# 1. Generation of Signals

Aim: To generate and plot various types of signals.

1. Delta Function

```
clc;
n=0:10;
n0=2;
x=[(n-n0)==0];
subplot(2,2,1);
stem(n,x); grid on
title('delayed impulse');
```

2. Step Function

```
clf;
n=0:10;
n0=2;
x=[(n-n0)>=0];
stem(n,x); grid on
title('delayed step');
```

3. Exponential Function

```
clf;
n=0:0.1:10;
x=(0.3).^n;
stem(n,x); grid on
title('0.3^n');
```

4. Sinusoidal sequence ; x(n) = 3cos(0.1πn + π/3) + 2 sin(0.5πn)

```
clf;
n=0:10;
x = 3*cos(0.1*pi*n+pi/3) + 2*sin(0.5*pi*n);
stem(n,x); grid on
title('Sinusoidal sequence');
```

5. Functions

Generates x(n) = delta(n-n0); n1<=n<=n2

```
function [x,n] = impseq(n0,n1,n2)
n = [n1:n2]; x = [(n-n0) == 0];
```

Generates x(n) = u(n-n0); n1<=n<=n2

```
function [x,n] = stepseq(n0,n1,n2)
n = [n1:n2]; x = [(n-n0) >= 0];
```

6. $x(n) = 2\delta(n+2) - \delta(n-4), \quad -5 \le n \le 5$

```
clf;
n = [-5:5];
x = 2*impseq(-2,-5,5) - impseq(4,-5,5);
stem(n,x); title('Given sequence')
xlabel('n'); ylabel('x(n)');
```

7. $x(n) = n[u(n) - u(n-10)] + 10e^{-0.3(n-10)}\,[u(n-10) - u\,(n-20)], \quad 0 \le n \le 20$

```
n = [0:20];
x1 = n.*(stepseq(0,0,20)-stepseq(10,0,20));
x2 = 10*exp(-0.3*(n-10)).*(stepseq(10,0,20)-stepseq(20,0,20));
x = x1+x2;
stem(n,x); title('Sequence')
xlabel('n'); ylabel('x(n)');
```

EXERCISE

1. Generate and plot
   x(n) = {..., 5, 4, 3, 2, 1, 5, 4, 3, 2, 1, 5, 4, 3, 2, 1, ...} ; $-10 \le n \le 9$.

2. Generate $x(n) = e^{(-0.1+j0.3)n}, -10 \le n \le 10$ , plots its real part, and the imaginary part.

3. Let x(n) = u(n) − u(n − 5). Plot its even and odd components.

**********