

UNIT – I

PART A(2 Marks and answers)

1. What is mean by data communication?

Data communication is the exchange of data (in the form of 1s and 0s) between two devices via some form of transmission medium (such as a wire cable).

2. What are the three criteria necessary for an effective and efficient network?

The most important criteria are performance, reliability and security.

Performance of the network depends on number of users, type of transmission medium, the capabilities of the connected h/w and the efficiency of the s/w.

Reliability is measured by frequency of failure, the time it takes a link to recover from the failure and the network's robustness in a catastrophe.

Security issues include protecting data from unauthorized access and viruses.

3. What are the three fundamental characteristics determine the effectiveness of the data communication system?

The effectiveness of the data communication system depends on three fundamental characteristics:

Delivery: The system must deliver data to the correct destination.

Accuracy : The system must deliver data accurately.

Timeliness: The system must deliver data in a timely manner.

4. What are the advantages of distributed processing?

Advantages of distributed processing include security/encapsulation, distributed databases, faster problem solving, security through redundancy and collaborative processing.

5. Why are protocols needed?

In networks, communication occurs between the entities in different systems. Two entities cannot just send bit streams to each other and expect to be understood. For communication, the entities must agree on a protocol. A protocol is a set of rules that

7. For n devices in a network, what is the number of cable links required for a mesh and ring topology?

Mesh topology – $n(n-1)/2$

Ring topology – n

8. What is the difference between a passive and an active hub?

An active hub contains a repeater that regenerates the received bit patterns before sending them out. A passive hub provides a simple physical connection between the attached devices.

9. Distinguish between peer-to-peer relationship and a primary-secondary relationship.

Peer-to-peer relationship: All the devices share the link equally.

Primary-secondary relationship: One device controls traffic and the others must transmit through it.

10. Assume 6 devices are arranged in a mesh topology. How many cables are needed? How many ports are needed for each device?

Number of cables = $n(n-1)/2 = 6(6-1)/2 = 15$

Number of ports per device = $n-1 = 6-1 = 5$

11. Group the OSI layers by function.

The seven layers of the OSI model belonging to three subgroups. Physical, data link and network layers are the network support layers; they deal with the physical aspects of moving data from one device to another. Session, presentation and application layers are the user support layers; they allow interoperability among unrelated software systems. The transport layer ensures end-to-end reliable data transmission.

12. What are header and trailers and how do they get added and removed?

Each layer in the sending machine adds its own information to the message it receives from the layer just above it and passes the whole package to the layer just below it. This information is added in the form of headers or trailers. Headers are added to the message at the layers 6,5,4,3, and 2. A trailer is added at layer 2. At the receiving machine, the headers or trailers attached to the data unit at the corresponding sending layers are removed, and actions appropriate to that layer are taken.

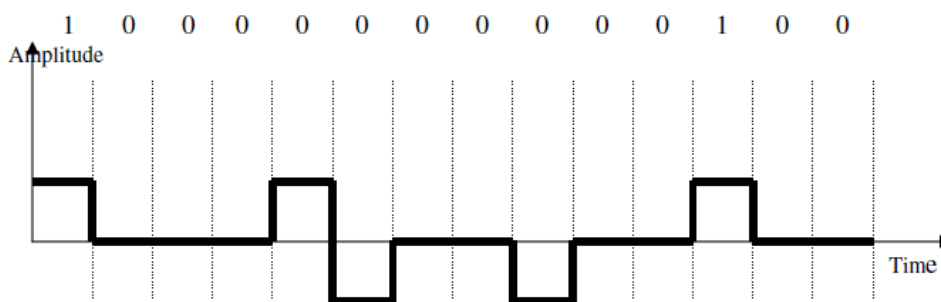
13. The transport layer creates a communication between the source and destination. What are the three events involved in a connection?

