

Total No. of Questions : 6]

SEAT No. :

P3688

[Total No. of Pages :2

Engg. - 26
T.E (E & TC) (Semester-I)
Digital Communication (In Sem.)
(2012 Pattern)

Time :1 Hour]

[Max. Marks :30

Instructions to the candidates :

- 1) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side indicate full marks.*

UNIT-I

- Q1)** a) State Sampling Theorem. Find the Nyquist Rate and Interval for the given signal $X(t) = \text{sinc}(100 \pi t) + \text{sinc}(50 \pi t)$ [4]
- b) A linear delta modulator is designed to operate on speech signals limited to 3.6 kHz and which is sampled at a rate of 10 times the Nyquist rate. Step size is 100 mV. The modulator is tested with a 1 kHz sinusoidal signal. Determine the maximum amplitude of this test signal required to avoid slope overload. [6]

OR

- Q2)** a) Explain the working of LPC speech coder with the help of block schematic. [4]
- b) A television signal has a bandwidth of 4.5MHz. This signal is sampled, quantized and binary coded to obtain a PCM signal. [6]
- i) Determine the sampling rate if the signal is to be sampled at a rate above the Nyquist rate.
 - ii) If the samples are quantized into 1024 levels determine the number of binary pulses required to encode each sample.
 - iii) Determine the bit rate and minimum bandwidth required to transmit this signal.

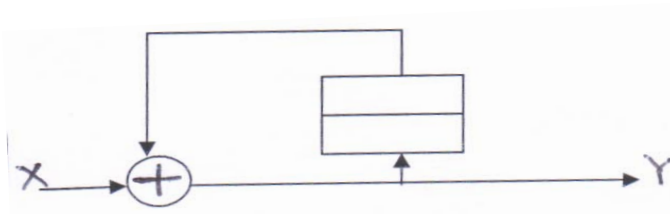
P.T.O.

UNIT-II

- Q3)** a) Explain the broad categories of digital multiplexers. [4]
- b) Given the data stream 11000101, sketch the transmitted sequence of pulses for each of the following line codes and compare performance parameters of these codes [6]
- AMI-RZ
 - Split Phase (Manchester)

OR

- Q4)** a) The data stream of [11111] is given to a scrambler shown below. Determine the output sequence of a scrambler. Assume initial contents of the registers to be zero. [4]



- b) What do you understand by ISI and state Nyquist First Criterion for Zero ISI. [6]

UNIT-III

- Q5)** a) State any four properties of Power Spectral Density. [4]
- b) Show that the random process $x(t) = A \cos(\omega_c t + \theta)$ is a Wide Sense Stationary Process, where θ is a RV which is uniformly distributed in the range $(0, 2\pi)$. [6]

OR

- Q6)** a) Define the following terms: [4]
- Autocorrelation Function
 - Autocovariance Function
- b) Explain the procedure to represent narrowband noise in terms of in-phase and quadrature components. [6]

