CT-1

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Question Sets

1. (a) What is computer network ? 1

(b) Write down the classifications of computer network ? 5

(c) what are the applications of computer network.? 3

(d) Describe about different types of computer networks ? 5

2. (a) What is ethernet? 1

(b) Write down about LAN technology. 5

(c) what is the difference between a switch and a hub? 4

(d) Write the names of different types of topologies ? 4

3. (a) What is hub ?

(b) what types of devices are used in an ethernet network ?

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(c) What are the catagonies of computer network security threads?

(d) What is Encryption? write down the types of encryption / Decryption / cryptographic algorithm?

4. (a) What is the purpose of Domain Name system?

(b) How is a secret key difference from public key?

(c) Write down the three types of WWW documents

(d) Discuss the three main division of the domain name space.

5. (a) Define CGI.

(b) How many processes are there to communicate with two people?

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(c) How client server model works ?

(d) How the browser interacts with the server

6. (a) what is the purpose of HTML ?

(b) State the different between fully qualified and qualified domain name.

(c) Describe about application layer protocols.

7. (a) What is the function of SMTP ?

(b) Why is an application such an POP needed for electronic messaging ?

(c) write down about directory services ?

(d) Describe about file sharing and transfering over the network ?

8. (a) Define permutation

(b) what is Digital signature ?

(c) Describe about communication services of computer network ?

(d) write down about application services of CN.

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Answer to the question no- 1

(a)

Computer Network : A system of interconnected computer and computerized peripherals such as printers is called computer network.

Answer to the question no- 1

(b)

Computer networks are classified based on various factors. They includes -

(i) Geographical span

(ii) Inter-connectivity

(iii) Administration

(iv) Architecture

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Geographical span : Geographically a network can be seen in one of the following catagories :-

(i) It may be spanned across our table, among Bluetooth enabled devices, Ranging not more than few meters.

(ii) It may be spanned across a whole city.

(iii) It may be spanned across multiple cities or provinces.

(iv) It may be one network covering whole world.

(v) It may be spanned across a whole building, including intermediate devices to connect all floors.

Inter-Connectivity : Components of a computer network can be connected to each other differently in some fashion. By connectedness we mean either logically, physically or both ways.

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

(ii) All devices can be connected to a single medium but geographically disconnected, created bus like structure.

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

(iv) All devices connected together with a single device, creating star like structure.

(v) All devices connected arbitrarily using all previous ways to connect each other, resulting in a hybrid structure.

Administration: From an administrators point of view, a network can be private network

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which belongs a single autonomous system and cannot be accessed outside its physical or logical domain. A network can be public which is accessed by all.

Network Architecture: Computer networks can be discriminated into various types such as client-server, peer-to-peer, or hybrid, depending upon its architecture.

(i) There can be one or more systems acting as server. Other being client, requests the server to server requests.

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

(iii) There can be hybrid network which involve network architecture of both the above type.

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Answer to the Question no-1

(c)

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

(i) Resource sharing such as printers and storage devices.

(ii) Exchange of information by means of e-mails and FTP.

(iii) Information sharing by using web on Internet.

(iv) Interaction with other users using dynamic web pages.

(v) IP phones

(vi) Video conference

(vii) Parallel computing

(viii) Instant messaging

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Answer to the question no-1

(d)

Generally, networks are distinguished based on their geographical span. A network can be as small as distance between our mobile phone and its Bluetooth headphone and as large as the internet itself, covering the whole geographical world.

There are different types of computer network.

They are -

1. Personal area network.
2. Local Area network.
3. Metropolitan Area network.
4. Wide Area - Network.
5. Internetwork.

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1. Personal Area Network: A personal area network (PAN) is smallest network which is very personal to a user. This may include Bluetooth enabled devices or infra-red enabled devices. PAN has connectivity range upto 10 meters. PAN may include wireless computer keyboard and mouse. Bluetooth enable headphones wireless printers and TV remotes.

For example, Piconet is Bluetooth-enabled personal Area Network which may contain up to 8 devices connected together in a master slave fashion.

2. 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's offices.

school, colleges or universities. Number of systems connected in LAN may vary from as least as two to as much as 16 million.

