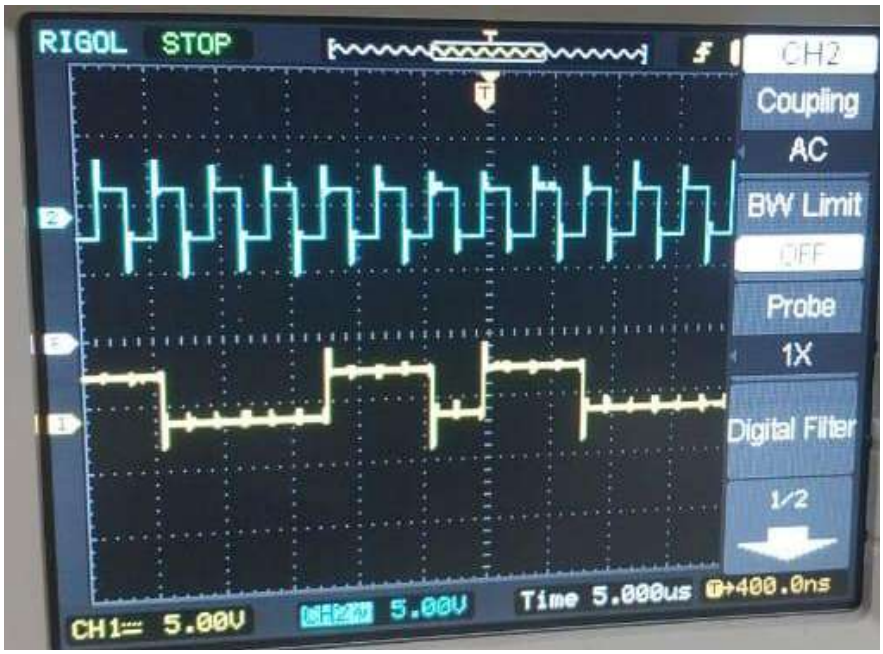
Lab-6

Raj-202201403, Bhoomish-202201414

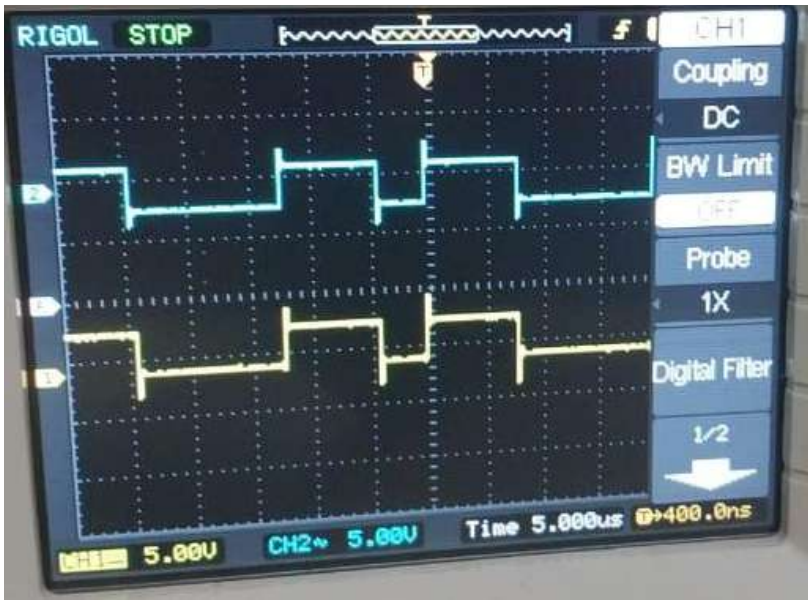
Manthan-202201416, Rakshit-202201426

Experiment 1

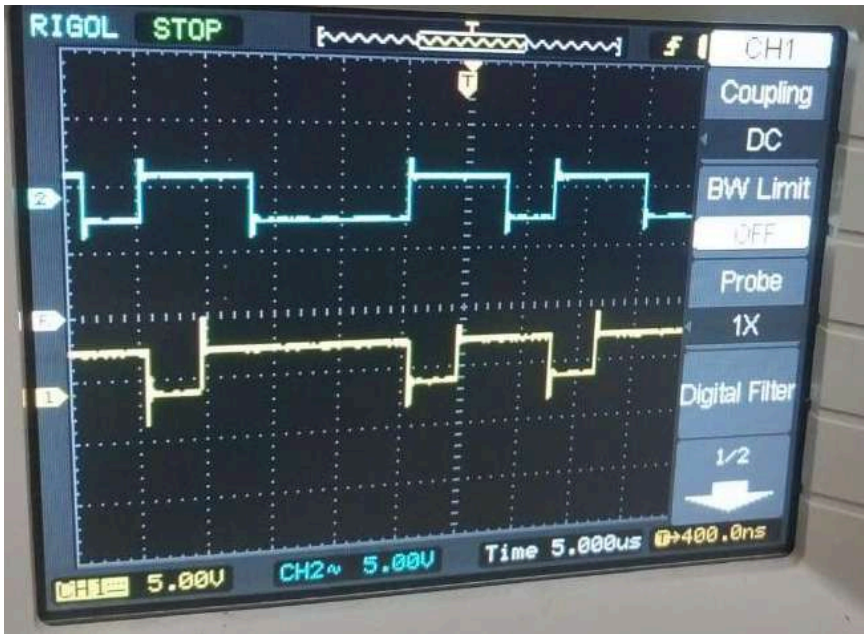
CH 1: DATA CLK (266 KHz) & CH 2: SERIAL DATA (00011011)



