Code No: 07A3EC12 **R07** **Set No. 2**

II B.Tech I Semester Examinations,MAY 2011
SIGNALS AND SYSTEMS
Common to BME, ETM, E.CONT.E, EIE, ECE

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

⋆ ⋆ ⋆ ⋆ ⋆

1. (a) State and Prove Properties of cross correlation function.
   (b) If $v(f) = AT\frac{\sin 2\pi fT}{2\pi fT}$ find the energy contained in V(t). [8+8]

2. (a) Obtain the Trigonometric Fourier series for the function f(t) as shown in figure 6a

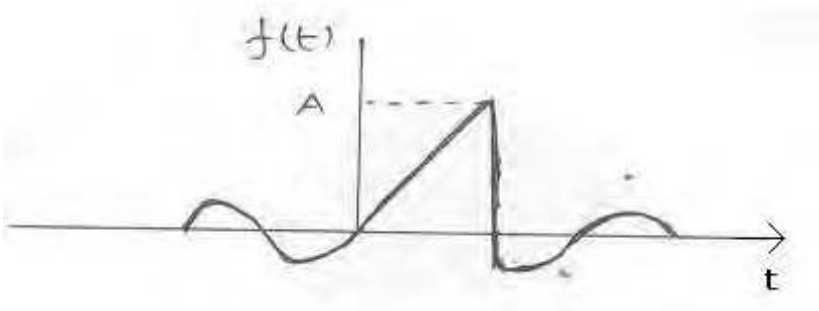

Figure 6a

   (b) Use the definition of the Fourier series to determine the time domain representation signals represented by the following Fourier series coefficients.
      i. $C_n = j\delta(n+1) - j\delta(n-1) + j\delta(n-3) + j\delta(n+1) and \omega_0 = 4\pi$
      ii. $C_n = \left(-\frac{1}{5}\right)^{|n|}$, $\omega_0 = 1$. [8+8]

3. (a) When is a function f(t) is said to be laplace transformable.
   (b) What do you mean by region of convergence?
   (c) List the advantages of Laplace transform.
   (d) If δ(t) is a unit impulse function find the laplace transform of d^2/dt^2 [δ(t)]. [4+4+4+4]

4. (a) Determine the Nyquist rate corresponding to each of the following signals.
      i. x(t) = 1 + cos 2000 πt + sin 4000 πt
      ii. x(t) = (sin 4000 πt)/ πt
   (b) The signal, Y(t) is generated by convolving a band limited signal X_1(t) with another band limited signal X_2(t) that is
   Y(t) = X_1 (t) * X_2 (t)
   Where,
   $X_1(j\omega) = 0 for\ |\omega| > 1000\pi$
   $X_2(j\omega) = 0 for\ |\omega| > 2000\pi$
   Impulse train sampling is performed on y(t) to obtain

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$$y_p(t) = \sum_{n=-\infty}^{\infty} y(nT)\,\delta(t-nT)$$

Specify the range of values for sampling period T which ensures that y(t) is recoverable from $Y_p(t)$. [8+8]

5. (a) Find the Z transform of t^2e^{-at}.
   (b) Find the final value and initial value of x(n) for $X(z) = \frac{z^2}{(z-1)(z-0.2)}$. [8+8]

6. (a) Find the Fourier Transform for the following functions shown in figure 1a.

