

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 1250

Roll No.

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B.Tech.

(SEM. III) ODD SEMESTER THEORY
EXAMINATION 2013-14

SIGNALS AND SYSTEMS*Time : 3 Hours**Total Marks : 100***Note :—Answer all the questions.****SECTION-A**1. Attempt all parts : **(10×2=20)**

(a) Determine the fundamental period of the signal :

$$x(t) = 3 \sin(7t + 2) - 4 \cos(4t + 1).$$

(b) Consider a discrete-time system with input $x[n]$ and output $y[n]$:

$$y[n] = x[n + 2] - x[n - 2].$$

Is this system Linear ?

(c) Determine the Z-Transform of $x[n] = a^{-n}u[-n]$.(d) Find Laplace Transform of $x(t) = \sum_{k=0}^{\infty} \delta(t - kT)$

(e) Prove the time scaling property of Fourier transform.

- (f) For the following frequency response of a causal and stable LTI System :

$$H(j\omega) = \frac{1 - j\omega}{1 + j\omega}$$

Show that $|H(j\omega)| = A$, and determine the value of A .

- (g) Consider a LTI System with step response $y(t) = e^{-t} u(t)$. Determine the output of this system to the input $x(t) = u(t-1) - u(t-3)$.

- (h) Find the Fourier transform of the Signal :

$$X(t) = e^{at} u(-t), a > 0.$$

- (i) $X(s) = \frac{s^2 + 5s + 7}{s^2 + 3s + 2}$, Determine the value of $x(\infty)$.

- (j) Sketch the given signal :

$$x(t) = r(t) u(3-t).$$

SECTION-B

2. Attempt any three parts : (3×10=30)

- (a) (i) Determine the impulse response of the Discrete Time System :

$$y(n) - 3y(n-1) + 2y(n-2) = x(n) + 3x(n-1) + 2x(n-2).$$

- (ii) Let $x(t) = u(t-3) - u(t-5)$ and $h(t) = e^{-3t} u(t)$.

$$\text{Compute } y(t) = x(t) * h(t).$$

- (b) Suppose that $x(t) = e^{-(t-2)} u(t-2)$ and $h(t)$ is shown in figure 3 :

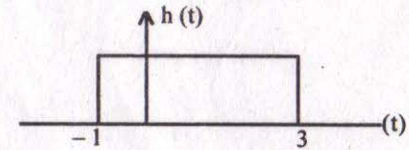


Figure 3

Verify the convolution property for this pair.

- (c) Obtain the Fourier series for the wave form shown in figure 4 :

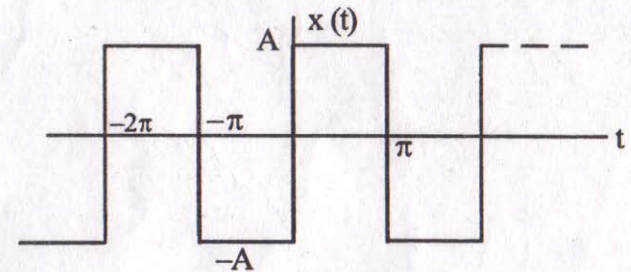


Figure 4