

Code: 9A04304

II B. Tech I Semester (R09) Supplementary Examinations, May 2012

SIGNALS & SYSTEMS

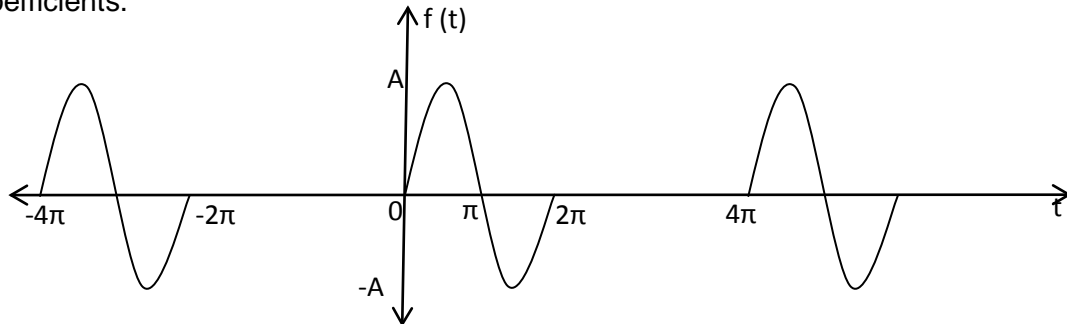
(Common to EIE, E.Con.E, ECE & ECC)

Time: 3 hours

Max Marks: 70

Answer any FIVE questions
All questions carry equal marks

- 1 (a) Define and discuss the conditions for orthogonality of functions.
(b) Prove that sinusoidal functions are orthogonal functions.
- 2 (a) Find the exponential Fourier series for the signal shown in figure by direct evaluation of the coefficients.



- (b) Derive the relation between Trigonometric and exponential Fourier series coefficients.
- 3 (a) Find the Fourier transform of $f(t) = \cos \pi t$; $-\frac{1}{2} \leq t \leq \frac{1}{2}$ and $f(t) = 0$; otherwise.
(b) Find the Fourier Transform of $(t-2)f(t)$ and $(1-t)f(1-t)$.
- 4 (a) The transfer function of a system is given by $H(\omega) = k$, where k is a constant. Sketch the magnitude and phase function of this transfer function. Evaluate the impulse response of this filter. Sketch this response and state whether the filter is physically realizable.
(b) Obtain the conditions for the distortion less transmission through a system. And also define signal bandwidth and system bandwidth.
- 5 (a) State and prove sampling theorem in frequency domain.
(b) What is aliasing? Explain its effect on sampling.
- 6 (a) Prove that the correlation and convolution functions are identical for even signals.
(b) Show that the auto-correlation function at the origin is equal to the energy of the function.
- 7 (a) For the signal given below, find the Fourier transform from the Laplace transform, if possible. If it is not possible give the reason: $X(s) = \frac{s+2}{(s+1)(s+5)}$.
(b) State and prove convolution and differentiation properties of Laplace transform.
- 8 (a) Discuss in detail, the relationship between Laplace transform, and z transform. What is the region of convergence for z transform?
(b) Find the z transform of $x[n] = a^n u[-n-1]$.
