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Set - I

- ① (a) What is DCN?
- (b) Write down the applications of DCN.
- (c) Why to learn DCN?
What is computer network?
- (d) Classification of Computer Networks.

Ans:

(a)

DCN:

'DCN' means Data Communication and Computer network. Data communications 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 computers to exchange data. The best-known computer network is the internet. The physical connection between networked computing devices is established using either cable

(2)

media on wireless media.

(b)

Applications of communication and computer network:

Computer systems and peripherals are connected to form a network. They provide numerous advantages:-

■ Information sharing by using Web or Internet

■ Video conferences.

■ Parallel computing.

■ Instant messaging.

■ Interaction with other users using dynamic web pages.

■ Exchange of information by means of e-Mails and FTP.

(1)

(2)

Importance of Data communication and computer network:

→ Network Basic Understanding:

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

→ Network engineering:

Networking 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

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of all other layers.

⇒ Internet:

A network of networks is called an internetwork, or simply, the internet. It is the largest network in existence on this planet. Present day, Internet is widely implemented using IPv4. Because of storage of address spaces, it is gradually migrating from IPv4 to IPv6. It uses WWW, FTP, email services, audio and video streaming etc. Internet uses very high speed backbone of fiber optics.

Computer network:

Computer network is a system of interconnected computers and computerized peripherals such as printers. This interconnection among computers facilitates information sharing among them.

Classification of Computer Network:

Computer networks are classified based on various factors. They include:

① Geographical Span.

② Connectivity.

③ Inter-connectivity.

④ Administration.

⑤ Architecture.

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Set-2

- (a) Difference between LAN, MAN, WAN.
- (b) Write down the applications of network.
- (c) Write down the architecture of network.
- (d) Details about the classification of network.

Ans:

(a)

Difference between LAN, MAN, WAN :-

LAN	MAN	WAN
① LAN stands for Local area network	① MAN stands for metropolitan area network	① WAN stands for wide area network
② LAN's ownership is private.	② MAN's ownership can be private or public.	② WAN also might not be owned by one organization.
③ The transmission speed of a LAN is high.	③ The transmission speed of a MAN is average.	③ The transmission speed of a WAN is low.

④ There is less congestion in LAN.

⑤ While there is more congestion in MAN.

⑥ There is more congestion than MAN in WAN.

⑦ LAN's design and maintenance is easy.

⑧ MAN's design and maintenance is difficult than LAN.

⑨ WAN's design and maintenance is also difficult than LAN as well as MAN.

(b)

Network applications:

① Resource sharing such as printers and storage devices.

② Exchange of information by means of e-mails and FTP.

③ Interaktion with other users using dynamic web pages.

④ Information sharing by using Web or Internet.

⑤ IP phones.

⑥ Video conferences.

⑦ Instant messaging.

Network Architectures

Computer networks can be discriminated into various types such as Client-Server, peer-to-peer or hybrid, depending upon its architecture.

⇒ There can be one or more systems acting as servers. Other being client, request the server to serve requests.

⇒ Two systems can be connected point-to-point, or in back-to-back fashion. They both reside at the same level and called peers.

⇒ There can be hybrid network which involves network architecture of both the above types.

(d)

Geographical span

Geographically a network can be seen in one of the following categories:

→ It may be spanned across a whole city.

→ It may be spanned across multiple cities or provinces

→ It may be one network covering whole world.

Inter-Connectivity

→ Each device is connected to its left and right peers only, creating linear structure.

→ All devices connected together with a single device, creating star like structure.

→ Every single device can be connected to every other device on network, making the network mesh.

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Administration:

From an administrator's point of view, a network can be private network which belongs a single autonomous sys. and cannot be accessed outside its physical or logical domain. A network can be public which is accessed by all.

Set - 3

- ① Write down the service of Internetwork
- ② What is Ethernet?
- ③ Difference between Fast-Ethernet and Gigabit-Ethernet.
- ④ Discuss about Virtual LAN.

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(a)

Internet is serving many purposes and is involved in many aspects of life. Some of them are:

- (I) Web sites.
- (II) E-mail.
- (III) Instant Messaging.
- (IV) Blogging.
- (V) Social Media.
- (VI) Marketing.
- (VII) Networking.
- (VIII) Resource sharing.
- (IX) Audio and Video streaming.