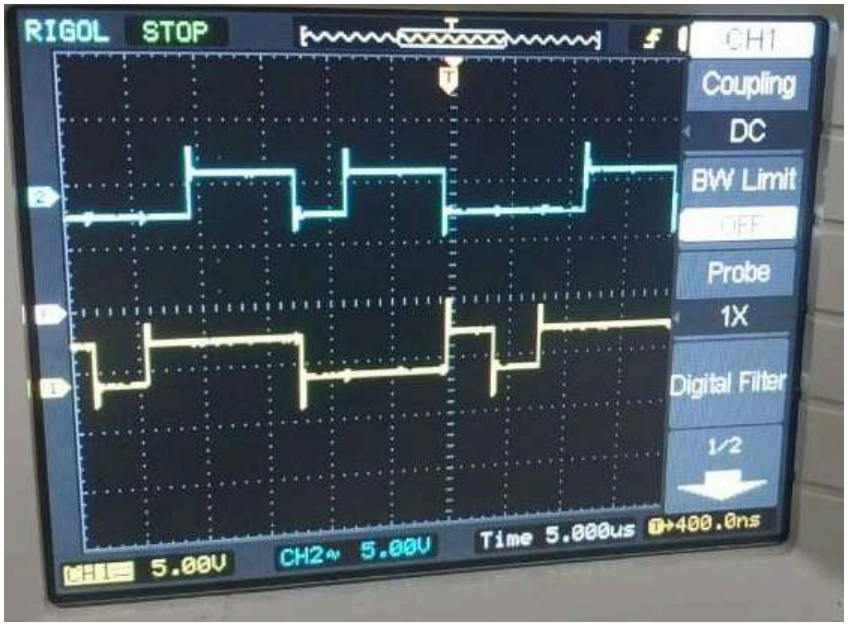
CH 1:DATA IN& CH 2:NRZ-L



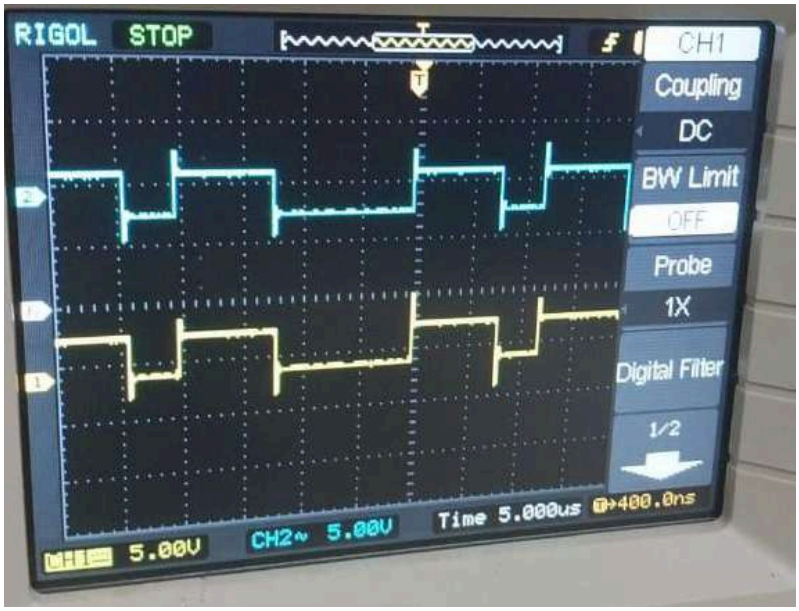
CH 1: DATA IN& CH 2: NRZ-M



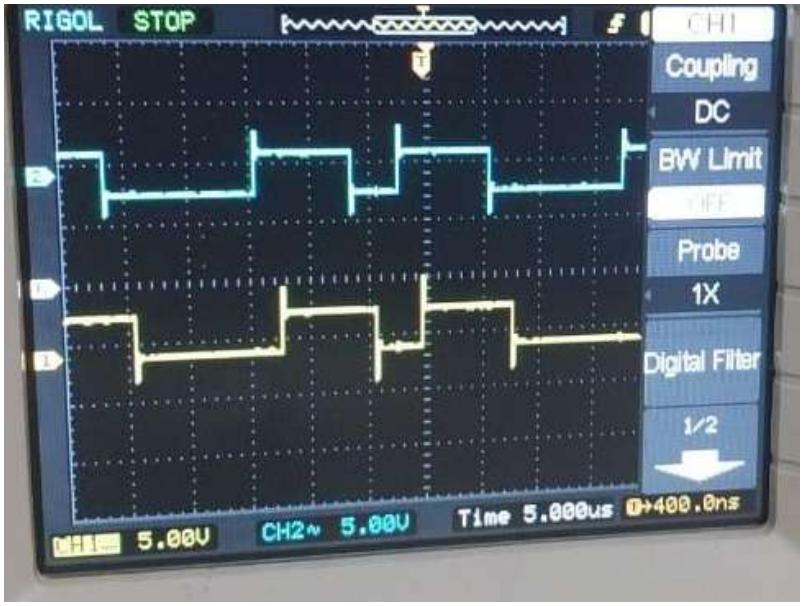
CH 1: DATA IN& CH 2: NRZ-S



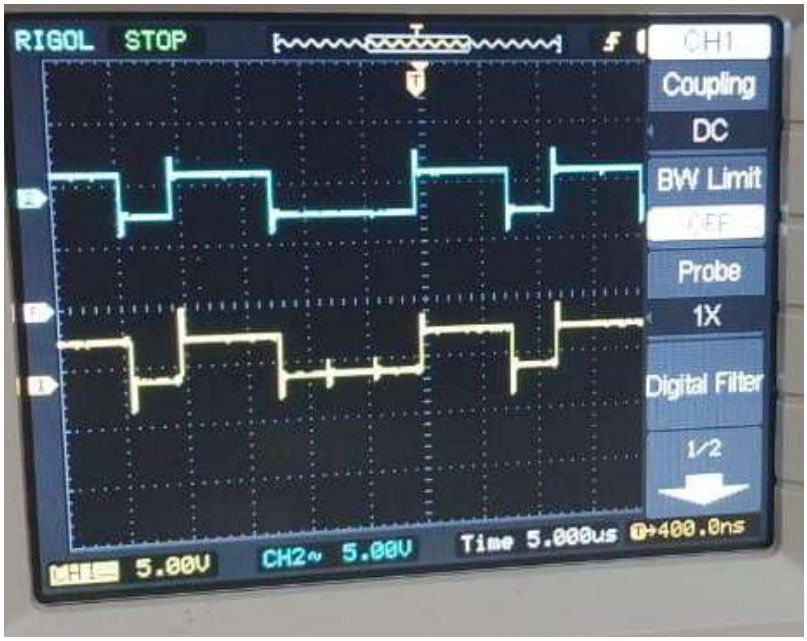
CH 1:DATA IN& CH 2: OUT1



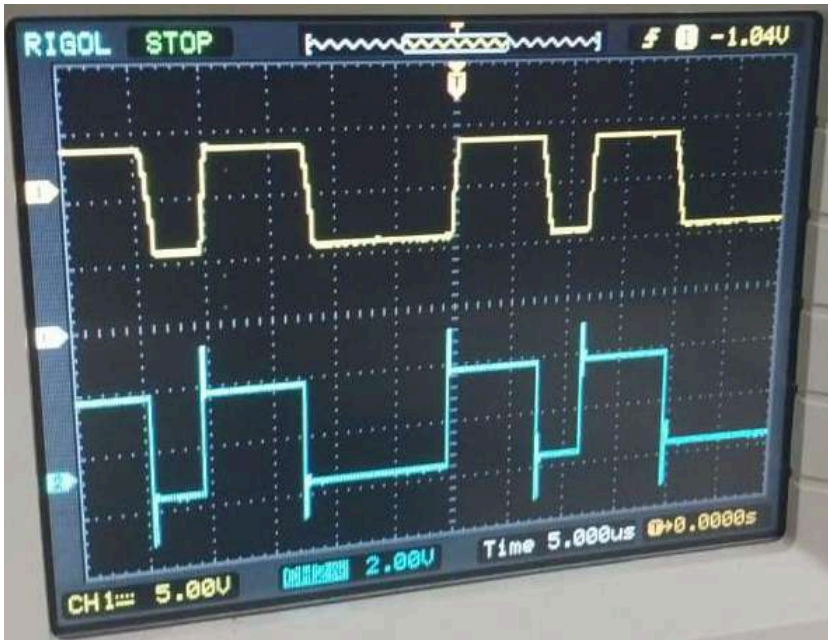
