American International University- Bangladesh
Department of Computer Engineering
COE 3201: Data Communication Laboratory

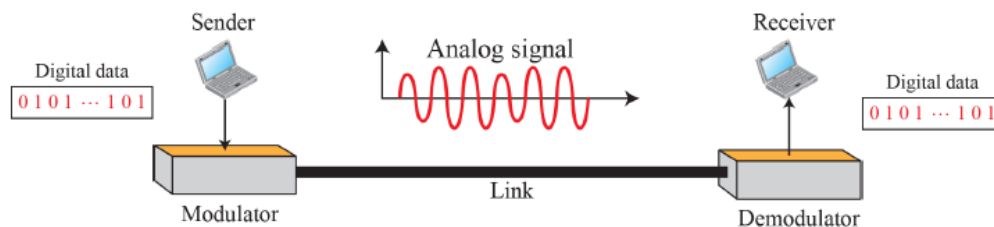**Title:** **Study of Digital to Analog Conversion using MATLAB**

Abstract:

This experiment is designed to-

1.To understand the use of MATLAB for solving communication engineering problems.
2.To develop understanding of Digital to Analog conversion using MATLAB.

Introduction:

I.   DIGITAL TO ANALOG CONVERSION: Digital to analog conversion is the process of changing one of the characteristics of an analog signal based on the information in digital data Figure bellow shows the relationship between the digital information, the digital to analog modulating process, and the resultant analog signal.
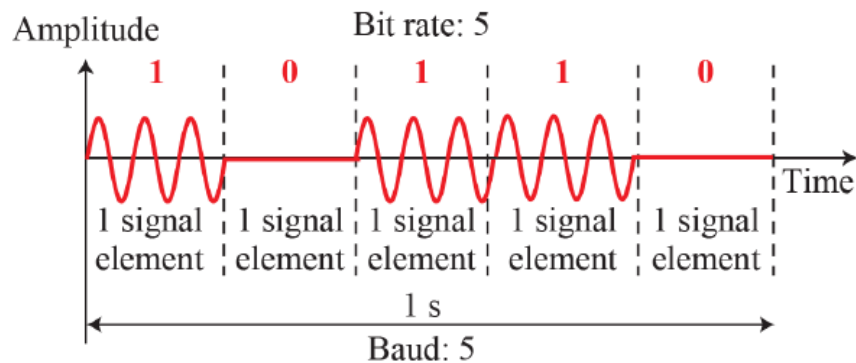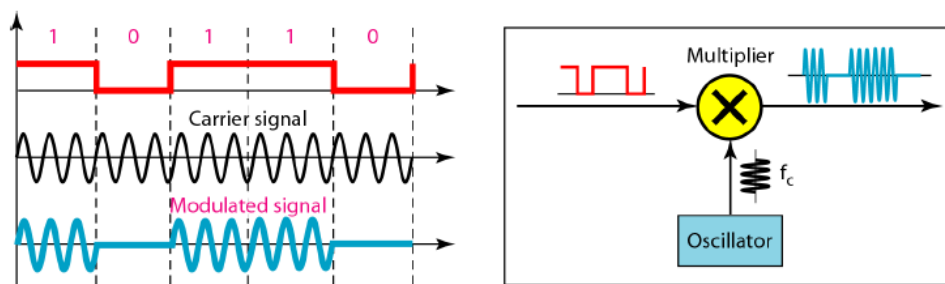

