Roll No. .....

Total No. of Pages : 3

BT6/M11

8617

Digital Communication

Paper : ECE-308 E, Option : I

Time : Three Hours]

[Maximum marks : 100

Note :— Attempt **FIVE** questions in total selecting at least **ONE** question from each unit.

UNIT—I

1. (A) What is sampling process ? Derive and explain the sampling theorem. 10

(B) A continuous time signal is given below :

$x(t) = 8 \cos 200 \pi t$

determine :

(I) Minimum sampling rate.

(II) If sampling frequency $f_s = 400$ Hz, what is the discrete time signal x[n] or $x[nT_s]$ obtained after sampling ?

(III) If sampling frequency $f_s = 650$ Hz, what is the discrete time signal x[n] or $x[nT_s]$ obtained after sampling ?

(IV) What is the frequency of sinusoidal signal for range $0 < f \leq \frac{f_s}{2}$ that yields samples identical to those obtained in part III. 10

2. Write a short note on each of the following :

(I) PCM

(II) μ-law and A-law compressors. 2×10=20

UNIT—II

3. (A) In a binary transmission, one of the messages is represented by a rectangular pulse x(t). An another message is transmitted by the absence of the pulse. Evaluate the signal to noise ratio at $t = T$, assuming white noise with psd equal to $\frac{N_o}{2}$. Also sketch the impulse response and output of the matched filter. 10

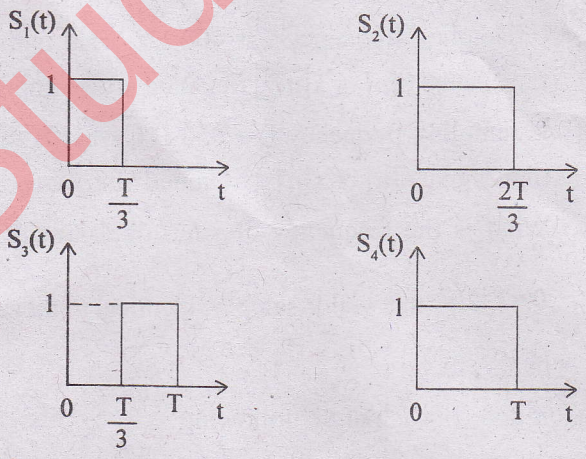
(B) What is intersymbol interference ? Discuss its cause and methods to avoid it. 10

4. (A) Discuss Duo-binary signalling. 10

(B) Outline the concept of Eye-patterns. 10

UNIT—III

5. (A) Given the signals $S_1(t)$, $S_2(t)$, $S_3(t)$ and $S_4(t)$ as shown below. Use the Gram-Schmidt orthogonalization procedure to find an orthonormal basis for the set of signals : 10



(B) What do you mean by coherent binary PSK ? Discuss their generation and detection techniques. 10

6. (A) Explain the response of bank of correlators to noise input. 10

(B) Discuss QPSK explaining the concept of signal space diagram. Also derive an expression for probability of error. 10

UNIT—IV

7. (A) Describe the direct sequence spread spectrum with coherent BPSK. 10

(B) What are PN sequences ? Discuss their properties. 10

8. Discuss in detail the following :

(A) Frequency spread spectrum 12

(B) CDM. 8