UNIT I FUNDAMENTALS AND LINK LAYER
PART-A

1   Compare LAN and WAN.

LAN	WAN
Scope of Local Area Network is restricted to a small/ single building	Scope of Wide Area Network spans over large geographical area country/ Continent
LAN is owned by some organization.	A part of n/w asserts are owned or not owned.
Data rate of LAN 10-.10-100mbps.	Data rate of WAN is Gigabyte.

2   Define Full Duplex and simplex transmission system.

With Full duplex transmission, two stations can simultaneously send and receive data from each other. This mode is known as two-way simultaneous. The signals are transmitted in only one direction. One is the sender and another is the receiver.

3   Why sliding window flow control is considered to be more efficient than stop and wait flow control?

In sliding window flow control, the transmission link is treated as a pipeline that may be filled with frames in transit. But with stop-and-wait flow control only one frame may be in the pipe at a time.

4   Differentiate between lost frame and damaged frame? What is the difference between stop and wait and sliding window protocol? *(Nov 2012)*

Lost Frame	Damaged Frame
Lost frame is the frame that fails to arrive at the other side.	The damaged frame is a recognizable frame does arrive, but some of the bits are in error

Stop and Wait Protocol	Sliding Window Protocol
In stop and wait protocol, we can send one frame at a time	In sliding window protocol we can send multiple frames at a time.
Shows poor performance than Sliding Window Protocol, comparatively	As sliding window doesn't waste network bandwidth compared with stop-n-wait, both in normal and in congested condition, sliding window show better performance than stop-n-wait.

5   Define Piggybacking?

The technique of temporarily delaying outgoing acknowledgment so that they can be hooked onto the next outgoing data frame is widely known as piggybacking.

6   What is OSI?

OSI (Open Systems Interconnection) is reference model for how applications can communicate over a network. It is partitioned into seven layers. It was developed by the International Organization for Standardization (ISO).

7   What is a protocol? What are the key elements of a protocol? *(Nov 2015)*

Protocol is used for communications between entities in a system and must speak the same language. Protocol is the set of rules governing the exchange of data between two entities. It defines what is communicated, how it is communicated, when it is communicated. The Key elements of a Protocol are as follows,

- **Syntax** – It refers to the structure or format of data meaning the order in which they are presented.
- **Semantics** – It refers to the meaning of each section of bit. How to do

interpretation.

- **Timing** – When data should be sent and how fast they can be sent.

8 **What are the uses of transport layer?**
- Reliable data exchange
- Independent of network being used
- Independent of application

9 **What is Protocol Data Unit (PDU)?**
At each layer, protocols are used to communicate and Control information is added to user data at each layer. Transport layer may fragment user data. Each fragment has a transport header added and header consists of destination SAP, sequence number and error detection code.

10 **What are the uses of internet layer in TCP/IP?**
- Systems may be attached to different networks
- Routing functions across multiple networks
- Implemented in end systems and routers

11 **What is a layered Network Architecture?**
- A layer is created when a different level of abstraction occurs at protocol. Each layer should perform a well defined function.
- Function of each layer should be chosen using internationality standardized protocols. Boundaries between should be chosen to minimize information flow across the interfaces.
- A set of layers and protocol is called network architecture. A list of protocols used by a system is called protocol stack.

12 **Compare OSI and TCP.**

Open System Interconnection	Transmission Control Protocol
It distinguishes between Service, Interface, Protocol	It does not distinguish between Service,Interface,Protocol
Protocols are well hidden	Protocols are not just hidden
Dejure standard Fit Model	Defacto standard Fit Model
In transport layer only connection oriented services are available	In Transport layer choice is for connection oriented and connectionless
Contains 7 layers	Contains 5 layers

13 **Why is flow control and error control duplicated in different layers?**
Like the data link layer, the transport layer is responsible for flow and error control. Flow control and error control at data link layer is node-to-node level. But at transport layer, flow control and error control is performed end-end rather than across a single link.

14 **How do layers of the internet model correlate to the layers of the OSI model?**

OSI	TCP/IP
Physical Layer	Physical Layer
Data Link Layer	Network Access Layer
Network Layer	IP Layer
Transport Layer	TCP Layer
Session Layer	
Presentation Layer	Application Layer
Application layer	

15 **What is the use of data link layer in OSI?** *(Nov 2015)*
- **Frame synchronization**: Data is divided by data link layer as frames, a manageable unit.
- **Flow Control**: Sending station does not overwhelm receiving station.

