

Date! - 2/6/2012

Sem! - V<sup>th</sup>

Branch! - Bio-Med

Sub! - Signals & systems

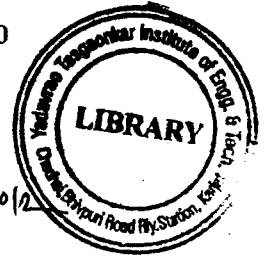
Con. 4574-12.

(3 Hours)

GN-8585

[ Total Marks:100

- NB: (1) Question no. 1 is compulsory.  
(2) Attempt any four questions of the remaining six.  
(3) Assume suitable data when ever necessary.



YTJET/LIB/ENGG/ BM/SEM-V/SS/15Jun.2012

Q1. Attempt any four :

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- (a) Explain time variant and time invariant signals with examples.  
(b) Determine whether the following signals are periodic or not  
 $X1(n) = \cos(6\pi n) + 6\cos(3\pi n/2)$   
 $X2(n) = \sin(12n)$   
(c) Compute the energy of  $x(t) = e^{-2t}u(t)$ .  
(d) Explain Fourier transform and z transform.  
(e) Plot the following signal with respect to time  
 $x(t) = (u(t) - u(t-2))4r(t)$ .

Q2. (a) Perform discrete convolution using graphical technique  
 $X(n) = \{1, 1, 1, 1\}$  and  $h(n) = \{-1, -2, 1, 0, 3, 2\}$ .

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(b) Perform continuous convolution of the given two signals  
 $e^{-4t}\{u(t) - u(t-3)\}$  and  $h(t) = e^{-t}u(t)$

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Q3. (a) Sketch the root locus for a unity feedback system.

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$$G(s) = \frac{K}{s(s+1)(s+5)}$$

(b) Examine the stability using routh criteria

$$s^5 + 6s^4 + 3s^3 + 2s^2 + s + 1 = 0$$

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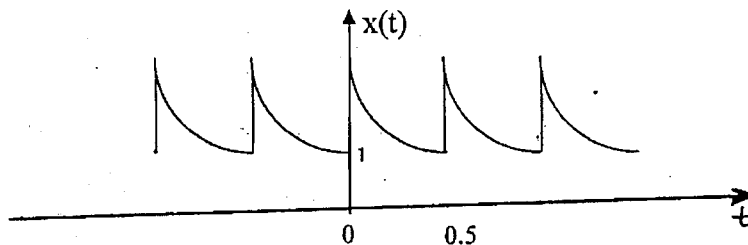
$$s^4 + 3s^3 + 7s^2 + 1 = 0$$

Q4. (a) Show that the set of exponentials is orthogonal over any interval  $T_0$   
 $\{1, e^{+j\omega t}, e^{+j2\omega t}, e^{+j3\omega t}, \dots\}$

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(b) Find the trigonometric Fourier series for the given periodic signal

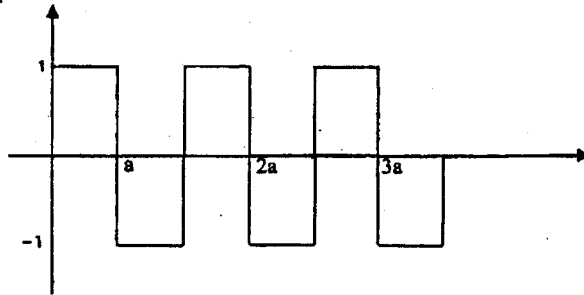
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[TURN OVER

Q5. (a) Prove the periodicity property and the time shifting property of the laplace transform. 10

(b) Using the above periodicity property obtain the laplace transform for the square wave 10



Q6. (a) Find the Z- transform of  $x(n) = a^n \sin(\omega_0 n) u(n)$ . 10

(b) Find the inverse Z transform of the following 10

$$X(z) = \frac{1 - 0.5Z^{-1}}{1 - 0.25Z^{-2}} \quad |Z| > 0.5$$

Q7. (a) Draw the bode plot and comment on stability 10

$$G(s)H(s) = \frac{10(s+3)}{s(s+0.5)(s+20)}$$

(b) Explain gain margin and phase margin in detail. 10

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