Chapter 34: Electromagnetic Waves

Ex:1 Calculate E max and B max at a distance of 20 cm from a 100 w light bulb. Assume the light bulb is a point source.

Ex:2 A 150 kw radio transmitter broadcasts isotropically. Calculate E max 10 km from the transmitter.

Ex:3 A 100 Ω resistor is connected to a 9 volt battery. What is the magnitude of E max and B max at the resistor's surface. Assume the resistor has a 1 mm radius and a 1.2 cm length.

Ex:4 A 9 mw laser has a beam diameter of 0.6 mm. What is the average energy density of the laser beam?

Ex:5 Calculate the average electric field energy density 20 cm from a 60 w light bulb.

Ex:6 A 5 gm, 1 cm^2 coin is perfectly reflecting and is being levitated by a laser beam. What is the power of the laser? (Assume the cross-sectional area of the laser beam is the same as the coin.)

Ex:7 A black piece of cardboard is 8 cm by 12 cm and is 20 m from a 1000 w light bulb. What radiation force acts on it? (Assume complete absorption.)

Ex:8 A laser is used to power a 100,000 kg space ship at 9.8 m/s^2. What is the laser power required if the laser is pointed out the back of the ship?

Ex:9 A mirror reflects 80% of the sunlight that strikes it and absorbs the rest. If the intensity of the light is 640 w/m^2 and the mirror is 30 cm by 40 cm, what force is exerted on it by the normally incident sunlight?