(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]   [MaximumMarks:100

Section-A

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

(a) Draw the Block diagram of SSb synchronous demodulation system.

(b) List the advantages of DSB-FC modulation shceme.

(c) Write two properties of Bessel's Function $J_n(\beta)$

(d) Mention three direct methods of FM generation.

(e) 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?

(f) Mention the exact data rates for T-1, T-2, T-3 and T-4 carrier systems.

(g) Which scheme utilizes the most number of bits per symbol- Delta modulation of Adaptive delta modulation?

(h) Define noise bandwidth.

(i) What is the shape of autocorrelatiion function of a random process having power spectral density (PSD) with only DV term?

(j) Convert 120 μ W into dBm.

Section-B

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

Q2. What is the basic limitation SSb modulation scheme? How it is eliminated by Vestigial Side Band modulation.

Q3. Mention advantages and applications of VSB modulatiion. Two signals m1 (t) and m2 (t), both band-limited to 5000 rad/sec, are to be transmitted simultaneously over a channel by the multiplexing shceme as shown in figure 1 below. The single at point b is the signal at point c is transmitted over a channel.

(i) Sjetch the signal spectra at a, b, c.
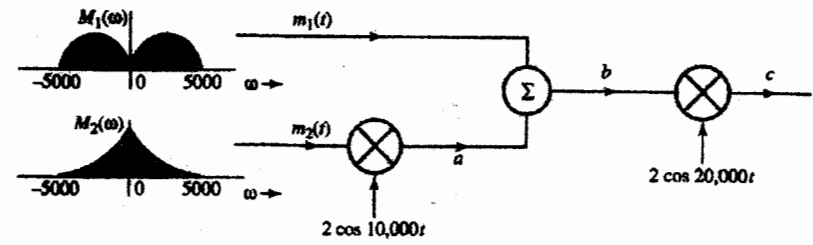
(ii) What must be the bandwidth of the channel?

Figure: 1

Q4. Prove that bandwisth of an FM wave is infinity. Also represent the single tone FM wava 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 smapling. Draw the block diagram of PCM shceme and explain its functionality.

Q7. Show that the equivalent noise bandwidth of a low pass filter is $\dfrac{\pi}{2}$ 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.

Section-C

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

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

    (i)   Determine the output signal-to-quantizing ratio for a full-scale sinusoid.

    (ii)   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.

    (iii)   The CD can record an hour's worth of musci. Determine the number of bits recorder on a CD.

    (iv)   For a comparison, a high-grade collegiate disctionary amy contain 1500 pages, 2 columns per page, 100 lines per columns, 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:
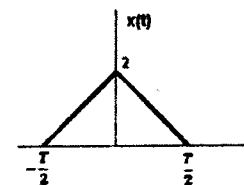

Figure: 2

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

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