



JSPM's
JAYAWANTRAO SAWANT COLLEGE OF ENGINEERING
Sr. No. 58, Handewadi Road, Hadapsar, Pune, Maharashtra 411028
Department of Electronics and Telecommunication Engineering



Code :

```
% Script to generate Binary PSK
clear all;
close all;
clc;
fc=1000;                                % Frequency for "0" bits
t=linspace(0,1/1000,50);

e0=cos(2*pi*fc*t);                      % BPSK output for "1"
e1=-cos(2*pi*fc*t);                     % BPSK output for "0"

b=mod(randperm(16),2);
bnot=1-b;
n=['The binary data is ',num2str(b)];
bpsk1=[ ];bpsk2=[ ];bin=[ ];

for i=1:length(b)
    bpsk1=[bpsk1,b(i)*e0];
    bpsk2=[bpsk2,bnot(i)*e1];
    bin=[bin,b(i)*ones(1,50)];
end;

bpskout=bpsk1+bpsk2;
tm=[0:length(bpsk1)-1];

plot(tm,bin,'r--');
axis([0 length(bin) 0 1.5]);
hold on;

plot(tm,bpskout,'b');
axis([0 length(tm) -1.5 1.5]);
hold off;

xlabel('Time index');
ylabel('Amplitude');

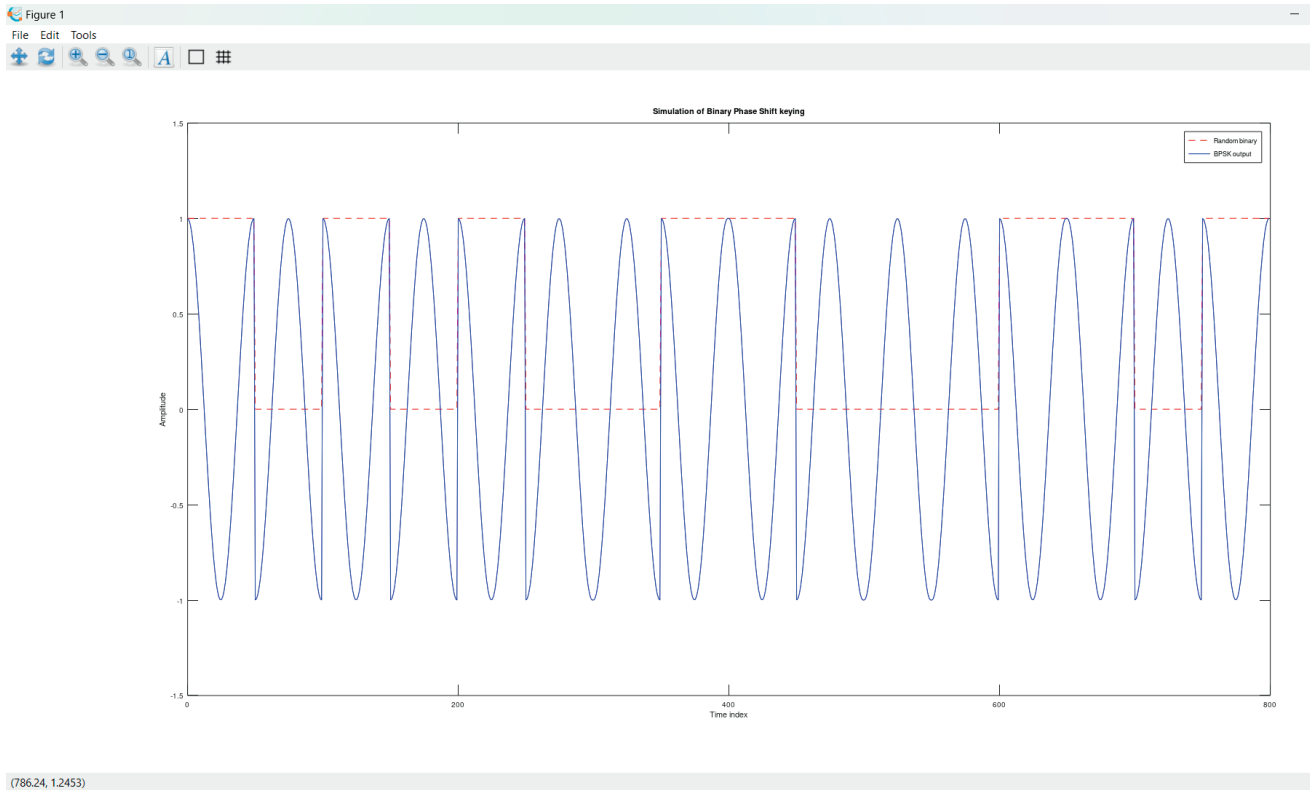
legend('Random binary','BPSK output');
title('Simulation of Binary Phase Shift keying');
gtext(n);
```



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Output :





