QUES 05:-

A solenoid of length 0.5 m has a radius of 1 cm and is made up of 500 turns. It carries a current of 5 A.
What is the magnitude of the magnetic field inside the solenoid?

Sol. The number of turns per unit length is,

$n = \frac{500}{0.5} = 1000$ turns/m

The length l = 0.5 m and radius r = 0.01 m. Thus, l/r = 50 i.e., l >> r

Hence, we can use the long solenoid formula, namely,

$B = \mu_0 nI$

$= 4\pi \times 10^{-7} \times 10^3 \times 5$

$= 6.28 \times 10^{-3}$ T