

N 1158

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2004.

Sixth Semester

Electronics and Communication Engineering

EC 341 — DIGITAL COMMUNICATION

: Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

What should be the pass band for antialiasing and smoothing filters used with pulse modulation/demodulation systems?

Why compressors are used in PCM?

A TDM signal with bit time of $0.5 \mu\text{S}$ is to be transmitted using a channel with raised cosine roll off factor of 0.5. What is the bandwidth required?

From the eye pattern, how is the best time for sampling determined?

State the condition for a set of basis functions to be orthonormal.

Write the expression for bit error rate for coherent binary FSK.

How is the syndrome computed for block codes?

Draw the diagram of a convolutional encoder of rate $\frac{1}{2}$ with generator

polynomial : $g^{(1)}(D) = 1 + D + D^2$
 $g^{(2)}(D) = 1$

What is the period of the maximum length sequence generated using 3 bit shift register?

How is the processing gain of spread spectrum system computed?

PART B — (5 × 16 = 80 marks)

11. (i) Draw the block diagram of differential PCM and explain the function performed by each block. (8)
- (ii) What is meant by slope overload distortion in DM? What is the condition to be satisfied to avoid this distortion? (8)
12. (a) (i) What is meant by the ideal Nyquist channel? What are its merits and limitations? (8)
- (ii) Draw the block diagram of the duobinary signalling scheme and derive the overall frequency response of this scheme. (8)
- Or
- (b) (i) Derive the equation for the impulse response coefficients of the zero forcing equalizer. (8)
- (ii) Explain why adaptive equalizers are required for telephone channel. (4)
- (iii) Compare the bandwidth and power required for M-ary PAM with binary PAM. (4)
13. (a) (i) Explain what is meant by likelihood function for a transmitter consisting of M symbols. How is it used to compute the average probability of error? (8)
- (ii) Draw the block diagram of correlation receiver for detecting transmitted signals with M possible symbols and explain the decision rule used. (8)

Or

- (b) (i) Draw the block diagram of MSK transmitter and explain the function of each block. (8)
- (ii) Explain how MSK signal is obtained from CPFSK signal. (8)

- (a) (i) Find the generator and parity check matrix of (5, 1) repetition code. (4)
- (ii) Explain any four characteristics of the following block codes (1) BCH codes (2) CRC codes (3) Maximum length codes. (12)

Or

- (b) (i) Draw the diagram of the $\frac{1}{2}$ rate convolutional encoder with generator polynomials $g^{(1)}(D) = 1 + D$ $g^{(2)}(D) = 1 + D + D^2$ and compute the encoder output for the input sequence 101101. (10)

- (ii) What is meant by free distance of a convolutional code? How does it affect the no. of errors that can be corrected and coding gain? (6)

- (a) (i) A pseudo noise sequence is generated using an 8 bit register. The outputs of 7th and 8th bit of the register are exored and fed to the serial input of the register. The shift register is clocked at 10 MHz rate. Find the PN sequence length and PN sequence period. (8)

- (ii) Explain how the average probability of error and jamming margin may be evaluated for direct sequence spread BPSK system. (8)

Or

- (b) (i) Draw the block diagram of frequency hopped M-ary FSK transmitter and explain its operation. (8)

- (ii) Explain how symbol energy to noise spectral density ratio and processing gain of slow FH/MFSK are evaluated. (8)