

(Following Paper ID and Roll No. to be filled in your Answer Book)

Paper ID : 131522

131502

Roll No.

B.Tech.

(SEM. V)(ODD SEM) THEORY EXAMINATION, 2015-16

PRINCIPLES OF COMMUNICATION

[Time:3 hours]

[Maximum Marks:100]

Section-A

Q1. Attempt **all** parts. All parts carry equal marks. Write answer of each part in short. $(2 \times 10 = 20)$

- Draw the Block diagram of SSb synchronous demodulation system.
- List the advantages of DSB-FC modulation scheme.
- Write two properties of Bessel's Function $J_n(\beta)$
- Mention three direct methods of FM generation.
- A signal has frequency components from 300 Hz to 1.8 KHz. What is the minimum possible rate at which the signal has to be sampled?
- Mention the exact data rates for T-1, T-2, T-3 and T-4 carrier systems.

- Which scheme utilizes the most number of bits per symbol- Delta modulation or Adaptive delta modulation?
- Define noise bandwidth.
- What is the shape of autocorrelation function of a random process having power spectral density (PSD) with only DV term?
- Convert $120 \mu W$ into dBm.

Section-B

Note: Attempt any five questions from this section. $10 \times 5 = 50$

- What is the basic limitation SSb modulation scheme? How it is eliminated by Vestigial Side Band modulation.
- Mention advantages and applications of VSB modulation. Two signals $m_1(t)$ and $m_2(t)$, both band-limited to 5000 rad/sec, are to be transmitted simultaneously over a channel by the multiplexing scheme as shown in figure 1 below. The signal at point b is the signal at point c is transmitted over a channel.
 - Sketch the signal spectra at a, b, c.
 - What must be the bandwidth of the channel?

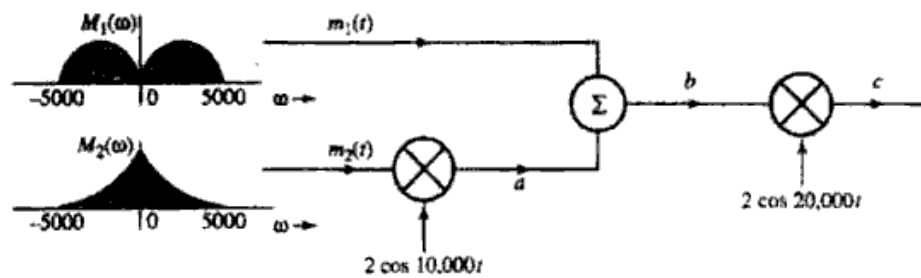


Figure: 1

- Q4. Prove that bandwidth of an FM wave is infinity. Also represent the single tone FM wave as a function of Bessel's Function.
- Q5. Discuss Armstrong's method of indirect FM generation in detail.
- Q6. Explain the TDM principle. Draw a circuit diagram to illustrate the flat-top sampling. Draw the block diagram of PCM scheme and explain its functionality.
- Q7. Show that the equivalent noise bandwidth of a low pass filter is $\frac{\pi}{2}$ times of its 3dB bandwidth F_{3dB} .
- Q8. Describe PWM and PPM generation with a neat labeled diagram.
- Q9. Quantify the noise performance of frequency modulated systems in detail.

Note: Attempt any two questions from this section. (15×2=30)

Q10. A compact disk (CD) recording system samples each of two stereo signals with a 16-bit analog-to digital converter (ADC) at 44.1 kb/s.

- Determine the output signal-to-quantizing ratio for a full-scale sinusoid.
- The bit stream of digitized data is augmented by the addition of error-correcting bits, clock extraction bits, and display and control bit fields. These additional bits represent 100 percent overhead. Determine the output bit rate of the CD recording system.
- The CD can record an hour's worth of music. Determine the number of bits recorded on a CD.
- For a comparison, a high-grade collegiate dictionary may contain 1500 pages, 2 columns per page, 100 lines per column, 8 words per line, 6 letters per word, and 7 b per letter on average. Determine the number of bits required to describe the dictionary, and estimate the number of comparable books.

Q11. Write a short note on AWGN. Calculate the Power Spectrum Density (PSD) corresponding to the autocorrelation function $x(t)$ of a random process shown in figure 2 below:

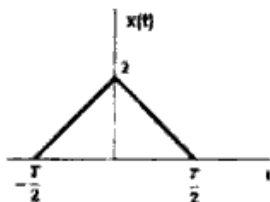


Figure: 2

Q12. How is the human voice modeled? What do you mean by VOCODER? Explain the generation of LPC VOCODER system.

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