s●)2) Determine the current in (A) through a 60cm long solenoid when the solenoid has 400 turns and the value of magnetic flux density is 6 millitesla.

Ans Magnetic flux density $= \vec{B}$

$$\vec{B} = \mu_0 \frac{NI}{l}$$

When,

  N = Total no of turns.
  I = Current in solenoid.
  l = length of solenoid

$\therefore n = \frac{N}{l}$ = turns per unit length

Hence, we have

$$\dot{\vec{B}} = \frac{\mu_0 N I}{l}$$

$\vec{B} = 6 \times 10^{-3}$ T, $\quad I = ?$, $l = 0.6$ M

$$= 6 \times 10^{-3} = \frac{4\pi \times 10^{-7} \times 400 \times I}{0.6}$$

$$I = \frac{6 \times 10^{-3} \times 0.6}{4\pi \times 10^{-7} \times 400}$$

$$I = \frac{6 \times 10^{4} \times 0.6^{0.3}}{\underset{2\pi}{4\pi} \times 400} = \frac{0.9 \times 10^{4}}{3.14 \times 400} = \frac{9 \times 10^{3}}{1256}$$

$$I = 0.0071 \times 10^{-3} = 7.1 \text{ A} \Rightarrow \boxed{I = 7A}$$