

ANNA UNIVERSITY

END SEMESTER EXAMINATION APRIL/MAY 2012

B.E. ELECTRONICS AND COMMUNICATION ENGINEERING

EC 9253 COMMUNICATION SYSTEMS

IV SEMESTER

R2008

Time 3 hr

Max Marks 100

Answer All Questions

PART A (10x2=20)

1. Draw the spectra of SSB and DSBSC modulated signals, with a carrier frequency of 5 MHz and single tone message of frequency at 15 kHz (The modulated signals have an amplitude of 2 Volts).
2. What is the constraint under which the probability of symbol error could be approximated to be twice the probability of bit error for QPSK reception?
3. Determine the maximum amplitude of the sinusoidal input signal of 1kHz frequency that can be applied to the Delta modulator with a step size of 0.5V operating at a sampling rate of 16 kHz in order to avoid the slope over load distortion.
4. An amplifier has contributed 1 micro watt of noise at the output. If the amplifier has a gain of 70 dB over the frequency range of operation (20MHz to 30MHz), calculate the effective noise temperature of the amplifier. (Boltzmann's constant = 1.38×10^{-23} J/K).
5. Draw the magnitude responses of the Pre-emphasis and De-emphasis filters that could be used in FM and justify your choices.
6. Due to the non availability of a single LNA satisfying the specifications, it is proposed to cascade three available LNAs. The available LNAs have a gain of 3dB, 4dB and 4dB and their respective Noise Figures are 0.3 dB, 0.1dB and 0.3 dB. Give the order in which you will cascade them (starting from the antenna).
7. Indicate your choice in each of the following with suitable justifications:
 - a. Modulation for Broadcast application
(AM / DSBSC /SSB)
 - b. Encoder for very low bit rate voice Transmission for defence application
(PCM / DPCM /DM/ADPCM)

8. How do you convert a FM signal into a signal that looks like AM?
9. Give the relative merits and demerits of FM over AM.
10. How is AM demodulated using envelope detection?

PART B (5X16=80)

11. A BPSK based wireless communication link operates at a carrier frequency of 150 MHz at a bit rate of 2Kbps. Assume that an existing BPSK demodulator operating at 10.7 MHz, capable of supporting up to 2kbps is to be used.
 - a. Draw the block diagram of the receiver structure. (3)
 - b. Draw the frequency (magnitude) responses of the Bandpass filters used in the receiver. (4)
 - c. What is the minimum power required at the input of the BPSK demodulator, if the BER is to be maintained at 10^{-6} . (Noise power spectral density = -150dBm /Hz). (4)
 - d. Explain as to how you would achieve carrier Synchronization in BPSK demodulation? (5)

12. a. A FM signal is generated by modulating a carrier of frequency (f_c) 100 MHz of amplitude 5V using a message of amplitude 2.5V and frequency 1 KHz (f_m). (Frequency sensitivity of FM = $k_f = 2000$ Hz/Volt)
 - (i). Write down the expression for FM wave $s(t)$. (2)
 - (ii). Plot the spectrum of FM wave by obtaining the essential expression. (4)
 - (iii). Obtain the BW using Carson's rule. (2)
 - (iv). What is the power in the unmodulated carrier? (2)
 - (v). What is the power in the component ($f_c + 2f_m$)? (2)
 - (vi). How do you generate FM? (2)
 - (vii). Compare the important features of FM and AM. (2)

(OR)