

**Total No of Questions: [06]****SEAT NO. :****[Total No. of Pages : 2]****S.E. (E & TC )****(Signal & System) (204181) 2012 Pattern****(Semester - III)****Time: 2 Hours****Max. Marks : 50****Instructions to the candidates:**

- 1) Answer Q1 or 2, 3 or 4 and 5 or 6.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right side indicate full marks.
- 4) Use of Calculator is allowed.
- 5) Assume Suitable data if necessary
- 6)

Q.1)	a)	A discrete time signal is given below. Check for following system properties : 1. Static/Dynamic    2. Linearity    3. Causality    4. Stability $y(n) = 8 \cos x(n)$	[6]
	b)	State and prove the convolution Integral property. With suitable block diagram & mathematical equation.	[3]
	c)	Find Y(n) discrete time signal convolution Integral. $X(n) = (u(n) - u(n - 4))$ and $h(n) = \{1,1,1,1\}$	[3]

**OR**

Q.2)	a)	Find given signal is whether energy signal or power signal. Find its Value $x(t) = \text{rect}(t)$ ; for $t = -1$ to $t = +1$	[3]
	b)	Find the convolution of following signal. Plot Y(t) <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;"> <p>x(t)</p> </div> <div style="text-align: center;"> <p>h(t)</p> </div> </div>	[6]
	c)	Find Even and Odd Components for given signal. $x(t) = 1 + 3t + 4 \sin(t) + 6 \cos(3t)$	[3]

Q.3)	a)	State and Prove the following property of Laplace Transform. i) Periodic Signal Property.    i) Time Scaling Property	[6]
	b)	Find the Quadrature Fourier series for the full wave rectifier output signal. With amplitude 'A' and period 0 to $\pi$ .	[6]
		OR	
Q.4)	a)	Find the Initial Value and Final Value of the signal $x(t)$ its Laplace Transform $X(S) = \frac{2S + 3}{S^2 + 5S - 7}$	[6]
	b)	Show that Rectangular function in time domain to become Sinc function in Frequency Domain.	[6]
Q.5)	a)	Determine the Auto Correlation Function Energy Spectral density of $x(t) = \cos \pi t [u(t+2)] - u[t-2]$ And sketch the Auto-correlation.	[10]
	b)	State the properties of Energy Spectral Density, Power Spectral Density, Autocorrelation and Cross Correlation.	[8]
	c)	Explain the properties of Probability, CDF and PDF.	[8]
OR			
Q.6)	a)	The Probability density function of a random Variable 'x' is defined as $f_x(x) = \begin{cases} Ke^{-4x} & x > 0 \\ 0 & x \leq 0 \end{cases}$ Find    i) Constant    ii) $P(1 < x < 2)$ iii) $P(x \geq 3)$ iv) $P(x < 1)$	[10]
	b)	Draw and explain the following probability distribution model. i) Gaussian distribution Model.    ii) Uniform Distribution Function.	[8]
	c)	Find Cross- Correlation of following discrete time signal. $x(n) = \{1, 2, 3, 4\}$ and $y(n) = \{3, 2, 1, 0\}$	[8]