

II B.Tech I Semester Supplementary Examinations, November 2006
SIGNALS & SYSTEMS

(Common to Electronics & Communication Engineering, Electronics & Instrumentation Engineering, Electronics & Control Engineering and Electronics & Telematics)

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
 All Questions carry equal marks

1. (a) Write the significance of spectral analysis in communication systems. [4M]
 (b) Explain how a function can be approximated by a set of orthogonal functions. [6M]
 (c) Derive the expression by which the Mean square error can be evaluated. [6M]
2. Find out the exponential Fourier series for the impulse train and plot its magnitude and phase spectrum and find the normalized average power of the signal shown below the figure2: [8+3+3+2=16M]

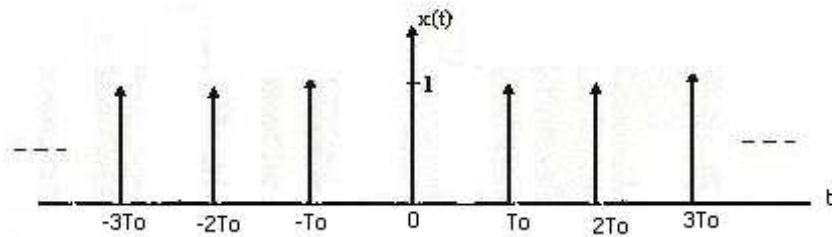


Figure 2

3. (a) Find and sketch the convolution of two signals: [8M]
 $x(t) = 2\pi \left(\frac{t-5}{2} \right)$ and $h(t) = \pi \left(\frac{t-2}{4} \right)$.
 (b) Find the Fourier Transform. of $\sin(8t + 0.1\pi)$. [8M]
4. Determine the maximum bandwidth of signals that can be transmitted through the lowpass RC filter shown in the figure4., if over this bandwidth the gain variation is to be within 10 percent and the phase variation is to be within 7 percent of the ideal characteristics. [16M]

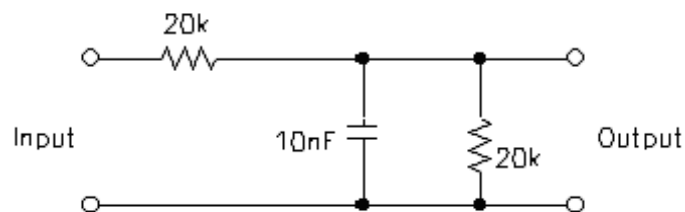


Figure 4

5. Consider a gaussian filter $H(\omega) = \exp(-k\omega^2 + j\omega t_0)$.

- (a) Determine and sketch the unit impulse response of this filter. [6M]
- (b) State, with reasons, whether this filter is physically realizable. [6M]
- (c) Can this filter be made approximately realizable by providing a sufficient amount of delay t_0 ? [4M]
- 6. (a) Explain how auto correlation and energy of a signal $f(t)$ are related? [8M]
- (b) Find the cross correlation between triangular and Gate function. [8M]
- 7. (a) Prove that the Laplace transform of even and odd functions is even and odd functions respectively. [8M]
- (b) Find the Laplace transform of $x(t) = e^{-t} \cos(\omega_0 t + \phi) \cdot u(t)$ and its ROC. [6+2=8M]
- 8. (a) State and prove the convolution and scale change properties in z transform. [4+4=8M]
- (b) Prove that the final value of $x(n)$ for $X(z) = z^2/[z-1][z-0.2]$ is 1.25 and its initial value is unity. [8M]
