Experiment No: 1 Date: 05/08/2024

Generation of elementary signals

Aim

To generate the elementary signals:

1. Impulse function
2. Unit step function
3. Ramp signal
4. Parabola signal
5. Exponential signal
6. Sinusoidal signal
7. Cosine signal
8. Square signal
9. Triangular signal

Theory

1. Impulse function: A rectangular pulse of unit area, the Dirac delta function is also known as the unit impulse.
2. Unit step function: It represents a signal that suddenly changes from zero to one and remains constant afterwards.
3. Ramp signal: A ramp signal is a type of standard signal that starts at $t = 0$ and increases linearly with time.
4. Parabola signal: A parabolic signal is a signal that gives the constant acceleration distinction .
5. Exponential signal: An exponential signal is defined as :-When $\alpha > 0$, the exponential signal is a growing exponential signal ,When $\alpha < 0$, the signal is a decaying exponential signal
6. Sinusoidal signal: A sinusoidal signal is a smooth periodic signal that is expressed in terms of sine trigonometric functions
7. Cosine signal: cosine waves are identical signal waveforms where cosine wave leads the sine wave by an amount of 90 degrees.
8. Square signal: A square wave is a periodic waveform in which the amplitude alternates at a steady frequency between fixed minimum and maximum values, with the same duration.
9. Triangular signal: Triangular signals are non-sinusoidal waveforms with a triangular shape.

Program

1. To plot the Unit Impulse function

```
clc;
clf;
n1=input ('Enter the starting pt=');
n2=input ('Enter the ending pt=');
sample_point=-n1:1:n2
amplitude=[zeros(1,n1) 1 zeros(1,n2)];
stem(sample_point,amplitude)
grid on;
xlabel('Sample');
ylabel('Amplitude');
title('Unit impulse function');
```

2. To plot Unit Step function

```
clc;
clf;
n1=input ('Enter the starting pt=');
n2=input ('Enter the ending pt=');
sample_point=-n1:1:n2
amplitude=[zeros(1,n1) ones(1,n2+1)];
plot(sample_point,amplitude)
grid on;
xlabel('Sample');
ylabel('Amplitude');
title('Unit step function');
```

3. To plot the Ramp signal

```
clc;
clf;
n1=input ('Enter the starting pt=');
n2=input ('Enter the ending pt=');
s_p=-n1:1:n2
amp_1=zeros(1,n1+1);
for(i=1:n2)
    amp_2(i)=i;
end
amplitude=[amp_1,amp_2];
subplot(121);
plot(s_p,amplitude)
grid on;
xlabel('Sample');
ylabel('Amplitude');
title('Continuous');
subplot(122);
stem(s_p,amplitude)
grid on;
xlabel('Sample');
ylabel('Amplitude');
title('Discrete');
```

4. To plot the Parabolic signal

```
clc;
clf;
n1=input ('Enter the starting pt=');
n2=input ('Enter the ending pt=');
s_p=-n1:1:n2
amp_1=zeros(1,n1+1);
for(i=1:n2)
    amp_2(i)=(i^2)/2;
end
amplitude=[amp_1,amp_2];
subplot(121);
plot(s_p,amplitude)
grid on;
xlabel('Sample');
ylabel('Amplitude');
title('Continuous');
subplot(122);
stem(s_p,amplitude)
grid on;
xlabel('Sample');
ylabel('Amplitude');
title('Discrete');
```

5. To plot the Exponential signal

```
clc;
clf;
Am=input('Enter the amp =');
n=input('enter the no=');
dec=input('enter the dec factor=');
s_p=0:1:n-1
amplitude=Am*exp(-dec*s_p)
subplot(121);
plot(s_p,amplitude)
grid on;
xlabel('Sample');
ylabel('Amplitude');
title('Continuous');
subplot(122);
stem(s_p,amplitude)
grid on;
xlabel('Sample');
ylabel('Amplitude');
title('Discrete');
```

6. To plot the sinusoidal signal

```
clc;
clf;
Am=input('Enter the amp =');
Fm=input('enter the freq=');
Cy=input('enter the no of cycles=');
t=0:(1/(50*Fm)):Cy/Fm;
amplitude=Am*sin(2*pi*Fm*t);
subplot(121);
plot(t,amplitude)
grid on;
xlabel('Time');
ylabel('Amplitude');
title('Continuous');
subplot(122);
stem(t,amplitude)
grid on;
xlabel('Time');
ylabel('Amplitude');
title('Discrete');
```

