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Department of Software Engineering

Computer Networks

Assignment 1

(Spring 2025)

Submission Date: 10th April 2025

15 X 2 = 30 Marks

Book Data Communications & Networking Fifth Edition (Page 91, 92 and 93)

Solve all the following problems on a paper (Hand written assignment)

P3-4. What is the bandwidth of a signal that can be decomposed into five sine waves with frequencies at 0, 20,

50, 100, and 200 Hz? All peak amplitudes are the same. Draw the bandwidth.

P3-5. A periodic composite signal with a bandwidth of 2000 Hz is composed of two sine waves. The first one has

a frequency of 100 Hz with a maximum amplitude of 20 V; the second one has a maximum amplitude of 5 V.

Draw the bandwidth.

P3-6. Which signal has a wider bandwidth, a sine wave with a frequency of 100 Hz or a sine wave with a frequency

of 200 Hz?

P3-13. A nonperiodic composite signal contains frequencies from 10 to 30 KHz. The peak amplitude is 10 V for

the lowest and the highest signals and is 30 V for the 20-KHz signal. Assuming that the amplitudes change

P3-15. A signal travels from point A to point B. At point A, the signal power is 100 W. At point B, the power is

90 W. What is the attenuation in decibels?

P3-16. The attenuation of a signal is −10 dB. What is the final signal power if it was originally 5 W?

P3-17. A signal has passed through three cascaded amplifiers, each with a 4 dB gain. What is the total gain? How

much is the signal amplified?

P3-18. If the bandwidth of the channel is 5 Kbps, how long does it take to send a frame of 100,000 bits out of this

device?

P3-19. The light of the sun takes approximately eight minutes to reach the earth. What is the distance between the

sun and the earth?

P3-20. A signal has a wavelength of 1 μm in air. How far can the front of the wave travel during 1000 periods?

P3-21. A line has a signal-to-noise ratio of 1000 and a bandwidth of 4000 KHz. What is the maximum data rate

supported by this line?

P3-22. We measure the performance of a telephone line (4 KHz of bandwidth). When the signal is 10 V, the noise

is 5 mV. What is the maximum data rate supported by this telephone line?

P3-23. A file contains 2 million bytes. How long does it take to download this file using a 56-Kbps channel? 1-

Mbps channel?

P3-24. A computer monitor has a resolution of 1200 by 1000 pixels. If each pixel uses 1024 colors, how many

bits are needed to send the complete contents of a screen?

P3-25. A signal with 200 milliwatts power passes through 10 devices, each with an average noise of 2 microwatts.

What is the SNR? What is the SNRdB?