Creating a connection involves three steps: connection establishment, data

15. How does NRZ-L differ from NRZ-I?

In the NRZ-L sequence, positive and negative voltages have specific meanings: positive for 0 and negative for 1. In the NRZ-I sequence, the voltages are meaningless. Instead, the receiver looks for changes from one level to another as its basis for recognition of 1s.

16. Using HDB3, encode the bit stream 1000000000100. Assume the number of 1s so far is odd and the first 1 is positive.



17. What are the functions of a DTE? What are the functions of a DCE?

Data terminal equipment is a device that is an information source or an information sink. It is connected to a network through a DCE.

Data circuit-terminating equipment is a device used as an interface between a DTE and a network.

18. What does the electrical specification of EIA-232 describe?

The electrical specification of EIA-232 defines that signals other than data must be sent using OFF as less than -3 volts and ON as greater than +3 volts. The data must be transmitted using NRZ-L encoding.

19. Discuss the mode for propagating light along optical channels.

There are two modes for propagating light along optical channels, multimode and single mode.

Multimode: Multiple beams from a light source move through the core in different paths.

Single mode: Fiber with extremely small diameter that limits beams to a few angles, resulting in an almost horizontal beam.

20. What is refraction?

The phenomenon related to the bending of light when it passes from one medium to another.

22. What are the disadvantages of optical fiber as a transmission medium?

The disadvantages of optical fiber are

- Very expensive.
- Installation and maintenance is difficult.
- Fragility.

23. What are the criteria used to evaluate transmission medium?

The criteria used to evaluate transmission medium are

- Throughput
- Propagation speed
- Propagation time
- Wavelength

24. Give the relationship between propagation speed and propagation time?

Propagation time = distance / propagation speed

The time required for a signal or a bit to travel from one point to another is called **Propagation time**.

Propagation speed is the distance, a signal or a bit travel through a medium in one second.

25. Explain cross talk and what is needed to reduce it?

Effect of one wire on another is called as cross talk. One wire will be the sending antenna and the other wire will be the receiving antenna. We can use the shielded twisted pair cable or coaxial cable for transmission, which contains metal foil to reduce cross talk.

UNIT-II

DATA LINK LAYER

1. What are the responsibilities of data link layer?

Specific responsibilities of data link layer include the following.

- a) Framing
- b) Physical addressing
- c) Flow control
- d) Error control
- e) Access control

2. Mention the types of errors.

There are 2 types of errors

- a) Single-bit error.
- b) Burst-bit error.

3. Define the following terms.

- a) Single bit error: The term single bit error means that only one bit of a given data unit (such as byte character/data unit or packet) is changed from 1 to 0 or from 0 to 1.
- b) Burst error: Means that 2 or more bits in the data unit have changed from 1 to 0 from 0 to 1.

4. What is redundancy?

It is the error detecting mechanism, which means a shorter group of bits or extra bits may be appended at the destination of each unit.

5. List out the available detection methods.

There are 4 types of redundancy checks are used in data communication.

- a) Vertical redundancy checks (VRC).
- b) Longitudinal redundancy checks (LRC).
- c) Cyclic redundancy checks (CRC).
- d) Checksum.

6. Write short notes on VRC.

The most common and least expensive mechanism for error detection is the vertical redundancy check (VRC) often called a parity check. In this technique a redundant bit called a parity bit, is appended to every data unit so, that the total number of 0's in the unit (including the parity bit) becomes even.

7. Write short notes on LRC.

In longitudinal redundancy check (LRC), a block of bits is divided into

sequence of redundant bits, called the CRC remainder is appended to the end of data unit.

9. Write short notes on CRC generator.

A CRC generator uses a modulo-2 division.

- a) In the first step, the 4 bit divisor is subtracted from the first 4 bit of the dividend.
- b) Each bit of the divisor is subtracted from the corresponding bit of the dividend without disturbing the next higher bit.

10. Write short notes on CRC checker.

A CRC checker functions exactly like a generator. After receiving the data appended with the CRC it does the same modulo-2 division. If the remainder is all 0's the CRC is dropped and the data accepted. Otherwise, the received stream of bits is discarded and the data is resent.

