

## **Module 1 ---(DC)**

1. Define data communication. Explain the four characteristics for data communication.
2. Explain five components of data communication.
3. Illustrate the different types of dataflow with an example.
4. List the basic criteria for a network
5. Illustrate the two types of connections to form a network.
6. What are the advantages of a multipoint connection over a point-to-point connection?
7. Compare and contrast different types of topologies in a network.
8. What is the need of switched WAN?
9. What is the need for layering? Explain TCP/IP Protocol Suite.
10. Explain the layering functionality of OSI Model.
11. Compare TCP/IP and OSI model with a neat diagram.
12. What are the types of addresses (identifiers) used in each of the following layers? a. application layer b. network layer c. data-link layer.
13. Assume five devices are arranged in mesh topology. How many cables are required?  
Draw the topology for 5 nodes. Compare it with star topology.
14. A simple internet is shown in below figure:



15. Show the TCP/IP protocol suite layers at each node and explain the layer's functionality.

### **Module1- Application Layer**

1. Compare the Recursive and Iterative DNS mapping process
2. Interpret the meaning of each line in the following HTTP request message  
  
GET/somedir/page.html HTTP/1.1  
  
HOST: www.someschool.edu  
  
Connection: close  
  
User agent: Mozilla/5.0  
  
Accept language: fr
3. Explain DNS Message format for both query and reply.
4. Describe the process of mapping of Domain name to IP address.
5. Compare SMTP, FTP, and HTTP Protocols.
6. Explain persistent and Non-persistent TCP connections.
7. Write the HTTP request and response message format.
8. Explain web caching.
9. Explain the need for cookies. Illustrate with an example how web servers maintain the information of the users using cookies.
10. Explain FTP commands and reply

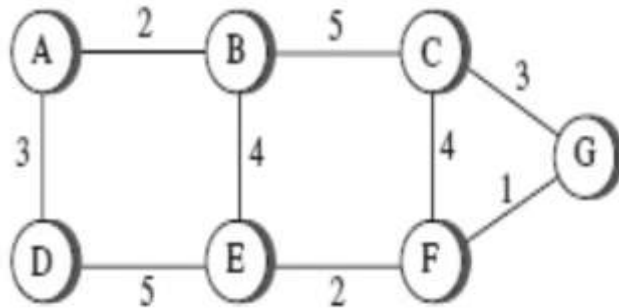
11. Explain Mail access protocols.
12. Explain the services provided by DNS.
13. Explain the three classes of DNS Servers organized in a hierarchy.
14. RR format of DNS.
15. Explain the File distribution Time for Peer to peer and client server architecture.
16. Explain the need for a conditional GET message.
17. With a neat sketch Explain how SMTP operates when A send mail to B, where the mail server of A and B are different. Show the sequence of events.

## **Module 2**

1. Explain flow control and error control at the transport layer.
2. Explain Transport-layer multiplexing and demultiplexing with a neat diagram.
3. Explain the transport-layer segment with a neat diagram.
4. why some applications are better suited for UDP than TCP? Justify.
5. Give UDP segment structure.
6. Explain the Checksum field in UDP.
7. Explain the Reliable data transfer protocol.
8. Explain a sliding-window protocol /Go-Back-N.
9. Discuss Go-Back-N Protocol along with the sequence diagram.
10. Explain pipelined Go-Back-N Protocol with FSM.
11. Discuss Select repeat Protocol along with the sequence diagram.
12. Explain TCP Segment Structure.
13. Explain the 3-way handshake and closing a TCP connection.
14. Suppose the measured RTT values are 106 ms and 120 ms.
  - a. Compute estimated RTT after each of these sample RTT values is obtained using the value of  $\alpha = 0.125$  and assuming that the value of estimated RTT was 100 ms just before the first of these two samples was obtained.
  - b. Compute also DevRTT after each sample is obtained assuming the value of  $\beta=0.25$  and assuming the value of DevRTT = 5 ms just before the first of these two samples was obtained.
  - c. Compute the TCP time-out interval after each of these samples was obtained.
15. Explain the flow control mechanism in TCP along with receiver window calculations.
16. Explain TCP Connection Management in the server side.
17. Describe the causes and cost of congestion for the scenario of:
  - a. Two Senders, a Router with Infinite Buffers
  - b. Two Senders and a Router with Finite Buffers.
  - c. Four Senders, Routers with Finite Buffers, and Multi-hop Paths
18. Explain the approaches to Congestion Control.
19. Explain the FSM description of TCP congestion control.
20. Justify the statement: TCP congestion control is referred to as Additive-increase, multiplicative-decrease congestion control.

