1. TELECOMMUNICATIONS AND NETWORKS

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                        │  Telecommunication and Networks  │
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| Telecommunication network model components | Classification of Telecommunication Networks | Network Topologies | Digital Data Transmission | Network Architecture & Protocols |

| Based on Area of Coverage | Functional Based | Ownership based | Media Based |

| Network Computing | Network Security: Risks & Controls | Network Administration & Management | Internet Revolution and its applications |

| Intranet & Extranet | E – Commerce | M – Commerce | EFT |

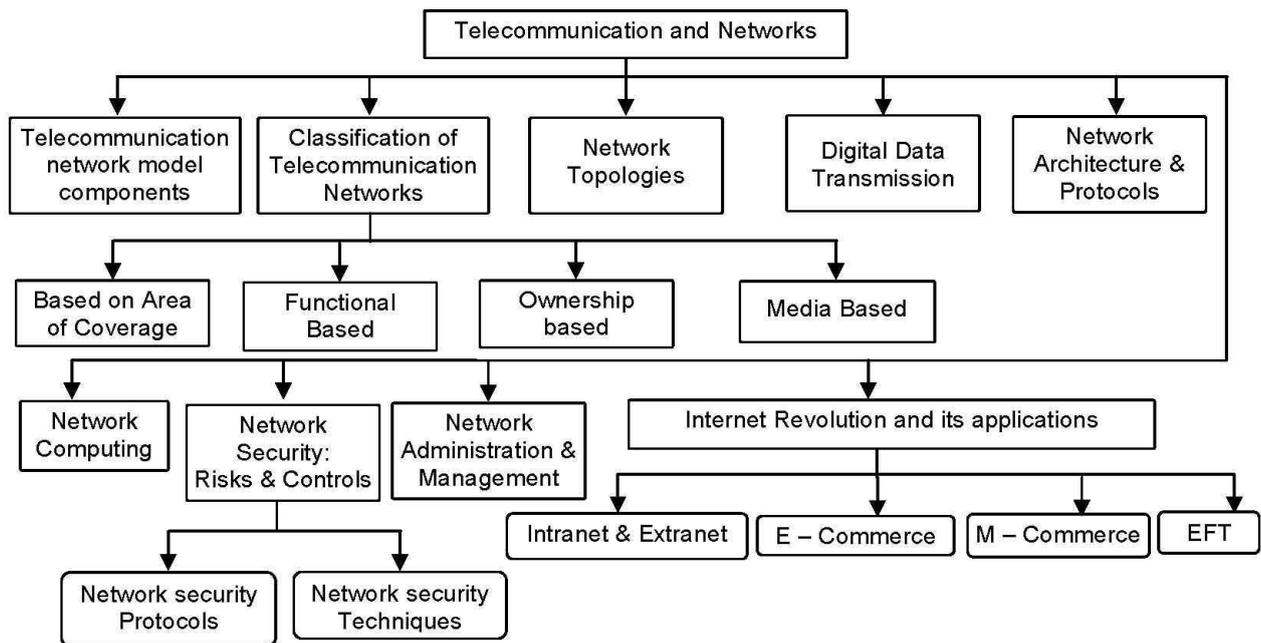| Network security Protocols | Network security Techniques |

Q.No.1. What is a Computer Network? Explain different types of networks? (C)

COMPUTER NETWORK: (M15RTP)

1. A computer network is a collection of computers and terminal devices connected together by a communication system.

2. The set of computers may include large-scale computers, medium scale computers, mini computers and micro computers.

3. *The set of terminals may include dumb terminals, intelligent terminals, workstations and miscellaneous devices such as telephone lines, printers, etc.*

PURPOSE OF NETWORKS:

1. It allows departments to share hardware devices,

2. It allows information to be shared,

3. It allows electronic transfer of text,

4. It allows decentralization of various data processing functions

5. It facilitates communication between organizations.

MOST COMMONLY FOUND NETWORKS:

Telecommunication networks can be classified on the basis of different factors like:

a) **Classification based on Area of Coverage:** LAN, WAN, MAN

b) **Functional Based Classification:** Client-Server, Peer-to-Peer

c) **Ownership-based Classification:** Public Network(internet), Private Network(intranet), Virtual Private Network(extranet)

d) **Media based Classification:** Guided and Unguided
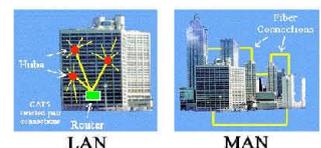
Q.No.2. Write short notes on need and scope of computer networks?   (or)   Describe the ways in which a computer network can help business?   (A)   (SAME: N16 – 2M)

Some of the advantages of a computer network in an organization:

a) <u>**File Sharing:**</u> It provides sharing and grouping of data files over the network

b) <u>**Resource Sharing:**</u> It provides sharing of computer resources such as hard disk, printers etc. by multiple users simultaneously to reduce the cost of installing and maintaining multiple resources in the organization.

c) <u>**Remote Access**</u>: Network allows users to remotely access the data and information from organization's network via Internet in cost effective manner.

d) <u>**Shared Databases:**</u> Network facilitates simultaneous access to the shared databases to multiple users at the same time by ensuring the integrity of the database.

e) <u>**Fault Tolerance:**</u> By using network, fault tolerance can be implemented as a defense against accidental data loss. Usually, primary and secondary line of <u>defense backups</u> the data in case of system failure. Additional measures can also be taken by attaching a server with uninterruptible power supply in case of power failure or backouts.

f) <u>**Internet Access and Security:**</u> It provides access to the Internet for transferring the document and to access the resources available on World Wide Web *by maintaining data security through firewall system in the organization's network.*

TOPIC 2: COMPONENTS OF TELECOMMUNICATION NETWORK MODEL

Q.No.3. Write short notes on telecommunication network model (Or) Components of telecommunication network model? (B)   (N16 RTP)
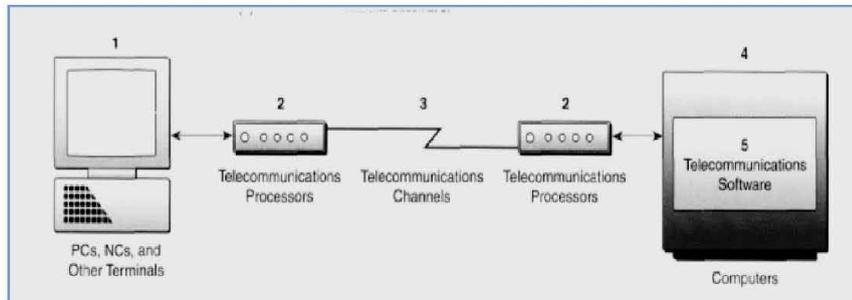
<u>**TELECOMMUNICATION NETWORK:**</u> A communication network is any arrangement where a sender transmits a message to a receiver over a communication channel consisting of some type of medium.

COMPONENTS: Telecommunication model consists of five basic categories of components:

1. <u>**Terminals:**</u> These are the <u>starting and stopping points</u> in any telecommunication network environment. Any input or output device that is used to transmit or receive data can be classified as a terminal component.

    a) Examples are Microcomputers, Office Equipment, Telephone and Transaction Terminals.

2. <u>**Telecommunications Processors:**</u>

    a) These <u>support data transmission and reception</u> between terminals and computers by providing a variety of control and support functions.

    b) Examples are NIC, MODEM, Multiplexer, Internet worked Processors, etc.

3. <u>**Telecommunications Media/Channels:**</u>

    a) These are the part of a network that connects the message source with the message receiver.

    b) It is a <u>path between the sender and the receiver</u> that carries the data in the form of signals. These are divided into two groups: Guided media and unguided media.

4. <u>**Computers:**</u>

    a) In a network, computers of all sizes and types are connected through media to perform their communication assignments.

    b) These include Host Computers (mainframes), Front-End Processors (minicomputers) and Network Servers (micro computers).

5. **Telecommunications Control Software:** (N16 MTP1 - 2M)

   a) It consists of programs <u>that control and manage</u> the functions of networks.

   b) It provides features such as performance monitoring, activity monitoring, priority assigning, transmission error correction and network problem mitigation.

Q.No.4. Write about Telecommunication processors in a detailed manner? (A)

TELECOMMUNICATION PROCESSORS: These support data transmission and reception between terminals and computers by providing a variety of control and support functions. They include:

1. **Network Interface Card (NIC):**

   a) It is a computer hardware component that connects a computer to a computer network.

   b) It has additional memory for <u>buffering(=storage area)</u> incoming and outgoing data packets, thus improving the network throughput.

2. **Modem:** It is a device that converts a digital computer signal into an analog signal (i.e. it <u>modulates</u> the signal) and converts an analog signal into a digital computer signal (i.e. it <u>demodulates</u> the signal) in a data communication system. **(M16 MTP1 - 1M)**

3. **Multiplexer:**   **(N14RTP, N14 MTP2 –1M)**

   a) It is a device that allows a single communications channel to carry simultaneous data transmissions from many terminals.

   b) Typically, a multiplexer merges the transmissions of several terminals at one end, while a similar unit separates the individual transmissions at the receiving end.
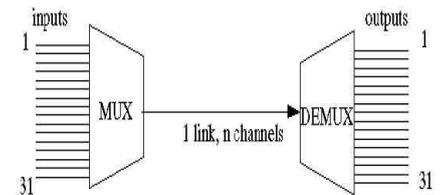
4. **Internetwork Processors:** Telecommunications networks are interconnected by special- purpose communications processors called internetwork processors such as: **(N14RTP, M15 MTP2 - 5M)**

   a) <u>Switch:</u> It is a device, which makes connections between telecommunications circuits in a network so that a message can reach its intended destination. **(N15 – 1M, M15RTP, N16 – 1M)**

   b) <u>Hub:</u> It is a <u>port-switching</u> device, allows for the sharing of the network resources such as servers, LAN workstations, printers, etc.

   c) <u>Repeater:</u> It is a device that boosts or <u>amplifies</u> the signal before passing it to the next section of cable in a network. **(N15 RTP, M15 MTP1 – 1M)**

   d) <u>Bridge:</u> It is a communication processor that connects numerous LANs. It <u>magnifies the data</u> transmission signal while passing data from one LAN to another. **(N16 – 1M)**

   e) <u>Router:</u> It is a communication processor that interconnects networks based on different rules or protocols, so that a message can be routed to its destination. **(N15 – 1M, N15 RTP)**

   f) <u>Gateway:</u> Gateway is a communication processor that connects networks that use <u>different communication architectures.</u>

> **Q.No.5. Write about different kinds of cables commonly used in LAN's (Or) What are the popular guided media available? (A)   (PM, N14RTP, N15 MTP1 – 2M)**

1. Communication medium is a <u>path</u> between the sender and the receiver that carries the data in the form of signals.

