SHRI G.S. INSTITUTE OF TECHNOLOGY & SCIENCE, INDORE

Dept. Of Electronics & Telecommunication Engineering

Session: Jan- Jun 2019

Assignment Submission of

MATLAB PROGRAMMINGS

SUBMITTED TO-

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SUBMITTED BY-

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Q.1

```
%Create a 10x10 random matrix with the command A=rand(10). Now do the
following operations.
%    a) Multiply all elements by 100 and then round off all elements
of the matrix to integers with the command A=fix(A).
%    b) Replace all elements of A<10 with Zeros.
%    c) Replace all elements of A>90 with infinity (inf).
%    d) Extract all 30 <= aij <= 50 in a vector b, that is find all
elements between 30 and 50 and put them in a vector b.
%
A=rand(10);
%%
%(a)
A=A*100;
A=fix(A);
%%
%(b)
A(A<10)=0;
%%
%(c)
A(A>90)=inf;
%%
%(d)
b=A(A>=30 & A<=50)
```

>> Q1
b = 48 42 39 31 43 38 48 44 49 34 50
34 47 35 38 46 33

Q2. Find out the values of current il. 12 13 for the following given ckt using the

```
%    MATLAB R1=5 ohm, R2=100 ohm, R3=200 ohm,R4=150 ohm,R=250 ohm;
V1= 5V and V2= 10V.
%                 [V]= [R][I]
%                 [i]= inv([R])[V]
%                 -V1= (R1+R4)I1 + (-R4)I2      + (0)I3
%                   0= (-R4)I1   + (R2+R4+R5)I2 + (-R5)I3
%                 -V2= (0)I1     + (-R5)I2      + (R3+R5)I3
R1=5;
R2=100;
R3=200;
R4=150;
R5=250;
V1=5;
V2=10;
V=[-V1;0;-V2];
R=[R1+R4 -R4        0;
   -R4   R2+R4+R5 -R5;
   0     -R5      R3+R5];
I=inv(R)*V;
I
```

>>I = -0.0788 -0.0481 -0.0490

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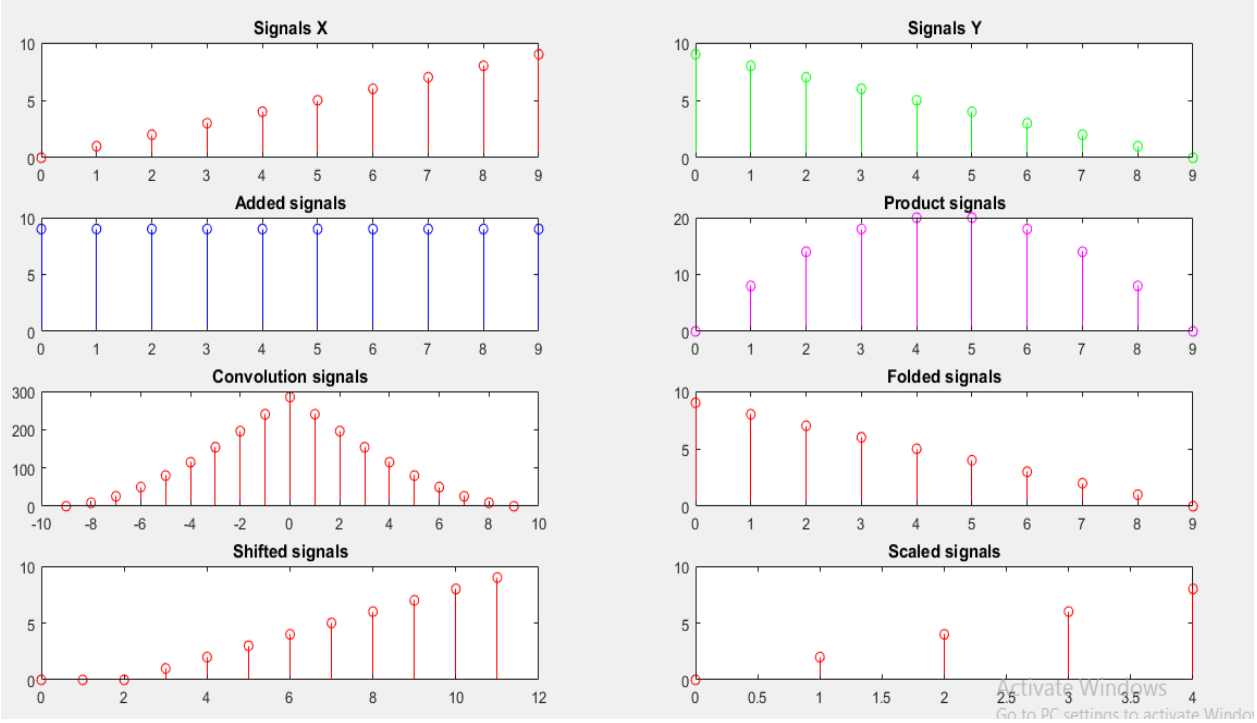
Q3. Write a program which does the following operation on given signal:

```
%     a) Addition, Multiplication and Convolution of two signal
%     b) Folding, Shifting and Scaling operation on a given signal
%%
%Let two DIGITAL signals are X, Y
N=0:9;
X=N;
H=fliplr(N);%H=9:-1:0
%%
%(a)Addition, Multiplication and Convolution
Added=X+H;
Product=X.*H;
Convolution=conv(X,H);
%stem(0:19,Convolution)
%%
%(b) Folding, Shifting and Scaling operation on a given signal
%Folding using inbuilt function
Folded1=fliplr(X);
%Using for loop
Folded2=[];
for ij=length(X):-1:1
    Folded2=[Folded2  X(ij)];
end
Folded2;
%Shifing by 3 in right(Delay)
N2=N+3;
Shfited1(N2)=X;
%Scaling by factor c=2
Scaled=X(1:2:9);
```

