

Question

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- (i) what is application layer. (3)
- (ii) How network services help in our life? (5)
- (iii) Briefly explain the classification of computer network ? (6)

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- (i) What is data communication and computer network ? (3)
- (ii) What is distributed processing ? What are the advantages of distributed processing? (5)
- (iii) Define security threats . Categorize security threats . (6)

3]

- (i) Differentiate LAN technologies. (6)
- (ii) What is process application layer protocol. (3)
- (iii) Define Autonomous system. How do Autonomous system work? How do you create an Autonomous system? (5)

4]

- (i) Draw the client server model for two process to interact. (4)
- (ii) Identify the components of data communication systems. (4)
- (iii) Differentiate between client server and peer-to-peer networks. (6)

5]

- (i) Write down the effectiveness in data communication ? Write down network criteria. (5)
- (ii) write down the applications of communication and computer network. (4)
- (iii) Differentiate between computer network types with examples. (5)

6]

- (i) Define cryptography . How it works ? (12)
- (ii) Define OSI model and explain the layer in it (4)
- (iii) Define network topology . Explain different network topology . (5)

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- (i) What is TCP IP ? How does it work? (3)
- (ii) Define internet model . What are the layers in internet model ? (5)
- (iii) Why learning data communication and computer network is important ? Explain with example . (6)

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- (i) Define computer network . (3)
- (ii) Define client-server model . How to processes in client-server model can interact ? (6)
- (iii) Differentiate between physical and logical address . (5)

Ans: To The Question NO - 1 (i)

An application layer is an abstraction layer that specifies the shared communications protocols and interface methods used by hosts in a communication network.

In TCP/IP, the application layer contains the communications across an internet protocol (IP) computer network. The application layer contains communication and depends upon the underlying transport layer protocol to peer networking model.

Ans: To The Question No - 1 (ii)

Network services are given below:

File services:

- a) File sharing: One of the reason which give birth to networking was file sharing. File sharing enables its users to share their data with other users.
- b) File transfer: This is an activity to copy or move file from one computer to another computer.

Communication services:

- a) Email: Electronic mail is a communication method and something a computer user cannot work without.

b) Social Networking: Recent technologies have made technical life social. Now they can share their thoughts, pictures and videos.

c) Remote access: This service enables user to access the data residing on the remote computer.

Application Services:

Databases: This application service is one of the most important service which can stores data and information and also processes it.

Web services: It is used to connect to the internet, and access files and information services provided by the internet servers.

Resource Sharing: To use resources efficiently and economically, network provides a mean to share them.

Ans: To The Question No - 1 (iii)

Computer networks are classified based on various factors; They includes:

1) Geographical Span:

- a) It may be spanned across your table, among bluetooth enabled devices.
- b) It may spanned across a whole city.
- c) It may be one network covering whole world.

2) Inter-connectivity:

- a) Every single device can be connected to every other device on network.
- b) Each device is connected to its left and right peers only.

3) Administration: From an administrator's point of view, a network can be private network which belongs a single autonomous system and can't be accessed outside its physical unit or logical domain.

4) Network Architecture:

- a) There can be one or more systems acting as server. Other being client, requests the server to serve requests.
- b) Two systems can be connected point-to-point, or in back-to-back fashion.
- c) There can be hybrid network which involves network architecture of both the above types.

Ans: To The Question No - 2 (i)

Data communication refers to the transmission of this digital data between two or more computers and a computer network or data network is a telecommunications network that allows computer to exchange data.

The physical connection between networked computing devices is established using either cable media or wireless media.

The best-known computer network is the internet.

Ans: To The Question No - 2 (ii)

Distributed computing in simple words can be defined as a group of computers that are working together at the backend while appearing as one to the end-user. The individual computers working together in such groups operate concurrently and allow the whole system to keep working if one or some of them fail.

In a distributed system multiple computers can host different software components, but all the computers work to accomplish a common goal.