2. Communication media is divided into two groups:<u> Guided media and unguided media.</u>

<u>GUIDED MEDIA/ BOUND MEDIA:</u> Guided Transmission Media uses a "<u>cabling</u>" system that guides the data signals along a <u>specific path.</u>

1. <u>**Twisted – Pair cables:**</u>

   a) It is ordinary telephone wire, consisting of <u>copper wire twisted</u> into pairs.

   b) It is used for both <u>voice and data</u> transmissions.

   c) It is used extensively in home and office telephone systems.

   d) It is inexpensive and easy to install.

   e) The only disadvantage is susceptible to various types of <u>electrical interferences</u>.
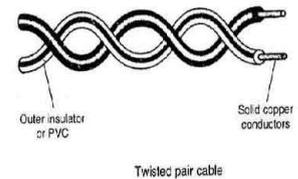
2. <u>**Coaxial Cable:**</u>

   a) This consists of <u>copper or aluminum</u> wire wrapped with spacers.

   b) It can carry a large volume of data.

   c) It provides <u>high-speed data</u> transmission used in metropolitan areas for cable TV systems, and for short-distance connection. It is used extensively in office buildings and other work sites for local area networks.

   d) The only disadvantage is that it is more expensive than twisted pair
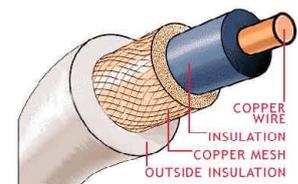
3. <u>**Fiber Optic Cables:**</u> This media consists of one or more <u>hair-thin filaments</u> of <u>glass fiber</u> wrapped in a protective jacket. Signals are converted to light form and fired by laser in bursts

   a) They can carry digital as well as analog signals in the <u>form of light</u> and provides increased speed and greater carrying capacity.

   b) Data is more <u>secure</u>.

   c) These are easy to install because they are smaller and more flexible.

   d) A biggest disadvantage it is expensive.

   e) <u>**Advantages of Fiber optics:**</u> (M17 – 2M)

      - <u>Reduced size</u> and installation effort

      - Greater <u>communication capacity</u>

      - <u>Faster</u> transmission speeds

      - <u>Freedom</u> from electrical interference
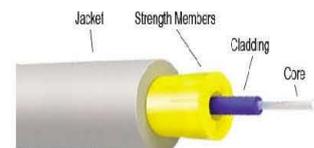
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> **Q.No.6. What are the popular unguided media available? (A)   (PM, N14 RTP)**

<u>UNGUIDED MEDIA:</u> Unguided Transmission Media or unbound media consists of a means for the data signals to travel but <u>nothing to guide</u> them along a specific path. The data signals are not bound to a cabling media.

Some of the common examples of unguided media are:

1. **Terrestrial Microwave:**

   a) Terrestrial microwave involves earthbound microwave systems, which transmit high-speed radio signals in a line-of-sight path between relay stations spaced approximately 30 miles apart.

   b) This media uses the atmosphere as the medium through which it transmits signals, in the form of <u>electromagnetic waves</u>.

   c) It is used extensively for high-volume as well as long-distance communication of both data and voice.

   d) Major disadvantage is that it cannot bend around the curvature of the earth.

2. **Radio Waves:**   **(M15 MTP2 – 1M)**

   a) These are an <u>invisible form</u> of electromagnetic radiation that varies in wavelength from around <u>1 millimeter to 1,00,000 kms.</u>

   b) These are the most commonly used in Wireless LAN.
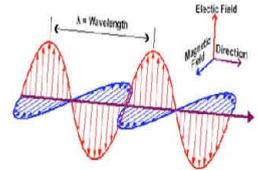
3. **Micro Waves: (M16RTP)**

   a) These are radio waves with wavelengths ranging from as long as 1 meter to as short as 1 millimeter and the frequencies between <u>300 MHz and 300 GHz</u>.

   b) These are used for communication, radar systems, radio astronomy, navigation and spectroscopy.
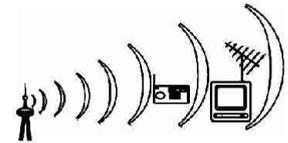
4. **Infrared Waves:**

   a) This used in industrial, scientific and medical applications.

   b) <u>Night-vision devices</u> using infrared illumination allow people or animals to be observed without the observer being detected.

5. **Communication Satellites:**   **(N16 RTP, M16 MTP2-1M)**

   a) Communication satellites use atmosphere as the medium through which it transmit signals.

   b) A satellite is some <u>solar-powered</u> electronic device that receives, amplifies, and retransmits signals.

   c) It acts as a <u>relay station</u> between satellite transmissions stations on the ground (earth stations).

   d) It is cost-effective method for moving large quantities of data over long distances.
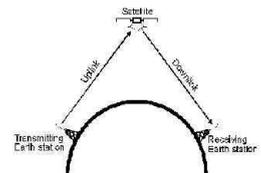
SIMILAR QUESTIONS:

1. Discuss transmission media in detail? (Hint: Answer 6 & 7 Question Answers)

TOPIC 4: NETWORK TOPOLOGIES

> **Q.No.7. What is meant by network topology? What are different topologies or structures available? (C)**

1. The <u>geometrical arrangement</u> of computer resources, remote devices, and communication facilities is known as network structure or network topology.

2. *In other words a network structure or topology determines <u>how one computer in the network can communicate</u> with other computers.*

3. Following are the most commonly used network topologies:

a) Mesh topology / Mesh form of Network.

b) Star topology / Star form of Network

c) Bus topology / Bus form of Network

d) Ring topology / Ring form of Network

Q.No.8. Write about Mesh form of Network? (OR) Which Network topology can be used in case of military installations with a very small number of nodes and why it should be used? List advantages and disadvantages? (M13 – 4M, M15 - 4M, N14 RTP, N15RTP, M15 MTP1 - 2M)

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a) In a mesh network structure, the nodes are <u>randomly connected</u> using communication links.

b) A mesh network may be <u>fully connected</u> or connected with <u>only partial links</u>.

c) In a fully interconnected topology, each node is connected by a <u>dedicated point to point link</u> to every node. These are not <u>very common</u> because of <u>the high cost</u>.

d) In <u>partially connected topology</u>, nodes are <u>widely scattered</u>.

e) When every node is connected to every other node, a mesh network with 'n' nodes will have <u>n(n-1)/2 number of links</u> and the number of <u>links coming</u> from every node is <u>(n-1)</u>.

f) This concept is applicable to <u>wired and wireless networks</u>.

g) Only <u>military installations</u>, which <u>need high degree of redundancy</u>, may have such networks, that too with a small number of nodes.
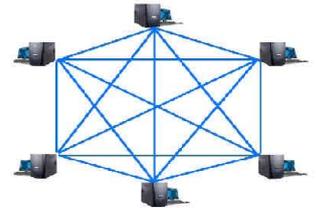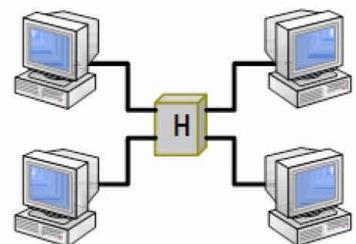
<u>ADVANTAGES:</u>

a) Highly <u>reliable</u>.

b) Network problems are <u>easier to diagnose</u>.

c) Gives the greatest amount of <u>redundancy</u>. *Even if one node fails, network traffic can be redirected to another node.*

<u>DISADVANTAGES:</u>

a) <u>More Cabling</u> is needed.

b) High Cost of <u>installation and maintenance</u>

c) Adding or replacing a node will <u>disturb</u> the entire network.

Q.No.9. Write short notes on Star Network?   (A)
(N09- 5M, M 11 - 4M, N 13 – 4M, M16 - 4M, M15 RTP)

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a) This is the <u>most commonly</u> used structure or topology.

b) A star network consists of <u>one central switch, hub or computer,</u> which acts as a medium to transmit messages.

c) The <u>central computer</u> is usually a mainframe (host), which acts as the file server.

d) The <u>central unit</u> in the star network acts as the <u>traffic controller</u> among all the other computers tied to it.

e) If a node wants to <u>transmit information</u> from one node to another, it can be done by sending the details to the central node, which in turn sends them to the destination.

f) This is well suited to companies with <u>one large data processing facility</u> shared by a number of smaller departments.

ADVANTAGES:

a) <u>Easy to add</u> new nodes and <u>remove</u> existing nodes.

b) A <u>node failure</u> does not bring down the entire network

c) <u>Several users</u> can use the central unit at the same time.

d) It is <u>easier to diagnose</u> network problems through a central hub

DISADVANTAGES:

a) More <u>dependence </u>on central hub. If the central <u>hub fails</u>, the entire network ceases to function

b) Considered <u>less reliable</u> than a <u>ring network</u>.

c) The performance and <u>scalability</u> of the <u>network depends</u> upon the <u>capabilities of the hub</u>.

Q.No.10. Write about bus network? (A)   **(N14 - 3M, M15 MTP2 - 2M)**

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a) In a bus network, a <u>single length of wire</u>, cable, or optical fiber connects a number of computers.

b) In this method, all communications travel along this cable, which is called a <u>bus</u>.

c) Bus networks have a <u>decentralized approach</u>.

d) *Bus networks are the <u>simplest way</u> to connect multiple clients, but often have problems when two clients want to transmit at the same time on the same bus.*

ADVANTAGES:

a) There is <u>no host computer or file server</u>, which makes bus network reliable as well as easy to use and understand.

b) If one of the <u>microcomputers fails</u>, it will not affect the entire network.

c) Requires <u>least amount of cable</u> to connect the computers together.

d) It is <u>easy to extend</u> the network *by using connectors.*

e) A repeater can also be <u>used to extend</u> a bus configuration.

DISADVANTAGES:

a) <u>Heavy traffic</u> can slow down the network.

b) Each <u>new connection</u> weakens the signal.

c) <u>Difficult to troubleshoot</u> bus network.

d) If there is a <u>problem with main cable</u>, the entire network goes down.

Terminator   Trunk Line   Terminator
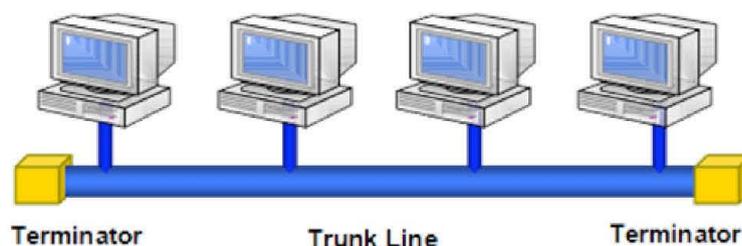
Q.No.11. Write about Ring form of Network? (A)   **(N 09 - 5M, N 12 – 4M, N15RTP)**

a) A ring network has a <u>decentralized approach</u>.

b) Local computer processors are <u>tied together sequentially</u> in a <u>ring</u> with each device being connected to two other devices.

c) When one computer needs data from another computer, the data is passed along the ring.

d) Considered more <u>reliable and less costly</u> than star networks
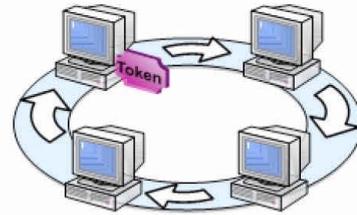
ADVANTAGES:

a) It offers <u>high performance</u> for a <u>small number of workstations</u>.

b) It do <u>not require a central computer</u> to control activity. Each computer connected to the network can communicate directly with the other computers in the network.

c) It can <u>spread</u> over <u>longer distances</u> than other types of networks.

d) It is also <u>easy to expand</u> ring network.

e) It is <u>more reliable.</u>

DISADVANTAGES:

a) Relatively <u>expensive</u> and <u>difficult to install</u>.

b) Failure of one computer on the network can <u>affect the whole network</u>.

c) It is <u>difficult to trouble shoot</u> a ring network.

d) Adding or removing computers can <u>disturb the network</u>.