3. Write a program which does the following operation on given signal:

```
%     a) Addition, Multiplication and Convolution of two signal
%     b) Folding, Shifting and Scaling operation on a given signal
%%
%Let two DIGITAL signals are X, Y
N=0:9;
X=N;
H=fliplr(N);%H=9:-1:0
subplot(421); stem(N,X,'r'); title('Signals X');
subplot(422); stem(N,H,'g'); title('Signals Y');
%%
%(a)Addition, Multiplication and Convolution
Added=X+H;
Product=X.*H;
Convolution=conv(X,H);
subplot(423); stem(N,Added,'b'); title('Added signals');
subplot(424); stem(N,Product,'m'); title('Product signals');
subplot(425); stem(-9:9,Convolution,'r'); title('Convolution
signals');
%stem(0:19,Convolution)
%%
%(b) Folding, Shifting and Scaling operation on a given signal
%Folding using inbuilt function
Folded1=fliplr(X);
%Using for loop
Folded2=[];
for ij=length(X):-1:1
    Folded2=[Folded2  X(ij)];
```

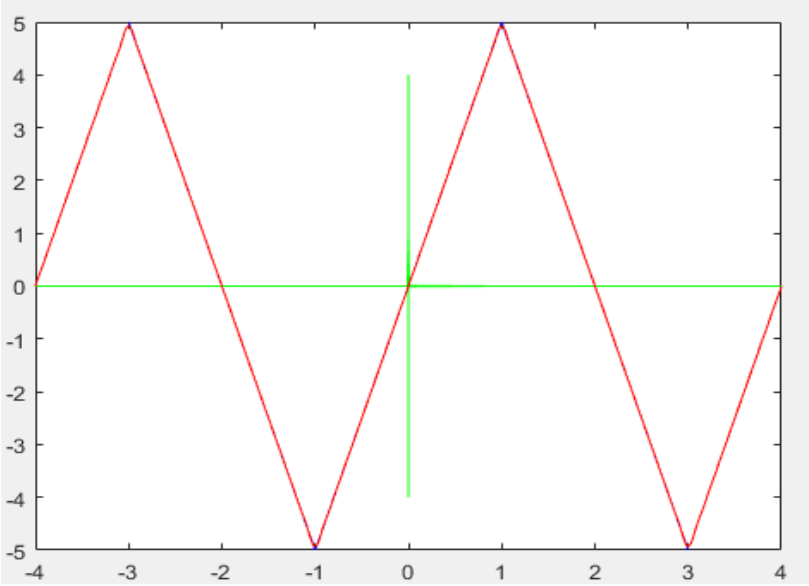
```
end
subplot(426); stem(0:9,Folded2,'r'); title('Folded signals');
%Shifing by 3 in right(Delay)
N2=N+3;
Shfited1(N2)=X;
subplot(427); stem(0:11,Shfited1,'r'); title('Shifted signals');
%Scaling by factor c=2
Scaled=X(1:2:9);
subplot(428); stem(0:4,Scaled,'r'); title('Scaled signals');
```



Q4. Program to draw fourier transform of trinangular function.

```
T=4;     %a= -2 to b= +2
V0=5;    %V=+-(10) Asussumed
w= 2*pi/T;
%%
%Function declareation
fun1= @(t)( (-4*V0/T).*(t + T/2) );
fun2= @(t)( (4*V0/T).*t );
fun3= @(t)( (-4*V0/T).*(t - T/2) );
func= @(t)( fun1(t)+fun2(t)+fun3(t) );
%%
%a0, an & bn finding
a10=@(n)(2/T)*integral( fun1, -T/2, -T/4 );
a20=@(n)(2/T)*integral( fun2, -T/4,  T/4 );
a30=@(n)(2/T)*integral( fun3,  T/4,  T/2 );
a0 =@(n)( a10(n)+a20(n)+a30(n) );

a1n=@(n)(2/T)*integral( @(t)fun1(t).*cos(n*w*t), -T/2, -T/4 );
a2n=@(n)(2/T)*integral( @(t)fun2(t).*cos(n*w*t), -T/4,  T/4 );
a3n=@(n)(2/T)*integral( @(t)fun3(t).*cos(n*w*t),  T/4,  T/2 );
an =@(n)( a10(n)+a20(n)+a30(n) );

b1n=@(n)(2/T)*integral( @(t)fun1(t).*sin(n*w*t), -T/2, -T/4 );
b2n=@(n)(2/T)*integral( @(t)fun2(t).*sin(n*w*t), -T/4,  T/4 );
b3n=@(n)(2/T)*integral( @(t)fun3(t).*sin(n*w*t),  T/4,  T/2 );
```

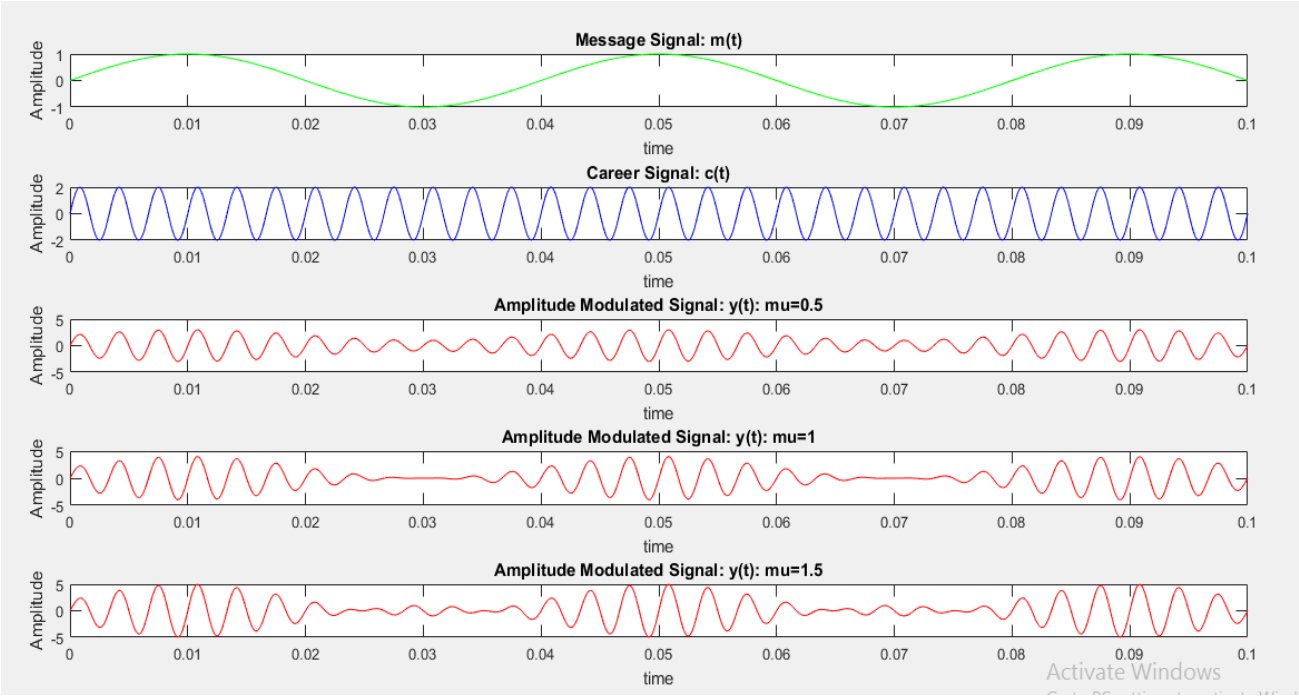
```
bn =@(n)( b1n(n)+b2n(n)+b3n(n) );
%%
t=-4:0.01:4;
t1=-3:0.01:-1;
t2=-1:0.01: 1;
t3= 1:0.01: 3;
%%
for j=1:2:50

    %hold on
    plot(t1,fun1(t1),'k')
    plot(t2,fun2(t2),'k')
    plot(t3,fun3(t3),'k')

    FS=0;
    for k=1:j
        FS=FS + an(k).*cos(k*w*t)+bn(k).*sin(k*w*t);
    end
    FS=FS+a0(0);
    plot(t,t==0,'g',t==0,t,'g', t1,fun1(t1),'b', t2,fun2(t2),'b', t3,
fun3(t3),'b',t,FS,'r' )
    pause(1)
end
```