CH 1: DATA IN& CH 2: OUT2



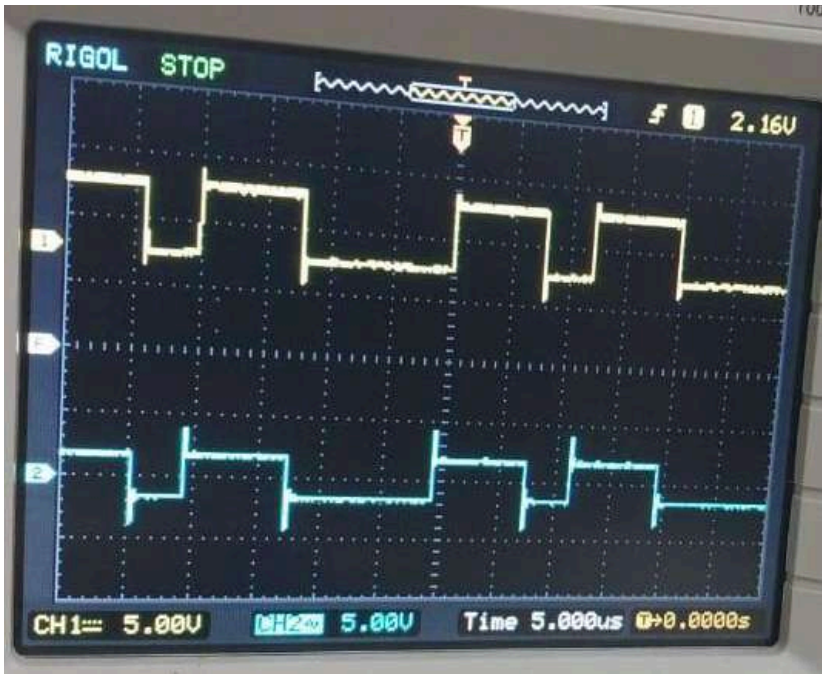
CH 1: DATA IN& CH 2: OUT3



CH 1: IN10& CH 2:OUT10

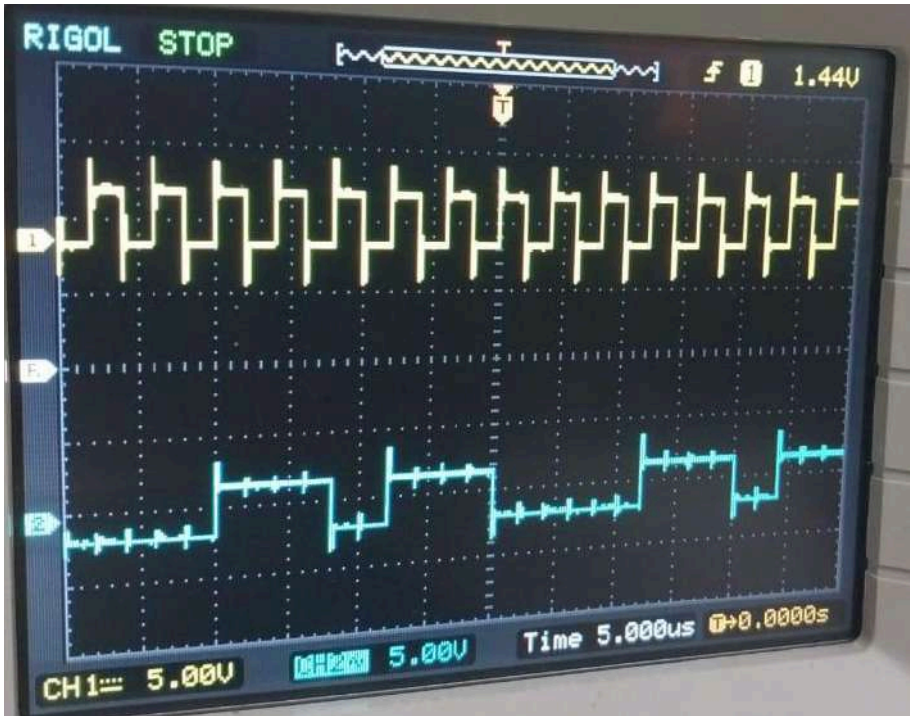


CH 1: IN10& CH 2: OUT11

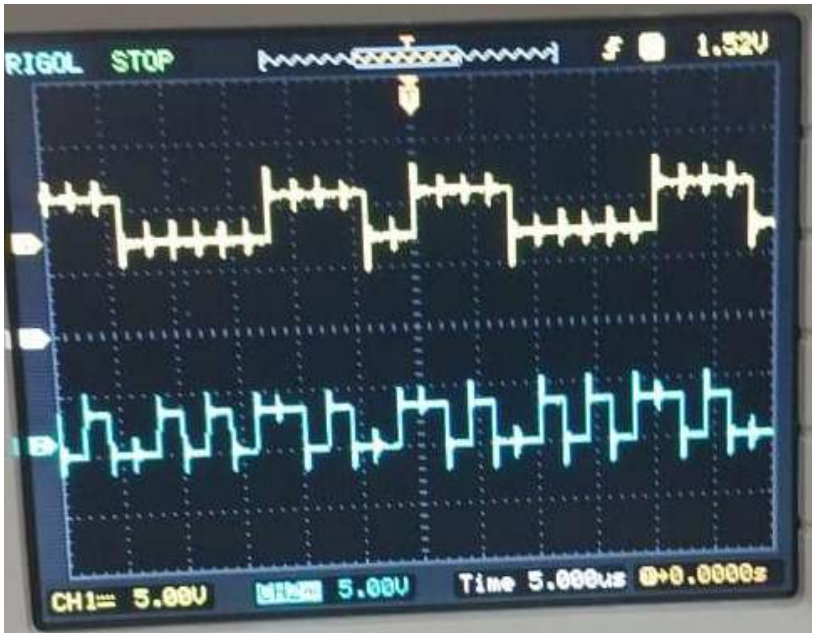


Experiment 2

CH 1: DATA CLK (266 KHz) & CH 2: SERIAL DATA (00011011)