11. Give the essential properties for polynomial.

A polynomial should be selected to have at least the following properties.

- a) It should not be
- b) It should be divisible by $(x+1)$.

12. Define checksum.

The error detection method used by the higher layer protocol is called checksum. Checksum is based on the concept of redundancy.

13. What are the steps followed in checksum generator?

The sender follows these steps

- a) The units are divided into k sections each of n bits.
- b) All sections are added together using 2's complement to get the sum.
- c) The sum is complemented and become the checksum.
- d) The checksum is sent with the data.

14. List out the steps followed in checksum checker side.

The receiver must follow these steps

- a) The unit is divided into k section each of n bits.
- b) All sections are added together using 1's complement to get the sum.
- c) The sum is complemented.
- d) If the result is zero.

15. Write short notes on error correction.

16. Mention the types of error correcting methods.

There are 2 error-correcting methods.

- a) Single bit error correction
- b) Burst error correction.

17. What is the purpose of hamming code?

A hamming code can be designed to correct burst errors of certain lengths. So the simple strategy used by the hamming code to correct single bit errors must be redesigned to be applicable for multiple bit correction.

18. Define flow control.

Flow control refers to a set of procedures used to restrict the amount of data. The sender can send before waiting for acknowledgment.

19. What is a buffer?

Each receiving device has a block of memory called a buffer, reserved for storing incoming data until they are processed.

20. Mention the categories of flow control.

There are 2 methods have been developed to control flow of data across communication links.

- a) Stop and wait- send one frame at a time.
- b) Sliding window- send several frames at a time.

21. What is the function of stop and wait flow control?

In this method, the sender sends one frame and waits for an acknowledgement before sending.

22. Mention the advantage and disadvantage of stop and wait flow control.

Advantage: simplicity

Disadvantage: inefficiency.

23. Define ARQ.

Error control in the data link layer is based on Automatic repeat request (ARQ), which means retransmission of data in 3 cases.

- a) Damaged frame
- b) Lost frame
- c) Lost acknowledgment.

24. Mention the function of go-back N-ARQ.

It is the popular mechanism for continuous transmission error control. In the method, if our frame is lost or damaged, all frames sent since the last frame acknowledged are retransmitted.

26. Define HDLC.

It is a bit-oriented data link protocol designed to support both half-duplex and full duplex communication over point to point and midpoint links.

27. List the types of stations in HDLC.

HDLC differentiates between 3 types of stations.

- a) Primary
- b) Secondary
- c) Combined

28. Define configuration .

The bond configuration refers to the relationship of hardware devices on a link.

29. List the various ways of station configuration.

The stations are configured in 3 ways

- a) Unbalanced configuration
- b) Symmetrical configuration
- c) Balanced configuration

30. What are the different communication modes in HDLC?

HDLC supports 3 modes of communication between stations.

- a) Normal response mode (NRM)
- b) Asynchronous response mode (ARM)
- c) Asynchronous balanced mode (ABM)

31. Mention the types of frames in HDLC.

There are 3 types of HDLC frames.

- a) Information frames (I-frames)
- b) Supervisory frames (S-frames)
- c) Unnumbered frames (U-frames)

32. Give the usage of I, S, U frames.

I frames – used to transport user data and control information relating to user data.

S frames – used only to transport control information, primarily data link layer and error controls.

U frames – reserved for systems management.

33. Write the types of frame fields contained in HDLC.

Each frame in HDLC may contain up to 6 fields.

- a) Beginning flag field

34. What is meant by bit stuffing?

Bit stuffing is the process of adding one extra 0 whenever there are 5 consecutive 1s in the data so that the receiver doesn't mistake the data for a flag.

35. Define LAN.

A Local Area Network (LAN) is a data communication system that allows a number of independent devices to communicate directly with each other in a limited geographic area.

36. Mention the various architecture in a LAN.

LAN is dominated by 4 architectures.

