



**DEPARTMENT OF INFORMATION TECHNOLOGY**

**U23IT44-COMPUTER NETWORKS**

**II YEAR IT – REGULATION 2023**

**PART – A QUESTIONS & ANSWERS**

**1. Define – Data Communication (or) What is meant by data communication? (N/D11)**

Data communication is defined as the exchange of data between two devices via some form of transmission medium in whatever form that is agreed upon by the parties creating and using the data.

**2. What is the main function of physical layer? (M/J – 11 )**

The main functions of physical layer are

- a. Physical characteristics of interfaces and media
- b. Representation of bits
- c. Data rate
- d. Synchronization of bits
- e. Line configuration
- f. Physical topology
- g. Transmission mode

**3. What is TCP/IP? (N/D – 12 )**

TCP/IP is a five-layer hierarchical protocol suite made up of interactive modules, developed before the OSI model. It is the internet model. The five layers are

- a. Physical
- b. data link (Host to network)
- c. Network (Internet)
- d. Transport
- e. Application (session, presentation and application)

**4. What is meant by circuit switching? (N/D – 10 )**

A circuit switched network is made of a set of switches connected by physical links, in which each link is divided into n channels. Circuit switching takes place at the physical layer. In circuit switching, the resources need to be reserved during the setup phase. The resources remain dedicated for the entire duration of data transfer phase until the teardown phase.

**5. What is the role of DSL modem? (M/J – 12 )**

The role of Digital Subscriber Line (DSL) modem, is to provide high speed access to the Internet over the existing local loops. DSL technology is a set of technologies, each differing in the first letter

(ADSL, VDSL, HDSL, and SDSL).

**6. Define – Flow control (N/D – 11 )**

Flow Control refers to a set of procedures which is used to restrict the flow of data that the sender can send before waiting for acknowledgment.

**7. Define – Error control (N/D – 10 )**

Error control in the data link layer refers primarily to methods of error detection and retransmission and is based on automatic repeat request, which is the retransmission of data.

**8. Define – Protocol (M/J – 12 )**

A protocol is a set of rules that govern data communication. It represents an agreement between the communicating devices. Without a protocol, two devices may be connected but not communicating with each other.

**9. What are the five important component of the data communication? (or) Name the various components of data communication system. (N/D – 10 )**

The five important components of the data communication are

- a. Message
- b. Sender
- c. Receiver
- d. Transmission Medium
- e. Protocol

**10. Name the four topologies used in the network.(A/M – 11 )**

The four topologies of a network are

- a. Ring
- b. Star
- c. Mesh
- d. Bus

**11. Define – Computer network (or) Define – Network (N/D – 11)**

A computer network is group of devices referred to as nodes connected by communication links. A node can be a computer, printer, or any other device capable of sending and/or receiving data generated by other nodes on the network.

**12. List the types of Link. (N/D – 10 R08) (or) What are the two types of line configuration? (N/D – 10 R08)**

The types of link or line configuration are

- ❖ Point to Point
- Dedicated link between two devices

- Capacity reserved for two nodes
  - ❖ Multipoint (or) multidrop
- More than two devices connected
- Link and Capacity shared either spatially or temporally

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

The three criteria necessary for the effective and efficient networks are

- a. Performance
- b. Reliability
- c. Security

**14. What are the fundamental characteristics that determine the effectiveness of the data communication system?**

The fundamental characteristics that determines the effectiveness of data communication system are

- a. Delivery
- b. Accuracy
- c. Timeliness
- d. Jitter

**15. What are the advantages of distributed processing?**

The advantages of the distributed processing are

- a. Security
- b. Encapsulation
- c. Distributed databases
- d. Faster problem solving
- e. Security through redundancy
- f. Collaborative processing

**16. For an 'n' device in a network, what is the number of links required for a mesh and ring topology?**

The link required for the number of cables for a mesh and ring topologies are Mesh topology:  $n(n-1)/2$  (Duplex),  $n(n-1)$  (Simplex)

Ring Topology:  $n$

**17. What are the criteria to evaluate the transmission medium?**

The criteria used to evaluate transmission medium are

- a. Throughput
- b. Propagation Speed
- c. Propagation Time
- d. Wavelength

**18. What are the key elements of a protocol?**

The Key elements of a protocol are

- a. Syntax
- b. Semantics
- c. Timing

**19. Assume 6 devices are arranged in the mesh topology. How many cables are needed? How many ports are needed for each device?**

