Digital Communication
Project - 1
Pulse Shaping with Nyquist Pulses

Name: Suhas KV
Section: 4B
SRN: PES2UG20EC093

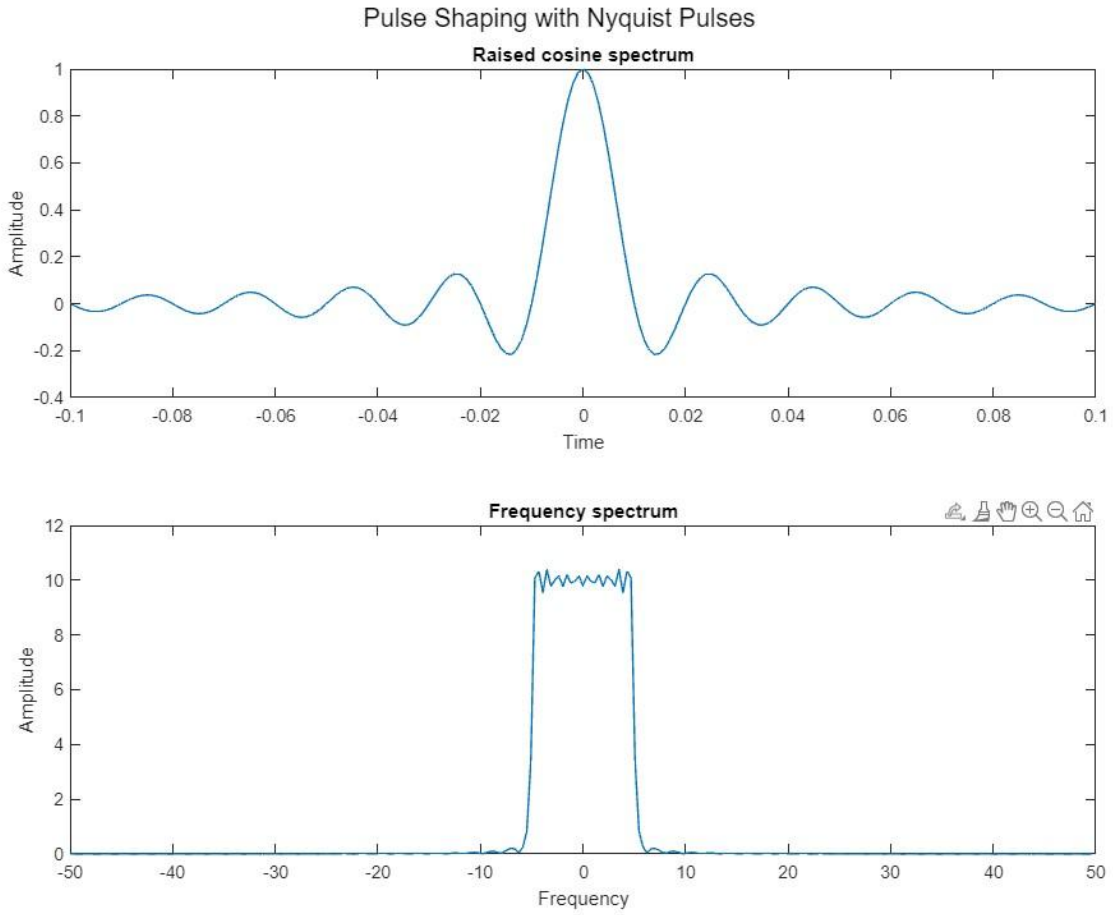
MATLAB Code:

```
%% Pulse Shaping with Nyquist pulses

clear;
close all;
clc;

% Parameters
rb = 100; % bitrate in hertz
tb = 1/rb;
tmax = 10*tb; % 3*tb
tr = 0.001;
alpha = 0; % 0.5, 1
t = -tmax : tr : tmax;

% Raised Cosine Pulse
p = (sinc(rb.*t).*cos(pi.*alpha.*rb.*t))./(1-(4.*alpha.^2.*rb.^2.*t.^2));

%p = (sinc(rb.*t)).^2; % sinc^2

% Frequency Spectrum
nfft = length(t);
nfft = 2^ceil(log2(nfft));
f = ((-nfft/2):(nfft/2)-1)/(nfft*tb);
f1 = fft(p,nfft);
f1 = fftshift(f1);

% Plotting spectrum
figure(1);

sgtitle("Pulse Shaping with Nyquist Pulses");
subplot(2,1,1);
```

