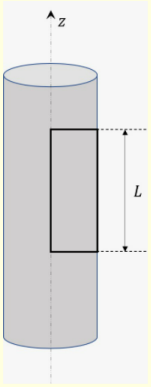
Ques1.

If the magnetization of a long thin rod of radius R is given by $\vec{M} = a\rho^3\hat{\phi}$, where a is a constant and ρ distance from the axis, find the magnetic field everywhere in the unit of μ_0.

- $\vec{B} = a\rho^3\hat{\phi}$ for $\rho < R$ and $\vec{B} = 0$ for $\rho > R$
- $\vec{B} = 3a\rho^3\hat{\phi}$ for $\rho < R$ and $\vec{B} = 0$ for $\rho > R$
- $\vec{B} = 3a\rho^3\hat{\phi}$ for $\rho < R$ and $\vec{B} = a\rho^3$ for $\rho > R$
- $\vec{B} = \frac{1}{3}a\rho^3\hat{\phi}$ for $\rho < R$ and $\vec{B} = a\rho^3$ for $\rho > R$
- $\vec{B} = \frac{1}{3}a\rho^3\hat{\phi}$ for $\rho < R$ and $\vec{B} = 0$ for $\rho > R$
- $\vec{B} = a\rho^3\hat{\phi}$ for $\rho < R$ and $\vec{B} = \rho\hat{\phi}$ for $\rho > R$

Ques2.

The magnetization of a long thin rod of radius R is given by $\vec{M} = b\rho^3\hat{k}$, where b is a constant and ρ distance from the axis. The current enclosed by the rectangular loop (see figure) of length L and width R is [0]. All quantities are in SI units.



Ques3.

Consider a circular disc of radius R, thickness $t \ll R$, uniformly magnetized parallel to the axis of the disk. The magnetic moment of the disc is m. The magnetic field at a distance $z = R$ on the axis of the disc in the unit of $\frac{\mu_0 m}{\pi R^3}$ is [0.50]

Expected Solutions: 0.18 . Round off your answer to two decimal places.

Ques4.

The vector potential in a region of space is given by, $\vec{A} = ay^2\hat{x} + bz^3\hat{y}$. Find the volume current density in the region in the unit of μ_0.

- $\vec{J} = -\frac{1}{\mu_0}[2a\hat{x} + 6bz\hat{y}]$
- $\vec{J} = \frac{1}{\mu_0}[2a\hat{x} + 6bz\hat{y}]$
- $\vec{J} = -\frac{1}{\mu_0}[2ay\hat{x} + 3bz^2\hat{y}]$
- $\vec{J} = -\frac{1}{\mu_0}[6bz\hat{x} + 2a\hat{y}]$
- $\vec{J} = -\frac{1}{\mu_0}[2a\hat{x} - 6bz\hat{y}]$
- $\vec{J} = 2ay\hat{x} + 3bz^2\hat{y}$
- $\vec{J} = -\frac{1}{\mu_0}[-2a\hat{x} + 6bz\hat{y}]$