2054
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. 1 which is compulsory and selecting two questions from each Unit.*

x-x-x

Q.1a) If H and G are both stable systems, show that the overall system is stable. (5×2)

b) Define the duality property of Fourier transform.

c) Distinguish between continuous-time and discrete –time signals.

d) Establish the relation between the Unit step and Unit impulse signals.

e) State the Dirichlet's condition for Fourier series.

UNIT - I

Q.2a) State and prove following properties of Fourier transform. (5)

(i) Convolution in time domain (ii) Differentiation in time domain (iii) Time shifting

b) When is a System said to be memory less? Give Example. Differentiate even and (5) odd signals.

Q.3a) Determine whether the following function is linear or not. (5)

(i) $y(t)=\sin[x(t)]$ (ii) $y(t) = \sin t. x(t)$

b) Explain how input and output signals are related to impulse response of a LTI (5) System.

Q.4a) Find the Fourier series coefficients for the following signal, $x(t)= 1+\cos(2\pi t)$ (5)

b) State and prove sampling theorem. Define Nyquist rate. (5)

UNIT - II

Q.5a) Find the Laplace transform of the periodic square wave of amplitude range (6)

(-A, A) and time period 2T. $F(s) = \frac{17s^3+7s^2+s+6}{s^5+3s^4+5s^3+4s^2+2s}$

b) What is the relationship between Z transform and Fourier transform? (4)

Q.6a) Find x[n] from X(z) below using partial fraction expansion, where x[n] is known (5) to be causal $X(z) = \frac{3+2z^{-1}}{2+3z^{-1}+z^{-2}}$

b) Find the z transform of the following signals using properties: (5)
x[n] = u[n] - u[n-4]

Q.7a) Compute the discrete-time Fourier transform of the following signal. (7)

x [n] = $(1/4)^n$ u[n+2]

b) What is Hilbert transform? Discuss its significance in electrical engineering. (3)

x-x-x