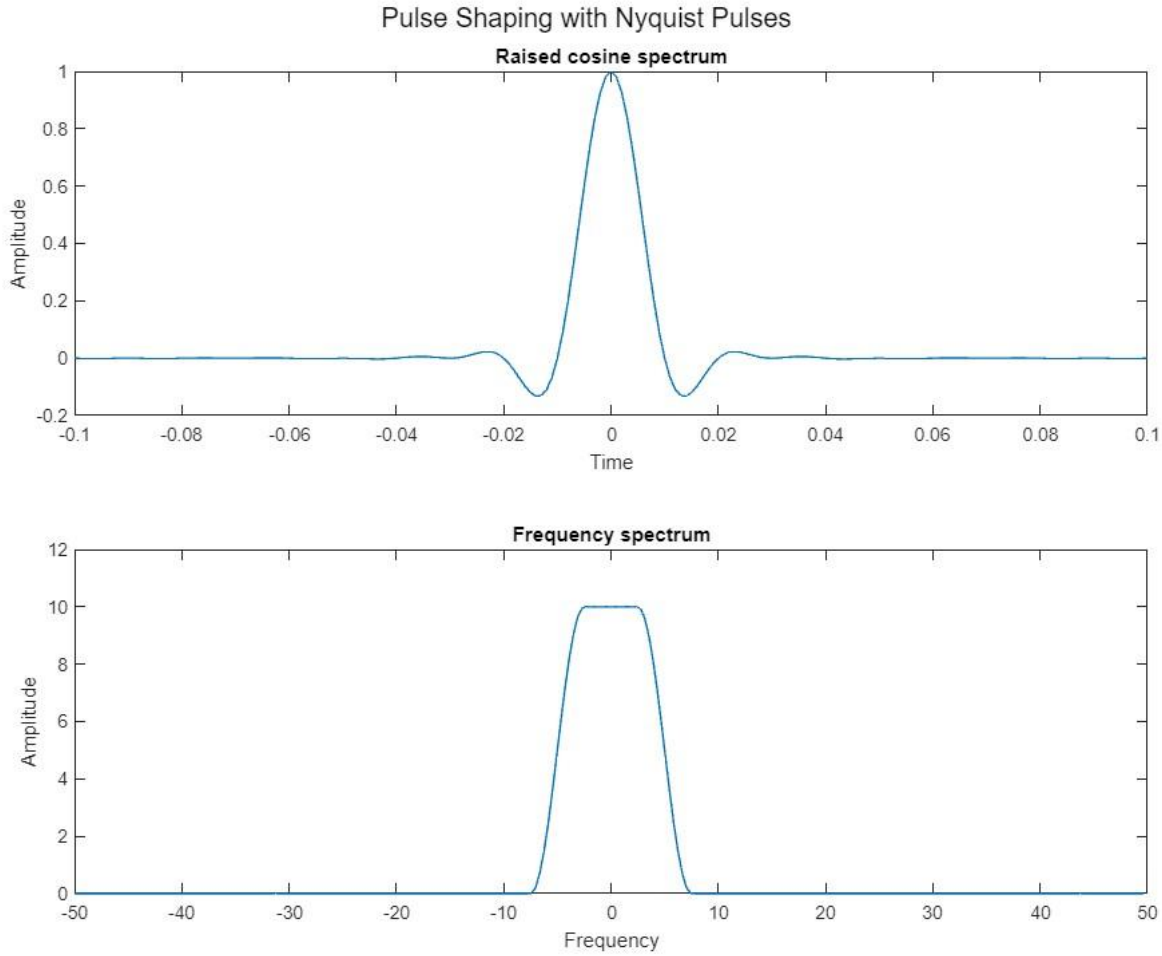
```
plot(t,p);
title("Raised cosine spectrum");
xlabel("Time");
ylabel("Amplitude");

subplot(2,1,2);
plot(f,abs(f1));
title("Frequency spectrum");
xlabel("Frequency");
ylabel("Amplitude");
```

Output:

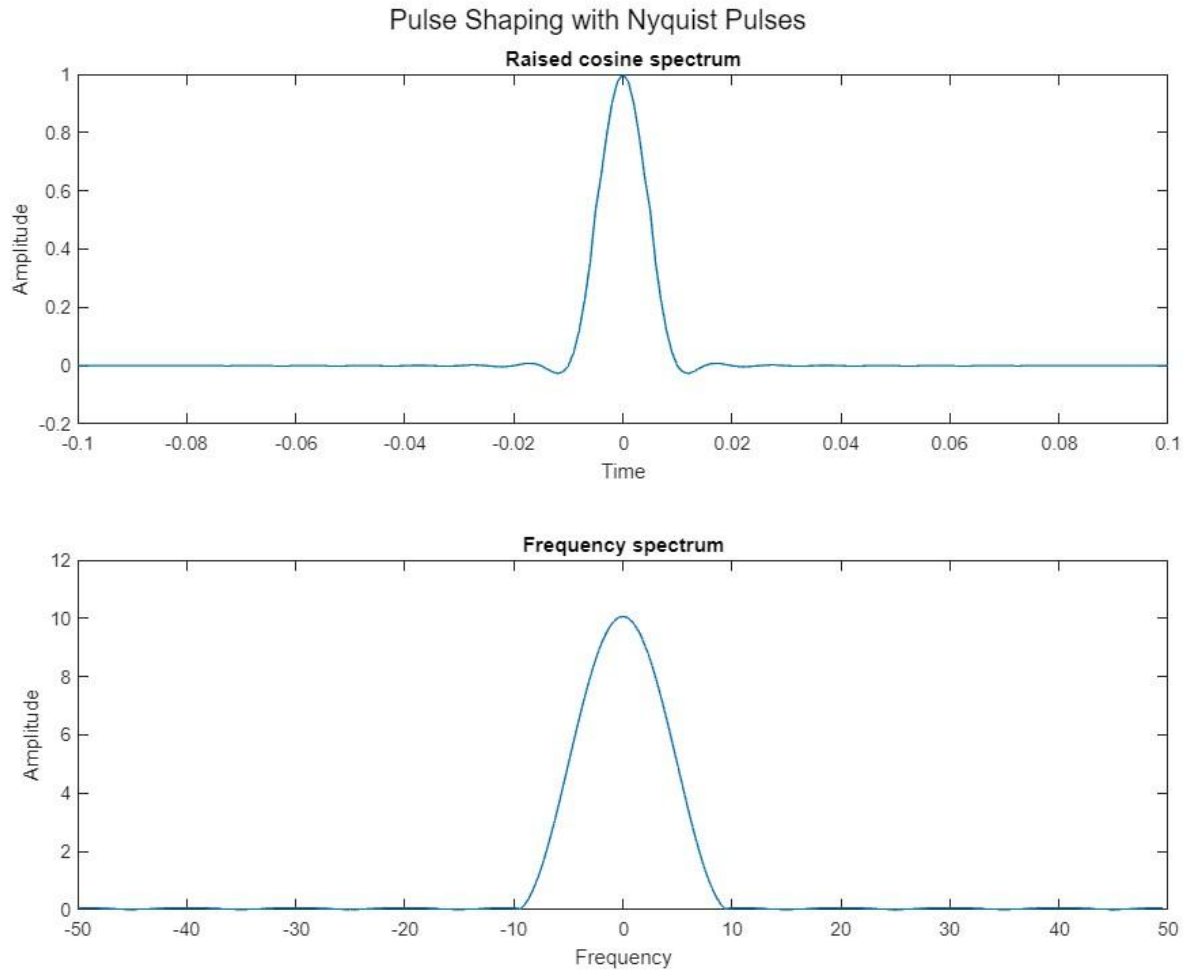
i) Raised cosine pulse shaping with α= 0 and Tmax= 10Tb