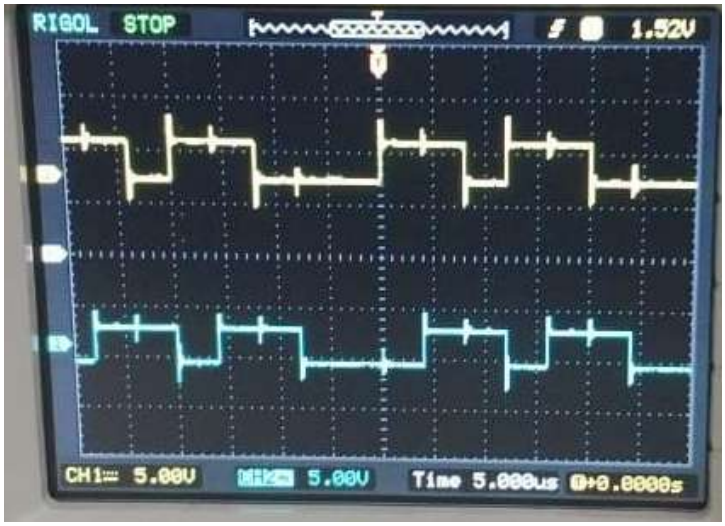
CH 1: DATA IN& CH 2: BIO-L



CH 1: DATA IN & CH 2: BIO-M

CH 1: DATA IN& CH 2: BIO-S

CH 1: DATA IN& CH 2: OUT5



CH 1: DATA IN& CH 2: OUT6

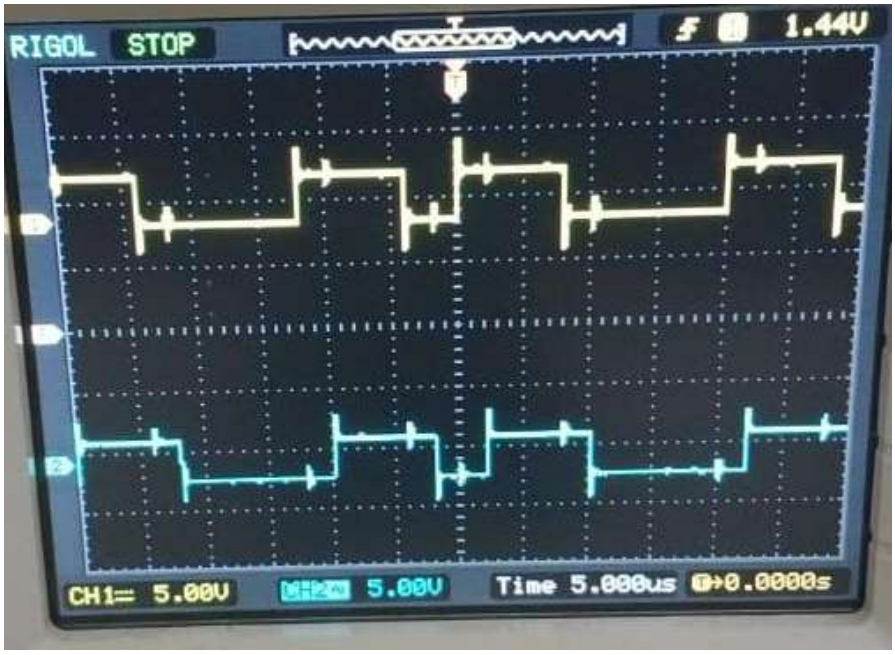
CH 1: DATA IN& CH 2: OUT7

Experiment 3

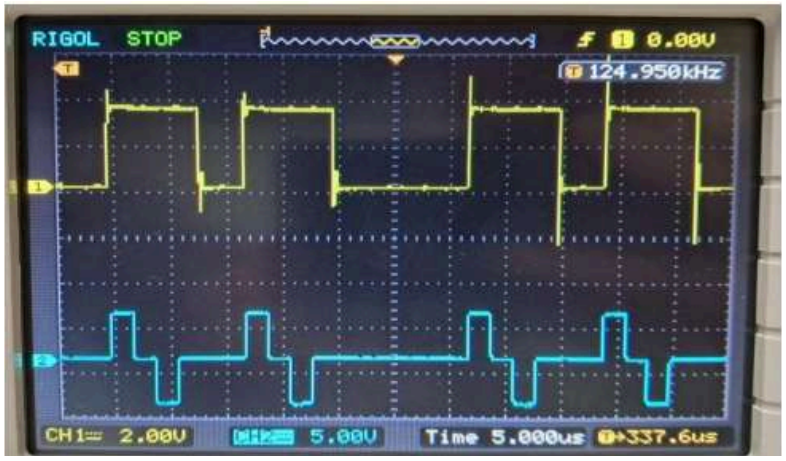
CH 1: DATA CLK (266 KHz) & CH 2: SERIAL DATA (00011011)

