

## Department of ECE

## Assignment –I

## Part - A

## PART-A

1. State and prove convolution property of z transform?
2. What are energy and power signals?
3. Differentiate: Linear and Nonlinear system.
4. Differentiate time variant from time invariant system.
5. State the necessary and sufficient condition for stability of LTI systems
6. Determine whether the following signal is periodic. If periodic, then compute their fundamental period  $x(n) = \cos(0.01\pi n)$
7. State sampling theorem
8. A discrete time signal  $x(n) = \{0, 0, 1, 1, 2, 0, 0, \dots\}$ . Sketch the  $x(n)$  and  $x(-n+2)$  signals

## PART-B

1. Check whether the systems described by the following equations are Linear, Shift invariant, Causal and Stable.  
(i)  $y(n) = x(n) \cos \omega n$  (ii)  $y(n) = x(n)$  (iii)  $y(n) = \text{sgn}(x(n))$
2. Compute the linear convolution of the following sequences  $x(n) = \{0, 2, 2, 3\}$  and  $h(n) = \sin(3\pi n/8)$  with  $n = (0-4)$  using all possible methods
3. a) What is Nyquist rate? Explain its significance while sampling the analog signal. **1b -24**  
b) Determine the Z transform and ROC of  $x(t) = \cos \omega t u(t)$
4. i) Determine the Z Transform and ROC of the signal

$$x(n) = 7 \left(\frac{1}{3}\right)^n u(n) - 6 \left(\frac{1}{2}\right)^n u(n)$$

ii) Determine  $x(n)$  of

$$X(z) = \frac{1 + 2z^{-1}}{1 - 2z^{-1} + z^{-2}} \quad \mathbf{1b -16}$$

using long division and partial fraction method with the following conditions.

- a)  $|Z| > 1$       b)  $|Z| < 1$