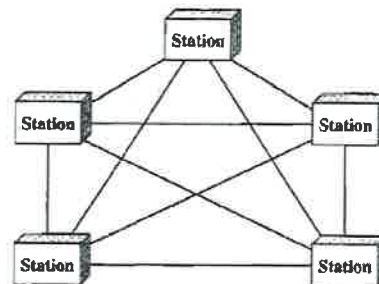


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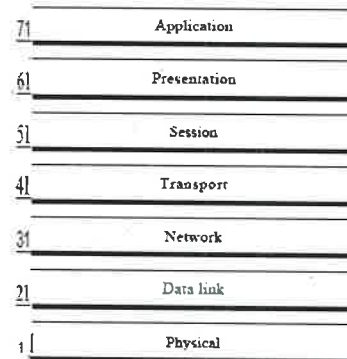
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- Q.1 Attempt the following**
- (a) **Select the correct alternative** (5M)
- (i) A) Transport
 - (ii) B) Fragmentation
 - (iii) A) Digital
 - (iv) A) ARP
 - (v) C) Parallel
- (b) **Fill in the blanks with help of the options given in the pool below:** (5M)
- (i) Multiplexing
 - (ii) Phase
 - (iii) Twisted Pair
 - (iv) Metric
 - (v) TCP
- (c) **Answer the following in one or two lines:** (5M)
- (i) The latency or delay defines how long it takes for an entire message to completely arrive at the destination from the time the first bit is sent out from the source.
 - (ii) The throughput is a measure of how fast we can actually send data through a network.
 - (iii) 117.149.29.2
 - (iv) thermal noise, induced noise, crosstalk, and impulse noise
 - (v) Propagation time measures the time required for a bit to travel from the source to the destination.

- Q.2 Attempt the following (Any THREE)** (15M)
- (a)



- (b) Calculate following:
- i) 3.96MHz
 - ii) 10^3 Hz or 1KHz
- (c)



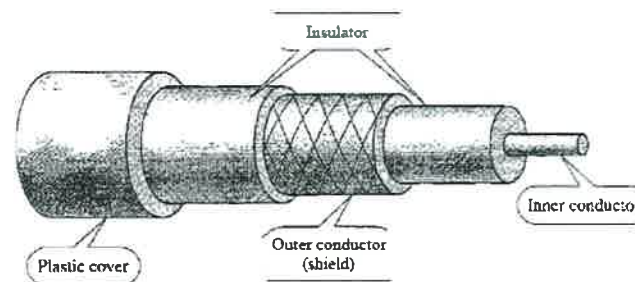
- (d) In the half-duplex mode, two devices can send and receive, but not at the same time.
 In a full-duplex (or simply duplex) mode, two devices can send and receive at the same time.
 Topology defines how devices are connected to make a network.
 A protocol is a set of rules that govern data communication; the key elements of a protocol are syntax, semantics, and timing.
- (e) attenuation, distortion, and noise
 Explanation of each
- (f) Local Area Network, Metropolitan Area Network, Wide Area Network
 Explanation of each

Q. 3 Attempt the following (Any THREE)

(15M)

- (a) Block coding is normally referred to as mB/nB coding; it replaces each m-bit group with an n-bit group. Block coding normally involves three steps: division, substitution, and combination. In the division step, a sequence of bits is divided into groups of m bits. For example, in 4B/5B encoding, the original bit sequence is divided into 4-bit groups. The next step is the substitution step. In this step, we substitute an m-bit group for an n-bit group. For example, in 4B/5B encoding we substitute a 4-bit code for a 5-bit group. Finally, the n-bit groups are combined together to form a stream. The new stream has more bits than the original bits.
- (b) Digital-to-analog conversion can be accomplished by changing the carrier signal by modifying one or more of its characteristics (amplitude, frequency, or phase). This kind of modification is called modulation (shift keying).
 In amplitude shift keying, the amplitude of the carrier signal is varied to create signal elements. Both frequency and phase remain constant while the amplitude changes.
- (c) Electromagnetic Waves ranging in frequencies between 3 kHz and 1 GHz are normally called radio waves. Radio waves are omnidirectional. The omnidirectional characteristics of radio waves make them useful for multicasting, in which there is one sender but many receivers. AM and FM radio, television, maritime radio, cordless phones, and paging are examples of multicasting.
- (d) Cyclic Redundancy Check
 A category of cyclic codes called the cyclic redundancy check (CRC) is used in networks such as LANs and WANs.
 Working

(e)



