King Fahd University of Petroleum & Minerals
Electrical Engineering Department
EE370: Communications Engineering I (102)

Serial # 0

-1 points for not writing your serial #

Quiz 6: PCM : Pulse Coded Modulation

Name: KEY Sec. 2

Ten television signals (video and audio) with a bandwidth of 4.5 MHz each, are to be transmitted by binary PCM. The signals are sampled at 25% above the Nyquist rate. Samples are quantized into 1024 levels. In every frame, framing and synchronization requires an additional 2% extra bits. A PCM encoder is used to convert these signals before they are time-multiplexed into a single data stream.

a) Determine the sampling rate and the sampling interval for each channel.

Sampling rate: =1.25*Nyquist rate=1.25*2*4.5M= 11.25 M samples /sec

Sampling interval: =1/sampling rate= 1/(11.25 M)= 88.88889 *n sec*

b) At the quantizer, how many bits are used to represent each sample.

Log_2 1024=10

c) In every frame, how many bits are there?

10*(10)*1.02=102 bits

d) Determine the data rate of the multiplexed signal.

Date rate (bits/sec)= 102 bits/sampling interval(sec)=102 bits* sampling rate = (102)(11.25M)=1147.5 M bits/sec

e) Determine the minimum required bandwidth of baseband communication.

Min baseband BW= Rate/2=1147.5 M /2 =573.75 M HZ

Good Luck, **Dr. Ali Muqaibel**