Wireless Media Communication Lab Project

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MATLAB Code:

```
clc
clear all
s=[0 1 1 1 0]
for j=1:10
    for i=1:5
        r(i)=rand;
        if r(i)<0.5
            b(i)=0;
        else
            b(i)=1;
        end
    end
    m = xor(b,s);
    for i=1:5
        if m(i)==0
            d(i)=-1;
        else
            d(i)=1;
        end
    end
    l=length(d);
    res=.01;
    t=0:res:(l-res);
    i=1;
    while i<l+1
        for j=((i-
1)/res)+1:i/res
            y(j)=d(i);
        end
        i=i+1;
    end
    sig=sin(2*pi*t).*y;
    pnSequence =
comm.PNSequence('Polynomial',[3
2
0],'SamplesPerFrame',5,'Initial
Conditions',[0 0 1]);
    x2 = pnSequence()
    for i=1:5
        if x2(i)==0
            x1(i)=-1;
        else
            x1(i)=1;
        end
    end
    l1=length(x1);
    res=.01;
    t=0:res:(l1-res);
    i=1;
    while i<l1+1
        for j=((i-1)/res)+1:i/res
            y1(j)=x1(i);
        end
        i=i+1;
    end
    figure
    subplot(5,1,1)
    plot(t,sin(2*pi*t))
    title(' Carrier Wave')
    xlabel('bit value')
    ylabel('amplitude')
    subplot(5,1,2)
    plot(t,y)
    title('Data Wave')
    xlabel('bit value')
    ylabel('amplitude')
    subplot(5,1,3)
    plot(t,sig)
    title('BPSK')
    xlabel('bit value')
    ylabel('amplitude')
    subplot(5,1,4)
    plot(t,y1)
    title('PN')
    xlabel('bit value')
    ylabel('amplitude')
    subplot(5,1,5)
    plot(t,y1.*sig)
    title('DSSS BPSK and PN')
    xlabel('bit value')
    ylabel('amplitude')
    figure
    stem(t,y1.*sig)
    title('DSSS BPSK and PN(Sampled
Version)')
    xlabel('bit value')
    ylabel('amplitude')
end
```

Code Explanation:

1.
```
s=[0 1 1 1 0]
```
First 5 letters of name = VAISH
Position of each Letter:
V=22=Even=0
A=1=Odd=1
I=9=Odd=1
S=19=Odd=1
H=8=Even=0
s=[0 1 1 1 0]

2.
```
for j=1:10
    for i=1:5
        r(i)=rand;
        if r(i)<0.5
            b(i)=-1;
        else
            b(i)=1;
        end
    end
```
Creates 10 random signal each consisting of 5 bits.

3.
```
    m = xor(b,s);
```
Binary addition of all 5-bit signals (b) with 5- bit signal (s).

4.
```
    for i=1:5
        if m(i)==0
            d(i)=-1;
        else
            d(i)=1;
        end
    end
```
Replace all 0 by -1 and create new matrix d.

5.
```
    l=length(d);
    res=.01;
    t=0:res:(l-res);
    i=1;
    while i<l+1
        for j=((i-1)/res)+1:i/res
            y(j)=d(i);
        end
        i=i+1;
    end
```
Creating square wave of each 5-bit sequence in matrix d

6.
```
    sig=sin(2*pi*t).*y;
```
Multiplexing sequences in matrix d on sine carrier wave of double frequency to generate BPSK signal

7.

```
    pnSequence = comm.PNSequence('Polynomial',[3 2
0],'SamplesPerFrame',5,'InitialConditions',[0 0 1]);
    x1 = pnSequence()
    for i=1:5
        if x2(i)==0
            x1(i)=-1;
        else
            x1(i)=1;
        end
    end
```

Generating PN sequence.

