Title: Study of Digital to Analog Conversion using MATLAB

Abstract:
In this experiment, various MATLAB operations and functions will be used. The aim of this experiment is to learn how to perform digital to analog conversion in MATLAB, as well as to become familiar with the environment, instructions, and syntax of the program and how to utilize it to solve communication engineering problems. Software called MATLAB was used to carry out the experiment. The goals were all accomplished. It improved in our comprehension of the MATLAB environment, command usage, and syntax.

Introduction:

MATLAB is a high-performance language for technical computing. It integrates computing, programming, and visualization in a welcoming environment where problems and answers are laid forth in plain English.

Digital Signal – A digital signal is a signal that represents data as a sequence of discrete values; at any given `time, it can only take on one of a finite number of values.

Analog Signal – An analog signal is any continuous signal for which the time varying feature of the signal is a representation of some other time varying quantity i.e., analogous to another time varying signal.

Digital to Analog Conversion:

The process of altering a characteristic of an analog signal based on information in digital data is known as digital to analog conversion.

Types Of Digitals to Analog Conversion:

1. **Amplitude Shift keying –** Amplitude Shift Keying is a technique in which carrier signal is analog and data to be modulated is digital. The amplitude of analog carrier signal is modified to reflect binary data.
   The binary signal when modulated gives a zero value when the binary data represents 0 while gives the carrier output when data is 1. The frequency and phase of the carrier signal remain constant.
2. **Frequency Shift keying –** In this modulation the frequency of analog carrier signal is modified to reflect binary data.
   The output of a frequency shift keying modulated wave is high in frequency for a binary high input and is low in frequency for a binary low input. The amplitude and phase of the carrier signal remain constant.
3. **Phase Shift keying –** In this modulation the phase of the analog carrier signal is modified to reflect binary data. The amplitude and frequency of the carrier signal remains constant.

Apparatus:

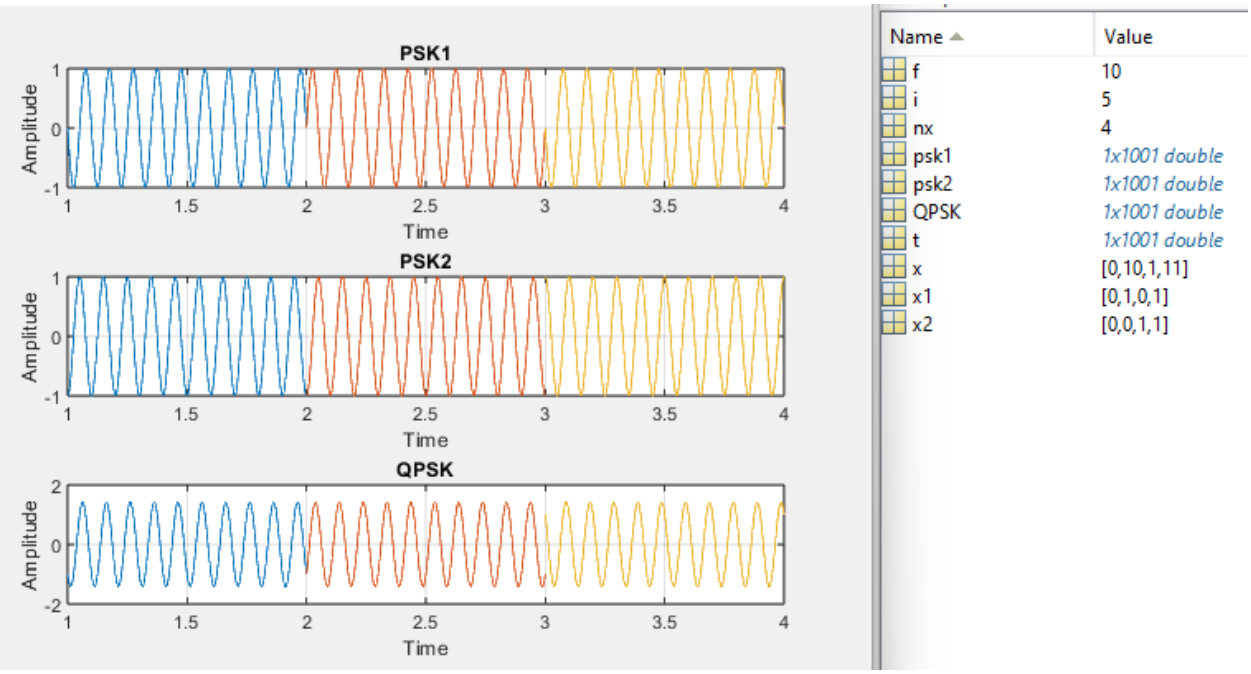
1. Computer
2. MATLAB2016a software

Code:

```
f=10;
x=[00 10 01 11] % input signal ;
x1=[0 1 0 1];
x2=[0 0 1 1];
nx=size(x1,2);
i=1;

while i<nx+1
     t = i:0.001:i+1;

     if x1(i)==1
        psk1=sin(2*pi*f*t);
     else
        psk1=sin(2*pi*f*t+pi);
     end

     if x2(i)==1
        psk2=sin(2*pi*f*t+pi/2);
     else
        psk2=sin(2*pi*f*t+pi+pi/2);
     end

     QPSK = psk1+psk2;

     subplot(3,1,1);
     plot(t,psk1);
     xlabel('Time')
     ylabel('Amplitude')

     hold on;
     grid on;
     axis([1 4 -1 1]);
     title('PSK1')

     subplot(3,1,2);
     plot(t,psk2);
     xlabel('Time')
     ylabel('Amplitude')

     hold on;
```

```
        grid on;
        axis([1 4 -1 1]);
        title('PSK2')
        subplot(3,1,3);
        plot(t,QPSK);
        xlabel('Time')
        ylabel('Amplitude')

        hold on;
        grid on;
        axis([1 4 -2 2]);
        title('QPSK')
        i=i+1;
end
```

Simulation:



Discussion:

Different MATLAB operations were carried out in accordance with the purpose, which gave us a better-developed grasp of digital to analog conversion using MATLAB and the MATLAB environment, instructions, and syntax, as well as its application to address communication engineering challenges.

Conclusion:

This experiment was designed to gain a better grasp of digital to analog conversion using MATLAB and the MATLAB environment, commands, and syntax, as well as how to use it to solve communication engineering problems. We were successful in achieving all of the goals. Using the MATLAB software in the lab presented some challenges. The experiment was conducted without a hitch. In this investigation, we employed a few MATLAB procedures, graphs, and functions. Perhaps the results of this experiment could be checked using different software, and then they could be compared. This experiment demonstrates the importance of MATLAB in the solution of complex mathematics and data communication problems. It is really simple to use, saves us a tremendous amount of time, and produces highly accurate results.

REFERENCE:

[1] MATLAB user guide.
[2] AIUB lab manual.
[3] Prof. Dr.-Ing. Andreas Czylwik, “MATLAB for Communications”