

ST JOSEPH COLLEGE OF ENGINEERING, SRIPERUMBUTHUR
DEPARTMENT OF ECE

CS6551 – COMPUTER NETWORKS
QUESTION BANK
PART-A (2 MARKS)

UNIT-I

1. What are the three criteria necessary for an effective and efficient network? (MAY/JUNE 16)

The most important criteria are performance, reliability and security. *Performance* of the network depends on number of users, type of transmission medium, and the capabilities of the connected h/w and the efficiency of the s/w. *Reliability* is measured by frequency of failure, the time it takes a link to recover from the failure and the network's robustness in a catastrophe.

Security issues include protecting data from unauthorized access and viruses.

2. Group the OSI layers by function? (MAY/JUNE 13)

The seven layers of the OSI model belonging to three subgroups. Physical, data link and network layers are the *network support layers*; they deal with the physical aspects of moving data from one device to another. Session, presentation and application layers are the *user support layers*; they allow interoperability among unrelated software systems. The transport layer ensures *end-to-end reliable data transmission*.

3. What are header and trailers and how do they get added and removed?

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

4. What are the features provided by layering? (MAY/JUNE 14)

Two nice features:

It decomposes the problem of building a network into more manageable components. It provides a more modular design.

5. Why are protocols needed?

In networks, communication occurs between the entities in different systems. Two entities cannot just send bit streams to each other and expect to be understood. For communication, the entities must agree on a protocol. A protocol is a set of rules that govern data communication.

6. What are the two interfaces provided by protocols?

- Service interface
- Peer interface

Service interface- defines the operations that local objects can perform on the protocol. Peer interface- defines the form and meaning of messages exchanged between protocol peers to implement the communication service.

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7. Mention the different physical media?

- Twisted pair (the wire that your phone connects to)
- Coaxial cable (the wire that your TV connects to)
- Optical fiber (the medium most commonly used for high-bandwidth, long-distance links)
- Space (the stuff that radio waves, microwaves and infra red beams propagate through)

8. Define Signals?

Signals are actually electromagnetic waves traveling at the speed of light. The speed of light is, however, medium dependent-electromagnetic waves traveling through copper and fiber do so at about two-thirds the speed of light in vacuum.

9.. What are the different encoding techniques?

- NRZ
- NRZI
- Manchester
- 4B/5B

10. How does NRZ-L differ from NRZ-I? (MAY/JUNE 16)

In the NRZ-L sequence, positive and negative voltages have specific meanings: positive for 0 and negative for 1. in the NRZ-I sequence, the voltages are meaningless. Instead, the receiver looks for changes from one level to another as its basis for recognition of 1s.

11. What are the responsibilities of data link layer? (MAY/JUNE 14)

Specific responsibilities of data link layer include the following. a) Framing b) Physical addressing c) Flow control d) Error control e) Access control.

12. What are the ways to address the framing problem?

- Byte-Oriented Protocols(PPP)
- Bit-Oriented Protocols(HDLC)
- Clock-Based Framing(SONET)

13. List out the available detection methods. (MAY/JUNE 13)

There are 4 types of redundancy checks are used in data communication.

- Vertical redundancy checks (VRC).
- Longitudinal redundancy checks (LRC).
- Cyclic redundancy checks (CRC).
- Checksum.

14. Write short notes on CRC.

The third and most powerful of the redundancy checking techniques is the cyclic redundancy checks (CRC) CRC is based on binary division. Here a sequence of redundant bits, called the CRC remainder is appended to the end of data unit.

15. Define checksum. (MAY/JUNE 16)

The error detection method used by the higher layer protocol is called checksum. Checksum is based on the concept of redundancy.

16. Mention the types of error correcting methods.

- There are 2 error-correcting methods.
- Single bit error correction

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- Burst error correction.

17. Write short notes on error correction? (MAY/JUNE 15)

It is the mechanism to correct the errors and it can be handled in 2 ways.

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

18. What is the purpose of hamming code? (NOV/DEC 14)

A hamming code can be designed to correct burst errors of certain lengths. So the simple strategy used by the hamming code to correct single bit errors must be redesigned to be applicable for multiple bit correction.

19. Define flow control?

Flow control refers to a set of procedures used to restrict the amount of data. The sender can send before waiting for acknowledgment.

20. Mention the categories of flow control? (MAY/JUNE 16)

There are 2 methods have been developed to control flow of data across communication links. a) Stop and wait- send one from at a time. b) Sliding window-send several frames at a time.

