

17. (a) From  $K = \frac{1}{2}m_e v^2$  we get

$$v = \sqrt{\frac{2K}{m_e}} = \sqrt{\frac{2(1.20 \times 10^3 \text{ eV})(1.60 \times 10^{-19} \text{ eV/J})}{9.11 \times 10^{-31} \text{ kg}}} = 2.05 \times 10^7 \text{ m/s} .$$

- (b) From  $r = m_e v / qB$  we get

$$B = \frac{m_e v}{qr} = \frac{(9.11 \times 10^{-31} \text{ kg})(2.05 \times 10^7 \text{ m/s})}{(1.60 \times 10^{-19} \text{ C})(25.0 \times 10^{-2} \text{ m})} = 4.67 \times 10^{-4} \text{ T} .$$

- (c) The “orbital” frequency is

$$f = \frac{v}{2\pi r} = \frac{2.07 \times 10^7 \text{ m/s}}{2\pi(25.0 \times 10^{-2} \text{ m})} = 1.31 \times 10^7 \text{ Hz} .$$

- (d)  $T = 1/f = (1.31 \times 10^7 \text{ Hz})^{-1} = 7.63 \times 10^{-8} \text{ s}.$