EXPERIMENT NO. 1

OBJECTIVES:

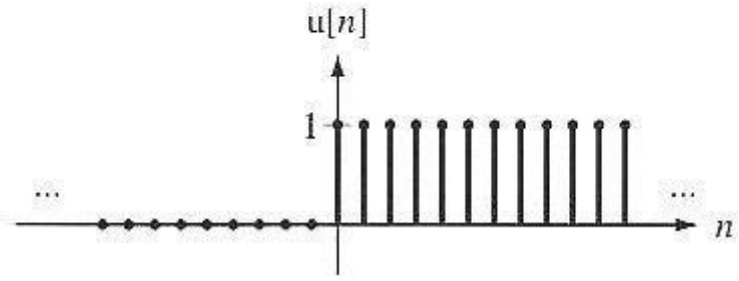
- To generate signals like impulse, unit step, unit ramp and sine using MATLAB

APPARATUS: MATLAB SOFTWARE

THEORY: MATLAB (Matrix Laboratory) is a technical programming language and numerical computing environment developed by Mathworks. Different test signals like impulse, unit step, ramp and sine etc. can be generated using it which are explained as follows:

1. **Unit Step signal:** A signal with magnitude one for time greater than or equal to zero. Its magnitude is zero when time is less than zero. It is integral of unit impulse signal.

$$u[n] = \begin{cases} 1, & n \geq 0 \\ 0, & n < 0 \end{cases}$$



-Fig.1 Unit Step signal

2. **Ramp signal:** A signal whose magnitude increases same as the time when time is greater than zero. It is integral of unit step signal.

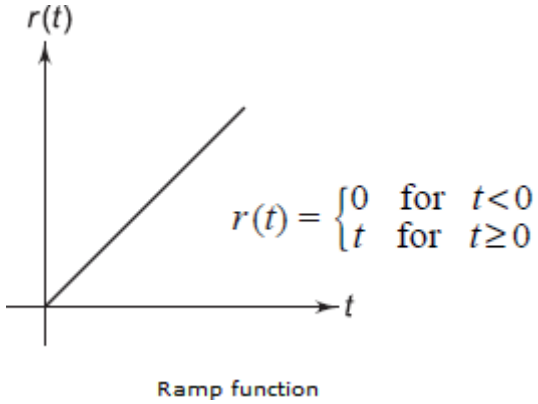


Fig.2 Ramp Signal

3. **Impulse signal:** A signal which has unity magnitude at time equal to zero only. Its magnitude is zero at all other values of time. It is also called delta function.

