DCN Questions

CHAPTER 1: NETWORKING FUNDAMENTALS

Q1. What are the four fundamental Characteristics of Data Communication? On which effectiveness of data communication is depended?

Q2. Define data communication? List and explain five Components of Data Communication?

Q3. Explain the different modes of data flow?

Q4. List and explain the basic network criteria?

Q5. Define network? What are the basic network categories?

Q6. Write a note on BUS & RING topology?

Q7. Similarity and difference between star and mesh topology?

Q8. Differences between LAN and WAN?

Q9. What is Internet? Explain the hierarchy of internet service providers?

Q10. Define protocol? Explain the Key element of protocol?

CHAPTER 2: NETWORK MODELS

Q1. Explain ISO OSIRM model?

Q2. What is the responsibilities of PHYSICAL layer?

Q3. What is the responsibilities of DATA LINK layer?

Q4. What is the responsibilities of NETWORK layer?

Q5. What is the responsibilities of TRANSPORT layer?

Q6. What is the responsibilities of SESSION layer?

Q7. What is the responsibilities of PRESENTATION layer?

Q8. What is the responsibilities of APPLICATION layer?

Q9. Explain TCP/IP Protocol suite?

Q10. List & Explain the Protocols used in Network Layer?

Q11. List & Explain the Protocols used in Transport Layer?

Q12. List and explain the 4 level of address used in TCP/IP Protocol?

Q13. Match the following to one or more layers of the OSI model:
   a. Communicates directly with user’s application program- Application layer.
   b. Error correction and retransmission- Data-link layer and Transport layer.
   c. Mechanical, electrical, and functional interface- Physical layer.
   d. Responsibility for carrying frames between adjacent nodes- Data-link layer.

Q14. Match the following to one or more layers of the OSI model:
   a. Establishes, manages, and terminates sessions- Session layer.
   b. Format and code conversion services- Presentation layer.
c. Ensures reliable transmission of data—Transport layer.
d. Log-in and log-out procedures—Session layer.
e. Provides independence from differences in data representation—Presentation layer.

Q15. Match the following to one or more layers of the OSI model:
   a. Flow control—Data-link layer and Transport layer.
   b. Route determination—Network layer.
   c. Provides access for the end user—Application layer.
   d. Interface to transmission data—Data-link layer.

Q16. Match the following to one or more layers of the OSI model:
   a. Transmission of bit stream across physical medium—Physical layer.
   b. Defines frames—Data-link layer.
   c. Reliable process-to-process message delivery—Transport layer.
   d. Route selection—Network layer.
   e. Provides user services such as e-mail and file transfer—Application layer.

CHAPTER 3: Data & Signal

Q1. What is the relationship between period and frequency?
Q2. What does the amplitude of a signal measure? What does the frequency of a signal measure? What does the phase of a signal measure?
Q3. Name three types of transmission impairment
Q4. Distinguish between a low-pass channel and a band-pass channel.
Q5. Why do optical signals used in fiber optic cables have a very short wave length?
Q6. We send a digital signal from one station on a LAN to another station. Is this baseband or broadband transmission?
Q7. Distinguish between analog signals and digital signals
Q8. State and explain the following
   - Frequency, Wavelength, Throughput, Jitter, Bandwidth of the channel, Data rate, Latency (Delay)
Q9. Write a note on
   Noise, Signal-to-Noise Ratio (SNR)

CHAPTER 4: Digital Transmissions

Q1. What are the differences between parallel and serial transmission?
Q2. List three different techniques in serial transmission and explain the differences
Q3. Compare and contrast PCM and DM.
Q4. Distinguish between data rate and signal rate.
Q5. Define a DC component and its effect on digital transmission.
Q7. List five line coding schemes discussed in this book.
Q8. Define the characteristics of a self-synchronizing signal.
Q9. We have a baseband channel with a 2-MHz bandwidth. What is the data rate for this channel if we use one of the following line coding schemes?
   a. NRZ-L
   b. Manchester
   c. MLT-3, d. 2B1Q
Q10. Draw the graph of the NRZ-L scheme using each of the following data streams, assuming that the last signal level has been positive. From the graphs, guess the bandwidth for this scheme using the average number of changes in the signal level. Compare your guess with the corresponding entry in Table 4.1.
   a. 00000000
   b. 11111111
   c. 01010101
   d. 00110011
Q11. How many invalid (unused) code sequences can we have in 5B/6B encoding? How many in 3B/4B encoding?
Q12. We want to transmit 1000 characters with each character encoded as 8 bits.
   a. Find the number of transmitted bits for synchronous transmission.
   b. Find the number of transmitted bits for asynchronous transmission.
   c. Find the redundancy per cent in each case.

