2061
B.E. (Electronics and Communication Engineering)
Fourth Semester
EC-401: Communication Engineering

Time allowed: 3 Hours   Max. Marks: 50

NOTE: Attempt _five_ questions in all, including Question No. I which is compulsory and selecting two questions from each Unit.

x-x-x

1. (a) A telephone channel requires 4 KHz bandwidth. Specify the upper and lower cutoff frequencies for the sideband filter on the modulator output if it is to use the upper sideband on the carrier frequency of 172 KHz.

   (b) An FM signal, modulated to a depth of 8, generates a bandwidth of 160 KHz. Calculate the frequency deviation.

   (c) Describe image frequency and its rejection ratio. Find the image frequency of an AM input signal at 835 kHz.

   (d) Describe the transmission of a binary signal using 8-ary system.

   (e) What is purpose of mixing of signals in a heterodyne receiver?

   (5×2=10)

Section-A

2. (a) Compare SSB system with DSB-SC system. A message signal $m(t) = \cos 2000\pi t + 2\cos 4000\pi t$ modulates the carrier $c(t) = 100 \cos 2\pi f_c t$, where $f_c = 1 MHz$ to produce the DSB signal $m(t)c(t)$. Determine the expression and sketch the spectrum of the USB signal. (5)

   (b) Compare the effect of adjacent-channel interference in FM, PM and AM systems. How is it corrected in FM system? (5)

3. (a) Discuss the redundancies present in the video signal. How are these exploited for image compression? (5)

   (b) Design an Armstrong Indirect FM modulator to generate FM signal with a carrier frequency of 91.4 MHz and deviation of 76 KHz. A narrowband FM generator is available at a carrier frequency of 100 KHz and a frequency deviation of 15 Hz. Make suitable assumptions about the frequency of local oscillator and frequency multipliers. (5)

4. (a) Describe the generation and demodulation of PWM signal. How the trailing edges of PWM signal are considered position modulated? (5)

P.T.O.

(b) Fig 1 shows the Fourier spectra of two signals $g_1(t)$ and $g_2(t)$. Determine the Nyquist interval and the sampling rates for the signals $g_2(t)$, $g_2^m(t)$, and $g_1(t)g_2(t)$.
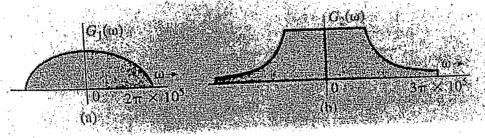

Fig 1.

(5)

Section-B

5. (a) Describe the various aspects and limitations in modeling of noise in a communication system. Derive the expression for output signal-to-noise ratio in a FM system.

(5)

(b) Compare different line codes based on their frequency spectrum. For the input data of {1 0 1 1 0 1 0 0 0 1 0}, determine the differentially encoded data.

(5)

6. (a) Compare the performance of PCM and DM systems. A sinusoidal signal with a maximum peak input voltage of 5V is applied to a PCM channel using a 10-bit code word. Find the number of quantization levels used, the RMS quantization noise level in volts, and the maximum sinusoidal signal to quantization noise ratio in decibels.

(5)

(b) What are the ways to minimize the quantization error? Discuss noise-bandwidth tradeoff in PCM system.

(5)

7. (a) Describe the effects of inter symbol interference in a communication system. How is it controlled?

(5)

(b) How the correlation in the signal is changed for delta modulation system. Describe the working of adaptive delta modulation system.

(5)

x-x-x