## **Module 3**

1. Find the least cost path from the source node A using Link state routing



2. An IPv4 packet has arrived with the first 8 bits as  $(01000011)_2$ . The receiver discards the packet. Justify the answer.
3. Illustrate classful addressing with a block allocation diagram. What is the need for CIDR?
4. With a diagram explain the IPV4 datagram format.
5. A router receives the packet with the destination address 201.24.67.32. How the router finds the network address of the packet?
6. Explain the Count to infinity problem and discuss the solution.
7. Explain the OSPF protocol with its features.
8. Explain the Link state routing algorithm
9. Explain the Distant vector routing algorithm.
10. An organization is granted a block of addresses with the beginning address 14.24.74.0/24. The organization needs to have three subblocks of addresses to use in its three subnets: one subblock of 10 addresses, one subblock of 60 addresses, and one subblock of 120 addresses. Design the sub-blocks.
11. What is fragmentation? What is the need for fragmentation?

### **Module 4**

1. What is framing?
2. Explain the types of framing.
3. What is the need for Byte stuffing and unstuffing.
4. Explain the types of errors.
5. Explain the Process of error detection in block coding.
6. Explain Hamming distance for error detection.
7. What is the Hamming distance for each of the following codewords?
  - a. d (10000, 00000)
  - b. d (10101, 10000)
  - c. d (00000, 11111)
  - d. d (00000, 00000)
8. Explain the Encoder and decoder for simple parity-check code.
9. Explain CRC encoder and decoder.
10. Find the codeword for the dataword: 1001 and generator: 1011.
11. Give the Taxonomy of multiple-access protocols.
12. Explain Space and time model of a collision in CSMA.
13. Explain the persistent methods of CSMA.
14. Explain CSM/CD in detail.

15. Explain CSM/CA in detail.
16. In CRC, which of the following generators (divisors) guarantees the detection of an odd number of errors? a. 10111 b. 101101 c. 111

## **Module 5**

### **LAN:**

1. Explain Ethernet frame format.
2. Explain how the address 47:20:1B:2E:08:EE is sent out online
3. Define the type of the following destination addresses:
  - a. 4A:30:10:21:10:1A
  - b. 47:20:1B:2E:08:EE
  - c. FF:FF:FF:FF:FF:FF
4. Explain Architecture of wireless Ethernet
5. Explain MAC layers in the IEEE 802.11 standard
6. Explain Frame format in the IEEE 802.11 standard
7. Explain the frame types in IEEE 802.11 standard
8. Explain the Addressing mechanisms in IEEE 802.11 standard
9. What is Exposed-Station Problem? Explain in detail.

### **Physical layer:**

1. Define the terms: period, peak amplitude, and phase with a sine wave.
2. Compare Bitrate and Baud rate.
3. Assume we need to download text documents at the rate of 100 pages per minute.  
(Assume: A page is an average of 24 lines with 80 characters in each line).
  - a. What is the required bit rate of the channel?
  - b. What is the required bit length of the channel?
4. Explain the causes of transmission impairment in signal transmission.
5. Suppose a signal travels through a transmission medium and its power is reduced to one-half. Calculate the attenuation for the signal transmission.
6. We need to send 265 kbps over a noiseless (ideal) channel with a bandwidth of 20 kHz. How many signal levels do we need?
7. A telephone line normally has a bandwidth of 3000 Hz (300 to 3300 Hz) assigned for data communications. The signal-to-noise ratio is usually 3162. For this channel calculate the capacity of the channel.
8. We have a channel with a 1-MHz bandwidth. The SNR for this channel is 63. What are the appropriate bit rate and signal levels?
9. Explain the factors that measure the performance of the transmitting data.
10. Discuss Analog-to-Digital Conversion methods with a neat diagram.
11. We want to digitize the human voice. What is the bit rate, assuming 8 bits per sample?
12. What is modulation. Explain the three types of modulation.
13. Explain three types of Analog to digital conversion.
14. What is multiplexing? Explain three basic multiplexing techniques.