Chapter 5: Analog Transmission

Q1. Define analog transmission.
Q2. Define carrier signal and its role in analog transmission.
Q3. Define digital-to-analog conversion.
Q4. Which characteristics of an analog signal are changed to represent the digital signal in each of the following digital-to-analog conversion?
   a. ASK
   b. FSK
   c. PSK
   d. QAM
Q5. Which of the four digital-to-analog conversion techniques (ASK, FSK, PSK, or QAM) is the most susceptible to noise? Defend your answer.
Q6. What are the two components of a signal when the signal is represented on a constellation diagram? Which component is shown on the horizontal axis? Which is shown on the vertical axis?

Q7. Define analog-to-analog conversion.

Q8. Which characteristics of an analog signal are changed to represent the lowpass analog signal in each of the following analog-to-analog conversions?
   a. AM
   b. FM
   c. PM

Q9. Which of the three analog-to-analog conversion techniques (AM, FM, or PM) is the most susceptible to noise? Defend your answer.

Q10. What is the number of bits per baud for the following techniques?
   a. ASK with four different amplitudes
   b. FSK with 8 different frequencies
   c. PSK with four different phases
   d. QAM with a constellation of 128 points.

Q11. Draw the constellation diagram for the following:
   a. ASK, with peak amplitude values of 1 and 3
   b. BPSK, with a peak amplitude value of 2
   c. QPSK, with a peak amplitude value of 3
   d. 8-QAM with two different peak amplitude values, 1 and 3, and four different phases.

Q12. WRITE SHORT NOTES ON
   A. ASK (Amplitude Shift Keying)
   B. Frequency Shift Keying (FSK)
   C. Phase Shift Keying (PSK)
   D. Quadrature Amplitude Modulation (QAM)

Q13. WRITE SHORT NOTES ON
   A. Amplitude Modulation (AM)
   B. Frequency Modulation (FM)
   C. Phase Modulation (PM)

Chapter 6:- Bandwidth Utilization: Multiplexing and Spreading

Q1. List and explain three main multiplexing techniques mentioned in this chapter. And difference between Static and Synchronous TDM.

Q2. Define FHSS and explain how it achieves bandwidth spreading.
Q3. Define DSSS and explain how it achieves bandwidth spreading.
Q4. Distinguish between a link and a channel in multiplexing.
Q5. Describe the goals of multiplexing.
Q6. Define spread spectrum and its goal. List the two spread spectrum techniques discussed in this chapter.
Q7. Distinguish between FHSS and CSSS
Q8. Which of the three multiplexing techniques is common for fiber optic links? Give reason

Chapter 7:- Transmission Media

Q1. Write a short note on:
   a. Twisted Pair Cables,
   b. Coaxial Cables,
   c. Fibre Optics,
   d. Wireless (Unguided Media)

Q2. Explain BNC & UTP Connector?
Q3. List & explain propagation modes in Fibre Optic cable?
Q4. Write short note on
   a. Micro Waves
   b. Infrared
Q5. Distinguish between Directional and Omni-directional Antenna?

Chapter 8:- Switching

Q1. Write note on various types of switch networks?
Q2. Explain the characteristic of circuit-switched networks, packet-switched and virtual switch networks?
Q3. Explain the setup data transfer and face of circuit switching?
Q4. Explain the setup data transfer and face of virtual switching circuit?
Q5. Difference between:
   a. Circuit switch network & Packet switch network
   b. Circuit switch network & virtual switch network
   c. virtual switch network & Packet switch network
Q6. Describe the structure of multistage switch?
Q7. Describe the structure of division switch?
Chapter 9: Using Telephone and cable Networks for Data Transmission

