

EE 302 PS 13 - SOLUTIONS

Chapter 14

Questions: 3, 4, 5, 6

Problems: None

Critical Thinking: None

Additional Problems: 1

Question 3

Radio waves are electromagnetic waves. They are comprised of an electric field component (\mathbf{E}), and a magnetic field component (\mathbf{H}). \mathbf{E} and \mathbf{H} are perpendicular to one another, and both are perpendicular to the direction of wave propagation.

Question 4

The orientation of the radio wave's electric field component (\mathbf{E}) with respect to the earth's surface determines the polarization of the radio wave.

Question 5

Vertical.

Question 6

Antenna reciprocity is an antenna's ability to both radiate and receive electromagnetic waves at the operating frequency.

Additional Problem 1

$$\lambda = \frac{c}{f} = \frac{3 \times 10^8 \text{ m/s}}{100 \times 10^6 \text{ Hz}} = 3 \text{ m}$$

The far-field radiation pattern starts at a distance $d \approx 10\lambda = 30 \text{ m}$ from the antenna.