Final Lab Project

Course: Data Communication

FALL 2020-21

Submitted by:

Name	ID	Section
Fahim Farajannat	17-35634-3	D

Fill up the table: [Your ID = AB-CDEFG-H]

VAL1	VAL2
EFG	BH
634	73

Marks Distribution:

Exam (Total Mark:20)				
Objectives	**Level (20-15) (Completely Attained)**	**Level (6-14) (Somewhat Attained)**	**Level (1-5) (Not Attained)**	**Secured Marks**
Problem Solving	All objectives are satisfied.	Objectives are satisfied at major extent.	Only few objectives are satisfied.	
Viva (Total Mark:20)				
Objective	**Level (20-15) (Completely Attained)**	**Level (6-14) (Somewhat Attained)**	**Level (1-5) (Not Attained)**	**Secured Marks**
In depth idea about Physical layer of OSI Model	Has clear idea of all topics	Has partial idea of all topic	Do not have proper idea of any topic	

Matlab Code:

```
clc;
Message='Fahim Farajannat';
val1=634;
%My ID IS (17-35634-3)
val2=73;
%Converting Information Message to bit%
x=asc2bin(Message); % Binary Information
val1Bin = de2bi(val1);
bp=.000001; % bit period
disp(' Binary information at Transmitter :');
disp(val1Bin);
%== (val1) binary information as digital signal
bit=[];
for n=1:1:length(val1Bin)
if val1Bin(n)==1
se=5*ones(1,100);
else val1Bin(n)=0;
se=zeros(1,100);
end
bit=[bit se];
end
```

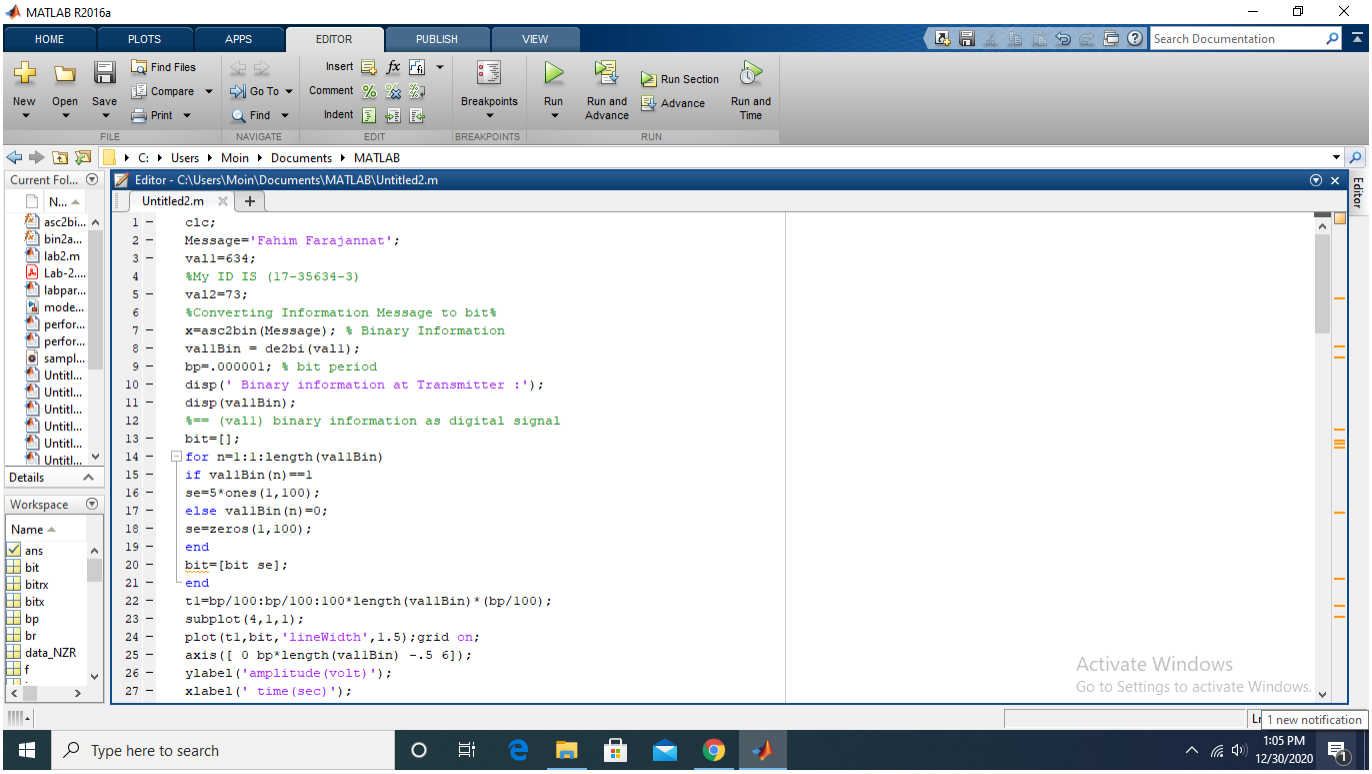
```
t1=bp/100:bp/100:100*length(val1Bin)*(bp/100);
subplot(4,1,1);
plot(t1,bit,'lineWidth',1.5);grid on;
axis([ 0 bp*length(val1Bin) -.5 6]);
ylabel('amplitude(volt)');
xlabel(' time(sec)');
title('Converted Val1 To Signal');
%=========text binary information as digital signal
bitx=[];
for n=1:1:length(x)
if x(n)==1;
se=5*ones(1,100);
else x(n)==0;
se=zeros(1,100);
end
bitx=[bitx se];
end
t2=bp/100:bp/100:100*length(x)*(bp/100);
subplot(4,1,2);
plot(t2,bitx,'g','lineWidth',1.5);grid on;
axis([ 0 bp*length(x) -.5 6]);
ylabel('amplitude(V)');
```

```
xlabel(' time(s)');
title('Text digital signal');

%===QPSK modulation===%
data_NZR=2*x-1;
s_p_data=reshape(data_NZR,2,length(x)/2); % S/P convertion of data
br=10.^6; %Let us transmission bit rate 1000000
f=br;
T=1/br; % bit duration
t=T/99:T/99:T; % Time vector for one bit information

y=[];
y_in=[];
y_qd=[];
for(i=1:length(x)/2)
y1=s_p_data(1,i)*cos(2*pi*f*t); % inphase component
y2=s_p_data(2,i)*sin(2*pi*f*t) ;% Quadrature component
y_in=[y_in y1]; % inphase signal vector