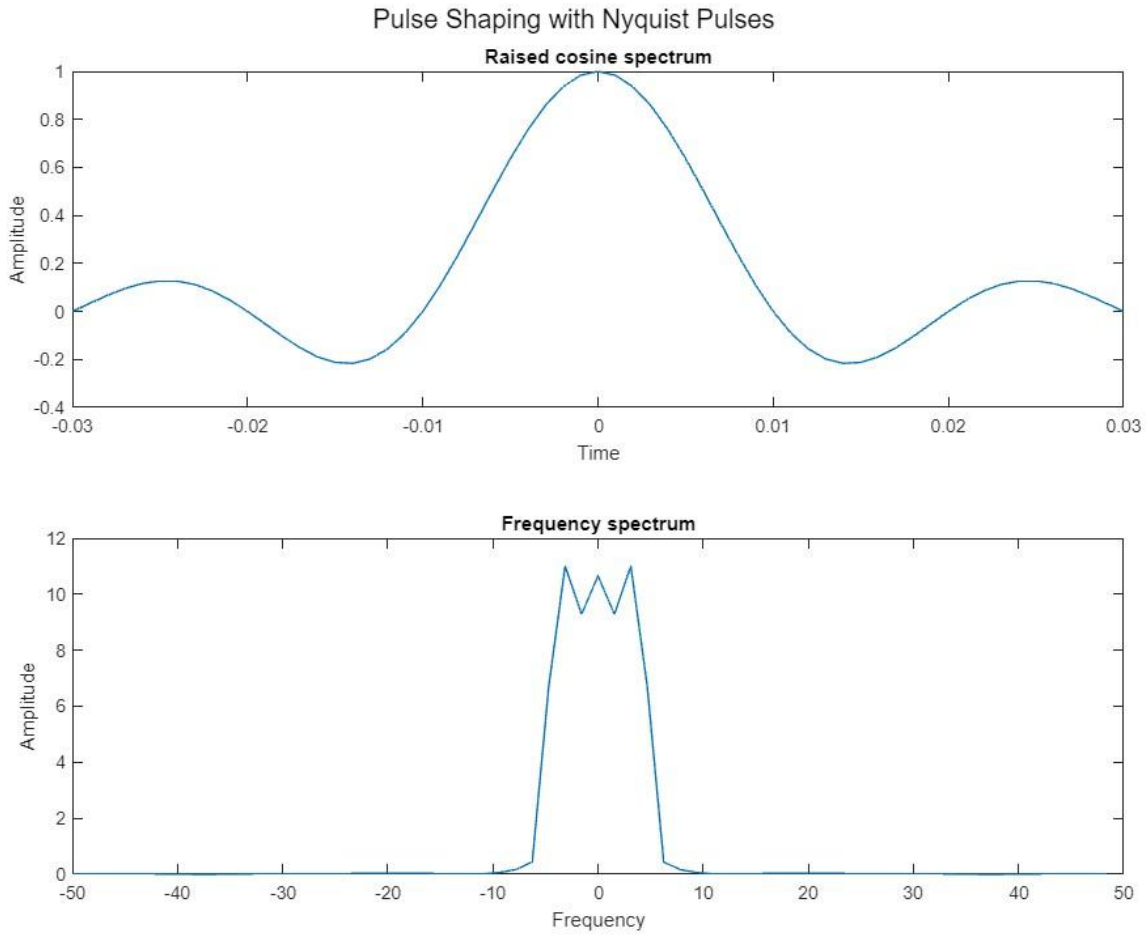
ii) Raised cosine pulse shaping with α= 0 and Tmax= 3Tb



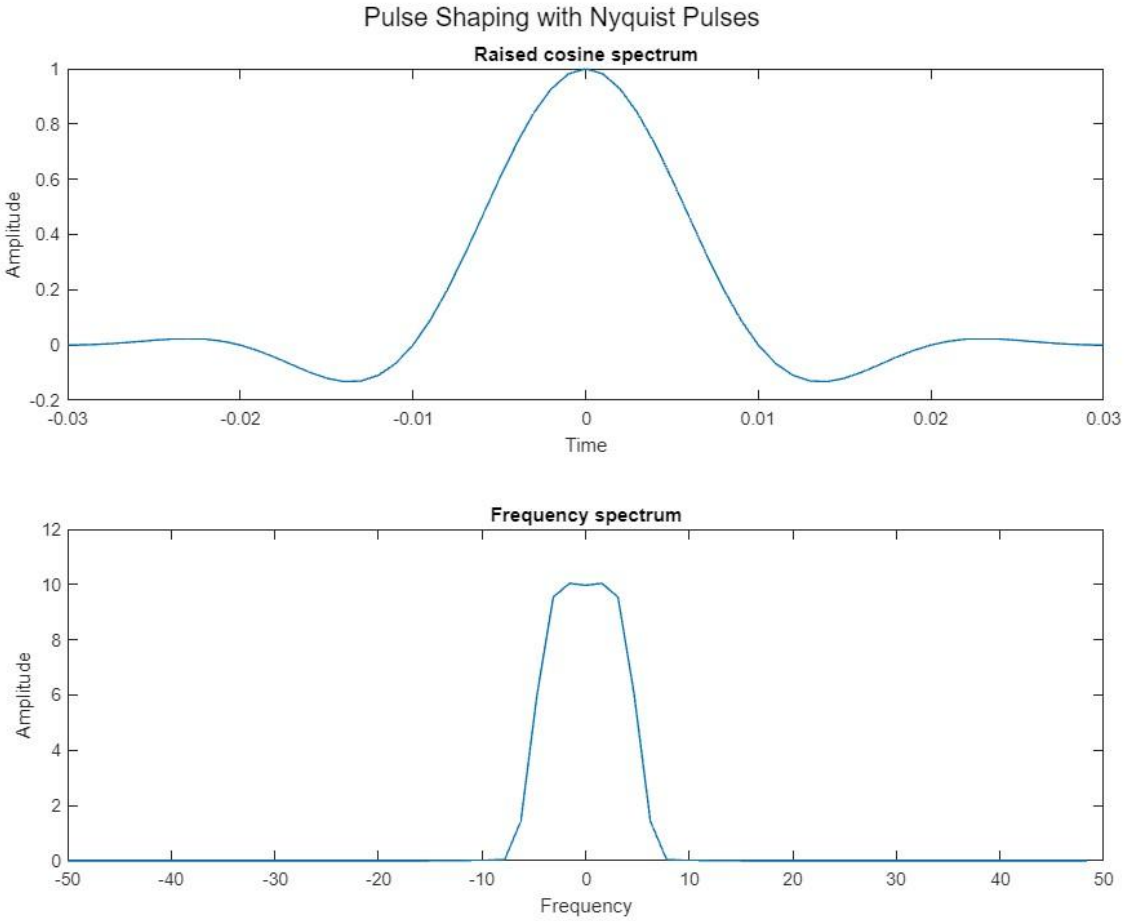
iii) Raised cosine pulse shaping with α= 0.5 and Tmax= 10Tb