(b)

Ethernet:

Ethernet is a widely deployed LAN technology. Ethernet shares media. Network which uses shared media has high probability of data collision. Ethernet connector is network interface and Ethernet equipped with 48-bits MAC address card identifies devices to identify others. Ethernet devices communicate with remote devices and communicate with star topology. In Ethernet, Ethernet follows star topology with segment length up to 100 meters.

(19)

(c)

Difference between Fast-Ethernet and Gigabit Ethernet:

Key	Fast Ethernet	Gigabit Ethernet
① Successor	Fast Ethernet is successor of 10-BASE-T-Ethernet.	Gigabit Ethernet is successor of Fast Ethernet.
② Network speed	Fast Ethernet speed is upto 100 Mbps.	Gigabit Ethernet speed is upto 1Gb/s.
③ Complexity	Fast Ethernet is simple to configure.	Gigabit Ethernet is quite complex to configure.
④ Delay	Fast Ethernet generates more delay.	Gigabit Ethernet generates less delay than fast Ethernet.
⑤ Coverage Limit	Fast Ethernet coverage limit is upto 10km.	Gigabit Ethernet coverage limit is upto 70 km.

(d)

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. Introduction of switches to Ethernet has removed single collision domain issue and each device connected to switch works in its separate collision domain. But even switches cannot divide a network into separate Broadcast domains. Virtual LAN is a solution to divide a single Broadcast domain into multiple broadcast domains. Host in one VLAN cannot speak to a host in another. By default, all hosts are placed into the same VLAN.

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- ① What is Network-topology?
- ② Discuss about point-to-point network.
- ③ Difference between Bus topology and star topology.
- ④ Difference between Ring topology and mesh topology.

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Ans: Network Topology:
A network topology is the arrangement with which computer systems or network devices are connected to each other.
Topologies may define both physical and logical aspect of the network.
Both logical and physical topologies could be same or different in a same network.

(6)

Point-to-point:

Point-to-point networks contains exactly two hosts such as a computer, switch or router, servers connected back-to-back using a single piece of cable. Often, the receiving end of one host is connected to sending end of the other and vice-versa.

If the hosts are connected point-to-point logically, then may have multiple intermediate devices. But the end hosts are unaware of underlying network and see each other as if they are connected directly.

(17)

(a)

Difference between Bus and Star topology:

key	Bus topology	Star topology
Fundamental Element	Cable	Hub or switch
speed of data transfer	Slow	Comparatively fast
Network Orientation	Linear	Non-linear
Cost	Low	Quite high
Cabling requirement	Less	More
Fault detection	Difficult	Comparatively easy
Network Extension	This configuration permits addition of many devices	Here the network permits limited addition of devices.

(18)

① Difference between Ring and Mesh Topology:

No.	Ring Topology	Mesh Topology
1.	In ring topology, every node is connected to its left and right side nodes.	In mesh topology, the nodes are connected to each other completely via dedicated vid.
2.	The cost of ring topology is low.	The cost of Mesh topology is expensive.
3.	Ring topology is used in LAN.	Mesh topology is generally suited for WAN.
4.	Ring topology is poor extensible.	Mesh topology is also poor extensible.
5.	In ring topology, the information is travel from node to node in one direction.	In mesh technology the information is travel from node to node.

(P)

Set-5

- (a) Write down the application process.
- (b) How to interact, client-server model.
- (c) Discuss about sockets.
- (d) Discuss about Remote Procedure Call.

Ans:

(a)

Two remote application processes can communicate mainly in different fashion

- (i) Peer-to-peer: Both remote processes are executing at same level and they exchange data using some shared resource.
- (ii) Client-Server: One remote process acts as a client and requests some resource from another application process acting as server.