Q1. Write short note on
   a. ADSL
   b. ADSL Lite
   c. HDSL
   d. SDSL
   E. VDSL

Chapter 10: Error Detection & Correction

Q1. Write short note on type of errors?
Q2. Explain the structure of Encoder and Decoder for error detection and correction with example.
Q3. Write a short note on Block Coding with an example.
Q4. Explain the process of Error Detection in Block coding.
Q5. Explain the process of Error Correction in Block coding.
Q6. Explain the following terms and show the relation among them.
   a. Data word
   b. Code word
   c. Redundancy
Q7. Describe the Hamming Distance. How it is used for Error Detection and Error Correction.
Q8. Short note on Simple Parity-check code.
Q9. Explain the error detection process used by CRC.
Q10. Explain Checksum with example.
Q11. Apply the exclusive-or operation on the following pair of patterns:
   a. (10001) XOR (10000)
   b. (10001) XOR (10001)
   c. (11100) XOR (00000)
   d. (10011) XOR (11111)
Q12. Using the code in following, what is the dataword if one of the following code word is received?

<table>
<thead>
<tr>
<th>Data word</th>
<th>Code word</th>
</tr>
</thead>
<tbody>
<tr>
<td>00</td>
<td>00000</td>
</tr>
<tr>
<td>01</td>
<td>01011</td>
</tr>
<tr>
<td>10</td>
<td>10101</td>
</tr>
<tr>
<td>11</td>
<td>11110</td>
</tr>
</tbody>
</table>
Q13. We need a dataword of at least 16 bits. Find the values of k and n in the Hamming
codeC(n, k) with \( d_{\text{min}} = 3 \).

Q14. What is Hamming distance for each of the following codeword.
   A. \( d(10000,01000) \)
   b. \( d(10101,10010) \)
   c. \( d(1111,1111) \)
   d. \( d(0000,0000) \)

Q15. Find the minimum Hamming distance for the following cases:
   a. Detection of two errors.
   b. Correction of two errors.
   c. Detection of 3 errors or correction of 2 errors.
   d. Detection of 6 errors or correction of 2 errors.

Q16. Assuming even parity, find the parity bit for each of the following data unit.
   a. 1001011
   b. 0001100
   c. 1000000
   d. 1110111

**Chapter 11:- Data Link Layer**

Q1. Briefly explain the Transition phase in PPP.
Q2. Describe the frame structure of PPP.
Q3. List and explain the services given by the PPP.
Q4. List and explain the services missing in the PPP.
Q5. Explain Piggybacking
Q6. What is Byte Stuffing and how it is implemented?
Q7. Explain the control frames of HDLC.
Q8. Describe the frame structure of HDLC
Q9. Explain the Transfer modes in HDLC protocol.
Q10. List the flow control protocol used for noiseless and noise channel.
Q11. Difference between Character oriented and Bit oriented protocol.
Q12. Write a short note on following.
   a. Stop and Wait:
   b. Stop and wait arq:
   c. Go-Back-N ARQ:
   d. Selective-Repeat ARQ:

**Chapter 12:- MULTIPLE ACCESS**

Q1. Write short note on CSMA?
Q2. List of various multiple access protocol?
Q3. COMPARE 1-persistent, non-persistent,p-persistent?
Q4. Explain The Reservation Medium?
Q5. With the help of flow diagram explain CSMA/CA?
Q6. With the help of flow diagram Explain CSMA/CD?
Q7. Explain polling medium access mechanism?
Q8. Explain token passing medium access mechanism?
Q9. Write short note on...
   a. FDMA
   b. TDMA
   c. CDMA
Q10. Difference between FDMA, CSMA, TDMA?

Chapter 13 WIRED LANs: ETHERNET

Q1. Why do we need LLC?
Q2. Explain the framing at LLC?
Q3. Compare Standard Ethernets on following Characteristics?
Q4. Draw and explain the fields of frame Format?
Q5. Short notes on
   a. 10Base5 Thick Ethernet
   b. 10Base2 Thin Ethernet
   c. 10BaseT Twisted-Pair Ethernet
   d. 10BaseF Fiber Ethernet
   e. Bridge Ethernet
   f. Switch Ethernet
Q6. What are the purpose and goal of fast Ethernet?