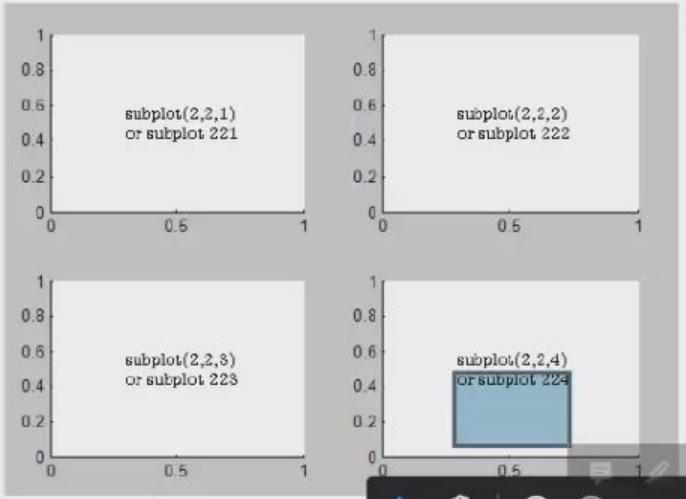
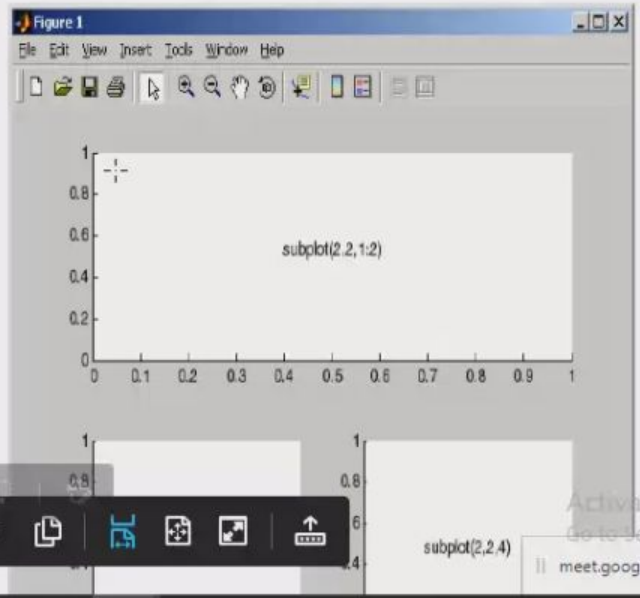



```
subplot(2,2,1:2)
subplot(2,2,3)
subplot(2,2,4)
```



MATLAB Program:

```
tfinal=0.02;
t=0:0.00002:tfinal;
fd=input('Enter analog freuency ');
%define analog signal for comparison
xt=cos(2*pi*fd*t);
%simulate condition for undersampling i.e., fs1<2*fd
fs1=1.5*fd;
%define the time vector
n1=0:1/fs1:tfinal;
%Generate the undersampled signal
xn1=cos(2*pi*n1*fd);
%plot the analog & sampled signals
subplot(3,2,1); plot(t,xt,'b',n1,xn1,'r*-'); title('undersampled plot');
%spectrum of discrete signal
Xk1=fft(xn1);
%frequency index of spectrum plot
f1=(0:length(Xk1) -1)*fs1/length(Xk1);
subplot(3,2,2); stem(f1,abs(Xk1)); title('spectrum of undersampled plot');
```

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- cir_conv1.m
- circular_conv.m
- convm.m
- d.m

Details

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Workspace

Name	Value	Min	Max
t	[1,2,3,4]	1	4
x	[0,2,4,6]	0	6

Editor - C:\Users\SHRI\Documents\MATLAB\today1.m

today1.m

```
1 -  clc;
2 -  clear all;
3 -  close all;
4 -  x = [0 2 4 6];
5 -  t = [1 2 3 4] ;
6 -  subplot(2,2,2)
7 -  stem (t, x);
```

Figure 1

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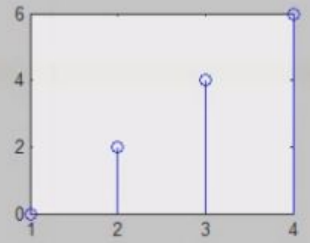

