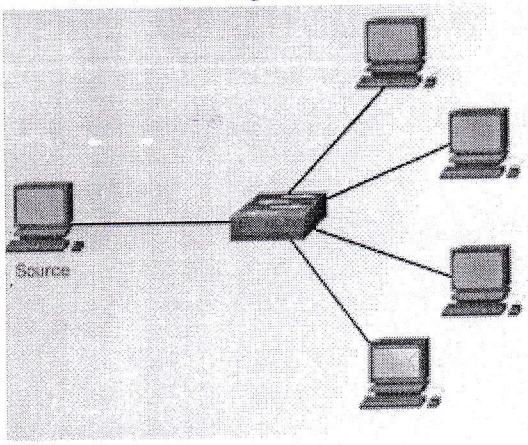
Source and destination hosts use flow control to negotiate correct timing to avoid overwhelming the destination and ensure information is received.

ii.Response Timeout

Hosts on the network have rules that specify how long to wait for responses and what action to take if a response timeout occurs.

Message Delivery Options

i.Unicast Message :

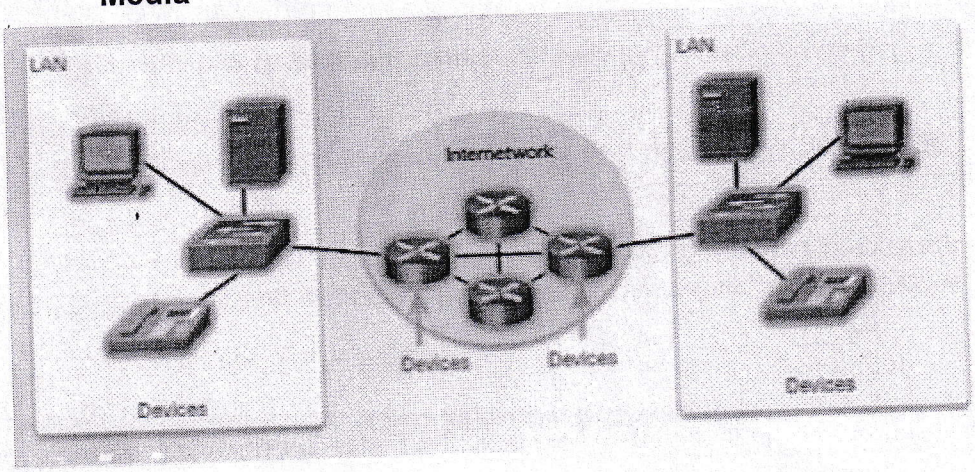


One-to-one delivery

ii.Multicast Message

components:

Devices
Media



1.Devices :

End Devices

An end device is where a message originates from or where it is received.

Data originates with an end device, flows through the network, and arrives at an end device

Intermediary Network Devices

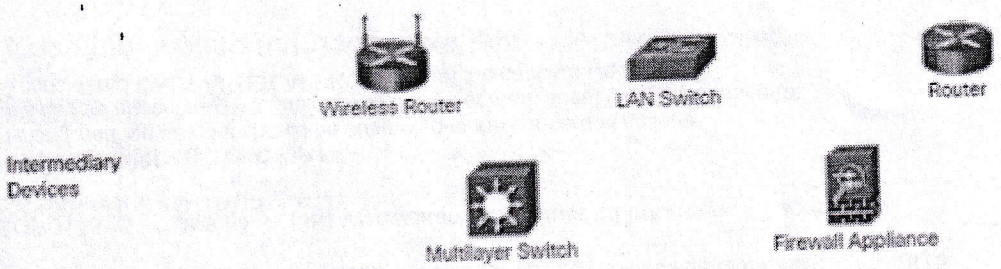
An intermediary device interconnects end devices in a network. Examples include: switches, wireless access points, routers, and firewalls.

The management of data as it flows through a network is also the role of an intermediary device including:

•Regenerate and retransmit data signals.