PART-B (16 MARKS)

UNIT I

1. Explain the OSI-ISO model of computer with neat diagram. (16) (NOV/DEC12)
2. Distinguish between Point to Point links and multi-point links with relevant diagram. (16)
3. (i) Compare connection oriented and connection less service. (8)
(ii) Explain the various topologies. (8)
4. (i) Write a short note on various types of transmission media, highlighting their merits and demerits? (8)
(ii) Describe the categories of network. (8)
5. Explain Error correction and detection? (8)(NOV/DEC 12)
6. Explain framing with its header diagram? (8)
7. (i) Discuss about stop and wait protocol with an example (8) (MAY/JUNE 13)
8. Explain the different approaches of framing in detail. (MAY/JUNE 13)
9. Write the Sliding Window Algorithm and explain it in detail.
10. Compare Stop and Wait ARQ scheme with sliding window ARQ scheme.
11. Write in detail about the flow control mechanisms.(NOV/DEC 14)

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UNIT-II

1. What are the functions of MAC? (NOV/DEC 16)

MAC sub layer resolves the contention for the shared media. It contains synchronization, flag, flow and error control specifications necessary to move information from one place to another, as well as the physical address of the next station to receive and route a packet.

2. What are the functions of LLC?

The IEEE project 802 models take the structure of an HDLC frame and divide it into 2 sets of functions. One set contains the end user portion of the HDLC frame – the logical address, control information, and data. These functions are handled by the IEEE 802.2 logical link control (LLC) protocol.

3. What is Ethernet? (NOV/DEC 15)

Ethernet is a multiple-access network, meaning that a set of nodes send and receive frames over a shared link.

4. Define the term carrier sense in CSMA/CD? (NOV/DEC 14)

All the nodes can distinguish between idle and a busy-link and “collision detect” means that a node listens as it transmits and can therefore detect when a frame it is transmitting has interfered (collided) with a frame transmitted by another node.

5. Define Repeater?

A repeater is a device that forwards digital signals, much like an amplifier forwards analog signals. However, no more than four repeaters may be positioned between any pairs of hosts, meaning that an Ethernet has a total reach of only 2,500m.

6. Define collision detection?

In Ethernet, all these hosts are competing for access to the same link, and as a consequence, they are said to be in the same collision detection.

7. Why Ethernet is said to be a I-persistent protocol?

An adaptor with a frame to send transmits with probability ‘1’ whenever a busy line goes idle.

8. What is exponential back off?

Once an adaptor has detected a collision and stopped its transmission, it waits a certain amount of time and tries again. Each time it tries to transmit but fails, the adaptor doubles the amount of time it waits before trying again. This strategy of doubling the delay interval between each transmission attempt is a general technique known as exponential back off.

9. What is token holding time (THT)?

It defines that how much data a given node is allowed to transmit each time it possesses the token or equivalently, how long a given node is allowed to hold the token.

10. What are the two classes of traffic in FDDI? (NOV/DEC 16)

- Synchronous
- Asynchronous

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11. What are the four prominent wireless technologies? (MAY/JUNE 12)

- Bluetooth
- Wi-Fi (formally known as 802.11)
- WiMAX (802.16)
- Third generation or 3G cellular wireless.

12. Define Bluetooth? (MAY/JUNE 16)

Bluetooth fills the niche of very short-range communication between mobile phones, PDAs, notebook computers, and other personal or peripheral devices. For example, Bluetooth can be used to connect mobile phones to a headset, or a notebook computer to a printer.

13. What are the four steps involves in scanning? (MAY/JUNE 16)

1. The node sends a Probe frame.
2. All APs within reach reply with a Probe Response frame.
3. The node selects one of the access points, and sends that AP an Association Request frame.
4. The AP replies with an Association Response frame.

14. Explain the term handoff? (NOV/DEC 16)

If the phone is involved in a call at the time, the call must be transferred to the new base station in what is called a hand off.

15. Define smart phones?

Smartphone's use communication satellites as base stations, communicating on frequency bands that have been reserved internationally for satellite use.

16. How to mediate access to a shared link?

Ethernet, token ring, and several wireless protocols. Ethernet and token ring media access protocols have no central arbitrator of access. Media access in wireless networks is made more complicated by the fact that some nodes may be hidden from each other due to range limitations of radio transmission.

17. Define Aggregation points?

It collects and processes the data they receive from neighboring nodes, and then transmit the processed data. By processing the data incrementally, instead of forwarding all the raw data to the base station, the amount of traffic in the network is reduced.

