Final-term Lab Assessment Task

Submitted By:		
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Parameters:

Consider, your ID = **AB-CDEFG-H.**

ID: 19-39909-1

[please use any random value if assigned value comes out zero]

VAL1 = EFG*100	**VAL2** = GH*10
= 909*100 = 90900	**= 91*10 = 910**

Problem Statement:

Suppose, you want to send a message which contains your FIRST MEMBER NAME. Develop a MATLAB code to show the transmission process to send the information from SENDER to RECEIVER. Available frequency ranges for the transmission: 1.8 - 2.5 GHz

Hint:

1. Encode the message.
2. Convert binary bit stream from parallel to serial transmission.
3. Convert data to signal using at least **VAL1** sample data.
4. Now, modulate the digital signal (using any Digital to Analog Conversion except BASK) to send via a transmission channel.
5. The signal to noise ratio of the channel is **VAL2**.
6. Demodulate the received signal.
7. Convert the binary data to retrieve the message.

MATLAB Codes:

1. ASCII to Binary Converter Function:

```
function dn = asc2bn(txt)
dec=double(txt) %Text to ASCII (decimal)
p2=2.^(0:-1:-7) % 2^0,2^-1,.......,2^-7
B=mod(floor(p2'*dec),2) %Decimal to binary conversion
%Columns of B are bits of chars
dn=reshape(B,1,numel(B));%Bytes to serial conbversion
end
```

2. Binary to ASCII Converter Function:

```
function txt = bin2asc(dn)
%bin2asc Serial binary to ASCII to text conversion
% 8 bits per char , LSB first
% >> txt= bin2asc(dn) <<
% where dn is binary input sequence
% txt is output text string
L=length(dn); %Length of input string
L8=8*floor(L/8); %Multiple of 8 Length
B=reshape(dn(1:L8),8,L8/8); %Cols of B are bits of chars
p2=2.^(0:7); %power of 2
dec=p2*B; %Binary to decimal conversion
txt=char(dec); %ASCII (decimal) to txt
end
```

Message Sending using QPSK Modulation and Demodulation:

```
%APPLYING QPSK
clc;
clear all;
close all;
Transmitted_Message= '19-39909-1'
%Converte the Information Message to bit stream%
x=asc2bn(Transmitted_Message);
bp=.0000001;
disp(' Binary information at Transmitter :');
disp(x);

%XX representation of transmitting binary information as digital signal XXX
bit=[];
for n=1:1:length(x)
 if x(n)==1;
 se=5*ones(1,100);
 else x(n)==0;
 se=zeros(1,100);
 end
 bit=[bit se];
end
t1=bp/106:bp/106:100*length(x)*(bp/106);
subplot(4,1,1);
plot(t1,bit,'lineWidth',2.5);
```

```
grid on;
axis([ 0 bp*length(x) -.5 6]);
ylabel('amplitude(volt)');
xlabel(' time(sec)');
title('Transmitting information as digital signal');

%  QPSK modulation

data_NZR=2*x-1;         % Data Represented at NZR form for QPSK modulation
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;                                  % minimum carrier frequency
T=1/br;                                % bit duration
t=T/90900:T/90900:T; % Time vector for one bit information; Sample= DEF =
90900
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
tt=T/90900:T/90900:(T*length(x))/2;     % Sample= DEF = 90900
                                  %AB-CDEFG-H

Rec=awgn(Tx_sig,910);           % noise = EG = 910
subplot(4,1,2);
plot(tt,Tx_sig,'g','linewidth',1.5),
grid on;
title('QPSK modulated signal');
xlabel('time(sec)');
ylabel('amplitude(volt)');
subplot(4,1,3);
plot(tt,Rec,'r','linewidth',2.5),
grid on;
title('QPSK modulated signal at Receiver');
xlabel('time(sec)');
ylabel('amplitude(volt)');

disp(' Message transmitted through a Transmission medium');



% QPSK demodulation
Rx_data=[];
Rx_sig=Tx_sig; % Received signal
for(i=1:1:length(x)/2)
%------------inphase coherent dector----------
    Z_in=Rx_sig((i-1)*length(t)+1:i*length(t)).*cos(2*pi*f*t);
    % above line indicat multiplication of received & inphase carred signal
    Z_in_intg=(trapz(t,Z_in))*(2/T);% integration using trapizodial rull
```

```
    if(Z_in_intg>0) % Decession Maker
        Rx_in_data=1;
    else
       Rx_in_data=0;
    end
          %-------------Quadrature coherent dector-------------
    Z_qd=Rx_sig((i-1)*length(t)+1:i*length(t)).*sin(2*pi*f*t);
    %above line indicat multiplication ofreceived & Quadphase carred signal

    Z_qd_intg=(trapz(t,Z_qd))*(2/T);%integration using trapizodial rull
        if (Z_qd_intg>0)% Decession Maker
        Rx_qd_data=1;
        else
       Rx_qd_data=0;
        end
        Rx_data=[Rx_data  Rx_in_data  Rx_qd_data]; % Received Data vector
end
disp(' Binary information at Reciver :');
disp(Rx_data);
bit=[];
for n=1:length(Rx_data);
 if Rx_data(n)==1;
 se=5*ones(1,100);
 else Rx_data(n)==0;
 se=zeros(1,100);
 end
 bit=[bit se];
end
t5=bp/106:bp/106:100*length(Rx_data)*(bp/106);
subplot(4,1,4);
plot(t5,bit,'LineWidth',2.5);
grid on;
axis([ 0 bp*length(Rx_data) -.5 6]);
ylabel('amplitude(volt)');
xlabel(' time(sec)');
title('Demodulated signal at Receiver');
%Converting Information bit to Message%
Received_Message=bin2asc(Rx_data)
```

Text Output:

```
Transmitted_Message =

    '19-39909-1'


dec =

    49    57    45    51    57    57    48    57    45    49


p2 =

    1.0000    0.5000    0.2500    0.1250    0.0625    0.0312    0.0156    0.0078


B =

     1     1     1     1     1     1     0     1     1     1
     0     0     0     1     0     0     0     0     0     0
     0     0     1     0     0     0     0     0     1     0
     0     1     1     0     1     1     0     1     1     0
     1     1     0     1     1     1     1     1     0     1
     1     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     0     0     0     0

 Binary information at Transmitter :
  Columns 1 through 21

     1     0     0     0     1     1     0     0     1     0     0     1     1     1     0     0     1     0     1     1     0

  Columns 22 through 42

     1     0     0     1     1     0     0     1     1     0     0     1     0     0     1     1     1     0     0     1     0

  Columns 43 through 63

     0     1     1     1     0     0     0     0     0     0     1     1     0     0     1     0     0     1     1     1     0

  Columns 64 through 80

     0     1     0     1     1     0     1     0     0     1     0     0     0     1     1     0     0


 Message transmitted through a Transmission medium
 Binary information at Reciver :
  Columns 1 through 21

     1     0     0     0     1     1     0     0     1     0     0     1     1     1     0     0     1     0     1     1     0

  Columns 22 through 42

     1     0     0     1     1     0     0     1     1     0     0     1     0     0     1     1     1     0     0     1     0

  Columns 43 through 63

     0     1     1     1     0     0     0     0     0     0     1     1     0     0     1     0     0     1     1     1     0

  Columns 64 through 80

     0     1     0     1     1     0     1     0     0     1     0     0     0     1     1     0     0


Received_Message =

    '19-39909-1'
```

Signal Output