

16. (a) From Fig. 41-10 and Eq. 41-18,

$$\Delta E = 2\mu_B B = \frac{2(9.27 \times 10^{-24} \text{ J/T})(0.50 \text{ T})}{1.60 \times 10^{-19} \text{ J/eV}} = 58 \mu\text{eV} .$$

(b) From  $\Delta E = hf$  we get

$$f = \frac{\Delta E}{h} = \frac{9.27 \times 10^{-24} \text{ J}}{6.63 \times 10^{-34} \text{ J}\cdot\text{s}} = 1.4 \times 10^{10} \text{ Hz} = 14 \text{ GHz} .$$

(c) The wavelength is

$$\lambda = \frac{c}{f} = \frac{2.998 \times 10^8 \text{ m/s}}{1.4 \times 10^{10} \text{ Hz}} = 2.1 \text{ cm} ,$$

which is in the short radio wave region.