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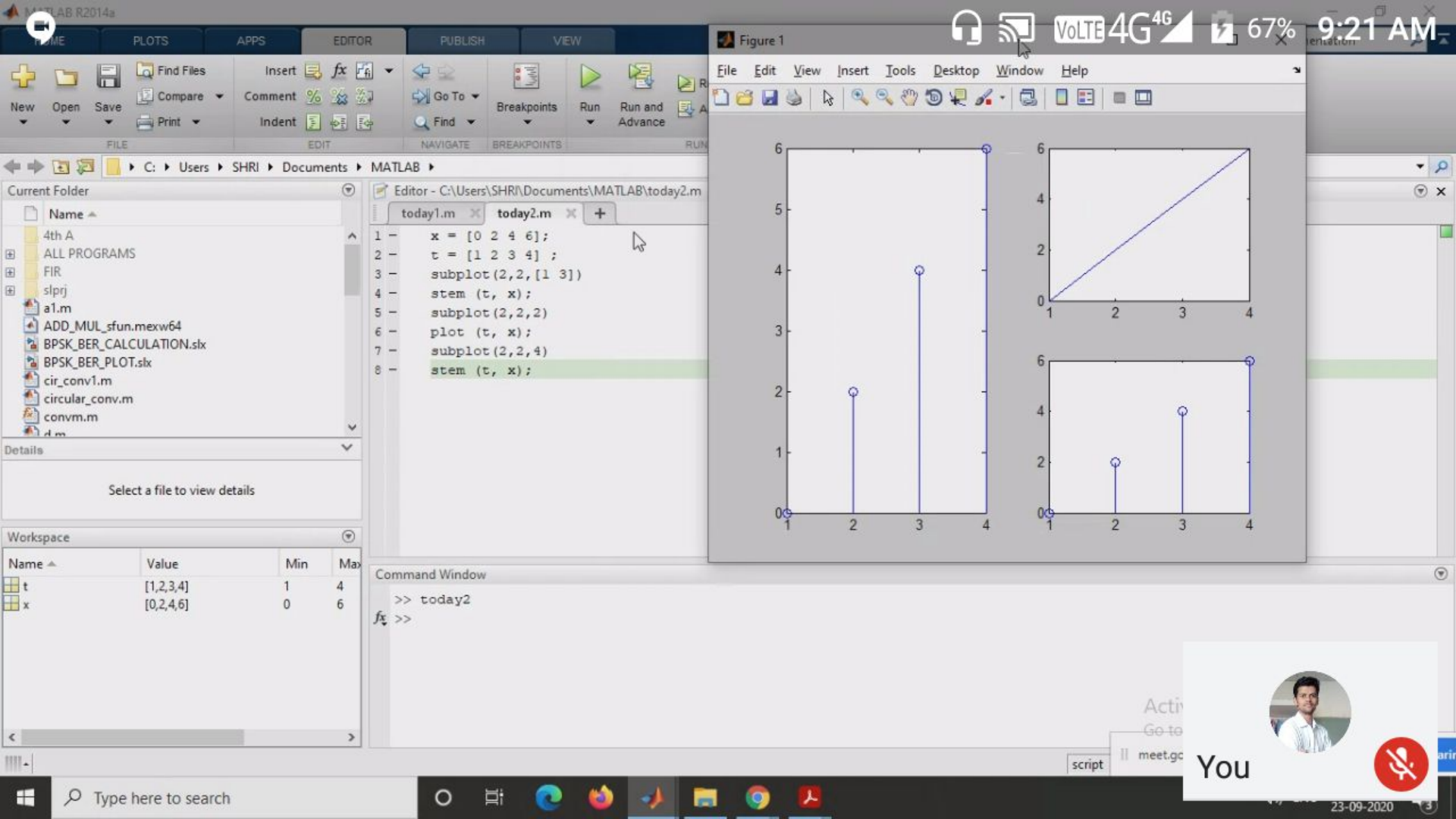
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circular_conv.m
convm.m
Details
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Workspace
Name
Value
Min
Max
t
[1,2,3,4]
1
4
x
[0,2,4,6]
0
6
Editor - C:\Users\SHRI\Documents\MATLAB\today2.m
today1.m
today2.m
1 – x = [0 2 4 6];
2 – t = [1 2 3 4] ;
3 – subplot(2,2,[1 3])
4 – stem (t, x);
5 – subplot(2,2,2)
6 – plot (t, x);
7 – subplot(2,2,4)
8 – stem (t, x);
Figure 1
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Command Window
>> today2
>>
script
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- cir_conv1.m
- circular_conv.m
- convm.m

Details

Select a file to view details

Workspace

Name	Value	Min
a1	2	2
a2	2	2
a3	0.5000	0.5000
n	1x21 double	-10
N	10	10
n2	1x101 double	0
x	[2,4,6]	2
x1	1x21 double	0

Editor - C:\Users\SHRI\Documents\MATLAB\today6.m*

today1.m | today2.m | today3.m | today5.m | today6.m*

```
1  tfinal=0.02;
2  t=0:0.00002:tfinal;
3  fd=input('Enter analog freuency ');
4  %define analog signal for comparison
5  xt=cos(2*pi*fd*t);
6  %simulate condition for undersampling i.e., fs1<2*fd
7  fs1=1.5*fd;
8  %define the time vector
9  n1=0:1/fs1:tfinal;
10 %Generate the undersampled signal
11 xn1=cos(2*pi*n1*fd);
12 %plot the analog & sampled signals
13 subplot(3,2,1); plot(t,xt,'b',n1,xn1,'r*-'); title('undersampled plot');
14 %spectrum of discrete signal
15 Xk1=fft(xn1);
16 %frequency index of spectrum plot
17 f1=(0:length(Xk1) -1)*fs1/length(Xk1);
```

Command Window

```
>> x= [2 4 6];
>> y= x.^2

y =

     4    16    36

fx >>
```

5 usages of "tfinal" found

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- circular_conv.m
- convm.m
- d.m