- **Error Control**: Any error in bits must be detected and corrected using some mechanism.
- **Addressing**: Two stations in a multi point that involved in transmission must be specified using physical address
- **Access Control**: When two or more devices are connected to the same link, Access control mechanism is needed to determine which device has control over the link at any given time.

16 **List the key ingredients of technology that determines nature of a LAN. List the common topologies available for LAN.**

Topology, Transmission medium and Medium access control technique are the technology that determines nature of a LAN. Star Topology, Ring Topology, Bus Topology and Tree Topology are the topologies available for LAN.

17 **What are the functions of physical layer and presentation layer?**

   Functions of Physical Layer-
   - Encoding/ decoding of signals
   - Preamble generation/removal (for synchronization)
   - Bit transmission/ reception

   Functions of Presentation Layer-
   - Translation, Encryption / Decryption, Authentication and Compression

18 **What do you mean by Flow Control?** *(Nov 2011)(May 2016)*

Flow control is a technique for assuring that a transmitting entity does not overwhelm a receiving entity with data. It is a feedback mechanism by which the receiver is able to regulate the sender. Such a mechanism is used to keep the sender from overrunning the receiver, i.e., from transmitting more data than the receiver is able to process

19 **Define error detection and correction.** *(Nov 2011)*

Error detection: Sender transmits every data unit twice. Receiver performs bit-by-bit comparison between two versions of data. Any mismatch would indicate an error, which needs error correction. Error Correction is the process or analyzing and rectifying the errors and the code.

20 **What are the functions of Application Layer?** *(Apr 2011)*

It enables the user (human/software) to access the network. It provides user interfaces and support for services such as electronic mail, remote file access and transfer, shared database management and other types of distributed information services. Services provided by the application layer are Network Virtual terminal, File transfer, access and management. Mail services, Directory services.

PART-B

1 **Explain in detail the error detection.**

2 **Explain about internet architecture.**

3 **Discuss in detail about the layers in OSI model**

4 **Explain various flow control mechanisms. i)Stop Wait protocol ii)Sliding window protocol**

UNIT II   MEDIA ACCESS & INTERNETWORKING

PART-A

1 **List the advantages of a centralized scheme.**
It may afford greater control over access for priorities, overrides, and guaranteed capacity.
It enables the use of relatively simple access logic at each station.
It avoids problems of distributed coordination among peer entities.

2 **Mention some of the physical properties of Ethernet.** *(May 2011)*
The Ethernet is a multiple-access network, meaning that a set of nodes send and receive frames over a shared link. An Ethernet is like a bus that has multiple stations plugged into it.

3 **When a transmitting station will insert a new token on the ring?**
It will insert a new token when the station has completed transmission of its frame.
The leading edge of the transmitted frame has returned to the station.

4 **List the rules for CSMA/CD.**
1. If the medium is idle, transmit; otherwise go to step 2.
2. If the medium is busy, continue to listen until the channel is idle, and then transmit immediately.
3. If a collision detected during transmission, transmit a brief jamming signal to all station to indicate collision has occurred and then cease transmission.

5 **What is Early Token Release (ETR)?**
ETR allows a transmitting station to release a token as soon as it completes frame transmission, whether or not the frame header has returned to the station.

6 **What is CSMA/CD?** *(Nov 2011)*
Carrier Sense Multiple Access with Collision Detection is one of the methods of medium access. It is used to sense whether a medium is busy before transmission. If the medium is busy, it refrains from transmitting the data or else proceeds with the transmission. Also has the ability to check whether a transmission has collided with another.

7 **What is a bridge?** *(Nov 2011)*
Bridge is a hardware networking device used to connect two LANs. A bridge operates at data link layer of the OSI layer. A bridge observes and forwards all frames that i receives. It does forwarding & filtering frames using LAN destination address. Bridges are used to connect LAN or WAN and works at data link layer level. Collisior Probability is more.

8 **What is the advantage of FDDI over a basic token ring?** *(Nov 2010)*

FDDI	Token Ring (IEEE 802.5)
No priority and reservation bits.	It has priority scheme by using reservation bits.
No need of converting a token to start of data frame by inverting token bits because of high data rate.	It converts a token to data frame changing token frame.
A station that transmits data frames releases a new token as soon as it completes data.	A station that data transmissions after releasing back its own transmission, release the token.