•Maintain information about what pathways exist through the network and internetwork.

•Notify other devices of errors and communication failures.



2.Network Media

Communication across a network is carried through a medium which

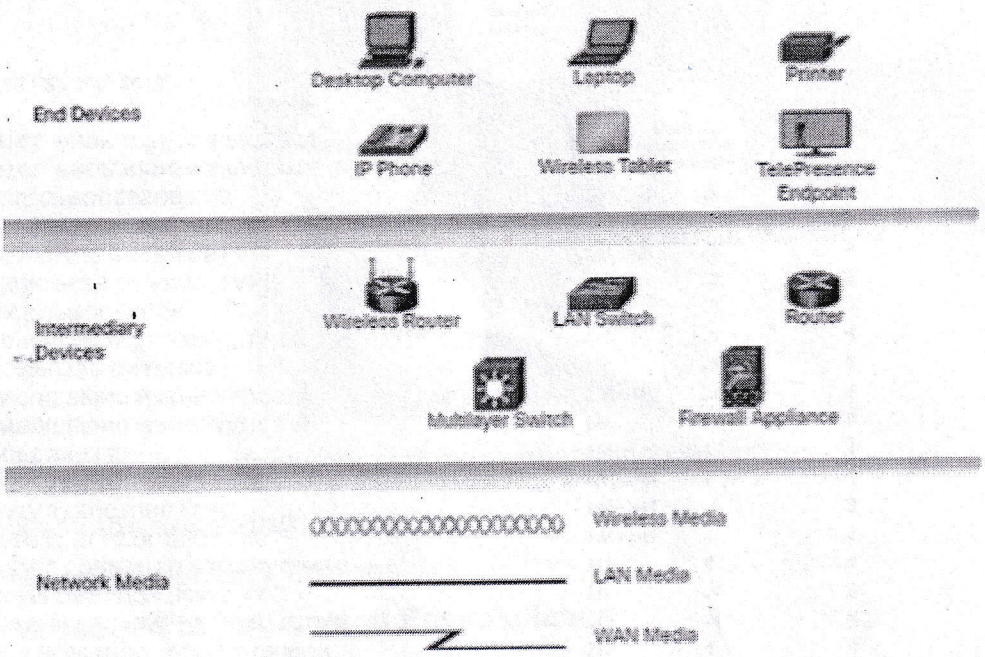
allows a message to travel from source to destination.

Networks typically use three types of media:

•Metallic wires within cables, such as copper

•Glass, such as fiber optic cables

•Wireless transmission



b Explain the process of rule establishment during communication. How rules or protocols ensure the message to be successfully delivered and understood at destination. [6]

MS:

Process of rule establishment: 3 Marks

Rules or protocols workings: 3 Marks

Ans:

Process of rule establishment

All communication methods have three elements in common:

•Source or sender

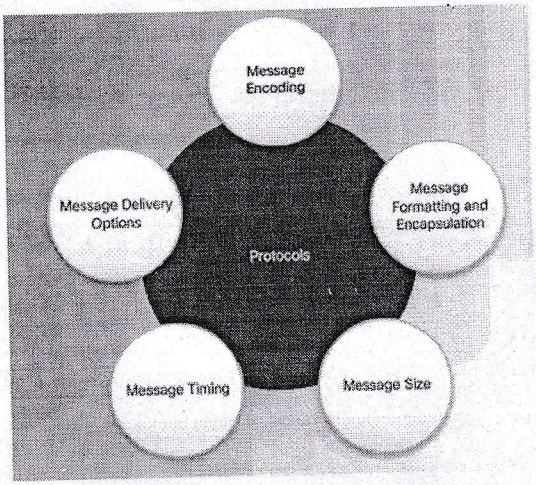
•Destination or receiver

•Channel or media

Rules or protocols govern all methods of communication.

