

# SRM Institute of Science and Technology

Tiruchirappalli Campus, Trichy – 621 105

## Faculty of Engineering and Technology

### DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

#### 21ECC204T – SIGNAL PROCESSING

#### ASSIGNMENT – 01

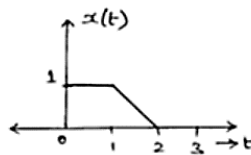
1. Draw the following signals

- $U(t-5)$
- $r(t+3)$
- $U(-t-1)$
- $x(t) = r(t) - (t-2)$
- $x(t) = -2u(t-1)$
- $x(t) = u(t+1) - u(t-1) + 2u(t)$
- $x(t) = -2r(t)$
- $-2 + 2u[n]$

2. Graphically represent the following Discrete Time Sequences.

- $x(-1) = 1, x(0) = 2, x(1) = 2, x(2) = 0.5,$   
 $x(3) = -1, x(4) = 1.5$
- $x(n) = u(n) \cdot u(-n+2)$

3. The signal  $x(t)$  is shown in the following figure. Find  $y(t) = x(2t+5)$ .



5. Determine the fundamental period for the following signals.

- $x[n] = \cos\left(\frac{\pi}{4}\right)n + \sin\left(\frac{\pi}{8}\right)n$
- $x[n] = \cos\left(\frac{\pi n}{4}\right) \cdot \sin\left(\frac{\pi n}{8}\right)$

6. Determine whether the signal is Periodic signal or Aperiodic Signal,  $x(t) = 4e^{j\left(2t + \frac{\pi}{4}\right)} + 6e^{j\left(4t + \frac{\pi}{8}\right)}$

7. Determine whether the signal is Periodic signal or Aperiodic Signal

$$x(n) = \cos\left(\frac{\pi n}{2}\right) + \sin\left(\frac{\pi n}{2}\right) - 2\cos\left(\frac{\pi n}{4}\right) + (2)$$

8. Determine whether the following systems is Linear or Non-Linear, (a)  $\frac{d}{dt}y(t) + t \cdot y(t) = 2 \cdot x(t)$ ,

(b)  $y(n) = \sum_{k=0}^n 5 \cdot x[k]$       (c)  $\frac{d}{dt}y(t) + 20y(t) = x(t)$

(d)  $y(t) = 4 \cdot x(t) + 1$       (e)  $y(t) = x(t+2) + x^2(t)$

9. Check whether the following system is a Time Variant System or Time Invariant System,

(a)  $y[n] = \sum_{k=0}^n x[k]$ .

(b)  $y[n] = (x[n])^2$

(c)  $y[n] = n \cdot x[n]$

10. Check whether the following system is a Stable System or an Unstable System,

(a)  $h(t) = \frac{1}{RC} e^{-t/RC} \cdot u(t)$ .

(b)  $h(t) = 2 \cdot u(t) + e^{-3t} u(t)$

(c)  $h(t) = (t+2)u(t)$

(d)  $h(t) = u(t) + e^{2t} u(t)$

11. Determine whether (or) not the system is Causal.

(a)  $y(t) = 2 \cdot x(t) \cdot \sin(t+6)$

(b)  $y(t) = \frac{3}{2} x(-t)$

12. Check whether the following signal is Energy signal or Power Signal

(a)  $x(t) = e^{j\left(t+\frac{\pi}{2}\right)}$

(b)  $x(n) = \sin\left(\frac{\pi}{2}n\right)$

13. Calculate the energy and power of the signal  $x(t) = \begin{cases} 5 & -2 \leq t \leq 2 \\ 0 & elsewhere \end{cases}$