9 **Give the format of Ethernet address.**

Preamble	Dest addr	Src addr	Type	Body	CRC
64	48	48	16		32

10 **What is meant by the contention period of Ethernet? How many lines are required to connect n systems in Direct Mesh topology?**
When several stations on an Ethernet have data to send, there are contention periods during which collisions happen and no data is successfully transmitted. $n(n-1)/2$

lines are required.

11   **What does IEEE 10 Base 5 standard signify?**

- 10 represents data rate 10 Mbps , 5 refers to segment length 5* 100 m that can run without repeaters
- Base represents Base band communication.

12   **Define Repeater and Hub.**

Repeaters and hubs are interconnecting devices.

Repeater: Repeaters extends the Ethernet segment and it repeats the signal. It does not amplify the signal. **Hub:** A Hub has several point to point segments coming out. It is a multi way repeater. It broadcasts any signal through all outgoing lines.

13   **What is meant by Exponential back of algorithm?**

After first collision, each station waits either 0 or 1 slot time before trying again. If two stations collide and each one picks same random number 0/1. After second collision, each one picks 0, 1, 2 or 3 slot at random and waits. If collision occurs again, then next time the number of slots to wait is chosen at random from 0 to [2^3 – 1]. This algorithm is called binary exponential "back off algorithm".

14   **Mention the different types of bridge. What are the limitations of bridges?** *(Nov/Dec 2013)*

- Simple Bridge connects two LAN
- Multi port Bridge connect more than 2 LANs
- Transparent Bridge it learns on its own about connected LANs.
    The limitations of bridges: Scalability and Heterogeneity

15   **What are the functions of Bridges?** *(Nov 2010)*

- A bridge should have enough buffer space to store the frames until it is transmitted.
- It should be able to distinguish addresses of host on different LAN.
- It can contain information about other bridges.
- It should follow congestion control mechanisms to overcome congestion.
- It works at layer 1 and layer 2.

16   **List out any four IEEE 802 standard with its name.** *(May 2012)*

The IEEE 802 family of standards is maintained by the IEEE 802 LAN/MAN Standards Committee (LMSC). The most widely used standards are for the Ethernet family, Token Ring, Wireless LAN, Bridging and Virtual Bridged LANs. An individual Working Group provides the focus for each area.

17   **Define Bridge and Switch.** *(May 2012)*

Bridge: used to send the message from one LAN into another LAN.

Switch: used to send the data from one node into another node directly in the network.

18   **What is packet switching?** *(Nov 2012)*

In a packet-switched network, it's not necessary to dedicate transmission capacity along a path through the network. Rather, data are sent out in a sequence of small chunks, called packets. Packet switching is mainly used in terminal-to-computer and computer-to-computer communications.

19   **Define Unicasting, Broadcasting and Multicasting.** *(Nov 2011)*

- Unicasting: Transmitting data from a single sender to a single receiver.
- Broadcasting: Transmitting data from a single source to all the other nodes in the network
- Multicasting: Transmitting data from a single source to a group of destination nodes.

20   **What is IP address?**
       An Internet Address is made of four bytes (32 bits) that define a host's connection to a
       network. There are currently 5 different field lengths patterns, each define a class of
       addresses. These are designed to cover the needs of different types of organizations,
       class A, B, C, D, E.

1   **Discuss in detail about the Ethernet.**

2   **Explain CSMA in detail.**

3   **Explain the functioning of wireless LAN in detail.**

4   **Explain in detail about IP v4 addressing methods.**

5   Explain in detail about DHCP,ICMP and CIDR

UNIT III   ROUTING

UNIT-III / PART-A

1   **Define routing.** *(Nov 2012,15)*
       It is the process of building up the tables that allow the collect output for a packet to
       be determined. It is a lot harder to create the forwarding tables in large, complex
       networks with dynamically changing topologies and multiple paths between
       destinations. Routing is a process that takes place in the background so that, when a
       data packet turns up, we will have the right information in the forwarding table to be
       able to forward, or switch, the packet.
2   **Write on the packet cost referred in distance vector and link state routing.** *(May
       2012)*
       In distance vector routing, cost refer to hop count while in case of link state routing,
       cost is a weighted value based on a variety of factors such as security levels, traffic or
       the state of the link.
3   **What is source routing?** *(Nov 2013)*
       Rotation, stripping off and using pointers are the different types of source routing
       approach.
4   **What is the function of a router?** *(Nov 2010)*
       Routers relay packets among multiple interconnected networks. They route packets

