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Contents

EXPERIMENT-1

Initialization

```
clc;
clear;
close all;
```

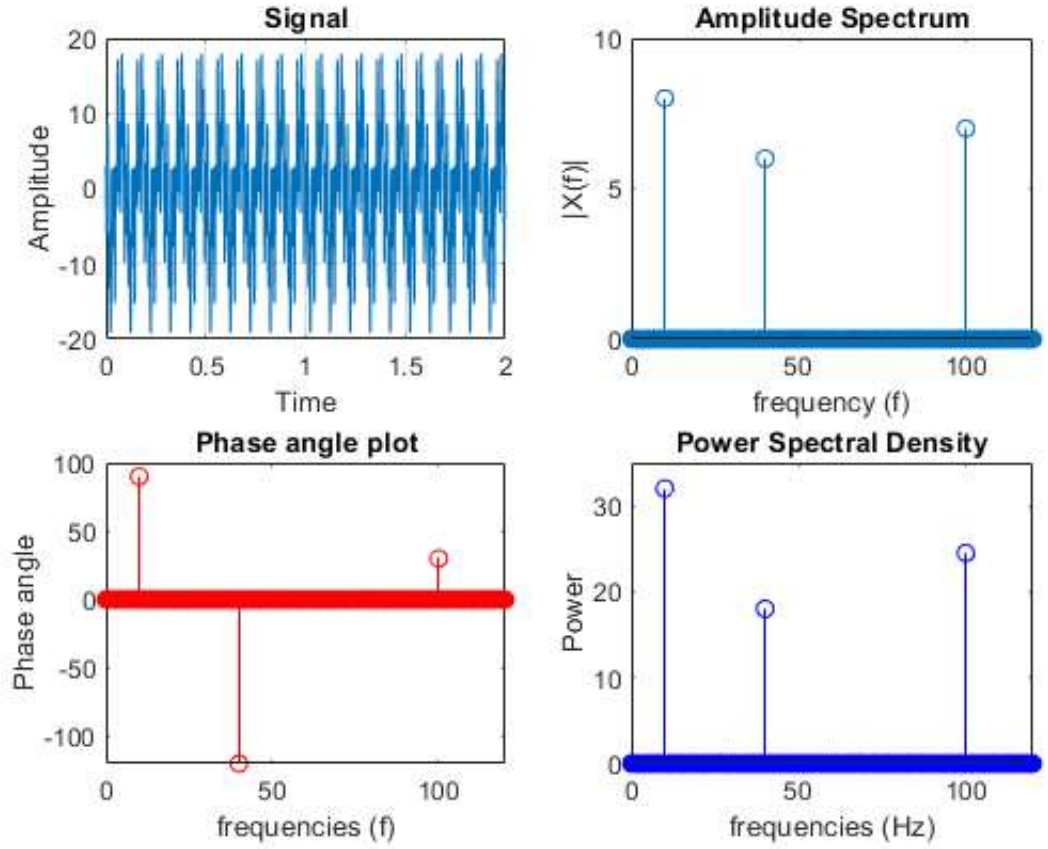
Variables

```
fc=100;
fs=32*fc;
t=0:1/fs:2-1/fs;
```

Signal Generation and FFT Computation

```
m=8*cos(2*pi*10*t + pi/2) + 6*cos(2*pi*40*t -2* pi/3) +7* cos(2*pi*100*t + pi/6);
N=6400;
X = fft(m,N);
X2=X(1:N/2)/(N/2);
df=fs/N;
sampleIndex = 0:N/2-1;
f=sampleIndex*df;

angle_x = angle(X2);
tolerance = 0.00001;
X3 = ceil(abs(X2) -tolerance);
X4 = round (X3 ./(X3+1));  %(X4 is the vector of 0s and 1s)
Angle_p = angle(X2).*X4;
Angle_deg = Angle_p*180/pi;

Px=X2.*conj(X2)/2; %Power of each freq components

figure(1)
```

```
subplot(2,2,1)
plot(t,m);
xlabel('Time');
ylabel('Amplitude');
title('Signal');
grid on;

subplot(2,2,2);
stem(f,abs(X2));
title('Amplitude Spectrum');
axis([0 120 0 10]);
xlabel('frequency (f)');
ylabel('|X(f)|');

subplot(2,2,3);
stem(f,Angle_deg,'r')
title('Phase angle plot');
axis([0 120 -120 100]);
xlabel('frequencies (f)');
ylabel('Phase angle');

subplot(2,2,4);
stem(f,Px,'b');
title('Power Spectral Density');
xlabel('frequencies (Hz)');
ylabel('Power');
axis([0 120 0 35]);
```



