

Code: R7210404

B.Tech II Year I Semester (R07) Supplementary Examinations December 2015

SIGNALS & SYSTEMS

(Common to ECE, EIE & E.Con.E)

(For 2008 regular admitted batch only)

Time: 3 hours

Max. Marks: 80

Answer any FIVE questions
All questions carry equal marks

- 1 (a) Define and derive an expression for mean square error.
(b) Explain how an unknown function $f(t)$ can be expressed using infinite mutually orthogonal functions.
- 2 (a) State and prove time differentiation and frequency shift properties of Fourier series.
(b) Determine the Fourier series representation of the signal $x(t) = \cos(3\omega t) \sin^2(2\omega t)$. Also draw magnitude and phase spectra.
- 3 (a) State and prove modulation property of Fourier transform.
(b) Derive the relationship between Fourier transform and Fourier series.
- 4 (a) Define an LTI system.
(b) Given a continuous LTI system with unit impulse response $h(t)$. A continuous time signal $x(t)$ is applied to the input of this LTI system, where, $x(t) = e^{-at} u(t)$ for $a > 0$ and $h(t) = u(t)$ and evaluate the output.
- 5 (a) Define correlation function and explain its properties.
(b) Determine the output of the LTI system for the input $x(t) = u(t) - u(t-2)$ and impulse response $h(t) = u(t) - u(t-2)$ graphically.
- 6 (a) What is aliasing and explain the cause behind it?
(b) Explain about natural and flat tap sampling.
- 7 (a) Determine the inverse Laplace transform of the following:
(i) $X(s) = \frac{9s+10}{2s+s^2}$.
(ii) $X(s) = \frac{3s+6}{(s+1)(s+4)^2}$.
(b) Explain about differentiation and integration properties of Laplace transforms.
- 8 (a) Find the z transform and ROC of $x[n] = \{1, 2, -1, 3, 2, 1\}$, $y[n] = u[n]$.
(b) Compare Laplace, Fourier and z transforms.
