

Con. 2781-09.

## Digital Communication

(REVISED COURSE)

(3 Hours)

[Total Marks : 100

**N.B. :** (1) Question No. 1 is **compulsory**.(2) Attempt any **four** questions out of remaining **six** questions.(3) **Figures** to the **right** indicate **full** marks.(4) Assume **suitable data** if **necessary**.

1. Answer the following :—

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(a) What are the disadvantages of digital communication ?

(b) Define Baye's rule.

(c) What is the significance of Euclidian distance ?

(d) Why MSK is called "shaped QPSK" ? Justify.

(e) Explain meaning of equalization.

(f) What is white Gaussian Noise ?

(g) Define Noise factor and Noise temperature.

(h) What is the maximum capacity of a noiseless channel of B.W. 100Hz in which values of the data transmitted may be indicated by any one of 10 different amplitudes ?

(i) Define (1) Hamming Bound (2) Code efficiency.

(j) What is linear predictive coding ?

2. (a) Explain in brief the TI digital system. Also discuss the Bit/frame, Frame synchronization, Bit rate signaling, line coding and Multiplexing of lines. 12

(b) Briefly discuss the transfer function of optimum filter. 8

3. (a) Explain signature authentication process using public key crypto system. 10

(b) Explain in brief the process of delta modulator, with neat diagram and waveform. 10

What is slope overload and granular noise error in delta modulator ?

4. (a) Discuss the various types of losses encountering in the link design of digital communication system. 12
- (b) What is noise? In a radio receiver an RF amplifier and a mixer are connected in cascade the amplifier has a noise figure of 10dB and power gain is 15dB. The noise figure of the mixer stage is 20dB. Calculate noise factor and noise figure. 8
5. (a) Describe the generation and reception of BPSK signals. Define signal space diagram and bandwidth for the same. Also state its drawbacks. 12
- (b) Derive an expression for power spectral density of Non Return to Zero (NRZ) data. 8
6. (a) The parity check bits of (8, 4) block code are generated by— 12
- $$C_5 = d_1 + d_2 + d_4,$$
- $$C_6 = d_1 + d_2 + d_3,$$
- $$C_7 = d_1 + d_3 + d_4,$$
- $$C_8 = d_2 + d_3 + d_4,$$
- Where  $d_1, d_2, d_3$  and  $d_4$  are the message bits—
- (i) Find the generator matrix and the parity check matrix
- (ii) Find the minimum weight of this code
- (iii) Find the error detecting and correcting capabilities of this code
- (iv) Show through an example that this code can detect up to three errors.
- (b) Explain the systematic cyclic code generator circuit by shift register and decoding process of cyclic codes. 8
7. Write short notes on (any four) :— 20
- (a) Eye pattern
- (b) A-law and  $\mu$  law.
- (c) Run length coding
- (d) JPEG
- (e) Cumulative Distribution function.