AMERICAN INTERNATIONAL UNIVERSITY–BANGLADESH (AIUB)

FACULTY OF ENGINEERING

Course name: Data Communication

Course code: COE 3201

Section: H

Semester: Spring 2023-24

Group-04

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Experiment No: 10

Experiment name: **A Message Passing and Receiving Using Modulator & Demodulator**

Submission date: May 13th, 2024

Please do the following task for experiment-10:
Consider first three digit any of your group member name as the transmitted message. Then, design the modulator and demodulator in MATLAB.

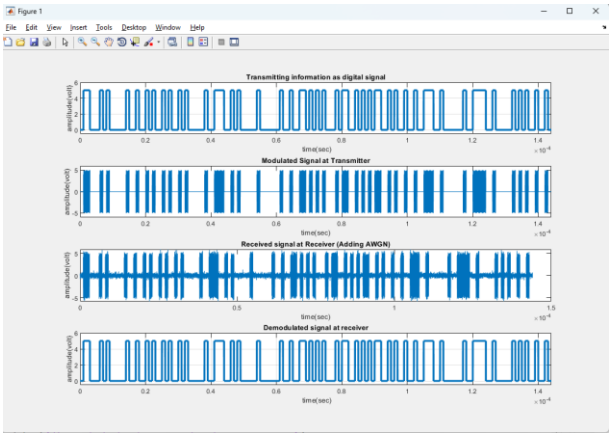
ANSWER OF QUESTION 1

Let, the first three digit of the name be ‘FARJANA YESMIN OPI’

Now, let’s design the modulator and demodulator in the MATLAB. We are using two external function here 1. Asc2bn and 2. Bn2bsc

MATLAB Code	Output Figure

```
clc;
clear all;

Transmitted_Message= 'FARJANA YESMIN OPI'

% Converting Information Message to bit%
x=asc2bn(Transmitted_Message); % Decimal to
Binary conversion
bp=.000001; % bit duration
disp(' Binary information at Trans mitter
:');
disp(x); %1x24

% Representation of transmitting binary
information as digital signal
bit=[];
for n=1:1:length(x)  %1 to 24
    if x(n)==1;
       se=5*ones(1,100);
    else x(n)==0;
       se=zeros(1,100);
    end
     bit=[bit se]; %24x100=2400 % Dimnension
will be 1x2400
end

% bit dimension is 1x2400=1x(24x100)

t1=bp/100:bp/100:100*length(x)*(bp/100); %
dimension is 1x2400

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');

% Binary-ASK modulation
A1=5;  % Amplitude of carrier signal for
information 1
A2=0;  % Amplitude of carrier signal for
information 0 bit
br=1/bp;  % bp is bit duration
f=br*10;  % carrier frequency

t2=bp/99:bp/99:bp; % size will be 1x99
ss=length(t2);

m=[]; % variable m will save the samples of
ASK modulated signal (Tx side)

for (i=1:1:length(x))
    if (x(i)==1)
        y=A1*cos(2*pi*f*t2);
    else
        y=A2*cos(2*pi*f*t2); % output will be
zero if original bit is 0
    end
    m=[m y]; % dimension of m 1x
(24x99)=2376, 1x2376
end

t3=bp/99:bp/99:bp*length(x); %Dimension of t3
is 1x2376

subplot(4,1,2);
plot(t3,m);
```




```
Received_Message =

    'FARJANA YESMIN OPI'

fx >>
```

```
axis([ 0 bp*length(x) -6 6]);
xlabel('time(sec)');
ylabel('amplitude(volt)');
title('Modulated Signal at Transmitter');
disp(' Message transmitted through a
Transmission medium');

% Transmitter side task is done. We have ASK
modulated signal 'm'

%Channel Noise (using mathematical formula)
%signal_power = mean(abs(m).^2);
%snr_dB=10;
%snr = 10^(snr_dB/10);
%noise_power = signal_power / snr;
%noise = sqrt(noise_power) * randn(size(m));
%Rec=m+noise;


%Channel Noise (using builtin 'agwn'
function)

Rec=awgn(m,10); % Rec is the received signal
at the receiver side

subplot(4,1,3);
plot(t3,Rec);
%axis([ 0 bp*length(x) -6 6]);
xlabel('time(sec)');
ylabel('amplitude(volt)');
title('Received signal at Receiver (Adding
AWGN)');

%Receiver side task started from here
% Binary ASK demodulation

mn=[]; % ASK demodulated signal for received
signal 'Rec'

for n=ss:ss:length(Rec)
  t=bp/99:bp/99:bp;
  y=cos(2*pi*f*t);  % Carrier siignal
  mm=y.*Rec((n-(ss-1)):n); % multifying the
carrier signal with received ASK modulated
signal
  % Arry index in mm signal: 99-(99-1)=99-
98=1:n
  %to amplify the received ASK modulated
signal amplitude
  z=trapz(t,mm) ; % intregation
  zz=round((2*z/bp));
  %disp('vlaue of zz is')
  %disp(zz)
  if(zz>2.5)
    a=1;
  else
    a=0;
  end
  mn=[mn a];
end
disp('Binary information at Reciver :');
disp(mn);

% Representation of binary information as
digital signal which achived
% After ASK demodulation

bit=[];
for n=1:length(mn);
    if mn(n)==1;
       se=5*ones(1,100);
```

```
    else mn(n)==0;
        se=zeros(1,100);
    end
     bit=[bit se];
end

t5=bp/100:bp/100:100*length(mn)*(bp/100);
subplot(4,1,4)
plot(t5,bit,'LineWidth',2.5);grid on;
axis([ 0 bp*length(mn) -.5 6]);
ylabel('amplitude(volt)');
xlabel(' time(sec)');
title('Demodulated signal at receiver');

%Converting Information bit to Message
Received_Message=bin2asc(mn)
```

The asc2bn function is as follows:

```
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
```

The bn2asc function is as follows:

```
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
```