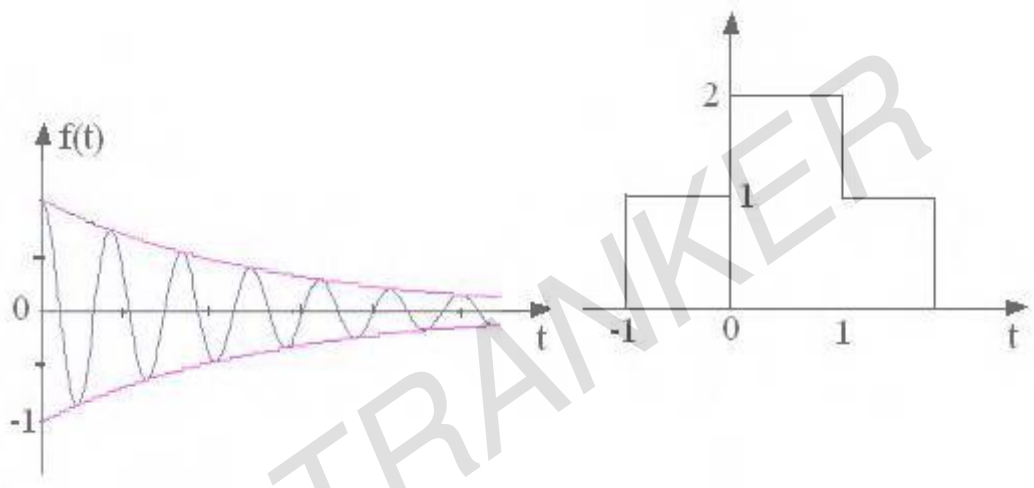

Figure 1a

   (b) Find the total area under the function g(t) = 100 Sin c ((t-8)/30). [10+6]

7. (a) Explain the Graphical Evaluation of a component of one function in other function.
   (b) Sketch the single sided and double sided spectra of the following signal: $x(t) = 4\,Sin\left(10\pi - \frac{\pi}{6}\right)$. [10+6]

8. (a) The transfer function of an ideal low pass filter is given by $H(j\omega) = KG_w(\omega)e^{-j\omega t_0}$
   Evaluate the unit step response of this filter.
   (b) Find the output voltage V(t) of a network shown in figure 7b. when the voltage applied to the terminals ab is given by t e^{-t} u(t)

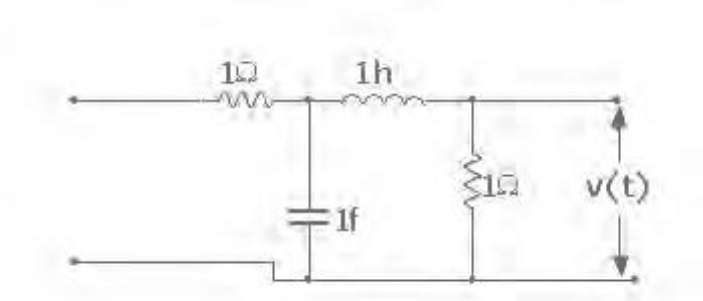

Figure 7b

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Code No: 07A3EC12 **R07** **Set No. 4**

II B.Tech I Semester Examinations,MAY 2011
SIGNALS AND SYSTEMS
Common to BME, ETM, E.CONT.E, EIE, ECE

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
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⋆ ⋆ ⋆ ⋆ ⋆

1. (a) State and Prove Properties of cross correlation function.
   (b) If $v(f) = \mathrm{AT}\frac{\sin 2\pi \mathrm{fT}}{2\pi \mathrm{fT}}$ find the energy contained in V(t). [8+8]
2. (a) When is a function f(t) is said to be laplace transformable.
   (b) What do you mean by region of convergence?
   (c) List the advantages of Laplace transform.
   (d) If δ(t) is a unit impulse function find the laplace transform of $\mathrm{d}^2/\mathrm{dt}^2$ [δ(t)]. [4+4+4+4]
3. (a) Explain the Graphical Evaluation of a component of one function in other function.
   (b) Sketch the single sided and double sided spectra of the following signal: $x(t) = 4\,Sin\,\left(10\pi - \frac{\pi}{6}\right)$. [10+6]
4. (a) Determine the Nyquist rate corresponding to each of the following signals.
      i. x(t) = 1 + cos 2000 πt + sin 4000 πt
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   (b) The signal, Y(t) is generated by convolving a band limited signal X_1(t) with another band limited signal X_2(t) that is
   Y(t) = X_1 (t) * X_2 (t)
   Where,
   $X_1(j\omega) = 0 for\,|\omega| > 1000\pi$
   $X_2(j\omega) = 0 for\,|\omega| > 2000\pi$
   Impulse train sampling is performed on y(t) to obtain
   $\mathrm{y_p}\,(t) = \sum_{n=-\infty}^{\infty} y(nT)\,\delta(t - nT)$
   Specify the range of values for sampling period T which ensures that y(t) is recoverable from Y_p(t). [8+8]
5. (a) Find the Z transform of t^2e^{-at}.
   (b) Find the final value and initial value of x(n) for $X(z) = \frac{z^2}{(z-1)(z-0.2)}$. [8+8]
6. (a) The transfer function of an ideal low pass filter is given by
   $\mathrm{H(j\omega) = KG_w(\omega)e^{-j\omega t_0}}$
   Evaluate the unit step response of this filter.

