

## Assignment - 1

**Q-1** What is Computer Network?

**Ans-1** Computer Network is a system in which multiple computers are connected to each other to share information and resources.

**Q-2** What are Advantages of C.N.?

**Ans-2** The advantages of CN is given below:-

- |                          |                              |
|--------------------------|------------------------------|
| 1. File Sharing          | 5. Internet Access           |
| 2. Flexible Access       | 6. Inexpensive System        |
| 3. Entertainment         | 7. Instant & Multiple Access |
| 4. Better Communication. | 8. Resource Sharing          |

**Q-3** What are the application of CN?

**Ans-3** The applications of computer networking are given below:-

1. Email Services
2. Teleconferencing
3. Business & Finance
4. File & Directory Services

**Q-4** What are types of CN?

**Ans-4** Computer networks can be categorized by their size as well as their purpose.

- The size of a network can be expressed by the geographic area.

- Some of the different networks are :-

- ① Local Area Network (LAN) :- It's a computer network that interconnects computers within limited area.
- ② Metropolitan Area Network (MAN) :- It's a computer network that interconnects with metropolitan area like city.
  - It is also used to interconnection of several local area network.
- ③ Wide Area Network :- It's a computer network that exists over a large-scale geographical area.
  - A WAN connects different network, including LAN and MAN

## Q-5 What is Internet ?

An-5 Internet is a type of world-wide computer network.

- Internet is a collection of infinite numbers of connected computers that are spread across the world.

## Q-6 What is Protocol ?

An-6 Protocol is define format, order of message that sent and received among network entities, and action taken on message transmission and reception.

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**Q-7 What is Network Edge?**

Ans-7 Computers and other devices are connected at the edge of the network.

- These computers are known as hosts or end systems.  
Router is known as edge router.

**Q-8 What is Network core?**

Ans-8 It defines the connection of different network segments together and process to transmit data packets across the network.

(It is implemented through the use of switching techniques)

① Circuit Switched Network :- Dedicated path between source and destination.

- All packets use same path.
- Reserve the entire bandwidth in adv.
- Bandwidth wastage.
- No store and forward transmission.

② Packet Switching :- No dedicated path.

- Packets travel independently
- Does not reserve bandwidth
- No bandwidth wastage
- Supports store and forward transmission

**Q-9 What is transmission Media, and its types of transmission media? Explain with details.**

Ans-9 A transmission media can be defined as any medium that can carry information from a source to a destination.

⇒ Guided Media = It provides a wired-channel from one device to another.

① Twisted Pair Cable → A physical media made up of a pair of cable twisted with each other.

→ Cheap

→ Installation is easy, it is lightweight cable, frequency = 0 to 3.5 kHz.

→ It consists of two insulated copper wires arranged in regular spiral.

→ Increase the number of turns per foot decreases noise interference.

→ Separately Insulated

→ The use of two wires twisted together helps to reduce crosstalk and electromagnetic induction.

→ Two types of Twisted cable → UTP (Unshielded Twisted Pair)

↳ STP (Shielded Twisted Pair)

UTP = Widely used in telecommunication.

↳ Ordinary telephone wires

↳ Weak immunity against noise & interference.

ADS → Cheap, Installation is easy, used for high-speed LAN

BIS → This cable can be used for shorter distance because of attenuation.

STP = It's a cable that contains the mesh surrounding the wire that allows higher transmission rate → easy installation, high attenuation  
↳ Higher capacity, used exterior

② Coaxial Cables → Outer conductor is braided shield, Inner conductor is solid metal, separated by insulating material, and whole covered by plastic cover, middle core is responsible for data transmission whose copper mesh prevents from EMI (Electromagnetic Interference)

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- Used in television, long distance telephone transmission.
- It has excellent noise immunity.
- It has higher frequency.

Types → Baseband transmission = Transmission single signal at high speed.  
 → Broadband transmission = multiple signals simultaneously.

ADS → high speed data transfer, better shielding, higher bandwidth.

DIS → More expensive, fault occurs failure of entire network.

③ Fiber Optic Cable → Made of glass and transmits signals in the form of light.

- Core surrounded by a cladding of less dense glass.
- Optic fiber uses reflection to guide light through a channel.
- Faster data transmission than copper wire.
- Covers longer distance
- Small size & weight
- Better Reliability
- Used in high bandwidth network.
- High data rate and lower attenuation.

⇒ Unguided Media = It transmits the electromagnetic waves without using any physical medium. (wireless transmission).

① Radio Wave → Emv transmitted in all the direction of free space. (omnidirectional)

- Signals propagates in all directions.
- Range of frequencies of radio waves from 3 khz to 1 khz
- Sending and receiving antenna are not aligned.
- The wave sent by the sending antenna can be received by any receiving antenna.
- Eg:- FM radio.

App. → Radio waves is used for multicasting (one sender many receiver)  
e.g.: - FM radio, television, cordless phones.

ADS → Mainly used for wide area network and mobile cellular phone.  
→ Cover large area, penetrate the walls.  
→ Provides higher transmission rate.

② Micro wave → Use directional antennas (point to point line of sight communication)  
→ Used for unicast communication such as cellular telephone.  
→ Higher frequency ranges can't efficiently penetrate walls.  
→ Frequency Range: 1GHz - 30 GHz  
    ↳ Terrestrial microwave is from 4-6 GHz to 21-23 GHz  
→ Bandwidth = 100 to mbps.  
→ Inexpensive short distance.  
→ Attenuation = means loss of signal. (Affected by antenna size)

ADS → Cheaper than using cables (Communication in ocean can be achieved)  
    ↳ It's free from land acquisition  
    ↳ Provides easy communication, installation is difficult.

