Answer Keys

Title of the Paper : Computer Networks Sub.Code : **16SCCCA8**

SECTION – A (10 x 2 = 20)

1. Data Communication : Data communications are the exchange of data between two devices via some form of transmission medium such as a wire cable.
2. Need for Protocol : A protocol is a set of rules that govern data communications. Without a protocol, two devices may be connected but not communicating.
3. Network : A network is the interconnection of a set of devices capable of communication.
4. Components of a Data Communication System : A data communications system has five components **Message, Sender, Receiver, Transmission medium, Protocol.**
5. Three criteria necessary for an effective and efficient network : A network must be able to meet a certain number of criteria. The most important of these are performance, reliability, and security.
6. Two types of Line Configurations : There are two possible types of connections: point-to-point and multipoint.
7. internet : (note the lowercase *i*) two or more networks that can communicate with each other.

Internet : (note the uppercase I ) composed of thousands of interconnected networks.

1. Four topologies : There are four basic topologies possible: mesh, star, bus, and ring.
2. TCP Timer : TCP Timers are used to avoid excessive delays during communication. TCP Timers are- Time Out Timer, Time Wait Timer, Keep Alive Timer, Persistent Timer.
3. WWW : WWW stands for World Wide Web. A technical definition of the World Wide Web is : all the resources and users on the Internet that are using the Hypertext Transfer Protocol HTTP).

SECTION – B (5 x 5 = 25)

1. (a) Types of Communication between two devices :

**Type of Connection :**

A network is two or more devices connected through links. A link is a communications pathway that transfers data from one device to another. For communication to occur, two devices must be connected in some way to the same link at the same time. There are two possible types of connections: point-to-point and multipoint.

**Point-to-Point :**

A point-to-point connection provides a dedicated link between two devices. The entire capacity of the link is reserved for transmission between those two devices. Most point-to-point connections use an actual length of wire or cable to connect the two ends.

**Multipoint :**

A multipoint (also called multidrop) connection is one in which more than two specific devices share a single link.

(or)

(b) **Network Criteria :** A network must be able to meet a certain number of criteria. The most important of these are performance, reliability, and security.

**Performance :**

Performance can be measured in many ways, including transit time and response time. Transit time is the amount of time required for a message to travel from one device to another. Response time is the elapsed time between an inquiry and a response.

**Reliability :**

In addition to accuracy of delivery, network reliability is measured by the frequency of failure, the time it takes a link to recover from a failure.

**Security :**

Network security issues include protecting data from unauthorized access, protecting data from damage and development, and implementing policies and procedures for recovery from breaches and data losses.

12.(a) **Basic Topologies :** There are four basic topologies possible: mesh, star, bus, and ring.

**Mesh Topology :**

In a mesh topology, every device has a dedicated point-to-point link to every other device. The term dedicated means that the link carries traffic only between the two devices it connects.

**Star Topology :**

In a star topology, each device has a dedicated point-to-point link only to a central controller, usually called a hub. The devices are not directly linked to one another. Unlike a mesh topology, a star topology does not allow direct traffic between devices.

**Bus topology,** on the other hand, is multipoint. One long cable acts as a backbone to link all the devices in a network

**Ring Topology :**

In a ring topology, each device has a dedicated point-to-point connection with only the two devices on either side of it. A signal is passed along the ring in one direction, from device to device, until it reaches its destination.

(or)

(b) **Different Ways to Access the Internet :** Using Telephone Networks Dial-up service. DSL Service. Using Cable Networks Using Wireless Networks Direct Connection to the Internet.

13.(a) **MAC : Media access control (MAC)** is a sublayer of the data link layer (DLL) in the seven-layer OSI network reference model. MAC is responsible for the transmission of data packets to and from the network-interface card, and to and from another remotely shared channel.

 The basic function of MAC is to provide an addressing mechanism and channel access so that each node available on a network can communicate with other nodes available on the same or other networks. Sometimes people refer to this as the MAC layer.

 Media Access Control can be accomplished on either a centralized or decentralized basis, and can be characterized as either deterministic or non-deterministic in nature.

(or)

(b) **Contention Window :** The contention window is an amount of time divided into slots. A station that is ready to send chooses a random number of slots as its wait time.

**Polling :** 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.

 **Reservation :** In the reservation access method, a station needs to make a reservation before sending data. Time is divided into intervals. In each interval, a reservation frame precedes the data frames sent in that interval.