CH 1: DATA IN& CH 2: URZ

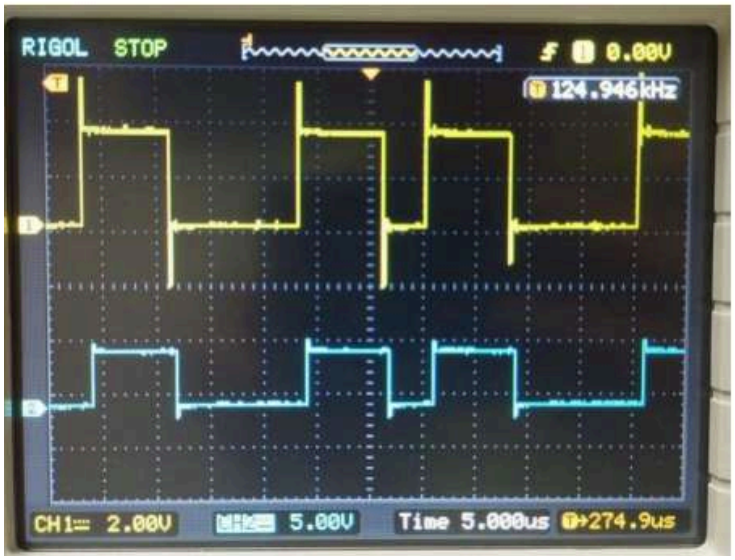
CH 1: DATA IN& CH 2: OUT4



CH 1: IN8 & CH 2: OUT8



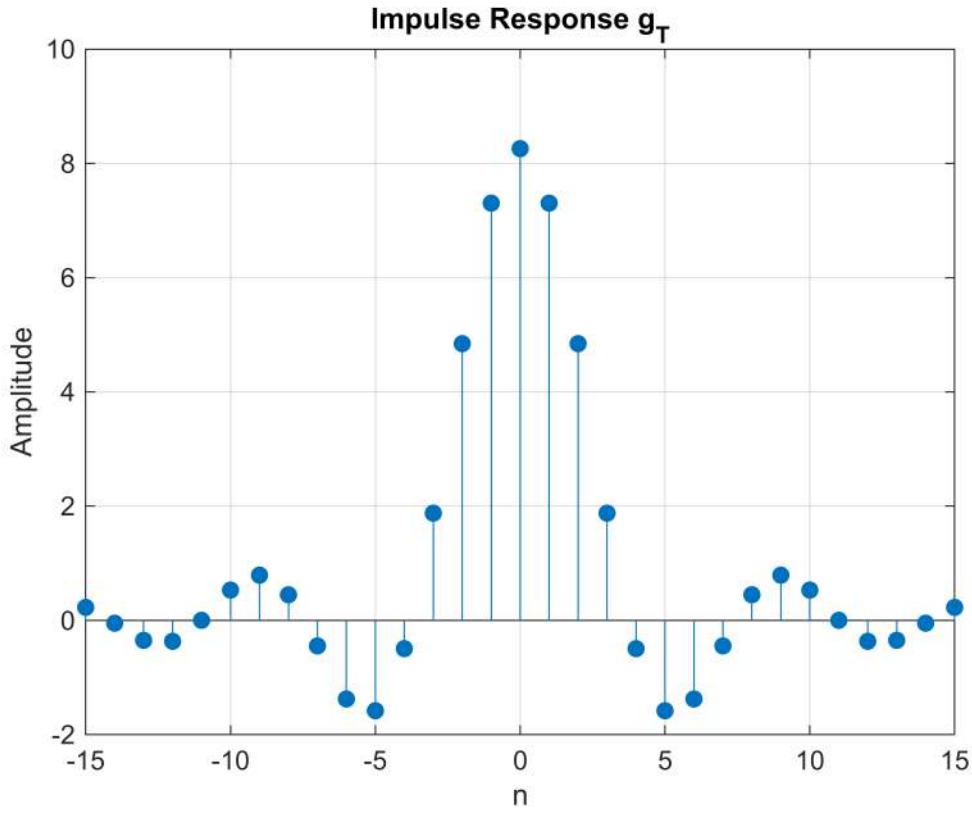
CH 1: IN8 & CH 2: OUT9


RIGOL
STOP
0.00V
124.946kHz
CH1 2.00V
5.00V
Time 5.000us
274.9us

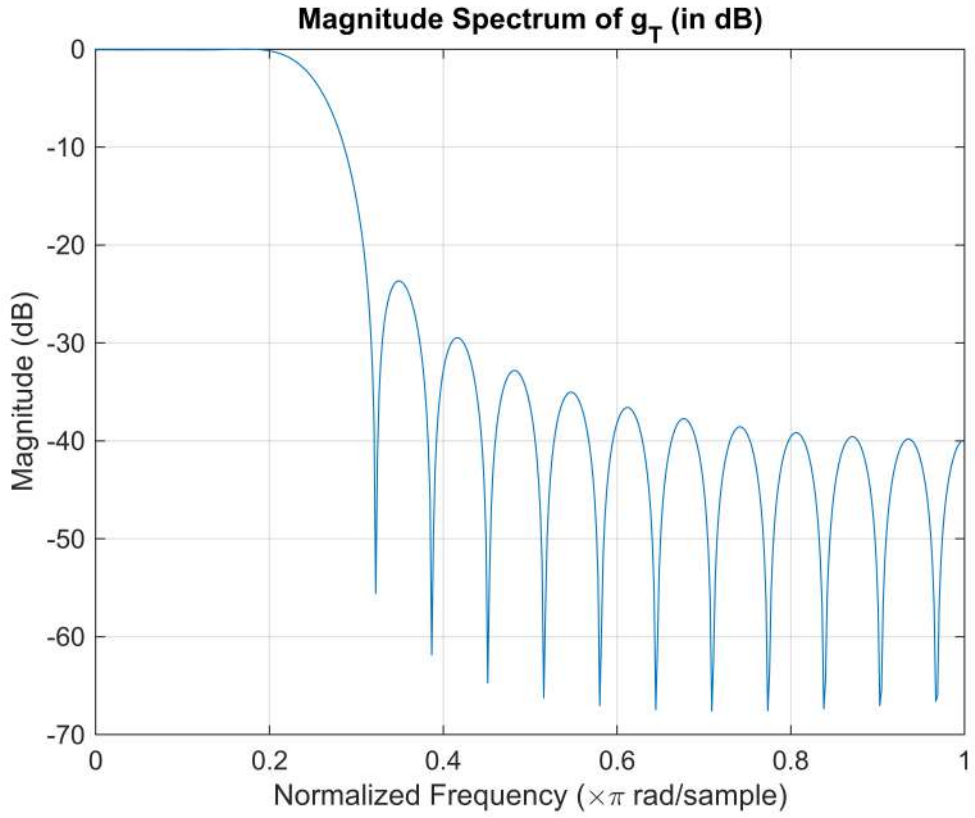
Matlab Exercises

Illustrative Problem 6.8

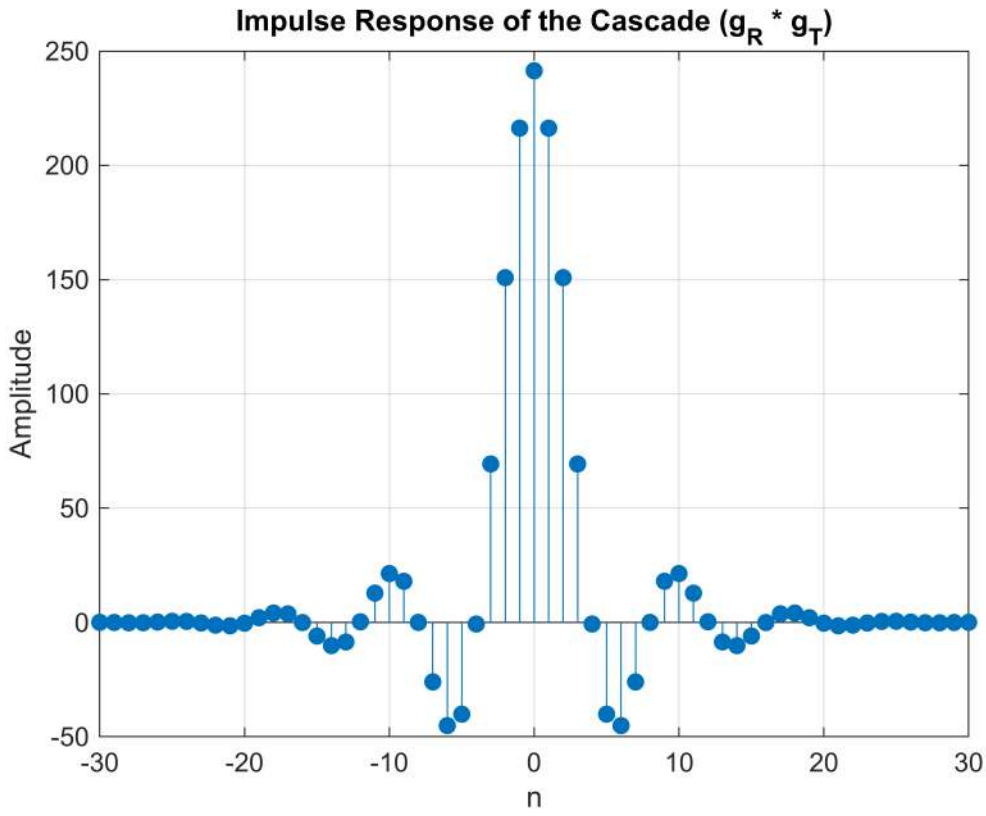
```
N = 31; % Number of samples
T = 1; % Symbol duration
alpha = 1/4; % Roll-off factor
n = -(N-1)/2:(N-1)/2;
g_T = zeros(1, length(n));
for i = 1:length(n)
for m = -(N-1)/2:(N-1)/2
g_T(i) = g_T(i) + sqrt(xrc(4*m/(N*T), alpha, T)) * exp(1j*2*pi*m*n(i)/N);
end
end
g_T = real(g_T);
[G_T, W] = freqz(g_T, 1);
magG_T_in_dB = 20 * log10(abs(G_T) / max(abs(G_T)));
g_R = g_T;
imp_resp_of_cascade = conv(g_R, g_T);
figure;
stem(n, g_T, 'filled');
title('Impulse Response g_T');
xlabel('n');
ylabel('Amplitude');
grid on;
```



```
figure;
plot(W/pi, magG_T_in_dB);
title('Magnitude Spectrum of g_T (in dB)');
xlabel('Normalized Frequency (\times\pi rad/sample)');
ylabel('Magnitude (dB)');
grid on;
```

