Question #75075, Physics / Electromagnetism |

A be am of ion with 2×100000 m/s enters normally into a uniform magnetic field of 4/100 T . If the specific charge of the ions is 5 ×10000000 C/kg , the radius of the circular path described will be (1) 0.10m (2) 0.16 m. (3) 0.20m (4) 0.25 m.

Need to find:

***R*-?**

$\boldsymbol{v} = 2 \times 10^5\, {}^{m}/_{s}$

$\boldsymbol{B} = {}^{4}/_{100}\ T$

$\dfrac{\boldsymbol{q}}{\boldsymbol{m}} = 5 \times 10^7\ {}^{C}/_{kg}$

Solution:

Lorentz force – (in Picture) $\boldsymbol{F_L = F_c}$, where $\boldsymbol{F_L = qvB}$, and $\boldsymbol{F_C = m\frac{v^2}{R}}$.

$$\boldsymbol{m\frac{v^2}{R} = qvB \rightarrow m\frac{v}{R} = qB \rightarrow R = \frac{m}{q}\frac{v}{B}.} \qquad \boldsymbol{\frac{m}{q} = \frac{1}{{}^{q}/_{m}}.}$$

$$\boldsymbol{R = \frac{1}{5\times10^7}\frac{2\times10^5}{{}^{4}/_{100}} = \frac{1}{5\times10^7}\frac{2\times10^7}{4} = \frac{2}{5\cdot4} = \frac{2}{20} = \frac{1}{10} = 0.10\ (m)}$$

Answer: (1) – R =0.10 m.