TOPIC 5: DIGITAL DATA TRANSMISSION

Q.No.12. Write about Digital Data transmission (Or) Write about Serial and Parallel Transmission.   (A)   **(N 12 - 4M, N14 MTP1 - 4M)**

TRANSMISSION TECHNOLOGY: Data transmission on a communication channel between two machines can occur in several different ways: Serial and parallel.
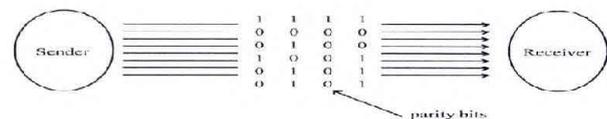
PARALLEL TRANSMISSION: **(N16 MTP2 - 2M)**

a) In parallel transmission <u>all the bits</u> of each byte are <u>transmitted simultaneously</u> i.e. each bit will have a unique channel dedicated to it.

   Data is transmitted over 8 different wires.

b) Example - <u>Parallel port</u> being used for printers.

Advantages: *Data can be transmitted at a <u>very high speed.</u>*

Disadvantage:

a) *As it uses parallel paths, <u>cross talk</u> may occur. So, it is not suitable for transferring data over long distances.*

b) *<u>More channels</u> are needed, hence it is costly.*

SERIAL TRANSMISSION:

a) Serial Transmission is the most commonly used method of communication. In serial transmission bits of each byte are transmitted <u>one after the other</u> along <u>a single path</u>. Then the receiver <u>assembles</u> the incoming bit stream into <u>characters</u>

b) RS-232 is an example of serial port, used for <u>Mouse or MODEM</u>.

c) Serial transmission can occur in any of the two ways - <u>Asynchronous & Synchronous transmission.</u>
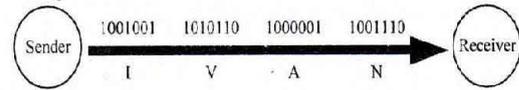
Advantages:

a) *It is a <u>cheap</u> mode of transferring data.*

b) *It is suitable to transmit data over <u>long distances</u>.*

Disadvantage: *This method is <u>not efficient</u> (i.e. slow) because it transfers data in series.*

Q.No.13. Write about Synchronous and Asynchronous methods of data transmission.   (B)
(N14 MTP2 - 4M)

SYNCHRONOUS TRANSMISSION: **(N 10 - 2M)**

a) In this method, the <u>transmitter and receiver</u> are paced by the same clock.

b) The <u>receiver continuously receives</u> the information at the <u>same rate</u> the transmitter sends it.

c) This is why the <u>transmitter and receiver</u> are paced at the same speed.

d) In addition, <u>supplementary information</u> is inserted to guarantee that there are no errors during transmission, A <u>group of synchronization</u> bits must be placed at the beginning and ending of each block to maintain synchronization.

ASYNCHRONOUS TRANSMISSION: **(M11 - 4M, N16 MTP1 - 2M)**

a) In this, <u>each character is sent at irregular intervals</u> in time as in the case of characters entered at the keyboard in real time.

b) So, the <u>sender provides a synchronization</u> signal to the receiver before starting the transfer of each message.


Q.No.14. Write about different modes of data communication (Or) Transmission modes? (A)
(M 12 - 4M, N 13 – 3M, M16 - 2M)

There are three different transmission modes characterized according to the <u>direction of exchange of data.</u>

1. **Simplex:**   **(N14 MTP1 - 1M)**

   a) In this mode data is transmitted in <u>one direction only</u>

   b) The <u>sending station cannot receive data</u>. This type of connection is useful if the data do not need to flow in both directions.

   c) A terminal connected to such line may send only or receive only.

   d) For ex: computer to printer.
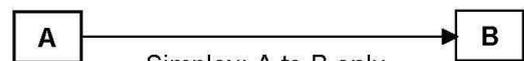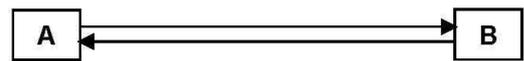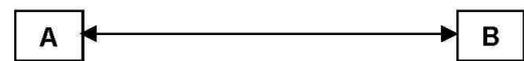
2. **Half duplex:**

   a) A half-duplex connection (alternating connection or semi-duplex) allows data can be transmitted in <u>both the directions</u> but <u>only one side at a time</u>. Thus every terminal can send and receive data but only one activity at a time.

   b) This type of connection makes it possible to have <u>bidirectional</u> communications using the <u>full capacity</u> of the line.

c) For example, Walkie Talkie.

3. **Full duplex:**

a) A full duplex connection can simultaneously transmit and receive data between two stations. It is the most commonly used communication mode.

b) A full duplex line is faster. Full-duplex transmission uses two separate circuits for communication i.e. one for each direction.

c) For example, mobile phones.

Q.No.15. Discuss various switching techniques used in a computer network? (B)
(PM, M 04 - 5M, N 11 - 4M, M15 RTP)

The primary objective in any communication network is simply moving information from one source to one or more destination nodes.

Based on the techniques used to transfer data, communication networks can be categorized into Broadcast and Switched networks.

a) In **Broadcast networks,** data transmitted by one node is received by many, sometimes all, of the other nodes.

b) In **switched-communication** networks, the data transferred from source to destination is routed through the switch nodes.

c) The way in which the nodes switch data from one link to another as it is transmitted from source to destination node is referred to as a switching technique.

THREE COMMON SWITCHING TECHNIQUES:

1. **Circuit switching:**

a) It is the simplest method of data communication.

b) The route or circuit (a fixed bandwidth channel) is dedicated and exclusive, and released only when the communication session terminates

c) At any point of time only two communication devices can transmit information to each other.

d) Once a circuit (a fixed bandwidth channel) is established between two stations, it is exclusively used by the two parties and the dedicated link becomes unavailable to others till the call is terminated by either party.

e) This will be the experience of every person using the telephone. *We make a call and either we get our destination party or encounter a busy signal.*

f) A single circuit is used for the entire duration of call.

g) Applications which use circuit switching go through three phases:

   i) Establish a Circuit

   ii) Transfer of data

   iii) Disconnect the Circuit.
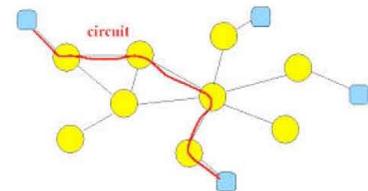
2. **Message switching/Store-and-Forward:**   (M 11 - 2M)

a) In message switching, end-users communicate by sending each other a message, which contains the entire data being delivered from the source to destination node.

b) As a message is routed from its source to its destination, each intermediate switch within the network stores the entire message, providing a very reliable service.

c) The intermediary nodes (switches) have the responsibility of conveying the received message from one node to another in the network.

   d) Therefore, each intermediary node within the network must <u>store all messages before retransmitting</u> them one at a time as proper resources become available.

   e) This characteristic is often referred to as <u>Store-and- Forward</u>.

   f) Examples of message switching are <u>Electronic mail and voice mail.</u>

3. <u>**Packet switching:**</u>   **(N16 - 2M)**

   a) It is a <u>sophisticated technique</u> of maximizing transmission capacity of networks.

   b) Packet switching refers to protocols in which messages are <u>broken up</u> into small transmission units called <u>packets</u>, before they are sent.

   c) Each packet is transmitted individually across the net.

   d) The packets may even follow <u>different routes</u> to the destination. Since there is no fixed path, different packets can follow different path and thus they may reach to destination out of order.

   e) This is method is currently used to <u>transmit data in internet</u>.
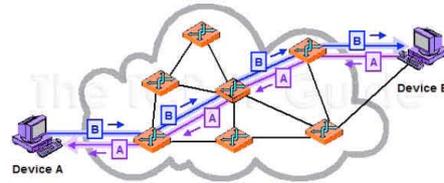
TOPIC 6: NETWORK ARCHITECTURE & PROTOCOLS

Q.No.16. Write short notes on Network Architecture?   (C)

1. Network architecture refers to the <u>layout of the network</u>, consisting of the hardware, software, connectivity, communication protocols and mode of transmission, such as wired or wireless.

2. *The diagram of the network architecture provides a full picture of the established network with detailed view of all the <u>resources accessible</u>.*

3. Network architecture includes hardware components used for communication, <u>cabling and device types, network layout and topologies, physical and wireless connections, implemented   areas and future plans</u>.

4. The goal is to promote an open, simple, flexible, and efficient telecommunications environment.

5. This is accomplished by the use of:

   a) Standard protocols,

   b) Standard communications hardware and software interfaces.

   c) Standard multilevel interface between end users and computer systems

6. There are two basic network architectures :

   a) OSI Model

   b) TCP/IP model

Q.No.17. What is a Protocol? Explain the aspects defined by protocols? (C)   (N16 MTP1 - 4M)

Communication Protocols: **(M15 RTP)**

1. <u>Protocols are software</u> that performs a variety of actions necessary for data transmission between computers.

2. Protocols are a <u>set of rules</u> for inter-computer communication that have been agreed upon and implemented by many vendors, users and standard bodies.

3. Protocols allow <u>heterogeneous computers</u> to talk to each other.

<u>**Aspects defined by protocols:**</u> A transmission protocol is a set of conventions or rules that must be followed by both the parties to ensure that the information is correctly exchanged.

1. A protocol defines the following 3 aspects of digital communication.

a) **Syntax:** The <u>format</u> of data being exchanged, character set used, type of error correction used, type of encoding scheme being used.

b) **Semantics:** <u>Type and order</u> of messages used to ensure reliable and error free information transfer.

c) **Timing:** Defines <u>data rate selection</u> and <u>correct timing</u> for various events during data transfer.

Q.No.18. Write about Open System Interconnection (OSI).(A)   (PM, M15 RTP, M17 RTP – 4M)

a) OSI or the Open System Interconnection model designed by International Standards Organization (ISO) to serve as a standard model for network architectures.

b) It facilitates <u>communication of heterogeneous</u> hardware or software platforms with each other.

c) It is defined with the help of following seven layers of functions with their associated controls

Layer 7 or Application Layer:

* This layer is closest to the end user and interacts with software applications and <u>provides user services</u> by file transfer, file sharing, etc.

* At this layer, communication partners are identified; <u>quality of service</u> is identified; user <u>authentication and privacy</u> are considered;

* <u>Database concurrency</u> and <u>deadlock situation controls</u> are undertaken at this layer.

Layer 6 or Presentation Layer:

* Also referred as Syntax Layer, this layer is usually a part of an operating system that converts incoming and outgoing data from one presentation format to another.

* It further controls <u>onscreen display of data</u>, transforms data to a standard application interface;

* <u>Encryption</u> and <u>data compression</u> are undertaken at this layer.

Layer 5 or Session Layer:

* This layer sets up, <u>coordinates, and terminates conversations</u>; exchanges and dialogs between the applications at each end.

* It deals with <u>session and connection coordination</u> and provides for full-duplex, half-duplex, or simplex operation, and establishes check pointing, adjournment, termination, and restart procedures.

Layer 4 or Transport Layer:

* This layer ensures reliable and <u>transparent transfer of data between user processes</u>; assembles and disassembles message packets and provides error recovery and flow control.

* <u>Multiplexing</u> and <u>encryption</u> are undertaken at this layer.

Layer 3 or Network Layer: (N09 - 1M)

* The Network Layer provides the functional and procedural means of transferring variable length data sequences from a source to a destination via one or more networks, while maintaining the quality of service requested by the Transport Layer.