from one network to any of a number of potential destination networks on internet. A router operates as the physical, data link and network layer of the OSI model. A router is termed as an intelligent device. Therefore, its capabilities are much more than those of a repeater or a bridge. A router is useful for interconnecting two or more heterogeneous networks that differ in their physical characteristics such as frame size, transmission rates, topologies, addressing etc. A router has to determine the best possible transmission path among several available paths. Destination, Cost and Next Hop are the important fields in a routing table

5   **Define ARP (or) what is the need of ARP?** *(Nov 2013)*

Associates an IP address with physical address. It is used to find the physical address of the node when its Internet address is known. Any time a host/router needs to find the physical address of another host on its network, it formats an ARP query packet that includes the IP address and broadcasts it. All hosts in the network process the ARP packet but only the required station sends back physical address.

6   **What is the role of VCI?** *(May 2011)*

An Incoming virtual circuit identifier (VCI) uniquely identifies the connection at this switch and that will be carried inside the header of the packets that belong to this connection. It is a potentially different outgoing VCI that will be used for outgoing packets. The combination of incoming interface and incoming VCI uniquely identifies the virtual connection. VCI assigned by n/w admin is an unused value on that interface and VCIs are unique on a link and not on entire n/w.

7   **Write the difference between Distance vector routing and Link state routing.**

Distance Vector Routing	Link state routing
Basic idea is each node sends its knowledge about the entire network to its neighbors.	Basic idea is every node sends its knowledge about its neighbors to the entire network
It is dynamic routing	It is dynamic routing
RIP uses Distance vector routing	OSPF uses link state routing

8   **What is subnetting?** *(Nov 2011,15)*

The whole network can't manage by single server, so that the entire network divided into small network in order to manage the network easily. Subnetting provides an elegantly simple way to reduce the total number of network numbers that are assigned. The idea is to take a single IP network number and allocate the IP address with that network to several physical networks, which are now referred to as subnets.

9   **State the rules of non boundary-level masking?** *(May 2012)*

• The bytes in the IP address that corresponds to 255 in the mask will be repeated in the sub network address

• The bytes in the IP address that corresponds to 0 in the mask will change to 0 in the sub network address

• For other bytes, use the bit-wise AND operator.

Example-

IP address	45	123	21	8
Mask	255	192	0	0
Subnet	45	64	0	0
123		0 1 1 1 1 0 1 1		
192		1 1 0 0 0 0 0 0		
64		0 1 0 0 0 0 0 0		

10 **Define MTU.**

A maximum transmission unit (MTU) is the largest size packet or frame, specified in octets (eight-bit bytes), that can be sent in a packet- or frame-based network such as

the Internet. The Internet's Transmission Control Protocol (TCP) uses the MTU to determine the maximum size of each packet in any transmission.

11 **What are data grams?**

In datagram approach, each packet is treated independently from all others. Even when one packet represents just a place of a multi packet transmission, the network treats it although it existed alone. Packets in this technology are referred to as datagram.

12 **What does Border Gateway Protocol (BGP) mean?**

Border Gateway Protocol (BGP) is a routing protocol used to transfer data and information between different host gateways, the Internet or autonomous systems. BGP is a Path Vector Protocol (PVP), which maintains paths to different hosts, networks and gateway routers and determines the routing decision based on that. It does not use Interior Gateway Protocol (IGP) metrics for routing decisions, but only decides the route based on path, network policies and rule sets. Sometimes, BGP is described as a reach ability protocol rather than a routing protocol.

13 **Explain IPV6 protocol.**

IPv6 (Internet Protocol version 6) is a set of basics of IPv6 are similar to those of IPv4. The most obvious improvement in IPv6 over IPv4 is that IP addresses are lengthened from 32 bits to 128 bits. This extension anticipates considerable future growth of the Internet and provides relief for what was perceived as an impending shortage of network addresses. IPv6 also supports auto-configuration to help correct most of the shortcomings in version 4, and it has integrated security and mobility features.