EXPERIMENT 2

Initialisation

```
close all
```

Signal Generation

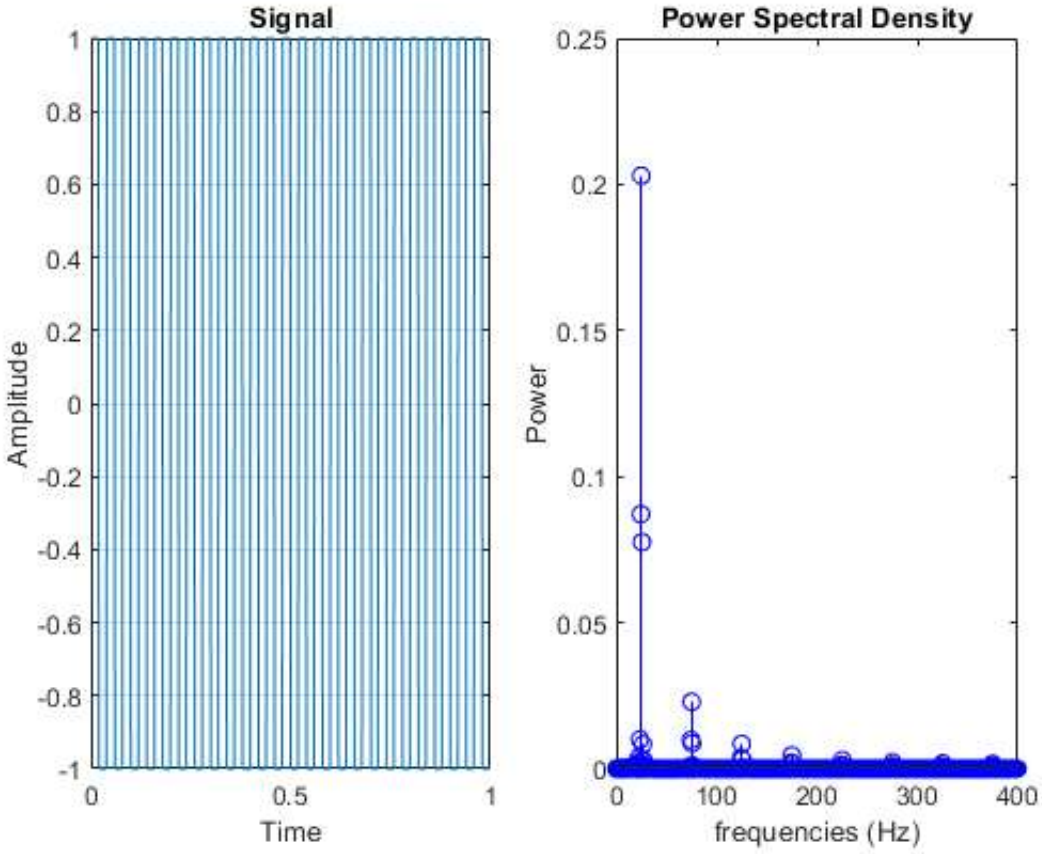
```
fc=25;
fs=32*fc;
t=0:1/fs:1-1/fs;
x=square(2*pi*fc*t,50);
```

Power Spectral Density

```
N=1600;
X = fft(x,N);
X2=X(1:N/2)/(N/2);
df=fs/N;
sampleIndex = 0:N/2-1;
f=sampleIndex*df;
Px=X2.*conj(X2)/2;
```

Plot Generation

```
figure(2)
subplot(121)
plot(t,x);
xlabel('Time');
ylabel('Amplitude');
title('Signal');
grid on;

subplot(122)
stem(f,Px,'b');
title('Power Spectral Density');
xlabel('frequencies (Hz)');
ylabel('Power');
```



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