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Grade	**18.20** out of 35.00 (**52**%)

Question 1

Incorrect

Mark 0.00 out of 1.40

A straight cylindrical rod with circular cross section and radius R is magnetized parallel to its axis with a magnetization given by $\vec{M} = M_0\hat{z}$. The bound surface current on the cylindrical surface of the rod will be

Select one:

- a. Along the z-direction parallel to the magnetization ✗
- b. Along the -z direction opposite to the direction of magnetization
- c. Zero
- d. Along the azimuthal direction

Your answer is incorrect.

The correct answer is: Along the azimuthal direction

Question 2

Correct

Mark 1.40 out of 1.40

A dielectric sphere of radius R and dielectric constant K carries a uniform polarization given by $\vec{P} = -P_0\hat{k}$. In this case the bound surface charge density on the surface of the sphere is

Select one:

- a. Non zero and uniform on the surface of the sphere
- b. Non zero and negative for $z > 0$ and positive for $z < 0$
- c. Zero on the surface of the sphere
- d. Non zero and positive for $z > 0$ and positive for $z < 0$

Your answer is correct.

The correct answer is: Non zero and negative for $z > 0$ and positive for $z < 0$

Question 3

Correct

Mark 1.40 out of 1.40

The $\vec{E}$ and $\vec{B}$ fields in electromagnetic waves are oriented

Select one:

- a. perpendicular to the wave's direction of travel, and also to each other ✓
- b. parallel to the wave's direction of travel, and perpendicular to each other
- c. parallel to the wave's direction of travel, as well as to each other
- d. perpendicular to the wave's direction of travel, and parallel to each other

Your answer is correct.

The correct answer is: perpendicular to the wave's direction of travel, and also to each other

Question 4

Correct

Mark 1.40 out of 1.40

. A metallic shell with inner and outer radius R_1 and R_2 respectively, has a point charge q kept inside the cavity. The resultant electric field in the region $R_1 < r < R_2$ (where, r is the distance from the center of the sphere) is

Select one:

- a. Constant and non-zero
- b. None of the options
- c. Zero ✓
- d. Dependent on r

Your answer is correct.

The correct answer is: Zero

Question 5

Correct

Mark 1.40 out of 1.40

Consider a straight cylindrical region of thickness $(b-a)$ and having a circular cross section between inner radius a and outer radius b. A current I flows with a uniform current density through the cross section of the cylinder. The value of $\vec{\nabla} \times \vec{B}$ will be

Select one:

- a. Non-zero in the region $a < r < b$ and zero everywhere else ✓
- b. Zero in the region $0 < r < a$ and non zero everywhere else
- c. Zero in the region $b < r < \infty$ and non zero everywhere else
- d. Zero everywhere

Your answer is correct.

The correct answer is: Non-zero in the region $a < r < b$ and zero everywhere else

Question 6

Incorrect

Mark 0.00 out of 1.40

A point charge q is placed at geometrical centre of one of the face of a cube. The total flux through the cube due to this charge is

Select one:

a. $\frac{2q}{\epsilon_0}$

b. 0

c. $\frac{q}{2\epsilon_0}$

d. $\frac{q}{\epsilon_0}$

Your answer is incorrect.

The correct answer is: $\frac{q}{2\epsilon_0}$

Question 7

Incorrect

Mark 0.00 out of 1.40

A point charge Q is placed at the center of a dielectric spherical shell of inner radius R and outer radius $2R$. The dielectric constant of the spherical shell is K. The region $r > 2R$ is free space. The bound surface charge densities on the inner and outer surfaces are

Select one:

- a. Larger at the inner surface and smaller at the outer surface
- b. Both zero
- c. Equal ✗
- d. Larger at the outer surface and smaller at the inner surface

Your answer is incorrect.

The correct answer is: Larger at the inner surface and smaller at the outer surface

Question 8

Incorrect

Mark 0.00 out of 1.40

A sphere of radius R carries uniform polarization $\vec{P} = k\vec{r}$, where, k is a constant. The electric field outside the sphere due to the polarized sphere will be given by

Select one:

a. $\frac{kR^3}{r^2}\hat{r}$

b. $\frac{kR^3}{\epsilon r^2}\hat{r}$

c. 0

d. $\frac{kR^3}{\epsilon_0 r^2}\hat{r}$

Your answer is incorrect.