Q5. Amplitude Modulation

```
Ac=2;       fc=300;
%mu=input('Enter Value of mu: ');
%Am= mu*Ac;
fm=25;

mt= @(t)sin(2*pi*fm*t);
ct= @(t)sin(2*pi*fc*t);
yt= @(t,mu)Ac*(1 + mu*mt(t)).*ct(t);

t=0:0.0001:0.1;
subplot(5,1,1)
plot( t,mt(t),'g' );
title('Message Signal: m(t)');
xlabel('time'); ylabel('Amplitude');
```

```
subplot(5,1,2)
plot( t,2*ct(t),'b' );
title('Career Signal: c(t)');
xlabel('time'); ylabel('Amplitude');

subplot(5,1,3)
plot( t,yt(t,0.5),'r' );
title('Amplitude Modulated Signal: y(t): mu=0.5');
xlabel('time'); ylabel('Amplitude');

subplot(5,1,4)
plot( t,yt(t,1),'r' );
title('Amplitude Modulated Signal: y(t): mu=1');
xlabel('time'); ylabel('Amplitude');

subplot(5,1,5)
plot( t,yt(t,1.5),'r' );
title('Amplitude Modulated Signal: y(t): mu=1.5');
xlabel('time'); ylabel('Amplitude');
```

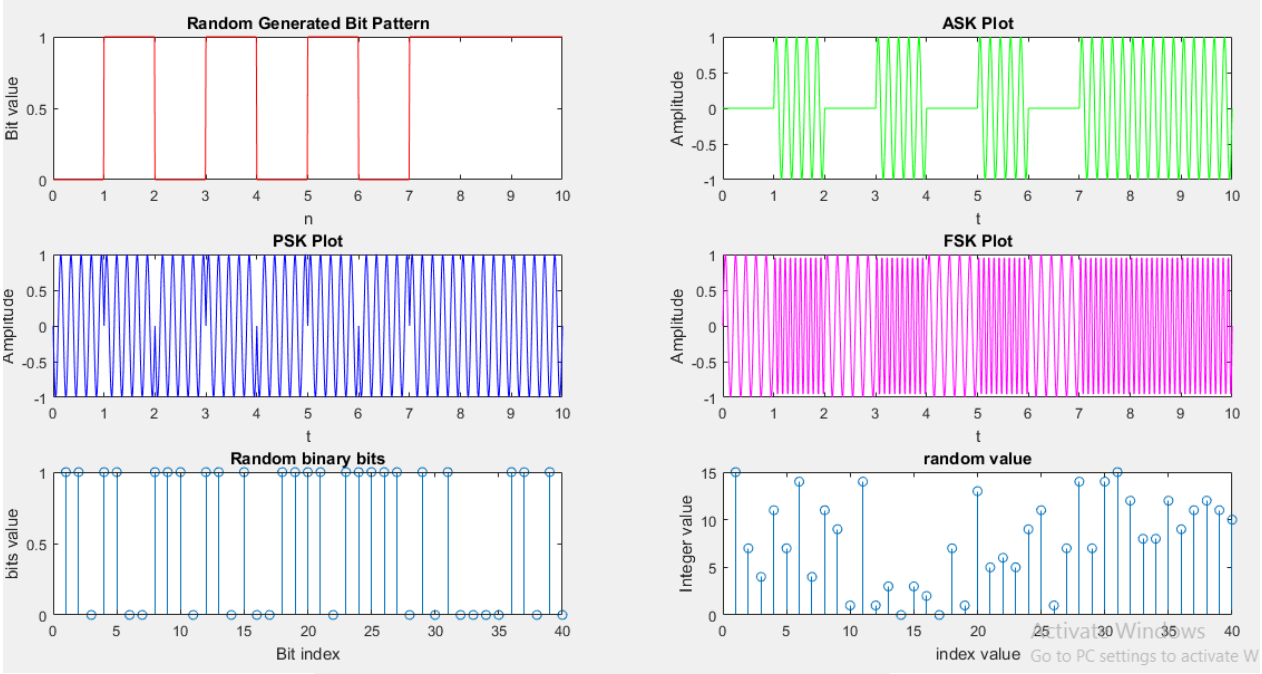


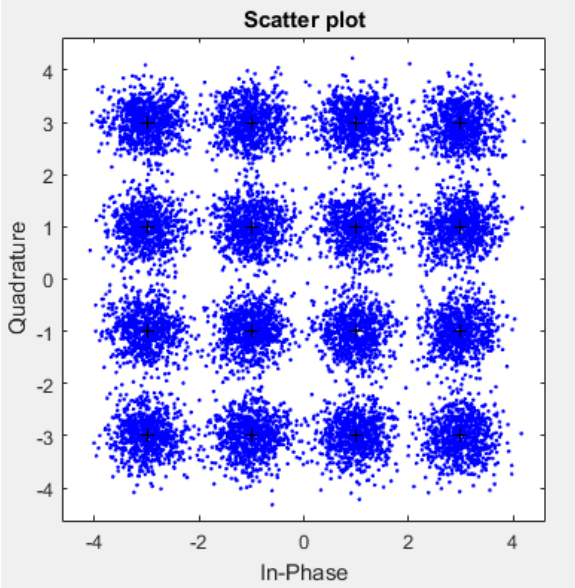
Q6. Program to implement ASK, PSK And QAM

```
b=randi(0:1,1,10);
subplot(3,2,1);
n=length(b);
t=0:0.01:n;
x=1:(n+1)*100;

for i=1:n
  for j=i:.1:i+1
    a(x(i*100:(i+1)*100))=b(i);
  end
end
a=a(100:end);
plot(t,a,'r')
title("Random Generated Bit Pattern"); xlabel("n");ylabel("Bit
value");
%%
```

```
s=a.*sin(2*pi*5*t);
subplot(3,2,2)
plot(t,s,'g')
title("ASK Plot"); xlabel("t");ylabel("Amplitude");
%%
%PSK
for i=1:n
  if b(i)==0
    p(i)=-1;
  else
    p(i)=1;
  end
  for j=i:.1:i+1