14 **What is RIP?**

RIP (Routing Information Protocol) is a widely-used protocol for managing router information within a self-contained network such as a corporate local area network or an interconnected group of such LANs. Using RIP, a gateway host (with a router) sends its entire routing table (which lists all the other hosts it knows about) to its closest neighbor host every 30 seconds. The neighbor host in turn will pass the information on to its next neighbor and so on until all hosts within the network have the same knowledge of routing paths, a state known as network convergence.

15 **Explain about OSPF.**

OSPF (Open Shortest Path First) is a router protocol used within larger autonomous system networks in preference to the Routing Information Protocol (RIP), an older routing protocol that is installed in many of today's corporate networks. Using OSPF, a host that obtains a change to a routing table or detects a change in the network immediately multicasts the information to all other hosts in the network so that all will have the same routing table information.

16 **Explain Multicast routing?**

Multicast IP Routing protocols are used to distribute data (for example, audio/video streaming broadcasts) to multiple recipients. Using multicast, a source can send a single copy of data to a single multicast address, which is then distributed to an entire group of recipients.

17 **Expand ICMP and write the function.**

Internet Control Message Protocol. ICMP is an error reporting mechanism. It does not specify the action to be taken for each possible error. The source must relate the error to an individual application program and take other actions to correct the problem.

18 **Write the types of connecting devices in networking.**

The types of connecting devices in networking are Hub, Switch, Router and Bridge

19 **What is PIM?**

Protocol-Independent Multicast (PIM) is a family of multicast routing

protocols for Internet Protocol (IP) networks that provide one-to-many and many-to-many distribution of data over a LAN, WAN or the Internet. It is termed *protocol-independent* because PIM does not include its own topology discovery mechanism, but instead uses routing information supplied by other routing protocols.

There are four variants of PIM:
- PIM Source-Specific Multicast
- Bidirectional PIM
- PIM Dense Mode
- PIM Sparse Mode

20 **What is DVMRP?**

The Distance Vector Multicast Routing Protocol (DVMRP), is a routing protocol used to share information between routers to facilitate the transportation of IP multicast packets among networks. The protocol is based on the RIP protocol. The router generates a routing table with the multicast group of which it has knowledge with corresponding distances. When a multicast packet is received by a router, it is forwarded by the router's interfaces specified in the routing table.

UNIT-III / PART-B

1 **Discuss about Link-state routing and routers.**

2 **Explain about the inter domain routing (BGP) routing algorithms.**

3 **Explain about IPV6?Compare IPV4 and IPV6**

4 **Explain the Routing Information protocol/Distance vector routing in detail**

5 **Explain in detail about Multicast Addressing and Global Internet.**

UNIT IV   TRANSPORT LAYER

UNIT IV - PART A

1 **Give any two Transport layer service. *(Dec 2012)***

Multiplexing: Transport layer performs multiplexing/de-multiplexing function. Multiple applications employ same transport protocol, but use different port number. According to lower layer n/w protocol, it does upward multiplexing or downward multiplexing.

Reliability: Error Control and Flow Control.

2 **Mention the various adaptive retransmission policy of TCP.**
- Simple average
- Exponential / weighted average
- Exponential RTT backoff
- Jacobson's Algorithm

3 **Define congestion. (Nov 2011)**

Congestion in a network occurs if user sends data into the network at a rate greater

than that allowed by network resources. Any given node has a number of I/O ports attached to it. There are two buffers at each port. One to accept arriving packets & another one to hold packets that are waiting to depart. If packets arrive too fast node than to process them or faster than packets can be cleared from the outgoing buffers, then there will be no empty buffer. Thus causing congestion and traffic in the network.

4 **Why the congestion occur in network?**

Congestion occurs because the switches in a network have a limited buffer size to store arrived packets. And also because the packets arrive at a faster rate than what the receiver can receive and process the packets.

5 **What is Tiny gram?**

A very small packet of data is called a tiny gram. Too many tiny grams can congest a network connection.

6 **Give the datagram format of UDP?**

The basic idea of UDP is for a source process to send a message to a port and for the destination process to receive the message from a port.

• **Source port address**: It is the address of the application program that has created the message.

• **Destination port address:** It is the address of the application program that will receive the message.

• **Total Length:** It defines the total length of the user datagram in bytes.

