10EC61 – Digital Communication

Assignment-I

Note: i) Write the assignment in a A4 size paper
iii) Mention your USN, name and section on the top right corner of first page
ii) Submit the assignment on or before 11.00 AM, Tuesday, 21/03/2017

1. The signal g(t)= 5 cos (50πt) cos(150πt) is sampled at the rate of 200 samples/second. Obtain the spectrum of g(t) and $G_\delta(t)$. Indicate if and how the signal can be recovered.

2. Obtain the expression for Fourier transform of sampling function h(t) used for flat top sampling. Hence explain aperture effect with the help of spectral diagrams. Bring out the differences between aperture effect and aliasing error.

3. Explain flat top sampling with proper waveforms and obtain the expression for sampled signal.

4. With a neat block diagram briefly explain the operation of digital communication system. Explain the functioning of each block.

5. Consider the signal g(t)= A sin ($2\pi f_o t$). Plot the spectrum of the discrete time signal $G_\delta(t)$ derived by sampling g(t) at the times $t_n = n/f_s$. where n=0, ±1, ±2, ±3, ... and i) $f_s=f_o$ ii) $f_s=2f_o$ iii) $f_s=3f_o$.

6. a) Explain TDM with the help of a block diagram.

b) Four messages band limited to W,W,W and 3W are to be time division multiplexed, with W being 3000 Hz. Set up a TDM scheme for the same and find speed of the commutator in samples per second.

7. State and prove sampling & reconstruction of low pass signals using Nyquist criterion with suitable waveforms and equations.

8. Derive the equation for signal to quantization noise ratio if probability of overload is less than 10^{-4} in the case of uniform quantizer. Further if a binary code of N-bits (N>6) is used, write the equation for $(SNR)_o$ and $(SNR)_{dB}$.

9. Explain signal distortion in sampling and obtain the expression for bound on aliasing error.

10. Explain quantization, quantization error, encoding and types of uniform quantization.