The correct answer is: 0

Question 9

Incorrect

Mark 0.00 out of 1.40

A point charge Q is placed at the center of a dielectric sphere of radius R and dielectric constant K. The value of $\vec{\nabla}.\vec{D}$ at a distance $r > R/2$ will be equal to

Select one:

a. $\frac{Q}{4\pi\epsilon_0(\frac{R}{2})^2}$

b. Zero

c. $\frac{Q}{\epsilon_0}$

d. $\frac{Q}{4\pi\epsilon_0}$

Your answer is incorrect.

The correct answer is: Zero

Question 10

Incorrect

Mark 0.00 out of 1.40

We have two diploles $\overrightarrow{P_1} = p_1 \hat{z}$ at the origin and $\overrightarrow{P_2} = p_2 \hat{y}$ at point (0,r,0). Find the electric field of $\overrightarrow{P_1}$ on $\overrightarrow{P_2}$.

Select one:

a. $-\frac{p_1}{4\pi\epsilon_0 r^3}\hat{\theta}$

b. $\frac{p_1}{2\pi\epsilon_0 r^3}\hat{r}$

c. $-\frac{p_1}{2\pi\epsilon_0 r^3}\hat{r}$

d. $\frac{p_1}{4\pi\epsilon_0 r^3}\hat{\theta}$

Your answer is incorrect.

The correct answer is: $\frac{p_1}{4\pi\epsilon_0 r^3}\hat{\theta}$

Question 11

Correct

Mark 1.40 out of 1.40

Two metal plates form a parallel plate capacitor. The distance between the plates is *d*. A metal sheet of thickness *d/2* and of the same area is introduced between the plates. What is the ratio of the capacitance in the two cases?

Select one:

- a. 5:1
- b. 4:1
- c. 3:1
- d. 2:1 ✓

Your answer is correct.

The correct answer is: 2:1

Question 12

Incorrect

Mark 0.00 out of 1.40

A thick spherical shell with inner and outer radius a and b respectively, is made up of a dielectric material with polarization $\vec{P} = \frac{k}{r}\hat{r}$. Here, k is a constant and r is the distance from the center. The bound surface charges at $r = a$ and $r = b$ will respectively be given by

Select one:

a. $-\frac{k}{a}, -\frac{k}{b}$

b. $0, \frac{k}{b}$

c. $-\frac{k}{a}, \frac{k}{b}$

d. $\frac{k}{a}, \frac{k}{b}$

Your answer is incorrect.

The correct answer is: $-\frac{k}{a}, \frac{k}{b}$

Question 13

Correct

Mark 1.40 out of 1.40

In a certain region of space the electrostatic potential is given by $V(x, y) = 2xy + 4y + 5y^2$. The electric field will be zero at

Select one:

a. $x = +2, y = 0$

b. $x = 0, y = 0$

c. $x = 0, y = -\frac{1}{3}$

d. $x = -2, y = 0$

Your answer is correct.

The correct answer is: $x = -2, y = 0$

Question 14

Correct

Mark 1.40 out of 1.40

The electric potential V at any point O (*x, y, z* all in metres) in space is given by $V = 4x^2$ volt. The electric field at the point (1 m, 0 m, 2 m) in volt/metre is

Select one:

- a. 16 along negative x-axis
- b. 8 along negative x-axis ✓
- c. 8 along positive x-axis
- d. 16 along positive z-axis

Your answer is correct.

The correct answer is: 8 along negative x-axis

Question 15

Incorrect

Mark 0.00 out of 1.40

In the region $R_1 < r < R_2$ expressed in spherical polar coordinate system, the displacement vector is given by $\vec{D} = \frac{c}{r^2}\hat{r}$. In this region

Select one:

- a. There are uniformly distributed negative free charges
- b. There are uniformly distributed positive free charges
- c. There are no free charges
- d. There is positive free charge density depending on distance from the origin ✗

Your answer is incorrect.

The correct answer is: There are no free charges

Question 16

Correct

Mark 1.40 out of 1.40

An infinite solenoid has n turns per unit length and carries current I. It is filled with linear material of susceptibility χ_m. The magnetic field $\vec{B}$ inside the solenoid will be

Select one:

a. $\mu_0(1+\chi_m)I\hat{k}$

b. $\mu_0\chi_m nI\hat{k}$

c. $\mu_0\chi_m I\hat{k}$

d. $\mu_0(1+\chi_m)nI\hat{k}$

Your answer is correct.

The correct answer is: $\mu_0(1+\chi_m)nI\hat{k}$

Question 17

Incorrect

Mark 0.00 out of 1.40

A long cylindrical rod of radius R has uniform magnetization $M_0\hat{k}$ parallel to its axis. There are no free currents. The magnetic field inside and outside the rod are respectively

Select one:

a. $0, \mu_0 M_0 \hat{\phi}$

b. $\mu_0 M_0 \hat{\phi}, 0$

c. $\mu_0 M_0 \hat{k}, 0$

d. $0, \mu_0 M_0 \hat{k}$

Your answer is incorrect.