DJS → Eavesdropping = Insecure Communication.  
    ↳ Out of phase signal = Signal can be moved out of phase  
    ↳ Susceptible to weather condition = Wind can distort the signal.  
    ↳ Bandwidth limited = Allocation of bandwidth is limited in the case of microwave transmission

Types of microwave transmission → Satellite microwave communication  
    ↓  
    ↳ A physical object that revolves

① Terrestrial microwave transmission.

- It transmits the focused beam of a radio signal from one ground-based microwave transmission antenna to another.
- Unidirectional and sending and receiving antenna is to be aligned.
- It works on the line of sight transmission.
- It is mounted on the towers over the direct sight of each other.

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③ Infrared Wave → Wireless technology for communicating under short ranges.

- Frequency = 300 - 400 GHz to THz
- Used for short-range communication.
- Can't penetrate the walls.
- It provides better security with minimum interference.
- Communication is unreliable outside the building because the sun rays will interfere with the infrared waves.

Q-10 What is Network Topology & Types with details.

Ans-10 Network topology is the arrangement of the various components (link, nodes, etc.) of a computer network.

Types :- ① Bus Topology = Every computer and network device is connected to single cable.

cost = Average

Used in = Small networks.

Troubleshoot = Easy, if cable fails the whole network fails.

② Ring Topology = Each computer is connected to each other, with last one connected to the first.

cost = Cheap

Used in = Expanded Network.

Troubleshoot = Difficult, failure of one = failure of whole network.

③ Star Topology = All computers are connected to a single hub through a cable.

Cost = High

Used in = Small Network.

Troubleshoot = Easy, If hub fails = whole network down.

④ Mesh Topology = All network nodes are connected to each other.

Cost = High

Used in = Expanded Network

Troubleshoot = Difficult ; Installation and Configuration

⑤ Tree Topology = It has a root node and all other nodes are connected to it forming hierarchy.

Cost = High

Used in = Expanded Network

Troubleshoot = Easy ; Central root hub fails = network fails.

Q-11 What is Protocol Layers ? Explain OSI model.

Ans-11 To deal with connecting systems that are open for communication with other system.

OSI (Open Systems Interconnection)

• Developed by the International Standards Organization (ISO) with 7 different layers.

① Application → To allow access to network resource.

② Presentation → To translate, encrypt and compress data.

③ Session → To establish, manage and terminate sessions.

④ Transport → To provide reliable proc-to-proc message delivery

⑤ Network → To move packets from source to destination, internet working

⑥ Data link → To organize bits into frames, hop-to-hop delivery.

⑦ Physical → To transmit bits over a medium, mechanical & electrical specification.

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Q-1a Explain TCP/IP layers.

An-1a TCP/IP [Transmission Control Protocol / Internet Protocol]

- It is a set of protocols developed to allow cooperating computers to share resources across the network.
- It was originally defined as having 5 layers

- Application Layer
- Transport Layer
- Network Layer
- Data link Layer
- Physical Layer

OSI Model Layer	TCP/IP Arch. Layer	TCP/IP protocol suite					
Application L.							
Presentation L.	Application Layer	Telnet	FTP	SMTP		DNS	RIP
Session L.							SNMP
Transport L.	Host-to-Host L.	Tcp				UDP	
Network L.	Internet L.				IP		
Data-link L.							
Physical L.	Network Interface L.	Ethernet	TOKEN Ring	Frame Relay			ATM

Q-13 Difference between OSI model & TCP/IP model.

OSI	TCP / IP
① It has 7 Layers	① It has 5 Layers
② It provides layer functioning and also defines functions of all the layers.	② It is based on protocols (not flexible with other layers)
③ Follows horizontal approach	③ Follows vertical approach.
④ It has separate presentation layer.	④ It does not have a SPL
⑤ It has a problem of fitting the protocols in the model	⑤ This model does not fit any protocol.

Q-14 What is Delay, Loss & Throughput.

Ans-14 Delay = As a packet travels from one node to the subsequent node along this path, the packet suffers from several types of delay at each node along the path.

$$d_{node} = d_{proc} + d_{queue} + d_{tran} + d_{prop}$$

$d_{node}$  = Total Delay

$d_{proc}$  = Processing Delay.

$d_{queue}$  = Queuing Delay

$d_{tran}$  = Transmission Delay

$d_{prop}$  = Propagation Delay.

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① Processing Delay = The time required to examine the packets header and determine where to direct the packet.

- To check bit level error.
- Determine output link.
- Delay in terms of microseconds.

② Queuing Delay = A time to wait at output link for transmission.

- Depends on congestion level of router.
- If queue is empty, then delay will be 0.
- If queue is full, then delay will be long.
- Delay in terms of micro sec to mili sec

③ Transmission Delay = An amount of time required for the router to transmit the packet.

- It is depending on packet Length ( $L$ ) and transmission rate ( $R$ ) of link.

④ Propagation Delay = A time required to propagate from the beginning of the link to router B.

- Depends on the length of physical medium ( $d$ ) link and propagation speed ( $s$ ) of link
- Delay in terms of millisecond.

$\Rightarrow$  Packet Loss = It is the failure of one or more transmitted packets to arrive at their destination.

- The loss of data packet depends on the switch queue/buffer.
- The loss ~~rate~~ of data packet increases with the increase in the traffic intensity.
- It affects the performance of the network.

⇒ Throughput = It is the rate of successful message delivery over a communication channel.

- It is measured in bits (data) per second (bit or bps)