The number of device: 6 Topology used: Mesh

Number of cables:  $n(n-1)/2 = 6(6-1)/2 = 15$  Number of ports per device:  $n-1 = 6-1 = 5$

Link is a physical medium that transfers data from one device to another

**20. What are headers and trailers and how do they get removed?**

Each layer in sending machine adds its own information to the message it receives from the layer just above it and passes the whole packages 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, 2. Trailers are added in the layer 2. At the receiving machine, the headers or trailers attached to the data unit corresponding to the sending layers are removed and appropriate actions are taken at the receiving layers.

**UNIT – II**

**1. Define – Flow control. (A/M – 11)(N/D – 11)**

Flow Control refers to a set of procedures which is used to restrict the flow of data that the sender can send before waiting for acknowledgment.

**2. Define Error control. (A/M – 11 R08)**

Error control in the data link layer refers primarily to methods of error detection and retransmission and is based on automatic repeat request, which is the retransmission of data.

**3. Define HDLC (or) What is HDLC? (M/J – 12)**

HDLC is a bit oriented protocol designed to support both half duplex and full duplex communication over point to point and multipoint links.

**4. List the types of stations in HDLC.**

The types of stations present in the HDLC are

- a. Primary
- b. Secondary
- c. Combined

**5. Why Ethernet is said to be an I-persistent protocol? (N/D – 12)**

Ethernet uses I-persistent protocol as the access method. In the I-persistent method, after the station finds the line idle, it sends its frame immediately with probability 1. This method has the highest chance of collision because two or more stations may find the line idle and send their frames immediately. (or) The Ethernet is said to be I-persistent protocol because a station with a frame to send transmits with probability 1 whenever a busy line goes idle.

**6. What is CSMA/CD? (N/D – 11)**

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 there is a collision, the frame is sent again.

**7. Define – Bluetooth (N/D – 12)**

Bluetooth is a wireless LAN technology designed to connect devices of different functions such as telephones, notebooks, computers (desktop and laptop), cameras, printers etc. A Bluetooth LAN is an ad hoc network. Bluetooth communicates over short distance of 10m.

**8. Define – Error detection and correction (N/D – 11 )**

Error detection and error correction are mechanisms of Error control. Error detection is a mechanism for detecting corrupted segments, lost segments, out-of-order segments, and duplicated segments. Error control also includes a mechanism for correcting errors after they are detected. Error detection and correction is achieved through the use of three simple tools: checksum, acknowledgment, and time-out.

**9. What is the purpose of Network Interface Card? (M/J – 13 )**

A network interface controller (NIC, also known as a network interface card, network adapter, LAN adapter) is a computer hardware component that connects a computer to a computer network. Every network controller for an IEEE 802 network such as Ethernet, Wi-Fi, or Token Ring, and every FDDI network controller, has a unique 48-bit serial number called a MAC address, which is stored in read-only memory.

**10. What are Virtual LANs?(M/J – 13 )**

Virtual local area network (VLAN) is a local area network configured by software, not by physical wiring. VLANs group stations belonging to one or more physical LANs into broadcast domains. The stations in a VLAN communicate with one another as though they belonged to a physical segment.

**11. What are the responsibilities of the Data Link Layer?**

The responsibilities of data link layer are

- a. Framing
- b. Physical Addressing
- c. Flow Control
- d. Error Control
- e. Access Control

**12. Write short notes on error correction.**

Error correction is the mechanism used to correct the error and it can be handled in two ways

- a. When an error is discovered, the receiver can have the sender to retransmit the entire data unit.
- b. A receiver can use an error correcting code, which automatically corrects certain error.

**13. What is a buffer?**

Buffer is a device which has a block of memory, reserved for storing incoming data until they are processed.

**14. What are the categories of flow control?**

The two categories of flow control are

- a. Stop and Wait
- b. Sliding Window

**15. What is the function of stop and wait protocol?**

The function of stop and wait protocol is to transmit frame and wait for the acknowledgement before sending the next frame.

**16. What is selective reject ARQ?**

In selective reject ARQ only specific damaged or lost frame is transmitted. If a frame is corrupted in transit, a NAK (Negative Acknowledgement) is returned and the frame is resent out of sequence.