- a) Ethernet
- b) Token bus
- c) Token ring
- d) Fiber distributed data interface (FDDI)

37. Define a standard 802.3

IEEE 802.3 supports a LAN standard originally developed by Xerox and later extended by a joint venture between digital equipment corporations. Intel Corporation and Xerox. This was called 'Ethernet'.

38. List the most common kinds of Base band 802.3 LAN.

- a) 10 Base 5
- b) 10 Base 2
- c) 10 Base T
- d) 1 Base 5
- e) 100 Base T

39. Mention the different kinds of Ethernet networks.

- a) Switched Ethernet
- b) Fast Ethernet
- c) Gigabit Ethernet

40. Write short notes on FDDI.

Fiber distributed data interface is a local area network protocol standardized by ANSI and ITU-T. It supports data rates of 100 Mbps and provides a high-speed alternative to Ethernet and token ring access method used here is token passing.

41. Describe the three HDLC station types?

The three HDLC station types are:

Primary station : The primary station has the complete control of the link. The Primary station sends commands to the secondary station.

Secondary station : The secondary station sends responses.

frame received in one single frame.

Piggy backing can save bandwidth because the overhead from a data frame and an ACK frame can be combined in to just one frame

43. Name the four types of S-frames?

The four types of S-frames are

Receive ready(RR). The value of the code sub field is 00

Receive not ready(RNR). The value of the code sub field is 10

Reject(REJ). The value of the code sub field is 01

Selective reject(SREJ). The value of the code sub field is 11

44. Name the five categories of U-frames?

The five categories of U-frames are

Mode setting

Unnumbered exchange

Disconnection.

Initialization mode.

Miscellaneous mode

UNIT III

NETWORK LAYER

1. What are the network support layers and the user support layers?

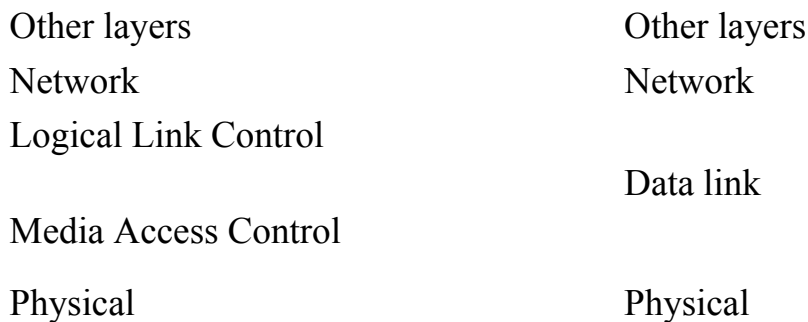
Network support layers:

The network support layers are Physical layer, Data link layer and Network layer. These deal with electrical specifications, physical connection, transport timing and reliability.

User support layers:

The user support layers are: Session layer, Presentation layer, Application layer. These allow interoperability among unrelated software systems.

2. With a neat diagram explain the relationship of IEEE Project to the OSI model?



The IEEE has subdivided the data link layer into two sub layers:

- * Logical link control (LLC)
- * Medium access control (MAC)

LLC is non-architecture specific. The MAC sub layer contains a number of distinct modules, each carries proprietary information specific to the LAN product being used.

3. What are the functions of LLC?

The IEEE project 802 model takes the structure of an HDLC frame and divides it into 2 sets of functions. One set contains the end user portion of the HDLC frame - the logical address, control information, and data. These functions are handled by the IEEE 802.2 logical link control (LLC) protocol.

4. What are the functions of MAC?

MAC sub layer resolves the contention for the shared media. It contains synchronization, flag, flow and error control specifications necessary to move information from one place to another, as well as the physical address of the next station to receive and route a packet.

- Control field
- Information field

6. What are headers and trailers and how do they get added and removed?

The control data added to the beginning of a data is called headers. The control data added to the end of a data is called trailers. At the sending machine, when the message passes through the layers each layer adds the headers or trailers. At the receiving machine, each layer removes the data meant for it and passes the rest to the next layer.