* The Network Layer makes a <u>choice of the physical route</u> of transmission; creates a virtual circuit for upper layers to make them independent of data transmission and switching;

* It establishes, maintains, terminates connections between the nodes and ensures <u>proper routing of data</u>.
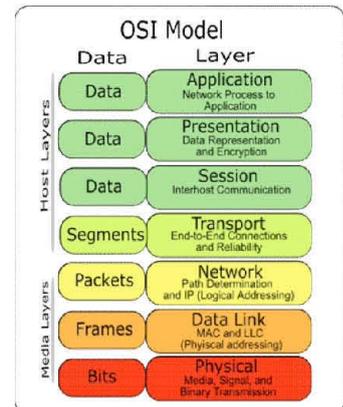
Layer 2 or Data Link Layer:

- The Data Link Layer responds to service requests from the Network Layer and issues service requests to the Physical Layer.

- This layer transfers data between adjacent network nodes in a WAN or between nodes on the same LAN segment.

- This layer also specifies <u>channel access control method</u> and ensures <u>reliable transfer of data</u> through the transmission medium.

- It provides the functional and procedural means to transfer data between network entities and detects and possibly corrects errors that may occur in the Physical Layer.

Layer 1 or Physical Layer: **(M16 - 2M, N15 MTP2 - 2M)**

- The Physical Layer is a hardware layer which specifies <u>mechanical features</u> as well as <u>electromagnetic features</u> of the connection between the devices.

- Establishment and termination of a connection to a communications medium can be undertaken at this layer;

- <u>Modulation or conversion of digital data</u> in user equipment and the corresponding signals transmitted over a communications channel are the major tasks of this layer.

Q.No.19. Write short notes on TCP/IP. (A)   **(N09 - 5M, N10 - 1M, N14 RTP)**

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1. The protocol used on the Internet is called TCP/IP (Transmission Control Protocol/Internet Protocol) or internet protocol suite

2. TCP/IP consists of <u>five levels or layers of protocols</u> that can be related to the seven layers of the <u>OSI architecture</u>.

3. TCP/IP is used by the <u>Internet</u> and by all <u>Intranets and extranets</u>

4. *Many companies and other organizations are also converting their client/server networks to TCP/IP.*

5. Five levels of TCP/IP includes:

TCP/IP		The OSI Model	
		Application Layer	Provides communications services for end user applications
Application or Process Layer		Presentation Layer	Provides appropriate data transmission formats and codes
		Session Layer	Supports the accomplishment of telecommunications sessions
Host-to-Host Transport Layer		Transport Layer	Supports the organization and transfer of data between nodes in the network
Internet Protocol (IP)		Network Layer	Provides appropriate routing by establishing connections among network links
Network Interface		Data Link Layer	Supports error-free organization and transmission of data in the network
Physical Layer		Physical Layer	Provides physical transmission of data on the telecommunications media in the network.

TOPIC 7: CLASSIFICATION OF NETWORKS: FUNCTIONAL BASED CLASSIFICATION

Q.No.20. How can Client computers be classified? (B)   (PM)

Client:

1. Client is a <u>single-user workstation</u> that provides a <u>presentation services</u> and the appropriate computing, connectivity and the database services relevant the business need.

2. Client computers can be classified as <u>Fat Client</u>, <u>Thin Client</u> or <u>Hybrid Client.</u>

   a) **<u>Fat / Thick Client:</u>** A fat client or thick client is a <u>client</u> that performs the <u>bulk</u> of any data processing operations <u>itself</u>, and does not necessarily rely on the server.   For example – Personal Computer.   **(N16 - 2M)**

   b) **<u>Thin Client:</u>** Thin clients use the resources of the <u>host computer</u>. A thin client generally <u>presents only</u> processed data provided by an <u>application server</u>. A thin client machine is going to communicate with a central processing server, meaning there is little hardware and software installed on the user's machine. A device using <u>web application</u> is a <u>thin client</u>.

   c) **<u>Hybrid Client:</u>** A hybrid client is a <u>mixture of the thick and thin</u> client models. Similar to a fat client, it processes locally, but relies on the server for storing persistent data. Hybrid clients are <u>well suited</u> for <u>video gaming</u>.

Q.No.21. Discuss the Working of Client/Server architecture. (A)   (N15 MTP1 – 4M)

a) <u>Servers</u> are typically powerful computers running advanced <u>network operating systems</u>. Servers can host e-mail; store common data files and serve powerful network applications, validates login to the network and can deny access to both networking resources as well as client software.

b) <u>End user Personal Computer</u> or Network Computer workstations are the <u>Clients</u>.

c) Clients are <u>interconnected</u> by local area networks and share application processing with network servers, which also manage the <u>networks</u>. Client and Server can operate on <u>separate computer platforms</u>.

d) Either the client platform or the server platform can be <u>upgraded</u> without having to upgrade the other <u>platform</u>.

e) The server is able to service <u>multiple clients concurrently</u>; in some client/server systems, clients can access multiple servers.

f) <u>Action</u> is usually initiated at the client end, not the server end.

g) Middleware is all the distributed software needed to allow <u>clients and servers to interact/communicate</u>.

h) Middleware allows for <u>communication</u>, <u>directory services</u>, <u>queuing</u>, <u>distributed file sharing</u>, and <u>printing.</u>

Q.No.22. Discuss some of the characteristics and issues of Client/Server (C/S) architecture? (A)   (PM)

Prominent Characteristics: **(N15 – 4M)**

a) **<u>Service:</u>** C/S provides as clean separation of function based on the <u>idea of service</u>. The <u>server process</u> is a provider of services and the client is a consumer of services.

b) **<u>Shared Resources:</u>** A server can service many clients at the same <u>time and regulate</u> their access to the shared resources.

c) **Transparency of Location:** C/S software usually masks the location of the server from the clients by the <u>redirecting the service</u> calls when needed

d) **Mix-and-Match:** The ideal C/S software is <u>independent of hardware</u> or Operating System software platforms.

e) **Scalability:** In a C/S environment, client work stations can either be <u>added or removed</u> and also the server load can be distributed across multiple servers.

f) **Integrity:** The server code and server data is <u>centrally managed</u>, which results in cheaper maintenance and the safeguarding of shared data integrity.

Client/Server Components
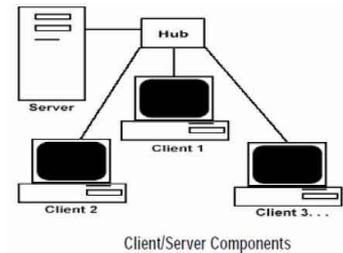
Issues in Client/Server Network:

a) When the server goes <u>down or crashes</u>, all the computers connected to it become unavailable to use.

b) Simultaneous access to data and services by the user takes <u>little more time for server</u> to process the task.

Q.No.23. Write about Peer – to – Peer network? (C)   (PM, M15- 2M, M16 RTP, N16 MTP2 - 5M)

a) It is created with <u>two or more PCs</u> connected together and share resources without going through a separate server computer.

b) A P2P network can be an <u>adhoc connection</u> – a couple of computer connected via a universal serial bus to transfer files.

c) A P2P network also can be <u>permanent infrastructure</u> that links half dozen computers in a small <u>office over copper wires</u>.

d) The primary goal of a P2P file <u>sharing network</u>, is that many computers come together and pool their resources to form a content <u>distribution system</u>.
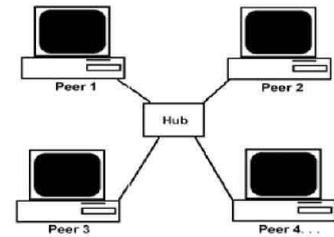
Advantages:

a) It is <u>easy and simple</u> to set up.

b) It is very <u>simple</u> and <u>cost effective</u>.

c) If one <u>computer fails</u> to work, all other computers connected to it <u>continue</u> to work

Disadvantages:

a) There can be problem in <u>accessing files</u> if computers are not connected properly.

b) It does <u>not support</u> connections with too many computers.

c) The <u>data security</u> is very poor in this architecture.

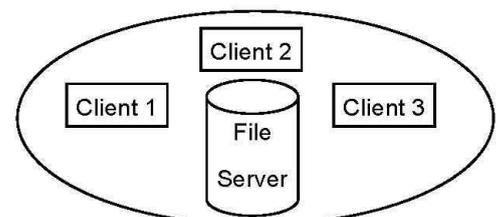**Q.No.24. Discuss Multi-Tier Architecture? (A)   (PM)**

A tier is a distinct part of hardware or software.

1. **Single Tier Systems/ One-Tier architecture:**

   a) A single computer that contains a <u>database and a front-end</u> (GUI) to access the database is known as Single Tier System.

   b) Generally, this type of system is used in <u>small businesses</u>.

Single Tier Architecture

c) *One-tier architecture involves putting all of the required components for a software application or technology on a <u>single server or platform</u>.*
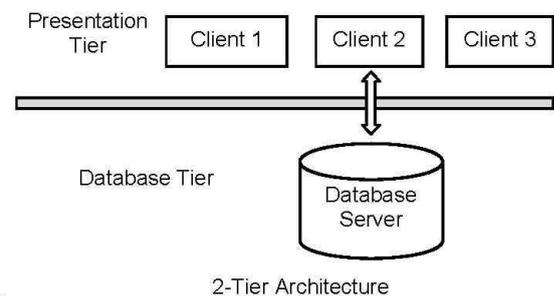
Advantages:

a) It requires one <u>stand-alone computer</u>.

b) *It also requires only one installation of <u>proprietary software</u> which makes it the most <u>cost- effective</u> system available.*

Disadvantages:

a) It can be used by only <u>one user at a time</u>.

b) *A <u>single tier system</u> is impractical for an organization which requires two or more users to interact with the <u>organizational data stores</u> at the <u>same time</u>.*

2. **Two Tier Systems/ Two Tier architecture::**

a) A two-tier system consists of a <u>client and a server</u>.

b) It is a software architecture in which a <u>presentation layer</u> or <u>interface</u> runs on client, and a data layer or data structure gets <u>stored</u> on a server.

c) *In other words, the database is <u>stored on the server</u>, and the <u>interface</u> used to access the <u>database</u>.*

2-Tier Architecture

Advantages:

a) The <u>system performance</u> is higher because <u>business logic</u> and <u>database</u> are physically close.

b) Since processing is shared between the <u>client and server</u>, more users could interact with system.

c) It is easy to <u>setup and maintain</u> entire system smoothly.

Disadvantages:

a) Performance decreases if number of users is greater than 100.

b) Restricted <u>flexibility</u>.

3. **n-tier Architecture:**   **(N16 RTP, M16 MTP2 - 2M)**

a) It is client–server architecture in which presentation, application processing, and data management functions are logically separated.

b) By segregating an application into tiers, developers acquire the option of modifying or adding a specific layer, instead of reworking the entire application.

c) For example, an application that uses middleware to service data requests between a user and a database employs multitier architecture.

d) The most widespread use of multi-tier architecture is the Three-tier architecture.
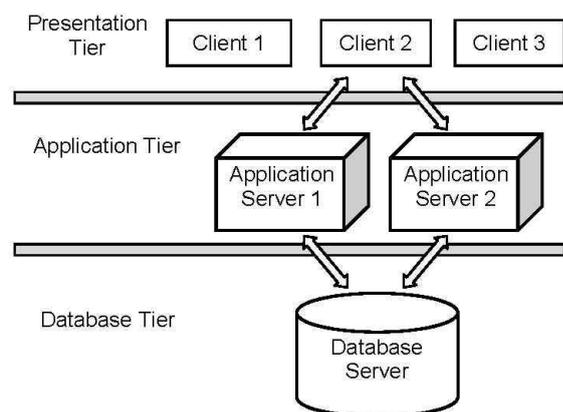
4. **Three-tier architecture:**   **(M15 - 2M)**

a) Three-tier architecture is a client-server architecture in which the functional process logic, data access, computer data storage and user interface are developed and maintained as <u>independent modules</u> on <u>separate platforms</u>.

b) It *is a <u>software design pattern</u> and well-established software* architecture.

