Q 1. A closely wound solenoid 80 cm long has 5 layers of windings of 400 turns each. The diameter of the solenoid is 1.8 cm. If the current carried is 8.0 A, estimate the magnitude of B inside the solenoid near its centre.

Sol. Here, l= 80 cm = 0.8 m, N = 5 × 400 = 2000

I = 8.0 A, D = 1.8 cm, n = no. of turns per unit length

Magnitude of magnetic field inside a solenoid near its center

$$n = \frac{Total\ turns}{length}$$

$$n = \frac{2000}{0.80}$$

Magnitude of magnetic field induction at a point well inside the solenoid is,

$$B = \mu_0 nI = \frac{4\pi \times 10^{-7} \times 2000 \times 8.0}{0.80}$$

$$= 8\pi \times 10^{-3}T = 2.5 \times 10^{-2}T$$