Q.2

Ans

Given : $B = 1.6 \, T$

Find : Force per unit area, fe/A (force density)

① The mechanical force due to field is

$$\text{fe} = - \frac{\partial W_f \, (B, x)}{\partial x}$$

$$= - \frac{1}{2} \frac{B^2 A}{\mu}$$

② The force per unit area is :

$$\frac{\text{fe}}{A} = \frac{1}{2} \frac{B^2}{\mu}$$

$$= \frac{1}{2} \times \frac{(1.6)^2}{4\pi \times 10^{-7}}$$

$$= \frac{1}{2} \times \frac{2.56}{4 \times 3.14 \times 10^{-7}}$$

$$= \frac{2.56}{2 \, (12.56 \times 10^{-7})}$$

$$= \boxed{1.02 \times 10^6 \, N/m^2}$$