y_qd=[y_qd y2]; %quadrature signal vector
y=[y y1+y2]; % modulated signal vector
end
Tx_sig=y; % transmitting signal after modulation
```

```
t3=bp/71:bp/70.62:70.1*length(x)*(bp/100);
subplot(4,1,3);
plot(t3,Tx_sig,'R','lineWidth',1.5);grid on;
axis([ 0 bp*length(x) -.5 6]);
ylabel('amplitude(volt)');
xlabel(' time(sec)');
title('Modulated Signal');
axis([ 0 0.000012 -2 2]);

snry = randn(size(Tx_sig))*std(Tx_sig)/db2mag(val2);
disp('Calculated SNR Value');
disp(snr(Tx_sig,snry));

%======== QPSK demodulation ==================%
mn=[];
Rx_sig=Tx_sig; % Received signal
for(i=1:1:length(x)/2)

Z_in=Rx_sig((i-1)*length(t)+1:i*length(t)).*cos(2*pi*f*t);

Z_in_intg=(trapz(t,Z_in))*(2/T);
if(Z_in_intg>0) % Decession Maker
```

```
   Rx_in_data=1;
else
   Rx_in_data=0;
end
%=====================================================
%
Z_qd=Rx_sig((i-1)*length(t)+1:i*length(t)).*sin(2*pi*f*t);

Z_qd_intg=(trapz(t,Z_qd))*(2/T);
if (Z_qd_intg>0)% Decession Maker
Rx_qd_data=1;
else
Rx_qd_data=0;
end
mn=[mn Rx_in_data Rx_qd_data]; % Received Data vector
end
%===============
rs=mn;
bitrx=[];
for n=1:1:length(rs)
   if rs(n)==1;
      se=5*ones(1,100);
```

```
   else rs(n)==0;
      se=zeros(1,100);
   end
bitrx=[bitrx se];
end
t2=bp/100:bp/100:100*length(rs)*(bp/100);
subplot(4,1,4);
plot(t2,bitrx,'g','lineWidth',1.5);grid on;
axis([ 0 bp*length(rs) -.5 6]);
ylabel('amplitude(V)');
xlabel(' time(s)');
title('Received Signal');
%===============
disp('Receive Text');
Received_Message=bin2asc(mn);
disp(Received_Message);
```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Editor - C:\Users\Moin\Documents\MATLAB\Untitled2.m
Untitled2.m
clc;
Message='Fahim Farajannat';
val1=634;
%My ID IS (17-35634-3)
val2=73;
%Converting Information Message to bit%
x=asc2bin(Message); % Binary Information
val1Bin = de2bi(val1);
bp=.000001; % bit period
disp(' Binary information at Transmitter :');
disp(val1Bin);
%== (val1) binary information as digital signal
bit=[];
for n=1:1:length(val1Bin)
if val1Bin(n)==1
se=5*ones(1,100);
else val1Bin(n)=0;
se=zeros(1,100);
end
bit=[bit se];
end
t1=bp/100:bp/100:100*length(val1Bin)*(bp/100);
subplot(4,1,1);
plot(t1,bit,'lineWidth',1.5);grid on;
axis([0 bp*length(val1Bin) -.5 6]);
ylabel('amplitude(volt)');
xlabel(' time(sec)');
Activate Windows
Go to Settings to activate Windows.
