

The Islamic University of Gaza

Faculty of Engineering

Department of Computer Engineering



ECOM 4314: Data Communication

Instructor: Dr. Aiman Abu Samra

T.A.: Eng. Alaa O. Shama

Name:

Number:

Quiz#1

Q1. An image is 1024×768 pixels with 3 bytes/pixel. Assume the image is uncompressed. How long does it take to transmit it over a 56-Kbps modem channel?

Size of the Image = $1024 \times 768 \times 3$ bytes = 2359296 bytes = 18874368 bits
Time to send = $18874368 / 56,000 = 337$ seconds.

Q2. A digital signaling system is required to operate at 9600bps. If a signal element encodes a 4-bit word, what is the minimum required bandwidth of the channel if we assume a noise free system?

Noise free >>> Nyquist $C = 2B \log_2 L$

#of bits = $\log_2 L$ >>>> $4 = \log_2 L$ >>> $L = 16$

$C = 9600$ bps

$B = C / 2 \log_2 L = 9600 / 2 \times 4 = 1200$ Hz

Q3. Determine the possible Bit-rate and number of levels over a channel if $BW = 3$ KHz, $SNR = 40$ dB.

$SNR_{dB} = 10 \log_{10} SNR$ >>>> $SNR = 10000$

Bit rate = $B \times \log_2(1 + SNR)$

$= 3 \times 1000 \times \log_2(1 + 10000) = 39.8$ kbps

$39.8 \times 1000 = 2 \times 3000 \times \log_2 L$ >>> $L = 100$

$L = 128$ levels, since 100 isn't a power of 2