II.   TYPES OF DIGITAL TO ANALOG CONVERSION:
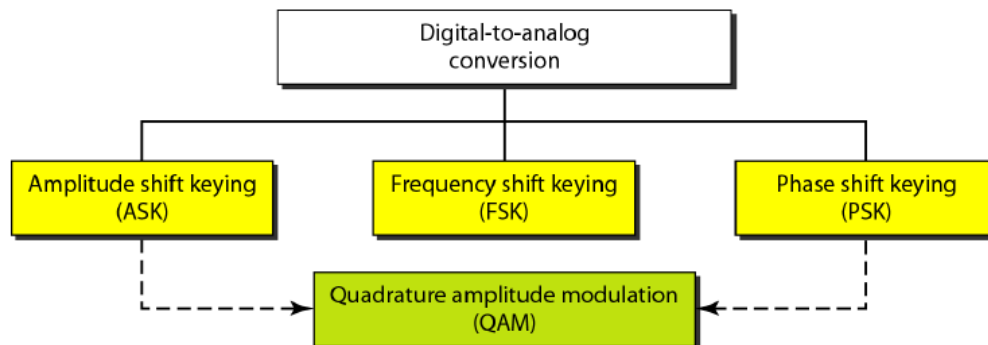
ASK: In amplitude shift keying, the amplitude of the carrier signal is varied to create signal elements Both frequency and phase remain constant while the amplitude changes.
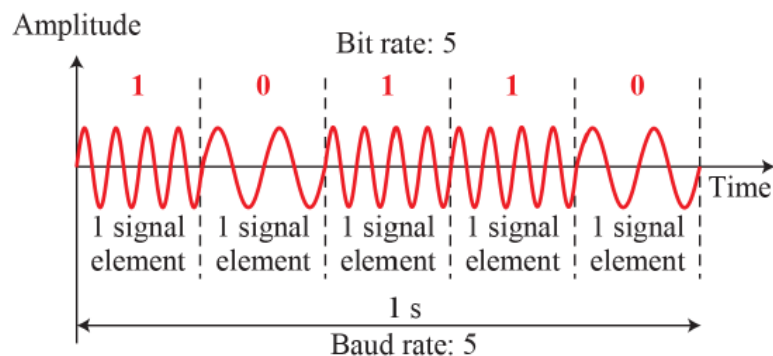
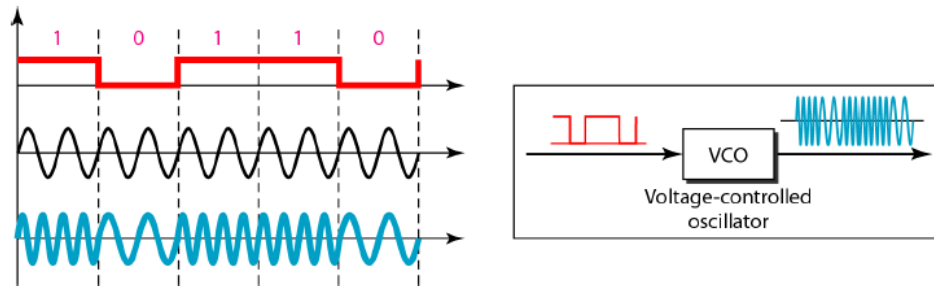**Binary amplitude shift keying**

Implementation of binary ASK:

FSK: In frequency shift keying, the frequency of the carrier signal is varied to represent data The frequency of the modulated signal is constant for the duration of one signal element, but changes for the next signal element if the data element changes Both peak amplitude and phase remain constant for all signal elements

Binary frequency shift keying

Implementation of BFSK:

PSK: In phase shift keying, the phase of the carrier is varied to represent two or more different signal elements Both peak amplitude and frequency remain constant as the phase changes Today, PSK is more common than ASK or FSK. However, we will see shortly that QAM, which combines ASK and PSK, is the dominant method of digital to analog modulation

Binary phase shift keying
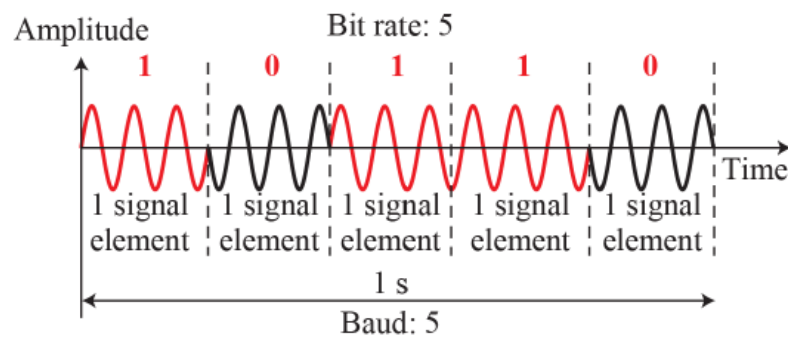
Implementation of BPSK
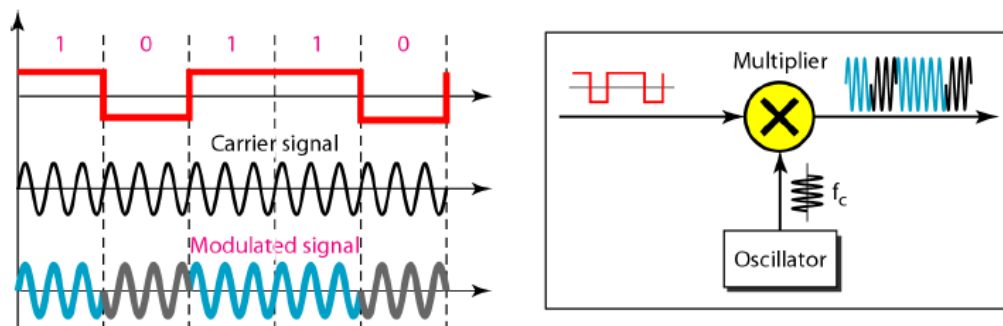
MATLAB code for digital to analog modulation (ask, fsk and psk):

```
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
```