Protocols are necessary for effective communication and include:

- **An identified sender and receiver**
- **Common language and grammar**
- **Speed and timing of delivery**
- **Confirmation or acknowledgment requirements**



Protocols used in network communications also define:

- **Message encoding**
- **Message delivery options**
- **Message Formatting and Encapsulation**
- **Message Timing**
- **Message Size**

c Discuss the importance of following [4]

i. Message formatting
ii. Message encapsulation
iii. Message sizing
iv. Protocol Data Unit

MS:

Each importance point: 1 Marks

Ans :

i.Message formatting

There is an agreed format for letters and addressing letters which is required for proper delivery.

ii.Message encapsulation

Putting the letter into the addressed envelope is called encapsulation.Each computer message is encapsulated in a specific format called a frame, before it is sent over the network

A frame acts like an envelope providing destination address

and
source address

Destination (physical / hardware address)	Source (physical / hardware address)	Start Flag (start of message indicator)	Recipient (destination identifier)	Sender (source identifier)	Encapsulated Data (bits)	End of Frame (end of message indicator)
Frame Addressing		Encapsulated Message				

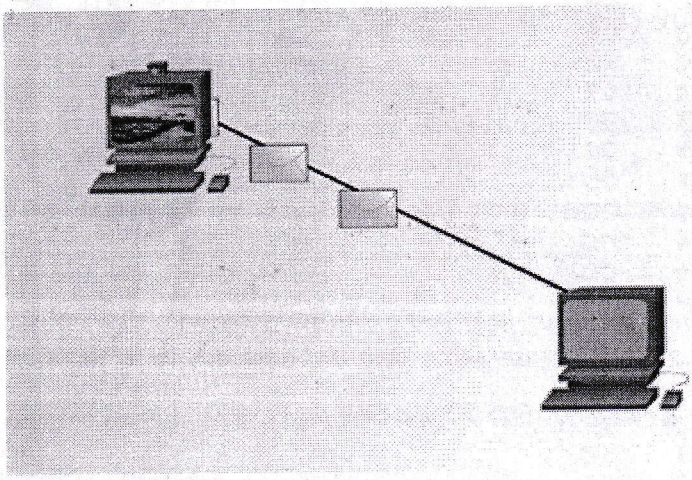
iii.Message sizing

Long messages must also be broken into smaller pieces to travel across a network.

•Each piece is sent in a separate frame.

•Each frame has its own addressing information.

•A receiving host will reconstruct multiple frames into the original message.



iv.Protocol Data Unit

a Protocol data unit (PDU) is a single unit of information transmitted among peer entities of a computer network.

A PDU is composed of protocol specific control information and user data the form that the data takes at each layer is known as a Protocol Data Unit (PDU).

•Data - application layer PDU
•Segment – Transport layer PDU
•Packet – Network layer PDU
•Frame – Data Link Layer PDU
• •Bits – Physical Layer PDU

Q.3) a Mention any three error detection techniques at data link layer with suitable example. [6]

MS:

Mentioning 3 error detection techniques: 3 Marks

Examples: 3 Marks

Ans :
Error Detection Techniques

There are three main techniques for detecting errors in frames:

Parity Check, Checksum and Cyclic Redundancy Check (CRC).

Parity Check

The parity check is done by adding an extra bit, called parity bit to the data to make a number of 1s either even in case of even parity or odd in case of odd parity.

While creating a frame, the sender counts the number of 1s in it and adds the parity bit in the following way

- In case of even parity: If a number of 1s is even then parity bit value is 0. If the number of 1s is odd then parity bit value is 1.
- In case of odd parity: If a number of 1s is odd then parity bit value is 0. If a number of 1s is even then parity bit value is 1.

On receiving a frame, the receiver counts the number of 1s in it. In case of even parity check, if the count of 1s is even, the frame is accepted, otherwise, it is rejected. A similar rule is adopted for odd parity check.

The parity check is suitable for single bit error detection only.

