

Code: 9A04304

R09

B.Tech II Year I Semester (R09) Supplementary Examinations December 2015 SIGNALS & SYSTEMS

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

Time: 3 hours

Max. Marks: 70

Answer any FIVE questions All questions carry equal marks

- 1 (a) Derive the expression by which the Mean square error can be evaluated.
 - (b) Evaluate the following integrals: i) $\int_0^5 \delta(t) \sin(2\pi t) dt$ ii) $\int_{-\alpha}^{\alpha} e^{-\alpha t^2} \delta(t-10) dt$
- 2 Find the complex Fourier series coefficients for the signal $x(t)=|\sin \pi t|$. And also draw the magnitude and phase spectra.

3 (a) If a function x(t) is a real and odd function show that $X(w) = -j2\int_{0}^{\infty} x(t)$ Sinwt dw. Also show that

X(w) is an imaginary and odd function of w.

(b) Find the Fourier transform of $f(t) = \frac{1}{T}e^{-\frac{t}{T}}u(t)$.

4 (a) Derive the relationship between rise time and bandwidth.

- (b) Sketch the frequency response of ideal LPF, HPF and BRF.
- 5 (a) State & prove sampling theorem.
 - (b) Find the Nyquist rate & Nyquist interval for the signal: $m(t) = \frac{1}{2\pi} Cos(4000\pi t) \bullet Cos(1000\pi t)$.
- 6 (a) Determine and plot the auto-correlation function of $e^{-a|t|}$.
 - (b) Prove that auto correlation function of f(t) is maximum at the origin.
- 7 (a) Find the inverse Laplace transform of $X(s) = \frac{2s^3 + 8s^2 + 11s + 3}{(s+2)(s+1)^3}$.
 - (b) State and prove time shifting and shifting in S-domain properties of Laplace transform. Plot the ROC for the both.
- 8 (a) State and prove the convolution theorem and time shifting properties of z-transform.
 - (b) Using the power series method find the first five samples of $X(z) = \frac{1}{(1 4z^{-1} + 6z^{-2})}$.

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