Three-Tier Architecture

c) This is used when an effective distributed client/server design is needed that provide increased performance, flexibility, maintainability, reusability and scalability.

Three tiers in 'three-tier' architecture: **(N15 MTP1 – 2M)**

a) **Presentation Tier:** Occupies the top level and displays information related to services available on a website. *This tier communicates with other tiers by sending results to the browser and other tiers in the network.*

b) **Application Tier:** Also called the middle tier, business logic or logic tier, this tier is pulled from the presentation tier. It controls application functionality by performing detailed processing.

c) **Database Tier:** Houses database servers where information is stored and retrieved. Data in this tier is kept independent of application servers or business logic.

Advantages:

a) **Clear separation of user-interface-control and data presentation from application - logic**: *With this separation more clients are able to have access to a wide variety of server applications.*

b) **Dynamic load balancing:** *If bottlenecks in terms of performance occur, the server process can be moved to other servers at runtime.*

c) **Change management:** *It is easy and faster to exchange a component on the server than to furnish numerous PCs with new program versions.*

Disadvantages:

a) It creates an increased need for network traffic management, server load balancing, and fault tolerance.

b) Current tools are relatively immature and are more complex.

c) Maintenance tools are currently inadequate for maintaining server libraries.

TOPIC 9: NETWORK SECURITY: RISKS AND CONTROLS

Q.No.25. Explain the threats involved in system security? (A) (N14 RTP, N14 MTP1 – 2M)

THREAT: It is a possible danger that can disrupt the operation, functioning, integrity, or availability of a network or system.

Network security threats can be categorized into four broad themes

1. **Unstructured threats:**   **(M16 MTP1 - 2M)**

    a) These originate mostly from inexperienced individual's using easily available hacking tools from the Internet.

    b) Many tools available on the Internet can be used to discover weaknesses in the company's network.

    c) These include port-scanning tools, address-sweeping tools and many others.

    d) *Most of them are done out of interest rather than with a malicious intention.*

2. **Structured threats:**   **(M16 MTP1 - 2M)**

    a) These originate from individuals who are highly motivated and technically competent.

    b) They can understand as well as create hacking scripts to penetrate into network systems.

    c) Generally they target specific destination or group.

    d) Usually, these hackers are hired by organized crime, industry competitors, or state-sponsored intelligence organizations.

3. **External threats:**

    a) They originate from individuals or organizations working outside an organization, which does not have authorized access to organization's computer systems or network.

b) They usually work their way into a network from the Internet or dialup access servers.

4. Internal threats:

a) They originate from individuals who have authorized access to the network.

b) These users either have an account on a server or physical access to the network.

c) It may come from a discontented former or current employee or contractor.

Q.No.26. Explain the vulnerabilities involved in system security? (A)
(PM, N14 - 4M, M17 – 4M, M15 RTP, M16 RTP, N14 MTP2 - 4M, M15 MTP1 - 1M)

VULNERABILITY: Vulnerability is an inherent weakness in the design, configuration or implementation of a network or system that renders it susceptible to a threat. The following facts are responsible for occurrence of vulnerabilities in the software:

a) **Software Bugs:** Software bugs are so common that users have developed techniques to work around the consequences. A bug that saves the work every half an hour or crash the computer so often is considered to be a normal part of computing.

b) **Timing Windows:** This problem may occur when a temporary file is exploited by an intruder to gain access to the file, overwrite important data and use the same file as a gateway for advancing further into the system.

c) **Insecure default configurations:** They occur when vendors use known default passwords to make it as easy as possible for consumers to set up new systems. Unfortunately, most intruders know these passwords and can access systems effortlessly.

d) **Bad Protocols:** Some protocols or the standards by which information is exchanged over the Internet, may lack any security at all.

e) **Trusting Untrustworthy information:** This is usually a problem that affects routers or those computers that connect one network to another. When routers are not programmed to verify that they are receiving information from a unique host, bogus routers can gain access to systems and do damage.

f) **End users:** Generally, users of computer systems are not professionals and are not always security conscious. In addition to this, users do human errors, for example save confidential files to places where they are not properly protected.

Q.No.27. Write short notes on network security? (B)   (M16 - 4M - PART)

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1. Network security is becoming more and more crucial as the volume of data being exchanged on the Internet increases.

2. Network Security Protocols are primarily designed to prevent any unauthorized user, application, service or device from accessing network data.

3. Based on the increasing demand and expectations, the security involves four aspects:

a) **Privacy:**   **(N15 MTP2 – 4M)**

i) Privacy means that the sender and the receiver expect confidentiality.

ii) The transmitted message should make sense to only the intended receiver and the message should be unintelligible to unauthorized users.

iii) This is achieved by cryptography and encryption techniques so that the data is secured and can only be decrypted with a special algorithm, logical key, mathematical formula and/or a combination of all of them.

b) **Authentication:** This means that the receiver is sure of the sender's identity and that an imposter has not sent the message.

c) <u>Integrity:</u> This means that the <u>data must arrive at the receiver exactly</u> as it was sent. There must <u>not be any changes during the transmission</u> – either accidental or malicious.

d) <u>Non - Repudiation:</u> This means that a receiver must be able to prove that a received message came from a specific sender and the <u>sender must</u> not be able to <u>deny sending it.</u>

Q.No.28. Discuss the concept of cryptography in a computer network. (B)   **(PM, N15 – 4M)**

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1. <u>Cryptography:</u>   **(M15 RTP, N14 MTP1 –1M)**

   a) Cryptography is the <u>practice and study</u> of techniques for secure communication in the presence of third parties.

   b) It is about <u>constructing and analyzing protocols</u> that overcome the influence of adversaries and which are related to various aspects in information security such as data confidentiality, integrity, <u>authentication, and non-repudiation.</u>

2. <u>Encryption:</u> In Cryptography, encryption is the process of <u>encoding messages</u> (or information) in such a way that <u>eavesdroppers or hackers</u> cannot read it, but only authorized parties can.

3. <u>Decryption:</u> Decryption is defined as the <u>recovery of the original message</u> from the encrypted data.

4. <u>Plaintext:</u> It is the message that is to be <u>encrypted</u>. It is transformed by a function that is parameterized by a key.

5. <u>Cipher Text:</u> It is the output of the <u>encryption process</u> that is transmitted often by a messenger or radio.

6. <u>Encryption Model:</u>

   a) The intruder may hear and <u>accurately</u> copy down the complete <u>cipher text.</u>

   b) However, unlike the intended recipient, he does not know what the decryption key is and so cannot decrypt the <u>cipher text easily</u>.

   c) Sometimes the intruder can not only listen to the communication channel (passive intruder) but can also record messages and play them back later, inject his own messages, or modify <u>legitimate messages</u> before they get to the receiver (active intruder).

   d) The art of breaking ciphers is known as Cryptanalysis and the art of devising them is known as Cryptography. Both Cryptanalysis and Cryptography are collectively known as Cryptology.

7. There are <u>two categories of encryption/decryption</u> methods: **(N15 - 2M)**

   a) In **Secret key encryption/decryption method**, the <u>same key</u> is used by both sender and the receiver. The sender uses this key and an encryption algorithm to encrypt data; the receiver uses the same key and the corresponding decryption algorithm to decrypt the data. In this, the algorithm used for decryption is the inverse of the algorithm used for encryption.

   b) In **Public key encryption**, there are two keys: <u>a private key and a public key</u>. The private key is kept by the receiver and the public key is announced to the public.

8. There are <u>two approaches to Encryption:</u>   **(N15 - 2M, M17 MTP – 4M)**

   a) <u>Hardware Encryption:</u> Hardware encryption devices are available at a reasonable cost, and can support <u>high- speed traffic</u>. If the Internet is being used to exchange information among branch offices or development collaborators, for instance, use of such devices can ensure that all traffic between these offices is secure.

   b) <u>Software Encryption:</u> Software encryption is typically employed in conjunction with <u>specific applications</u>. Certain electronic mail packages provide encryption and decryption for message security.

TOPIC 10: NETWORK SECURITY PROTOCOLS

Q.No.29. Explain popular network security protocols? (B)   (PM, N15 RTP)

NETWORK SECURITY PROTOCOLS:

a) Network Security Protocols are primarily <u>designed</u> to <u>prevent any unauthorized</u> user, application, service or device from <u>accessing network</u> data.

b) Some of the <u>popular network security protocols</u> include

1. <u>SSH:</u> (M16 MTP2 - 1M)

   a) <u>Secure Shell</u> is a program to log into another computer over a network, to execute <u>commands in a remote machine</u>, and to move files from one machine to another.

   b) It provides strong <u>authentication and secure communication</u> over insecure channels.

   c) SSH protects a network from attacks such as IP spoofing, IP source routing, and DNS spoofing.
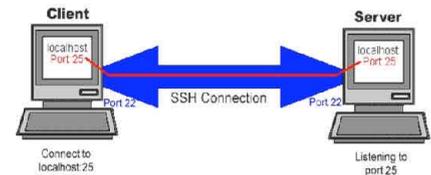
2. <u>SFTP:</u> (N16 RTP)

   a) The SSH File Transfer Protocol (also known as Secure FTP and SFTP) is a computing network protocol for <u>accessing and managing files</u> on remote file systems.

   b) SFTP <u>encrypts both commands</u> and data preventing passwords and sensitive information from being transmitted in telecommunication network.

3. <u>HTTPS:</u> (N14 – 2M, M17 – 2M, N14 MTP2 - 1M, M15 MTP1 - 1M, M16 MTP1 - 1M)

   a) Hypertext Transfer Protocol Secure (HTTPS) is a communications protocol for secure communication over a computer network, with especially <u>wide deployment on the Internet</u>.

   b) The security of HTTPS uses long term <u>public and secret keys to</u> exchange a <u>short term session key</u> to encrypt the data flow between client and server.

4. <u>SSL:</u> (M16 – 2M, N15 MTP2 –2M)

   a) SSL stands for <u>secure socket layer.</u>

   b) It is essentially a protocol that <u>provides a secure channel</u> between two machines operating over the Internet or an internal network.

   c) SSL protocol is typically used when a web browser needs to securely connect to a web server over the inherently <u>insecure Internet</u>.

   d) SSL is used to <u>secure online credit card transactions</u>, system logins and any sensitive information exchanged online, to secure <u>webmail and applications</u>.