    ps(x(i*100:(i+1)*100))=p(i);
  end
end
ps=ps(100:end);
s=ps.*sin(2*pi*5*t);
subplot(3,2,3)
plot(t,s,'b')
title("PSK Plot"); xlabel("t");ylabel("Amplitude");
%%
%FSK
for i=1:n
  if b(i)==0
    p(i)=-1;
  else
    p(i)=1;
  end
  for j=i:.1:i+1
    f(x(i*100:(i+1)*100))=p(i);
  end
end
f=f(100:end);
s=sin(2*pi*7.5*t+(2*pi*2.5*t).*f);
subplot(3,2,4)
plot(t,s,'m')
title("FSK Plot"); xlabel("t");ylabel("Amplitude");
%%
M = 16;
k = log2(M);
n2 = 50000;
nps = 1; % number per sample

rng default
data = randi([0,1],n2,1);
subplot(3,2,5);
stem(data([1:40]));
title('Random binary bits');
xlabel('Bit index');
ylabel('bits value');

four_bit_data = reshape(data , length(data)/k ,k); % creates 4 bit
data for QAM
datanew = bi2de(four_bit_data);                    % converts 4 bit
binary data to decimal value

subplot(3,2,6);
stem(datanew([1:40]));
title('random value');
```

```
xlabel('index value');
ylabel('Integer value');

modulated_data = qammod(datanew , M ,'bin');
Eb = 10;
snr = Eb + 10*log10((k)/(nps));
recieved_signal = awgn(modulated_data , snr , 'measured');

newplot = scatterplot(recieved_signal,1,0,'b.');
hold on;
scatterplot(modulated_data,1,0,'k+',newplot);
```





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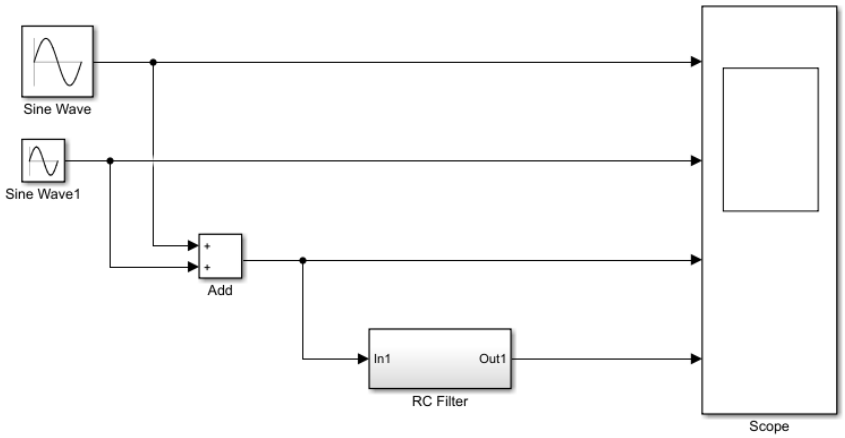
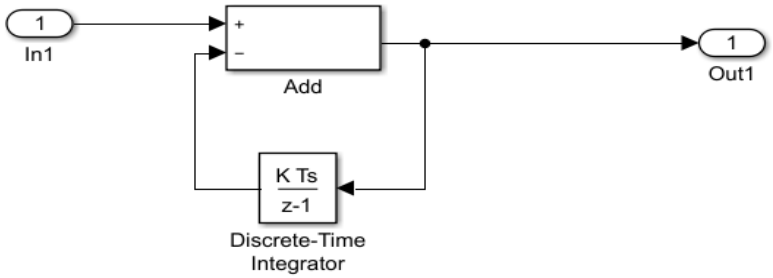
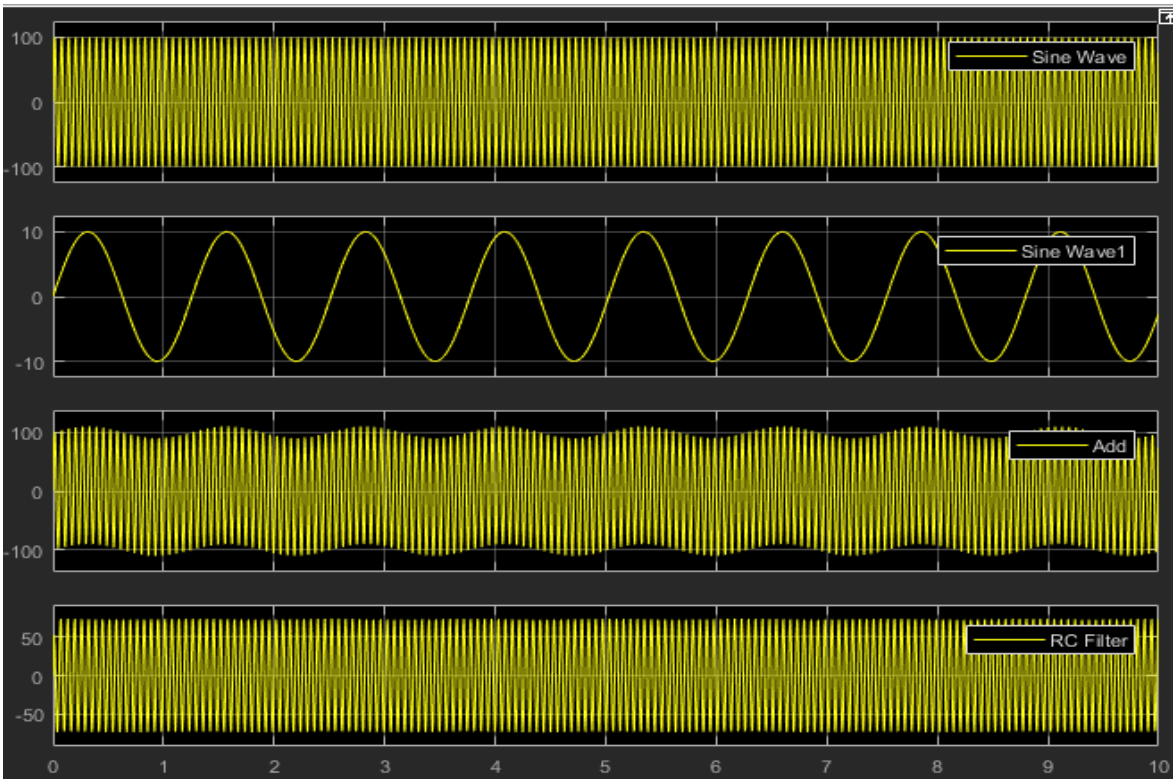
Q7. Design a High pass filter



