Unit 12 - Week 11

Assignment 11

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Due on 2020-04-15, 23:59 IST.

1) **Magnetic Dipole** *5 points*

A circular loop of wire, with radius R, lies in the xy plane, centered at the origin, and carries a current I running counterclockwise as viewed from the positive z axis. What is its magnetic dipole moment?

- $\vec{m} = 2I\pi R\hat{z}$
- $\vec{m} = I\pi R^2\hat{z}$
- $\vec{m} = 3\pi\mu_0 I R\hat{z}$
- $\vec{m} = I^2\pi R^2\hat{z}$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$\vec{m} = I\pi R^2\hat{z}$

A thin uniform donut, carrying charge Q and mass M, rotates about its axis $\hat{z}$

2) The gyromagnetic ratio is *4 points*

- $g = \frac{2Q}{M}$
- $g = \frac{Q}{M}$
- $g = \frac{Q}{4M}$
- $g = \frac{Q}{2M}$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$g = \frac{Q}{2M}$

3) What is the gyromagnetic ratio for a uniform spinning sphere of radius R? *4 points*

- $g = \frac{2QR}{M}$
- $g = \frac{2Q}{RM}$
- $g = \frac{Q}{2M}$
- $g = \frac{QR}{2M}$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$g = \frac{Q}{2M}$

A uniform current density $J = J_0\hat{z}$ fills a slab straddling the yz plane, from $x = -a$ to $x = +a$. A magnetic dipole $m = m_0\hat{x}$ is situated at the origin.

4) The force on the dipole is *4 points*

- $\vec{F} = \mu_0 J_0 a^2\hat{x}$
- $\vec{F} = m_0\mu_0 J_0 a\hat{x}$
- $\vec{F} = 0$
- $\vec{F} = \mu_0 J_0 a\hat{y}$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$\vec{F} = \mu_0 J_0 a^2\hat{x}$

5) What is the force if the dipole pointing in the y direction: $m = m_0\hat{y}$. *4 points*

- $\vec{F} = m_0\mu_0 J_0\hat{x}$
- $\vec{F} = m_0\mu_0 J_0 a\hat{z}$
- $\vec{F} = \mu_0 J_0 a\hat{y}$
- $\vec{F} = 0$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$\vec{F} = m_0\mu_0 J_0\hat{x}$