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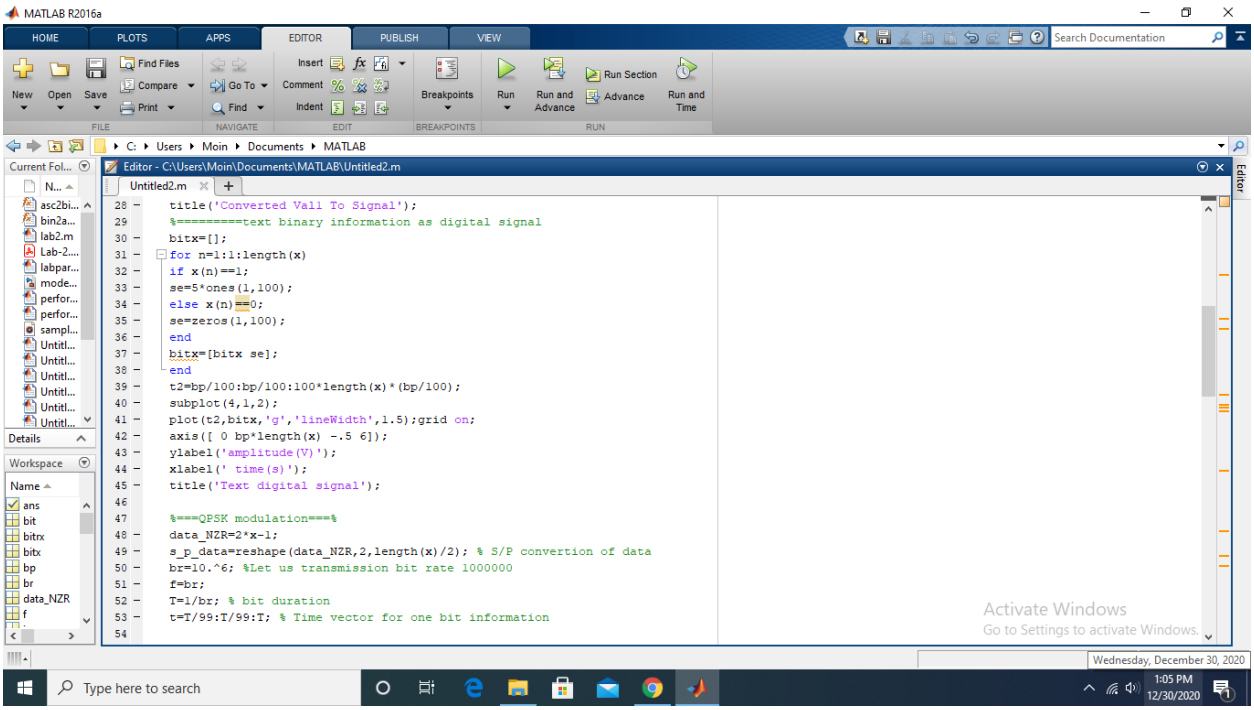
12/30/2020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Editor - C:\Users\Moin\Documents\MATLAB\Untitled2.m
Untitled2.m
title('Converted Vall To Signal');
%=========text binary information as digital signal
bitx=[];
for n=1:1:length(x)
if x(n)==1;
se=5*ones(1,100);
else x(n)==0;
se=zeros(1,100);
end
bitx=[bitx se];
end
t2=bp/100:bp/100:100*length(x)*(bp/100);
subplot(4,1,2);
plot(t2,bitx,'g','lineWidth',1.5);grid on;
axis([0 bp*length(x) -.5 6]);
ylabel('amplitude(V)');
xlabel(' time(s)');
title('Text digital signal');
%===QPSK modulation===%
data_NZR=2*x-1;
s_p_data=reshape(data_NZR,2,length(x)/2); % S/P convertion of data
br=10.^6; %Let us transmission bit rate 1000000
f=br;
T=1/br; % bit duration
t=T/99:T/99:T; % Time vector for one bit information
Activate Windows
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Wednesday, December 30, 2020
