Q1. For optical fiber to carry light, the light must be completely internally reflected and stay in the core. Should the index of refraction of the cladding be less than or greater than the index of refraction of the core? Also mention the angle of incidence at core-cladding interface with respect to critical angle for TIR   [CO1]

Q2. For a fiber the index of refraction of the inner core is 1.480 , and the index of refraction of the outer cladding is 1.44.   [CO2]

A. What is the critical angle for the core-cladding interface?
B. For what range of angles in the core at the entrance of the fiber will the light be completely internally reflected at the core-cladding interface?
C. What range of incidence angles in air does this correspond to?
D. If light is totally internally reflected at the upper edge of the fiber, will it necessarily be totally internally reflected at the lower edge of the fiber (assuming edges are parallel)?

Q3. Refractive index of the core of a fiber is 1.5 and its cladding has fractional index difference of 0.005. Calculate the refractive index of cladding and its numerical aperture and angle of acceptance.   [CO2]

Q4. For a fiber the refractive index of core & cladding is 1.54 and 1.5 respectively. The radius of core is 25 μm. For 1500 nm wavelength, calculate the V number and number of modes, also mention weather this fiber is single mode or multimode for the given wavelength?   [CO2]

Q5.For the fiber mentioned in question 4, calculate the reflections per meter suffered by a guided ray at steepest angle with respect to the fiber axis.

Q6. A step index optical fiber is single mode at $\lambda > 1.2$ micrometer. Another fiber is to be fabricated from the same materials, but it has to be single mode for $\lambda > 0.63$ micrometer. By what percentage must the core radius of new fiber differ from the old one?   [CO3]

Q7. The optical power, after propagating through 500 m long fiber is reduced to 25% of its original power. Calculate the fiber loss in dB/km.   [CO3]