7. What are the responsibilities of network layer?

The network layer is responsible for the source-to-destination delivery of packet across multiple network links. The specific responsibilities of network layer include the following:

- Logical addressing.
- Routing.

8. What is a virtual circuit?

A logical circuit made between the sending and receiving computers. The connection is made after both computers do handshaking. After the connection, all packets follow the same route and arrive in sequence.

9. What are data grams?

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

10. What are the two types of implementation formats in virtual circuits?

Virtual circuit transmission is implemented in 2 formats.

- Switched virtual circuit
- Permanent virtual circuit.

11. What is meant by switched virtual circuit?

Switched virtual circuit format is comparable conceptually to dial-up line in circuit switching. In this method, a virtual circuit is created whenever it is needed and exists only for the duration of specific exchange.

12. What is meant by Permanent virtual circuit?

Permanent virtual circuits are comparable to leased lines in circuit switching. In this method, the same virtual circuit is provided between two users on a continuous basis. The circuit is dedicated to the specific uses.

14. What is meant by hop count?

The pathway requiring the smallest number of relays, it is called hop-count routing, in which every link is considered to be of equal length and given the value one.

15. How can the routing be classified?

The routing can be classified as,

- Adaptive routing
- Non-adaptive routing.

16. What is time-to-live or packet lifetime?

As the time-to-live field is generated, each packet is marked with a lifetime, usually the number of hops that are allowed before a packet is considered lost and accordingly, destroyed. The time-to-live determines the lifetime of a packet.

17. What is meant by brouter?

A brouter is a single protocol or multiprotocol router that sometimes act as a router and sometimes act as a bridge.

18. Write the keys for understanding the distance vector routing.

The three keys for understanding the algorithm are

- Knowledge about the whole networks
- Routing only to neighbors
- Information sharing at regular intervals

19. Write the keys for understanding the link state routing.

The three keys for understanding the algorithm are

- Knowledge about the neighborhood.
- Routing to all neighbors.
- Information sharing when there is a change.

20. How the packet cost referred in distance vector and link state routing?

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.

21. How the routers get the information about neighbor?

A router gets its information about its neighbors by periodically sending them a short greeting packets. If the neighborhood responds to the greeting as expected, it is assumed to be alive and functioning. If it does not, a change is assumed to have occurred and the sending router then alerts the rest of the network in its next LSP.

- Gateway

23. Define IP address.

IP address is the 3-bit number for representing a host or system in the network. One portion of the IP address indicates a networking and the other represents the host in a network.

24. What is Token Bus?

Token Bus is a physical bus that operates as a logical ring using tokens. Here stations are logically organized into a ring. A token is passed among stations. If a station wants to send data, it must wait and capture the token. Like Ethernet, station communicates via a common bus.

25. What is token passing?

Stations may attempt to send data multiple times before a transmission makes it onto a link. This redundancy may create delays of indeterminable length if the traffic is heavy. Token ring resolves this uncertainty by requiring that stations take turns sending data. Each station may transmit only during its turn and may send only one frame during each turn. The mechanism that coordinates this rotation is called token passing.

26. Define Masking?

Masking is the process that extracts the address of the physical network from an IP address.

27. What are the rules of boundary-level masking?

The rules of boundary-level masking

- The bytes in the IP address that corresponds to 255 in the mask will be repeated in the subnetwork address
- The bytes in the IP address that corresponds to 0 in the mask will change to 0 in the subnetwork address

28. What are the rules of nonboundary-level masking?

- The bytes in the IP address that corresponds to 255 in the mask will be repeated in the subnetwork address
- The bytes in the IP address that corresponds to 0 in the mask will change to 0 in the subnetwork address
- For other bytes, use the bit-wise AND operator

29. Define Gateway.

A device used to connect two separate networks that use different communication protocols.