• **Checksum:** It is a 16 bit field used in error correction.

Source Port Address 16 bits	Destination Port Address 16 bits
Total Length 16 bits	Checksum 16 bits

7 **What is the main difference between TCP & UDP?**

TCP	UDP
It provides Connection oriented service	Provides connectionless service.
Connection Establishment delay will be there	No connection establishment delay
Provides reliable service	Provides unreliable, but fast service
It is used by FTP, SMTP	It is used by DNS, SNMP, audio, video and multimedia applications.

8 **What are the advantages of using UDP over TCP?** *(Nov 2010)*

UDP is very useful for audio or video delivery which does not need acknowledgement. It is useful in the transmission of multimedia data. Connection Establishment delay will occur in TCP.

9 **What is TCP?** *(Nov/Dec 2011)*

Transmission Control Protocol provides Connection oriented and reliable services. TCP guarantees the reliable, in order delivery of a stream of bytes. It is a full-duplex protocol, meaning that each TCP connection supports a pair of byte streams, one flowing in each direction. It is used by FTP, SMTP. The different phases in TCP state machine are Connection Establishment, Data transfer and Connection Release. TCP services to provide reliable communication are Error control, Flow control, Connection control and Congestion control.

10 **Name the policies that can prevent (avoid) congestion.**

• DEC (Digital Equipment Corporation) bit.

• Random Early Detection (RED).

• Source based congestion avoidance.

The congestion may be avoided by two bits:

• BECN - Backward Explicit Congestion Notification

- FECN - Forward Explicit Congestion Notification.

11 **List out various congestion control techniques.**
- AIMD (Additive Increase Multiplicative Decrease)
- Slow start
- Fast retransmit
- Recovery

12 **What is the difference between service point address, logical address and physical address?**

Service point addressing	Logical addressing	Physical addressing
The transport layer header includes a type of address called a service point address or port address, which makes a data delivery from a specific process on one computer to a specific process on another computer.	If a packet passes the network boundary we need another addressing to differentiate the source and destination systems. The network layer adds a header, which indicates the logical address of the sender and receiver.	If the frames are to be distributed to different systems on the network, the data link layer adds the header, which defines the source machine's address and the destination Machine's address.

13 **What is the use of UDP's Pseudo header?**
The pseudo header consists of three field from the IP header protocol number ,source IP address and destination IP address plus the UDP length field (which is included twice in checksum calculation).The pseudo header is used to check whether the message is delivered between 2 endpoints.

14 **What are the two categories of QoS attributes?**
User Oriented and Network Oriented. User related attributes are
- SCR – Sustainable Cell Rate
- PCR – Peak Cell Rate
- MCR- Minimum Cell Rate
- CVDT – Cell Variation Delay Tolerance.
The network related attributes are,
  - Cell loss ratio (CLR),
  - Cell transfer delay (CTD),
  - Cell delay variation (CDV),
  - Cell error ratio (CER).

15 **Suppose TCP operates over a 1-Gbps link, utilizing the full bandwidth continuously. How long will it take for the sequence numbers to wrap around completely? Suppose an added 32-bit timestamp field increments 1000 times during this wrap around time, how long it will take timestamp filed to wrap around?**
(May 2013)
Once a segment with sequence x survives in Internet, TCP cannot use the same sequence no. How fast 32-bit sequence no space can be consumed? 32-bit sequence no is adequate for today's network.
Wrap Around Time for T3-45Mbps (2^{32} x 8) /45Mbps=763.55sec=12.73 min.

16 **Write short notes on congestion control.** *(Nov 2012)*

It involves preventing too much data from being injected into the network, thereby causing switches or links to become overloaded. Thus flow control is an end to an end issue, while congestion control is concerned with how hosts and networks interact.

17 **Differentiate congestion control and flow control.** *(Nov 2013,15)*

Congestion Control	Flow Control
Congestion control means preventing the source from sending data that will end up getting dropped by a router because its queue is full.	Flow control means preventing the source from sending data that the receiver will end up dropping because it runs out of buffer space.
This is more complicated, because packets from different sources travelling different paths can converge on the same queue.	This is fairly easy with a sliding window protocol

18 **What do you mean by QoS?** *(May 2012) (Nov 2015)*

The quality of service defines a set of attributes related to the performance of the connection. For each connection, the user can request a particular attribute each service class is associated with a set of attributes.