$$\delta[n] = \begin{cases} 1\ , n = 0 \\ 0\ , n \neq 0 \end{cases}$$

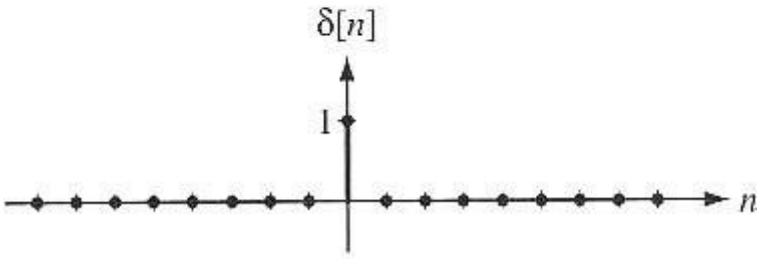


Fig.3 Unit Impulse signal

4. Sine signal

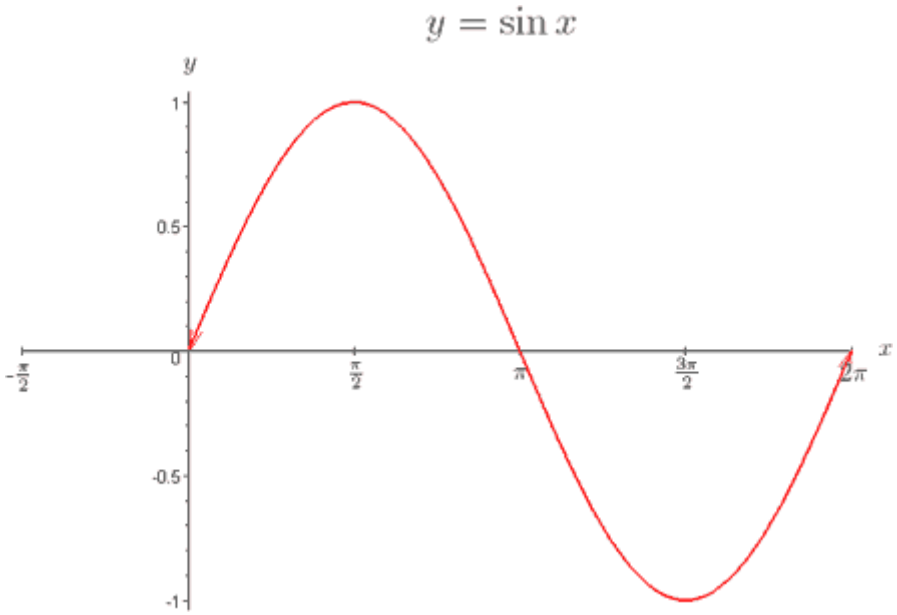


Fig.4 Sine wave

PROGRAMS:

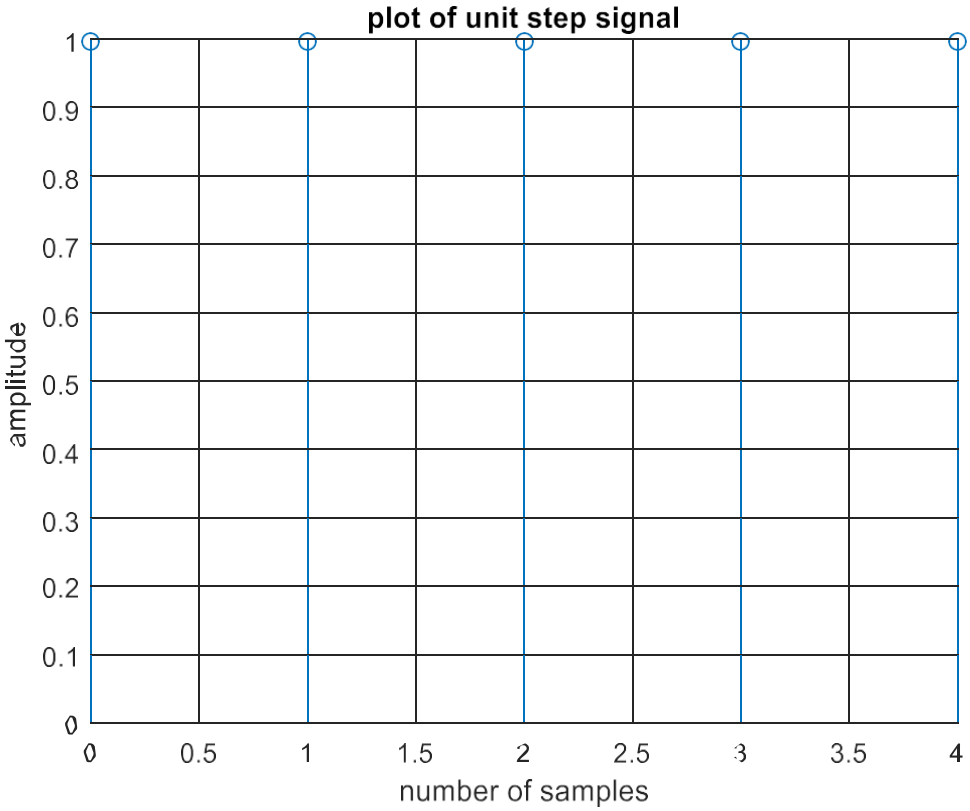
1. Unit step:

```
n = input("enter the  value")
t = 0 : n-1
y = ones(1,n)
stem(t,y)
title("plot of unit step signal")
xlabel("number of samples")
ylabel("amplitude")
grid on
```

