

Department of Computer Science and Engineering
National Institute of Technology, Srinagar
Fifth Semester february 2020
End-term Examination
(Regular)

Course No: CSE 508
Course Title: Data Communication
M.MARKS: 90
Duration : 3 hr
Date of Exam : 09/02/2020 (AN)

No. of Pages	= 1
No. of Questions	= 6

COURSE OUTCOMES (CO)

CO1	Understand the concept of communication engineering, signals, channels and communication systems, Spread Spectrum techniques.
CO2	Understand and analyze the characteristics of various Line coding techniques. Analysis of error detection techniques.
CO3	Critically analyze various modulation techniques used in modern communication systems.
CO4	Solve basic network design problems using knowledge of common local and wide area network architectures.
CO5:	Apply knowledge of computers, software, networking technologies and information assurance to an organization's management, operations and requirements. Implementation of multiplexing techniques.

Note: Attempt five Questions. All parts of a question should be answered consecutively. Each answer should start from a fresh page.

Q1(a) Determine the maximum information rate for 128 level encoding, when bandwidth is 4 KHz and signal to noise ratio SNR is 30 db.

(b) Explain various types of noises. Provide examples wherever necessary.

(c) A digitized voice channel is made by digitizing a 4 KHz bandwidth analog voice signal. We need to sample the signal at twice the highest frequency (two samples per hertz). We assume that each sample requires 8 bits. What is the required bit rate? [CO1] (06,06,06)

Q2: (a) Explain various transmission impairments in detail.

(b) A signal travels through an amplifier, and its power is increased 10 times. This means that $P_2 = 10P_1$. Calculate the gain of power of the signal in decibels.

(c) Explain the following techniques with the help of suitable diagram:

- Frequency Hopping Spread Spectrum
- Direct sequence Spread Spectrum. [CO1]

(08,02,08)

Q3: (a) Prove that a receiving station can get the data sent by a specific sender if it multiplies the

entire data on the channel by the sender's chip code and then divides it by the number of stations.

- (b) What is the number of sequences if we have 90 stations in our network?
- (c) Find the chips for a network with
 - i) Two stations
 - ii) Four stations

[CO4] (10,03,05)

Q4:(a) Consider the binary sequence 0100101. Draw the waveforms for the following signaling formats. Also give advantages and disadvantages of these signaling formats.

- i) unipolar NRZ signaling format
- ii) Bipolar RZ signaling format
- iii) Amplitude Mark Inversion

(b) What is the Hamming distance? Find the minimum Hamming distance of the code words given below:

00000, 01011, 10101, 11110.

(c) What is the basic approach for Hamming Code? Explain by using an example how to correct single bit errors. [CO2] (08,04,06)

Q5:(a) What are the goals of Multiplexing? How Time division multiplexing (TDM) is implemented. Give the performance of Asynchronous TDM.

(b) What is the result of scrambling the sequence 111000000000001 using each of the following scrambling techniques? Assume that the last non-zero signal level has been positive.

i) B8Zs

ii) HDB3 [CO5]

(10,08)

Q6:(a) Explain the different types of Guided media used to transmit a signal. Specify the frequency range and bandwidth of each media. Write advantages of fiber optics over others.

(b) Distinguish between Asynchronous and Synchronous serial modes of data communication. [CO3] (10,08)

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