TOPIC 11: NETWORK ADMINISTRATION AND MANAGEMENT

Q.No.30. Discuss FCAPS model of network management? (or) Discuss the ways of characterizing common functions of Network Management. (B)   (PM, M16 RTP)

1. FCAPS is the ISO Telecommunications Management Network model and frame work for network management.

2. It is an <u>acronym</u> for **Fault, Configuration, Accounting, Performance and Security.**

   a) **<u>Fault Management:</u>**

   i) A <u>fault is an event</u> that has a <u>negative significance</u>.

   ii) The goal of fault management is to <u>recognize, isolate, correct and log faults</u> that occur in the network.

   b) **<u>Configuration Management:</u>**

   i) <u>Monitors network and system</u> configuration information so that the impact on network operations can be <u>tracked and managed</u>.

   ii) Network changes, additions, and deletions need to be coordinated with the network management personnel.

   c) **<u>Accounting Management:</u>**

   i) It is concerned with <u>tracking network utilization information</u>.

   ii) Accounting refers to administration whose primary goal is to administer the set of authorized users by establishing user IDs, passwords, and permissions -- to administer the operations of the equipment.

   d) **<u>Performance Management:</u>**   **(M15 MTP2 - 1M)**

   i) It measures and makes <u>network performance</u> such as <u>throughput</u>, <u>response times</u>, <u>packet loss</u> rates, <u>link utilization</u>, <u>error rates</u> and so forth.

   ii) It enables the manager to prepare the <u>network for the future</u>, as well as to determine the efficiency of the current network.

   e) **<u>Security Management:</u>**

   i) Security management functions include <u>managing network authentication</u>, <u>authorization</u>, <u>auditing</u> and management of firewalls, intrusion detection systems, such that both <u>internal and external authorized users</u> only have access.

   ii) Most network management systems address security regarding to network resources as established by organizational security guidelines.

TOPIC 12: NETWORK SECURITY TECHNIQUES

Q.No.31. What tools are available to protect the information in network against intrusion or misuse? (OR) Explain various Network Security Techniques? (A)   (N15RTP, N15MTP1 - 4M)

1. Several tools are now available to <u>protect information and systems</u> from unauthorized intrusion or misuse. Those are :

   a) **<u>Firewalls:</u> (N15 – 2M, N14 RTP)**

   i) It is a device that forms a <u>barrier (fence)</u> between a secure and an <u>open environment</u>.

   ii) It acts as a <u>system or combination of systems</u> that enforces a boundary between more than one networks.

   iii) A firewall is a proved, effective means of <u>protecting the firm's internal resources</u> from unwanted intrusion.

   b) **<u>Site blocking:</u> (M16 RTP)**

   i) It is a software-based approach that <u>prohibits access to certain web sites</u> that are deemed to be inappropriate by management.

   ii) For example, sites that contain objectionable material can be <u>blocked</u> to prevent employees from accessing these sites.

iii) *Companies can also <u>log activities</u> and determine the amount of time spent on the Internet and identify the sites visited.*

c) <u>Network Access Control:</u> (N15RTP)

   i) NAC products enforce <u>security policy</u> by granting only security policy–compliant devices access to network assets.

   ii) They handle access authentication and authorization functions and can even control the data that specific users' access, based on their ability to recognize users, their devices and their network roles.

d) <u>Anti – Malware:</u>

   i) Anti-malware network tools help administrators to identify, block and <u>remove malware</u>.

   ii) They enable the IT department to <u>tailor its anti-malware policies</u> to identify known and unknown malware sources.

   iii) Malware is always on the lookout for network vulnerabilities - in security defenses, operating systems, browsers, applications and popular targets such as Adobe Flash, Acrobat Reader - that they can exploit to fully access a victim's network.

   iv) *Best practices call for a <u>multipronged defense</u> that might also include IP blacklisting, data loss prevention (DLP) tools, anti-virus and anti-spyware software, web browsing policies, egress filtering, and outbound-traffic proxies.*

e) <u>Intrusion Detection System (IDS):</u> An Intrusion Detection System is a device or software application that monitors network or system activities for <u>malicious activities</u> or <u>policy violations</u>.

Q.No.32. Write about Intrusion Detection System (IDS)? Explain Primary IDS technologies? (A) (M15 RTP)

MEANING: An Intrusion Detection System is a device or software application that monitors network or system activities for malicious activities or policy violations.

The goal is to monitor the <u>network assets, to detect anomalous behavior and misuse.</u>

PRIMARY IDS TECHNOLOGIES:

1. **<u>Network Intrusion Detection (NID):</u>**

   a) NID System is placed on a network to <u>analyze traffic</u> in search of <u>unwanted or malicious events</u> on the wire between hosts.

   b) Typically referred to as "<u>packet-sniffers</u>", NID devices <u>intercept packets</u> traveling in different communication channels.

   c) Once captured, the packets are analyzed in a number of different ways.

2. **<u>Host-based Intrusion Detection (HID):</u>**   (M13 - 2M)

   a) HID systems are designed to monitor, detect and respond to user and system activity and <u>attacks on a given host</u>.

   b) *The difference between host-based and network-based intrusion detection is that NID deals with data transmitted from host to host while HID is concerned with what occurs on the hosts themselves.*

   c) Host-based intrusion detection is best suited to combat <u>internal threats</u>.

   d) Majority of computer <u>threats</u> come from <u>within organization</u>. For example, disgruntled employees, corporate spies, etc.
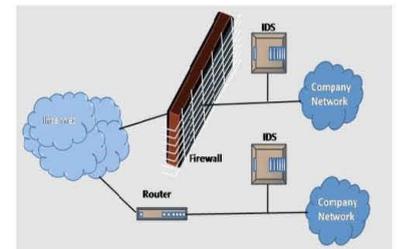
3. **Hybrid Intrusion Detection:**

   a) Hybrid intrusion detection systems offer management of and alert notification from <u>both network</u> and <u>host-based intrusion</u> detection devices.

   b) Hybrid solutions provide the <u>logical complement to NID and HID</u> i.e. Central Intrusion Detection Management.

Q.No.33. Write about Intranets? Explain benefits and role of intranet in organization? (A)
(M15 RTP)

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a) An intranet is a network <u>inside an organization</u> that <u>uses Internet technologies</u> such as web browsers and servers, TCP/IP protocols, HTML, databases, and so on, to provide an Internet-like environment within the enterprise.

b) The main purpose is to provide information sharing, resource sharing, <u>communications, collaboration</u>, and the support of business processes.

c) Intranet is a type of information system that <u>facilitates communication</u> within the organisation, among widely dispersed departments, divisions and regional locations.

d) Intranet can also be used to <u>facilitate working groups</u>, video conferencing and continuous updating of company database.

e) Intranets is the main means of <u>intra-office communication</u>.

f) An Intranet is <u>protected by security</u> measures such as passwords, encryption, and firewalls.

ADVANTAGES:

a) Reduced <u>information searching time</u>

b) <u>Easier, faster </u>access to information

c) <u>Sharing and reuse</u> of tools and information

d) Latest, <u>up-to-date information</u>,

e) <u>Collaborative</u> or group working is possible.

f) <u>Reduced costs</u> - printing, paper, software distribution, mailing, order processing, telephone.

Business Value of Intranets:

1. **Communications and Collaboration:**

   a) Intranets can significantly improve communications & collaboration within an enterprise.

   b) Using an Intranet browser and workstation one can send and receive e-mail, voicemail, etc.

2. **Web Publishing:**

   a) The advantages of developing and publishing hyperlinked multimedia documents to hypermedia databases accessible on Web servers has moved to corporate intranets.

   b) The comparative ease, attractiveness, and lower cost of publishing are one of the primary reasons for the explosive growth of the use of intranets in business.

3. **Business Operations and Management:**

   a) Intranets are being used as the platform for developing and deploying critical business applications to support business operations and managerial decision making across the enterprise.

   b) Many companies are developing customer applications like order processing, inventory control, sales management, and executive information systems that can be implemented on intranets, extranets, and the Internet.

   c) Employees within a company, or external business partners, can access and run applications using web browsers from anywhere on the network whenever needed.

Q.No.34. Write about Extranet? (A)	(M13-1M, M13 RTP)

1. Extranet is a <u>private network</u> that uses Internet protocol and public telecommunication systems to <u>securely share part of a business's</u> information or operations with suppliers, vendors, partners, customers or other businesses.

2. It is part of company's intranet that is <u>extended to users</u> outside the company.

3. Simply put, it is the <u>Company's website</u> for its customers and vendors.

4. It requires security and privacy which can be provided through <u>Firewall server</u> management; the Issuance of <u>digital signature certificate</u> or similar means of user authentication;

BUSINESS VALUES OF EXTRANET: (M15 - 2M)

a) The web browser technology of extranets makes the customer and supplier accesses of the intranet recourses a lot easier and faster than previous business methods.

b) Extranet enables a company to offer <u>new kinds of interactive web enables service</u> to their business partners.

c) Extranets enable and <u>improve collaboration</u> by a business with its customers and other business partners.

d) Extranet facilitates an online, interactive product development, marketing and customer focused process that can bring better designed products to market faster.

USES/APPLICATIONS: Companies can use Extranet to:

a) <u>Exchange large volumes</u> of data using EDI.

b) <u>Share product catalogues</u> exclusively with wholesaler or those "in the trade".

c) Collaborate with other companies on <u>joint development efforts</u>.

d) <u>Jointly develop and use training</u> programs with other companies.

e) <u>Share news</u> of common interest exclusively with partner companies.

FIVE RULES OF THE EXTRANET:

a) **Be as flexible as the business:** It must be extremely flexible and allow companies to immediately deploy extranet services that best fit the business need.

b) **Deploy in "Internet time":** To remain market-driven, enterprises must be able to deploy their extranet quickly and leverage their existing infrastructure to do so.

c) **Protect the interest of the data owner:** An extranet must ensure that what is supposed to be private stays private.

d) **Serve the partner as a customer:** Partners should never be required to change their security policies, networks, applications and firewalls for the "good" of the extranet community.

e) **Drive information to the decision-maker:** An extranet must provide a central means to measure progress, performance and popularity.

TOPIC 14: E - COMMERCE

Q.No.35. What are the benefits of E-Commerce application implementation? (A)
(PM, M16 MTP1 - 4M)

1. EC presents many benefits to individual organizations, consumers and society as a whole. Some of them are:

    a) <u>Buyers</u> can get the required goods at <u>less cost.</u>

    b) It is not necessary to <u>re-enter data</u>. Thus information processing errors, time and overhead costs can be reduced.

c) Sellers can participate in on-line bidding. Thus selling costs can be reduced.

d) Reduced time to complete business transactions, from delivery to payment.

e) Creation of new markets as it is easy and cheap to reach potential customers.

f) Easy entry into new markets, especially geographically remote markets, for companies of all sizes and locations.

g) Better quality and improved variety of goods can be acquired by consumers because of increase in competition and expanded markets.

h) Reduced inventories.

i) Reduced overhead costs through uniformity, automation and large scale integration of management processes.

j) Reduced delivery cost, especially for goods that can also be delivered electronically.

k) Equal access to markets (i.e. for small-to-medium enterprises and big corporations).

l) Reduced use of ecologically damaging materials.

m) Ability to undertake more global programs.

n) Reduced advertising costs.