Details

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Workspace

Name	Value	Min	Max
t	[1,2,3,4]	1	4
x	[0,2,4,6]	0	6

Editor - C:\Users\SHRI\Documents\MATLAB\today3.m

today1.m | today2.m | today3.m

```
1 -  clc; clear all; close all;
2 -  t = [0:0.001:0.1];
3 -  f = input('Enter the input frequency: ');
4 -  x1=sin(2*pi*f*t);
5 -  figure(1);
6 -  plot(t,x1,'b'); xlabel('time'); ylabel('amplitude');
7 -  title(' First signal ');
8 -  grid on;
9 -  t = [0:0.0001:0.2];
10 - x2=sin(2*pi*f*t);
11 - figure(2);
12 - plot(t,x2,'r*'); xlabel('time'); ylabel('amplitude');
13 - title('Second signal');
```

Command Window

```
>> today2
fx >>
```

script

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Editor - C:\Users\SHRI\Documents\MATLAB\today6.m*

today6.m*

```
10 -    fs1=1.5*fd;
11      %define the time vector
12 -    n1=0:1/fs1:tfinal;
13      %Generate the undersampled signal
14 -    xn1=cos(2*pi*n1*fd);
15      %plot the analog & sampled signals
16 -    subplot(3,2,1);
17 -    plot(t,xt,'b',n1,xn1,'r*-');
18 -    title('undersampled plot');
19      %spectrum of discrete signal
20 -    Xk1=fft(xn1);
21      %frequency index of spectrum plot
22 -    f1=(0:length(Xk1) -1)*fs1/length(Xk1);
23 -    subplot(3,2,2); stem(f1,abs(Xk1)); title('spectrum of undersampled plot');
24      %condition for Nyquist plot
25 -    fs2=2*fd;
26 -    n2=0:1/fs2:tfinal;
27 -    xn2=cos(2*pi*fd*n2);
28 -    subplot(3,2,3); plot(t,xt,'b',n2,xn2,'r*-'); title('Nyquist plot');
29 -    Xk2=fft(xn2);
30 -    f2=(0:length(Xk2)-1)*fs2/length(Xk2);
31 -    subplot(3,2,4); stem(f2,abs(Xk2)); title('spectrum of rightsampled plot');
32      %condition for oversampling
33 -    fs3=10*fd;
34 -    n3=0:1/fs3:tfinal;
35 -    xn3=cos(2*pi*fd*n3);
36 -    subplot(3,2,5); plot(t,xt,'b',n3,xn3,'r*-'); title('Oversampled plot');
```

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Editor - C:\Users\SHRI\Documents\MATLAB\today6.m*

today6.m*

```
clc;
clear all;
close all;
tfinal=0.02;
t=0:0.00002:tfinal;
fd=input('Enter analog freuency ');
%define analog signal for comparison
xt=cos(2*pi*fd*t);
%simulate condition for undersampling i.e., fs1<2*fd
fs1=1.5*fd;
%define the time vector
n1=0:1/fs1:tfinal;
%Generate the undersampled signal
xn1=cos(2*pi*n1*fd);
%plot the analog & sampled signals
subplot(3,2,1);
plot(t,xt,'b',n1,xn1,'r*-');
title('undersampled plot');
%spectrum of discrete signal
Xk1=fft(xn1);
%frequency index of spectrum plot
f1=(0:length(Xk1) -1)*fs1/length(Xk1);
subplot(3,2,2);
stem(f1,abs(Xk1));
title('spectrum of undersampled plot');
%condition for Nyquist plot
fs2=2*fd;
```