LAN provides a useful way of sharing the resource between end users. The resources such as printers, file servers, scanners, and internet are easily sharable among computers.

LAN uses either ethernet or token-ring technology. Ethernet is most widely employed LAN technology and uses star topology, while token-ring is rarely seen.

LAN can be wired, wireless or in both forms at once.

3. Metropolitan Area Network: The Metropolitan Area Network (MAN) generally expands throughout a city such as cable TV network. It can be in the form of ethernet, token-ring, ATM or fiber

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Distributed Data Interface (FDDI)

Metro ethernet is a service which is provided by ISPs. This service enables its users to expand their Local Area Networks. For example, MAN can help an organization to connect all of its officer in a city.

Backbone of MAN is high capacity and high-speed fiber optics. MAN works in between Local Area Network and Wide Area Network. MAN provides uplink for LANs to WANs or internet.

4. Wide Area Network: As the name suggests, the wide Area Network (WAN) covers a wide area which may span across provinces and even a whole country. Generally, telecommunication networks are wide Area Network. These Networks provide connectivity to MANs

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and LANs. Since they are equipped with very high speed backbone, WANs are very expensive network equipment.

WAN may use advance technologies such as Asynchronous Transfer Mode (ATM), Frame Relay, and Synchronous Optical Network (SONET). Relay, and WAN may be managed by multiple administration

5. Internetwork : A network of networks is called an internetwork, or simply the internet. It is the largest network in existance on this planet. The internet hugely connects all WANs and it can have connection to LANs and home networks. Internet uses TCP/IP protocol suite and uses IP as its addressing protocol. Present day, Internet is widely implemented using IPv4. Because of shortage of address spaces,

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it is gradually migrating from IPv4 to IPv6.

Internet enables its users to share and access enormous amount of information worldwide. It uses WWW, FTP, email services, audio and video streaming etc.

At huge level, internet works on client-server model.

Internet uses very high-speed backbone of fiber optics. To inter-connect various continents, fibers are laid under sea known to us as submarine communication cable.

Internet is serving many proposes 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

Answer to the question no:-2

(a)

Ethernet: Ethernet is a local area network (
protocol that was originally developed to lin
computers.

Answer to the question no:-2

(b)

There are various LAN technologies -

(i) Ethernet
(ii) Fast- Ethernet
(iii) Giga- Ethernet
(iv) Virtual LAN

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(i) Ethernet :- Ethernet is a widely deployed LAN technology. This technology was invented by Bob Metcalfe and D.R Boggs in the year 1970. It was standardized in IEEE 802.3 in 1980. Ethernet shares media. Network which uses shared media has high probability of data collision. Ethernet uses carrier sence Multi Access / collision Detection (CSMA / CD) technology to detect collisions.

Ethernet follows star topology with segment length up to 100 meters.

(ii) 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.

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It can provide speed up to 100 mbps. This standard in named as 100 BASE-T in IEEE 803.2 using cat-5 twisted pair cable. It uses CSMA/CD technique for wired media sharing among the ethernet hosts and CSMA/CA (CA stands for collision avoidance) technique for wireless ethernet LAN.

(iii) Giga-Ethernet : After being introduced in 1995, Fast-Ethernet could enjoy its high-speed status only for 3 year till Giga-Ethernet introduced. Giga-Ethernet provides speed up to 1000 mbps.

(iv) Virtual LAN : LAN uses Ethernet wich in turn works on shared media. Shared media in ethernet create one single broadcast domain and one single collision domain. Introduction

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of switches to ethernet has removed single collision domain issue and each device connected to switch works in its separate collision domain.

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Answer to the Question no - 2

(c)

Difference between a switch and hub :-

Switch	Hub
1. Switch works in full duplex mode.	1. Hub works in half duplex mode.
2. Sends data in form of framer.	2. Sends data in form of bits.
3. Multicast device	3. Broadcast device
4. Switch works in data Link / Network layer of OSI model.	4. Hub works in physical layer of OSI model.
5. It used to connect devices to the network.	5. It used to connect devices to the same network.
6. It stores MAC address and IP address of nodes in the network.	6. It does not store only MAC address of a node in the network.
7. Type are Layer 2 and Layer 3 switch.	7. Type are :- Active hub, passive hub, intelligent hub.

