

**Model Question Paper-1 with effect from 2019-20 (CBCS Scheme)**

USN :

**Fourth Semester B.E. Degree Examination**

**Data Communication**

**Time: 03 Hrs**

**Max. Marks:100**

Note: Answer any **FIVE** full questions, choosing at least **ONE** question from each **MODULE**

**Module – 1**

- |       |  |    |
|-------|--|----|
| 1. a) | What is Data Communication? With a neat diagram, explain the three basic topologies.   | 6  |
| b)    | List out the functionalities of physical layer, data link layer, network layer and Application layer. Explain in brief.  | 8  |
| c)    | Explain the different characteristics of periodic analog signal.   | 6  |
| 2. a) | Define Nyquist bit rate and Shannon capacity. What are the propagation time and the transmission time for a 2.5-kbyte message (an e-mail) 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 $2.4 \times 10^8$ m/s | 6  |
| b)    | What is noiseless channel?. Find out the maximum bit rate in noiseless channel with a bandwidth of 3000 Hz transmitting a signal with two signal levels.   | 4  |
| c)    | Explain the different causes for transmission impairment during signal transmission through media  | 10 |

**Module – 2**

- |       |   |    |
|-------|---|----|
| 3. a) | Explain PCM and Quantization process with steps and examples.   | 10 |
| b)    | With the help of a neat diagram, explain the ASK, FSK and PSK. Discuss the bandwidth requirement in each case.                | 10 |
| 4. a) | Explain Digital signal Transmission methods.  | 6  |
| b)    | Distinguish between low pass channel and band pass channel  | 6  |
| c)    | What is line coding? Represent the sequence "01001110" using NRZ-I, Manchester, differential Manchester and RZ coding schemes | 8  |

### Module – 3

5. a) What is Multiplexing? Define Synchronous TDM with data rate management strategies. 8  
b) Four 1-kbps connections are multiplexed together. A unit is 1 bit. Find (a) the duration of 1 bit before multiplexing, (b) the transmission rate of the link, (c) the duration of a time slot (d) the duration of a frame. 4  
c) What is spread spectrum? Explain direct sequence spread spectrum with an example. 8

**OR**

6. a) Define cyclic code. Find the codeword  $c(x)$ , using CRC for the information 1101 with generator 1100. 6  
b) With an example explain the computation of internet checksum. List the steps undertaken by the sender and receiver for error detection. 8  
c) Define switching? Compare and contrast circuit switched network and packet switched network. 6

### Module – 4

7. a) Describe the need for bit stuffing with an example. 4  
b) Illustrate the working of CDMA with suitable example. 8  
c) Explain the three persistence methods of CSMA. A network using CSMA/CD has a bandwidth of 10 Mbps. If the maximum propagation time (including the delays in the devices and ignoring the time needed to send a jamming signal) is  $25.6 \mu s$ , calculate the minimum size of the frame? 8

**OR**

8. a) Find the class of the following classful IP addresses: 4  
a. 130.34.54.12    b. 200.34.2.1    c. 245.34.2.8    d. 110.11.5.88  
b) Combine the following three blocks of addresses into a single block: 6  
a. 16.27.24.0/26    b. 16.27.24.64/26    c. 16.27.24.128/25  
c) Explain the functionalities of below protocols: 10  
a. PPP    b. ARP    c. NAT    d. DHCP    e. ALOHA

### Module – 5

9. a) Describe the frame format of standard Ethernet. 6  
b) Define Bluetooth and explain the architecture of Bluetooth 6  
c) Describe the MAC layers in IEEE 802.11 standard. 8

**OR**

10. a) Explain the operation of cellular telephony. 6  
b) Explain Hidden and Exposed Station problems in IEEE 802.11 8  
c) With a neat sketch, explain BSS and ESS 6