

S.E. - IV Sem. Biomed.

9/12/14

Signals & Systems.

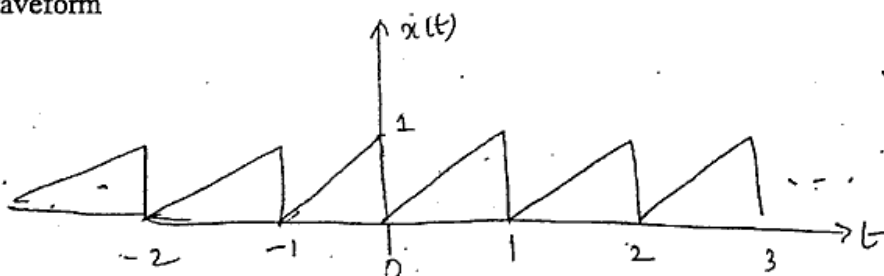
(19) QP Code : 12518

(3 Hours)

[Total Marks : 80]

- N.B.: (1) Answer any four questions.
 (2) Assume data if required, mention clearly.

1. (a) Sketch the signal $x(t) = [u(t) - u(t-4)] 6 r(t)$ 5
 (b) Check whether the following signal is linear or non-linear 5
 $y(t) = 4x(t) + 12.$
 (c) Differentiate between Time Variant and Time Invariant System with suitable example. 5
 (d) Compute the z-transform of the given signal 5
 $x(n) = a^n u(n) + b^n u(n)$
2. (a) Determine whether the following signals are periodic or not. If periodic, find its fundamental period. 5
 (i) $x(t) = \cos(t + \frac{\pi}{6})$ 5
 (ii) $x(n) = \sin(\frac{6\pi}{7}n + 1)$
 (b) Find the even and odd part of the signal 5
 (i) $x(t) = u(t) - u(t-3)$ 5
 (ii) $x(n) = \{1, 2, 3, 4, 5\}$
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3. (a) Perform convolution operation of the two signals given below 10
 $x(t) = e^{-4t} u(t), h(t) = u(t)$ muADDA.com
 (b) Show that the signal set 10
 $\{1, \cos w_0 t, \cos 2w_0 t, \dots, \cos n w_0 t, \sin w_0 t, \sin 2w_0 t, \dots, \sin m w_0 t\}$
 is orthogonal over an interval to $T_0 = \frac{2\pi}{w_0}$.
4. (a) Find the exponential Fourier Series and plot the phase spectrum for the Saw tooth 10 waveform 10



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- (b) Obtain the Fourier transform of the given signal
 $x(t) = e^{2t} u(-t)$
- (c) Determine the Laplace transform of the given signal
 $x(t) = 40 \cos \omega_0 t u(t)$

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5. (a) Check whether the given signal is Energy or power
 $x(t) = u(t)$
- (b) Perform Discrete time convolution of the given signals
 $x(n) = \{1, 3, 5, 7\}$, $h(n) = \{1, -1, 1\}$.
- (c) Prove the time shifting property of the Laplace transform.
- (d) Explain the concept of Region of Convergence in the z-transform.

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6. (a) Find the impulse response of the system if

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$$H(z) = \frac{1}{1 - \frac{1}{4}z^{-1} - 1 - 3z^{-1}}$$

if the system is (i) Causal (ii) Stable.

- (b) Show that if $x(t) \xrightarrow{L} X(s)$, then $x(at) \xrightarrow{L} \frac{1}{|a|} X\left(\frac{s}{a}\right)$.
- (c) Plot the single sided spectrum of the given signal
 $x(t) = 20 \cos(100\pi t + 20^\circ) + 6 \sin(50\pi t)$.
- (d) Find the difference equation from the given transfer function

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$$H(z) = \frac{1 + \frac{1}{4}z^{-1} - \frac{1}{8}z^{-2}}{1 - z^{-1} + \frac{1}{4}z^{-2}}$$