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Answer to the Question no - 2

(d)

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. There are different types of topologies :

(i) Point-to-Point

(ii) Bus topology

(iii) Star topology

(iv) Ring topology

(v) Mesh topology

(vi) Tree topology

(vii) Daisy Chain

(viii) Hybrid topology

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Answer to the Question no - 3

(a)

Hub : A hub is a network hub used for connecting of devices in a network. It connects several devices in a LAN. All the devices in the network connection is connected through hub that acts as a central connection for all the devices.

Answer to the question no - 3

(b)

Hubs, switches, routers, media converters and the various user device that can connect to them. switches are used to manage traffic in an efficent manner and are available in managed and unmanaged various.

Hubs are older technology devices that repeat

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the transmission that is received on one port to all ports a very inefficient operation. Media converters allow two different forms of media - copper and fiber - to 'connect'. A router is a device that manages traffic between network segments. It connects networks at Layer 3 of the OSI ~~mob~~ model.

Answer to the ques no-13

(c)

During initial days of internet, its use was limited to military and universities for research and development purpose. Later when all networks merged together and formed internet, the data used to travel through public transit network. Common people may send the data that can be highly sensitive

such as their bank credentials, username and passwords, personal documents, online shoping details on confidential documents.

All sequrity threads are intentional i.e. they occur only if intentionally triggered. Security threads can be divided into the following catagories

(i) Interruption :

Interruption is a security threat in which availability of resources is attacked.

For example, a user is unable to access its web-server on the web-server is hijacked.

(ii) Privacy-Branch :

In this threat, the privacy of a user is compromised. Someone, who is not the athorized person is accessing or intercepting data sent or received by the original authenticated user.

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(iii) Integrity :

This type of thread includes any attention on modification in the original context of communication. The attacker intercepts and receives the data sent by the sender and the attacker then either modifies or generates false data and sends to the receiver. The receiver receives the data assuming that it is being sent by the original senders.

(iv) Authencity :

Ther threat occurs when an attacker or a security violator, poses as a genuine person and accesses the resources or communicates with other genuine users.

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Answer to the Question no - 3

(d)

Encryption : Encryption is a way of scrambling data so that only authorized parties can understand the information. In technical terms, it is the process of converting plaintext to ciphertext.

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 -

(i) Secret key Encryption

(ii) Private key Encryption

(iii) Message Digest

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(i) 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.

Example of secret key encryption is data encryption standard (DES). In secret key encryption, it is required to have a separate key for each host on the network making it difficult to manage.

(ii) Public key Encryption : In this encryption system, every user has its own secret key

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and it in not in the shared domain. The secret key in 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. When the user receives the encrypted data he can easily dy decrypt it by using its own secret key.

Example of public key encryption is Rivest-Shamir-Adleman (RSA)

(iii) 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

Otherwise rejected.

Example of Message Digent in MD5 hashing.

It is mostly used in authentication where user password is cross checked with the one saved on the server.

Answer to the ques no-04

(a)

Domain Name System can map a name to an address and conversely ~~and~~ an address to name.

Answer to the ques no-4

(b)

In secrate key, the same key is used by both parties. The sender uses this key and an encryption algorithm to encrypt

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data; the receiver uses the same key and the corresponding decryption algorithm to decrypt the data.

In public key, there are two keys.

(i) a private key
(ii) a public key

The private key is kept by the receiver. The public key is annouced to the public.

Answer to the question no- 4

(c)

The documents in the www can be grouped into three board catagories-

(i) Static
(ii) Dynamic
(iii) Active

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(i) Static : Fixed content documents that are created and stored in a server.

(ii) Dynamic : Created by web server whenever a browser requests the document.

(iii) Active : A program to be run at the client side.

