

ENEE 691 Problem Set #5 4/25/02

Due 5/2/02

- (1) Keiser Problem 6-5
- (2) Keiser Problem 6-6
- (3) Keiser Problem 6-8
- (4) Keiser Problem 7-8
- (5) Keiser Problem 7-12
- (6) Keiser Problem 7-23
- (7) Do Problem (2) From ENEE 691 First examination 2001

(2) If the light in a single mode fiber crosses a perpendicular cleaved end face there is a back-reflection because of the index change. Calculate the reflectance in this case if $n_1=1.455$.

What coating (thickness and refractive index) could you place on the end face to reduce the reflectance to zero?

A common way to reduce back-reflection is to cleave the fiber at an angle of 8° away from perpendicular. If a quarter wavelength thick layer is placed on this cleaved face what is the back-reflectance for a P-wave if the layer has $d = \lambda/4$, refractive index $n=1.3$?

Hint: the effective impedance for a P-wave is $Z \cos \theta$. The transformed impedance formula is:

$$Z_3'' = Z_2' \left(\frac{Z_3' \cos k_2 d' + j Z_2' \sin k_2 d'}{Z_2' \cos k_2 d' + j Z_3' \sin k_2 d'} \right)$$

In the following arrangement estimate how much power emerges at port 5.