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(b)

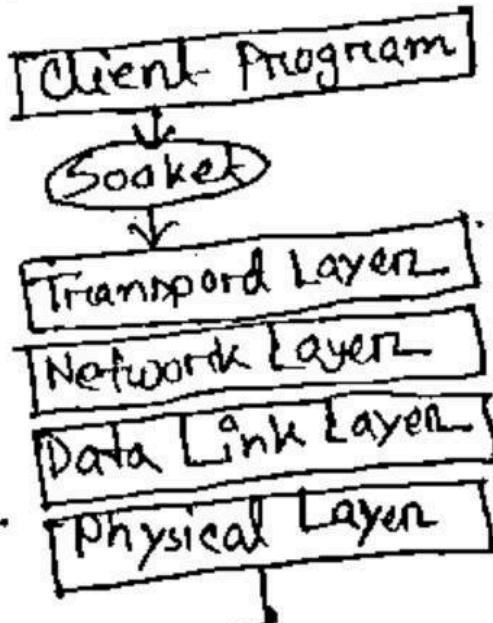
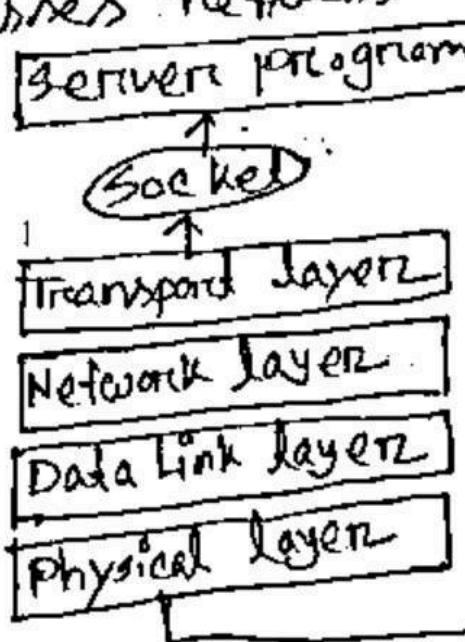
Two processes in client-server model can interact in various ways,

④ Sockets

④ Remote Procedure Calls (RPC)

(c)

In this paradigm, 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, the client processes 'request first'.



(P)

(d)

Remote Procedure Call:

This is a mechanism where one process interacts with another by means of procedure calls. This communication happens.

- The remote host passes data to the server stub where it is unmarshaled.
- The parameters are passed to the procedure is then executed.
- The result is sent back to the client in the same manner.
- Kernel sends the data over the network and the other and receives it.

(23)

Ques - 6

- (a) Write down the two categories of Application Layer.
- (b) What is HTTP?
- (c) Details about FTP and POP.
- (d) Write down the Domain name system.

Ans:

(a)

Application Layer protocols can be broadly divided into two categories:

① Protocols which are used by users.

For example, eMail.

② Protocols which help and support

protocols used by users. For example DNS.

(b)

HTTP:

The Hyper Text Transfer Protocol is the foundation of World Wide Web. Hypertext is well organized documentation system which uses hyperlink to link the pages in the text documents. HTTP works on client server model. When a user wants to access any HTTP page on the Internet the client machine at user end initiates a TCP connection to server on port 80. When the server accepts the client request, the client is authorized to access web pages.

FTP:

The file transfer protocol is the most widely used protocol for file transfer over the network. FTP uses TCP/IP for communication and it works on TCP port 21. FTP works on client/server model where a client requests file from server sends requested resource back to the client. FTP uses out-of-band controlling i.e. FTP uses TCP port 20 for exchanging controlling information and the actual data is sent over TCP port 21.

POP:

The post office protocol version 3 (POP3) is a simple mail retrieval protocol used by User Agents (client email

software) to retrieve mails from mail servers. When a client needs to retrieve mails from server, it opens a connection with server on TCP port 110. User can then access his mails and download them to the local computer. POP3 works in two modes. The most common mode, the delete mode, is to delete the emails from remote server after they are downloaded to local machine.



Domain Name System:

The domain Domain Name System works on client server model. It uses UDP protocol for transport layer communication. DNS uses hierarchical domain based.

naming scheme. The DNS server is configured with Fully Qualified Domain Names (FQDN) and email addresses mapped with their respective internal protocol addresses.

A DNS server is requested with FQDN and it responds back with the IP address mapped with it. DNS uses UDP port 53.

Set - 7

- (a) What is Application Layer?
- (b) Discuss about Application services.
- (c) What is Email?
- (d) Discuss about file services.

(a)

Application Layer:

Application Layer is the top most layer in OSI and TCP/IP layered model. This layer exists in both layered because of its significance of interacting with user and user applications. This layer is for applications which are involved in communication system.