UNIT IV TRANSPORT LAYER

1. What is function of transport layer?

The protocol in the transport layer takes care in the delivery of data from one application program on one device to an application program on another device. They act as a link between the upper layer protocols and the services provided by the lower layer.

2. What are the duties of the transport layer?

The services provided by the transport layer

- End-to-end delivery
- Addressing
- Reliable delivery
- Flow control
- Multiplexing

3. What is the difference between network layer delivery and the transport layer delivery?

Network layer delivery	Transport layer delivery
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The network layer is responsible for the source-to-destination delivery of packet across multiple network links.

The transport layer is responsible for source-to-destination delivery of the entire message.

4. What are the four aspects related to the reliable delivery of data?

The four aspects are,

- Error control
- Sequence control
- Loss control
- Duplication control

5. What is meant by segment?

At the sending and receiving end of the transmission, TCP divides long transmissions into smaller data units and packages each into a frame called a segment.

6. What is meant by segmentation?

When the size of the data unit received from the upper layer is too long for the network layer datagram or data link layer frame to handle, the transport

several can fit together into a single datagram or frame, the transport protocol combines them into a single data unit. The combining process is called concatenation.

8. What are the types of multiplexing?

The types of multiplexing are,
Upward multiplexing
Downward multiplexing

9. What are the two possible transport services?

Two basic types of transport services are,
Connection service
Connectionless services

10. The transport layer creates the connection between source and destination.

What are the three events involved in the connection?

For security, the transport layer may create a connection between the two end ports. A connection is a single logical path between the source and destination that is associated with all packets in a message. Creating a connection involves three steps:

- Connection establishment
- Data transfer & Connection release.

11. What are the techniques used in multiplexing?

The three basic techniques of multiplexing are,
Frequency-division multiplexing
Time-division multiplexing
Wave-division multiplexing

12. What is meant by congestion?

Congestion in a network occurs if user sends data into the network at a rate greater than that allowed by network resources.

13. Why does congestion occur in network?

Congestion occurs because the switches in a network have a limited buffer size to store arrived packets.

14. How will the congestion be avoided?

The congestion may be avoided by two bits
BECCN - Backward Explicit Congestion Notification
FECN - Forward Explicit Congestion Notification

The sender and receiver are communicating with each other and are using some types of flow control at a higher level.

17. What is meant by quality of service?

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.

18. What are the two categories of QoS attributes?

The two main categories are

User Oriented

Network Oriented

19. List out the user related attributes?

User related attributes are

SCR – Sustainable Cell Rate

PCR – Peak Cell Rate

MCR- Minimum Cell Rate

CVDT – Cell Variation Delay Tolerance

20. What are the networks related attributes?

The network related attributes are,

Cell loss ratio (CLR)

Cell transfer delay (CTD)

Cell delay variation (CDV)

Cell error ratio (CER)

21. What is frame?

A frame consists of one complete cycle of time slots, including one or more slot dedicated to each sending device.

22. What is interleaving?

The switch moves from device to device at a constant rate and fixed order. This process is called interleaving.

23. What is framing bits?

One or more synchronization bits are usually added to the beginning of each frame. These bits are called framing bits.

24. What is the difference between service point address, logical address and physical address?

which makes a data delivery from a specific process on one computer to a specific process on another computer.

destination systems. The network layer adds a header, which indicate the logical address of the sender and receiver.

header, which defines the source machine's address and the destination machine's address.

UNIT – V

APPLICATION LAYER

1. What is the purpose of Domain Name System?

Domain Name System can map a name to an address and conversely an address to name.

2. Discuss the three main division of the domain name space.

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.

3. Discuss 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.

4. Discuss the basic model of FTP.

The client has three components: the user interface, the client control process, and the client data transfer process. The server has two components: the server control process and the server data transfer process. The control connection is made between the control processes. The data connection is made between the data transfer processes.

5. What is the function of SMTP?

The TCP/IP protocol 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. SMTP provides mail exchange between users on the same or different computers.