High Pass Filter



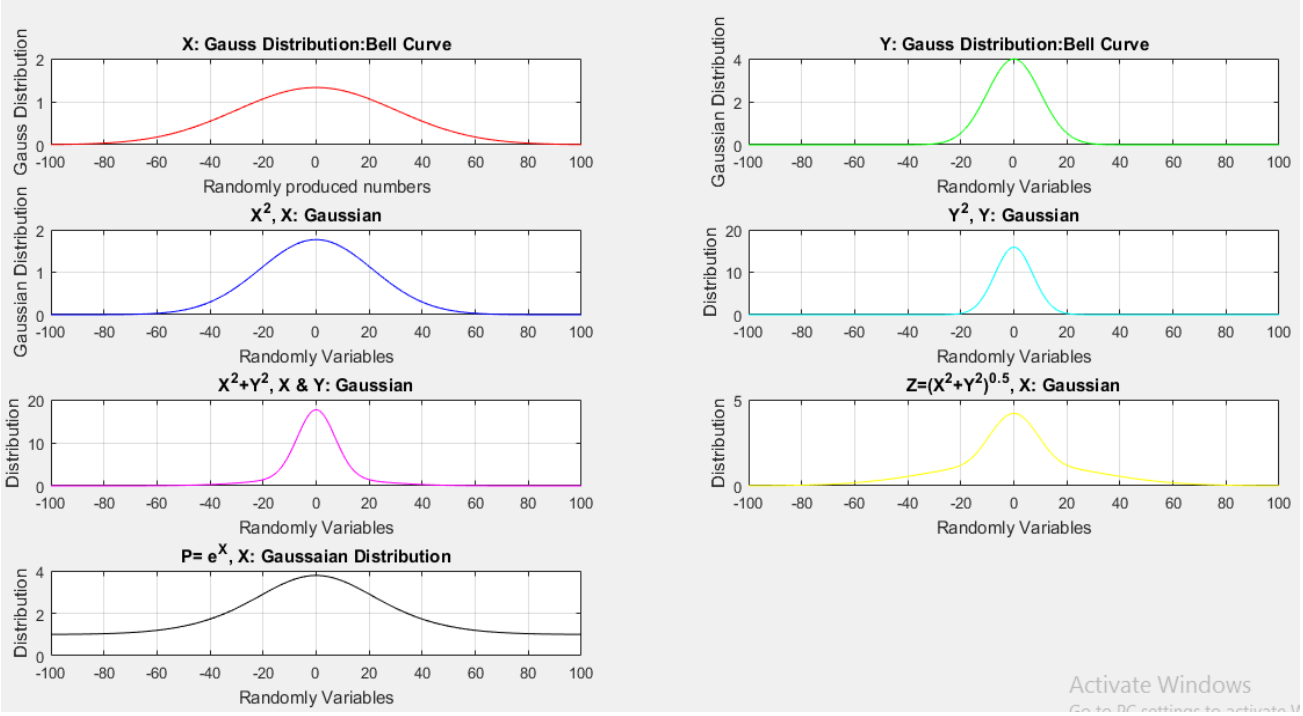
RC Filter(Internal Architecture)



Q8. Gaussian Distributions

```
a = -100; b = 100;
x=-100:100;
mu = (a + b)/2;

p1 = @(s)-0.5 * ((x - mu)/s) .^ 2;
p2 = @(s)(s * sqrt(2*pi));
f=@(s)exp(p1(s)) ./ p2(s);
%%
X = 100.*f(30);  %sigma=30
subplot(4,2,1)
plot(x,X,'r')
grid on
title('X: Gauss Distribution:Bell Curve')
xlabel('Randomly produced numbers')
ylabel('Gauss Distribution')
%%
Y = 100.*f(10);
subplot(4,2,2)
plot(x,Y,'g')
grid on
title('Y: Gauss Distribution:Bell Curve')
xlabel('Randomly Variables')
ylabel('Gaussian Distribution')
%%
X2=X.^2;
subplot(4,2,3)
plot(x,X2,'b')
grid on
title('X^2, X: Gaussian')
xlabel('Randomly Variables')
ylabel('Gaussian Distribution')
%%
Y2=Y.^2;
subplot(4,2,4)
plot(x,Y2,'c')
grid on
title('Y^2, Y: Gaussian')
xlabel('Randomly Variables')
ylabel('Distribution')
%%
Z2=X2+Y2;
subplot(4,2,5)
plot(x,Z2,'m')
grid on
title('X^2+Y^2, X & Y: Gaussian')
xlabel('Randomly Variables')
ylabel('Distribution')
%%
Z=Z2.^0.5;
subplot(4,2,6)
plot(x,Z,'y')
grid on
title('Z=(X^2+Y^2)^0^.^5, X: Gaussian')
xlabel('Randomly Variables')
ylabel('Distribution')
%%
P=exp(X);  %sigma=30
subplot(4,2,7)
plot(x,P,'k')
grid on
```