19 **What are the four aspects related to the reliable delivery of data?** *(May 2012)*

The four aspects are Error control, Sequence control, Loss control and Duplication control.

20 **What is UDP?**

It stands for User Datagram Protocol. It is part of the TCP/IP suite of protocols used for data transferring. UDP is a known as a "stateless" protocol, meaning it doesn't acknowledge that the packets being sent, have been received.

21 **What do you mean by slow start in TCP congestion?** *(May 2016)*

TCP slow start is an algorithm which balances the speed of a network connection. Slow start gradually increases the amount of data transmitted until it finds the network's maximum carrying capacity.

22 **List the different phases used in TCP Connection.** *(May 2016)*

The different phases used in TCP connection are
   • Connection establishment Phase
   • Data transfer
   • Connection Termination Phase

UNIT IV - PART B

1 **Write short notes on** *(May 2012)*
   (i) TCP segment format   (ii) Silly window syndrome (Or) discuss the silly window syndrome and explain how to avoid it.

2 **With neat architecture, Explain TCP and its sliding window algorithm for flow control.***(Nov 2015)*

3 **Describe with examples the three mechanisms by which congestion control is achieved in TCP.** *(Nov 2013,15)(May 2015,16)*

4 **Discuss TCP congestion avoidance algorithm in detail. (Or) DEC bit method.** *(May 2012)*

UNIT V   APPLICATION LAYER

UNIT V - PART A

1   **Why do we need a Domain Name System? What role does the DNS Resolver play in the DNS system?** *(Nov/Dec 2012)*
Domain Name System can map a name to an address and conversely an address to name. The Domain Name System converts domain names into IP numbers. IP numbers uniquely identify hosts on the Internet: however they are difficult to remember. We therefore need a memorable way of identifying hosts. A DNS Resolver is responsible for making requests of the local DNS server in behalf of clients. A DNS Resolver must know the IP address of at least one DNS server. It uses this address to start the DNS Lookup process.

2   **What are the four main properties of HTTP?**
   - Global Uniform Resource Identifier.
   - Request-response exchange.
   - Statelessness.
   - Resource metadata.

3   **What is WWW and SMTP?** *(Nov 2010,15)(May 2015)*
World Wide Web is an internet application that allows user to view pages and move from one web page to another. It helps to store and share data across varied distances. The TCP/IP protocol that supports electronic mail on the Internet is called Simple Mail Transfer (SMTP). It is a system for sending messages to other computer users based on e-mail addresses.

4   **What are the four groups of HTTP Headers? What are the two methods of HTTP?** *(May/June 2015) (Nov 2015)*
The four groups of HTTP headers are
   General headers
   Entity Headers
   Request Headers
   Response Headers.
Two methods of HTTP are
   - GetMethod( )
   - PostMethod( )

5   **What is PGP?** *(Nov 2010, May 2012)*
Pretty Good Privacy (PGP) is used to provide security for electronic mail. It provides authentication, confidentiality, data integrity, and non-repudiation. It is a program using public key encryption popularly used with email.

6   **What are the transmission modes of FTP?**
   - Stream mode: Default mode and data is delivered from FTP to TCP as a continuous stream of data.
   - Block mode: Data is delivered from FTP to TCP in terms of blocks. Each data block follows the three byte header.
   - Compressed mode: File is compressed before transmitting if size is big. Run length encoding method is used for compression.

7   **Why is an application such as POP needed for electronic messaging?** *(May 2012)*
Workstations interact with the SMTP host, which receives the mail on behalf of every host in the organization, to retrieve messages by using a client-server protocol such as

Post Office Protocol. Although POP3 is used to download messages from the server, the SMTP client still needed on the desktop to forward messages from the workstation user to its SMTP mail server.

8 **What are the TCP connections needed in FTP?**

FTP establishes two connections between the hosts. One connection is used for data transfer, the other for control information. The control connection uses very simple rules of communication. The data connection needs more complex rules due to the variety of data types transferred.