Q.No.36. Explain the risks involved in e- commerce? (or) Discuss various risk factors involved in e-Commerce transactions? (A)
(PM, N14 MTP1 - 4M, M16 MTP2 - 4M, N16 MTP1 - 4M, M17 MTP – 4M)

Some of the risks associated with e-commerce are:

a) **Problem of anonymity:** There is need to identify and authenticate users in the virtual global market where anyone can sell to or buy from anyone, anything from anywhere.

b) **Repudiation of contract:** There is possibility that the electronic transaction in the form of contract, sale order or purchase by the trading partner or customer may be denied.

c) **Lack of authenticity of transactions:** The electronic documents that are produced in the course of an e-Commerce transaction may not be authentic and reliable.

d) **Data Loss or theft or duplication:** The data transmitted over the Internet may be lost, duplicated, tampered with or replayed.

e) **Attack from hackers:** Web servers used for e-Commerce may be vulnerable to hackers.

f) **Denial of Service:** Service to customers may be denied due to non-availability of system as it may be affected by viruses, e-mail bombs and floods.

g) **Non-recognition of electronic transactions:** E-Commerce transactions, as electronic records and digital signatures may not be recognized as evidence in courts of law.

h) **Lack of audit trails:** Audit trails in e-Commerce system may be lacking and the logs may be incomplete, too voluminous or easily tampered with.

i) **Problem of piracy:** Intellectual property may not be adequately protected when such property is transacted through e-Commerce.

Q.No.37. Write about different types of E-Commerce (or) Different classes of E-Commerce? (B)
(PM)

Following are the general classes of e-Commerce applications

1. **Business-to-Business (B2B) e-Commerce:**

   a) B2B refers to the exchange of services, information and/or products from one business to another.

   b) Typically takes the form of <u>automated processes</u> between trading partners and is performed in much higher volumes than Business-to-Consumer (B2C) applications.

   c) It *can also <u>encompass</u> marketing activities between businesses and not just the final transactions that result from marketing.*

2. <u>Business-to-Consumer (B2C) e-Commerce:</u>   **(M16 RTP)**

   a) It is defined as the <u>exchange of services, information and/or products</u> from a business to a consumer, as opposed to between one business and another.

   b) It has a <u>virtual store</u> available for consumers to purchase goods and services eliminating the need to physically view or pick up the merchandise.

   c) This model <u>can save time and money</u> by doing business electronically.

   d) *B2C provides <u>safe and secure</u> as well as easy-to- use options.*

<u>Advantages of B2C e-commerce:</u>   **(N16 RTP)**

   a) Shopping can be faster and more convenient

   b) Offerings and prices can change instantaneously.

   c) Call centers can be integrated with the website.

   d) Broadband telecommunications will enhance the buying experience.

3. <u>Consumer-to-Business (C2B) e-Commerce:</u>

   a) In this model, <u>consumers directly contact</u> with business vendors by posting their project work online so that the needy companies review it and contact the consumer directly with bid.

   b) The <u>consumer reviews</u> all the bids and selects the company for further processing.

   c) Some examples are guru.com, rentacoder.com, getacoder.com, freelancer.com.

4. <u>Consumer-to-Consumer (C2C) e-Commerce:</u>

   a) It is an <u>Internet-facilitated</u> form of commerce that has existed for <u>the span of history</u> in the form of barter, flea markets, swap meets, yard sales and the like.

   b) C2C e-Commerce sites provide a <u>virtual environment</u> in which consumers can sell to one another through a <u>third-party intermediary</u>.

5. <u>Business-to-Government (B2G) e-Commerce:</u> B2G e-Commerce, also known as <u>e-Government</u>, refers to the use of information and communication technologies to <u>build and strengthen</u> relationships between government and employees, citizens, businesses, non-profit organizations, and other government agencies.

6. <u>Business-to-Employee (B2E) e-Commerce:</u> B2E e-Commerce, from an <u>intra-organizational perspective</u>, has provided the means for a business to offer online products and services to its employees.

TOPIC 15: MOBILE COMMERCE

Q.No.38. Write about Mobile Commerce. (A)   (M11 - 2M, M13 - 4M, N14 RTP)

<u>MEANING:</u>

a) *Mobile Commerce or M-Commerce is about applications and services that are accessible from <u>Internet-enabled mobile devices</u>.*

b) It is the <u>buying and selling of goods and services</u> through wireless handheld devices such as cellular phones, Personal Digital Assistants (PDAs), etc. It is also known as next generation e-commerce.

<u>FEATURES:</u>

a) It involves <u>new technologies, services</u> and <u>business models</u>.

b)　It is quite different from traditional E-Commerce.

c)　This technology is based on Wireless Application Protocol (WAP).

FACILITIES:

a)　Enables users to access the Internet without any wired connection.

b)　*Using Bluetooth technology, smart phones are able to offer fax, e-mail, and phone capabilities all in one.*

c)　The content delivery over wireless devices is faster, more secure, and scalable. So, there is a speculation that m-commerce will surpass wire line e-commerce.

INDUSTRIES AFFECTED BY M-COMMERCE:

a)　**Financial services:** Financial services, which include mobile banking as well as brokerage services, in which stock quotes can be displayed and trading can be done from the same handheld device.

b)　**Telecommunications:** Service charges, bill payment and account reviews in telecommunications, can all be conducted from a handheld device.

c)　**Service/retail:** Consumers can place orders and pay for them on the move.

d)　**Information services:** They include the delivery of financial news, sports updates and traffic updates to individual mobile devices.

TOPIC 16: ELECTRONIC FUNDS TRANSFER

Q.No.39. Define the Electronic Funds Transfer. State some examples of EFT systems in operation?　(A)

a)　EFT stands for "Electronic Funds Transfer".

b)　It represents the ways the business can receive direct deposit of all payments from financial institutions to the company's bank account.

c)　Once the user signs up, money come to him directly and sooner than ever before.

d)　EFT is fast and safe. *It means the money will come to the user's bank account quicker.*

e)　The payment mechanism moves money between accounts in a fast, paperless way.

SOME EXAMPLES

AUTOMATED TELLER MACHINES (ATMS):

a)　ATMs are specialized form of Point of Sale Terminals that are designed for unattended use by a customer of a financial institution.

b)　Consumers can do their banking without the assistance of a teller, or to make deposits, pay bills, or transfer funds from one account to another electronically.

c)　These machines are used with a debit or EFT card and a code, which is often called a personal identification number or "PIN."

d)　*ATM cards can be used to get cash, or to make deposits, pay bills, or transfer funds from one account to another account electronically.*

POINT – OF – SALE (POS) TRANSACTIONS:

a)　Some Debit or EFT cards (sometimes referred to as cheque cards) can be used for shopping that allow the transfer of funds from the consumer's account to the merchant's account.

b)　To pay for a purchase, the consumer presents an EFT card instead of cheque or cash.

c)　Money is taken out of the consumer's account and put into the merchant's account electronically.

PREAUTHORIZED TRANSFERS:

a) This is a method of <u>automatically depositing to or withdrawing</u> funds from an individual's account, when the account holder authorizes the bank or a third party (such as employer) to do so.

b) For example, <u>consumers can authorize</u> direct electronic deposit of wages, social security, or dividend payments to their accounts.

c) They can also authorize financial institutions to make <u>regular, ongoing payments</u> of insurance, mortgage, utility or other bills.

TELEPHONE TRANSFERS:

a) Consumers can transfer funds from one account to another <u>through telephone instructions</u> rather than traditional written authorization.

b) The accounts being debited can be checking or savings, for example—you can order payment of specific bills by phone.

QUESTIONS FOR ACADEMIC INTEREST – FOR STUDENT SELF STUDY

Q.No.40. Write short notes on Telecommunications control software packages? What is Network Management in Computer Networks and what functions does it perform? (B)

Telecommunication Control Software: Consists of programs that control and manage the functions of telecommunication networks and include Telecommunication Monitors, Network Operating Systems, Network Management Components and Communication Packages. **(M17 MTP – 2M)**

NETWORK MANAGEMENT:

1. Telecommunications software packages provide a variety of <u>communication support services</u>.

2. For example, they work with a communications processor to connect and disconnect communications links and establish communications parameters such as transmission speed, mode or direction.

MAJOR NETWORK MANAGEMENT FUNCTIONS:

1. **Traffic management:** Manages network resources and traffic to <u>avoid congestion and optimize telecommunications</u> service levels to users.

2. **Security:** Provides <u>authentication, encryption, and auditing functions</u>, and enforces security policies.

3. **Network monitoring:** <u>Troubleshoot and watch over the network</u>, informing network administrators of potential problems before they occur.

4. **Capacity planning:** <u>Surveys network resources</u> and <u>traffic patterns</u> and users' needs to determine how best to accommodate the needs of the network as it grows and changes.

Q.No.41. Write short notes on public and private networks? (C)

Public Data Network: **(M17 RTP – 2M, N14 MTP1 - 1M)**

a) A public data network is a network <u>shared and accessed</u> by all users across the world.

b) It is a network established and operated by a telecommunications administration for the specific purpose of providing data transmission services for the public.

c) <u>Ex. Internet</u>

Private Data Network:

a) Private Network is used by <u>particular organization</u>, particular campus or particular enterprise only.

b) This is a network that is <u>not available</u> to the outside world.

c) <u>Ex.Intranet.</u>

Q.No.42. Write about Decentralized systems? Explain the Advantages & disadvantages? (C)
(PM)

Decentralized systems:

a) Decentralized computing is the <u>collection of resources</u>, both hardware and software, to each individual workstation, or office location which are capable of running <u>independently</u> of each other.

b) Decentralized systems enable <u>file sharing</u> and all computers can share peripherals such as printers, scanners and modems, allowing all the computers in the network to <u>connect to the internet</u>.

<u>Advantages:</u> A decentralized system utilizes the potential of desktop systems to <u>maximize</u> the <u>potential performance</u> of the business applications.

<u>Disadvantages:</u> All computers have to be <u>updated individually</u> with new software, unlike a centralized computer system.

Q.No.43. Write about Centralized systems? Explain the Advantages and disadvantages of Centralized Computing? (C)
(PM)

Centralized systems:

a) Centralized computing is computing done at a <u>central location</u>, using terminals that are <u>attached to a central computer</u>.

b) The computer itself may <u>control</u> all the <u>peripherals directly</u> or they may be attached via a terminal server.

Advantages:

a) **Ease of management:** There are relatively few computers to manage.

b) **Enhanced security:** The physical and logical securing of the computing environment can be more easily managed since there is only one location and a few computers.

c) **Ease of control:** The introduction of change can be managed closely since there is only one location.

d) **Reduced cost of ownership:** Fewer computing elements to manage and therefore few people are needed to manage them.

e) **Multiple types of workload:** All of the work associated with the business runs at the central computing location.

Disadvantages:

a) The <u>central computer</u> performs the <u>computing function</u>. *If the central computer fails to works, then the <u>entire system will go down</u>.*

b) <u>Central computing</u> relies heavily on the <u>quality of administration</u> and <u>resources provided</u> to its users. *Empowerment of the central computer should be adequate by all means, else the usage suffers greatly.*

**Q.No.44. Write short notes on applications of internet? (B)**

Internet can be used as a very effective media for various applications such as:

a) **E-Commerce:** Electronic commerce transactions between businesses and their suppliers and customers can also performed with online web applications.

b) **Chat rooms:** Using Internet Chat Software, user can log on to certain website and communicate with other users. *This is <u>interactive software</u> that allows users to type comment in one window and receive reply in another. Such websites are called Chat rooms.*

c) **Bulletin Boards:** The Internet provides bulletin board systems formed and managed by thousands of special-interest newsgroups.

d) **E-mail:** It is an electronic mail system in Internet. Each user will be given a unique address. With this user can communicate with any person in the world.ex.gmail.com. *There are different web sites providing this service such as Hotmail.com, Rocketmail.com, P.O.box.com., e-mail.com, yahoo.com, Rediffmail.com, gmail.com, etc.*

e) **Knowledge base:** Internet is a library where companies and establishments provide information about their products and services.

f) **Downloading Software and information:** Internet allows us to download software and information files and accessing databases provided by thousands of businesses, governments, and other organizations.

g) **Data Publishing:** Data publishing is a new opportunity being provided by Internet. Information can be either forwarded to a specified address or stored in a particular place.