(b) Find the output voltage V(t) of a network shown in figure 7b. when the voltage applied to the terminals ab is given by t e^{-t} u(t)

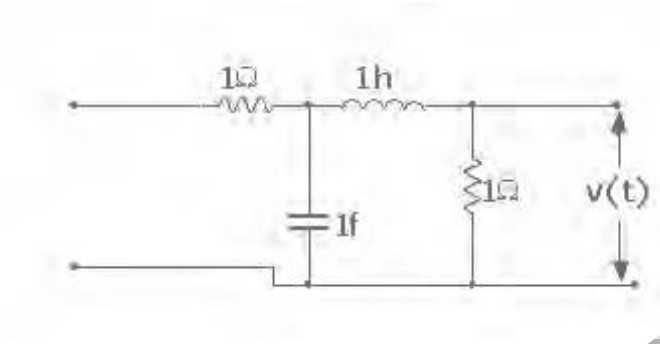

Figure 7b

7. (a) Find the Fourier Transform for the following functions shown in figure 1a.

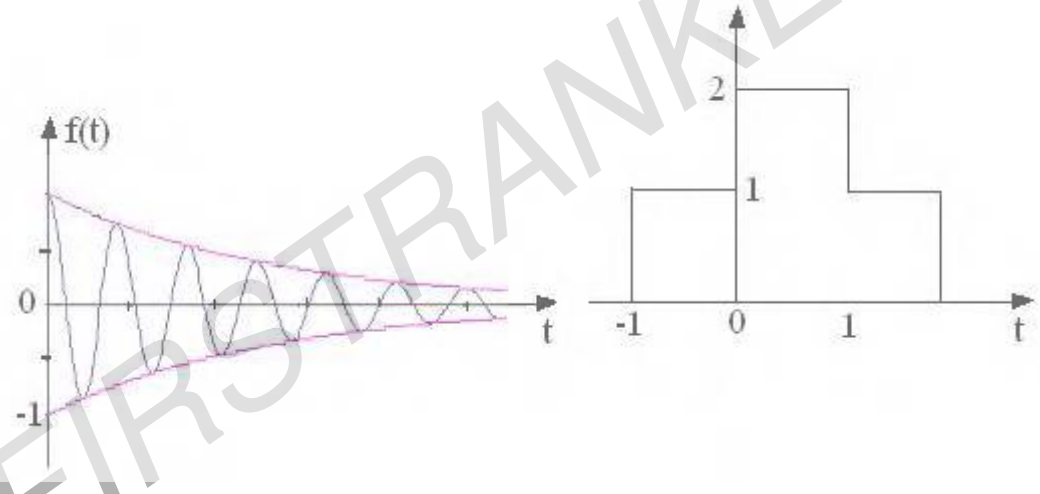

Figure 1a

(b) Find the total area under the function g(t) = 100 Sin c ((t-8)/30). [10+6]