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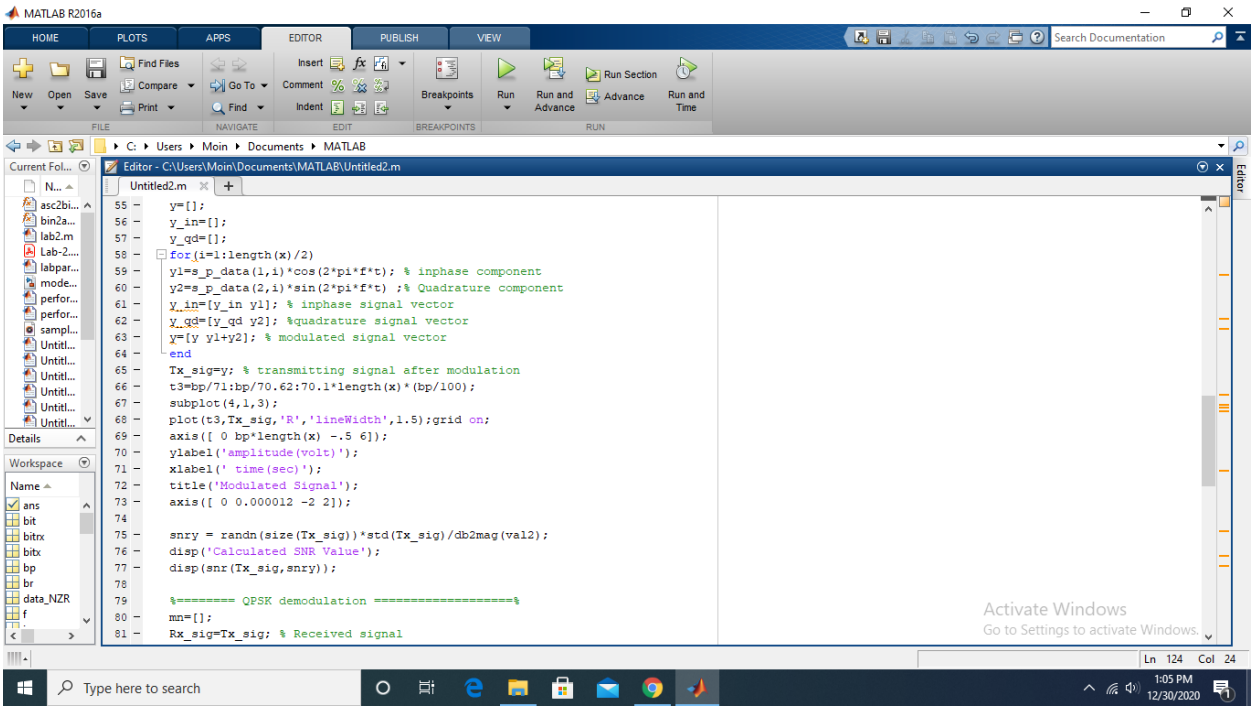
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Editor - C:\Users\Moin\Documents\MATLAB\Untitled2.m
Untitled2.m
y=[];
y_in=[];
y_qd=[];
for(i=1:length(x)/2)
yl=s_p_data(1,i)*cos(2*pi*f*t); % inphase component
y2=s_p_data(2,i)*sin(2*pi*f*t) ;% Quadrature component
y_in=[y_in yl]; % inphase signal vector
y_qd=[y_qd y2]; %quadrature signal vector
y=[y yl+y2]; % modulated signal vector
end
Tx_sig=y; % transmitting signal after modulation
t3=bp/71:bp/70.62:70.1*length(x)*(bp/100);
subplot(4,1,3);
plot(t3,Tx_sig,'R','lineWidth',1.5);grid on;
axis([0 bp*length(x) -.5 6]);
ylabel('amplitude(volt)');
xlabel(' time(sec)');
title('Modulated Signal');
axis([0 0.000012 -2 2]);
snry = randn(size(Tx_sig))*std(Tx_sig)/db2mag(val2);
disp('Calculated SNR Value');
disp(snr(Tx_sig,snry));
%======== QPSK demodulation ==================%
mn=[];
Rx_sig=Tx_sig; % Received signal
Activate Windows
Go to Settings to activate Windows.
