Reg. No. : | | | | | | | | | | | |

R 3313

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2007.

Sixth Semester

(Regulation 2004)

Electronics and Communication Engineering

EC 1351 — DIGITAL COMMUNICATION

(Common to B.E. (Part-Time) Fifth Semester Regulation 2005)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — ($10 \times 2 = 20$ marks)

1. What are the drawbacks of PAM signal?

2. A signal $x(t) = 5\cos(1000\pi t)$ is sampled and quantized using 8 bit PCM system. Find the signal to quantization noise ratio.

3. State Nyquist criterion for zero ISI.

4. What is meant by correlative coding?

5. Draw the waveform for the binary data sequence 101100 modulated under
   (a) FSK
   (b) PSK.

6. What are the advantages and disadvantages of differential phase shift Keying?

7. Define linear block code.

8. What is meant by constraint length of a convolutional code?

9. What is meant by direct – sequence and frequency – hopped spread spectrum?

10. The SNR required to achieve reliable communication in direct-sequence spread spectrum system is 13 dB. If the interference–to–signal power at the receiver is 20 dB, determine the processing gain required to achieve reliable communication.

PART B — (5 × 16 = 80 marks)

11. (a) (i) With neat circuit diagram, explain the detection of PWM signals. (8)

(ii) Derive an expression for signal to quantization noise ratio for linear quantization in a PCM system. (8)

Or

(b) (i) Draw the block diagram of adaptive delta modulation system and explain. (8)

(ii) Explain the two types of quantization noise in delta modulation system. (8)

12. (a) (i) Derive the expression for probability of error for matched filter. (8)

(ii) Draw the block diagram of adaptive equalization and explain. (8)

Or

(b) Draw the block diagram of duo-binary and modified duo-binary system and explain without and with precoder.

13. (a) (i) Draw the block diagram of MSK transmitter and receiver and discuss in detail with required waveforms. (10)

(ii) What are the advantages and disadvantages of MSK as compared to QPSK system? (6)

Or

(b) (i) Explain carrier synchronization in QPSK signal. (6)

(ii) Explain the detection of binary FSK signal with block diagram. (7)

(iii) Explain binary PSK signal with geometrical representation. (3)

14. (a) (i) The parity check digits of a (6, 3) linear block code are generated by the equations :

$V_6 = u_1 + u_3$

$V_5 = u_1 + u_2 + u_3$

$V_4 = u_1 + u_2$

Where V_4, V_5 and V_6 are parity digits and u_1, u_2 and u_3 are message digits.

(1) Find the generator and parity check matrix of this code in systematic form.

(2) Find the error detecting and correcting capabilities of this code.

(3) Draw the circuit for encoder and syndrome computation of this code. (4 + 2 + 4)

(ii) Show that the generator polynomial of an (n,K) cyclic code is a factor of $X^n + 1$. (6)

Or

(b) (i) Draw the block diagram of trellis coded modulation system and explain with set partitioning of an 8-PSK constellation. (8)

(ii) A convolutional code is described by the following generator sequences :

$g^{(1)} = (1\ 0\ 1)$, $g^{(2)} = (1\ 0\ 0)$, $g^{(3)} = (1\ 1\ 1)$

(1) Draw the encoder to this code

(2) Draw the state diagram

(3) If the message sequence is 10110, determine the code word.

(2 + 4 + 2)

15. (a) (i) Draw the block diagram of direct sequence spread – spectrum signal demodulator and explain. (8)

(ii) Derive the expression for processing gain of direct – sequence spread spectrum system. (8)

Or

(b) (i) Draw the block diagram of frequency hopped spread spectrum system and explain. (10)

(ii) Explain the generation of maximum length sequence. (6)