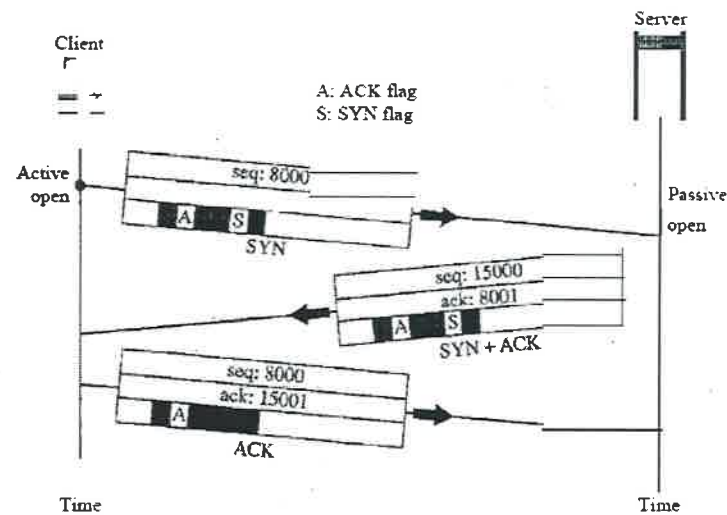
- (f) Wavelength-division multiplexing (WDM) is designed to use the high-data-rate capability of fiber-optic cable. The optical fiber data rate is higher than the data rate of metallic transmission cable. Using a fiber-optic cable for one single line wastes the available bandwidth. Multiplexing allows us to combine several lines into one. WDM is conceptually the same as FDM, except that the

multiplexing and demultiplexing involve optical signals transmitted through fiber-optic channels.

Q. 4 Attempt the following (Any THREE)

(15M)

- (a) IPv4 addressing, at its inception, used the concept of classes. This architecture is called classful addressing. In classful addressing, the address space is divided into five classes: A, B, C, D, and E. Each class occupies some part of the address space. Class A addresses were designed for large organizations with a large number of attached hosts or routers. Class B addresses were designed for midsize organizations with tens of thousands of attached hosts or routers. Class C addresses were designed for small organizations with a small number of attached hosts or routers.
- (b) Carrier sense multiple access with collision detection (CSMA/CD) augments the algorithm to handle the collision. In this method, a station monitors the medium after it sends a frame to see if the transmission was successful. If so, the station is finished. If, however, there is a collision, the frame is sent again.
- (c) Three-Way Handshaking



- (d) A unicast destination address defines only one recipient; the relationship between the sender and the receiver is one-to-one.
 A multicast destination address defines a group of addresses; the relationship between the sender and the receivers is one-to-many.
 An anycast address, like a multicast address, also defines a group of nodes. However, a packet destined for an anycast address is delivered to only one of the members of the anycast group, the nearest one.
- (e) In the polling method, all data exchanges must be made through the primary device even when the ultimate destination is a secondary device. The primary device controls the link; the secondary devices follow its instructions. Polling works with topologies in which one device is designated as a primary station and the other devices are secondary stations. All data exchanges must be made through the primary device even when the ultimate destination is a secondary device.
 The primary device controls the link; the secondary devices follow its instructions. It is up to the primary device to determine which device is allowed to use the channel at a given time. The primary device, therefore, is always the initiator of a session.
- (f) In distance vector routing, the least-cost route between any two nodes is the route with minimum distance. In this protocol, as the name implies, each node

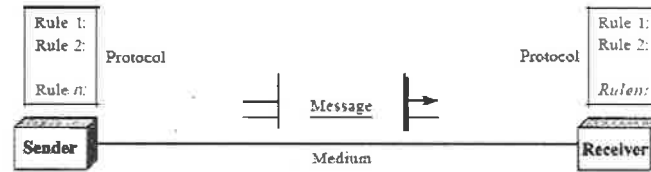
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maintains a vector (table) of minimum distances to every node. The table at each node also guides the packets to the desired node by showing the next stop in the route (next-hop routing).

Phases

Q. 5 Attempt the following (Any THREE) (15M)

(a)



(b) The data link layer is responsible for moving frames from one hop (node) to the next.

Framing

Flow Control

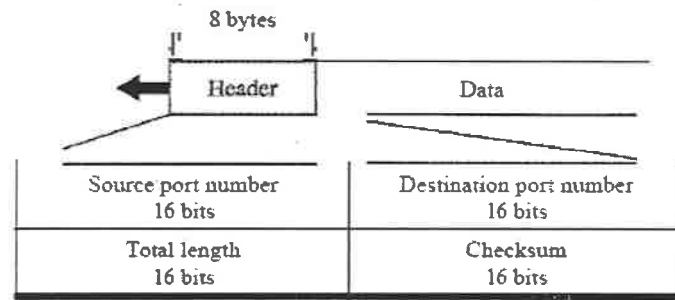
Error Control

Access Control

Physical Addressing

(c) Return to Zero (RZ) The main problem with NRZ encoding occurs when the sender and receiver clocks are not synchronized. The receiver does not know when one bit has ended and the next bit is starting. One solution is the return-to-zero (RZ) scheme, which uses three values: positive, negative, and zero. In RZ, the signal changes not between bits but during the bit. The main disadvantage of RZ encoding is that it requires two signal changes to encode a bit and therefore occupies greater bandwidth.

(d)



(e) A passive hub is just a connector. It connects the wires coming from different branches. An active hub is actually a multipart repeater. It is normally used to create connections between stations in a physical star topology.

Routers

A router is a three-layer device that routes packets based on their logical addresses (host-to-host addressing). A router normally connects LANs and WANs in the Internet and has a routing table that is used for making decisions about the route.