7. To plot the cosine signal

```
clc;
clf;
Am=input('Enter the amp =');
Fm=input('enter the freq=');
Cy=input('enter the no of cycles=');
t=0:(1/(50*Fm)):Cy/Fm;
amplitude=Am*cos(2*pi*Fm*t);
subplot(121);
plot(t,amplitude)
grid on;
xlabel('Time');
ylabel('Amplitude');
title('Continuous');
subplot(122);
stem(t,amplitude)
grid on;
xlabel('Time');
ylabel('Amplitude');
title('Discrete');
```

8. To plot square signal

```
clc;
clf;
Am=input('Enter the amp =');
Fm=input('enter the freq=');
Cy=input('enter the no of cycles=');
t=0:(1/(50*Fm)):Cy/Fm;
amplitude=Am*square(2*pi*Fm*t);
subplot(121);
plot(t,amplitude)
grid on;
xlabel('Time');
ylabel('Amplitude');
title('Continuous');
subplot(122);
stem(t,amplitude)
grid on;
xlabel('Time');
ylabel('Amplitude');
title('Discrete');
```

9. To plot the triangular signal

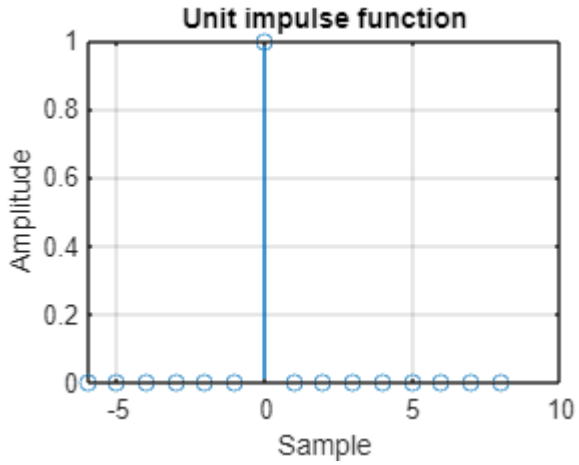
```
clc;
clf;
Am=input('Enter the amp =');
Fm=input('enter the freq=');
Cy=input('enter the no of cycles=');
t=0:(1/(50*Fm)):Cy/Fm;
amplitude=Am*sawtooth(2*pi*Fm*t);
subplot(121);
plot(t,amplitude)
grid on;
xlabel('Time');
ylabel('Amplitude');
title('Continuous');
subplot(122);
stem(t,amplitude)
grid on;
xlabel('Time');
ylabel('Amplitude');
title('Discrete');
```

Result

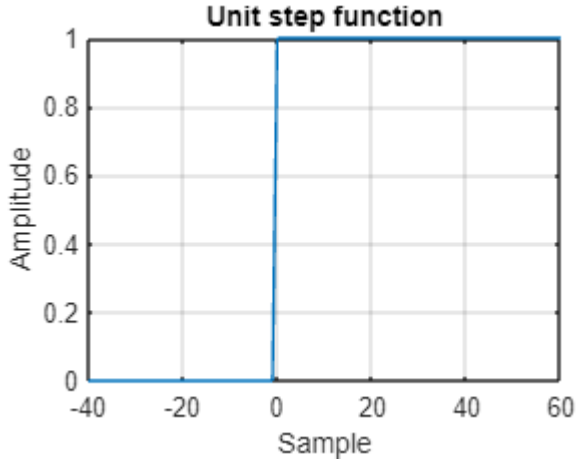
Implemented and generated the Elementary signals.