Answer to the ques no- 04

(d)

DNS in a TCP/IP protocol used on different platforms. The domain name space is divided into three different sections :-

(i) Generic domain

(ii) Country domain

(iii) Inverse domain

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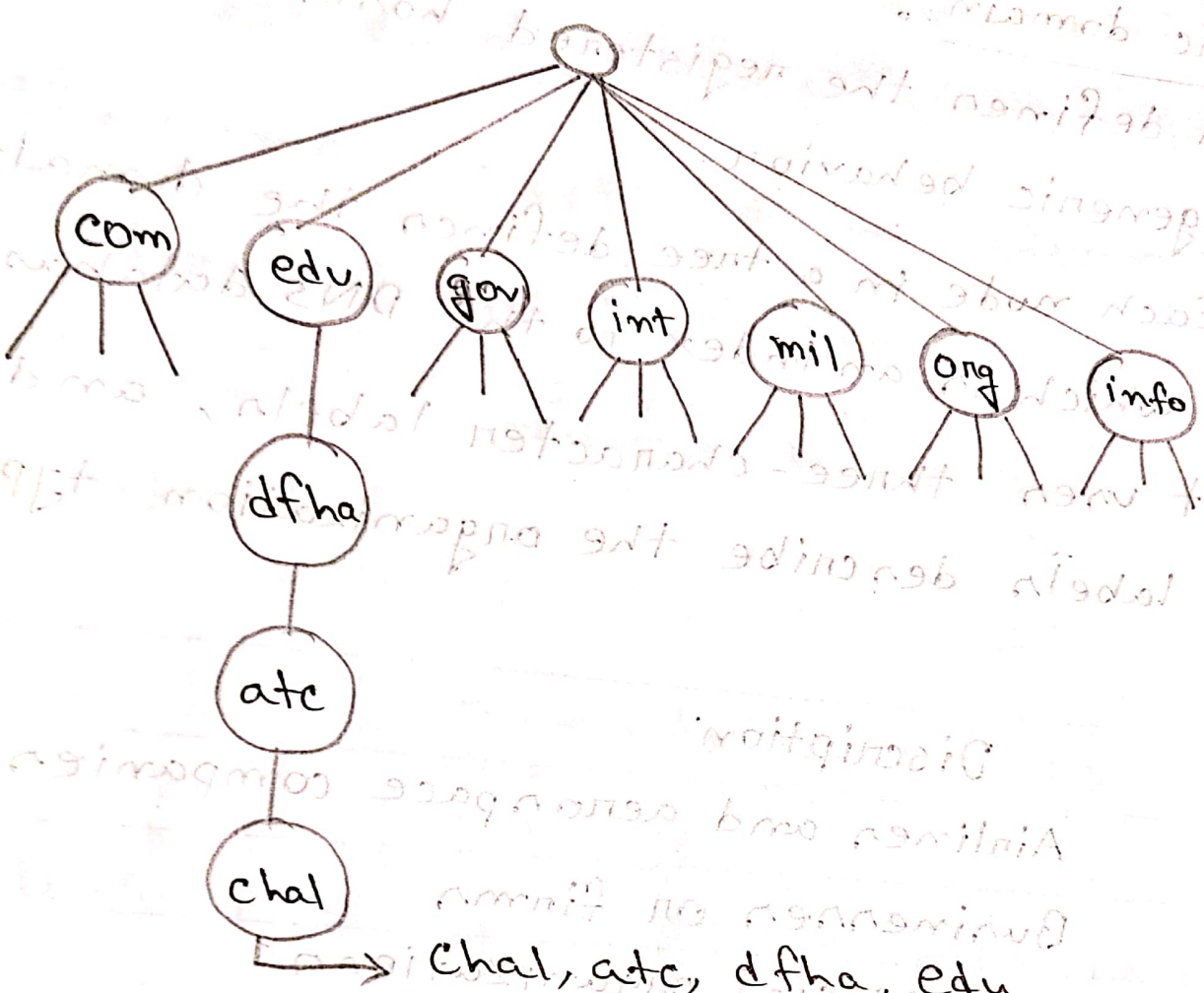
Generic domain :

① It defines the registered hosts according to their generic behavior.

② Each node in a tree defines the domain name, which is an index to the DNS database.

③ It uses three-character labels, and these labels describe the organization type

Label	Discription
aero	Airlines and aerospace companies.
biz	Businesses or firms
com	Commercial organizations
coop	Cooperative business organizations
edu	educational institutions
gov	Government institutions
Info	Information service providers.
mil	Military group
org	Nonprofit organizations.