18. Define Beacons?

Beacon to determine their own absolute locations based on GPS or manual configuration. The majority of nodes can then derive their absolute location by combining an estimate of their position relative to the beacons with the absolute location information provided by the beacons.

19. What is the use of Switch?

It is used to forward the packets between shared media LANs such as Ethernet. Such switches are sometimes known by the obvious name of LAN switches.

20. Explain Bridge? (NOV/DEC 12)

It is a collection of LANs connected by one or more bridges is usually said to form an extended LAN. In their simplest variants, bridges simply accept LAN frames on their inputs and forward them out on all other outputs.

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PART –B

1. Explain the frame format for token ring and token bus. (16)
2. Explain Ethernet protocol. (16) (MAY/JUNE 12)
3. Explain the following Inter connection devices also discuss their uses a.
Repeater (4)
b. Bridge (4) (NOV/DEC 14)
c. Switch (4)
d. Gateway (4)
4. Explain any one of the protocols used for flow control in noisy channel fiber distributed data interface operations. (16)
5. (i) Explain about SONET (8)
(ii) Explain the CSMA/CD algorithm in detail (8)
6. (i) Explain the token passing mechanism of Token ring network (8)
(ii) Discuss the ring maintenance in Token ring network (8)
7. Discuss in detail about the wireless LAN (16)

UNIT-III

1. Define packet switching?

A packet switch is a device with several inputs and outputs leading to and from the hosts that the switch interconnects.

2. What is a virtual circuit?

A logical circuit made between the sending and receiving computers. The connection is made after both computers do handshaking. After the connection, all packets follow the same route and arrive in sequence.

3. What are data grams?

In datagram approach, each packet is treated independently from all others. Even when one packet represents just a place of a multi packet transmission, the network treats it although it existed alone. Packets in this technology are referred to as datagram.

4. What is meant by switched virtual circuit?

Switched virtual circuit format is comparable conceptually to dial-up line in circuit switching. In this method, a virtual circuit is created whenever it is needed and exists only for the duration of specific exchange.

5. What is meant by Permanent virtual circuit?

Permanent virtual circuits are comparable to leased lines in circuit switching. In this method, the same virtual circuit is provided between two users on a continuous basis. The circuit is dedicated to the specific uses.

6. What are the properties in star topology?

□ Even though a switch has a fixed number of inputs and outputs, which limits the number of hosts that can be connected to a single switch, large networks can be built by interconnecting a number of switches.

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We can connect switches to each other and to hosts using point-to point links, which typically means that we can build networks of large geographic scope.

7. What is VCI?

A Virtual Circuit Identifier that uniquely identifies the connection at this switch, and which will be carried inside the header of the packets that belongs to this connection.

8. What is hop-by-hop flow control?

Each node is ensured of having the buffers it needs to queue the packets that arrive on that circuit. This basic strategy is usually called hop-by-hop flow control.

9. Explain the term best-effort?

If something goes wrong and the packet gets lost, corrupted, misbelieved, or in any way fails to reach its intended destination, the network does nothing.

10. What is maximum transmission unit?

MTU- which is the largest IP datagram that it can carry in a frame.

11. Define Routing?

It is the process of building up the tables that allow the collect output for a packet to be determined.

12. Define ICMP?

Internet Control Message Protocol is a collection of error messages that are sent back to the source host whenever a router or host is unable to process an IP datagram successfully

13. Write the keys for understanding the distance vector routing?

The three keys for understanding the algorithm are,

- Knowledge about the whole networks
- Routing only to neighbors
- Information sharing at regular intervals

14. Write the keys for understanding the link state routing?

The three keys for understanding the algorithm are,

- Knowledge about the neighborhood.
- Routing to all neighbors.
- Information sharing when there is a range.

15. How the packet cost referred in distance vector and link state routing?

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

16. Define Reliable flooding?

It is the process of making sure that all the nodes participating in the routing protocol get a copy of the link state information from all the other nodes.

17. What are the features in OSPF?

- Authentication of routing messages.
- Additional hierarchy.
- Load balancing.

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18. Define Subnetting?

Subnetting provides an elegantly simple way to reduce the total number of network numbers that are assigned. The idea is to take a single IP network number and allocate the IP address with that network to several physical networks, which are now referred to as subnets.

19. What are the different types of AS?

- Stub AS
- Multi homed AS
- Transit AS

20. What is an Area?

An Area is a set of routers that are administratively configured to exchange link-state information with each other. There is one special area- the backbone area, also known as area 0.

