**Link Power**

clc;

clear all;

close all;

pin=input('Enter the mean input optical power launched into the fiber in dBm');

po=input('Enter the mean incident optical power required at receiver in dBm');

af =input('Enter the in the attenuation factor in the fiber');

Lsp=input('Enter the in the splice loss per km');

Lc=input('Enter the in the total connector losses');

M=input('Enter the required safety margin');

L=(pin-po-Lc-M)/( af +Lsp);

disp('The maximum link length is');

disp(L);

pin=input('Enter the mean input optical power launched into the fiber in dBm');

po=input('Enter the mean incident optical power required at receiver in dBm');

af =input('Enter the in the attenuation factor in the fiber');

Lsp=input('Enter the in the splice loss per km');

Lc=input('Enter the in the total connector losses');

M=input('Enter the required safety margin');

L=(pin-po-Lc-M)/( af +Lsp);

disp('The maximum link length is');

disp(L);

pin=input('Enter the mean input optical power launched into the fiber in dBm');

po=input('Enter the mean incident optical power required at receiver in dBm');

af =input('Enter the in the attenuation factor in the fiber');

Lsp=input('Enter the in the splice loss per km');

Lc=input('Enter the in the total connector losses');

M=input('Enter the required safety margin');

DEP=input('Enter the required DEP');

L=(pin-po-Lc-M-DEP)/( af +Lsp);

disp('The maximum link length is');

disp(L);

**Rise Time**

clc;

clear all;

close all;

td=6;

ts=8;

l=input("fiber lenght: ");

inter=5;

tinter=(l\*inter);

intra=1;

tintra =(l\*intra);

tsys= sqrt (ts^2+td^2+tinter^2+tintra^2);

fprintf('Total system Rise time:');

disp (tsys)

nrz=(0.7/tsys\*1000);

fprintf('bit rate for NRZ format' );

disp (nrz)

rz=(0.35/tsys\*1000);

fprintf('Bit rate for RZ format: ');

disp(rz)

**SI & GI**

clc;

close all;

clear all;

% Parameters

n1 = 1.5; delta = 0.01; a = 30;

n2 = n1 \* sqrt(1 - 2 \* delta);

% Step-Index Data

r\_full = linspace(0, 50, 500);

n\_step\_full = n1 \* ones(size(r\_full));

n\_step\_full(r\_full > a) = n2;

% Graded-Index Data

r = linspace(0, a, 500);

m = r / a;

n\_step = n1 \* ones(size(r));

n\_tri = n1 .\* sqrt(1 - 2 \* delta \* m); % Triangular (α = 1)

n\_para = n1 .\* sqrt(1 - 2 \* delta \* m.^2); % Parabolic (α = 2)

% Plotting

figure;

% Subplot 1: Step-Index

subplot(1,2,1);

plot(r\_full, n\_step\_full, 'b', 'LineWidth', 1.5); hold on;

xline(a, 'r--', 'Core Boundary');

xlabel('Radial Distance (\mum)');

ylabel('Refractive Index');

title('Step-Index Fiber');

legend('Step Index'); grid on;

% Subplot 2: Graded-Index

subplot(1,2,2);

plot(r, n\_step, 'k--', r, n\_tri, 'g', r, n\_para, 'm', 'LineWidth', 1.5); hold on;

xline(a, 'm--', 'Core Boundary');

xlabel('Radial Distance (mm)');

ylabel('Refractive Index');

title('Graded-Index Profiles');

legend('Step (\alpha=\infty)', 'Triangular (\alpha=1)', 'Parabolic (\alpha=2)'); grid on;