8.

```
    l1=length(x1);
    res=.01;
    t=0:res:(l1-res);
    i=1;
    while i<l1+1
        for j=((i-1)/res)+1:i/res
            y1(j)=x1(i);
        end
        i=i+1;
    end
```

Generating square wave of the PN sequence

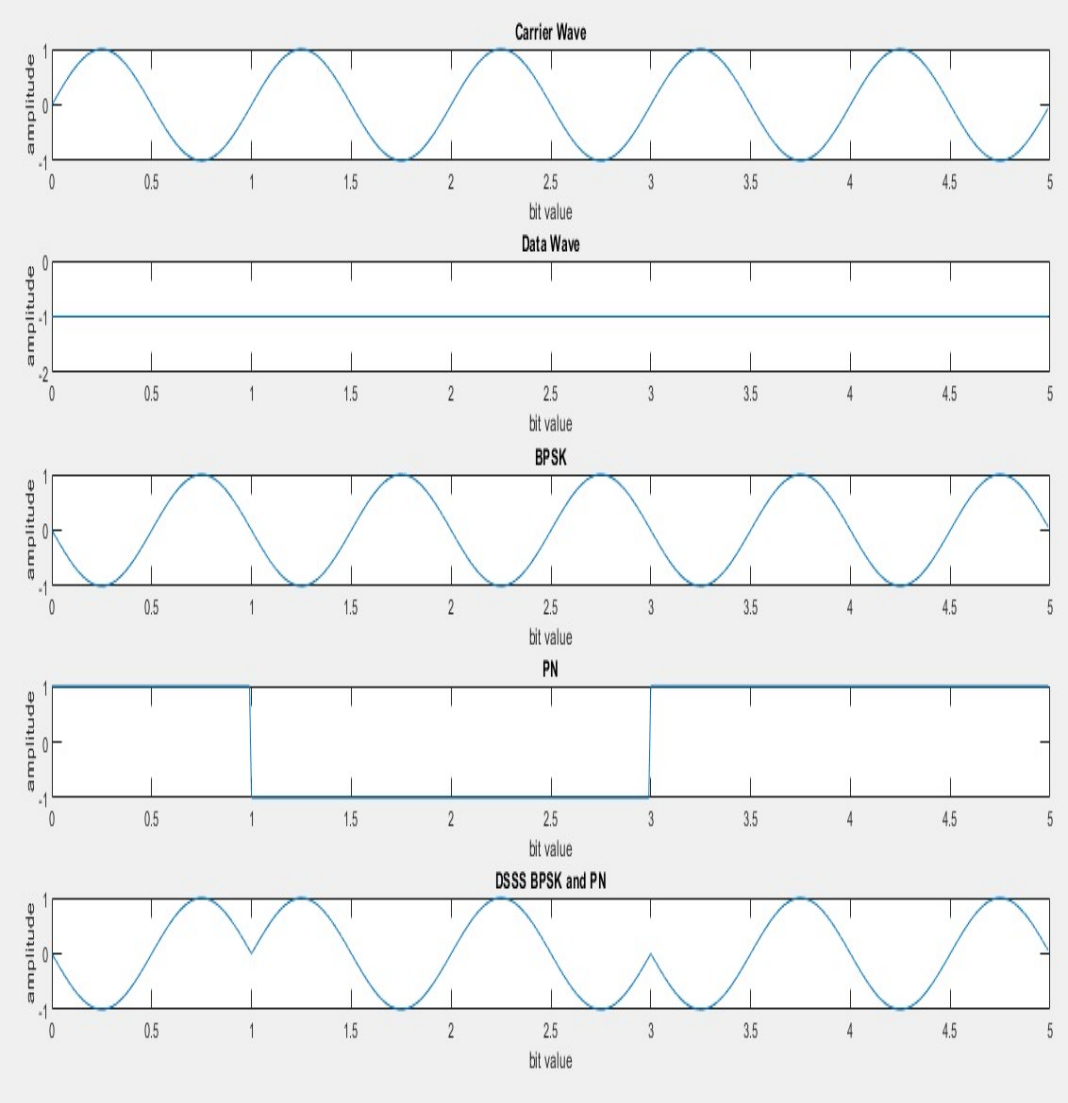
9.