Country domain: The format of a country domain is same as a generic domain, but it uses two-character country abbreviation (e.g., us for the united states) in place of three character organizational abbreviations.

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Inverse domain : The inverse domain is used for mapping an address to a name. When the server has received a request from the client, and the server contains the files of only authorized clients. To determine whether the client is on the authorized list or not; it sends a query to the DNS server and ask for mapping an address to the name.

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Answer to the question no - 5

(a)

CGI : CGI is a standard for communication between HTTP servers and executable programs. It is used in creating dynamic documents.

Answer to the question no - 5

(b)

Two remote application processes can communicate mainly in two 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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Answer to the question no-5

(c)

The client-server model is a distributed application structure that partitions task or workload between the providers of a resource or service, called servers and service requesters called clients.

Client: When we talk the world client, it mean to talk of a person or an organization using a particular service. Similarly in the digital world a client in a computer (Host) i.e capable of receiving information or using a particular service from the service providers.

Servers: Similarly, when we talk the word servers, it means a person or medium that serves something. Similarly, in this digital world a server is a remote.

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computer which provides information (data) on access to particular services.

So, its basically the client requesting something and the server serving it as long as its present in the database.

Answer to the question no-5

(d)

There are few steps to follow to interact with the servers and a client-

(1) User enters the url (uniform resource Locator) of the website or file. The browser then requests the DNS (Domain Name System) server.

(2) DNS server lookup for the address of the web server.

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③ DNS server responds with the IP address of the web server.

④ Browser sends over an HTTP/HTTPS request to web service's IP (provided by DNS server)

⑤ Server sends over the necessary files of the website.

⑥ Browser then renders the files and the website is displayed. This rendering is done with the help of DOM (Document Object Model) interpreter, CSS interpreter and JS Engine collectively known as the JIT or (Just In Time) compilers.

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Answer to the question no-6

(a)

Purpone of HTML: HTML in a computer language for specifying the contents and format of a web document. It allows additional text to include codes that define fonts, layouts embedded graphics and hypertext links.

Answer to the question no-6

(b)

Difference between fully qualified and partially qualified domain name-

Fully qualified	Partially qualified
1. It gives the full Location of the specific domain that ~~allows~~ bears its name within the hole DNS name space.	1. It doesn't give the full path to the domain.

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Fully Qualified	Partially qualified
2. Fully qualified domain names are sometimes called absolute domain names.	2. Partially qualified domain names are sometimes called relative domain names.

Answer to the question no-6

(c)

There are several protocols which work for users in Application layer. Some of application layer protocols are.

Domain Name System : The domain name system (DNS) 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

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email addresses mapped with their respective Internet 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.

Simple Mail Transfer Protocol: The simple Mail Transfer Protocol (SMTP) is used to transfer electronic mail from one user to another. The This task is done by means of email client software (user Agents) the user is using user Agents help the user to type and format the email and store it until internet is available. When an email is submitted to send, the sending process is handled by message transfer Agent which is normally comes inbuilt in email client software.

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Message Transfer Agent uses SMTP to forword the email to another Message Transfer Agent (server side). While SMTP is used by end user to only send the emails, the servers normally use SMTP to send as well as receive emails. SMTP uses TCP port number 25 and 587.

Client software uses Internet Message Access Protocol (IMAP) or POP protocols to receive emails.

File Transfer Protocol: The file transfer protocol (FTP) 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

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server and server sends requested resource back to the client.

FTP uses out-of-band controlling i.e FTP uses TCP port 20 for exchange controlling, information and the actual data is sent over TCP port 21.

Post Office Protocol (POP): The post office protocol version 3 (POP-3) is a simple mail retrieval protocol used by user Agents (client email software) to retrive mails from mail server.

When a client needs to retrive mails from server, it opens a connection with the server on TCP port 110. User can then access his mails and download them to the local

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Computer. POP 3 works in two modes. The most common mode the delete mode, is to delete the email from remote server after they are downloaded to local machines. The second mode, the keep mode, does not delete the mail from mail server and given the user an option to access mails later on mail server.