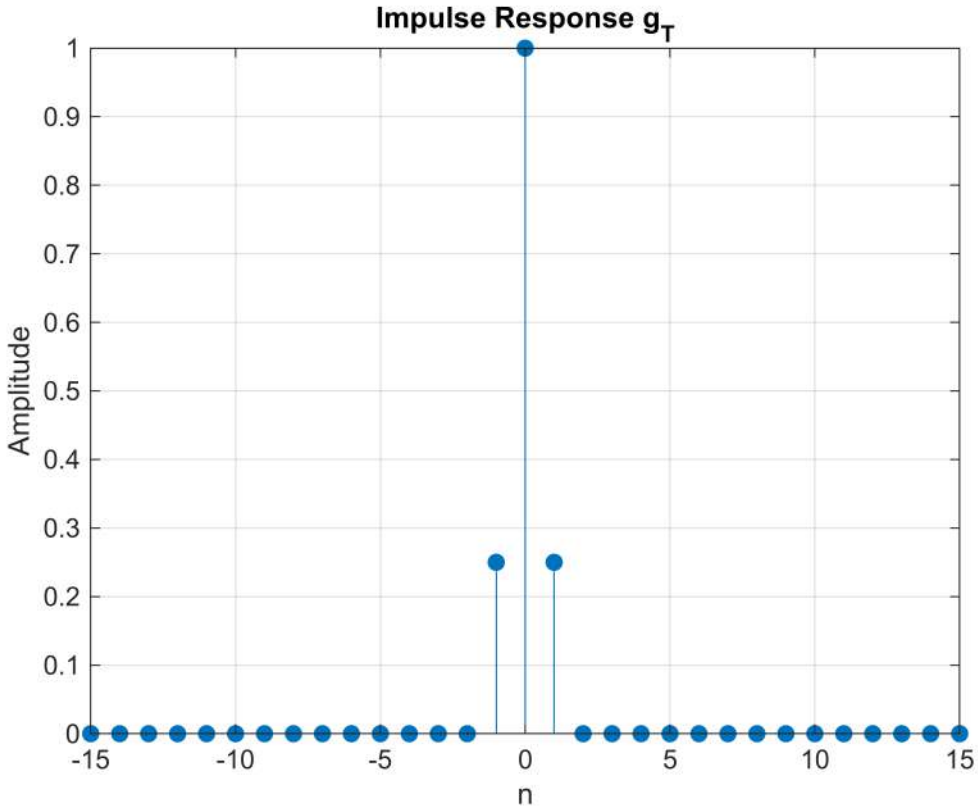



```
n_cascade = -(N-1):(N-1); % The correct range for the convolved output
figure;
stem(n_cascade, imp_resp_of_cascade, 'filled');
title('Impulse Response of the Cascade (g_R * g_T)');
xlabel('n');
ylabel('Amplitude');
grid on;
```