Checksum

In this error detection scheme, the following procedure is applied

- Data is divided into fixed sized frames or segments.
- The sender adds the segments using 1's complement arithmetic to get the sum. It then complements the sum to get the checksum and sends it along with the data frames.
- The receiver adds the incoming segments along with the checksum using 1's complement arithmetic to get the sum and then complements it.
- If the result is zero, the received frames are accepted; otherwise, they are discarded.

Cyclic Redundancy Check (CRC)

- Cyclic Redundancy Check (CRC) involves binary division of the data

bits being sent by a predetermined divisor agreed upon by the communicating system. The divisor is generated using polynomials.

- Here, the sender performs binary division of the data segment by the divisor. It then appends the remainder called CRC bits to the end of the data segment. This makes the resulting data unit exactly divisible by the divisor.
- The receiver divides the incoming data unit by the divisor. If there is no remainder, the data unit is assumed to be correct and is accepted. Otherwise, it is understood that the data is corrupted and is therefore rejected.

b Compare and contrast between OSI and TCP/IP model. [4]

MS:

Compare and contrast each point 1 Marks: 1*4= 4 Marks

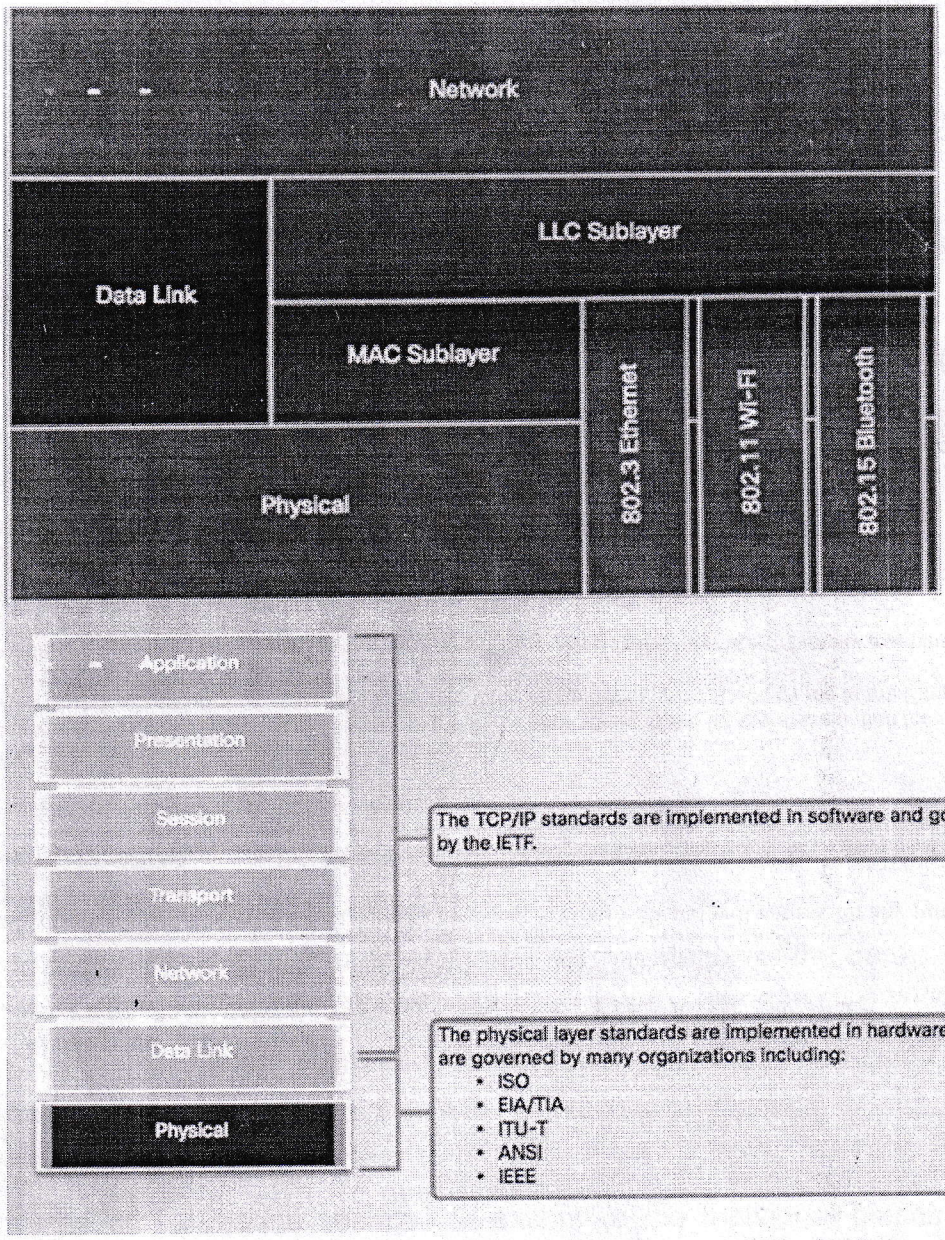
BASIS FOR COMPARISON	TCP/IP MODEL	OSI MODEL
Expands To	Transmission Control Protocol/ Internet Protocol	Open system Interconnect
Meaning	It is a client server model used for transmission of data over the internet.	It is a theoretical model which is used for computing system.
Number Of Layers	4 Layers	7 Layers
Developed by	Department of Defense (DoD)	ISO (International Standard Organization)
Tangible	Yes	No
Usage	Mostly used	Never used
Obeys	Horizontal approach	Vertical approach