OUTPUT:

enter the value5

n = 5
t = 0 1 2 3 4
y = 1 1 1 1 1

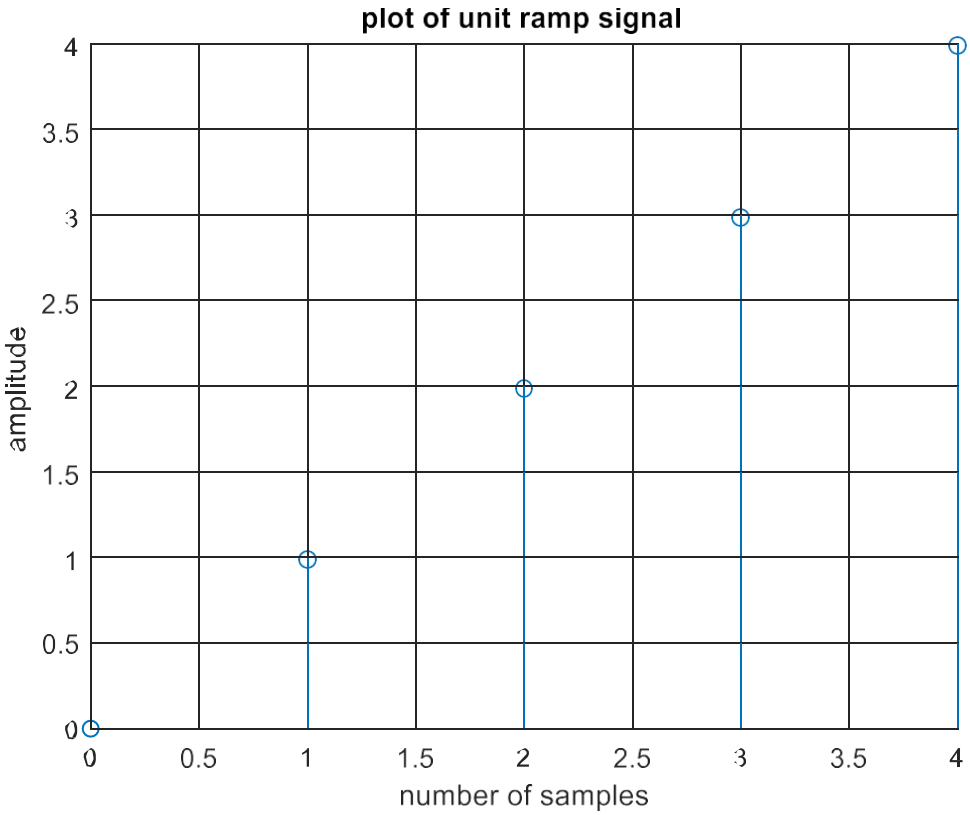


2. Ramp signal

```
n = input("enter the  value")
t = 0 : n-1
stem(t,t)
title("plot of  ramp signal")
xlabel("number of samples")
ylabel("amplitude")
grid on
```

OUTPUT:

