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18CS46

Fourth Semester B.E. Degree Examination, Dec.2023/Jan.2024
Data Communication

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. With a neat diagram, explain the components of data communication. **(06 Marks)**

b. With necessary diagrams, give the advantages and disadvantages of star and mesh topology. **(08 Marks)**

c. A channel with a 1-MHz bandwidth has a SNR value 15. Calculate bit rate and signal levels. **(06 Marks)**

OR

2 a. What is data communication? Explain the fundamental characteristics of data communication. **(06 Marks)**

b. With a neat diagram, explain encapsulation and decapsulation process in TCP/IP model. **(08 Marks)**

c. Calculate the propagation time and the transmission time for a 2.5 Kbyte message, if the bandwidth of the network is 1 Gbps. Assume that the distance between the sender and the receiver is 12,000 km and that light travels at 2.4×10^8 m/s. **(06 Marks)**

Module-2

3 a. With a neat diagram, illustrate pulse code modulation encoder and decoder along with quantization levels. **(12 Marks)**

b. Represent sequence 01001110 using polar NRZ-L, Manchester, AMI and psuedoternary line coding schemes. **(08 Marks)**

OR

4 a. With appropriate diagrams, explain transmission modes in physical layer. **(10 Marks)**

b. With necessary diagrams, explain amplitude shift keying and frequency shift keying along with the implementation and bandwidth requirements. **(10 Marks)**

Module-3

5 a. What is spread spectrum? Describe two different techniques to spread the bandwidth. **(10 Marks)**

b. Four channels are multiplexed using Time division multiplexing. If each channel sends 100 bytes/s and we multiplex 1 byte per channel, show the frame travelling on the link, the size of the frame, the duration of a frame and bit rate for the link. **(10 Marks)**

OR

6 a. With appropriate diagrams, explain frequency division multiplexing and wavelength division multiplexing. **(10 Marks)**

b. A bit stream 10011101 is transmitted using the standard CRC method. The generator polynomial is $x^3 + 1$. What is the actual bit string transmitted? Suppose the third bit from the left is inverted during transmission. How will receiver detect this error? **(10 Marks)**

Module-4

7 a. With a neat flow diagram, illustrate the working of CSMA/CA protocol. (10 Marks)
   b. Explain the three channelization protocols in the data link layer. (10 Marks)

OR

8 a. With neat FSM state diagram at the sender and receiver, explain stop and wait protocol. (10 Marks)
   b. With necessary diagrams, explain any two controlled access protocols. (10 Marks)

Module-5

9 a. Describe the frame format of standard Ethernet. (10 Marks)
   b. With necessary diagrams, explain the architecture of IEEE 802.11 standard. (10 Marks)

OR

10 a. With neat diagram, explain the Bluetooth architecture. (10 Marks)
    b. Explain the operation of cellular telephony. (10 Marks)

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