B.E. DEGREE EXAMINATIONS: APRIL / MAY 2009

Fourth Semester

COMPUTER SCIENCE ENGINEERING

U07EC409 Analog and Digital Communication

Time: Three Hours   Maximum Marks: 100

Answer ALL the Questions:-

PART A (20 x 1 = 20 Marks)

1. Determine the wavelength in meters for the frequency of 10MHz.

    A. 3000 m   B. 300 m   C. 30 m   D. 3 m

2. Modulation is mainly used to _____.

    A. Increase the antenna height   B. Reduce the antenna height

    C. Degrade the quality of reception   D. Improve the attenuation

3. In AM, the information contained in the message signal is carried in _____.

    A. Carrier   B. Single side band

    C. Both side bands   D. Carrier and Both side bands

4. For an AM modulator with the carrier frequency of $f_c = 100$KHz and maximum modulating frequency $f_{m\ (max)} = 5$ KHz, the bandwidth is _____.

    A. 5 KHz   B. 10 KHz   C. 20 KHz   D. 500 KHz

5. The theoretical bandwidth of FM signal is _____.

    A. Zero   B. $2 f_{m\ (max)}$ C. $(\delta + f_m)$ D. Infinite

6. PM signal can be obtained from a frequency modulator, by passing the modulating signal through _____.

    A. Differentiator   B. Integrator   C. Low pass filter   D. Amplifier

7. In FM with modulating signal voltage of 2V, if the frequency deviation is 10 KHz and modulating signal frequency is 1 KHz, then the modulation index is _____.

    A. 5   B. 20   C. 10   D. 0.1

8. A pre-emphasis circuit is employed in a FM transmission to _____.

    A. Boast the stability   B. Boast the noise

    C. Boast the low frequency components   D. Boast the high frequency components

9. To extract useful information from a signal with bandwidth of W Hertz, the sampling rate must be not less than _____.

    A. 1/W   B. W   C. 2W   D. 10 W

10. The corrective measure to prevent aliasing is usage of _____ prior to sampling.

    A. Low pass filter   B. High pass filter   C. Notch filter   D. Amplifier

11. "Cyclic Redundancy Checking (CRC)" is the most reliable scheme for
_____.

    A. Bit synchronization   B. Error detection

    C. Error correction   D. Error detection and correction

12. In Delta modulation, an error condition that occurs when the analog signal to be
digitized varies too quickly for the system to follow is called _____.

    A. Quantizing error   B. Aliasing   C. Slope overload   D. Companding

13. For a standard voice communication channel with signal-to-noise power ratio of
30dB and a bandwidth of 2.7 KHz, the Shannon limit for information capacity is

_____.

    A. 26.9 kbps   `B. 11.11 kbps           C. 81 kbps           ` D. 32.7 kbps

14. A simple FSK transmitter can be constructed using _____.

    A. Feedback Amplifier   B. VCO   C. Ring modulator   D. Matched filter

15. The number of output combinations possible from an M-ary encoding of 4 bits is

_____.

    A. 4   B. 8   C. 12   D. 16

16. Quadrature Amplitude Modulation (QAM) is a combination of keying techniques
_____ and _____.

    A. ASK & FSK   B. ASK & PSK   C. ASK & MSK   D.BPSK & MSK

17. For a signal having a bandwidth of 200 KHz is spreaded using a chipping signal to a
bandwidth of 10 MHz, the Processing gain (G_p) is _____.

    A. 2000   B. 210   C. 50   D. 0.05

18. A PN sequence can be generated using _____.

    A. Shift register   B. Counter   C. Binary adder   D. Logic gates

19. The chip rate for Slow-frequency Hopping is given by _____.

    A. $R_c = R_s$ B. $R_c = R_h$ C. $R_c > 2 R_h$ D. $R_c < R_s$

20. Probability of error (P_e) of DS-SS system is given by _____.

    A. $P_e = \frac{1}{2} \, erfc \, (E_b / JT_c)^{1/2}$ B. $P_e = \frac{1}{2} \, erfc \, (E_b / N_o)^{1/2}$

    C. $P_e = \frac{1}{2} \, erfc \, (E_b / JT_c)$ D. $P_e = \frac{1}{2} \, erfc \, (N_o / E_b)$

PART B (5 x 16 = 80 Marks)

21. a. (i) Explain the operation of Super Heterodyne Receiver with neat diagram.   (10)

     (ii) A AM signal has 5W power in carrier and 0.3125W power in sidebands. What
is the percentage of modulation (m) and total power of modulated wave?   (6)

b. Write short notes on the following.

   (i) Tuned Radio Frequency AM receiver   (8)

   (ii) Double Conversion AM receivers   (8)

22. a. (i) Explain the operation of Armstrong FM transmitter with neat diagram.   (10)

    (ii) For a FM modulator with a peak frequency deviation Δf = 10 KHz, a modulating signal frequency f_m = 10 KHz, V_c = 10V and a 500 KHz carrier, determine the modulation index and approximate minimum bandwidth using Carson's rule.   (6)

(OR)

b. Explain the operation of FM demodulator using Ratio detector and Phase Locked Loop (PLL) with necessary diagrams.

23. a. (i) Explain the operation of DPCM with necessary diagrams.   (12)

    (ii) Explain Inter Symbol Interference.   (4)

(OR)

b. Explain the error control techniques Cyclic redundancy check (CRC), Parity and Checksum.

24. a. (i) Explain the operation of QPSK transmitter and receiver with relevant diagrams.(12)

    (ii) Explain the bandwidth consideration for QPSK.   (4)

(OR)

b. (i) Explain the operation of 8-QAM transmitter.   (8)

   (ii) Explain the carrier recovery techniques Coastas loop and Squaring loop.   (8)

25. a. (i) Explain the operation of DSSS system with block diagram.   (8)

    (ii) Explain Time division multiple access and Frequency division multiple access. (8)

(OR)

b. (i) Explain the process of generation of Pseudo noise sequence.   (8)

   (ii) Explain Frequency Hopping system with neat diagram.   (8)

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