

1. Calculate for Step Index Fibers(using MATLAB):

- a) Numerical aperture
- b) Acceptance angle
- c) Solid acceptance angle
- d) Propagation constant

2. Calculate for Step Index Fibers(using MATLAB):

- a) Propagation constant (β)
- b) Normalized propagation constant (b)
- c) V number (V)
- d) Check whether the fiber is single mode or multi mode.
- e) Graph between normalized propagation constant (b) and V number
- f) Cut off wavelength (λ_c)
- g) Number of modes traveling in fiber (M_s)

3. Calculate for Graded Index Fibers(using MATLAB):

- a) Graphical representation of core refractive index $n_1[r]$ w.r.t. radius of core for different profile parameters.
- b) Graphical representation of numerical aperture $NA[r]$ w.r.t. radius of core (r) for different profile parameters.
- c) Acceptance Angle (θ_a) for given value of radius Where $0 < r \leq a$, Δ = refractive index difference

4. Calculate for Graded Index Fibers(using MATLAB):

- a) Numerical aperture (NA)
- c) V number (V)
- d) Check whether the fiber is single mode or multi mode.
- e) Graph between V number and wavelength (λ)
- f) Cut off wavelength (λ_c)
- g) Number of modes traveling in fiber (M_s)

5. Calculate for Step Index Fibers (using MATLAB): Mode Field Diameter

6. Calculate for pure Silica fibers (using MATLAB):

- a) Graph for refractive index (n) with wavelength (λ)
- b) Graph for $dn/d\lambda$ with wavelength (λ)
- c) Graph for $d^2n/d\lambda^2$ with wavelength(λ)
- d) Graph for material dispersion (D_m) with wavelength
- e) Calculate material dispersion (D_m) at given wavelength
- f) Find Zero material dispersion wavelength

7. Calculate for step index fibers (using MATLAB):

- a) V number (V)
- b) Cut off wavelength (λ_c)
- c) Waveguide dispersion at given wavelength
- d) Plot of waveguide dispersion with wavelength

8. Calculate (using MATLAB):

a) The Rayleigh Scattering Loss for Silica Fibers.

b) Plot a graph for Loss with wavelength.

9. Calculate the Infrared absorption loss for silica fibers and plot a graph with wavelength (using MATLAB)

<https://www.fiberoptics4sale.com/blogs/archive-posts/95048006-optical-fiber-loss-and-attenuation> different loss link

10. Calculate (using MATLAB):

a) Total loss for silica fibers and plot a graph with wavelength.

b) Plot output power with length.

<https://sites.google.com/site/worldofmatlab/home/optical-fiber> link for Optical Communication Laboratory

<https://www.mathworks.com/matlabcentral/answers/286107-how-to-get-b-vs-v-plot-for-multimode-optical-fiber-using-matlab-with-using-bessel-s-equation> Link for b vs V plot for multimode optical fiber using matlab using bessel's equation