B.TECH. DEGREE EXAMINATIONS: NOV/DEC 2010

Third Semester

INFORMATION TECHNOLOGY

ECE270: Principles of Communication

Time: Three Hours   **Maximum Marks: 100**

Answer ALL Questions:-

PART A (10 x 1 = 10 Marks)

1. The modulation technique with the smallest bandwidth is:

   (a) DSBFC AM   (b) DSBSC AM   (c) SSBSC AM   (d) VSB AM

2. A circuit that keeps the audio output cutoff until a signal is received is:

   (a) discriminator   (b) LPF   (c) squelch   (d) limiter

3. The carrier $v_c(t) = A \cos((2\pi 10^6 t)$ is angle modulated by the sinusoidal signal m(t) = $4\sin(2000\pi t)$. If the deviation sensitivity is 1000 Hz/V, the modulation index for FM is:

   (a) 2000   (b) 1000   (c) 4000   (d) 4

4. The bandwidth allowed in broadcast FM is:

   (a) 75 kHz   (b) 10 kHz   (c) 150 kHz   (d) 200 kHz

5. The probability of error in binary FSK is:

   (a) ½ erfc($\sqrt{E_b/2N_o}$)   (b) erfc($\sqrt{E_b/2N_o}$)   (c) ½ erfc($\sqrt{E_b/N_o}$)   (d) erfc($\sqrt{E_b/N_o}$)

6. The interference outside the bandwidth is reduced in:

   (a) MSK   (b) FSK   (c) QPSK   (d) QASK

7. The Nyquist rate for the signal $v(t) = A \cos(\pi 10^3 t)$ is:

   (a) 10^3 Hz   (b) 1000 Hz   (c) 500 Hz   (d) 2000 Hz

8. The accumulative error in the demodulated signal at the receiver in a DM system can be removed by:

   (a) Adaptive DM   (b) Delta-Sigma Modulation   (c) PCM   (d) DPCM

9. The period of a maximal length sequence is (*m* is length of the shift register):

   (a) $2^m - 1$ (b) 2^{m-1} (c) 2^m (d) $2^m + 1$

10. The commonly used modulation for FH spread spectrum is:

    (a) FSK   (b) MFSK   (c) PSK   (d) QPSK

PART B (10 x 2 = 20 Marks)

11. Calculate the % power savings in an SSBSC signal for 100% modulation.

12. What is tracking error?

13. What is capture effect in FM?

14. Determine the deviation ratio and bandwidth for the worst-case modulation index for an FM broadcast transmitter with a maximum frequency deviation of 75 kHz and a maximum modulating frequency of 15 kHz.

15. Distinguish between PSK and DPSK.

16. What is a constellation diagram in digital modulation?

17. What is aliasing effect?

18. State the significance of the eye diagram.

19. Define processing gain of a spread spectrum system.

20. What are multiple access techniques?

PART C (5 x 14 = 70 Marks)

21. a) (i) For an AM DSBSC wave with unmodulated carrier voltage of $18V_p$ and a load resistance of 50Ω, determine : unmodulated carrier power, modulated carrier power, total sideband power, upper and lower sideband power, total transmitted power. (4)

    (ii) With neat diagrams, explain how the envelope detector demodulates the AM signal.(10)

(OR)

  b) (i) Draw the block diagram of a superheterodyne receiver and explain the same. (7)

    (ii) Explain the characteristics of the above receiver. (7)

22. a) (i) Explain how a transistor can be used in a reactance modulator. (7)

    (ii) Explain the necessity for AFC in direct FM generation. (7)

(OR)

  b) (i) With a neat block diagram, explain the PLL method of FM demodulation. (10)

    (ii) Compare FM and PM. (4)

23. a) (i) Describe the QPSK modulation technique and discuss its advantages and

disadvantages. (7)

(ii) With a block diagram, explain how the QPSK signal is generated and demodulated. (7)

(OR)

b) (i) Compare the various digital modulation techniques. (10)

(ii) Explain how the MSK technique improves the noise performance of a receiver. (4)

24. a) (i) State sampling theorem. (4)

(ii) With an example, illustrate how a signal can be sampled and then reconstructed from the samples without distortion. (10)

(OR)

b) (i) What is intersymbol interference? Explain with an example. (4)

(ii) Describe the delta modulation technique in detail. (10)

25. a) (i) Explain the frequency hopping spread spectrum method. (7)

(ii) What are the types of FH spread spectrum? Compare their features. (7)

(OR)

b) (i) What is a PN sequence? Explain. (4)

(ii) With a block diagram explain how a maximal length sequence can be generated and discuss its properties. (10)

****