9 **Compare the HTTP and FTP.**

FTP	HTTP
FTP transfers the file from client to server and server to client.	HTTP transfer the file from server to client.(i.e. web pages)
It uses two different port connections. (i.e. port 20 and port 21)	HTTP use only one port connection. (i.e. Port 80)
FTP uses two parallel TCP connections to transfer a file. They are Control Connection and Data connection.	It also uses TCP protocol.
Out – of – band	In – band

10 **What is the use of MIME Extension?**

Multipurpose Internet Mail Extensions (MIME) is a supplementary protocol that allows non-ASCII data to be sent through SMTP. MIME transforms non-ASCII data at the sender site to NVT ASCII data and deliverers it to the client SMTP to be sent through the Internet.

MIME converts binary files, executed files into text files. Then only it can be transmitted using SMTP

11 **Which protocol support email and give details about that protocol? What are the basic functions of e-mail?**

SMTP is a standard protocol for transferring mails using TCP/IP

- SMTP standardization for message character is 7 bit ASCII
- SMTP adds log info to the start (i.e.) path of the message.

Basic functions of e-mail: composition, Transfer, Reporting, Displaying, and Disposition.

12 **What is POP3?**

POP3 (Post Office Protocol 3) is the most recent version of a standard protocol for receiving e-mail. POP3 is a client/server protocol in which e-mail is received and held for you by your Internet server.

POP and IMAP deal with the receiving of e-mail and are not to be confused with the Simple Mail Transfer Protocol (SMTP), a protocol for transferring e-mail across the Internet.

13 **What is IMAP?**

Internet Message Access Protocol (IMAP) is a standard protocol for accessing e-mail from your local server. IMAP is a client/server protocol in which e-mail is received and held for you by your Internet server. MAP can be thought of as a remote file server. POP3 can be thought of as a "store-and-forward" service.

14 **What is use of digital signature?**

Digital signature is a method to authenticate the sender of a message. It is similar to that of signing transactions documents when you do business with a bank. In network transactions, you can create an equivalent of an electronic or digital signature by the way you send data. Data appended to, or a data unit that allows a recipient of the data unit to prove the source and integrity if the data unit and protect against forgery.

15   **What is a URL, web browser and rlogin?**(*May 2016*)
- Uniform Resource Locator is a string identifier that identifies a page on the World Wide Web.
- Web browser is a software program that interprets and displays the contents of HTML web pages.
- Remote login or rlogin is used to login into remote system and access its contents.

16   **Discuss the three main division of the domain name space.** *(May 2012)*

Domain name space is divided into three different sections: generic domains, country domains & inverse domain.
- Generic domain: Define registered hosts according to their generic behavior, uses generic suffixes.
- Country domain: Uses two characters to identify a country as the last suffix.
- Inverse domain: Finds the domain name given the IP address.

17   **Name four factors needed for a secure network?**

Privacy: The sender and the receiver expect confidentiality.

Authentication: The receiver is sure of the sender's identity and that an imposter has not sent the message.

Integrity: The data must arrive at the receiver exactly as it was sent.

Non-Reputation: The receiver must able to prove that a received message came from a specific sender.

18   **Define SNMP.** *(May 2012)*

Simple Network Management Protocol (**SNMP**) is an "Internet-standard protocol for managing devices on IP networks". Devices that typically support SNMP include routers, switches, servers, workstations, printers, & modem. It is used mostly in network management systems to monitor network-attached devices for conditions that warrant administrative attention.

19   **What is meant by cryptography?** *(Nov 2012)*

Cryptography, a word with Greek origins, means "secret writing." However, we use the term to refer to the science and art of transforming messages to make them secure and immune to attacks. Original message before being transformed is called **plaintext**. After the message is transformed, is called **cipher text**. An encryption algorithm transforms the plaintext to cipher text; a decryption algorithm transforms the cipher text back to plaintext. The term cipher is used to refer to encryption and decryption algorithms.

20   **Explain Cyber Squatting.**

The practice of registering a domain only to turn around and sell it off to an interested party at a much higher price even has a name. It is called cyber squatting.

UNIT-V / PART-B

1   **Discuss how the Simple Mail Transfer Protocol (SMTP) is useful in electronic mail. (***May 2012,15***)(***Nov 2013,15***)**
2   **Write in detail about PGP.**
3   **Describe about Secure Shell (SSH).**
4   **Explain the role of a DNS on a computer network, including its involvement in the process of a user accessing a web page.** *(May 2013) (Nov 2015)*
5   **Discuss about MIME, IMAP and POP3.** *(May 2015)*