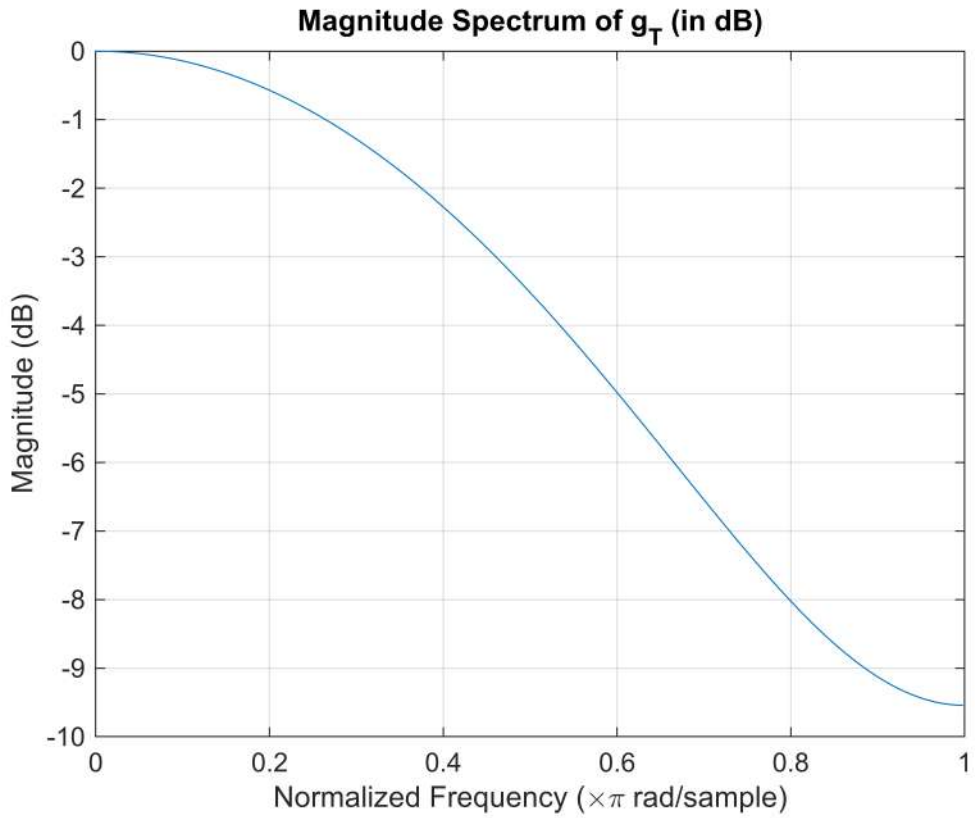


Problem 6.9

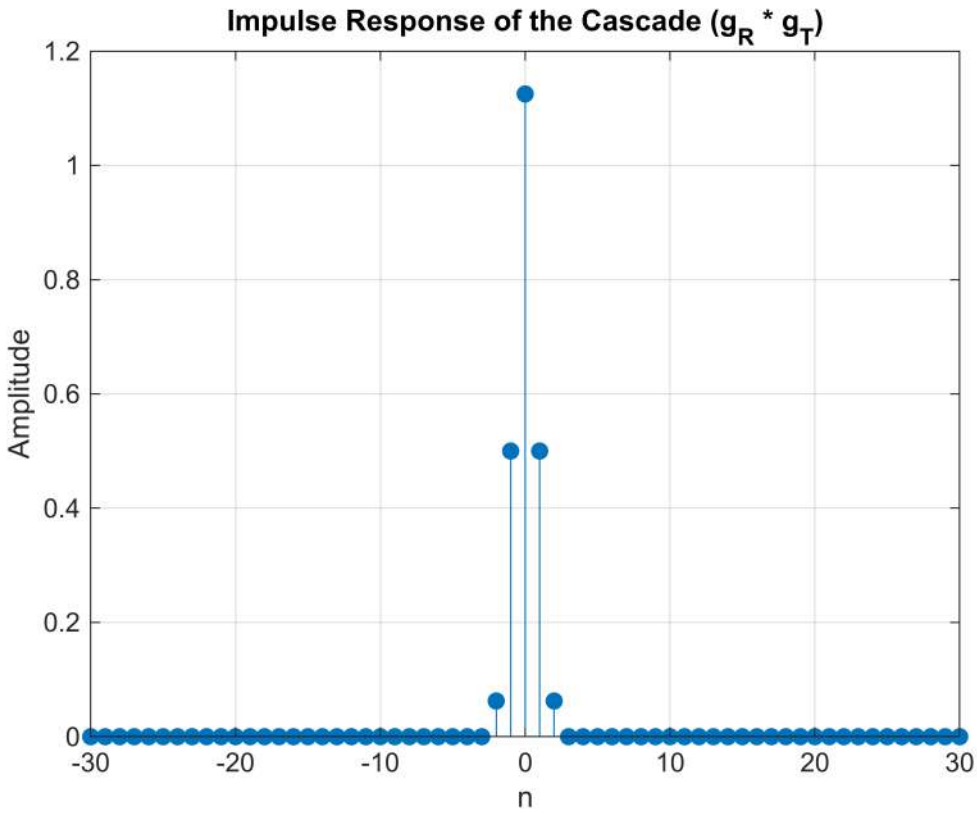
```
N = 31; % Number of samples
T = 1; % Symbol duration
alpha = 1/4; % Roll-off factor
n = -(N-1)/2:(N-1)/2;
g_T = zeros(1, length(n));
g_T(n==0) = 1;
g_T(n==1) = 0.25;
g_T(n==-1) = 0.25;
g_T = real(g_T);
[G_T, W] = freqz(g_T, 1);
magG_T_in_dB = 20 * log10(abs(G_T) / max(abs(G_T)));
g_R = g_T;
imp_resp_of_cascade = conv(g_R, g_T);
figure;
stem(n, g_T, 'filled');
title('Impulse Response g_T');
xlabel('n');


ylabel('Amplitude');
grid on;
```




```
figure;
plot(W/pi, magG_T_in_dB);
title('Magnitude Spectrum of g_T (in dB)');
xlabel('Normalized Frequency (\times\pi rad/sample)');
ylabel('Magnitude (dB)');
grid on;
```




```
n_cascade = -(N-1):(N-1); % The correct range for the convolved output
figure;
stem(n_cascade, imp_resp_of_cascade, 'filled');
title('Impulse Response of the Cascade (g_R * g_T)');
xlabel('n');
ylabel('Amplitude');
grid on;
```




```
function y = xrc(f, alpha, T)
if abs(f) > ((1 + alpha) / (2 * T))
y = 0;
elseif abs(f) > ((1 - alpha) / (2 * T))
y = (T / 2) * (1 + cos(pi * T / alpha * (abs(f) - (1 - alpha) / (2 * T))));
else
y = T;
end
end
```