6. What is the difference between a user agent (UA) and a mail transfer agent (MTA)?

The UA prepares the message, creates the envelope, and puts the message in the envelope. The MTA transfers the mail across the Internet.

7. How does MIME enhance SMTP?

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

8. Why is an application such as POP needed for electronic messaging?

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 , version 3(POP3). 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.

9. Give the format of HTTP request message.

Request Line

Headers

A Blank Line

Body
(present only in
some messages)

10. Give the format of HTTP response message.

Status Line

Headers

A Blank Line

Body
(present only in

11. Write down the three types of WWW documents.

The documents in the WWW can be grouped into three broad categories: static, dynamic and active.

Static: Fixed-content documents that are created and stored in a server.

Dynamic: Created by web server whenever a browser requests the document.

Active: A program to be run at the client side.

12. What is the purpose of HTML?

HTML is a computer language for specifying the contents and format of a web document. It allows additional text to include codes that define fonts, layouts, embedded graphics and hypertext links.

13. Define CGI .

CGI is a standard for communication between HTTP servers and executable programs. It is used in creating dynamic documents.

14. 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-Repudiation: The receiver must be able to prove that a received message came from a specific sender.

15. How is a secret key different from public key?

In secret key, the same key is used by both parties. 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 public key, there are two keys: a private key and a public key. The private key is kept by the receiver. The public key is announced to the public.

16. What is a 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.

17. What are the advantages & disadvantages of public key encryption?

Advantages:

- a) Remove the restriction of a shared secret key between two entities. Here each entity can create a pair of keys, keep the private one, and publicly distribute the other one.

Disadvantage:

If you use large numbers the method to be effective. Calculating the cipher text using the long keys takes a lot of time. So it is not recommended for large amounts of text.

18. What are the advantages & disadvantages of secret key encryption?

Advantage:

Secret Key algorithms are efficient: it takes less time to encrypt a message. The reason is that the key is usually smaller. So it is used to encrypt or decrypt long messages.

Disadvantages:

- a) Each pair of users must have a secret key. If N people in world want to use this method, there needs to be $N(N-1)/2$ secret keys. For one million people to communicate, a half-billion secret keys are needed.
- b) The distribution of the keys between two parties can be difficult.

19. Define permutation.

Permutation is transposition in bit level.

Straight permutation: The no. of bits in the input and output are preserved.

Compressed permutation: The no. of bits is reduced (some of the bits are dropped).

Expanded permutation: The no. of bits is increased (some bits are repeated).

20. Define substitutional & transpositional encryption.

Substitutional: A character level encryption in which each character is replaced by another character in the set.

Transpositional: A Character level encryption in which the characters retain their plaintext but the position of the character changes.

PART B
UNIT I
Data communications

1. Explain ISO/OSI reference model.

- Physical layer
- Data link layer
- Network layer
- Transport layer
- Session layer
- Presentation layer
- Application layer

2. Explain the topologies of the network.

- Mesh topology
- Star topology
- Tree topology
- Bus topology
- Ring topology

3. Explain the categories of networks.

- Local Area Network(LAN)
- Metropolitan Area Network(MAN)
- Wide Area Network(WAN)

4. Explain coaxial cable & fiber optics.

- Coaxial cable
 - Coaxial cable standards
 - Coaxial cable connectors
- Fiber optics
 - Propagation modes
 - Fiber sizes
 - Cable composition
 - Light sources for optical cable
 - Fiber optic connectors
 - Advantages & disadvantages of optical fiber

5. Explain line coding (digital to digital conversion).

- Unipolar
 - DC component
 - Synchronization
- Polar

Differential Manchester

Bipolar

Alternate Mark Inversion(AMI)

Bipolar 8-zero substitution(B8ZS)

High-Density Bipolar 3(HDB3)

UNIT II

Data link layer

1. Explain error detection and error correction techniques.

Types of errors

Single bit error

Burst error

Error detection

Vertical redundancy check(VRC)

Longitudinal redundancy check(LRC)

Cyclic redundancy check(CRC)

Checksum

Error correction

Single-bit error correction

Hamming code

Burst error correction

2. Explain error control mechanism.

Stop and wait ARQ

Sliding window ARQ

Go back-n

Selective-reject

3. Explain the flow control mechanism

Stop and wait

Sliding window.

