B.TECH. DEGREE EXAMINATIONS: OCTOBER / NOVEMBER -2008

Third Semester

INFORMATION TECHNOLOGY

U07IT301: Principles of Communication

Time: Three Hours   Maximum Marks: 100

PART A (20 x 1 = 20 Marks)

Answer ALL Questions:-

1. The modulation Index of an AM wave is changed from 0 to 1. The transmitted power is

   a) unchanged   b) halved   c) doubled   d) Increased by 50 percent.

2. If the carrier of a 100 percent modulated AM wave is suppressed, the percentage power saving will be

   a) 50   b) 150   c) 100   d) 66.66

3. A receiver tunes signals from 550 to 1600 kHz with an IF of 455 kHz. The frequency tuning ranges for Oscillator section is

   a) 1005 kHz to 2055 kHz   b) 95 kHz to 1145 kHz
   c) 105 kHz to 2055 kHz   c) 1005 kHz to 1145 kHz

4. A carrier is simultaneously modulated by two sine waves with modulation indices of 0.3 and 0.4. The total modulation index is

   a) 1   b) cannot be calculated   c) 0.5   d) 0.7

5. When modulation frequency is doubled, the modulation index is halved and the modulating voltage remains constant. The modulation system is

   a) Amplitude Modulation   b) Phase Modulation
   c) Frequency Modulation   d) any one of the three

6. A 15 W unmodulated carrier is frequency modulated with a sinusoidal signal such that the peak frequency deviation is 6 kHz. The frequency of the modulating signal is 1 kHz. The average power output by summing the powers of all side-frequency components is

   a) 15 W   b) 15 KW   c) 10 KW   d) 150 W

7. One of the following is the indirect way of generating FM.

   a) Reactance FET modulator   b) Armstrong Modulator
   c) Varactor diode Modulator   d) Reactance bipolar transistor modulator

8. Since noise Phase-modulates FM wave, as the noise side band frequency approaches the carrier frequency, the noise amplitude

   a) Remains constant   b) is decreased   c) is increased   d) is equalized

9. The digital modulation technique that gives better error probability is

    a) ASK   b) FSK   c) Binary PSK   d) DPSK

10. Which modulation technique would you consider for transmitting 90 Mb/s data in an authorized bandwidth of 20 MHz?

    a) PSK   b) QPSK   c) M-ary PSK   d) Binary FSK

11. The bit stream 1011100011 is to be transmitted using DPSK. The encoded sequence is

    a) 1101000010   b) 0110100001   c) 0101110001   d) 1101110001

12. In a QPSK system, the bit rate of NRZ stream is 10Mbps and carrier frequency is 1 GHz, the symbol rate of transmission is

    a) 10 MHz   b) 5 MHz   c) 5 Mbps   d) 10Mbps

13. A PCM system uses a uniform quantizer followed by a 7 bit binary encoder. The maximum message bandwidth for the system when the bit rate is equal to 50×10^6 bits/sec is

    a) 35.7 MHz   b) 35.7 KHz   c) 357 MHz   d) 3.57 MHz

14. The condition for slope overload distortion to occur in DM is

    a) $A_m > \dfrac{\delta}{2\pi f_m T_s}$ b) $A_m \geq \dfrac{\delta}{2\pi f_m T_s}$ c) $A_m < \dfrac{\delta}{2\pi f_m T_s}$ d) $A_m \leq \dfrac{\delta}{2\pi f_m T_s}$

15. Which of the following parameter differentiates PCM and DPCM?

    a) Sampling Rate KHz   b) Bits/Sample   c) Level Size   d) Step Size

16. The signal to Noise ratio of a DM system which is tested with 10 KHz sinusoidal signal, sampled at 10 times the nyquist rate is

    a) 10.8 db   b) 9.8 db   c) 11.8 db   d) 12.8 db

17. The generated output sequence of a 3 stage PN sequence generator with initial content of the shift register 100 is

    a) 0011101   b) 1001101   c) 0011001   d) 1011101

18. The length of the bit sequence of a direct sequence spread spectrum system with data sequence bit duration as 4.095ms and PN chip duration as 1 µs is

    a) 409.5   b) 40.95   c) 4.095   d) 4095

19. Chip rate for fast frequency hopping is

    a) $R_c = R_h$ b) $R_c = R_s$ c) $R_c < R_h$ d) $R_c < R_s$

20. The probability of error of DB/BPSK system is

a) $P(e) = \dfrac{1}{2} erfc \sqrt{\dfrac{E_b}{T_c}}$

b) $P(e) = \dfrac{1}{2} erfc \sqrt{\dfrac{E_b}{J}}$

c) $P(e) = \dfrac{1}{2} erfc \sqrt{\dfrac{E_b}{JT_c}}$

d) $P(e) = erfc \sqrt{\dfrac{E_b}{JT_c}}$

PART B (5 x 16 =80 Marks)

21. (a) (i) Explain the term Amplitude Modulation of a carrier wave. Illustrate with the help of simple sketches 50% and 100% modulation. (8)

   (ii) A transmitter radiates 1200 watts of power under carrier conditions. If this carrier is modulated simultaneously by two tones of 20% and 40% respectively, determine the total power radiated. (8)

(OR)

21. (b) (i) Discuss the merits and demerits of low level and high level transmitters. (4)

   (ii) Describe with the help of block diagram the working of a Superheterodyne receiver. What are the factors that decide the intermediate frequency? (12)

22. (a) Explain the working of an FM transmitter employing Armstrong method. What is the function of pre-distorter and pre-emphasis circuit? (16)

(OR)

22. (b) Draw the circuit diagram of a Foster-Seeley discriminator. Explain clearly its principle of operation with the help of relevant phasor diagrams. (16)

23. (a) Derive the expression for spectrum of BPSK system and hence calculate the bandwidth required. (16)

(OR)

23. (b) (i)Compare QASK and QPSK. (8)

   (ii) Explain the mechanism by which bandwidth reduction is made possible in QASK system. (8)

24. (a) (i)Derive the expression for signal to quantization noise ratio for PCM system that employs linear quantization technique, assuming the input to the system is sinusoidal input signal. (8)

   (ii) What is the necessity of non-uniform quantization and explain companding? (8)

(OR)

24. (b) (i) Compare PCM, DM, ADM and DPCM. (10)

(ii) Explain ISI. How it is avoided? (6)

25. (a) (i) Explain with block diagram, Direct sequence spread spectrum technique. (10)

(ii) In a DS/BPSK system the feedback register used to generate PN sequence has the length of m=15. The system is required to have an average probability of symbol error less than 10^{-5}. Calculate Processing Gain and Jamming margin for the system. (6)

(OR)

25. (b) (i) Differentiate slow frequency and fast frequency hopping. (6)

(ii) Explain the operation of frequency hop spread spectrum with the help of block diagram. (10)

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