

B.E DEGREE EXAMINATIONS: APRIL 2011

Sixth Semester

ELECTRONICS AND COMMUNICATION ENGINEERING

U07EC601: Digital Communication

Time: Three Hours

Maximum Marks: 100

Answer ALL Questions:-

PART A (10 x 1 = 10 Marks)

1. Companding is used
 - A) to overcome quantizing noise in PCM
 - B) in PCM transmitters to amplitude limiting in receivers
 - C) to protect small signals in PCM from quantizing distortion
 - D) in PCM receivers to overcome impulse noise
2. Mean square quantization error in PCM is
 - A) $S^2/3$
 - B) $S^2/12$
 - C) $S^2/4$
 - D) $S^2/2$
3. Compared to quaternary PAM system, a binary PAM system requires
 - A) low power and low bandwidth
 - B) low power and more bandwidth
 - C) high power and low bandwidth
 - D) high power and high bandwidth
4. The time interval over which the received wave can be sampled without error from ISI is defined by
 - A) width of eye opening
 - B) height of eye opening
 - C) slope of the eye pattern
 - D) asymmetries in the eye pattern
5. The digital modulation format that has the lowest probability of bit error is
 - A) PSK
 - B) FSK
 - C) QPSK
 - D) DPSK
6. A digital modulation scheme that provides conservation in bandwidth is
 - A) PSK
 - B) QPSK
 - C) MSK
 - D) FSK
7. The maximum number of errors that can be corrected by a (n, k) linear block code with a minimum distance d_{\min} is
 - A) $(d_{\min}-1)$
 - B) $(d_{\min}-1)/2$
 - C) $(d_{\min}+1)/2$
 - D) $(d_{\min}+1)$
8. A $1/2$ rate convolutional encoder has
 - A) two mod-2 adders and one input
 - B) two flipflops and one mod-2 adder
 - C) two mod-2 adders and two inputs
 - D) one mod-2 adder and two flipflops

9. A multiple access system that permits all users to transmit simultaneously and occupy the same RF bandwidth is
- A) TDMA B) FDMA C) CDMA D) GSM
10. The maximum length of the PN sequence possible with 8-bit linear feedback shift register is
- A) 255 B) 8 C) 64 D) 256

PART B (10 x 2 = 20 Marks)

11. What is aliasing? How do you overcome it?
12. Suppose that 50 similar messages each bandlimited to 3.3 KHz are to be time division multiplexed using PAM. Let the sampling rate be 8 KHz and use guard time equal to the pulse duration. Find the value of pulse duration.
13. A TDM signal with a bit time of 0.5ms is to be transmitted using a channel with a raised cosine roll-off factor of 0.5. What is the bandwidth needed for transmission?
14. Why do you need adaptive equalization in switched telephone network?
15. Distinguish coherent and noncoherent detection.
16. Draw the ML partitioning space for binary FSK.
17. What is meant by syndrome of a linear block code?
18. State the fundamental difference between block codes and convolutional codes.
19. Define Jamming margin.
20. What is the period of maximum length sequence generated using 3 bit shift register?

PART C (5 x 14 = 70 Marks)

21. a) (i) Derive the expression for mean square quantization error in PCM. (7)
- (ii) What is adaptive DM? Explain the generation and detection of adaptive DM. (7)
- (OR)**
- b) (i) State and prove sampling theorem. (7)
- (ii) Describe the operation of delta modulation transmitter and receiver. (7)
22. a) (i) Derive the expression for impulse response of a matched filter. (8)
- (ii) Write a note on eye pattern. (6)
- (OR)**
- b) (i) State and prove the Nyquist criterion for distortionless transmission. (7)

- (ii) Draw the block diagram of a modified duobinary signaling scheme and derive the overall frequency response of the system. (7)
23. a) (i) With necessary equations explain briefly about FSK system. (8)
(ii) Write a note on carrier synchronization. (6)
- (OR)**
- b) (i) Explain the principle of operation of a MSK system with signal space diagram and block diagrams of transmitter and receiver. (8)
(ii) Compare the performance of PSK, FSK, QPSK and MSK (6)
24. a) (i) Discuss linear block codes in detail. (8)
(ii) Write a note on Trellis coded modulation. (6)
- (OR)**
- b) (i) Write a note on Hamming codes. (6)
(ii) Draw diagram of a $\frac{1}{2}$ rate convolutional encoder with generator polynomials $g^{(1)}(D)=1+D$ and $g^{(2)}(D)=1+D+D^2$. Compute the encoder output for the input sequence **{101101}**. (8)
25. a) (i) Explain briefly about antijam characteristics and deduce the expression for jamming margin of a DS/BPSK system. (8)
(ii) Describe the operation of a frequency hopped M-ary FSK system. (6)
- (OR)**
- b) (i) Draw the block diagram of a DS/BPSK system and explain its operation. (8)
(ii) Write short notes on maximum length and gold codes. (6)
