Reg. No.

Question Paper Code : **57291**

B.E/B.Tech. DEGREE EXAMINATION, MAY/JUNE 2016

Fifth Semester

Electronics and Communication Engineering

EC 6501 – Digital Communication

(Regulations 2013)

Time : Three Hours

Maximum : 100 Marks

Answer ALL questions.

PART – A (10 × 2 = 20 Marks)

1. What is aliasing ?

2. What is companding ? Sketch the input-output characteristics of a compressor and an expander.

3. What are the advantages of delta modulator ?

4. What is a linear predictor ? On what basis are the predictor coefficients determined ?

5. What are line codes ? Name some popular line codes.

6. What is ISI and what are the causes of ISI ?

7. Distinguish between coherent and non-coherent reception.

8. What is QPSK ? Write the expression for the signal set of QPSK.

9. What is a linear code ?

10. What is meant by constraint length of a convolutional encoder ?

PART – B (5 × 16 = 80 Marks)

11. (a) (i) State the low pass sampling theorem and explain reconstruction of the signal from its samples. (9)

   (ii) The signal $x(t) = 4 \cos 400 \pi t + 12 \cos 360 \pi t$ is ideally sampled at a frequency of 300 samples per second. The sampled signal is passed through a unit gain low pass filter with a cut off frequency of 220 Hz. List the frequency components present at the output of the low pass filter ? (7)

OR

(b) (i) Explain pulse code modulation system with neat block diagram. (10)

   (ii) What is TDM ? Explain the difference between analog TDM and digital TDM. (6)

12. (a) (i) Draw the block diagram of ADPCM system and explain its function. (10)

   (ii) A delta modulator with a fixed step size of 0.75 V, is given a sinusoidal message signal. If the sampling frequency is 30 times the Nyquist rate, determine the maximum permissible amplitude of the message signal if slope overload is to be avoided. (6)

OR

(b) (i) Draw the block diagram of an adaptive delta modulator with continuously variable step size and explain. (10)

   (ii) Compare PCM system with delta modulation system. (6)

13. (a) (i) Sketch the power spectra of (a) Polar NRZ and (b) bipolar RZ signals. (8)

   (ii) Compare the various line coding techniques and list their merits and demerits. (8)

OR

(b) (i) Draw the block diagram of duo binary signaling scheme without and with precoder and explain. (9)

   (ii) Explain the adaptive equalization with block diagram. (7)

14. (a) Explain the generation and detection of a coherent binary PSK signal and derive the power spectral density of binary PSK signal and plot it. (16)

OR

(b) Explain the non-coherent detection of FSK signal and derive the expression for probability of error. (16)

15. (a) Consider a linear block code with generator matrix   (3 + 3 + 6 + 4)

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

   (i) Determine the parity check matrix.

   (ii) Determine the error detecting and capability of the code.

   (iii) Draw the encoder and syndrome calculation circuits.

   (iv) Calculate the syndrome for the received vector $r = [1\ 1\ 0\ 1\ 0\ 1\ 0]$.

OR

   (b) (i) The generator polynomial of a (7, 4) cyclic code is $1 + X + X^3$. Develop encoder and syndrome calculator for this code.   (8)

   (ii) Explain Viterbi decoding algorithm for convolutional code.   (8)

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