

Unit 13 - Week 12

Course outline

How does an NPTEL online course work?

Week 1

Week 2

Week 3

Week 4

Week 5

Week 6

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Week 8

Week 9

Week 10

Week 11

Week 12

Ampere's law in magnetized materials

Electrodynamics

Electromagnetic induction

Laws of electromagnetism so far

Maxwell's correction to electromagnetism

Fictitious discussion about symmetry

Maxwell's equations in matter and the boundary conditions

Quiz : Assignment 12

Week 12 Feedback : Electromagnetism

Download Videos

Lecture materials

Assignment 12

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

Due on 2020-04-22, 23:59 IST.

1) Inductance

6 points

Find the self-inductance per unit length of a long solenoid, of radius R , carrying n turns per unit length.

$L = \mu_0 \pi n^2 R^2$

$L = \mu_0 \pi n R$

$L = \mu_0 2\pi R$

$L = \mu_0 n R$

No, the answer is incorrect.
Score: 0

Accepted Answers:
 $L = \mu_0 \pi n^2 R^2$

2) A long solenoid, of radius a , is driven by an alternating current, so that the field inside is sinusoidal: $\vec{B}(t) = B_0 \cos(\omega t) \hat{z}$.

6 points

A circular loop of wire, of radius $a/2$ and resistance R , is placed inside the solenoid, and coaxial with it. Find the current induced in the loop, as a function of time.

$I(t) = \frac{\pi a}{4R} B_0 \sin(\omega t)$

$I(t) = \frac{\pi a^2 \omega}{4R} B_0 \cos(\omega t)$

$I(t) = \frac{\pi a^2 \omega}{4R} B_0 \sin(\omega t)$

$I(t) = \frac{\pi a \omega}{R} B_0 \sin(\omega t)$

No, the answer is incorrect.
Score: 0

Accepted Answers:

$I(t) = \frac{\pi a^2 \omega}{4R} B_0 \sin(\omega t)$

3) A long cable carries current in one direction uniformly distributed over its (circular) cross section. The current returns along the surface (there is a very thin insulating sheath separating the currents). Find the self-inductance per unit length.

6 points

$L/l = \frac{\mu_0}{4\pi}$

$L/l = \frac{\mu_0}{8\pi}$

$L/l = \frac{\mu_0}{16\pi}$

$L/l = \frac{\mu_0}{2\pi}$

No, the answer is incorrect.
Score: 0

Accepted Answers:

$L/l = \frac{\mu_0}{8\pi}$