Q.No.45. Write about Client-Server Networking? (C)

a) Client-Server technology is one of the predominate information architecture used in business to satisfy its needs.

b) Client/Server network is a computer network in which one centralized powerful computer (called Server) is connected to many less powerful PCs or workstations (called Clients).

c) The clients run programs and access data that are stored on the server.

d) It is a technology in which the server software accepts requests for data from client software and returns the results to the client. The client processes the data and presents the results to the user.

e) Client server technology intelligently divides the processing work between the server and the workstation.

f) The server handles all the global tasks while the workstation handles all the local tasks.

g) The server sends only those records to the workstation that are needed to satisfy the information request. As a result network traffic is significantly reduced.

h) This is a versatile, message based and modular infrastructure.

i) It improves usability, flexibility, interoperability and scalability when compared to centralized, mainframe, time sharing computing.

j) This is very fast, secure, reliable, efficient, inexpensive and easy to use.
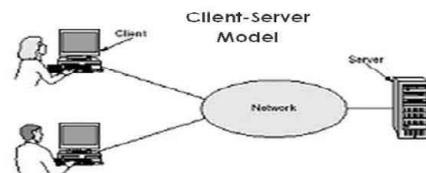
Q.No.46. Write about Local Area Networks (LAN)? Explain characteristics of LAN? (A)

A Local Area Network (LAN) is a group of computers and network devices connected together, usually within the same building, campus or spanned over limited distance. It provides high speed data transfer and is relatively inexpensive.

CHARACTERISTICS: (M17 – 4M)

» **Communication Media:** It uses variety of telecommunications media, such as ordinary telephone wires, coaxial cable, or wireless radio systems to interconnect workstations and peripherals.

» **Network interface card [NIC]:** To communicate over the network, a PC usually has a circuit board called a network interface card.

» **File Server:** It is used for managing files, servicing the network printers, handling communications etc. Server may be dedicated or non-dedicated.

» **Network OS:** It is loaded in the server's hard disk along with system management tools and it controls telecommunications and the use of network resources.

» **Communication and sharing:** LANs allow users in a workgroup to communicate electronically, share hardware, software, and data resources and pool their efforts when working on group projects.

Q.No.47. Why users prefer Local Area Networks? (Or) Of late many users are going for LAN system. Explain? (Or) Factors contributed to the growth of LANs (C)

LANs on a distributed environment allows us to have our own independent processing stations while sharing expensive computer resources like disk files, printers and plotters. Further LAN provides:

a) **Security:** Security for programs and data can be achieved using servers that are locked physically and logically. Diskless nodes also offer security by not allowing users to download important data on floppies or upload unwanted software or virus.

b) **Expanded PC usage through inexpensive workstation:** Once a LAN has been set up, it actually costs less to automate additional employees through diskless PCs. Existing PCs can be easily converted into nodes by adding network interface cards.

   Once LAN is set up; it is very easy and economical to accommodate additional employees.

c) **Distributed processing:** Many PCs are installed around the office and these machines represent the basic platform for a LAN with inter-user communication and information exchange.

d) **Electronic mail and Message Broadcasting:** E-mail allows users to communicate easily with other employees and to communicate a message to everyone, broadcasting facility can be used.

e) **Organizational Benefits:** With the shared computer hardware, software and peripherals, we can reduce cost and there will be drastic reduction in time and cost of training manpower to use the systems.

f) **Data management benefits:** Since data is located centrally on the server, it becomes much easier to manage it, access it, as well as back it up.

g) **Software cost and upgradation:** If the organization is concerned about using licensed software purchasing, a network version can save a lot of money since there would be no need to buy multiple copies of the same software for every machine in the organization.

Q.No.48. Write about Metropolitan Area Network?   (C)

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1. A Metropolitan Area Network (MAN) is somewhere between a LAN and a WAN.

2. MAN refers to a network that connects systems or local area networks within a metropolitan area (roughly 40 kms in length from one point to another).

3. MANs are based on fiber optic transmission technology and provide high speed interconnection between sites.

4. MAN can support both data and voice.

5. Cable television networks are best examples of MANs that distribute television signals.

Q.No.49. Explain the basic features & usage of Wide Area Networks? (C)

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1. Wide Area Networks are telecommunications networks that cover large geographic areas with various communication facilities such as long distance telephone service, satellite transmission, and under-sea cables.

2. These networks cover areas such as:

a) Large city or metropolitan area

b) Whole country

c) Many countries and continents

3. Examples of WANs are <u>interstate banking networks</u> and <u>airline reservation systems</u>.

Q.No.50. Explain the functions of protocols. (C)

1. Network protocols which are essentially <u>software</u> are sets of rules for –

    a) Communicating, timings, sequencing, formatting, and error checking for data transmission.

    b) Providing standards for data communication .

    c) Protocols are stored either in Computer's memory or Memory of transmission device

2. The entire operation of data transmission over a network is broken down into <u>systematic steps</u>.

3. Steps must be carried out in <u>consistent order</u> for every computer in the network, either receiving or sending data.

4. At the <u>sending computer</u>, protocols:

    a) Breakdown <u>data into packets</u>,

    b) Add destination address to the packet,

    c) Prepares data for transmission through Network Interface Card (NIC)

5. At the <u>receiving computer</u>, protocols:

    a) Take <u>data packets</u> from the cable,

    b) Bring packets into computer through Network Interface Card (NIC)

    c) Strip the packets off any transmitting information,

    d) Copy data from packet to a buffer for reassembly,

    e) Pass the <u>reassembled data</u> to the application.

Q.No.51. Write short notes on Virtual Private Networks? (B)
(N14 MTP2-2M, M16 MTP1-2M, N16 MTP2 - 2M)

a) Many organizations use Virtual Private Networks (VPNs) to <u>establish secure intranets</u> and <u>extranets.</u>

b) A VPN is a private network that <u>uses a public network</u> (usually the Internet) to <u>connect remote sites</u> or users together.

c) A key feature of a VPN is its <u>ability to work</u> over both private networks as well as public networks like the <u>Internet</u>.

d) VPN is a <u>secure network</u> that uses the Internet as its main backbone network, but relies on the firewalls and other <u>security features.</u>

Q.No.52. What is a security program? (OR) Write about network risks, controls and security? (C)   **(M16 - 2M)**

<u>NEED FOR SECURITY:</u> The basic objective of providing network security is to

a) To safeguard assets

b) To ensure and maintain data integrity.

Network security consists of provisions made in an underlying computer network infrastructure, policies adopted by the network administrator to <u>protect the network</u> and the <u>network accessible resources</u> from <u>unauthorized access.</u>

There are two types of Systems Security: (N16 RTP)

1. <u>**Physical Security of System:**</u> It is implemented to <u>protect the physical systems' assets</u> of an organization like the personnel, hardware, facilities, supplies and documentation.

2. <u>**Logical Security of System:**</u> It is intended to <u>protect data/information and software</u>. Security administrators tend to have responsibility for controls over malicious and non-malicious threats to physical security, and malicious threats to logical security itself.

Q.No.53. Write short notes on Internet?   (C)

1. The <u>Internet</u> is the <u>massive global system</u> that connects computer networks around the world together.

2. Millions of private, public, academic, business and government networks worldwide connect with each other over the internet to share massive amounts of <u>information, resources and services</u>.

3. The Internet uses the standard Internet protocol suite <u>(TCP/IP)</u> to allow us to connect to each other.

4. It has various <u>information resources</u> and <u>services</u>, such as the web pages of the World Wide Web (WWW), games, videos, images, e-mail, social networking, etc.

5. The Internet carries information from all streams – traditional such as newspaper, book and other print publishing and modern such as <u>blogging and web feeds</u>.

Q.No.54. State some of the business uses of the internet?   (B)
                                                (N11 - 4M, M15RTP, M15 MTP1-3M)

a) Providing <u>customer and vendor support</u>

b) <u>Collaboration</u> among business partners

c) <u>Strategic business alliances</u>

d) Marketing, sales, and customer service applications

e) <u>Growth</u> of cross-functional business applications

f) Enterprise <u>communications and collaboration</u>

g) <u>Attracting new customers</u> with innovative marketing and products.

h) <u>Retaining present customers</u> with improved customer service and support.

i) <u>Developing new web-based markets</u> and distribution channels for existing products.

j) Developing new information-based products <u>accessible on the Web</u>.

k) <u>Generating revenue</u> through electronic commerce applications.

l) <u>Emergence of applications</u> in engineering, manufacturing, human resources and accounting

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Q.No.55. Write short notes on E-Commerce? (B)

a) <u>Electronic commerce</u> is the process of <u>doing business electronically</u>. It involves automation of a variety of business-to-business and business-to-customer transactions through reliable and secure connections.

b) It <u>strengthens relationships</u> with buyers, makes it easier to attract new customers, improves customer responsiveness and opens new markets on a global scale.

c) It is the application of <u>various communication technologies</u> to provide automatic exchange of business information with <u>internal and external customers</u>, suppliers and financial institutions.

d) It helps to <u>cut costs</u> while improving the quality of goods & services and increase the speed of service.

e) It is <u>associated with</u> buying and selling of information, products & services via computer networks.

f) It is a <u>sophisticated</u> combination of technologies and consumer-based services <u>integrated</u> to form a new paradigm in business transaction processing.

g) It is the <u>automation of the business process</u> between buyers and <u>sellers.</u>

Q.No.56. What are the Key aspects to be considered in implementing e-commerce? (or) What are the key aspects for <u>Successful implementation</u> of e-Commerce?   (C)

Key aspects to be considered are:

1. <u>Successful implementation</u> of e-Commerce requires

   a) <u>Involvement</u> of key stakeholders, Key trading partners, external auditors, and representatives from other institutions *such as banks, trading houses, brokers, and other third-party services.*

   b) <u>Ideal Representatives</u> from accounting/ finance, internal audit, IT security, telecommunications, end users, system analysts and legal.

   c) <u>Implementing</u> appropriate policies, standards and guidelines

   d) Performing <u>cost benefit analysis</u> and <u>risk assessment</u>.

   e) Implementing the <u>right level of security across</u> all layers and processes

   f) <u>Integration of e-Commerce</u> with the business process and the physical delivery channels

   g) Providing adequate user training

   h) Performing <u>post implementation review</u> to ensure controls are working as envisaged.

Q.No.57. Discuss strategic capabilities of internet along with their business application. (or) Discuss the business value of telecommunications?   (C)   (PM)

1. The strategic capabilities of telecommunications and other information technologies include:

   a) **Overcome geographic barriers:** Capture information about business transactions from remote locations.

   b) **Overcome time barriers:** Provide information to <u>remote locations</u> immediately after it is requested.

   c) **Overcome cost barriers:** Reduce the cost of more traditional means of communication. For example – videoconferencing, E-mailing.

   d) **Overcome structural barriers:** Support linkages for <u>competitive advantage</u>. For example – B2B E-commerce websites.

   e) **Restructuring business relationships**: Telecommunications restructure the   interactions of people within a firm as well as with customers.

2. A telecommunication network can improve communication, reduce costs, improve efficiency, reduce errors and improve consistency in an organization.

THE END