Total No. of Questions – [8]   Total No. of Printed Pages   2

(*) Instructions to candidates:
1) Answer Q.1, Q.2, Q.3, Q.4, Q.5 OR Q.6, Q.7 OR Q.8
2) Figures to the right indicate full marks.
3) Use of scientific calculator is allowed
4) Use suitable data where ever required

Q. 1	a)	Determine x(2-n) where DT signal x(n) is as given below. $x[n] = 3u[n+4] - u[n-2] - 2u[n-4]$	[6]
		OR	
	b)	Determine even and odd components of the signal	[6]
Q. 2	a)	Consider a CT system with input-output relationship given as $$y(t) = \int_{-\infty}^{t} x(\tau)\, d\tau$$ Determine whether the system is Static, linear, causal and stable	[6]
		OR	
	b)	Consider a CT system with input-output relationship given as $$y[n] = T\{x[n]\} = x^2[n]$$ Determine whether the system is Static, linear, causal and stable	[6]
Q. 3	a)	Determine the output of the LTI systems for input and impulse responses: $x(t) = rect (t/2)$ and $h(t) = \delta(t+1) + \delta(t) + \delta(t-1)$	[6]
		OR	
	b)	Perform convolution of the following signals by graphical	[6]

		method x(n) = { 1 2 3 2 1} h(n) = { 1 1 1}	
Q. 4	a)	Calculate CTFT of the exponential function given as $x(t) = e^{-at}u(t)$	[4]
		OR	
	b)	Find CTFT of the following signal using appropriate property. x(t)= u(t+2) – u(t-2)	[4]
Q. 5	a)	Determine Inverse Laplace Transform of the following $$H(s) = \frac{(s+4)(s+1)}{s^2(s+2)(s-2)}$$	[6]
	b)	Derive Time domain convolution property of Laplace transform.	[4]
	c)	Determine Laplace transform and ROC, of X(s) for $x(t) = e^{-2t}[\, u(t) + u(t-3)]$	[4]
		OR	
Q. 6	a)	Determine Laplace transform of the signal $x(t) =$ $e^{-at} \sin \omega t\, u(t)$.	[6]
	b)	State Properties of ROC of Laplace Transform	[4]
	c)	Derive Time scaling property of unilateral Laplace transform.	[4]
Q. 7	a)	For CT signal x(t) = $e^{-at}u(t)$, find (a) autocorrelation function (b)plot of autocorrelation (c) ESD and (d) plot of ESD.	[6]
	b)	Find and verify the energy of the signal using autocorrelation x(n) = {-2, 3, 1, -1}	[4]
	c)	State and explain properties of PSD.	[4]
		OR	
Q. 8	a)	Obtain the cross correlation of following two sequences, x₁[n]= {2,3,4} and x₂[n]= {1,2,3}	[6]
	b)	State and prove its any two properties of autocorrelation for energy signal.	[4]
	c)	Find ESD of the function x(t) = 2 rect($\frac{t}{4}$)	[4]