script

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Figure 1

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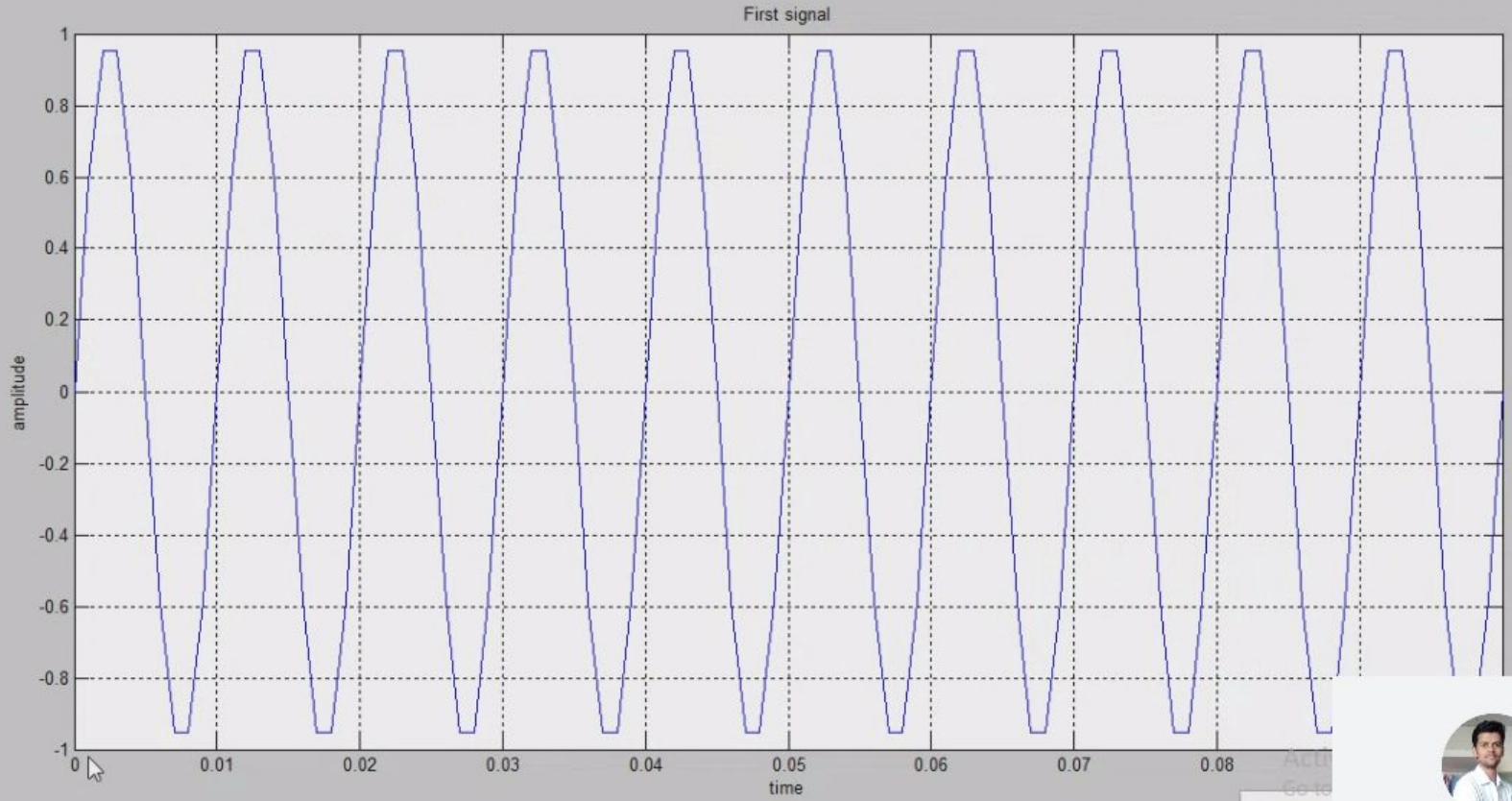

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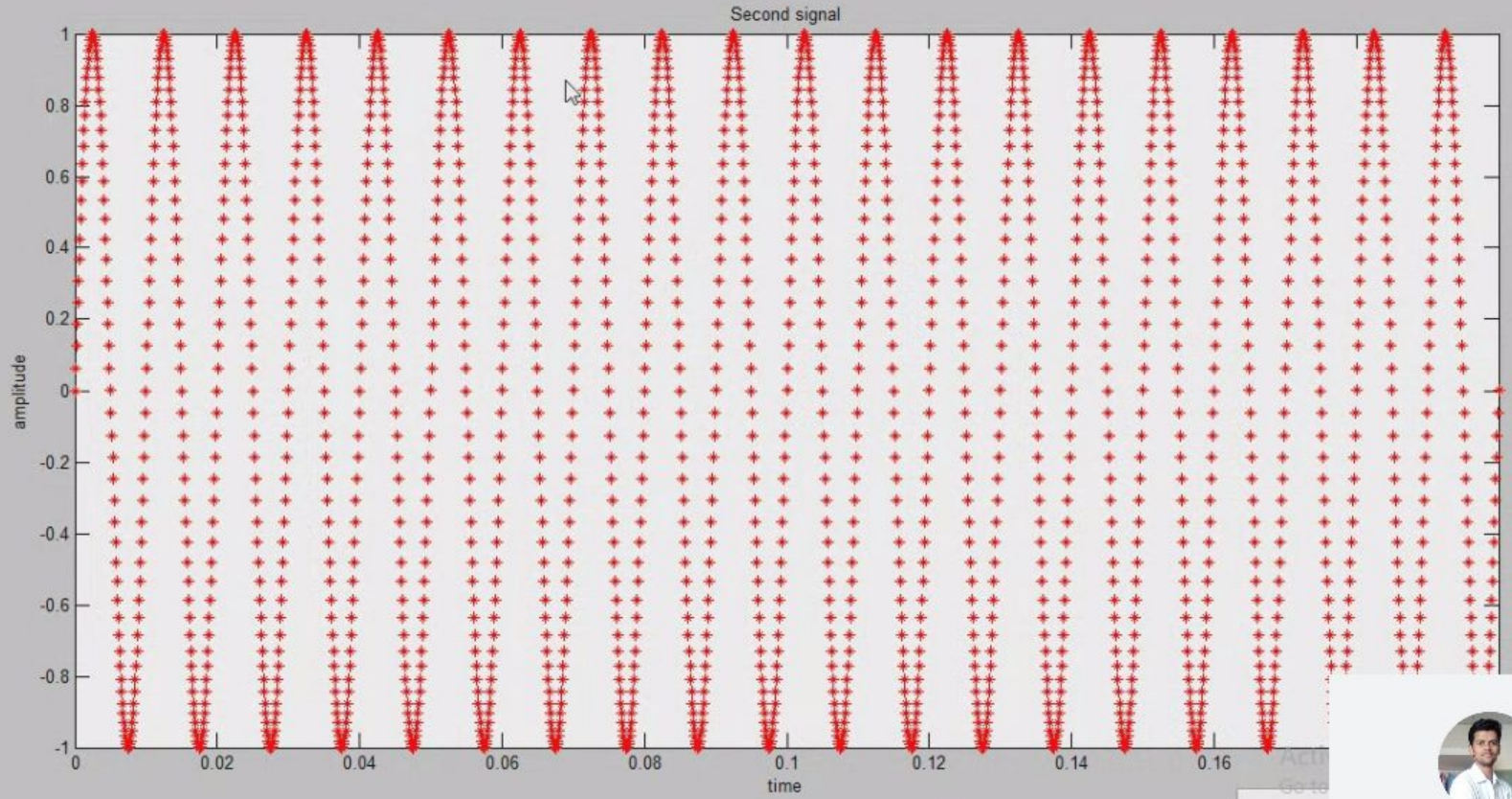
Figure 2