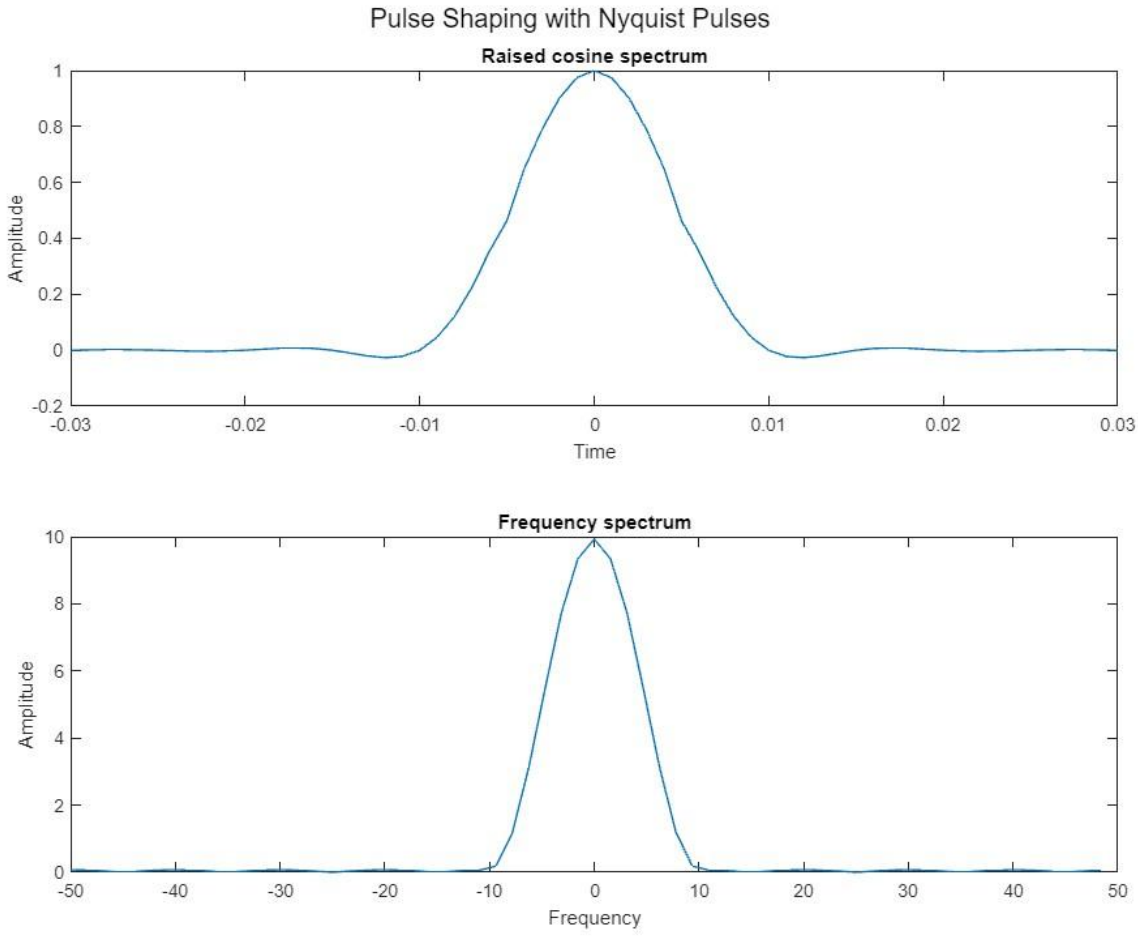
iv) Raised cosine pulse shaping with α= 0.5 and Tmax= 3Tb



