

GURU TEGH BAHADUR INSTITUTE OF TECHNOLOG

ANALOG COMMUNICATION

3RD SEMESTER, ECE

Assignment No .1

Ques1: Explain the fundamental limitation of a communication system?

Ques2: What is the difference between analog and digital communication system?

Ques3: What is modulation? What is its basic purpose in Electronic communication?

Discuss the various needs and benefits of modulation?

Ques4: What is the difference between low-level amplitude modulation and high-level amplitude modulation?

Ques5: Draw waveform for AM signal for undermodulation, overmodulation and 100% modulation?

Ques6: What are the advantages, disadvantages and application of AM?

Ques7: Describe balance Modulator using FET with the help of suitable diagram?

Ques8: Differentiate between envelope detector and synchronous detector?

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Assignment No .2

Ques1: Explain Inphase and Quadrature representation of SSB transmission?

Ques2: Why SSB transmission is not used for broadcasting?

Ques3: Explain vestigial side band modulation? What is its bandwidth?

Ques 4: Which modulation is used for transmission of picture and speech in TV transmission and why?

Ques 5: Comapare AM, DSB-SC and SSB-SC modulation?

Ques6: What is Quadrature null effect? How to overcome its effect?

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Assignment No. 3

Ques 1: For a broadcasting superhetrodyne AM receiver having no RF amplifier, the loaded Quality Factor Q of the antenna coupling circuit is 100. Now if the intermediate frequency is 455 kHz, then determine the image frequency and its rejection ratio at an incoming frequency of 100 KHz.

Ques2: A SSB transmission contains 15 KW. This transmission is to be replaced by a standard amplitude modulated signal with the same power content. Determine the power content of the carrier and each of the sidebands when the percent modulation is 60%.

Ques4: The first four moments of a distribution about X are 1,4,10 and 45 resp. Show that the mean is 5, variance is 3,

Ques5: For a binomial distribution mean is 6 and S.D. is 2 . Find the first two terms of the distribution.

Ques6: Determine the binomial distribution for which the mean is 4 and the variance is 3.

Ques7: Define poisson distribution.

Ques8: If X is a poisson variate such that $P(X = 2) = 9P(X = 4) + 90P(X = 6)$, find the variance.

Ques9: The moment generating function of a random variable X is given by
If $\text{Var}(X) = 4$, find $\text{Var}(3X+8)$, where X is a random variable.

Ques3: A tuned radio frequency receiver (TRF) has to be designed with a single tuned circuit using 9×10^{-6} Henry inductor .The ideal 10 KHz bandwidth occurs at 1100 KHz.

- (1) Determine the capacitance range of the variable capacitor in the LC tank circuit required to tune the receiver in 550 to 1550 ranges.
- (2) Determine the bandwidth of the receiver at 550 and 1550 Kz.

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Assignment No.4

Ques1: An antenna transmits an AM signal having total power contents of 15KHz. Determine the power being transmitted at the carrier frequency and each of the sideband when the percent modulation is 85%?

Ques2: A bandwidth of 12 MHz becomes available for assignment. If assigned for TV broadcast service, only two channels could be accommodated. Determine the number of AM stations that could broadcast simultaneously if the maximum modulated frequency is limited to 5 KHz.

Ques3: A 90 kHz bandwidth is to accommodate six AM broadcasts simultaneously. What maximum modulating frequency must each station be limited to?

Ques4: The following AM signal

$$S(t) = A_c [1 + k_a m(t)] \cos(2\pi f_c t)$$

Is applied to the system in the figure. Assuming that $|k_a m(t)| < 1$ for all t and message signal $m(t)$ is limited to the interval $-f_m \leq f \leq f_m$ and that the carrier frequency $f_c > 2f_m$, show that $m(t)$ can be obtained from the squarer-rooter output $v_3(t)$



Ques1: Explain the difference between Narrowband and Wideband FM?

Ques2: Write a short note on Bessel function?

Ques3: Define the following terms for Fm wave;

- 1) Carrier Swing
- 2) Frequency Deviation

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3) Per cent Modulation

4) Instantaneous frequency

Ques 4: What is Carson's rule?

Ques5: Compare AM, FM, PM.

Ques6: Explain PLL-FM demodulator? what are its advantages over other FM demodulators?

Ques7: Given an angle-modulated signal

$$x_c(t) = 10 \cos[(10^8)\pi t + 5 \sin 2\pi(10^3)t]$$

Determine the maximum phase deviation and the maximum frequency deviation.

Ques8: Determine the modulation index of an FM signal which is being broadcast in the 88-108 MHz band. This FM wave has a carrier swing of 130 kHz.

Assignment 6

Ques1: What is noise? What is its effect in electronic signal?

Ques2: Explain how noise figure of cascaded stages can be calculated?

Ques3 : Noise figure of individual two stage amplifier is 2 dB with power gain of 12 dB and 6 dB with power gain of 10 dB resp. Find the overall noise figure in dB?

Ques4: What is white noise? Write the expression for PSD of white noise.

Ques5: Two resistors R_1 and R_2 at absolute T_1 and T_2 are connected in series to form a white noise source. Find the equivalent noise temperature T_{eq} .

Ques6: Determine the noise figure of an amplifier for which noise equivalent resistance $R_{eq} = 2600$ and $R_t = 500$ ohm. It is driven by a generator whose output impedance is 50 ohm. It is given that this constitutes a large enough mismatch.

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