The advantages of Distributed processing:

- 1) Scalability and Modular Growth.
- 2) Fault Tolerance and Redundancy
- 3) Low latency
- 4) Cost Effectiveness
- 5) Efficiency
- 6) Complexity

Ans: To The Question No - 2 (iii)

Network security is a broad term that covers a multitude of technologies, devices and processes. In its simplest form, it is a set of rules and configurations designed to protect the integrity, confidentiality and accessibility of computer networks.

Security threats can be divided into the following categories:

- 1) Interruption: Interruption is a security threat in which availability of resources is attacked.

2) Privacy - Breach: In this threat, the privacy of a user is compromised. Someone, who is not the authorized person is accessing or intercepting data sent or the web-server is hacked.

3) Integrity: This type of threat includes any alteration or modification in the original context of communication.

4) Authenticity: This threat occurs when an attacker or a security violator, poses as a genuine person and accesses the resources or communicates with other genuine users.

Ans: To The Question No- 3 (i)

A local area network (LAN) is a computer network that spans a relatively small area. Most often, a LAN is confined to a single room, building or group of buildings, however, one LAN can be connected to other LANs.

Ethernet :

Ethernet is a widely deployed LAN technology. This technology was invented by Bob Metcalfe. Ethernet shares media. Network which uses shared media has high probability of data collision. Ethernet uses Carrier Sense Multiple Access / Collision Detects technology to detect collision.

Fast Ethernet:

To encompass need of fast emerging software and hardware technologies, Ethernet extends itself as Fast-Ethernet. It can run on UTP, Optical Fiber, and wirelessly too.

Giga Ethernet:

It provides speed up to 1000 mb/seconds. IEEE 802.3ab standardize Giga-Ethernet over UTP using Cat-5, Cat-5e and Cat-6 cables.

Virtual LAN:

LAN uses Ethernet which in turn works on shared media. Shared media in Ethernet create one single Broadcast domain and one single collision domain issue and each device connected.

Ans: To The Question No- 3 (ii)

Application layer protocol means standard TCP / IP services such as the ftp , tftp , and telnet commands . Simple network Management protocol (SNMP) , which enables network management.

Router Discovery server protocol (RDISC) and Routing information Protocol (RIP) routing protocols .

The application layer is present at the top of the OSI model . It is the layer through which users interact .

Ans: To The Question No- 3 (iii)

An autonomous system (AS) is a network or a collection of networks that are all managed and supervised by a single entity or organisation.