File Edit View Insert Tools Desktop Window Help



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- cir_conv1.m
- circular_conv.m
- convm.m

Details

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Workspace

Name	Value	Min	Max
f	100	100	100
t	1x2001 double	0	0.20
x1	1x101 double	-0.9511	0.95
x2	1x2001 double	-1	1

Editor - Untitled4*

today1.m | today2.m | today3.m | Untitled4*

```
1   clc;
2   clear all;
3   close all;
4   N = 10;
5   n = -N:1:N;
6   % unit Impulse
7   x1=[zeros(1,N) 1 zeros(1,N)];
8   subplot(3,2,1); stem(n,x1); title(' Impulse Signal');
9   %unit Step signal
10  x2=[zeros(1,N) 1 ones(1,N)];
11  subplot(3,2,2); stem(n,x2); title('Unit step signal');
12  %Unit Ramp signal
13  a1= 2;
14  x3=a1*n;
15  subplot(3,2,3); stem(n,x3); title('Unit ramp signal');
16  %Exponential growing/decaying signal
17  n2=0:0.1:N;
```

Command Window

```
Enter the input frequency: 100
>>
```

script

You

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Figure 1

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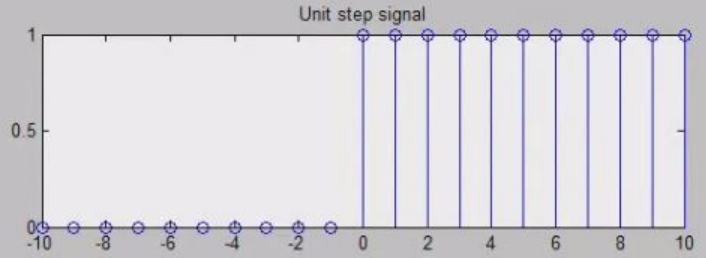