8. (a) Obtain the Trigonometric Fourier series for the function f(t) as shown in figure 6a

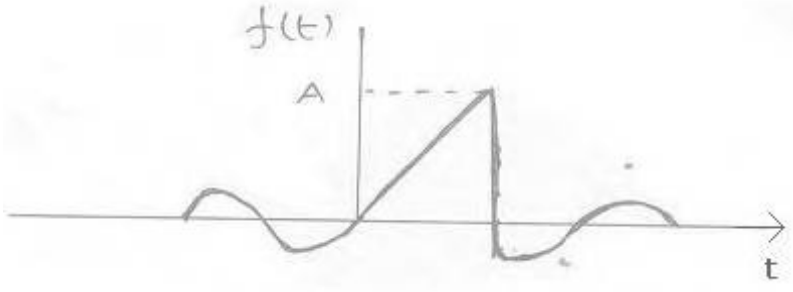

Figure 6a

(b) Use the definition of the Fourier series to determine the time domain representation signals represented by the following Fourier series coefficients.

i. $C_n = j\delta(n+1) - j\delta(n-1) + j\delta(n-3) + j\delta(n+1) and \omega_0 = 4\pi$

ii. $C_n = \left(-\frac{1}{5}\right)^{|n|}$, $\omega_0 = 1$. [8+8]

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Code No: 07A3EC12 **R07** **Set No. 1**

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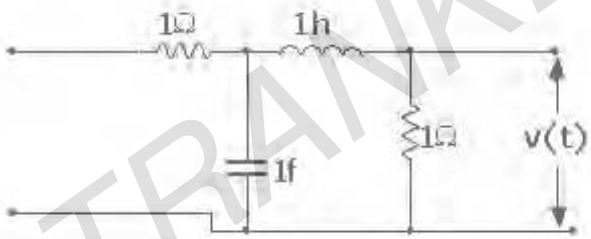

Figure 7b

2. (a) Find the Z transform of t^2e^{-at}.

   (b) Find the final value and initial value of x(n) for $X(z) = \frac{z^2}{(z-1)(z-0.2)}$. [8+8]

3. (a) Explain the Graphical Evaluation of a component of one function in other function.

   (b) Sketch the single sided and double sided spectra of the following signal: $x(t) = 4\,Sin\left(10\pi - \frac{\pi}{6}\right)$. [10+6]

4. (a) Obtain the Trigonometric Fourier series for the function f(t) as shown in figure 6a

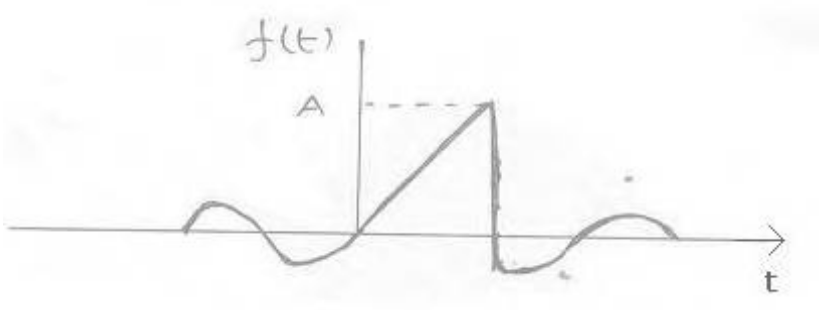

Figure 6a

   (b) Use the definition of the Fourier series to determine the time domain representation signals represented by the following Fourier series coefficients.

i. $C_n = j\delta(n+1) - j\delta(n-1) + j\delta(n-3) + j\delta(n+1) and \omega_0 = 4\pi$