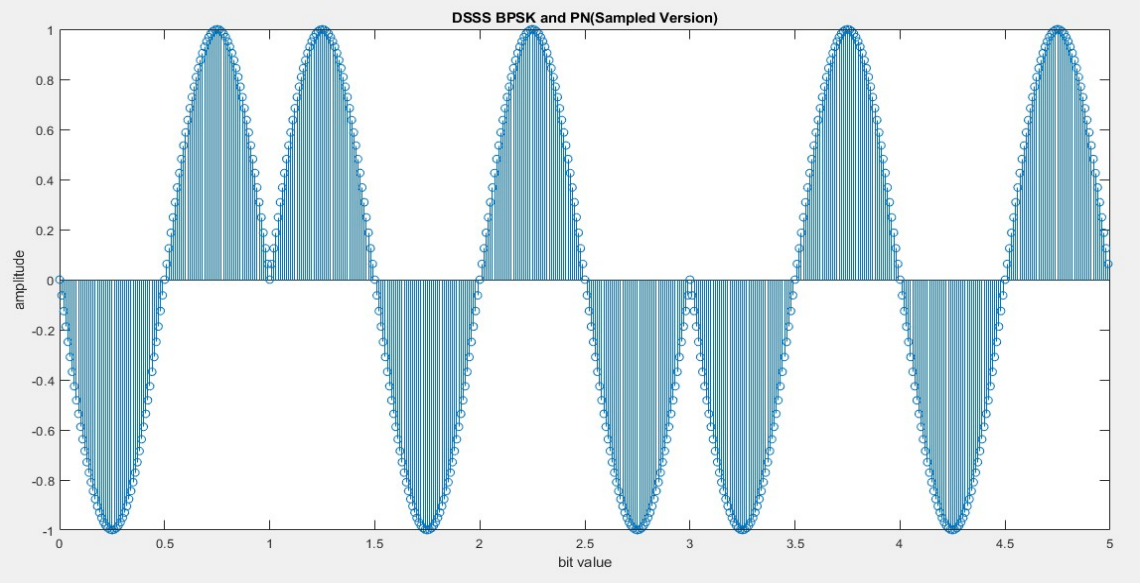
```
figure
    subplot(5,1,1)
    plot(t,sin(2*pi*t))
    title('Carrier Wave')
    xlabel('bit value')
    ylabel('amplitude')
    subplot(5,1,2)
    plot(t,y)
    title('Data Wave')
    xlabel('bit value')
    ylabel('amplitude')
    subplot(5,1,3)
    plot(t,sig)
    title('BPSK')
    xlabel('bit value')
    ylabel('amplitude')
    subplot(5,1,4)
    plot(t,y1)
    title('PN')
    xlabel('bit value')
    ylabel('amplitude')
    subplot(5,1,5)
    plot(t,y1.*sig)
    title('DSSS BPSK and PN')
    xlabel('bit value')
    ylabel('amplitude')
    figure
    stem(t,y1.*sig)
    title('DSSS BPSK and PN(Sampled Version)')
    xlabel('bit value')
    ylabel('amplitude')
end
```

Multiplexing PN signal to generate DSSS BPSK-PN signal for each data sequence and plotting all the signals .

