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**AMERICAN INTERNATIONAL UNIVERSITY–BANGLADESH (AIUB)**

FACULTY OF ENGINEERING

Course name: Data Communication

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Section: H

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Group-04

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Experiment No: 10

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

Submission date: May 13th, 2024

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**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

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| 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);  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