The correct answer is: $\mu_0 M_0 \hat{k}, 0$

Question 18

Incorrect

Mark 0.00 out of 1.40

A square loop of wire having a length of 10 cm is kept in a time varying magnetic field $B = 2t$. The magnetic field is perpendicular to the loop. The magnitude of the induced emf will be

Select one:

- a. 2.5 mV
- b. 1.25 mV
- c. 20 mV ✗
- d. 12.5 V

Your answer is incorrect.

The correct answer is: 1.25 mV

Question 19

Correct

Mark 1.40 out of 1.40

A current of 1 Ampere passes through a straight wire of length 2 metres. The magnetic field at a point along the axis of the wire at a distance of 3 metres from either end of the wire is given by

Select one:

a. $\frac{\mu_0}{12\pi}$

b. $\frac{\mu_0}{6\pi}$

c. Zero ✓

d. $\frac{\mu_0}{4\pi}$

Your answer is correct.

The correct answer is: Zero

Question 20

Correct

Mark 1.40 out of 1.40

An infinitely long thin straight wire carries a current I along the *z*-direction. The magnetic flux passing through a circular path of radius R and having the wire as the center and lying in the plane (*x*-*y* plane) perpendicular to the wire will be

Select one:

- a. Zero ✓
- b. $\mu_0 I \pi R^2$
- c. $\frac{1}{2}\mu_0 I R$
- d. $\mu_0 I$

Your answer is correct.

The correct answer is: Zero

Question 21

Correct

Mark 1.40 out of 1.40

An infinitely long cylindrical wire of radius R lying parallel to the z-axis carries a uniform current I distributed uniformly across its cross section. The magnetic field inside the cylinder at a distance r from the axis will be

Select one:

a. $\frac{\mu_0 Ir}{2\pi R^2}\hat{\phi}$

b. $\frac{\mu_0 I}{2\pi r}\hat{\phi}$

c. $\frac{\mu_0 IR}{2\pi r^2}\hat{\phi}$

d. $\frac{\mu_0 I}{2\pi R}\hat{\phi}$

Your answer is correct.

The correct answer is: $\frac{\mu_0 Ir}{2\pi R^2}\hat{\phi}$

Question 22

Correct

Mark 1.40 out of 1.40

Consider a straight cylindrical region of thickness $(b-a)$ and having a circular cross section between inner radius a and outer radius b. . A current I flows uniformly through the cross section of the cylinder. The value of $\vec{\nabla} \times \vec{B}$ at a distance $\frac{a+b}{2}$ from the axis of the cylinder would be

Select one:

a. $\mu_0 \frac{I}{\pi(b^2-a^2)}$

b. $\mu_0 I$

c. $\mu_0 \frac{I}{\pi(b-a)^2}$

d. $\mu_0 \frac{I}{\pi b^2}$

Your answer is correct.

The correct answer is: $\mu_0 \frac{I}{\pi(b^2-a^2)}$

Question 23

Correct

Mark 1.40 out of 1.40

A cylindrical conductor of inner and outer radius a and b respectively carries a current I, distributed uniformly across its cross section. The current density J will be

Select one:

a. $\frac{I}{\pi(b^2+a^2)}$

b. $\frac{I}{\pi(b^2-a^2)}$ ✓

c. $\frac{I}{\pi a^2}$

d. $\frac{I}{\pi b^2}$

Your answer is correct.

The correct answer is: $\frac{I}{\pi(b^2-a^2)}$

Question 24

Incorrect

Mark 0.00 out of 1.40

An infinitely long straight wire made of copper (having magnetic susceptibility of χ_m) and of radius R carries a current I which is uniformly distributed across its cross section. The value of $\oint \vec{H}.\vec{dl}$ over a circular path of radius $2R$ and perpendicular to the wire and with its center coinciding with the axis of the wire is equal to

Select one:

- a. $\mu_0 I$ ✘
- b. $\mu_0(1+\chi_m)I$
- c. Zero
- d. I

Your answer is incorrect.

The correct answer is: I

Question 25

Incorrect

Mark 0.00 out of 1.40

A circular conducting loop of radius R carries a current I. The magnetic flux through a sphere of radius $2R$ with its center coinciding with the center of the current loop will be

Select one:

a. $4\pi R^2 I$

b. $\mu_0 I$

c. Zero

d. $16\pi R^2 I$

Your answer is incorrect.

The correct answer is: Zero