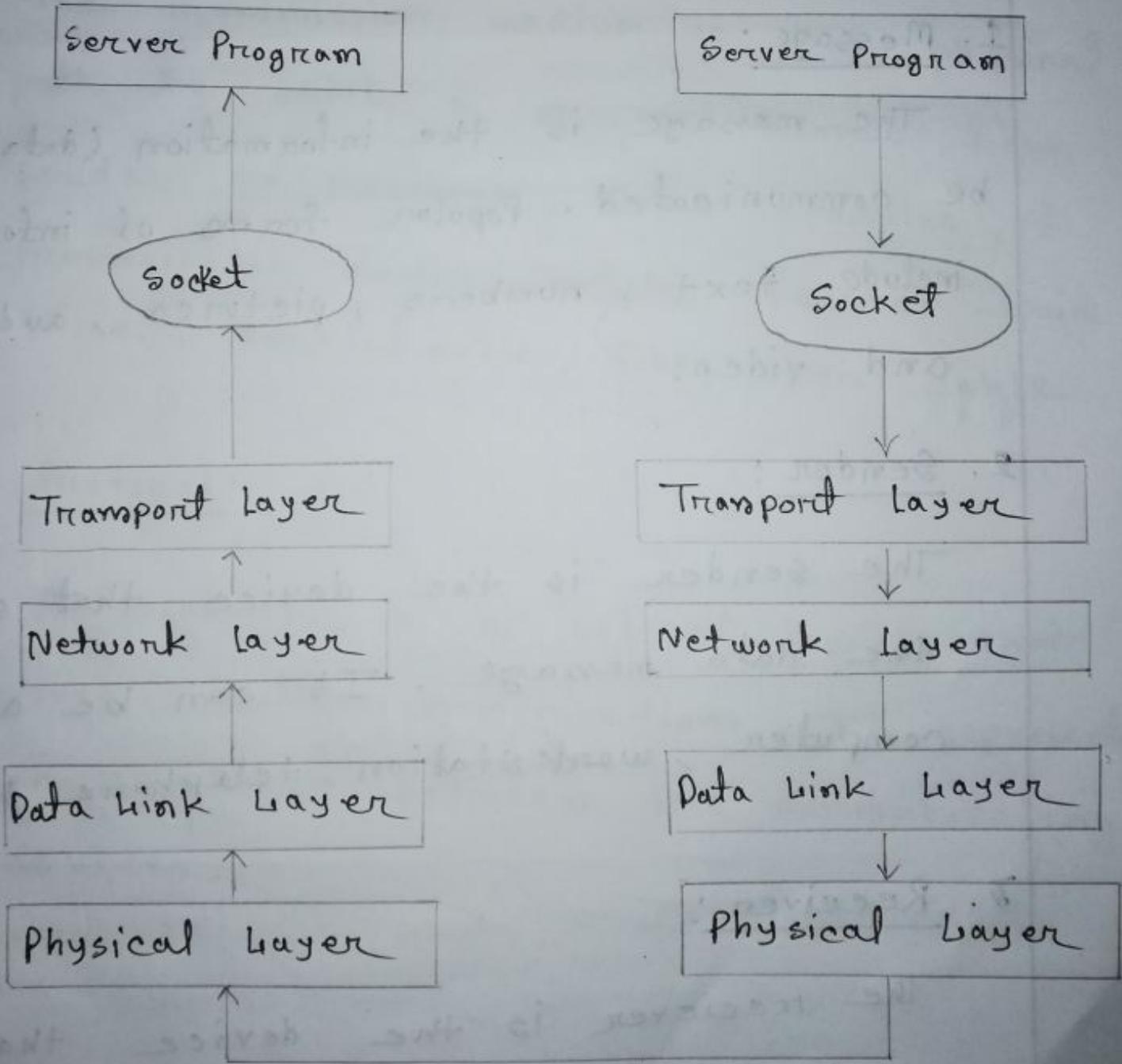
An autonomous system is also sometimes referred to as a routing domain. Networks within an autonomous system communicate routing information to each other using an Interior Gateway Protocol (IGP).

to make Autonomous System (AS) connections:

- 1) We must identify the AS to which each of the peering routers belongs.
- 2) We must decide on a group for the peering session.
- 3) Imagine, for example, that you have multiple connections between our network and neighbour network.
- 4) We must know the specific IP address of the interface to which we're connecting.

Ans: To The Question No - 4 (i)

The structure is given below.



Ans: To The Question No - 4 (ii)

The components of data communication systems is given below:

1. Message:

The message is the information (data) to be communicated. Popular forms of information include text, numbers, pictures, audio and video.

2. Sender:

The sender is the device that sends the data message. It can be a computer, workstation, telephone, handset.

3. Receiver:

The receiver is the device that receives the message. It can be

a computer, workstation, telephone, television and so on.

4. Transmission medium:

The transmission medium is the physical path by which a message travels from sender to receiver. Some examples of transmission media include twisted-pair wire, coaxial cable, fiber-optic cable.

5. Protocol:

A protocol is a set of rules that govern data communications. It represents an agreement between the communicating devices.

Ans: To The Question NO - 4 (iii)

The difference between client-server and peer to peer network given below:

Basis Comparison of	Client server Network	PEER - TO - PEER NETWORK
Focus	Focuses on information sharing.	Focuses on connectivity.
Data	Centralized server is used to store the data.	Each peer has its own data.
Implementation	Less expensive to implement.	It is less expensive to implement.
Stability	Client - server Network is more stable and scalable.	Less stable if number of peer is increased.

Service

The client requests Each and every node for service and server can make both request responds with a service and respond for the services.