Observation

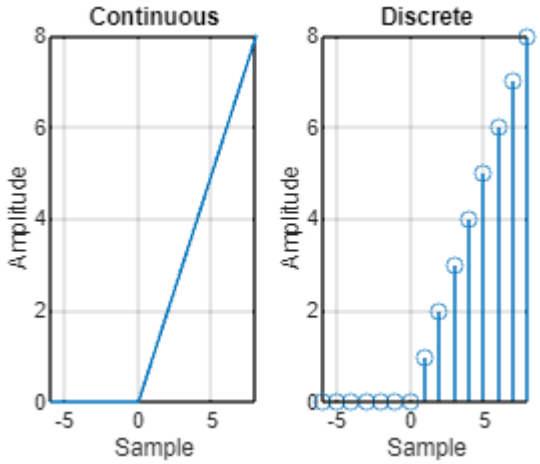
1. **INPUT=** n1=6, n2=8
   OUTPUT=



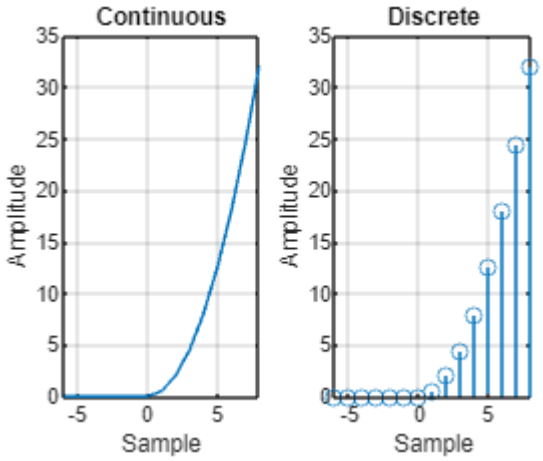
2. **INPUT=** n1=6, n2=8
   OUTPUT=



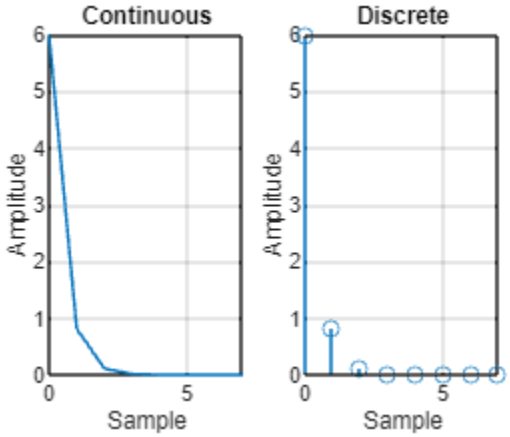
3. **INPUT=** n1=6, n2=8
   OUTPUT=



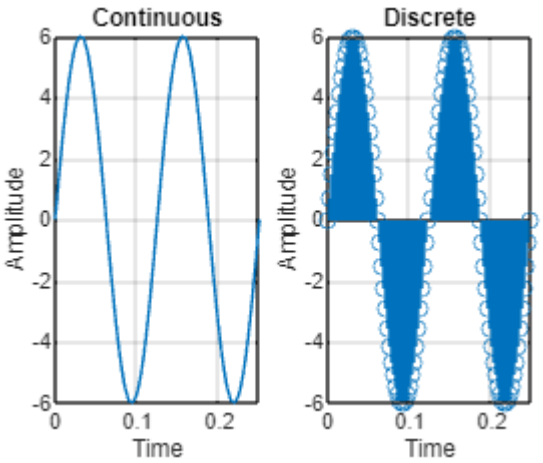
4. **INPUT=** n1=6, n2=8
   OUTPUT=



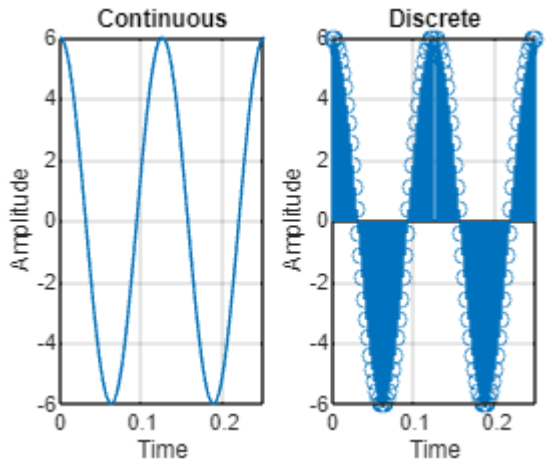
5. **INPUT =** Am=6, n=8, dec=2
   OUTPUT=



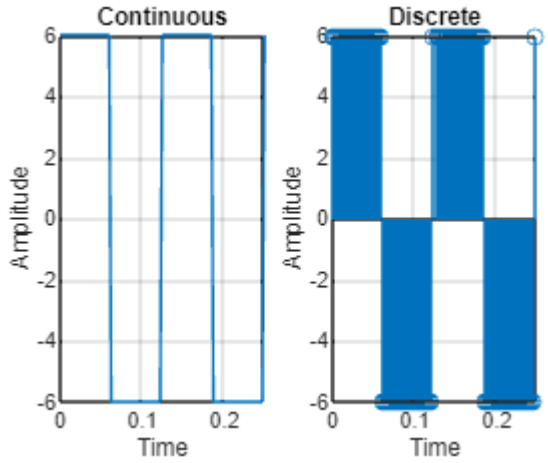
6. **INPUT=** Am=6, Fm=8, Cy=2
   OUTPUT=



7. **INPUT=** Am=6, Fm=8, Cy=2
   OUTPUT=



8. **INPUT=** Am=6, Fm=8, Cy=2
   OUTPUT=



9. **INPUT=** Am=6, Fm=8, Cy=2
   OUTPUT=