**5. Matlab Code:**

% Frequency Hopping Spread Spectrum

%------------------------------------------------------------%

clc

clear

% Generation of bit pattern

s=round(rand(1,25));    % Generating 25 bits

signal=[];

carrier=[];

t=[0:2\*pi/119:2\*pi];     % Creating 120 samples for one cosine

for k=1:25

    if s(1,k)==0

        sig=-ones(1,120);    % 120 minus ones for bit 0

    else

        sig=ones(1,120);     % 120 ones for bit 1

    end

    c=cos(t);

    carrier=[carrier c];

    signal=[signal sig];

end

subplot(4,1,1);

plot(signal);

axis([-100 3100 -1.5 1.5]);

title('\bf\it Original Bit Sequence');

% BPSK Modulation of the signal

bpsk\_sig=signal.\*carrier;   % Modulating the signal

subplot(4,1,2);

plot(bpsk\_sig)

axis([-100 3100 -1.5 1.5]);

title('\bf\it BPSK Modulated Signal');

% Preparation of 6 new carrier frequencies

t1=[0:2\*pi/9:2\*pi];

t2=[0:2\*pi/19:2\*pi];

t3=[0:2\*pi/29:2\*pi];

t4=[0:2\*pi/39:2\*pi];

t5=[0:2\*pi/59:2\*pi];

t6=[0:2\*pi/119:2\*pi];

c1=cos(t1);

c1=[c1 c1 c1 c1 c1 c1 c1 c1 c1 c1 c1 c1];

c2=cos(t2);

c2=[c2 c2 c2 c2 c2 c2];

c3=cos(t3);

c3=[c3 c3 c3 c3];

c4=cos(t4);

c4=[c4 c4 c4];

c5=cos(t5);

c5=[c5 c5];

c6=cos(t6);

% Random frequency hopps to form a spread signal

spread\_signal=[];

for n=1:25

    c=randint(1,1,[1 6]);

    switch(c)

        case(1)

            spread\_signal=[spread\_signal c1];

        case(2)

            spread\_signal=[spread\_signal c2];

        case(3)

            spread\_signal=[spread\_signal c3];

        case(4)

            spread\_signal=[spread\_signal c4];

        case(5)

            spread\_signal=[spread\_signal c5];

        case(6)

            spread\_signal=[spread\_signal c6];

    end

end

subplot(4,1,3)

plot([1:3000],spread\_signal);

axis([-100 3100 -1.5 1.5]);

title('\bf Spread Signal with 6 frequencies');

% Spreading BPSK Signal into wider band with total of 5 frequencies

freq\_hopped\_sig=bpsk\_sig.\*spread\_signal;

subplot(4,1,4)

plot([1:3000],freq\_hopped\_sig);

axis([-100 3100 -1.5 1.5]);

title('\bf Frequency Hopped Spread Spectrum Signal');

% Expressing the FFTs

figure,subplot(2,1,1)

plot([1:3000],freq\_hopped\_sig);

axis([-100 3100 -1.5 1.5]);

title('\bf Frequency Hopped Spread Spectrum signal and its FFT');

subplot(2,1,2);

plot([1:3000],abs(fft(freq\_hopped\_sig)));