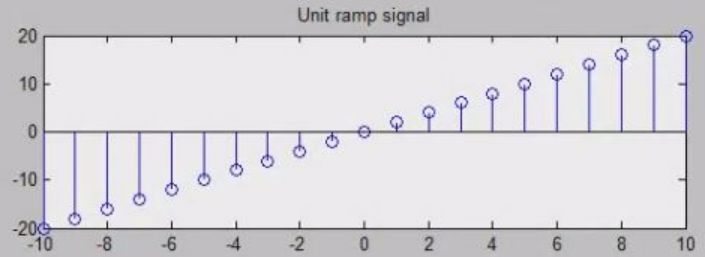

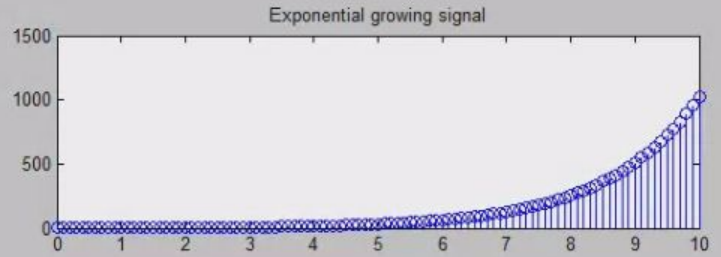

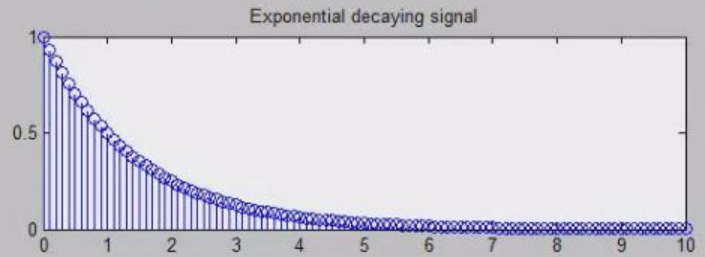

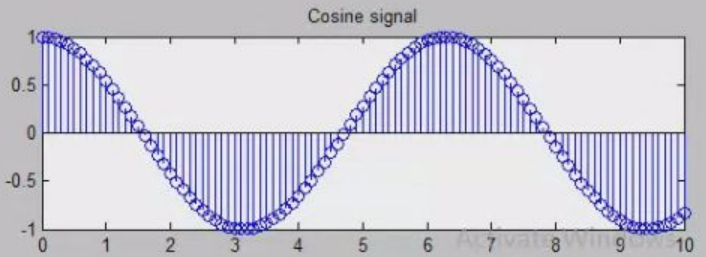

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```
%simulate condition for undersampling i.e., fs1<2*fd
fs1=1.5*fd;
%define the time vector
n1=0:1/fs1:tfinal;
%Generate the undersampled signal
xn1=cos(2*pi*n1*fd);
%plot the analog & sampled signals
subplot(3,2,1); plot(t,xt,'b',n1,xn1,'r*-'); title('undersampled plot');
%spectrum of discrete signal
Xk1=fft(xn1);
%frequency index of spectrum plot
f1=(0:length(Xk1) -1)*fs1/length(Xk1);
subplot(3,2,2); stem(f1,abs(Xk1)); title('spectrum of undersampled plot');
%condition for Nyquist plot
fs2=2*fd;
n2=0:1/fs2:tfinal;
xn2=cos(2*pi*fd*n2);
subplot(3,2,3);   plot(t,xt,'b',n2,xn2,'r*-');   title('Nyquist plot');
Xk2=fft(xn2);
f2=(0:length(Xk2)-1)*fs2/length(Xk2);
```

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- BPSK_BER_PLOT.slx
- cir_conv1.m
- circular_conv.m
- convm.m
- d.m

Details

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Workspace

Name	Value	Min	M
a1	2	2	2
a2	2	2	2
a3	0.5000	0.5000	0
n	1x21 double	-10	1
N	10	10	1
n2	1x101 double	0	1
x1	1x21 double	0	1
x2	1x21 double	0	1

Editor - C:\Users\SHRI\Documents\MATLAB\today5.m

today1.m | today2.m | today3.m | today5.m