**17. Define Automatic Repeat Request (ARQ).**

Error Control in the data link layer is based on the Automatic Repeat Request, which means

retransmission of data in three cases.

- a. Damaged Frame
- b. Lost Frame
- c. Lost Acknowledgement

**18. What is the function of go-back N ARQ?**

The function of go-back-N ARQ is to control the error in the continuous transmission.

**19. Define – Configuration**

The configuration refers to the relationship between the hardware of a device on a link.

**20. List the types of station configuration.**

The stations are configured in three ways

- a. Unbalanced Configuration
- b. Symmetrical Configuration
- c. Balanced Configuration

**UNIT – III**

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

**Network Support Layers:** The network support layers are Physical, Data Link and Network Layers. These layers deal with the electrical specifications, physical connection, transport timing and reliability. **User Support Layers:** The user support layers are Session, Presentation and Application Layers. These allow interoperability among the unrelated software systems.

**2. State the goals of Network layer (Or) What are the responsibilities of the network layer (N/D – 10 )**

The Network Layer is responsible for the source to destination delivery of packet across multiple network links. The specific responsibilities of network layer includes

- a. Logical Addressing
- b. Routing

**3. Define – ICMP (N/D – 12 )**

ICMP is a mechanism used by host and gateways to send query and error messages to the source of the datagram.

**4. What is internetworking? (N/D – 11 )**

Internetworking is the process or technique of connecting different networks by using intermediary devices such as routers or gateway devices.

**5. What is a virtual circuit?**

A virtual circuit is defined as a circuit that is made between the sender and the receiver after handshaking. All the packets of the sender and the receiver pair travel in the same path and it is dedicated for the entire session.

**6. What is datagram approach?**

In datagram approach, each packet is treated independently from all others. Even when a packet represents part of a multipacket transmission, the network treats it as if it exists alone. The individual packets travel different path. Packets in this technology are referred as datagram.

**7. What is a router? (Or) What is the function or role of a router? (M/J – 12)**

A router is a three layer device that routes packets based on their logical addresses i.e. 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.

The function of a router is to

- a. Find a path between nodes in a network
- b. Route the packets across the path to their final destination
- c. router that connects to the internet uses one private address and one global address.

**8. Why is IPV6 preferred than IPV4? (M/J – 12 , 13 )**

IPV6 is preferred than IPV4 due to some deficiencies in IPV4 which becomes unsuitable for fast growing internet. The deficiencies in IPV4 are

- a. Address depletion is a long term problem in the internet.
- b. Lack of accommodation for real-time audio and video transmission.
- c. Lack of encryption and authentication of data for some application

**9. What is IPv6? (N/D – 11 )**

IPv6 is the second network layer standard protocol that follows IPv4 for computer communications across the Internet and other computer networks. IPv6 offers several compelling functions that IPv4 cannot provide.

**10. What is the use of Network Address Translation? (M/J – 13)**

NAT (Network Address Translation) enables a user to have a large set of addresses internally and one address, or a small set of addresses, externally (public network). The traffic inside can use the large set, the traffic outside can use the small set.

**11. What is meant by multicasting? (N/D – 10 , 11 )**

Multicasting is the delivery of a message or information to a group of destination computers simultaneously in a single transmission from the source. It is communication between one source and many destinations.

**12. Define – Subnetting (N/D – 11 )**

Subnetting is dividing the large block of addresses into several contiguous groups and assigning each group to smaller networks called subnets. Subnetting increases the number of 1's in the mask.

**13. What is multitasking? (N/D – 11 )**

The simultaneous execution of multiple tasks i.e. programs under the control of an interrupt driven operating system is called multitasking.

**14. What is meant by hop count?**

Hop count is defined as the pathway requiring the smallest number of relays, in which every link is considered to be of equal length and give the value one.

**15. How can a routing be classified?**

The routing can be classified into two types

- a. Adaptive Routing
- b. Non Adaptive Routing

**16. What is the time-to-live (TTL) or packet life time?**

The time-to-live determines the life time of a packet. The time-to-live field of each such packet is marked with a life time. It is usually the number of hops that are allowed before a packet is considered

**17. Write the keys for understanding the distance vector routing.(N/D – 12)**

The keys for understanding the algorithm are

- a. Knowledge about the neighbourhood.
- b. Routing only to immediate neighbours.
- c. Information (routing table) sharing at regular intervals.
- d. The shortest route is the route with minimum hop count.

