Unit 6 - Week 5

Course outline

How does an NPTEL online course work?

Week 1

Week 2

Week 3

Week 4

Week 5

- Tutorial on Dirac delta function and electrostatics
- Tutorial on electrostatics
- The curl of an electric field
- Scalar potential
- Calculation of electric potential from different approaches
- **Quiz : Assignment 5**
- Week 5 Feedback : Electromagnetism

Week 6

Week 7

Week 8

Week 9

Week 10

Week 11

Week 12

Download Videos

Lecture materials

Assignment 5

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

Due on 2020-03-04, 23:59 IST.

Possible electric field

1) One of the following is an impossible electric field. Which one? (k is a constant) ***4 points***

- $\vec{E} = k\left[xy\hat{x} + 2xz\hat{y} + 3xz\hat{z}\right]$
- $\vec{E} = k\left[y^2\hat{x} + (2xy + z^2)\hat{y} + 2yz\hat{z}\right]$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$\vec{E} = k\left[xy\hat{x} + 2xz\hat{y} + 3xz\hat{z}\right]$

2) For the possible electric field, the scalar potential is ***4 points***

- $V(x, y, z) = -k(xy^2 + yz^2)$
- $V(x, y, z) = -kxy^2$
- $V(x, y, z) = -k(xy^2 + yz^2 + zx^2)$
- $V(x, y, z) = k(xy + yz^2)$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$V(x, y, z) = -k(xy^2 + yz^2)$

3) **Potential in cylindrical system** ***4 points***

The potential a distance s from an infinitely long straight wire that carries a uniform line charge λ is

- $V(s) = -\frac{1}{4\pi\epsilon_0} 2\lambda \, ln\left(\frac{s^3}{a}\right)$
- $V(s) = -\frac{1}{4\pi\epsilon_0} 2\lambda \, ln\left(sa\right)$
- $V(s) = -\frac{1}{4\pi\epsilon_0} 2\lambda \, \frac{s}{a}$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$V(s) = -\frac{1}{4\pi\epsilon_0} 2\lambda \, \frac{s}{a}$

4) **Hollow spherical shell** ***5 points***

A hollow spherical shell carries a charge density

$$\rho = \frac{k}{r^2}$$

k is a constant. The potential at the center, using infinity as the reference, is

- $V = \frac{k}{\epsilon_0} sin\left(\frac{b}{a}\right)$
- $V = \frac{k}{\epsilon_0} ln\left(\frac{b}{a}\right)$
- $V = \frac{k}{\epsilon_0} exp\left(\frac{b}{a}\right)$
- $V = \frac{k}{\epsilon_0} ln\left(b - a\right)$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$V = \frac{k}{\epsilon_0} ln\left(\frac{b}{a}\right)$