c Explain how physical layer and data link layer protocols and services support communication across data networks. [4]

MS:

Enlisting and writing each point: 1 Marks each

Ans :



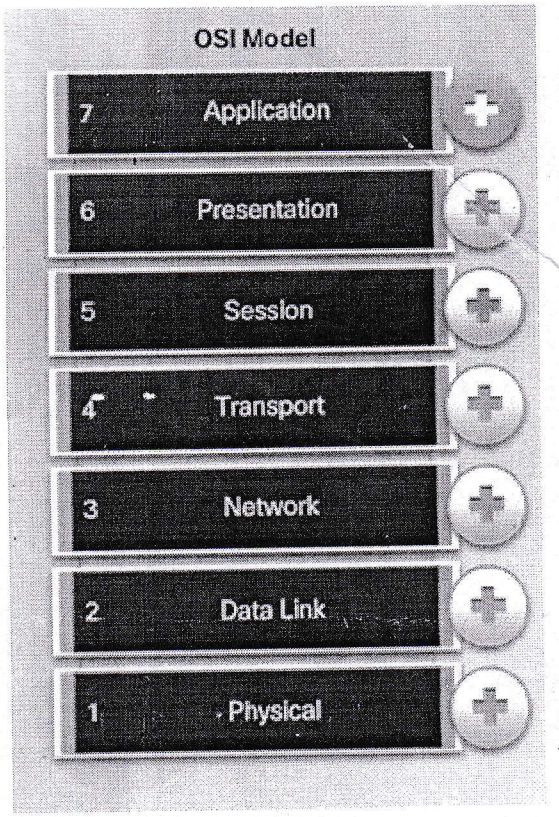
OR

Q.4) a Explain the OSI model for communication. What are the benefits of using layered model? [6]

MS:

Explanation OSI model: 3 Marks

Benefits: 3 Marks



Application - contains protocols used for process-to-process communications.

Presentation - provides for common representation of the data.

Session - provides services to the presentation layer to organize its dialogue and to manage data exchange.