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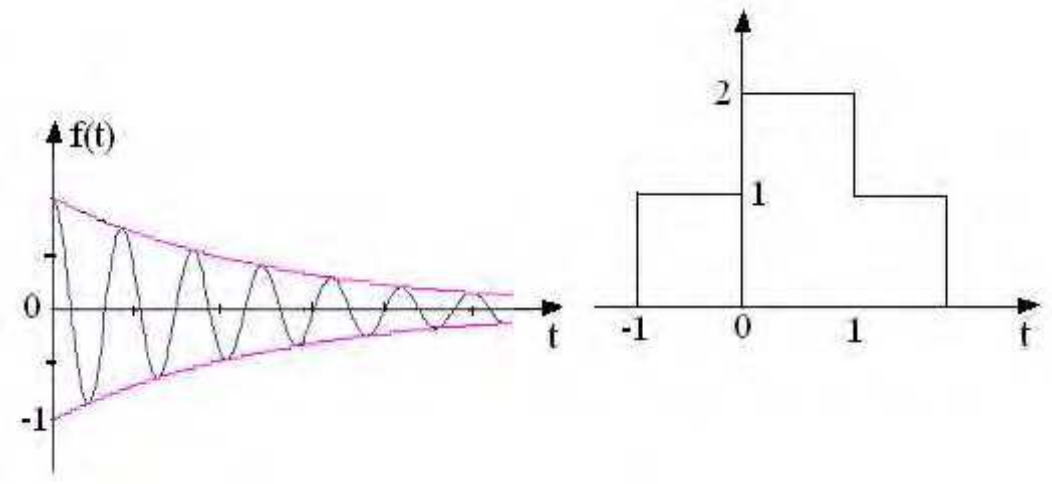

Figure 1a

(b) Find the total area under the function g(t) = 100 Sin c ((t-8)/30). [10+6]

6. (a) State and Prove Properties of cross correlation function.

(b) If $v(f) = AT\frac{\sin 2\pi fT}{2\pi fT}$ find the energy contained in V(t). [8+8]

7. (a) Determine the Nyquist rate corresponding to each of the following signals.

i. x(t) = 1 + cos 2000 πt + sin 4000 πt

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Specify the range of values for sampling period T which ensures that y(t) is recoverable from $Y_p(t)$. [8+8]

8. (a) When is a function f(t) is said to be laplace transformable.

(b) What do you mean by region of convergence?

(c) List the advantages of Laplace transform.

(d) If δ(t) is a unit impulse function find the laplace transform of d^2/dt^2 [δ(t)]. [4+4+4+4]

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Code No: 07A3EC12 **R07** **Set No. 3**

II B.Tech I Semester Examinations,MAY 2011
SIGNALS AND SYSTEMS
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Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
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1. (a) Find the Fourier Transform for the following functions shown in figure 1a.

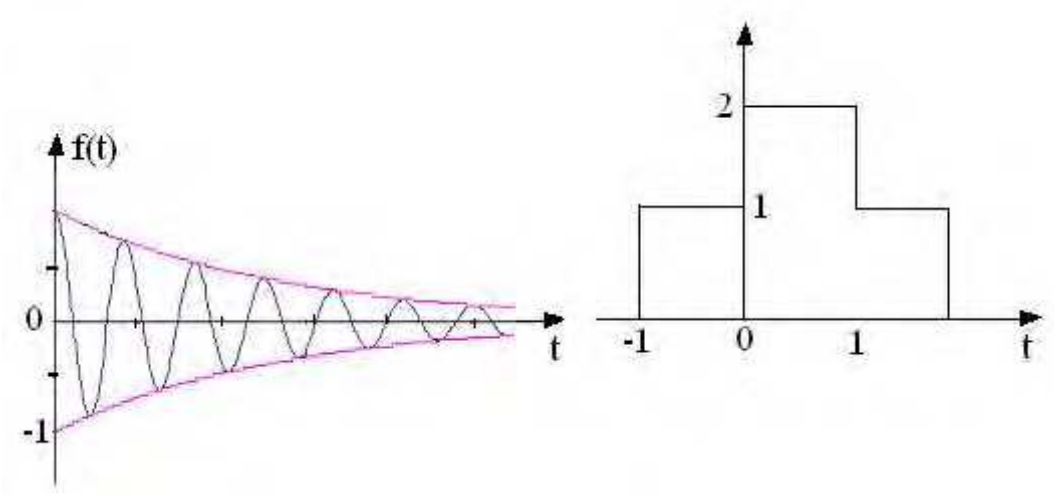

Figure 1a

(b) Find the total area under the function g(t) = 100 Sin c ((t-8)/30). [10+6]