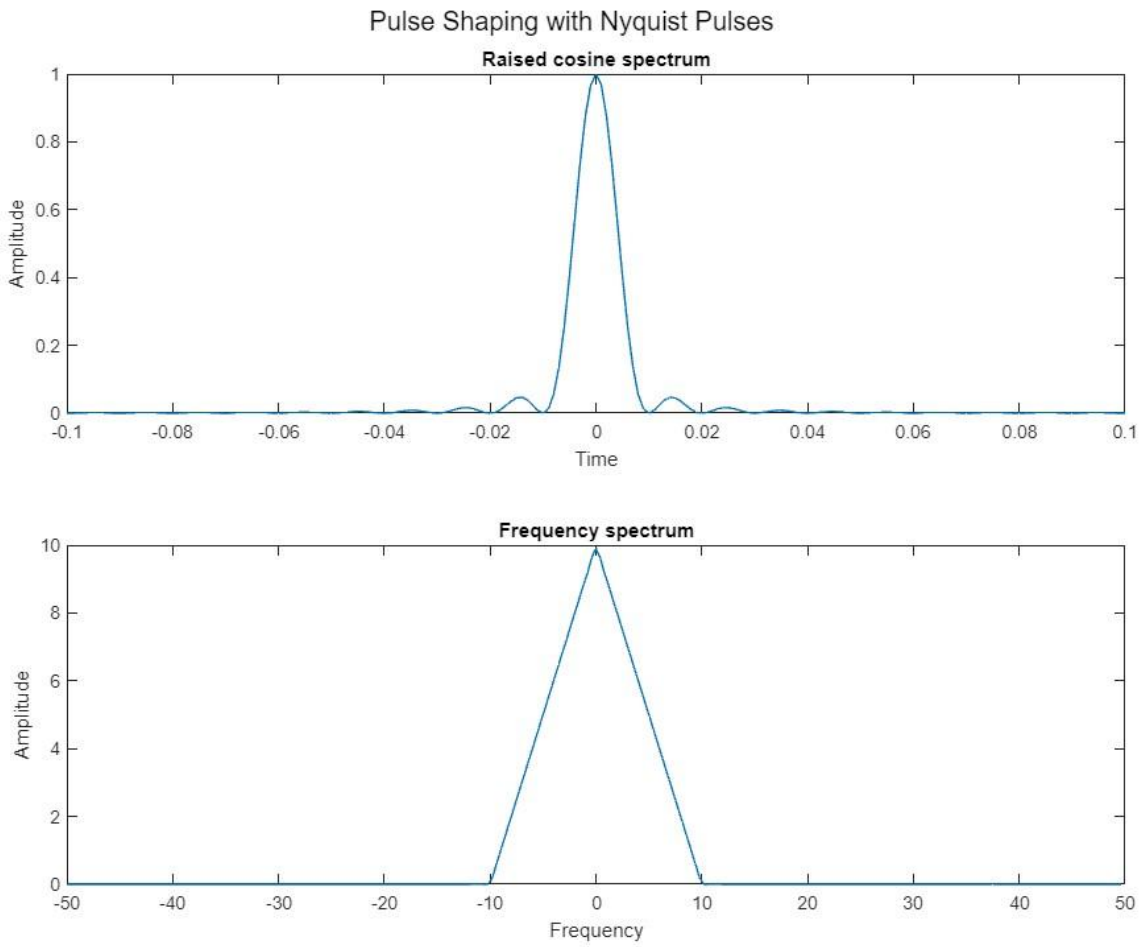
v) Raised cosine pulse shaping with α= 1 and Tmax= 10Tb



vi) Raised cosine pulse shaping with α= 1 and Tmax= 3Tb



vii) sinc^2 pulse shaping with Tmax= 10Tb



viii) sinc^2 pulse shaping with Tmax= 3Tb