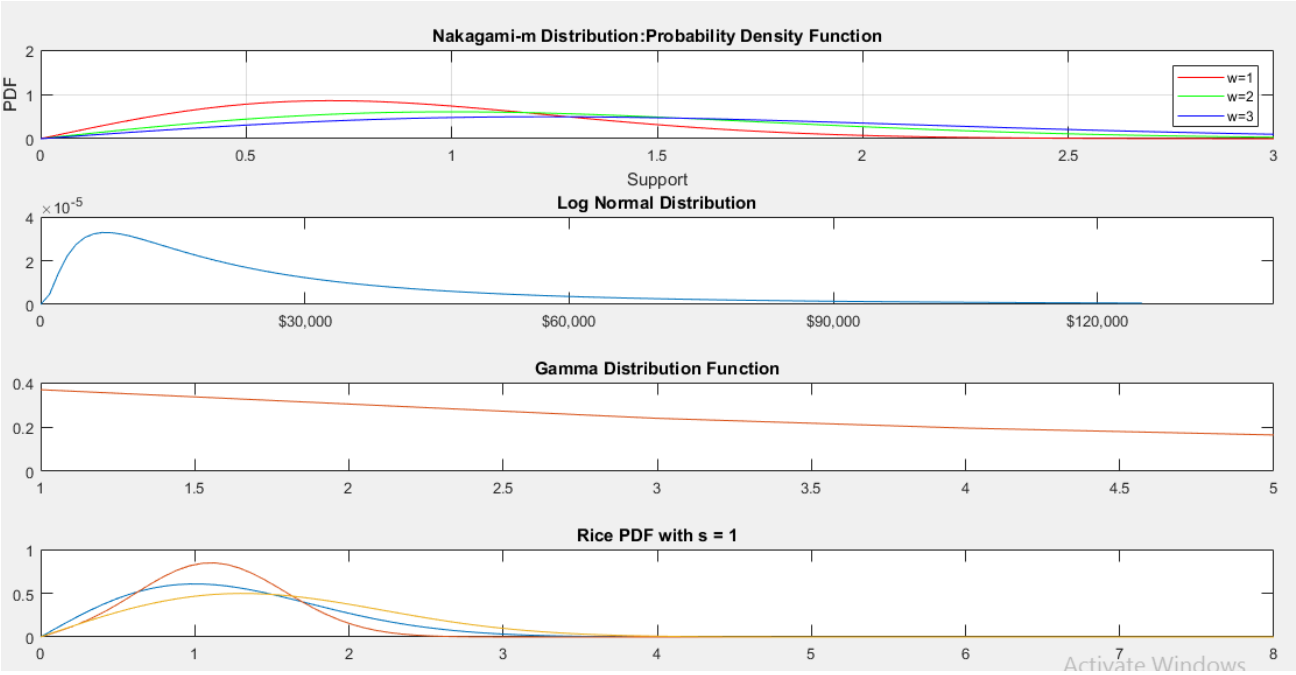
```
title('P= e^X, X: Gaussaian Distribution')
xlabel('Randomly Variables')
ylabel('Distribution')
```



Q9. Different Distribution

```
%Nakagami-m Distribution
clc; clear all; close all;
colors=['r','g','b'] ;
m = 1;
x = [0:0.05:3];
subplot(411)
for w = 1:3
    for ii = 1:length(x)
        y(ii)=((2*m^m)/(gamma(m)*w^m))*x(ii)^(2*m-1)*exp(-
((m/w)*x(ii)^2));
    end
    plot(x,y,colors(w))
    hold on
end
xlabel('Support');
ylabel('PDF');
title('Nakagami-m Distribution:Probability Density Function')
hleg1 = legend('w=1','w=2','w=3');
set(hleg1,'Location','NorthEast')
axis([0 3 0 2]);
grid on
%%
x = (10:1000:125010)';
y = lognpdf(x,log(20000),1.0);

subplot(412)
plot(x,y)
title('Log Normal Distribution')
h = gca;
h.XTick = [0 30000 60000 90000 120000];
h.XTickLabel = {'0','$30,000','$60,000','$90,000','$120,000'};
% Compute the Lognormal Distribution pdf
```

```
% Suppose the income of a family of four in the United States follows
% a lognormal distribution with mu = log(20,000) and sigma = 1.
% Compute and plot the income density

%%
mu = 1:5;

y = gampdf(1,1,mu);
%y = [0.3679  0.3033  0.2388  0.1947  0.1637]
y1 = exppdf(1,mu);
subplot(413)
plot(mu,y,mu,y1)
title("Gamma Distribution Function")
%%
%Rician
x = linspace(0, 8, 100);

subplot(4, 1, 4)
plot(x, ricepdf(x, 0, 1),  x, ricepdf(x, 1, 0.50), x, ricepdf(x, 1,
1.00))
title('Rice PDF with s = 1')
function y = ricepdf(x, v, s)
s2 = s.^2; % (neater below)
    try
        y = (x ./ s2) .*...
            exp(-0.5 * (x.^2 + v.^2) ./ s2) .*...
            besseli(0, x .* v ./ s2);
            % besseli(0, ...) is the zeroth order modified Bessel
function of
            % the first kind. (see help bessel)
        y(x <= 0) = 0;
    catch
        error('ricepdf:InputSizeMismatch','Non-scalar arguments must
match in size.');
    end
end
```