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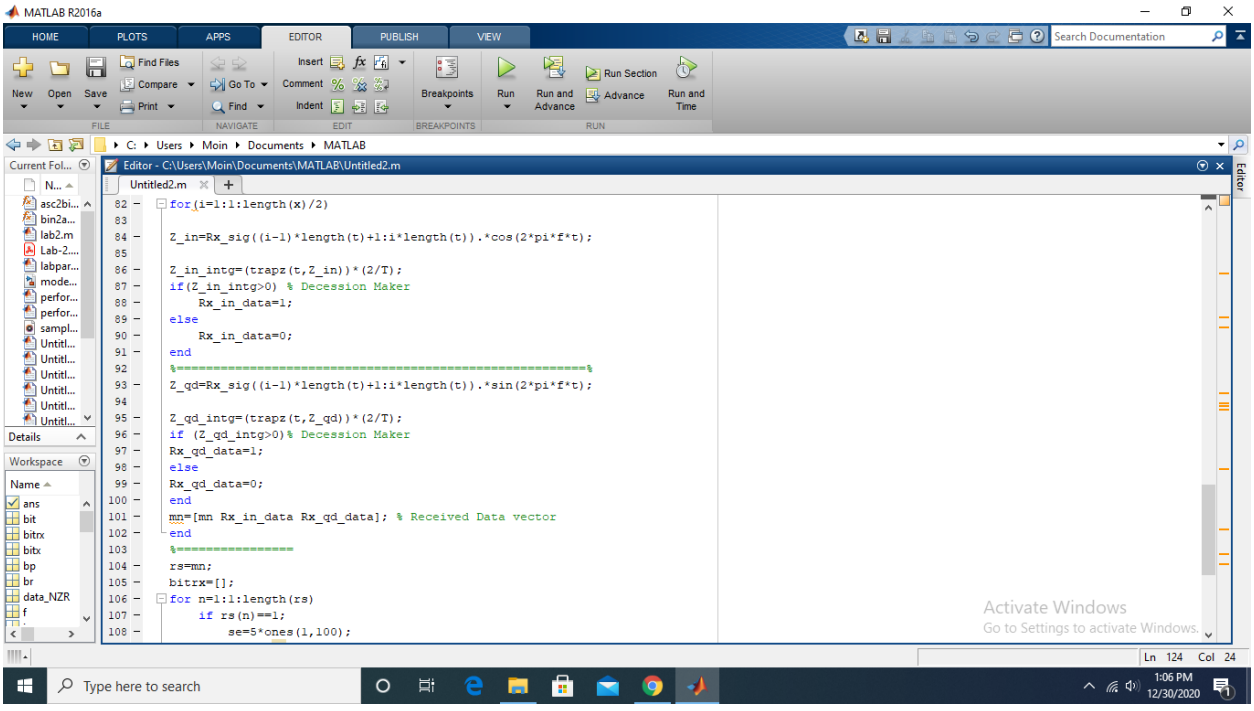
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Editor - C:\Users\Moin\Documents\MATLAB\Untitled2.m
Untitled2.m
for(i=1:1:length(x)/2)
Z_in=Rx_sig((i-1)*length(t)+1:i*length(t)).*cos(2*pi*f*t);
Z_in_intg=(trapz(t,Z_in))*(2/T);
if(Z_in_intg>0) % Decession Maker
Rx_in_data=1;
else
Rx_in_data=0;
end
%===%
Z_qd=Rx_sig((i-1)*length(t)+1:i*length(t)).*sin(2*pi*f*t);
Z_qd_intg=(trapz(t,Z_qd))*(2/T);
if (Z_qd_intg>0)% Decession Maker
Rx_qd_data=1;
else
Rx_qd_data=0;
end
mn=[mn Rx_in_data Rx_qd_data]; % Received Data vector
end
%===============
rs=mn;
bitrx=[];
for n=1:1:length(rs)
if rs(n)==1;
se=5*ones(1,100);
Activate Windows
Go to Settings to activate Windows.
Ln 124 Col 24
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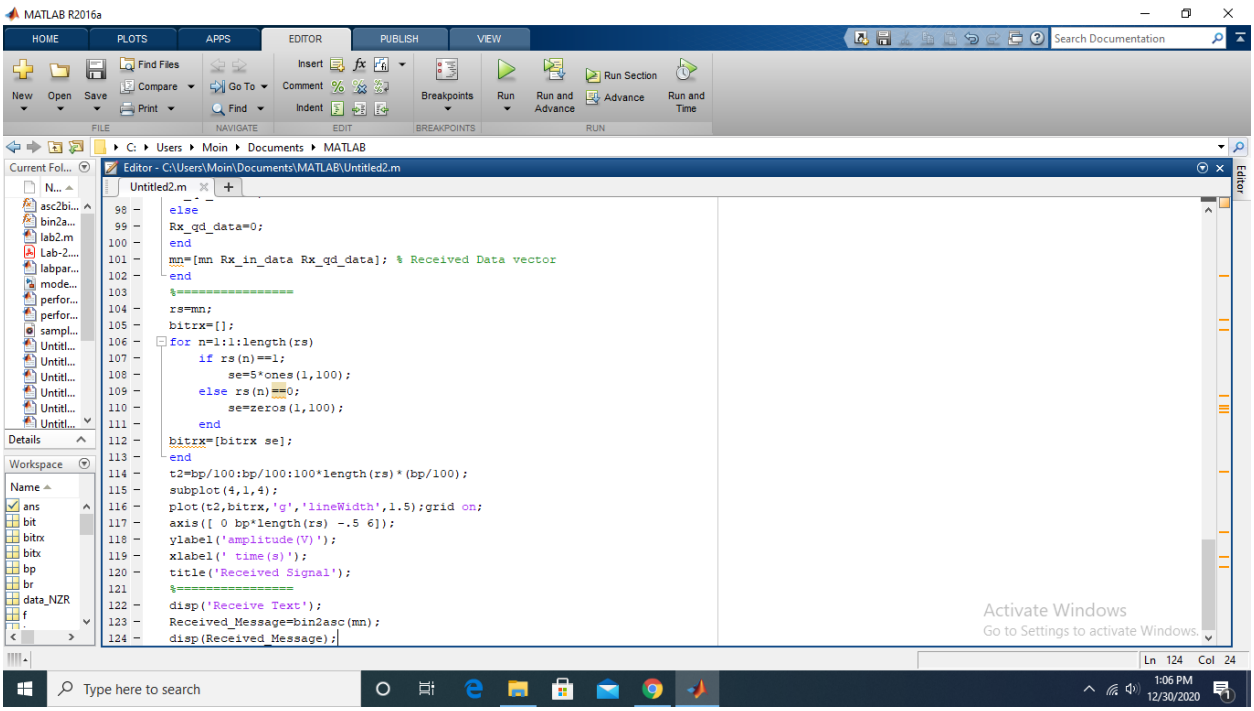
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Editor - C:\Users\Moin\Documents\MATLAB\Untitled2.m
Untitled2.m
98 – else
99 – Rx_qd_data=0;
100 – end
101 – mn=[mn Rx_in_data Rx_qd_data]; % Received Data vector