**18. Write the keys to understand the link state routing. (N/D11)**

The keys for understanding algorithm are:

- a. Knowledge about the whole networks.
- b. Routing to all neighbours.
- c. Information sharing where there is a change.
- d. The shortest route is the route with minimum cost metric.

**19. How is the packet cost referred in distance vector and link state routing?**

In distance vector routing, cost refer to the hop count while in the 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 link.

**20. Define – Masking**

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

**UNIT – IV**

**1. What are the duties of the transport layer? (N/D – 11 )**

The duties of the transport layer are

- End (Process) -to - end delivery
- Port Addressing
- Reliable delivery
- Flow control
- Multiplexing
- Segmentation and Reassembly

**2. What is a segment? (N/D – 11 )**

TCP divides long transmissions into smaller data units. It packages each into a frame called a segment. 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 protocol divides it into smaller usable blocks. The dividing process is called segmentation.

**3. What is UDP? (N/D – 12 )**

User Datagram Protocol (UDP) is a connectionless, unreliable transport protocol. It does not add anything to the IP services. It provides process-to-process communication and performs limited error checking.

**4. What are the advantages of using UDP over TCP? (N/D – 10 )**

The advantages of using UDP over TCP are

- UDP is a very simple protocol using a minimum overhead.
- UDP is used to send a small message without reliability.
- UDP has less interaction between the sender and receiver while sending small messages, than using TCP or SCTP.

**5. List the services of TCP from the application program point of view. (N/D – 10 )**

The services of TCP from the application program point of view are

- Process-to-process communication
- Stream delivery service
- Sending and receiving buffers
- Segments
- Full-duplex communication

**6. What is meant by congestion? (N/D – 11 )**

Congestion is the blockage in the network which reduces the throughput. Congestion in a network occurs if load on the network is greater than the capacity of the network.

**7. What is Quality of Service (QoS)? (N/D – 12 )**

The Quality of Service (QoS) 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. The attributes are

- Reliability
- Delay
- Jitter
- Bandwidth

**8. Name the parameters of Quality of Service (QoS) in a network. (M/J – 12 )**

The parameters of Quality of Service (QoS) in a network are

- Reliability
- Delay
- Jitter
- Bandwidth

**9. What is queuing? (N/D – 11 )**

Packets from different flows arrive at a switch or router for processing. The routers and switches have queues (buffers) that hold the packets before and after processing. The scheduling method of processing the packets waiting in a queue is called as queuing. Three types of queuing are FIFO queuing, priority queuing, and weighted fair queuing.

**10. What are the techniques used to improve QOS in process-to-process delivery? (A/M – 11 )**

The techniques used to improve QOS are

- Scheduling
- Traffic shaping
- Admission control
- Resource reservation

**11. What is function of transport layer?**

The functions of transport layer protocols are

- It takes care of the delivery of data from one application program (service) 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.

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

The four aspects related to the reliable delivery of the data are

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

**13. What is TCP?**

TCP is a connection-oriented, reliable protocol. It creates a virtual connection between two TCP's to send data. TCP uses flow and error control mechanisms at the transport level.

**14. What is 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 protocol divides it into smaller usable blocks. The dividing process is called segmentation.

**15. What is Concatenation?**

The size of the data unit belonging to a single session are so small that 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.

**16. What are the types of multiplexing?**

The types of multiplexing are

- Upward multiplexing
- Downward multiplexing

**17. What are the two possible transport services?**

Two basic types of transport services are

- Connection service
- Connectionless services

**18. The transport layer creates the connection between source and destination. What are the three events involved in the connection?**

The three events involved in the connection are

- Connection establishment
- Data transfer
- Connection release

**19. What are the techniques used in multiplexing?**

The three basic techniques of multiplexing are

- Frequency-division multiplexing
- Time-division multiplexing
- Wave-division multiplexing

**20. Why does congestion occur in network?**

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

**UNIT – V**

**1. What is the purpose of Domain Name System? (Or) State the role of DNS. (M/J – 12 )**

Domain Name System maps a name to an address (IP address) and conversely an address to name.

**2. What is cryptanalysis? (M/J – 12 )**

Cryptanalysis refers to the science and art of breaking ciphers to gain as much information as possible

about the original messages.