enter the value5
n = 5
t = 0 1 2 3 4

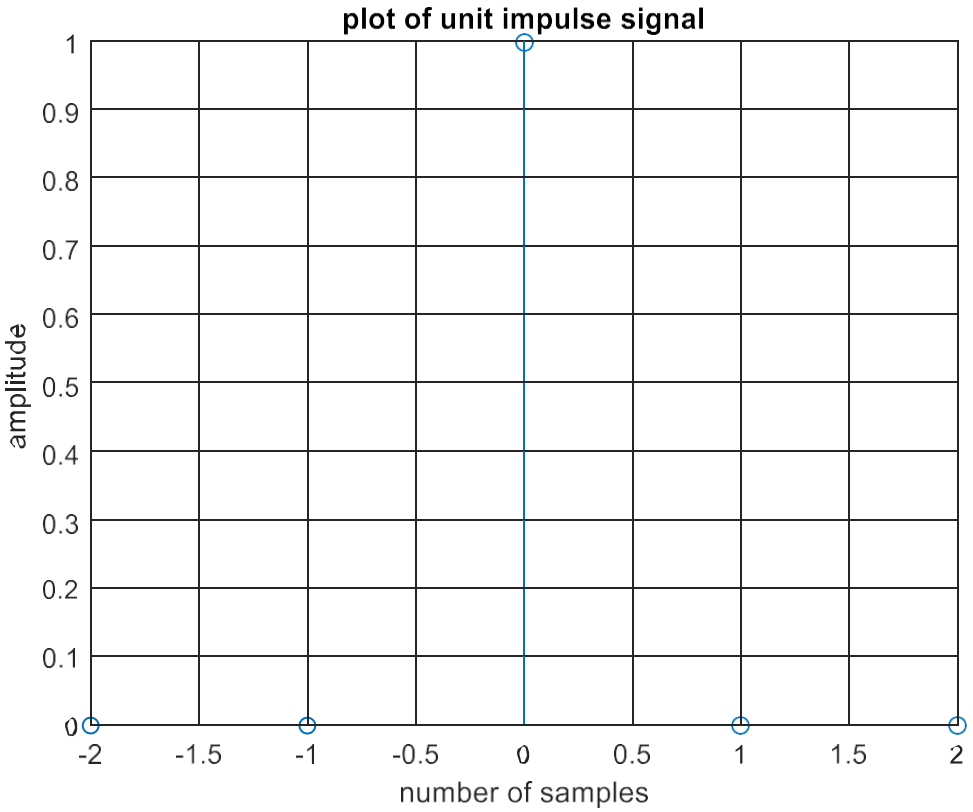


3. Impulse signal

```
t = -2 : 2
y = [zeros(1,2),ones(1,1),zeros(1,2)]
stem(t,y)
title("plot of impulse signal")
xlabel("number of samples")
ylabel("amplitude")
grid on
```

OUTPUT:

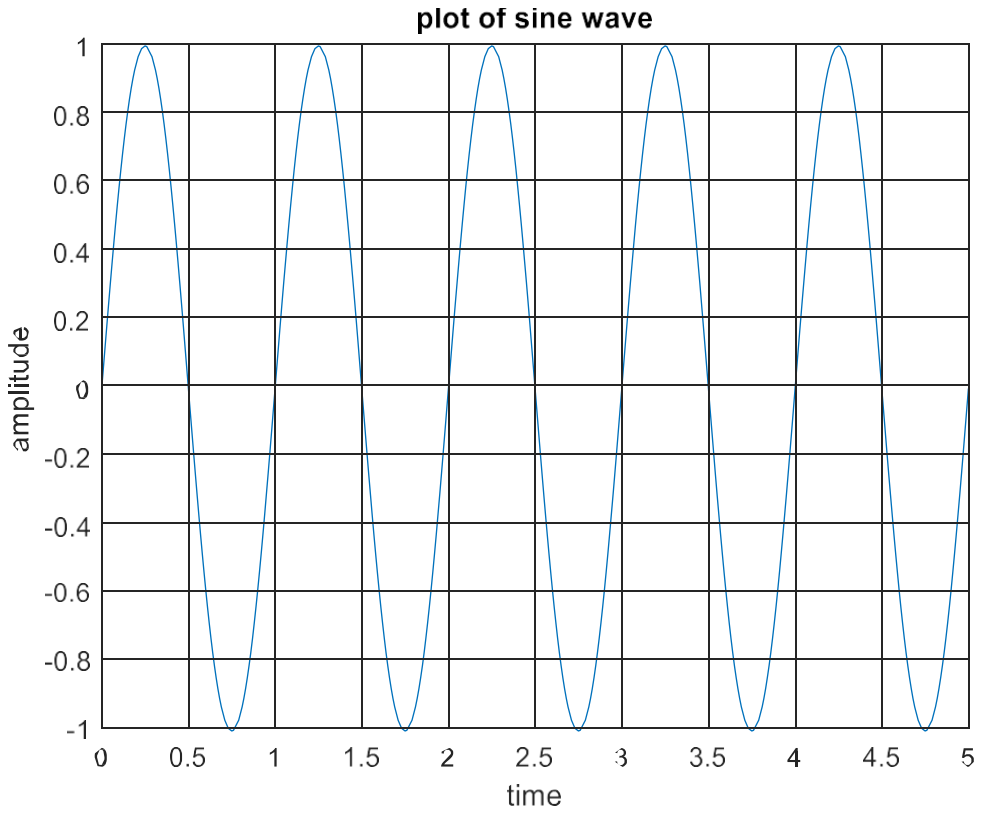
t = -2 -1 0 1 2
y = 0 0 1 0 0



4. Sine wave

```
t = 0 : 0.01 : 5
y = sin(2*pi*t)
plot(t,y)
title("plot of sine wave")
xlabel("time")
ylabel("amplitude")
grid on
```

OUTPUT:



CONCLUSION: After performing this experiment different signals can be generated using MATLAB.

POST LAB QUESTIONS:

1. Classify and describe the following signals. Even & odd, periodic & non periodic, energy & power, deterministic & non deterministic, signum, sinc, rectangular etc.

2. Write the MATLAB program to generate the following signals. Exponential, signum, rectangular etc.