102 – end
103 – %================
104 – rs=mn;
105 – bitrx=[];
106 – for n=1:1:length(rs)
107 – if rs(n)==1;
108 – se=5*ones(1,100);
109 – else rs(n)==0;
110 – se=zeros(1,100);
111 – end
112 – bitrx=[bitrx se];
113 – end
114 – t2=bp/100:bp/100:100*length(rs)*(bp/100);
115 – subplot(4,1,4);
116 – plot(t2,bitrx,'g','lineWidth',1.5);grid on;
117 – axis([0 bp*length(rs) -.5 6]);
118 – ylabel('amplitude(V)');
119 – xlabel(' time(s)');
120 – title('Received Signal');
121 – %================
122 – disp('Receive Text');
123 – Received_Message=bin2asc(mn);
124 – disp(Received_Message);
Activate Windows
Go to Settings to activate Windows.
Ln 124 Col 24
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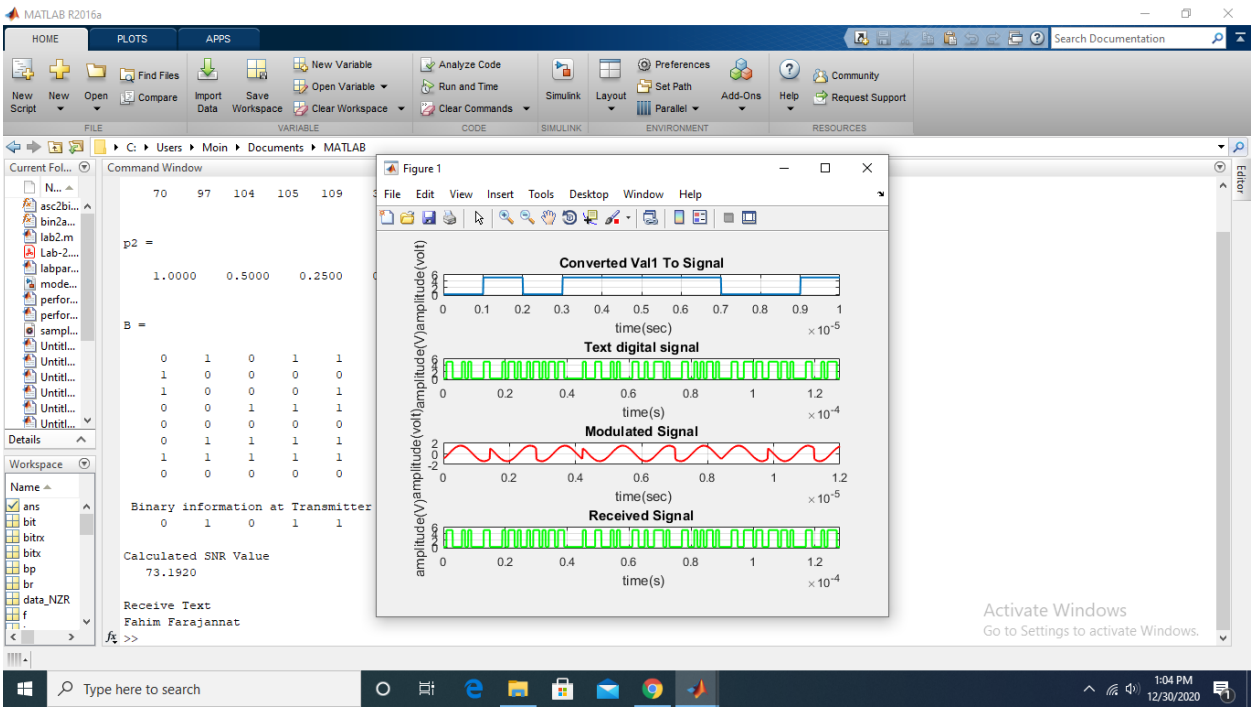
Output: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Command Window
70 97 104 105 109
p2 =
1.0000 0.5000 0.2500
B =
0 1 0 1 1
1 0 0 0 0
1 0 0 0 1
0 0 1 1 1
0 0 0 0 0
0 1 1 1 1
1 1 1 1 1
0 0 0 0 0
Binary information at Transmitter
0 1 0 1 1
Calculated SNR Value
73.1920
Receive Text
Fahim Farajannat
>>
Figure 1