 14. (a) **Flow Control :** Whenever an entity produces items and another entity consumes them, there should be a balance between production and consumption rates. If the items are produced faster than they can be consumed, the consumer can be overwhelmed and may need to discard some

 items. If the items are produced more slowly than they can be consumed, the consumer must wait, and the system becomes less efficient



 (or)

 (b) **Client Server Programming :** In a client-server paradigm, communication at the application layer is between two running application programs called processes: a client and a server. A client is a running program that initializes the communication by sending a request; a server is another application program that waits for a request from a client. The server handles the request received from a client, prepares a result, and sends the result back to the client. The lifetime of a server is infinite: it should be started and run forever, waiting for the clients. The lifetime of a client is finite: it normally sends a finite number of requests to the corresponding server, receives the responses, and stops.

 15. (a) **Windows in TCP :** Before discussing data transfer in TCP and the issues such as flow, error, and congestion control, we describe the windows used in TCP. TCP uses two windows (send window and receive window) for each direction of data transfer, which means four windows for a bidirectional communication. Send Window and Receive Window Explanation.

(or)

 (b) IPV4 & IPV6 : During the transition a host may need to use two addresses, IPv4 and IPv6. When the transition is complete, IPv4 addresses should disappear. The DNS servers need to be ready to map a host name to either address type during the transition, but the IPv4 directory will disappear after all hosts in the world have migrated to IPv6.

SECTION – C (3 x 10 = 30)

Answer Any Three Questions

16**. Network Types :** **Local Area Network A local area network** (**LAN**) is usually privately owned and connects some hosts in a single office, building, or campus.



**Wide Area Network :** A **wide area network (WAN)** is also an interconnection of devices capable of communication. However, there are some differences between a LAN and a WAN. A LAN is normally limited in size, spanning an office, a building, or a campus; a WAN has a wider geographical span, spanning a town, a state, a country, or even the world.

**Point-to-Point WAN**

A point-to-point WAN is a network that connects two communicating devices through a transmission media (cable or air). We will see examples of these WANs when we discuss how to connect the networks to one another. Figure 1.9 shows an example of a point-to-point WAN. (Diagram – 5 ,Marks)

**Switched WAN**

A switched WAN is a network with more than two ends. A switched WAN, as we will see shortly, is used in the backbone of global communication today. (Diagram – 5 Marks)

17. (i) Circuit Switched Network : In a **circuit-switched network,** a dedicated connection, called a circuit, is always

available between the two end systems; the switch can only make it active or inactive. (Detailed Explanation With Neat Diagram)

 (ii) Packet Switched Network : In a computer network, the communication between the two ends is done in blocks of

data called **packets.**



18. Functions of Layers : ***Physical Layer*** We can say that the physical layer is responsible for carrying individual bits in a frame across the link.

***Data-link Layer*** the data-link layer is responsible for taking the datagram and moving it across the link. The data-link layer takes a datagram and encapsulates it in a packet called a *frame*.

***Network Layer*** The network layer is responsible for creating a connection between the source computer and the destination computer.

***Transport Layer*** the transport layer is responsible for giving services to the application layer: to get a message from an application program running on the source host and deliver it to the corresponding application program on the destination host

***Application Layer***  the logical connection between the two application layers is end to-end. The two application layers exchange *messages* between each other as though there were a bridge between the two layers.

19. **Routing Algorithms :** **Distance-Vector Routing** In distance-vector routing, the first thing each node creates is its

own least-cost tree with the rudimentary information it has about its immediate neighbors.

***Bellman-Ford Equation***

The heart of distance-vector routing is the famous **Bellman-Ford** equation.

***Distance Vectors***

The concept of a **distance vector** is the rationale for the name *distance-vector routing*.

 **TCP Congestion Control :** TCP uses different policies to handle the congestion in the network

 Congestion Window , Congestion Detection, Congestion Policies

20. Explain : (a) FTP : File Transfer Protocol the standard protocol provided by TCP/IP for copying

a file from one host to another.

(b) HTTP : Hypertext Transfer Protocol The **HyperText Transfer Protocol (HTTP)** is used to define how the client-server programs can be written to retrieve web pages from the Web. An HTTP client sends a request; an HTTP server returns a response.

 ( c ) E-mail Electronic mail (or e-mail) allows users to exchange messages.

(d) DNS The Domain Name Systems (DNS) is the phonebook of the Internet.   DNS translates domain names to [IP addresses](https://www.cloudflare.com/learning/dns/glossary/what-is-my-ip-address/) so browsers can load Internet resources. The process of DNS resolution involves converting a hostname (such as www.example.com) into a computer-friendly IP address (such as 192.168.1.1).