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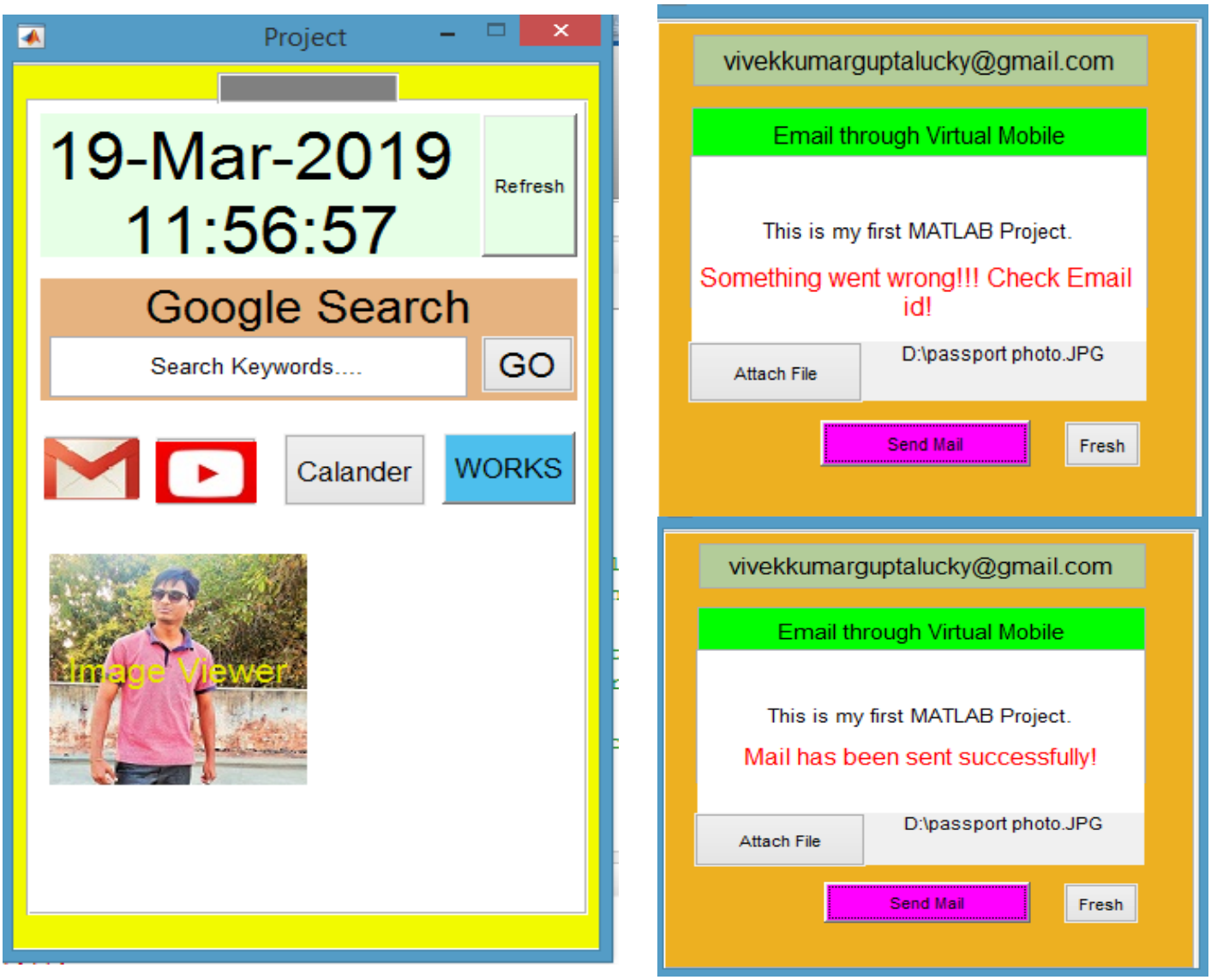
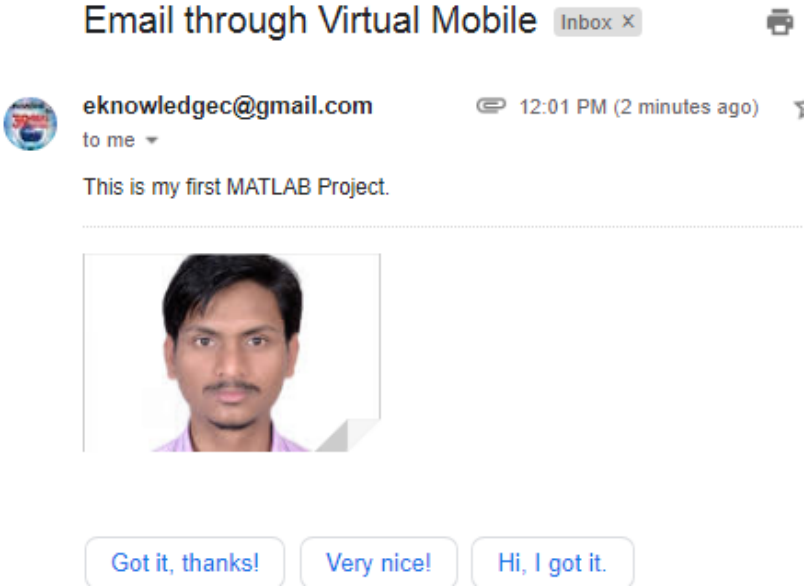
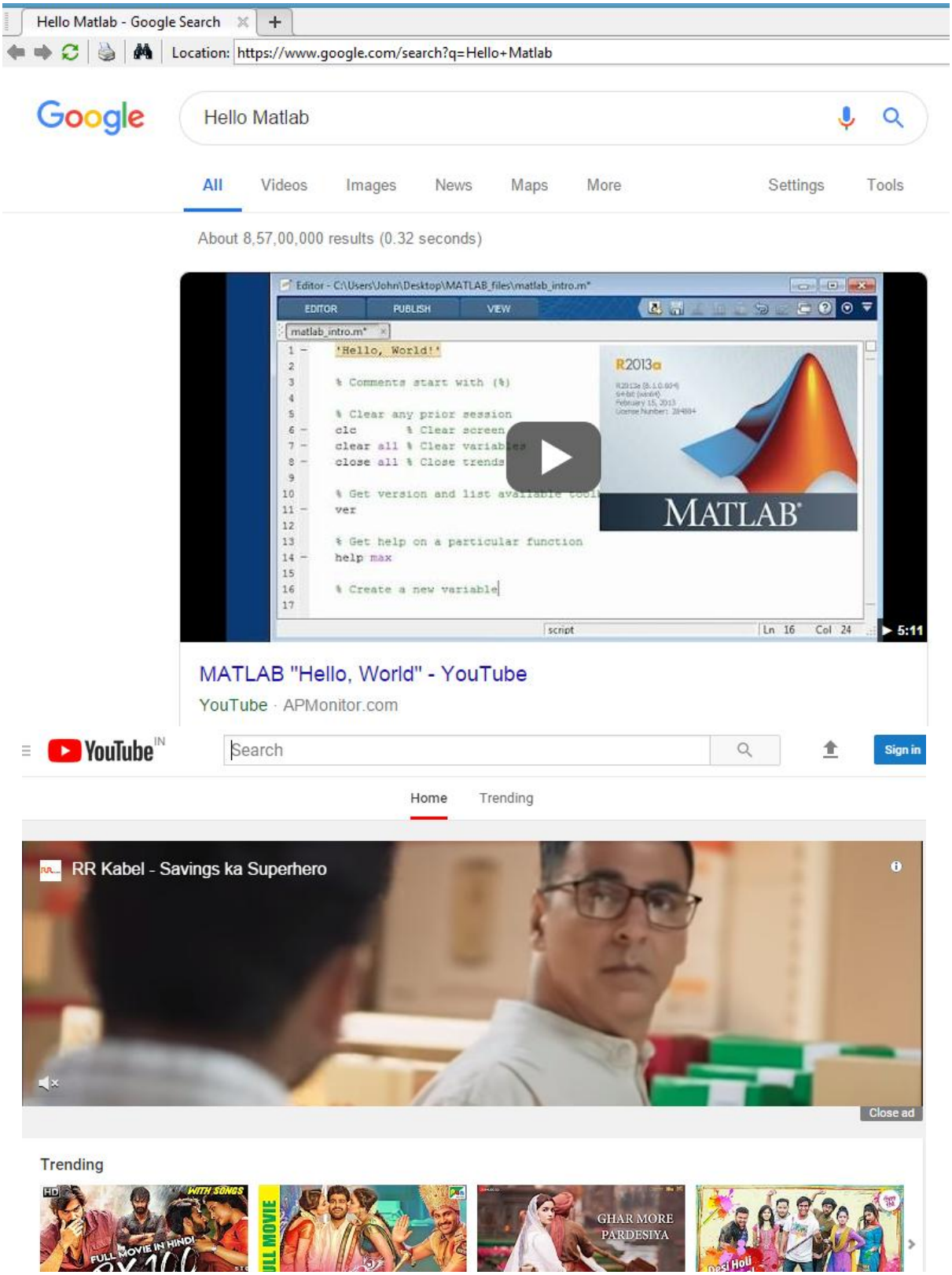
Project: Virtual Mobile