File Edit View Insert Tools Desktop Window Help
Converted Val1 To Signal
time(sec)
Text digital signal
time(s)
Modulated Signal
time(sec)
Received Signal
time(s)
amplitude(V)amplitude(volt)
Activate Windows
Go to Settings to activate Windows.
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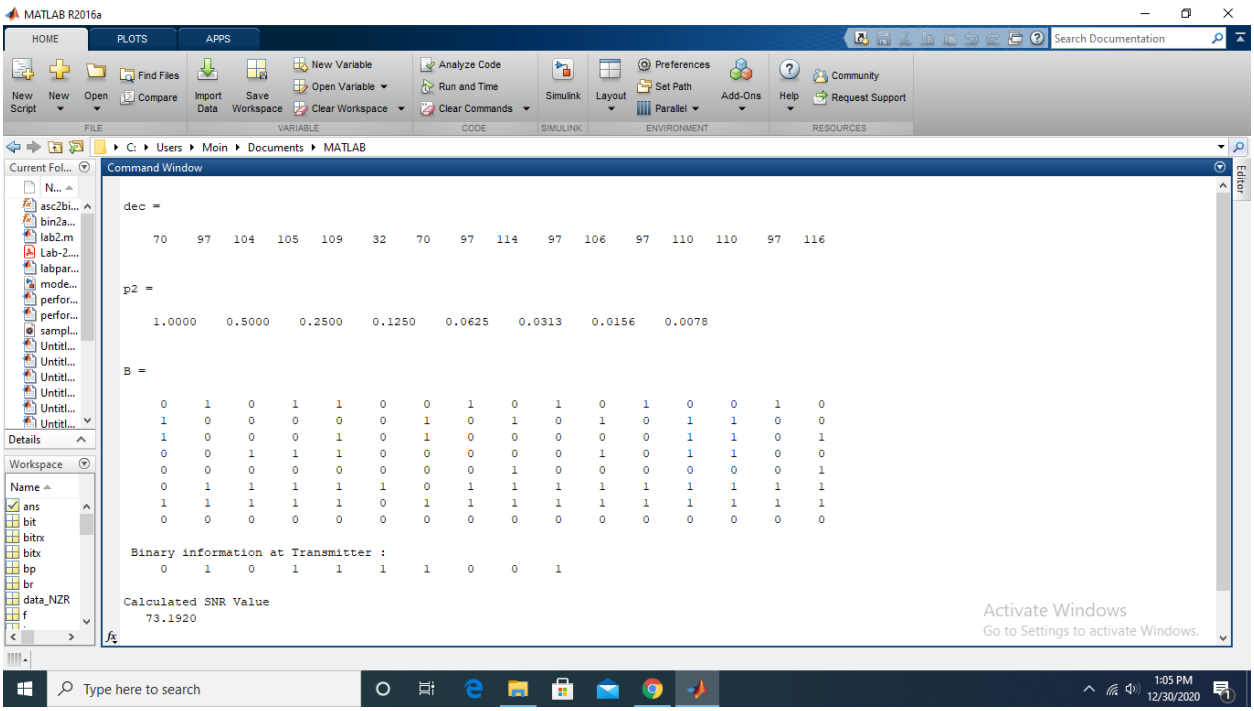
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Command Window
Editor
dec =
70 97 104 105 109 32 70 97 114 97 106 97 110 110 97 116
p2 =
1.0000 0.5000 0.2500 0.1250 0.0625 0.0313 0.0156 0.0078
B =
0 1 0 1 1 0 0 1 0 1 0 1 0 0 1 0
1 0 0 0 0 0 1 0 1 0 1 0 1 1 0 0
1 0 0 0 1 1 0 0 0 0 0 0 1 1 0 1
0 0 1 1 1 0 0 0 0 0 1 0 1 1 0 0
0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 1
0 1 1 1 1 1 0 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 0 1 1 1 1 1 1 1 1 1
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
Binary information at Transmitter :
0 1 0 1 1 1 1 0 0 1
Calculated SNR Value
73.1920
Details
Workspace
Name
ans
bit
bitrx
bitx
bp
br
data_NZR
f
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Go to Settings to activate Windows.
