AMERICAN INTERNATIONAL UNIVERSITY–BANGLADESH (AIUB)

FACULTY OF ENGINEERING

Course name: Data Communication

Course code: COE 3201

Section: H

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Group-04

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Experiment No : 06

Experiment name: **Study of Digital to Analog Conversion using MATLAB**

Submission date: April 26th, 2024

Performance Task for Lab Report:

1. For bit steam x= [1 0 1 0 1 1 1 0]; write a MATLAB code to generate ASK, BFSK, and BPSK modulated signal following the table 1-3. Then, Plot the modulated signals using subplot.

Table-1

Sine wave amplitude for ASK:

Bit	Amplitude (volts)
0	10
1	0

Table-2

Sine wave frequency for BFSK:

Bit	Frequency (Hz)
0	4
1	8

Table-3

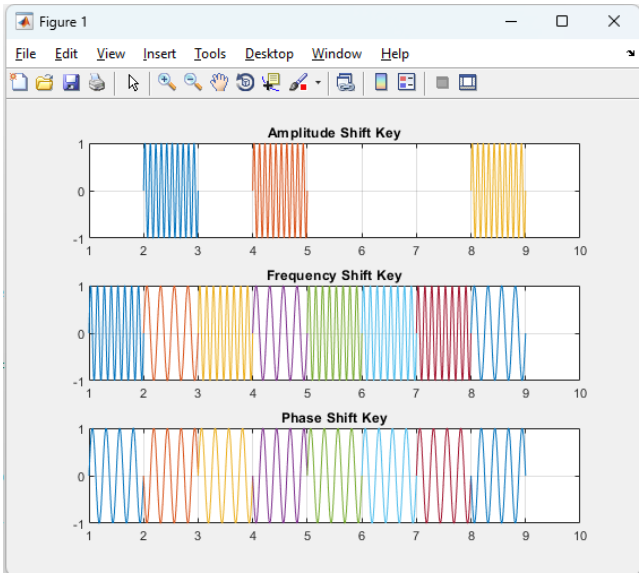
Sine wave phase shift for BPKS

Bit	Phase shift (degree)
0	180
1	0

ANSWER OF QUESTION 1:

MATLAB Code	Output Figure

```
ff = 10;
f=4;
f2=8;


x=[1 0 1 0 1 1 1 0]; % input signal x

%nx=size(x,2); %length of the input
signal (8)

nx=length(x); %nx=8

i=1;
while i<nx+1 % i<9 while loop start
run till i=8 to catch each element in
x
     t = i:0.001:i+1;  %represent the
time domain for each sin signal

    if x(i)==0
       ask=sin(2*pi*ff*t); % to
represent 1 bit
       fsk=sin(2*pi*f*t); % low
frequency to represent 1 bit, f=5 Hz
       psk=sin(2*pi*f*t + pi); % 0
degree phase shift for psk signal to
represent 1 bit

    else %signal element will be 0
bit
        ask=0;  %making almplitude 0
to represent 0 bit
        fsk=sin(2*pi*f2*t); %higher
frequency to represent 0 bit, f2=10
Hz
        psk=sin(2*pi*f*t); % 180
degree phase shift to represent 0 bit
    end

    subplot(3,1,1);
    plot(t,ask);
    hold on;
    grid on;
    axis([1 10 -1 1]); % define the
range of the x- and y axis

 title('Amplitude Shift Key')

    subplot(3,1,2);
    plot(t,fsk);
    hold on;
    grid on;
    axis([1 10 -1 1]);
title('Frequency Shift Key')

    subplot(3,1,3);
```



OUTPUT SCREENSHOT OF QUESTION 1

```
    plot(t,psk);
    hold on;
    grid on;
    axis([1 10 -1 1]);
 title('Phase Shift Key')

    i=i+1;
end
```

1. For bit steam x= [00 10 01 11]; write a MATLAB code to generate QPSK modulated signal using two different BPSK following table 4-5. Then, plot the modulated signal using subplot.

   Table-4: For BPSK-1 (in odd position of bit stream x)

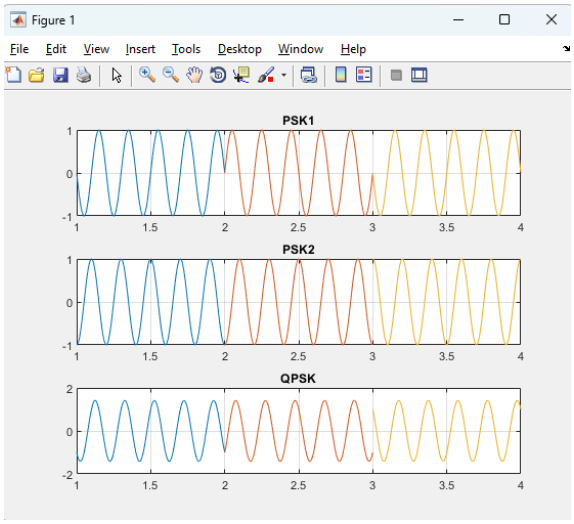
Bit	**Phase shift (degree)**
0	180
1	0

   Table-5: For BPSK-2 (in even position of bit stream x)

Bit	**Phase shift (degree)**
0	270
1	90

MATLAB Code	Output Figure

```
f=5;

x=[00 10 01 11] % input signal ;

x1=[0 1 0 1]; % first bit stream
x2=[0 0 1 1]; % second bit stream

%nx=size(x1,2);

nx=length(x1);

i=1; % array element

while i<nx+1  % while loop condition
    t = i:0.001:i+1; % define the
domain t for each sin waveform

    if x1(i)==1  % checking if array
element bit is 1 in x1 signal
       psk1=sin(2*pi*f*t); % 0 degree
phase shift if bit is 1 in x1
    else
       psk1=sin(2*pi*f*t+pi); % 180
degree phase shift if bit is 0 in x1
    end

    if x2(i)==1
       psk2=sin(2*pi*f*t+pi/2); % 90
degree phase shift if bit is 1 in x2
    else
       psk2=sin(2*pi*f*t+pi+pi/2); %
270 degree phase shift if bit is 0 in
x2
    end

    QPSK = psk1+psk2; % addition of
psk1 and psk2 to obtain QPSK signal

    subplot(3,1,1);
    plot(t,psk1);
    hold on;
    grid on;
    axis([1 4 -1 1]);
    title('PSK1')

    subplot(3,1,2);
    plot(t,psk2);
    hold on;
    grid on;
    axis([1 4 -1 1]);
    title('PSK2')

    subplot(3,1,3);
    plot(t,QPSK);
    hold on;
    grid on;
    axis([1 4 -2 2]);
```



OUTPUT SCREENSHOT OF QUESTION 2

```
    title('QPSK')

    i=i+1;
end
```