Hello Matlab - Google Search
Location: https://www.google.com/search?q=Hello+Matlab
Google
Hello Matlab
All
Videos
Images
News
Maps
More
Settings
Tools
About 8,57,00,000 results (0.32 seconds)
Editor - C:\Users\John\Desktop\MATLAB_files\matlab_intro.m*
EDITOR
PUBLISH
VIEW
matlab_intro.m*
'Hello, World!'
% Comments start with (%)
% Clear any prior session
clc % Clear screen
clear all % Clear variables
close all % Close trends
% Get version and list available tool
ver
% Get help on a particular function
help max
% Create a new variable
R2013a
MATLAB
script
Ln 16 Col 24
5:11
MATLAB "Hello, World" - YouTube
YouTube · APMonitor.com
YouTube IN
Search
Sign in
Home
Trending
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Close ad
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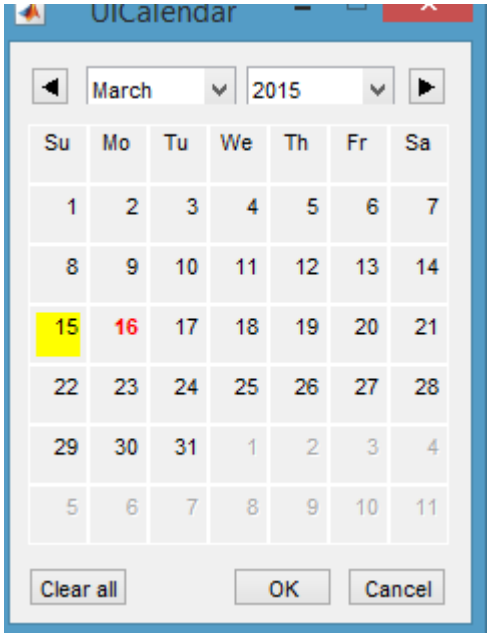
UICalendar
March
2015
Su Mo Tu We Th Fr Sa
1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31 1 2 3 4
5 6 7 8 9 10 11
Clear all
OK
Cancel

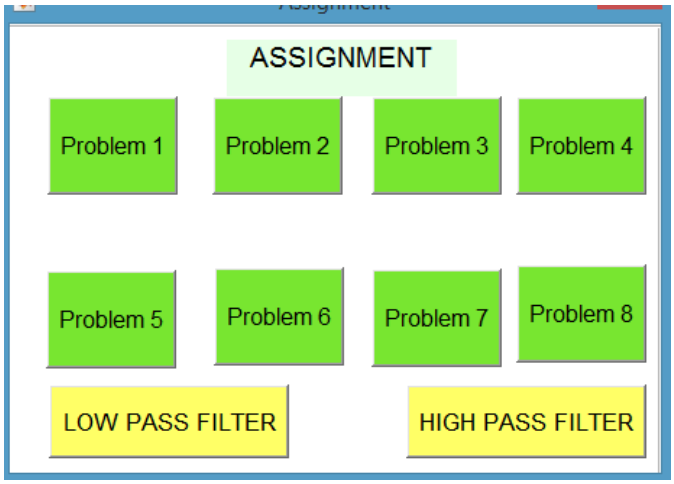
ASSIGNMENT
Problem 1
Problem 2
Problem 3
Problem 4
Problem 5
Problem 6
Problem 7
Problem 8
LOW PASS FILTER
HIGH PASS FILTER


Figure 1
File Edit View Insert Tools Desktop Window Help