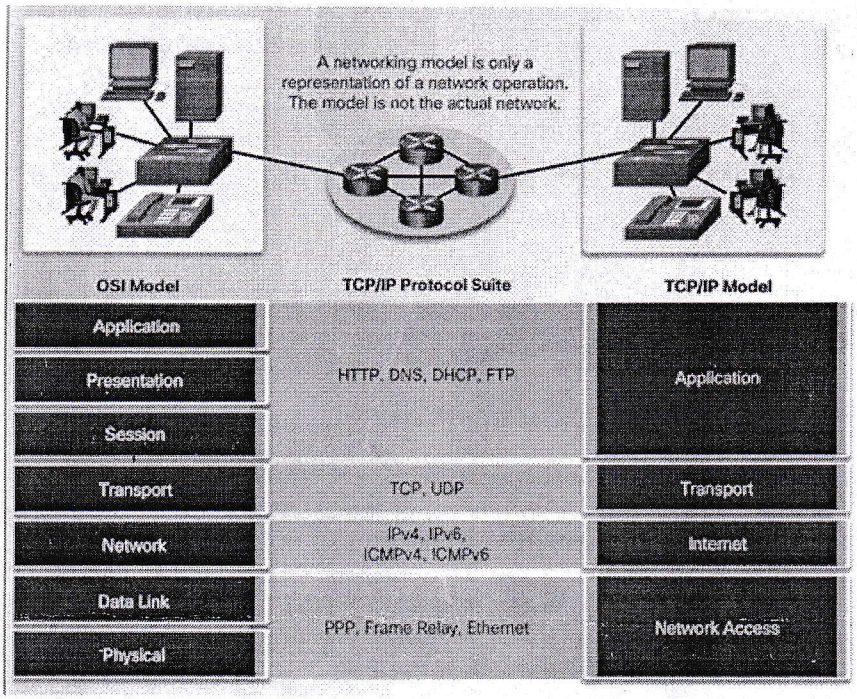
Transport - defines services to segment, transfer, and reassemble the data.

Network - provides services to exchange the individual pieces of data over the network between identified end devices.

Data Link - provides methods for exchanging data frames between devices over a common media.

Physical - describes the mechanical, electrical, functional, and procedural means to transmit bits across physical connections.

The Benefits of Using a Layered Model



The benefits of using a layered model include:

•Assisting in protocol design since protocols at each layer have defined functions.

•Fostering competition because products from different vendors can work together.

•Preventing technology changes in one layer from affecting other layers.

•Providing a common language to describe networking functions and capabilities.

b Differentiate between fast Ethernet and gigabit Ethernet. [4]

MS:

Differentiation each point 1 Mark.

Comparison Chart

BASIS FOR COMPARISON	FAST ETHERNET	GIGABIT ETHERNET
Basic	Offers 100 Mbps speed.	Provide 1 Gbps speed.
Delay	Generate more delay.	Less comparatively.
Configuration	Simple	Complicated and create more errors.
Coverage	Can cover distance up to 10 km.	Has the limit of 70 km.
Relation	Successor of 10-Base-T Ethernet.	A successor of fast Ethernet.
Round trip delay	100-500 bit times	4000 bit times

c Discuss various media access control techniques. [4]

MS:

Mentioning 1 mark for each point

Ans :

Media access control is the equivalent of traffic rules that regulate the entrance of motor vehicles onto a roadway.

The absence of any media access control would be the equivalent of vehicles ignoring all other traffic and entering the road without regard to the other vehicles.

However, not all roads and entrances are the same. Traffic can enter the road by merging, by waiting for its turn at a stop sign, or by obeying signal lights. A driver follows a different set of rules for each type of entrance.

Four main media access control methods :

- **Carrier Sense Multiple Access with Collision Detection (CSMA/CD), which is used in Ethernet networking**
- **Carrier Sense Multiple Access with Collision Avoidance (CSMA/CA), which is used in AppleTalk networking**
- **Token passing, which is used in Token Ring and Fiber Distributed Data Interface (FDDI) networking**
- **Demand priority, which is used in 100BaseVG networking**