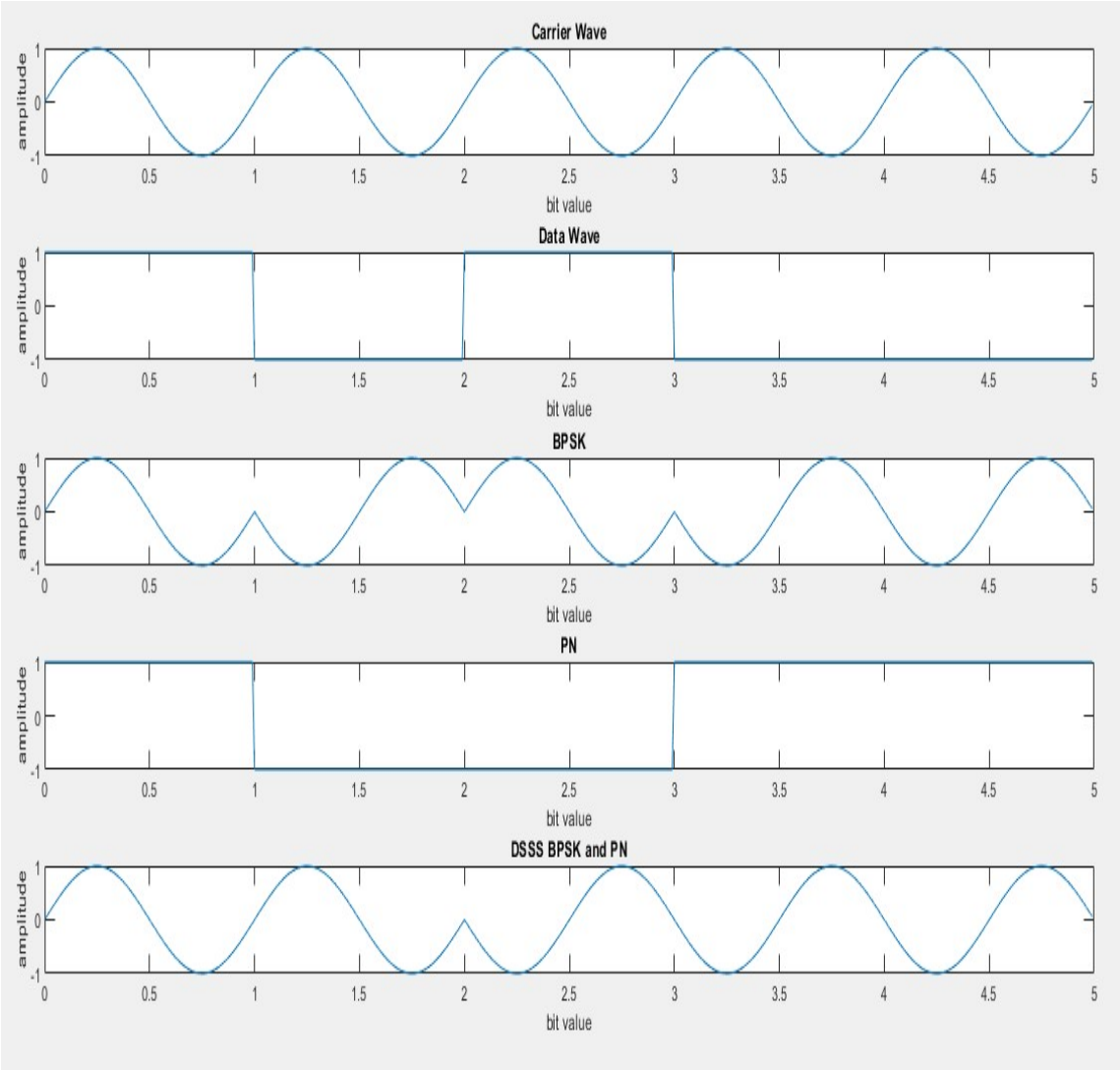
Output:

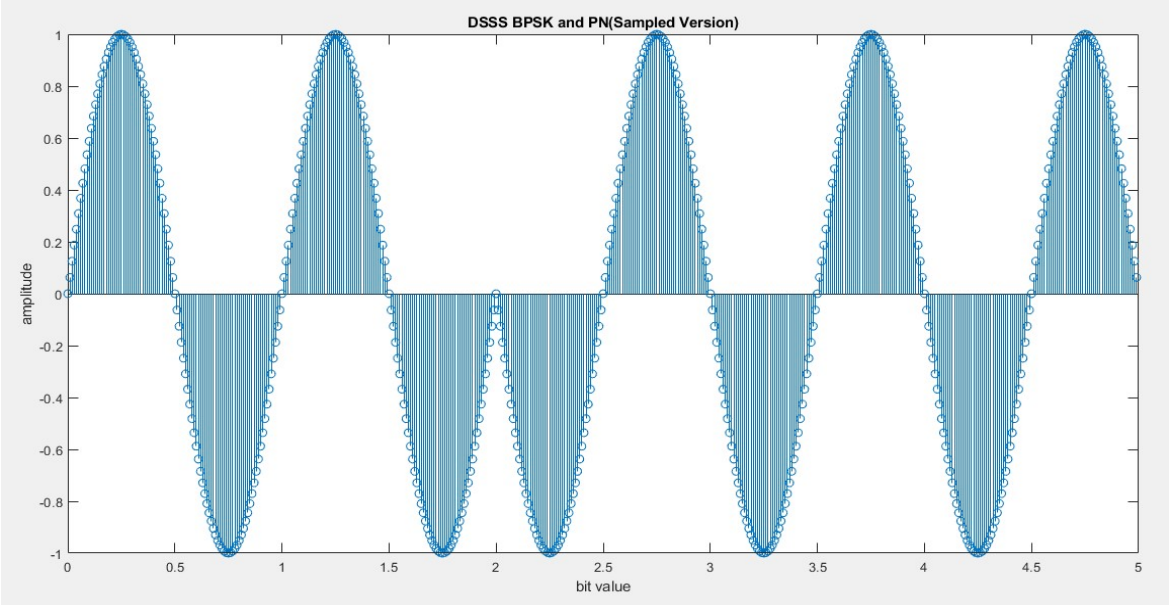
Signal 2:



