Unit 11 - Week 10

Assignment 10

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

Due on 2020-04-08, 23:59 IST.

Solenoid

Two long coaxial solenoids each carry current I, but in opposite directions. The inner solenoid (radius a) has n_1 turns per unit length, and the outer one (radius b) has n_2

1) Find B inside the inner solenoid *3 points*

- $B = \mu_0 I(n_2 - n_1)\hat{z}$
- $B = \mu_0 I n_1$
- $B = \mu_0 I n_2 n_1$
- $B = I(n_2 - n_1)$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$B = \mu_0 I(n_2 - n_1)\hat{z}$

2) Find B between the two coaxial solenoid *3 points*

- $B = I n_2$
- $B = \mu_0 I n_2$
- $B = -\mu_0 I n_2^2$
- $B = -\mu_0 I(n_2 - n_1)$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$B = \mu_0 I n_2$

3) Find B between outside the solenoid *3 points*

- $B = 0$
- $B = \mu_0 I n_1$
- $B = -\mu_0 I n_2$
- $B = -\mu_0 I(n_2 - n_1)$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$B = 0$

Capacitor

A large parallel-plate capacitor with uniform surface charge σ on the upper plate and $-\sigma$ on the lower is moving with a constant speed v.

4) Find the magnetic field between the plates and also above and below them. *4 points*

- $B = \mu_0 \sigma v$ in between the plates and $B = 0$ elsewhere.
- $B = 0$ in between the plates and $B = \mu_0 \sigma v$ elsewhere
- $B = \sigma v$ in between the plates and $B = 0$ elsewhere
- $B = \mu_0 \sigma v^2$ in between the plates and $B = \mu_0 v$ elsewhere

No, the answer is incorrect.
Score: 0

Accepted Answers:
$B = \mu_0 \sigma v$ *in between the plates and* $B = 0$ *elsewhere.*

5) Find the magnetic force per unit area on the upper plate, including its direction. *5 points*

- $f_m = \mu_0 \sigma^2 v^2/2, \downarrow$
- $f_m = \mu_0 \sigma^2 v^2, \uparrow$
- $f_m = \mu_0 \sigma v^2/2, \downarrow$
- $f_m = \mu_0 \sigma^2 v^2/2, \uparrow$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$f_m = \mu_0 \sigma^2 v^2/2, \uparrow$

6) Find the electric force per unit area on the upper plate, including its direction. *5 points*

- $f_e = \epsilon_0 \sigma^2 v^2/2, \downarrow$
- $f_e = \mu_0 \sigma^2 v^2, \uparrow$
- $f_e = \sigma^2/2\epsilon_0, \downarrow$
- $f_e = \sigma^2 v^2/2\epsilon_0, \downarrow$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$f_e = \sigma^2/2\epsilon_0, \downarrow$

7) At what speed v would the magnetic force balance the electrical force? *5 points*

- $v = \frac{1}{\sqrt{\epsilon_0 \mu_0}} = c$
- $v = \frac{1}{2\sqrt{\epsilon_0 \mu_0}} = c/2$
- $v = \frac{1}{\sqrt{16 \epsilon_0 \mu_0}} = c/4$
- $v = \frac{1}{\sqrt{9 \epsilon_0 \mu_0}} = c/3$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$v = \frac{1}{\sqrt{\epsilon_0 \mu_0}} = c$