

Total No. of Questions : 6]

SEAT No. :

**P5633**

[Total No. of Pages : 2

**TE/INSEM./OCT. - 20**  
**T.E. (E & TC)**  
**DIGITAL COMMUNICATION**  
**(2012 Course) (Semester - I)**

*Time : 1 Hour]*

*[Max. Marks : 30*

*Instructions to the candidates:*

- 1) Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Assume suitable data, if necessary.

**Q1) a)** Find the Nyquist Rate and Interval for the given signal. **[6]**

i)  $X(t) = 10 \sin c(100t)$ .

ii)  $X(t) = \cos^2(100\pi t)$ .

iii)  $X(t) = 10 \sin c^2(100t)$ .

- b) A Delta modulation system is designed to operate 20 times the Nyquist rate for a signal with 1kHz bandwidth. Determine the sampling frequency & maximum amplitude of 1kHz input sinusoid for which the delta modulator does not have slope-overload quantizing step size is 0.5V.[4]

OR

**Q2) a)** Compare PCM, Delta modulation & LPC on the basis Sampling frequency, bitrate & bandwidth requirement. **[6]**

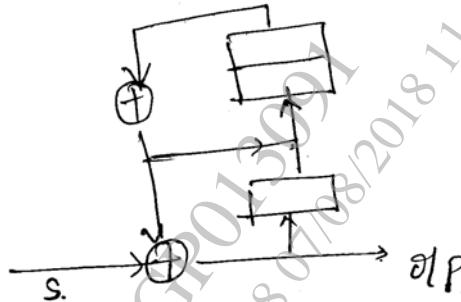
- b) A PCM system uses a uniform quantizer followed by a 7 bit binary encodes, the bitrate of the system is 50 mbps, what is the maximum signal bandwidth? Calculate the output signal to quantization noise ratio if sinusoidal modulating wave is applied to the input. **[4]**

**P.T.O.**

- Q3) a)** Draw & Explain  $T_1$  carrier system. [4]
- b)** For the sequence 101110, sketch the waveform using the following data formats. [6]
- Unipolar NRZ.
  - Polar NRZ.
  - Unipolar RZ.
  - Bipolar RZ.
  - AMI.
  - Split phase Manchesters coding.

OR

- Q4) a)** For input sequences = 10101001 determine the output sequence for the given scrambles. [6]



- b)** What is ISI & List out remedies to reduce them. [4]
- Q5) a)** State the any four properties of Autocorrelation function. [4]
- b)** Show that the random process.  $X(t) = A \cos(\omega t + \theta)$  is wide sense stationary process where  $\theta$  is a random variable uniformly distributed in the range  $[-\Pi, \Pi]$ . [6]

OR

- Q6) a)** Classify Random Process. [4]
- b)** A WSS random Process  $X(t)$  is applied to the LTI system with impulse response  $h(t) = ae^{-at} u(t)$ , find mean value if output  $Y(t)$  of the system if  $E(X(t)) = 3$  &  $a = 4$ . [6]