Hyper Text Transfer Protocol (HTTP) : The hyper text transfer protocol (HTTP) is the foundation of world wide web. Hypertext is well organized documentation system which uses hyperlinks to link the pages in the text documents. HTTP works on client server model. when a ~~ver~~ user wants to access any HTTP page on the internet the client machine at user end initials a TCP connection to server on port 80. when

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the server accepts the client request, the client is authorized to access web pages.

HTTP versions -

- HTTP 1.0 uses non persistent HTTP. At most one object can be sent over a single TCP connection.
- HTTP 1.1 uses persistent HTTP. In this version, multiple objects can be sent over a single TCP connection.

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Answer to the question no- 07

(a)

Function of SMTP : The TCP/IP protocol supports electronic mail on the Internet in called simple Mail Transfer (SMTP). It is a system for sending messages to other computer users based on email addresses. SMTP provides mail exchange between users on the same or different computers.

Answer to the question no- 07

(b)

Workstations interact with the SMTP host which receives the mail on behalf of every host in the organization, to retrieve messages by using a client server protocol such as Post office protocol, version 3 (POP 3). Although POP 3

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in used to download messages from the server, the SMTP client still needed on the desktop to forword messages from the workstation user to its SMTP mail server.

Answer to the question no-7

© Network services are mapping between name and its value, which can be variable value or fixed. This software system helps to store the information, organization, and provides various means of accessing it

① Accounting: In an organization, a number of users have their user names and passwords mapped to them. Directory services provide means of storing this information in cryptic form and make avilable when requested.

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② Authentication and Authorization : User credentials are checked to authenticate a user at the time of login and/or periodically. User accounts can be set into hierarchical structure and their access to resources can be controlled using authorization schemes.

③ Domain Name Services : DNS is widely used and one of the essential services on which internet works. The system maps IP addresses to domain names, which are easier to remember and recall than IP addresses. Because network operates with the help of IP addresses and humans tend to remember website name, the DNS provides websites IP addresses which is mapped to its name from the back-end on the request of a website name from the user.

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Ans. to the quen no - 07.

(d)

File services include sharing and transferring files over the network.

(i) File sharing

(ii) File transferring

(i) File sharing : One of the reason which gave birth to networking was file sharing. File sharing enables its users to share their data with other users. User can upload the file to a specific server, which is accessible by all intended users. As an alternative, user can make its file shared on its own computer and provides access to intended users.

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(iii) File Transfer : This is an activity to copy or move file from one computer to another computer or to multiple computers, with help of underlying network. Network enables its user to locate other users in the network and transfer files.

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Ans. to the ques. no - 8

(a)

Permutation: Permutation is transposition in bit level.

Ans. to the ques. no - 8

(b)

Digital signature is an electronic signature that can be used to authenticate the identity of the sender of a message or document and possibly to ensure that the original content of the message or document that has been sent is unchanged. Digital signature is easily transportable, cannot be imitated by someone else, and can be automatically time-stamped. The ability to ensure that the original signed message

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arrived means that the sender cannot easily repudiate it later.

Answer to the quen. no - 8

©

Few of communication services are here

(i) Email

(ii) Social networking

(iii) Internet chat

(iv) Discussion Boards

(v) Remote access

(i) Email : Electronic mail is a communication method and something a computer user cannot work without. This is the basis of todays internet features. Email system has one or more email severs. All its user are provided with unique ID's. When a user sends email to other user, it is actually

transferred between users with help of email service.

(ii) Social Networking : Recent technology have made ~~th~~technical life social. The computer savvy people, can find other known peoples or friends, can connect with them, can share thoughts, pictures and videos.

(iii) Internet chat : Internet chat provides instant text transfer services between two hosts. Two or more people can communicate with each other using text based Internet Relay chat services. These days, voice chat and video chat are very common.

(iv) Discussion Boards : Discussion boards provide a mechanism to connect multiple people with same interests. It enables the users to put

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queries, questions, suggestion etc. which can be seen by all other users. Other may respond as well.

(v) Remote access: This service enables user to access the data residing on the remote computer. This feature is known as Remote desktop. This can be done via some remote device, e.g. mobile phone or home computer.

Ans. to the ques. no-8

(d)

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

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Resource sharing: To use resource efficiently and economically, network provides 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 users to retrieve it efficiently by using queries. Database help organizations to make decisions based on statistics.

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 provided by the internet servers.