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Question Paper Code : 71734

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2017.

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. A certain lowpass bandlimited signal $x(t)$ is sampled and the spectrum of the sampled version has the first guard band from 1500 Hz to 1900 Hz. What is the sampling frequency? What is the maximum frequency of the signal?
2. What is companding? Sketch the characteristics of a compander.
3. What is meant by granular noise in a delta modulation system? How can it be avoided?
4. What is a linear predictor? On what basis are the predictor coefficients determined?
5. State the desirable properties of line codes.
6. What is an eye diagram?
7. What is QPSK? Write down an expression for the signal set.
8. What do you understand by non-coherent detection?
9. What is the need of channel coding?
10. What are the different methods of describing the structure of a convolutional code?

PART B — (5 × 16 = 80 marks)

11. (a) (i) What is meant by quantization? Derive the expression for signal-to-quantization noise ratio in PCM system. (10)
- (ii) The information in an analog signal with maximum frequency of 3 kHz is required to be transmitted using 16 quantization levels in PCM system. Determine (1) the maximum number of bits/sample that should be used (2) the minimum sampling rate required and (3) the resulting transmission data rate. (6)

Or

- (b) (i) Explain the following terms with respect to sampling: (4+4)
- (1) Aliasing
- (2) Aperture effect distortion
- (ii) Explain time division multiplexing system for N-number of channels. (8)
12. (a) With neat diagram, explain the adaptive delta modulation and demodulation system in detail.

Or

- (b) Explain the operation of DPCM encoder and decoder with neat block diagrams.
13. (a) Derive the power spectral density of unipolar NRZ data format and list its properties

Or

- (b) (i) Describe the Nyquist's criteria for distortionless base band transmission. (10)
- (ii) What is a "raised Cosine spectrum"? Discuss how does it help to avoid ISI? (6)
14. (a) Explain in detail the detection and generation of BPSK system. Derive the expression for its bit error probability

Or

- (b) (i) Explain the principle of working of an "early late-bit synchronizer". (8)
- (ii) Explain the principle of DPSK encoding. (8)

15. (a) The generator polynomial of a (7,4) linear systematic cyclic block code is $1 + X + X^3$. Determine the correct code word transmitted, if the received word is (i) 1011011 and (ii) 1101111

Or

- (b) A rate 1/3 convolutional encoder with constraint length of 3 uses the generator sequences: $g_1 = (100)$, $g_2 = (101)$ and $g_3 = (111)$. (2+6+8)
- (i) Sketch encoder diagram
 - (ii) Draw the state diagram for the encoder
 - (iii) Determine the d_{free} distance of the encoder
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