Code :

```
% Script of Eb/NO Vs BER for BPSK modulation scheme
clear;
clc;
N=10000000;      % Number of input bits
EbN0dB = -5:1:27;
data=randn(1,N)>=0; % Generating a uniformly distributed random 1s and 0s
bpskModulated = 2*data-1; % Mapping 0->-1 and 1->1
M=2;              % Number of Constellation points M=2^k for BPSK k=1
Rm=log2(M);       % Rm=log2(M) for BPSK M=2
Rc=1;             % Number of Constellation points M=2^k for BPSK k=1
BER = zeros(1,length(EbN0dB)); % Place holder for BER values for each Eb/NO
index=1;

for k=EbN0dB,      % Adding noise with variance according to the required Eb/NO
EbN0 = 10.^(k/10); % Converting Eb/NO dB value to linear scale
noiseSigma = sqrt(1./(2*Rm*Rc*EbN0)); % Standard deviation for AWGN Noise
noise = noiseSigma*randn(1,length(bpskModulated));
received = bpskModulated + noise;
% Threshold Detector
estimatedBits=(received>=0);
% Bit Error rate Calculation
BER(index) = sum(xor(data,estimatedBits))/length(data);
index=index+1;
endfor

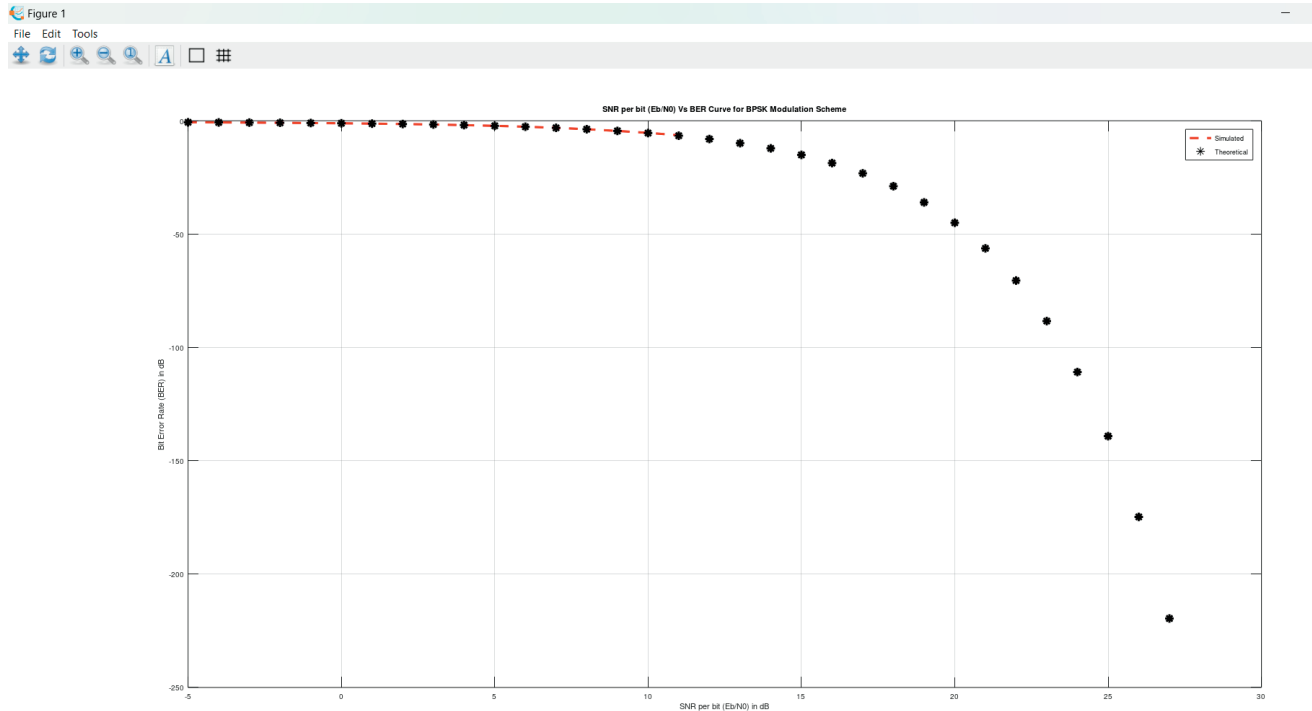
% Plot commands follows
plotHandle=plot(EbN0dB,log10(BER),'r--');
set(plotHandle,'LineWidth',1.5);
title('SNR per bit (Eb/NO) Vs BER Curve for BPSK Modulation Scheme');
xlabel('SNR per bit (Eb/NO) in dB');
ylabel('Bit Error Rate (BER) in dB');
grid on;
hold on;
theoreticalBER = 0.5*erfc(sqrt(10.^(EbN0dB/10)));
plotHandle=plot(EbN0dB,log10(theoreticalBER),'k*');
set(plotHandle,'LineWidth',1.5);
legend('Simulated','Theoretical');
grid on;
```



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Output :



(26.905, -40.316)