```
14 -    stem(n,x2);
15 -    title('Unit step signal');
16      %Unit Ramp signal
17 -    a1= 2;
18 -    x3=a1*n;
19 -    subplot(3,2,3); stem(n,x3); title('Unit ramp signal');
20      %Exponential growing/decaying signal
21 -    n2=0:0.1:N;
22 -    a2=2;
23 -    x4=a2.^n2;
24 -    subplot(3,2,4); stem(n2,x4); title( 'Exponential growing signal');
25 -    a3=0.5;
26 -    x5=a3.^n2;
27 -    subplot(3,2,5); stem(n2,x5); title( 'Exponential decaying signal');
28      %cosine siganl
29 -    x6=cos(n2);
30 -    subplot(3,2,6); stem(n2,x6); title('Cosine signal');
```

Command Window

fx >>

script

You

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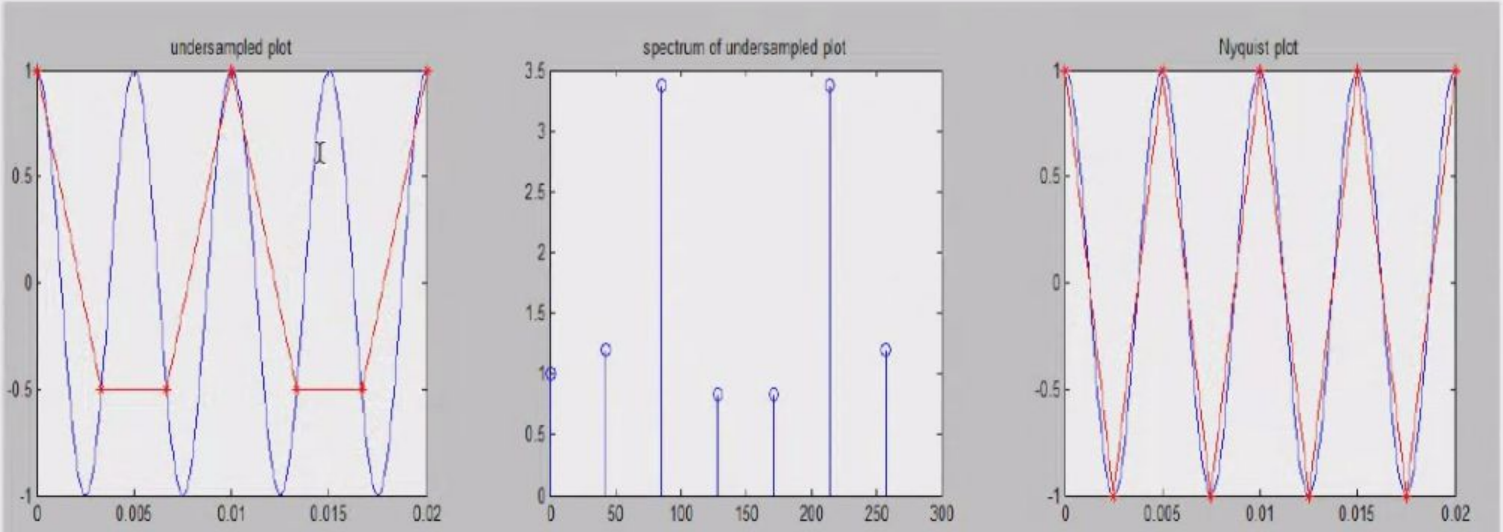
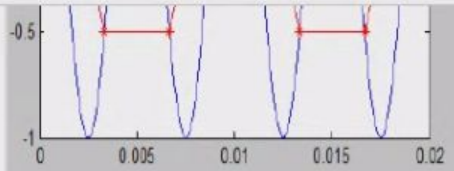
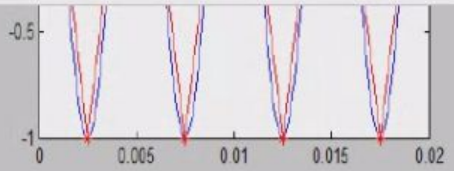
```
n1=0:1/fs1:tfinal;
%Generate the undersampled signal
xn1=cos(2*pi*n1*fd);
%plot the analog & sampled signals
subplot(3,2,1); plot(t,xt,'b',n1,xn1,'r*-'); title('undersampled plot');
%spectrum of discrete signal
Xk1=fft(xn1);
%frequency index of spectrum plot
f1=(0:length(Xk1) -1)*fs1/length(Xk1);
subplot(3,2,2); stem(f1,abs(Xk1)); title('spectrum of undersampled plot');
%condition for Nyquist plot
fs2=2*fd;
n2=0:1/fs2:tfinal;
xn2=cos(2*pi*fd*n2);
subplot(3,2,3);   plot(t,xt,'b',n2,xn2,'r*-');   title('Nyquist plot');
Xk2=fft(xn2);
f2=(0:length(Xk2)-1)*fs2/length(Xk2);
subplot(3,2,4);   stem(f2,abs(Xk2));    title('spectrum of rightsampled plot');
```

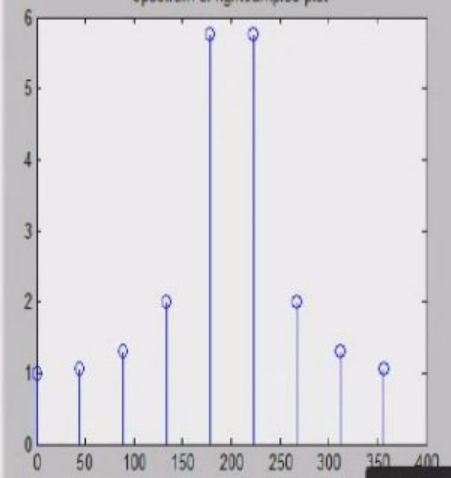
For Cos n2=0:1/fs2:tfinal;

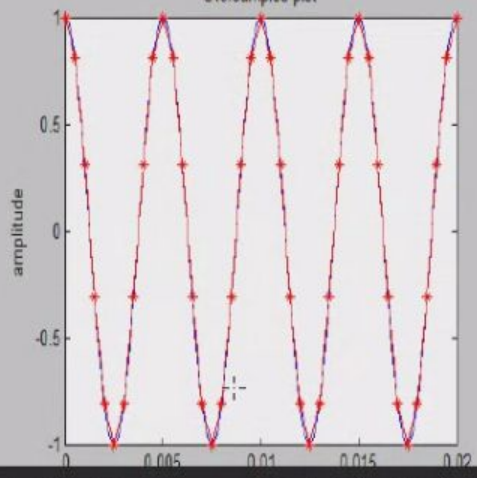
Result: Enter analog frequency 200 , The plots are shown in Fig.

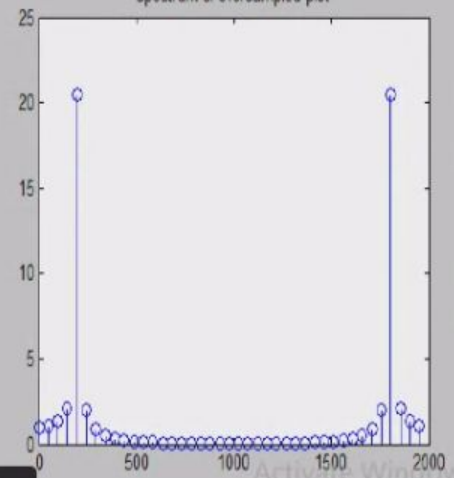












MATLAB Program:

```
tfinal=0.02;
t=0:0.00002:tfinal;
fd=input('Enter analog frequency ');
%define analog signal for comparison
xt=cos(2*pi*fd*t);
%simulate condition for undersampling i.e., fs1<2*fd
fs1=1.5*fd;
%define the time vector
n1=0:1/fs1:tfinal;
%Generate the undersampled signal
xn1=cos(2*pi*n1*fd);
%plot the analog & sampled signals
subplot(3,2,1); plot(t,xt,'b',n1,xn1,'r*-'); title('undersampled plot');
%spectrum of discrete signal
Xk1=fft(xn1);
%frequency index of spectrum plot
f1=(0:length(Xk1) -1)*fs1/length(Xk1);
subplot(3,2,2); stem(f1,abs(Xk1)); title('spectrum of undersampled plot');
%condition for Nyquist plot
fs2=2*fd;
n2=0:1/fs2:tfinal;
xn2=cos(2*pi*fd*n2);
subplot(3,2,3);  plot(t,xt,'b',n2,xn2,'r*-');  title('Nyquist plot');
Xk2=fft(xn2);
f2=(0:length(Xk2)-1)*fs2/length(Xk2);
subplot(3,2,4);  stem(f2,abs(Xk2));   title('spectrum of rightsampled plot');
```