2. (a) When is a function f(t) is said to be laplace transformable.
(b) What do you mean by region of convergence?
(c) List the advantages of Laplace transform.
(d) If $\delta(t)$ is a unit impulse function find the laplace transform of d^2/dt^2 $[\delta(t)]$. [4+4+4+4]

3. (a) Determine the Nyquist rate corresponding to each of the following signals.
   i. x(t) = 1 + cos 2000 πt + sin 4000 πt
   ii. x(t) = (sin 4000 πt)/ πt

   (b) The signal, Y(t) is generated by convolving a band limited signal $X_1(t)$ with another band limited signal $X_2(t)$ that is
   $Y(t) = X_1(t) * X_2(t)$
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   Impulse train sampling is performed on y(t) to obtain
   $$y_p(t) = \sum_{n=-\infty}^{\infty} y(nT)\,\delta(t - nT)$$
   Specify the range of values for sampling period T which ensures that y(t) is recoverable from $Y_p(t)$. [8+8]

4. (a) Find the Z transform of t^2e^{-at}.
   (b) Find the final value and initial value of x(n) for $X(z) = \frac{z^2}{(z-1)(z-0.2)}$. [8+8]

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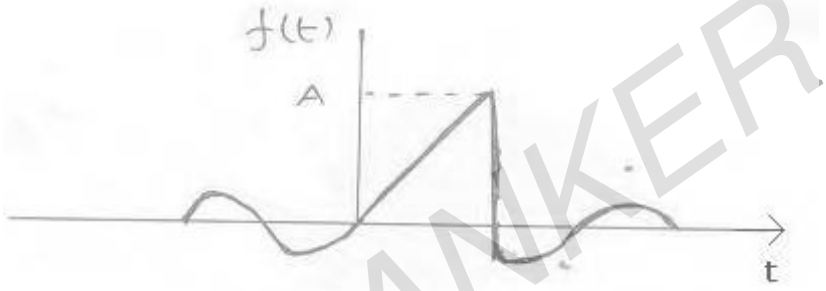

Figure 6a

   (b) Use the definition of the Fourier series to determine the time domain representation signals represented by the following Fourier series coefficients.
      i. $C_n = j\delta(n+1) - j\delta(n-1) + j\delta(n-3) + j\delta(n+1) and \omega_0 = 4\pi$
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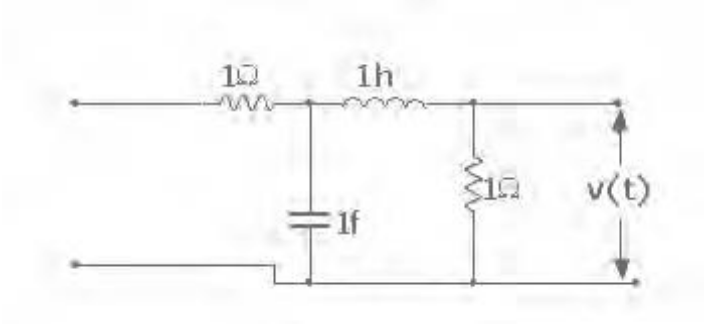

Figure 7b

8. (a) State and Prove Properties of cross correlation function.
   (b) If $v(f) = AT\frac{\sin 2\pi fT}{2\pi fT}$ find the energy contained in V(t). [8+8]

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