4. Explain the timers and time registers in FDDI.

Time registers

Synchronous allocation(SA)

Target token rotation time(TTRT)

Absolute maximum time(AMT)

Timers

Token rotation timer(TRT)

Token holding timer(THT)

5. Explain about Ethernet.

10 base 2 :Thin Ethernet
10 base T :Twisted-pair Ethernet
1 base 5 :Star LAN

6. Explain the frame format for token ring and token bus.

Access method: Token passing
Priority and reservation
Time limits
Monitor stations

7. Explain about HDLC.

Station types:
Primary station
Secondary station
Configurations:
Unbalanced configuration
Symmetrical configuration
Balanced configuration
Modes of communication:
Normal Response Mode(NRM)
Asynchronous Response Mode(ARM)
Asynchronous Balanced Mode(ABM)
Frames :
Flag field
Address field
Control field
Information field
FCS field

UNIT III
Network layer

1. Explain the two approaches of packet switching techniques.

Datagram approach
Virtual circuit approach
Switched virtual circuit(SVC)
Permanent virtual circuit(PVC)
Circuit – switched connection versus virtual – circuit connection
Path versus route
Dedicated versus shared

2. Explain IP addressing method.

A sample internet

3. Define routing & explain distance vector routing and link state routing.

Distance vector routing

Sharing information

Routing table

Creating the table

Updating the table

Updating algorithm

Link state routing

Information sharing

Packet cost

Link state packet

Getting information about neighbors

Initialization

Link state database

4. Define bridge and explain the type of bridges.

Bridges

Types of bridges

Simple bridge

Multiport bridge

Transparent bridge

5. Explain subnetting

Subnetting

Three levels of hierarchy

Masking

Masks without subnetting

Masks with subnetting

Finding the subnetwork address

Boundary level masking

Non-boundary level masking

6. Write short notes about repeaters, routers and gateways.

Repeaters

Routers

Routing concepts

Least-cost routing

Non adaptive routing

Adaptive routing

Packet lifetime

End to end delivery

Addressing

Reliable delivery

- Error control
- Sequence control
- Loss control
- Duplication control

Flow control

Multiplexing

2. Explain socket in detail.

- Introduction
- Explanation
- program

3. Explain UDP & TCP.

User Datagram Protocol(UDP)

Source port address

Destination port address

Total length

Checksum

Transmission Control Protocol(TCP)

Source port address

Destination port address

Sequence number

Acknowledgement number

Header length

Reserved

Control

Window size

Check sum

Urgent pointer

Options and padding

4. Explain about congestion control.

Congestion avoidance

BECN

FECN

Four situations

Discarding

UNIT V

Application Layer

1. Explain the functions of SMTP.

- System for sending messages to other computer users based on e-mail addresses. SMTP provides mail exchange between users on the same or different computers.
- User Agent
- Mail Transfer Agent
- Multipurpose Internet Mail Extensions
- Post Office Protocol

2. Write short notes on FTP.

- Transfer a file from one system to another.
- TCP connections
- Basic model of FTP

3. Explain about HTTP.

- HTTP transactions
- HTTP messages
- URL

4. Explain the WWW in detail.

- Hypertext & Hypermedia
- Browser Architecture
- Categories of Web Documents
- HTML
- CGI
- Java

5. Explain the type of encryption/decryption method.

Conventional Methods:

- Character-Level Encryption: Substitutional & Transpositional
- Bit-Level Encryption: Encoding/Decoding, Permutation, Substitution, Product, Exclusive-Or & Rotation

Public key Methods

6. Explain about RSA algorithm.

- Public key Encryption technique.
- Encryption algorithm
- Decryption algorithm

• Generation of RSA