```
%condition for oversampling
fs3=10*fd;
n3=0:1/fs3:tfinal;
xn3=cos(2*pi*fd*n3);
subplot(3,2,5); plot(t,xt,'b',n3,xn3,'r*-'); title('Oversampled plot');
xlabel('time'); ylabel('amplitude');
Xk3=fft(xn3);
f3=(0:length(Xk3) -1)*fs3/length(Xk3);
subplot(3,2,6); stem(f3,abs(Xk3)); title('spectrum of oversampled plot');
```

Figure 1

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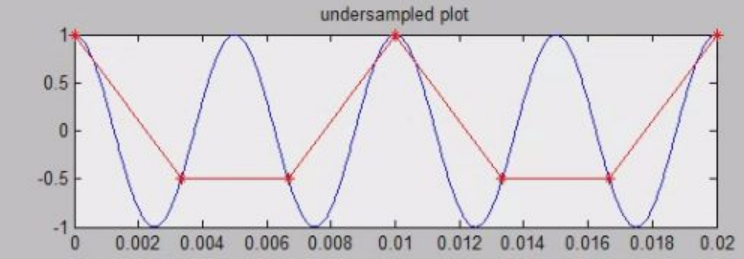

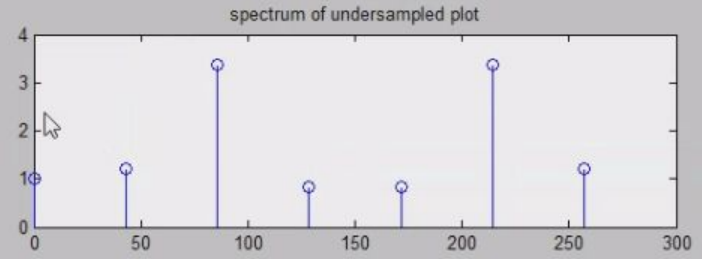

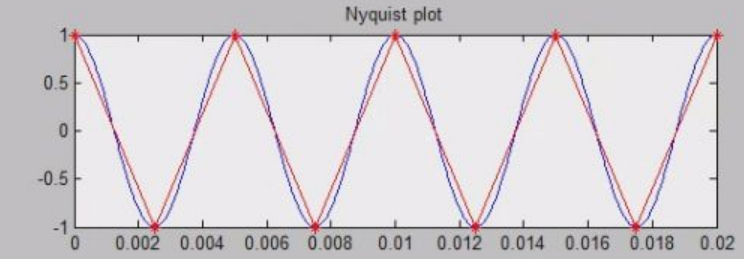

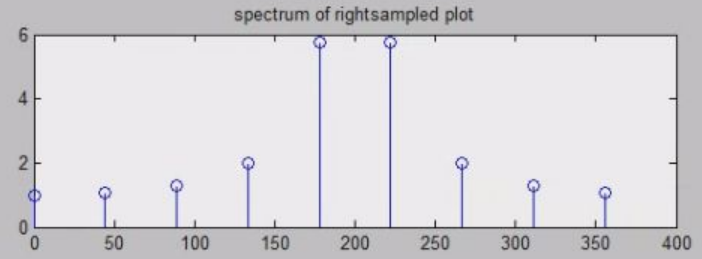

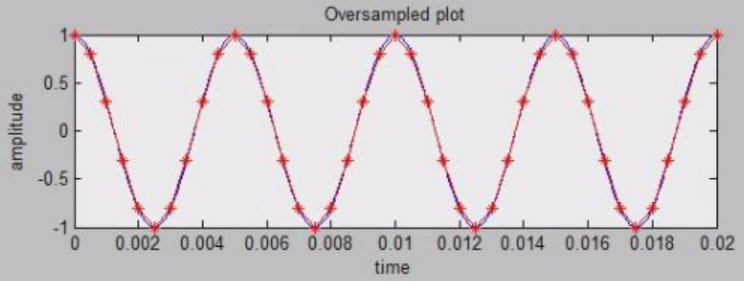

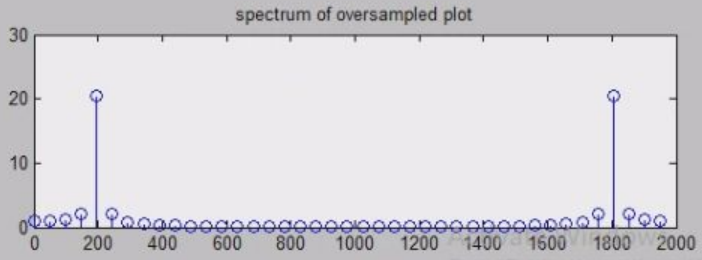

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