

Con-2518 -07.

ND-7916

(REVISED COURSE)

(3 Hours)

[Total Marks : 100

N.B.(1) Question No. 1 is **compulsory**.

- (2) Attempt in all **five** questions.
 (3) Figures to the **right** indicate **full** marks.
 (4) Draw **neat** diagrams whenever **necessary**.

1. (a) Compare Energy signal and power signal. 20
 (b) Explain poisson distribution and Gaussian distribution.
 (c) Explain PDF and CDF.
 (d) What is ergodic process ? What is difference between Ergodic process and stationery process ?
2. (a) Derive the expression for error probability of matched filter and justify that P_e does not depend on the shape of the input waveforms. 10
 (b) What is meant by equalization ? Sketch and explain the working of Traversal equalizer. 10
3. (a) Draw block diagram of DPSK system (transmitter and receiver) and explain why detection of DPSK does not require a differential decoder. 10
 (b) State and explain the condition for orthogonality of BFSK signals. Determine their spectrum and hence the bandwidth required for transmission of signals. 10
4. (a) For data bit sequence of 10110101, sketch the MSK waveform. Give relevent expressions.
 (b) An analog signal having 4 KHz bandwidth is sampled at 1.25 times the Nyquist rate, and each sample is quantized into one of 256 equally likely levels. Assuming the samples to be statistically independent :
 (i) What is information rate of this source
 (ii) Can the output of this source transmitted without error over an AWGN channel with a bandwidth of 10 KHz and S/N ratio of 20 dB ?
 (iii) Find S/N ratio required for error-free transmission of part (ii)
 (iv) Find the bandwidth required for an AWGN chanel for an error-free transmission of the output of this source if S/N ratio is 20 dB.
5. (a) Derive the expression for signal to quantization noise ratio for PCM system that employs linear quantization technique. Assume that input to the PCM system is a sinusoidal signal. 8
 (b) Explain Granular Noise and slope overload distortion. 4
 (c) A discrete memoryless source has five symbols x_1, x_2, x_3, x_4 and x_5 with probabilities 0.4, 0.19, 0.16, 0.15, and 0.15 respectively attached to every symbol. Construct a Huffman code for the source and calculate code efficiency η . 8

6. (a) The generator matrix of a(6, 3) systematic block code is given by—

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

- (i) Find the code vectors
- (ii) Find the parity check matrix
- (iii) Find the error syndrome.

(b) What is ideal secrecy ? Compare it with perfect secrecy.

5

(c) Differentiate between Channel coding and encryption.

5

7. Write short notes on :—

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(a) Viterbi Algorithm

(c) PCM waveform types

(b) Convolution code

(d) Effect of noises on communication system.