**3. Define – Cryptography (N/D – 11 )**

Cryptography refers to the science and art of transforming messages to make them secure and immune to attack.

**4. What is PGP? (N/D – 11 )(N/D – 10 )**

Pretty Good Privacy (PGP) protocol provides security at the application layer. PGP is designed to create authenticated and confidential e-mails.

**5. What is HTTP? (N/D – 11 )**

Hyper Text Transfer Protocol (HTTP) is a protocol which is used to access data on the World Wide Web (WWW). It functions as a combination of File transfer protocol (FTP) and Simple mail transfer protocol (SMTP).

**6. List the multimedia applications. (N/D – 11 )**

The multimedia applications are

- a. Streaming stored audio/video
- b. Streaming live audio/video
- c. Real time interactive audio/video

**7. What is TELNET? (N/D – 11 )**

TERminalNETwork (TELNET) is the standard TCP/IP protocol for virtual terminal service as proposed by ISO. TELNET is a general-purpose client/server application program It enables the establishment of a connection to a remote system in such a way that the local terminal appears to be a terminal at the remote system.

**8. What are the functionalities of TELNET? (N/D – 11 MCA) (Or)Name the function of TELNET. (N/D – 10 )**

TELNET enables the establishment of a connection to a remote system in such a way that the local terminal appears to be a terminal at the remote system. Simple Network Management Protocol (SNMP) is a framework used for managing devices in an internet using the TCP/IP protocol suite. It provides a set of fundamental operations for monitoring and maintaining an internet.

**9. Why is POP3 or IMAP4 needed for E-mail? (A/M – 11 )**

POP3 or IMAP4 is a client-server protocol. POP3 or IMAP4 for E-mail is needed by the client to pull messages i.e. retrieve messages from the server. The direction of the bulk data is from the server to the client. The POP3 or IMAP4 are message access agent protocols.

**10. What is SMTP? (N/D – 10 )**

Simple Mail Transfer Protocol (SMTP) is a system for sending messages to other computer users based on e-mail addresses. It provides mail exchange between users on the same or different computers. Simple Mail Transfer Protocol (SMTP) is a formal protocol that defines the Message Transfer Agent (MTA) client and server in the internet. The mail transfer is done through MTA.

**11. What are the three main division of the domain name space? (N/D – 12 )**

Three main division of the domain name space are generic domains, country domains and inverse domain.

- a. Generic domain: Define registered hosts according to their generic behaviour, uses generic suffixes.
- b. Country domain: Uses two characters to identify a country as the last suffix.
- c. Inverse domain: Finds the domain name given the IP address.

**12. What is a digital signature? (N/D – 11 )(M/J – 13 )**

Digital signature is a method to authenticate the sender of a message. Digital signature is a signature on a document, when verified, is a sign of sender.

**13. How is a secret key (symmetric) different from public key? (N/D – 12 )**

In secret (symmetric) 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.

**14. Explain 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.

**15. 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.

**16. 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 delivers it to the client SMTP to be sent through the Internet. The server SMTP at the receiving side receives the NVT ASCII data and delivers it to MIME to be transformed back to the original data.

**17. What are the three types of WWW documents?**

The three types of WWW documents are static, dynamic and active.

- a. Static: Fixed-content documents that are created and stored in a server.
- b. Dynamic: Created by web server whenever a browser requests the document.
- c. Active: A program to be run at the client side.

**18. Define – CGI (Common Gateway Interface)**

CGI is a set of standard that defines how a dynamic document is written, how data are input to the program, and how the output result is used. It is used for communication between HTTP servers and executable programs. It is used in creating dynamic documents.

**19. Name four factors needed for a secure network.**

The four factor that are needed for the secure network are

- a. Privacy: The sender and the receiver expect confidentiality.
- b. Authentication: The receiver is sure of the sender's identity and that an imposter has not sent the message.
- c. Integrity: The data must arrive at the receiver exactly as it was sent.
- d. Non-Reputation: The receiver must able to prove that a received message came from a specific sender.

**20. Define scenario testing.**

Scenario testing is a software testing activity that uses scenarios: hypothetical stories to help the tester work through a complex problem or test system. The idealso scenario test is a credible, complex, compelling or motivating story the outcome of which is easy to evaluate.