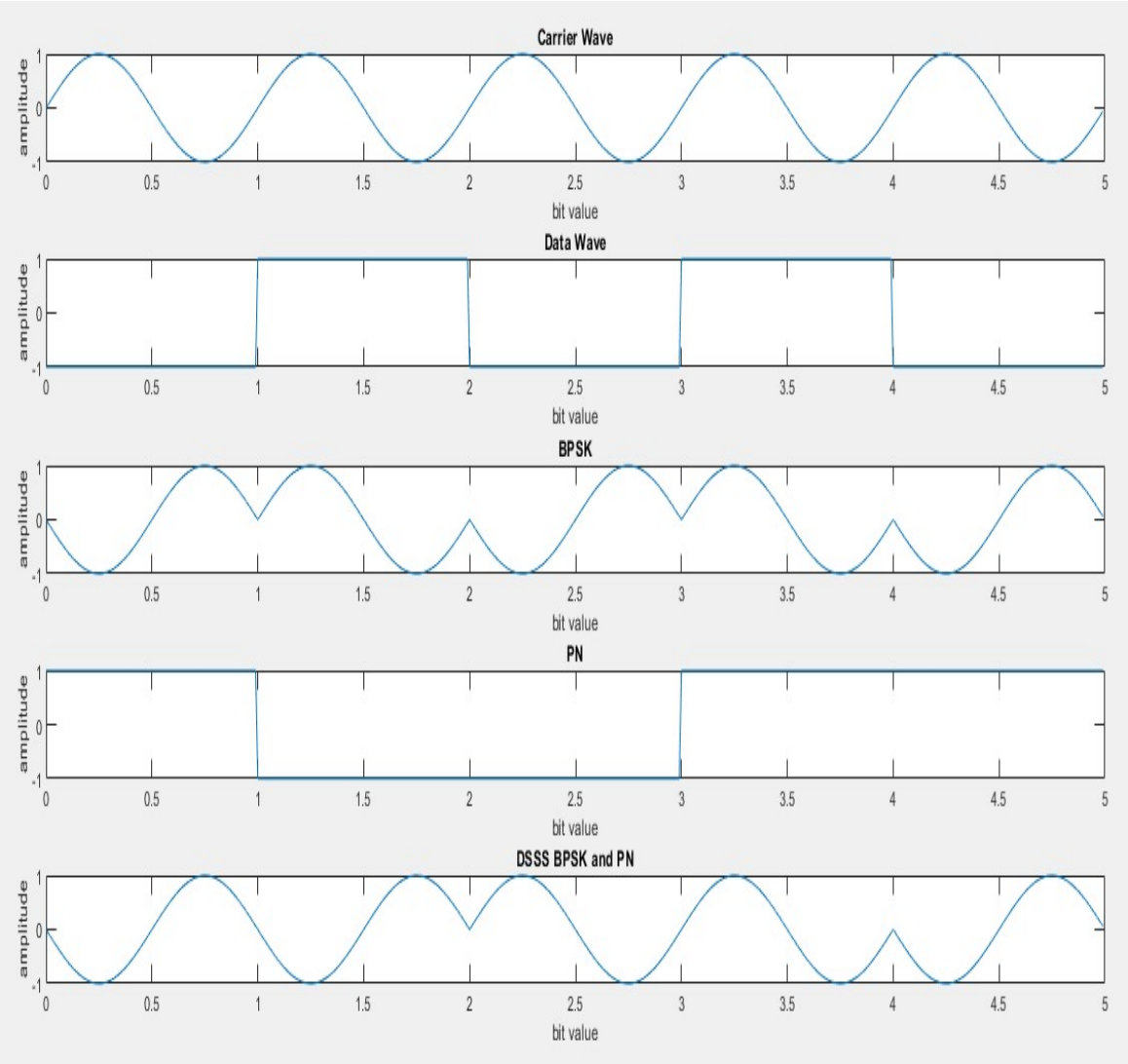


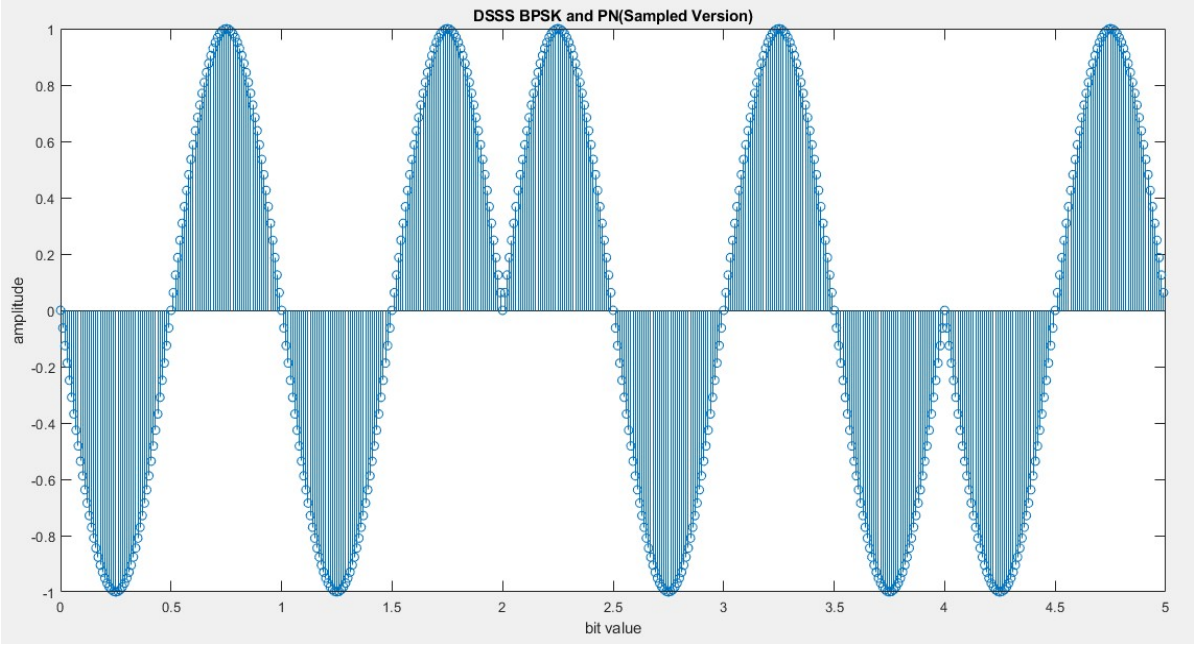
Signal 5:


Carrier Wave
amplitude
bit value
Data Wave
amplitude
bit value
BPSK
amplitude
bit value
PN
amplitude
bit value
DSSS BPSK and PN
amplitude
bit value


DSSS BPSK and PN(Sampled Version)
amplitude
bit value

Signal 8:


Carrier Wave
Data Wave
BPSK
PN
DSSS BPSK and PN
amplitude
bit value


DSSS BPSK and PN(Sampled Version)
amplitude
bit value