Fiber Optics Communications Topical Objectives

The student should be able to:

1. Apply Snell's Law to determine the effects of refraction.
2. Calculate the critical angle for a particular interface and understand the implications with respect to refraction/reflection.
3. Describe a traveling light wave using a mathematical representation of its electric field vector.
4. Use the characteristic equation of a slab waveguide to determine the number of guided modes and their propagation angles.
5. Discuss the parameters that could be adjusted (and in what way) to limit the number of propagating modes in a slab waveguide.
6. Calculate a fiber's normalized frequency and use it to determine the guided modes.
7. Calculate the effects of attenuation on transmitted optical power.
8. Determine if intramodal or intermodal dispersion will be dominant in a specified fiber at a given wavelength and calculate the effect of each (in terms of pulse spreading).
9. Describe the nature of a p-n junction and how it is employed to generate light in an LED or laser diode, including relative p- and n-type band energy levels and the relationship between band energy gap and emitted wavelength.
10. Calculate optical power emitted from an LED.
11. Calculate optical power emitted from a laser diode both above and below threshold current.
12. Describe the spectrum of a laser diode operating above threshold current, to include calculating the number of longitudinal modes and their wavelengths or frequencies.