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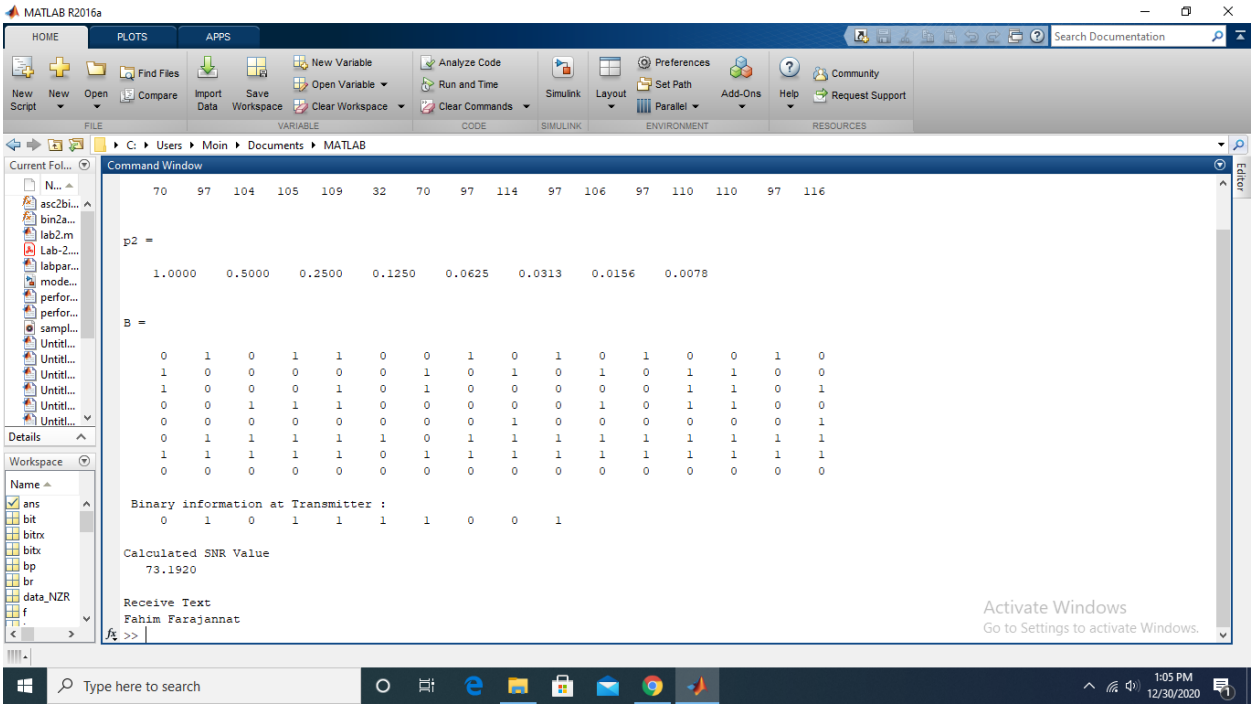
MATLAB R2016a
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Search Documentation
New Script
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Open Variable
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Command Window
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70 97 104 105 109 32 70 97 114 97 106 97 110 110 97 116
p2 =
1.0000 0.5000 0.2500 0.1250 0.0625 0.0313 0.0156 0.0078
B =
0 1 0 1 1 0 0 1 0 1 0 1 0 0 1 0
1 0 0 0 0 0 1 0 1 0 1 0 1 1 0 0
1 0 0 0 1 1 0 0 0 0 0 0 1 1 0 1
0 0 1 1 1 0 0 0 0 0 1 0 1 1 0 0
0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 1
0 1 1 1 1 1 0 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 0 1 1 1 1 1 1 1 1 1
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
Binary information at Transmitter :
0 1 0 1 1 1 1 0 0 1
Calculated SNR Value
73.1920
Receive Text
Fahim Farajannat
>>
Details
Workspace
Name
ans
bit
bitrx
bitx
bp
br
data_NZR
f
Activate Windows
Go to Settings to activate Windows.
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