Security

It is much more It is less secure.
secure.

Reliability

It is less reliable. It is more reliable.

Ans: To The Question No - 5 (i)

Data communications are the exchange of data between two devices via some form of transmission medium such as wire cable.

The effectiveness of data communication systems are given below:

1. Delivery: The system must deliver data to the correct destination.
2. Accuracy: The system must deliver the data accurately.
3. Timeliness: The system must deliver the data in time.
4. Jitter: Jitter refers to the variation in the packet arrival time.

A network must be able to meet certain number of criteria.

1. Performance: It can be measured many ways, including transit time and response time. It depends on a number of factors, including the number of users, the type of transmission medium.
2. Reliability: In addition to accuracy of delivery, network measured by the frequency of failure, the time it takes to recover and the network's robustness in a catastrophe.
3. Security: Network security issues include protecting data from unauthorized access, preventing damage and development and implementing policies and data losses.

Ans: To The Question NO: 5(ii)

The application of communication and computer network is given below:

1. Resource sharing such as printers and storage devices.
2. Exchange of information by means of e-mails and FTP.
3. Information sharing by using web or internet.
4. Interaction with other users using dynamic web pages.
5. IP phones.
6. Video conferences.
7. Parallel computing.
8. Instant messaging.

Ans: To The Question No - 5 (iii)

Difference between computer network :

Personal area Network:

A personal area network (PAN) is smallest network which is very personal to her. This may include Bluetooth enabled devices or infra-red enabled devices. PAN has connectivity range up to 10 meters. PAN has connectivity range up to 10 meter also wireless keyboard and mouse included.

Local Area Network:

A computer network spanned inside a building and operated under single administrative system is generally termed as Local Area Network (LAN). Usually, LAN covers an organization

offices, schools, colleges or universities. LAN provides a useful way of sharing the resources between end users. Ethernet is most widely employed LAN technology.

Metropolitan Area Network:

The metropolitan area network (MAN) generally expands throughout a city such as cable tv networks. It can be in the form of Ethernet, Token-ring, ATM or Fiber distributed Data interface.

Wide Area Network:

It covers a wide area which may span across provinces and even a whole country. Telecommunication networks are wide area network. These network provides connectivity to MANs and WANs.

Ans: To The Question NO - 6 (i)

Cryptography is a technique to encrypt the plain text data which makes it difficult to understand and interpret. There are several cryptographic algorithms available present day as described below:

Secret Key Encryption:

Both sender and receiver have one secret key. This secret key is used to encrypt the data at sender's end. After the data is encrypted, it is sent on the public domain to the receiver because the receiver knows and has the secret key, the encrypted data packets can easily be decrypted.

Public Key Encryption :

In this encryption system, every user has its own secret key and it is not in the shared domain. The secret key never revealed on public domain. Along with secret key, every user has its own but public key.

Message Digest :

In this method, actual data is not sent, instead a hash value is calculated and sent. The other end user, computes its own hash value and compares with the one just received. If both hash values are matched, then it is accepted.

Ans: To The Question NO - 6 (ii)

Open system Interconnect is an open standard for all communication systems. OSI model has seven layers:

- 1] Application Layer: This layer is responsible for providing interface to the application user.
- 2] Presentation layer: It defines how data in the native format of remote host should be presented.
- 3] Session Layer: This layer defines how data maintenance sessions between remote host.
- 4] Transport Layer: It is responsible for end-to-end delivery between hosts.
- 5] Network Layer: This layer is responsible for reading and writing data from and onto the line.

6] Data Link Layer: This layer is responsible for reading and writing data from, hardware, power output, pulse rate etc.

7] Physical Layer: This layer is also defines the hardware and power.

Ans: To The Question NO - 6(iii)

A network topology is the arrangement of nodes usually switches, routers, or software switch/router features and connections in a network.

The different network topology given below:

1] Bus topology: In this, every node is connected in series along a linear path.

2] Star topology: In this, a central node has direct connection to all other nodes.