(b)

Application Services:

These are nothing but providing network based services to the users such as web services, database managing, and resource sharing.

⇒ Web services

- World Wide Web has become the synonym for Internet. It is used to connect to the Internet and access files and information services.

⇒ Resource sharing

To use resources efficiently and economically, network providers a mean to share them. This may include servers, printers and storage media etc.

⇒ Databases

This application service is one of the most important services. It stores data and information, processes it, and enables the user to retrieve it efficiently by using queries. Databases help organizations to make decisions based on statistics.

①

E-mail:
Electronic mail is a communication method and something a computer user cannot work without. This is the basis of

29

- Today's Internet structure. Email system has one or more email servers. All its users are provided with unique IDs. When a user sends email to other user, it is actually transferred between users with help of email server.

④

File services:

File services include sharing and transferring files over the network.

→ file sharing.

One of the reason which gave birth to networking was file sharing. File sharing enable its users to share their data with other users. Users can upload the file to a specific server, which is accessible by all intended users.

⇒ File Transfer

This is an activity to copy or move file from one computer or do multiple computation with help of underlying network. Network enables its user to locate other users in the network and transfers files.

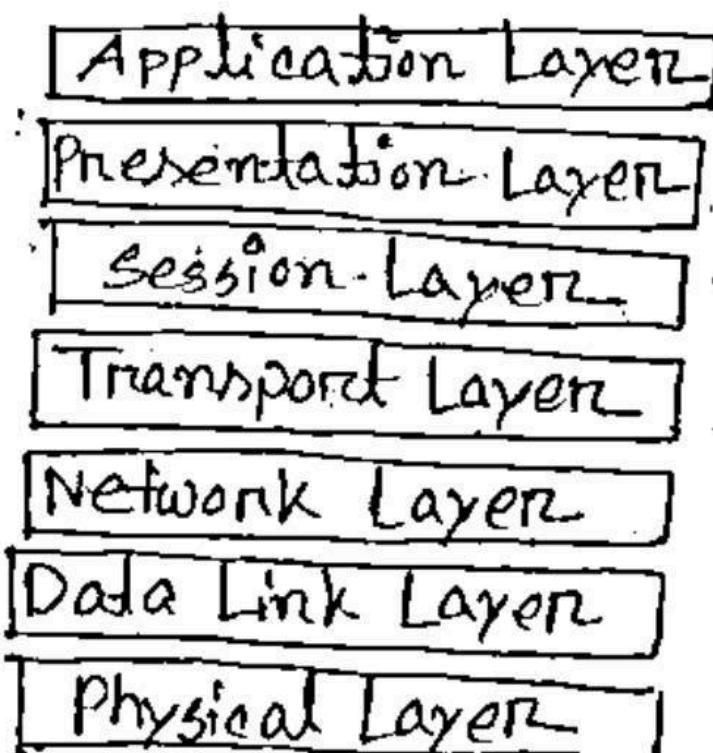
Set-8

- ① What is OSI Model?
- ② Discuss about Internet Model.
- ③ what is Layered Tasks ?
- ④ What is Secret key encryption and Public key encryption?

(A)

OSI Model:

Open system Interconnect is an open standard for all communication systems. OSI model is established by International Standard Organization. This model has seven layers:



(b)

Internet Model:

Internet uses TCP/IP protocol suite, also known as Internet suite. This model has the following layers:

⇒ Application Layer:

This layer defines the protocol which enable user to interact with the network for example FTP, HTTP etc.

⇒ Transport Layer:

This layer defines how data should flow between hosts. Major protocol is at this layer is Transmission control protocol.

⇒ Internet Layer:

Internet Protocol works on this layer. This layer facilitates host addressing and routing.

This layer defines routing.

③

→ 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.

④

Layered Tasks:

In Layered architecture of Network Model, one whole network process is divided into small tasks. Each small task is then assigned to a particular layer which works dedicatedly to process the task only. Every layer does only specific work.

In layered communication system, one layer of a host deals with the task done by or to be done by its peer layer at the same level on the remote host. The task is either initiated by layer at the lowest level or at the top most level.

(d)

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 is never revealed on public domain. Along with secret key, every user has its own but public key. Public key is always made public and is used by senders to encrypt the data.