B.TECH DEGREE EXAMINATIONS: DEC 2014

(Regulation 2009)

Third Semester.

INFORMATION TECHNOLOGY

ECE270: Principles of Communication

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

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. In AM, the amplitude of the unmodulated carrier signal is $20Vp$. The modulating signal changes the amplitude by $\pm 7.5Vp$. The modulation coefficient is _____.

    a) 20   b) 7.5

    c) 0.375   d) 3.75

2. The bandwidth improvement of an AM receiver with RF bandwidth equal to 200 KHz and IF bandwidth equal to 10KHz is _____

    a) 20   b) 10

    c) 0.2   d) 2

3. The bandwidth requirement of FM is higher than AM (A) because the number of sidebands in FM is more (R).

    a) both A and R are individually true and   b) both A and R are individually true but R is
        R is the correct explanation of A   not the correct explanation of A

    c) A is true but R is false   d) A is false but R is true.

4. Examples of angle modulation are

    1. Frequency modulation   2. Phase modulation   3. Amplitude modulation

    a) 1 and 2   b) 2 and 3

    c) Only 3   d) Only 2

5. The probability of error of a binary PSK is _____

    a) $\dfrac{1}{2}erfc\left(\sqrt{\dfrac{Eb}{No}}\right)$ b) $erfc\left(\sqrt{\dfrac{Eb}{No}}\right)$

c) $\frac{1}{2} erfc\left(\sqrt{\frac{2Eb}{No}}\right)$ d) $\frac{1}{2} erfc\left(\sqrt{\frac{Eb}{2No}}\right)$

6. Which of the following is orthogonal modulation scheme?

   a) FSK b) ASK

   c) PSK d) QPSK

7. Quantization is a _____ process.

   a) Irreversible and memory less b) Irreversible and with memory

   c) Reversible and with memory d) Reversible and memory less

8. In PCM every additional bit in the codeword will increase the SNR by _____ dB.

   a) 9 dB b) 12 dB

   c) 6 dB d) 3 dB

9. The bit duration is of a communication system that supports a data rate of 10 Mbps is _____

   a) 10sec b) 0.1μsec

   c) 10μsec d) 1sec

10. The primary advantage of spread spectrum communication system is its ability to reject interference (A) because it uses different time slot for different sources(R).

   a) both A and R are individually true and R is the correct explanation of A b) both A and R are individually true but R is not the correct explanation of A

   c) A is true but R is false d) A is false but R is true.

PART B (10 x 2 = 20 Marks)

11. What is the need for modulation?

12. For an AM DSBSC modulator with carrier frequency fc=100KHz and single tone modulating signal of 3 KHz, draw the output frequency spectrum.

13. Determine the peak frequency deviation and modulation index for an FM modulator with deviation sensitivity K1=5KHz/V with a modulating signal $Vm(t) = 2\cos(4000\pi t)$.

14. Differentiate Frequency modulation and phase modulation.

15. Define bandwidth efficiency?

16. Compare Minimum Shift Keying with FSK.

17. A computer puts out binary data at the rate of 56 Kbits per second. The computer output is transmitted using a baseband binary PAM system that is designed to have a raised cosine spectrum. Determine the transmission bandwidth required for the roll off factor α = 0.5.

18. What is the importance of pre-alias filter?

19. Summarize different multiple access techniques.

20. Calculate the value of throughput of packet satellite network using ALOHA for offered load G=0.5. Assume an infinite user population model for the network.

PART C (5 x 14 = 70 Marks)

21. a) (i) Determine the sideband power and the total transmitted power of AM (4) transmitter, with an unmodulated carrier power Pc= 1000W and modulation coefficient m=0.2.

    (ii) Explain the working of super heterodyne receiver with block diagram (10)

    (OR)

    b) (i) Briefly explain the parameters used to evaluate the performance of a receiver. (7)

    (ii) What are the advantages and disadvantages of low level AM modulator? Explain (7) its working with block diagram and waveforms.

22. a) (i) Explain the working of FM demodulator using PLL. (7)

    (ii) What is the importance of pre-emphasis and de-emphasis? Explain with relevant (7) diagrams.

    (OR)

    b) (i) How does the average power of the angle modulated wave is different from (7) AM? Derive the expression for average power of angle modulated wave.

    (ii) Explain the working of a direct FM modulator using Varactor diode. (7)

23. a) (i) With Transmitter and receiver block diagram explain binary FSK modulation (7) scheme. What is the required bandwidth for FSK signal?

    (ii) Explain the generation of DPSK with the help of transmitter and receiver block (7) diagram

    (OR)

    b) What is QPSK? Obtain QPSK waveform as a sum of two BPSK waveforms. Explain the Transmitter and receiver block diagram of QPSK with the bandwidth requirement

24. a) (i) What is the time domain and frequency domain condition to achieve zero ISI? (7) Derive the ideal time domain waveform to achieve zero ISI and explain.

    (ii) The signal $g(t) = 10\cos(20\pi t)\cos(200\pi t)$ is sampled at a rate of 250 samples per (7) second.

    a. Draw the spectrum of the resulting sampled signal.

b. Specify the cut off frequency of the ideal reconstructed filter so as to recover g (t) from its sampled version.

c. What is the Nyquist rate for g (t)?

(OR)

b) (i) What are the two different noise in Delta modulator? Derive the expression for maximum SNR when there is no slope overload error. (7)

(ii) What is the difference between PCM and DPCM? With transmitter and Receiver block diagram, explain DPCM in detail. (7)

25. a) (i) Explain the generation of maximum length sequence. What are its properties? (8)

(ii) Using the waveform and block diagram, explain the generation of Direct sequence spread coherent PSK. (6)

(OR)

b) For a spread spectrum communication information bit duration is 4.095msec, PN chip duration is 1μsec. Calculate the length of the feedback shift register needed. The minimum bit energy to noise density ratio needed to support probability of error is 10. Find Jamming gain. (7)

What are the different types of frequency hop spread spectrum methods. Explain slow FH spread M-ary frequency shift keying with relevant block diagram. (7)

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