3] Ring topology: In this, the nodes are connected in a closed loop configuration. Some rings will pass data only in one direction, while others are capable of transmission in both directions.

4] Mesh topology: In this, links node with connections so that multiple paths between at least some points of the network available.

5] Tree topology: It is a network where star topologies are themselves connected in a star configuration.

Ans: To The Question No- 7 (i)

TCP: TCP is responsible for taking large amounts of data , compiling it into packets and sending them on their way .

IP: It is the locational aspect of the pair allowing the packets of information to be sent and received to the location .

They work in the following fashion :

- 1 Physical network interconnect nodes and server .
- 2 Connects hosts to one another across networks .
- 3 Resolves all host-to-host communication .
- 4 Ensure communication between applications on a network .

Ans: To The Question NO - 7(ii)

Internet uses TCP / IP protocol suite, also known as internet suite. This defines Internet model which contains four layered architecture.

This model has following layer:

- 1 Application Layer: This layer defines the protocol which enables user to interact with the network. For example, FTP, HTTP etc.
- 2 Transport Layer: This layer defines how data should flow between hosts. Major protocol at this layer is transmission control protocol. This layer ensures data delivered between hosts is in-order and is responsible

for end-to-end delivery.

3] Internet Layer: Internet protocol (IP)

works on this layer. This layer facilitates host addressing and recognition. This layer defines routing.

4] Link Layer: This layer provides mechanism of sending and receiving actual data. Unlike its OSI model counterpart, this layer is independent of underlying network architecture and hardware.

Ans: To The Question No - 7 (iii)

The importance of learning data communication and computer network is given below :

1 Network Basic Understanding :

A system of interconnected computers and computerized peripherals such as printers is called computer network. This interconnection among computers facilitates information sharing among them. Computers may connect to each other by either wired or wireless media.

2 Network Engineering :

Network engineering is a complicated task, which involves software, firmware, chip

level engineering, hardware, and electric pulses. To ease network engineering, the whole networking concept is divided into multiple layers. Each layer is involved in some particular task and is independent of all other layers.

3 Internet:

A network of networks is called an internetwork, or simply the internet. Internet uses TCP/IP protocol suite and uses IP as its addressing protocol. It uses www, FTP, email services, audio and video streaming etc.

Ans: To The Question No - 8 (i)

A system of interconnected computers and computerized peripherals such as printers is called computer. This interconnection among computers facilitates information sharing among them.

Computer may connect to each other by either wired or wireless media.

The best known computer network is ~~is~~ the Internet.

Ans: To The Question NO - 8 (ii)

A client server model network is a specific type of online network comprised of a single central computer acting as a server that directs multiple other computers, which are referred to as the clients. By accessing the server, clients are then able to reach shared files and information saved on the serving computer. Examples of computer applications that use the client server model are Email, network printing and the world wide web.

Two processes in client-server model can interact in various ways:

- 1 Sockets: The process acting as Server opens a socket using a well-known port and waits until some client request comes. The second process acting as a Client also opens a socket but instead of waiting for an incoming request.
- 2 Remote Procedure Call: This is mechanism where one process interacts with another by means of procedure calls. One process calls the procedure lying on remote host. The process on remote host is said to be server. Both processes are allocated stubs.

Ans: To The Question No - 8 (iii)

Application layer protocols can be broadly divided into two categories:

- Protocols which are used by users. Example email etc.
- Protocols which help and support protocols used by user. Example DNS.

Few of Application layer protocols are described below:

Domain Name System:

DNS works on Client Server model. It uses UDP protocol for transport layer communication. DNS uses hierarchical domain based naming scheme.

Hyper Text Transfer Protocol:

The Hyper Text Transfer Protocol is the foundation of World Wide Web. Hypertext is well organized documentation system which uses hyperlinks to link the pages in the text documents.

Post Office Protocol:

The post office protocol version 3 (POP3) is a simple mail retrieval protocol used by user agents to retrieve mail from mail server. When user wants to retrieve mail, it opens a connection with the server on TCP port 110.