Spring_2018

Physics 8110 - Electromagnetic Theory II

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Assignment #5
(due to Monday, April 02, 2018)

1. Problem 8.2 (a), (b), and (c), Jackson textbook.
   (30 Points)

2. In a rectangular waveguide, assuming a=b
   a. Find the explicit fields for TE_{21} mode.
   b. Find the cutoff frequency ω_{12} and compare with ω_{10}.
   c. Find the total average transmitted power (Jackson p. 363…).
   (30 Points)

3. Equation 8.46 (Jackson p. 362) shows that the TE_{10} field is equivalent to two plane waves traveling in oblique directions.
   a. Find the phase velocity of the TE_{10} wave.
   b. Find the phase velocity of the two equivalent plane waves.
   c. Find the group velocity of the TE_{10} wave.
   (20 Points)

4. In a rectangular resonant cavity,
   a. Find the explicit fields for TE_{111} mode.
   b. Find the resonant frequency ω_{111} by assuming a=b=d.
   c. Find the time-averaged energy stored in the cavity.
   (20 Points)