AMERICAN INTERNATIONAL UNIVERSITY–BANGLADESH (AIUB)

DATA COMMUNICATION

Spring 2024-2025

Section: D

LAB REPORT ON

Study of Digital to Analog Conversion using MATLAB

Supervised By

DR. MD. HUMAYUN KABIR

Submitted By

Name	ID
S.M. RASEL	22-48039-2

Date of Submission: 03/05/2025

S.M Rasel
22.18039.2

Title: Study of Digital to Anlog Conversion using MATLAB

Objective:

This experiment was designed to help understand the use of MATLAB for Solving Communication engineering problems. This experiment also helps us develop the understanding of Digital to Analog converstion using MATLAB.

Simulation Tools: MATLABR2016a

Working principle:

1. define a digital input bitstream
2. loop for each bit (ASK, FSK, PSK evolate)
3. plot all generated signals using subplots
4. for QPSK (split bits into two parallel streams, generate two pks signals, Sum both to form the QPSK signal)
5. Display ASK, FSK, PSK and QPSK results.

Simulations Code and Screen short(SS):

```matlab
close all;
clc;
f=5;
f2=10;
x=[1 1 0 0 1 0 1 0] % input signal ;
nx=size(x,2);
i=1;
while i<nx+1
    t = i:0.001:i+1;
    if x(i)==1
        ask=sin(2*pi*f*t);
        fsk=sin(2*pi*f*t);
        psk=sin(2*pi*f*t);
    else
        ask=0;
        fsk=sin(2*pi*f2*t);
        psk=sin(2*pi*f*t+pi);
    end
    subplot(3,1,1);
    plot(t,ask);
    hold on;
    grid on;
    axis([1 10 -1 1]);
 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);
    plot(t,psk);
    hold on;
    grid on;
    axis([1 10 -1 1]);
 title('Phase Shift Key')
    i=i+1;
end
```
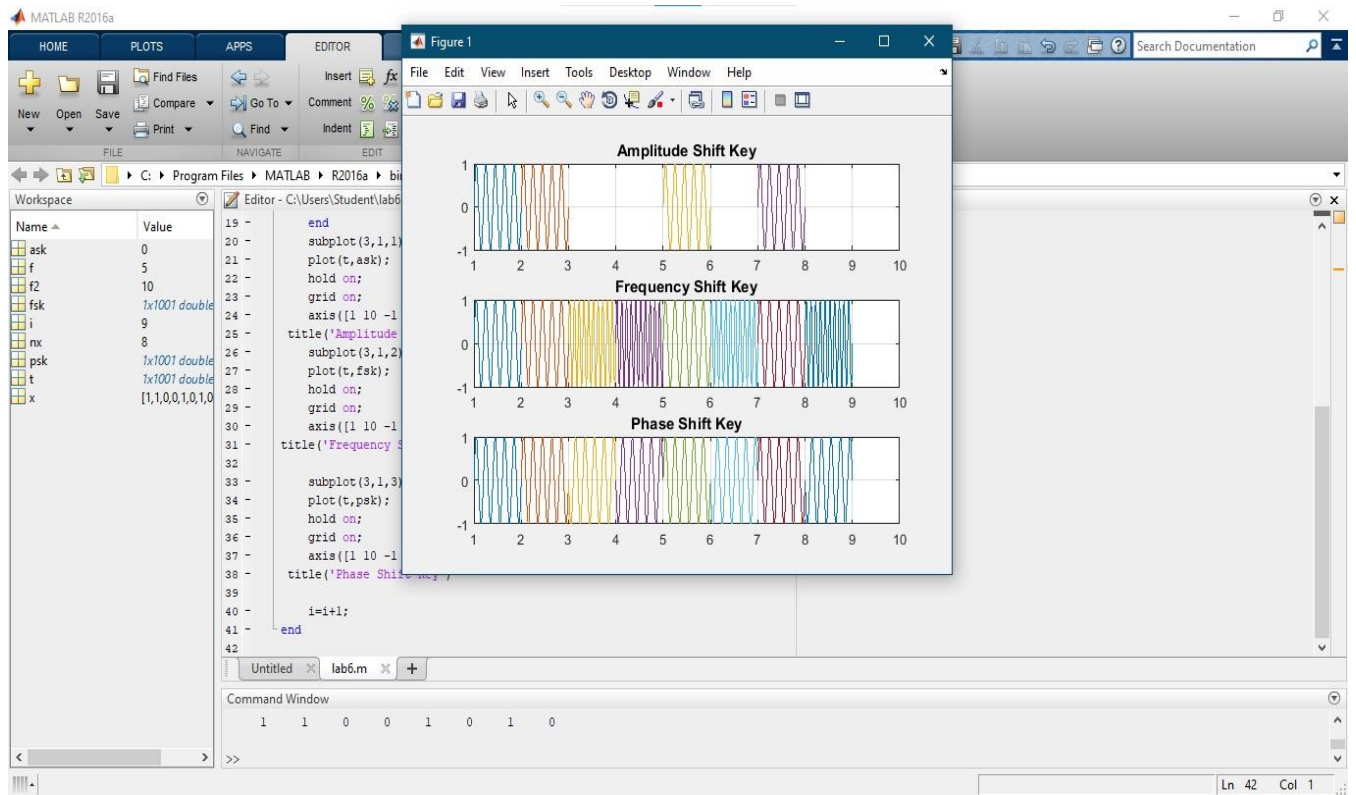
DATA SHEET:

S.M. Rasel
22-18030-2

```
close all;
cls;
f=5;
f2=10;
x=[1 1 0 0 1 0 1 0]% input signal;
nx=size(x,2);
i=1;
while i<nx+1
    t = i:0.001:i+1;
    if(x(i)==1
    ask=sin(2*pi*f*t);
    fsk=sin(2*pi*f*t);
    pask=sin(2*pi*f*t);

else ask=0;
    fsk=sin(2*pi*f2*t);
    PSK=sin(2*pi*f*t*pi);

end subplot(3,1,1);
    plot(t,ask);
    hold on;
    grid on;
    axis([t1 t0-1 1]);
    title('Amplitud shift key);
```

Performance Task:

The selected ID is the following:

2	2	-	4	8	0	3	9	-	2
A	**B**		**C**	**D**	**E**	**F**	**G**		**H**

Here 8-bit ASCII Code of the following values are:

Symbol	E	F	G
Decimal Value	0	3	9
8-bit ASCII Code	0 0 1 1 0 0 0 0	0 0 1 1 0 0 1 1	0 0 1 1 1 0 0 1

Task 1

```
%Code:
f=5;
x=[0 0 1 1 0 0 0 0 0 0 1 1 0 0 1 1 0 0 1 1 0 0 1];
nx=size(x,2);
i=1;
while i<nx+1
t = i:0.001:i+1;
if x(i)==1
ask=(sin(2*pi*f*t))+3.5;
else
ask=0*(sin(2*pi*f*t))+3.5;
end
subplot(3,1,1);
plot(t,ask);
hold on;
grid on;
axis([1 26 0 7]);
title('Amplitude Shift Key')
i=i+1;
end
```
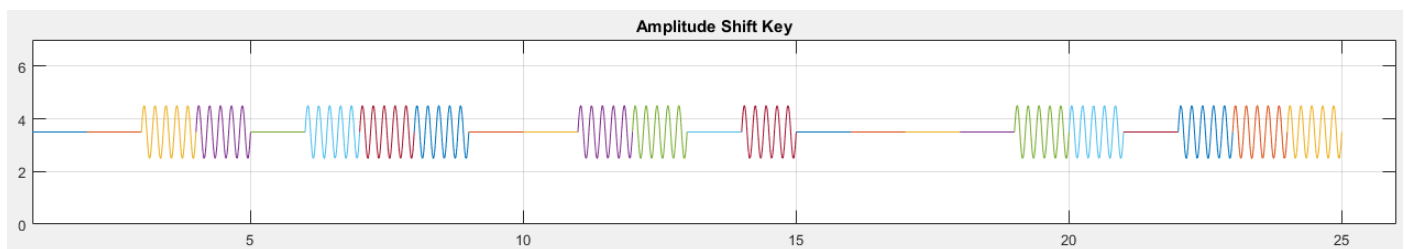

Figure: 8-bit ASK

Task 2

```
%Code:
f=5;
f2=10;
x=[0 0 1 1 0 0 0 0 0 0 1 1 0 0 1 1 0 0 1 1 0 0 1];
nx=size(x,2);
i=1;
while i<nx+1
t = i:0.001:i+1;
if x(i)==1
fsk=sin(2*pi*f*t)+4;
else
fsk=sin(2*pi*f2*t)+4;
end
subplot(3,1,1);
plot(t,fsk);
hold on;
grid on;
axis([1 26 1 8]);
title('Frequency Shift Key')
i=i+1;
end
```
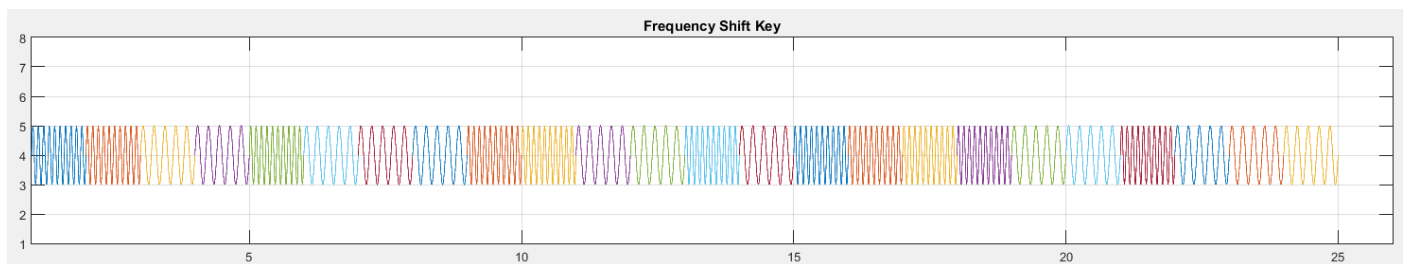

Figure: 8-bit FSK

Task 3

```matlab
%Code:
f=5;
x=[0 0 1 1 0 0 0 0 0 0 1 1 0 0 1 1 0 0 1 1 0 0 1];
nx=size(x,2);
i=1;
while i<nx+1
t = i:0.001:i+1;
if x(i)==1
psk=(sin(2*pi*f*t));
else
psk=(sin(2*pi*f*t+pi));
end
subplot(3,1,1);
plot(t,psk);
hold on;
grid on;
axis([1 26 -((3*pi)/4) (pi/2)]);
title('Phase Shift Key')
i=i+1;
end
```


Figure: 8-bit PSK

S.M. Rosel
22-98039-2

Discussion and Conclusion:

In this experiment, the code to perform ASK, FSK and PSK were observed. The necessary alternative required to get the required form the provided scenario was observed. QPSK was observed as well using the provided code in the manual. All the codes were performed on the MATLAB software for better visualization and understanding. Therefore, all the objectives of the exp. were obtained.

References:

1. Paakash C. Gupta, "Data Communication", Prentice Hall india Pvt.

2. William Stallings, "Data Computer Communication" Perso

3. Forouzan, B.A "Data Com. and Networking, tata Mcm (2005)

4. AIUB Data Communication Engineering Lab Manual, Report 06.