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

Question Paper Code : 13360

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2012.

Sixth Semester

Electronics and Communication Engineering

080290039 — DIGITAL COMMUNICATION

(Regulation 2008)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — ($10 \times 2 = 20$ marks)

1. State sampling theorem.

2. Define quantitation noise.

3. Differentiate: Base band and Pass band signals.

4. What is coherent communication?

5. Define Bit error probability.

6. What are In-phase and quadrature components?

7. List the differences between source coding and channel coding.

8. What is coding gain?

9. Define Jitter.

10. Give the applications of spread spectrum systems.

PART B — ($5 \times 16 = 80$ marks)

11. (a) (i) Compare PCM, DPCM and DM. (5)

(ii) Explain the process of Delta Modulation and the methods to avoid different types of noises. (5)

(iii) Show that if the sampling rate is equal to or greater than twice the highest message frequency, the message m(t) can be recovered from the natural sampled signal $X_{ns}(t)$ by low-pass filtering. (6)

Or

(b) (i) Explain the modulation and demodulation processes of pulse code modulation with necessary diagrams and expressions. (10)

(ii) Given the signal

$m(t) = 10 \cos 2000\pi t \cos 8000\pi t$

(1) What is the minimum sampling rate based on the low-pass uniform sampling theorem? (3)

(2) Repeat (1) based on the band pass sampling theorem. (3)

12. (a) (i) Describe the conditions for zero ISI based on sampling theorem. (10)

(ii) Elaborate on the concept and characteristics of correlative coding. (6)

Or

(b) Explain the following with necessary figures and expressions:

(i) Raised cosine channels (8)

(ii) Adaptive equalization for data transmission. (8)

13. (a) An analog signal of bandwidth 20KHz is sampled at a rate of 40KHz and quantized into 16 levels. The resultant digital signal is transmitted using M_{ary} PSK with raised cosine pulse (roll off factor 0.3). A channel with a 110 KHz bandwidth is available to transmit the data.

(i) Determine the bit rate. (4)

(ii) Determine the smallest acceptable value of M. (Number of phase angles). (4)

(iii) Determine the baud rate. (4)

(iv) Determine the spectral efficiency. (4)

Or

(b) Describe the generation, detection, signal space diagram, bit error probability and power spectra of minimum shift keying method.

14. (a) Consider a(7,4) linear block code with the parity check matrix H given by

$$H = \begin{bmatrix} 1 & 0 & 1 & 1 & 1 & 0 & 0 \\ 1 & 1 & 0 & 1 & 0 & 1 & 0 \\ 0 & 1 & 1 & 1 & 0 & 0 & 1 \end{bmatrix}$$

(i) Construct code words for this (7,4) code (6)

(ii) Show that this code is a Hamming code (5)

(iii) Illustrate the relation between the minimum distance and the structure of the parity-check matrix H by considering the code word 0101100. (5)

Or

(b) Elaborate on the following:

(i) Viterbi decoding of convolution codes (8)

(ii) Trellis coded modulation. (8)

15. (a) With an appropriate example, explain the concept and working of frequency hopping spread spectrum communication systems. Give necessary equations.

Or

(b) Explain the following with reference to spread spectrum system.

(i) m- sequence and gold sequence (8)

(ii) PN sequences (4)

(iii) Anti jamming. (4)

———————