UNIT III

1. Discuss link state routing techniques with example (16)
2. (i) Explain the two approaches of packet switching techniques and circuit switching techniques (16)
3. State the major difference between RIP and OSPF. (16)
4. Explain IP in detail.(16)
5. (i) What is the purpose of subnetting? explain the various subnet mask? (8)
(ii) Compare ARP and RARP? (8)
6. (i) Write notes on BGP and CIDR (10)
(ii) What is multicasting (2)
(ii) What is interdomain routing (4)
7. Write notes on the following(UQ)
 - a. Internet protocol.
 - b. Routers.
8. Discuss in detail the various aspects of IPV6. (UQ)
9. What are the different approaches in Packet Switching. Explain them in detail.
10. Write in detail about bridges.
11. Discuss the spanning tree algorithm in detail.
12. What are the limitations of bridges.
13. Explain in detail the ATM cell format.
14. Explain about the different AAL protocols.
15. Discuss DHCP in detail.
16. Explain Distance Vector routing in detail.

UNIT-IV

1. Explain the main idea of UDP?

The basic idea is for a source process to send a message to a port and for the destination process to receive the message from a port.

2. What are the different fields in pseudo header?

- Protocol number
- Source IP address

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Destination IP addresses.

3. Define TCP?

TCP guarantees the reliable, in order delivery of a stream of bytes. It is a full- duplex protocol, meaning that each TCP connection supports a pair of byte streams, one flowing in each direction.

4. Define Congestion Control?

It involves preventing too much data from being injected into the network, thereby causing switches or links to become overloaded. Thus flow control is an end to an end issue, while congestion control is concerned with how hosts and networks interact.

5. State the two kinds of events trigger a state transition?

- A segment arrives from the peer.
- The local application process invokes an operation on TCP.

6. What is meant by segment?

At the sending and receiving end of the transmission, TCP divides long transmissions into smaller data units and packages each into a frame called a segment.

7. What is meant by 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.

8. What is meant by Concatenation?

The size of the data unit belonging to single sessions 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.

9. What is rate based design?

Rate- based design, in which the receiver tells the sender the rate-expressed in either bytes or packets per second – at which it is willing to accept incoming data.

10. Define Gateway.

A device used to connect two separate networks that use different communication protocols.

11. What is meant by quality of service?

The quality of service 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.

12. What are the two categories of QoS attributes?

The two main categories are,

- User Oriented
- Network Oriented

13. List out the user related attributes?

User related attributes are SCR – Sustainable Cell Rate PCR – Peak Cell Rate MCR- Minimum Cell Rate CVDT – Cell Variation Delay Tolerance.

14. What are the networks related attributes?

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The network related attributes are, Cell loss ratio (CLR) Cell transfer delay (CTD) Cell delay variation (CDV) Cell error ratio (CER).

15. What is RED?

Random Early Detection in each router is programmed to monitor its own queue length and when it detects that congestion is imminent, to notify the source to adjust its congestion window.

16. What are the three events involved in the connection?

For security, the transport layer may create a connection between the two end ports. A connection is a single logical path between the source and destination that is associated with all packets in a message. Creating a connection involves three steps:

- Connection establishment
- Data transfer
- Connection release

17. What is Silly Window Syndrome?

If the sender or the receiver application program processes slowly and can send only 1 byte of data at a time, then the overhead is high. This is because to send one byte of data, 20 bytes of TCP header and 20 bytes of IP header are sent. This is called as silly window syndrome.

UNIT IV PART B

1. Explain congestion control and congestion avoidance in detail. (16)
2. i) Discuss about quality of services. (8)
ii) Explain the three way handshake protocol to establish the transport level connection. (8)
3. With neat architecture, explain TCP in detail.
4. Explain adaptive flow control in detail and its uses.
5. With neat architecture, explain UDP in detail.
6. Discuss the different Queuing Discipline in detail.
7. Explain how QoS is provided through Integrated Services.
8. Explain how QoS is provided through Differentiated Services.

UNIT-V

1. What is the function of SMTP?

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

2. 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.

3. 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

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delivers it to MIME to be transformed back to the original data.

4. Why is an application such as POP needed for electronic messaging?

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(POP3). Although POP3 is used to download messages from the server, the SMTP client still needed on the desktop to forward messages from the workstation user to its SMTP mail server.

6. Discuss the three main division of the domain name space.

Domain name space is divided into three different sections: **generic domains**, country domains & inverse domain. Generic domain: Define registered hosts according to their generic behavior, uses generic suffixes. **Country domain:** Uses two characters to identify a country as the last suffix. **Inverse domain:** Finds the domain name given the IP address.

