Oct.-16/T.E./Insem.-20

T.E. (E & TC)

DIGITAL COMMUNICATION

(2012 Pattern)

Time : 1 Hour] *[Max. Marks : 30*

Instructions to the candidates:

1) *Answer 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) With the help of detail diagram explain function of each block of digital communication system. **[5]**

b) A 1kHz signal of voice channel is sampled at 4kHz using 12-bit PCM and a DM system. If 25 cycles of input signal are digitized find in each case. **[5]**

     i) Signaling rate

     ii) Bandwidth required

     iii) Number of bits required to be transmitted

     iv) Comment on results

OR

Q2) a) Consider a sinusoidal signal $\times (t) = A\cos(\omega_m t)$ applied to a delta modulator with a step sized. Show that the slope overload distortion will occur if $A > \dfrac{\delta}{\omega_m T_s} = \dfrac{\delta}{2\pi} \dfrac{fs}{fm}$ where T_s is sampling period. **[5]**

b) What is delta. sigma modulation? Explain the transmitter and receiver schemes of a delta sigma system. **[5]**

Q3) a) What is a digital multiplexer? Explain the three main categories of multiplexer. **[5]**

b) Consider that the bit sequence given below is to be transmitted. Bit sequence = 10110010 Draw the resulting waveform, if the sequence is transmitted using : **[5]**
   i) Unipolar RZ
   ii) Polar RZ
   iii) AMI
   iv) Split phase manchester

OR

Q4) a) Explain Ts carrier system in detail **[5]**

b) What is bit synchronization? Explain closed loop bit synchronizer **[5]**

Q5) a) Consider a random process x (t) is given by x (t) = A cos (ωt + θ)

Where A and ω are constants and θ is a random variable over $(-\pi, \pi)$ show that x (t) is ergodic in both the mean and autocorrelation. **[5]**

b) Explain narrowband noise and represent an narrowband noise in terms of inphase and quadrature components **[5]**

OR

Q6) a) What is power spectral density? Derive the expression of PSD When a random process is transmitted through a LTI filter. **[5]**

b) Classify and explain different types of random processes. **[5]**

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