13. REVIEW QUESTIONS

1. Define: angle of incidence, reflection, and transmission angles, and their physical meaning.

2. Reflection and transmission are defined entirely and uniquely by the material properties on the two sides of the interface *T/F*.

3. If one or both materials at an interface are lossy, the reflection and transmission coefficients will be complex. How does this fact affect the reflected and transmitted waves?

4. The magnitude of the transmitted wave can be larger than the magnitude of the incident wave. *T/F*.

5. Although the amplitude of the transmitted wave can be larger than that of the incident wave, the power transmitted across the interface cannot be larger than the incident power. Show why this is so.

6. Transmission and reflection of waves are defined by the interface conditions: The transmission and reflection coefficients are merely a different expression of the interface conditions. *T/F*. Explain.

7. Define: plane of incidence, perpendicular polarization and parallel polarization. Sketch a figure to show the relations between these three quantities.

8. What are standing waves?

9. A pure standing wave can (mark correct answer):

(a) Propagate power.

(b) Propagate real and imaginary power.

(c) Propagate only imaginary power.

(d) Cannot propagate real or imaginary power.

10. Perfectly conducting bodies reflect all power regardless of the angle of incidence. *T/F*.

11. State Snell's law for reflection.

12. State Snell's law for refraction.

13. Define the reflection and transmission coefficients for parallel polarization. Show that for a zero angle of incidence, these reduce to the reflection and transmission coefficients for perpendicular incidence.

14. Define the reflection and transmission coefficients for perpendicular polarization. Show that for a zero angle of incidence, these reduce to the reflection and transmission coefficients for perpendicular incidence.

15. Do all materials exhibit a Brewster angle? Explain.

16. Suppose an interface between two materials exhibits no Brewster angle. If you were to replace one of the materials with another of your choice, could the new interface exhibit a Brewster angle? Explain.

17. Explain how you could use the Brewster angle to measure the permittivity of glass using a laser beam. Describe the polarization needed.

18. Total reflection occurs when a wave is transmitted from material (1) into material (2) if (mark correct answer):

(a) $\varepsilon_1 \geq \varepsilon_2$

(b) $\varepsilon_2 \geq \varepsilon_1$

(c) $\varepsilon_2 = \varepsilon_1$

(d) $\varepsilon_2 > \varepsilon_1$

(e) $\varepsilon_2 < \varepsilon_1$

19. A dielectric slab can be made transparent for a given frequency by proper choice of its thickness. *T/F*.