7. Discuss 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.

8. Discuss the basic model of FTP.

The client has three components: the user interface, the client control process, and the client data transfer process. The server has two components: the server control process and the server data transfer process. The control connection is made between the control processes. The data connection is made between the data transfer processes.

9. Name four factors needed for a secure network?

Privacy: The sender and the receiver expect confidentiality.

Authentication: The receiver is sure of the sender's identity and that an imposter has not sent the message.

Integrity: The data must arrive at the receiver exactly as it was sent.

Non-Reputation: The receiver must able to prove that a received message came from a specific sender.

10. How is a secret key different from public key?

In secret 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.

11. What is a digital signature?

Digital signature is a method to authenticate the sender of a message. It is similar to that of signing transactions documents when you do business with a bank. In network transactions, you can create an equivalent of an electronic or digital signature by the way you send data.

12. What are the advantages & disadvantages of public key encryption?

Advantages:

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a) Remove the restriction of a shared secret key between two entities. Here each entity can create a pair of keys, keep the private one, and publicly distribute the other one.

b) The no. of keys needed is reduced tremendously. For one million users to communicate, only two million keys are needed. Disadvantage:

If you use large numbers the method to be effective. Calculating the cipher text using the long keys takes a lot of time. So it is not recommended for large amounts of text.

13. Define substitution & transposition encryption?

Substitution: A character level encryption in which each character is replaced by another character in the set. *Transposition:* A Character level encryption in which the characters retain their plaintext but the position of the character changes.

14. Define CGI?

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

15. Define PGP?

Pretty Good Privacy is used to provide security for electronic mail. It provides authentication, confidentiality, data integrity, and non repudiation.

16. What is a digital signature?

Digital signature is a method to authenticate the sender of a message. It is similar to that of signing transactions documents when you do business with a bank. In network transactions, you can create an equivalent of an electronic or digital signature by the way you send data.

17. Define Cryptography

- Cryptography refers to the science and art of transforming messages to make them secure and immune to attacks.
- Original message before being transformed is called **plaintext**.
- After the message is transformed, is called **cipher text**.
- An encryption algorithm transforms the plaintext to cipher text; a decryption algorithm transforms the cipher text back to plaintext.
- The term cipher is used to refer to encryption and decryption algorithms.

18. What are the types of DNS Message

- Two types of messages Query: header and question records
- Response: Header, question records, answer records, authoritative records, and additional records.

19. What is TELNET PROTOCOL?

A TELNET connection is a Transmission Control Protocol (TCP) connection used to transmit data with interspersed TELNET control information. The TELNET Protocol is built upon three main ideas: first, the concept of a "Network Virtual Terminal"; second, the principle of negotiated options; and third, a symmetric view of terminals and processes.

20. What is PGP?

Pretty Good Privacy. A program using public key encryption popularly used with email A high security RSA public-key encryption

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application for MS-DOS, Unix, VAX/VMS, and other computers. It was written by Philip R. Zimmermann of Phil's Pretty Good(tm) Software and later augmented by a cast of thousands, especially including Hal Finney, Branko Lankester, and Peter Gutmann.

21. What is POP3?

POP3 (Post Office Protocol 3) is the most recent version of a standard protocol for receiving e-mail. POP3 is a client/server protocol in which e-mail is received and held for you by your Internet server. POP and IMAP deal with the receiving of e-mail and are not to be confused with the Simple Mail Transfer Protocol (SMTP), a protocol for transferring e-mail across the Internet.

22. What is IMAP.

IMAP (Internet Message Access Protocol) is a standard protocol for accessing e-mail from your local server. IMAP (the latest version is IMAP Version 4) is a client/server protocol in which e-mail is received and held for you by your Internet server. IMAP can be thought of as a remote file server. POP3 can be thought of as a "store-and-forward" service.

UNIT V

1. Describe the main aspects of hyper text transfer protocol(HTTP) in accessing data on world wide web. (16)
2. Write notes on Security protocols PGP & SSH (16)
3. (i) Write notes on IMAP, POP3 (8)
(ii) Discuss in detail about FTP (8)
4. (i) Explain the salient features of the SMTP protocol (12)
(ii) Explain telnet in detail (4)
5. Explain the SMTP and HTTP. Give their uses, state strengths and weaknesses.
6. Explain the role of a DNS on a computer network.
7. Explain Email protocols in detail.

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