Exam.Code:0936
Sub. Code: 6720

2053

B.E. (Electrical and Electronics Engineering)

Sixth Semester

EE-612: Signals and Systems

Time allowed: 3 Hours Max. Marks: 50

NOTE: *Attempt five questions in all, including Question No. I which is compulsory and selecting two questions from each Unit.*

x-x-x

I. Attempt the following:-

a) What is Hilbert Transform? Write its mathematical expression.

b) Explain when the system said to be memory less with an example.

c) Relate the impulse signal, step signal, ramp signal.

d) State the conditions for the ROC of causal and stable system function H(z).

e) Check whether the given system is time invariant and linear.

$y(t) = x(t^2) + x(t)$ (5x2)

UNIT - I

II. a) Check whether the given system is linear or non-linear: $y(t) = \sin(x(t+2))$

b) Differentiate between even and odd signals.

c) State the Dirichlet's conditions for the Fourier transform to exist. (4,3,3)

III. a) Compute the Fourier transform of the signal, $x(t) = e^{-t}u(t)$.

b) State and prove the following properties of continuous time Fourier transform: Scaling, Convolution.

c) What is a Dirac delta function? Enlist its properties? (4,3,3)

IV. a) State and prove sampling theorem. What is the Nyquist sampling rate?

b) Find the constant a_0 of the Fourier series for function $f(x) = x$ in $0 \le x \le 2\pi$

c) Distinguish between discrete time signals and digital signals. (4,3,3)

UNIT - II

V. a) Find the DTFS coefficients of the following DT periodic signal and plot the magnitude and phase spectrum, $x(n) = \sum_{K=-\infty}^{\infty} = \delta(n-8k)$

Contd.....P/2

b) Determine the causal signal *x(n)* having the z-transform using partial fraction method

$$X(z)=\frac{1}{\left(1+z^{-1}\right)\left(1-z^{-1}\right)^2} \qquad (6,4)$$

VI. a) Find the time signal corresponding to the following Laplace transform:

$$X(s)=\frac{4s^2+8s+10}{(s+2)\left(s^2+2s+5\right)}$$

b) Given the z-transform pair $3^n u[n] \leftrightarrow X(z)$, use the z-transform property to determine the time domain signals corresponding to the following z-transform:

$$Y(z)=X(z)X(9z) \qquad (6,4)$$

VII. a) The Fourier series coefficient a_k/X_n of a periodic signal with fundamental period T are as follows

$$a_K \text{ or } X_n=\frac{2}{jk\pi}$$

Using the properties of Fourier series, find the Fourier series Coefficients for the following signals: x (2t - 1) and $e^{j2\omega_0 t}x(t)$

b) State and prove the duality property of DFT.

c) Enlist four properties of ROC of Laplace Transform. Discuss with suitable examples. (4,3,3)

x-x-x