PHYSICS

BOOKS - EDUCART PUBLICATION

SAMPLE PAPER 9

Section A

1. If electric flux passing through a close surface is zero then :-

A. no net charge is enclosed by the surface.

B. uniform electric field exists within the surface.

C. electric potential varies from point to point inside the surface.

D. charge is present inside the surface.

Answer:

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2. The electrostatic potential energy between proton and electron separated by a distance 1 Å is

A. $5.1 \times 10^{11} NC^{-1}$

B. $4.9 \times 10^{11} NC^{-1}$

C. $5.1 \times 10^{10} NC^{-1}$

D. $49 \times 10^{12} NC^{-1}$

Answer:

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3. There is a thin conducting wire carrying current. What is the value of magnetic field induction at any point on the conductor itself?

A. $\frac{\mu_0}{4\pi}\frac{idl}{r^2}$

B. $\frac{\mu_0}{4\pi}\frac{idl}{r}$

C. Zero

D. $\frac{\mu_0}{4\pi}\frac{idl}{r^3}$

Answer:

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4. Faraday Cage:

A Faraday cage or Faraday shield is an enclosure made of a conducting material. The fields within a conductor cancel out with any external fields, so the electric field within the enclosure is zero. These Faraday cages act as big hollow conductors you can put things in to shield them from electrical fields. Any electrical shocks the cage receives, pass harmlessly around the outside of the cage.

A point charge of 2C is placed at centre of Faraday cage in the shape of cube with surface of 9 cm edge. The number of electric field lines passing through the cube normally will be

A. $1.9 \times 10^5 Nm^2/C$ entering the surface

B. $1.9 \times 10^5 Nm^2/C$ leaving the surface

C. $2.0 \times 10^5 Nm^2/C$ leaving the surface

D. $2.0 \times 10^9 Nm^2/C$ entering the surface

Answer:

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5. Calculate the magnetic field produced at the centre of a circle of radius 1 m around which a hydrogen nucleus moves in 1 s:

A. $3.2\pi \times 10^{-26} T$

B. $32 \times 10^{-26} T$

C. $32 \times 10^{-20} T$

D. $30\pi \times 10^{-20} T$

Answer: A

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6. Force on a charged particle moving with velocity $\overrightarrow{v}$ subjected to a magnetic field is zero. This means:

A. Angle between V and B is necessarily 90°

B. Angle between V and B can have any value other than 0° and 180°

C. Angle between V and B is either zero or 180°

D. Angle between V and B can have any value other than 90°

Answer: c

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7. 2 m long wire moving with $v = 1ms^{-1}$ in magnetic field intensity $0.5Wbm^{-2}$ perpendicular to the field. The induced emf is':

A. 0.1 V

B. 0.2 V

C. 0.5 V

D. 1 V

Answer: 1V

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8. Wheatstone Bridge

A. light

B. power

C. voltage

D. current

Answer:

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9. What is the SI unit of permeability

A. $\mathrm{Wb\ m^{-1}A^{-1}}$

B. $WbmA^{-1}$

C. $\mathrm{Wb\ m^{-1}A^{-2}}$

D. Wb m.A

Answer:

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10. An e.m.f. is produced in a coil, which is not connected to an external voltage source. This can be due to

A. the coil moving inside a constant magnetic field

B. the coil being in a time varying magnetic field

C. the coil moving in a time varying magnetic field

D. all of the above

Answer:

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11. If there is no charge enclosed then:

A. Flux will be zero

B. Flux will be $\frac{q_0}{\varepsilon_0}$, q_0 = test charge

C. Flux depends on charge

D. Not sufficient information

Answer:

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12. Across a metallic conductor of non-uniform cross section a constant potential difference is applied. The quantity which remains constant along the conductor is

A. Current density

B. Current

C. Drift speed

D. Both (a) and (b)

Answer:

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13. If the radius of gaussion surface increases, the electric flux is:

A. doubled

B. remains the same

C. halved

D. decreases

Answer: 2

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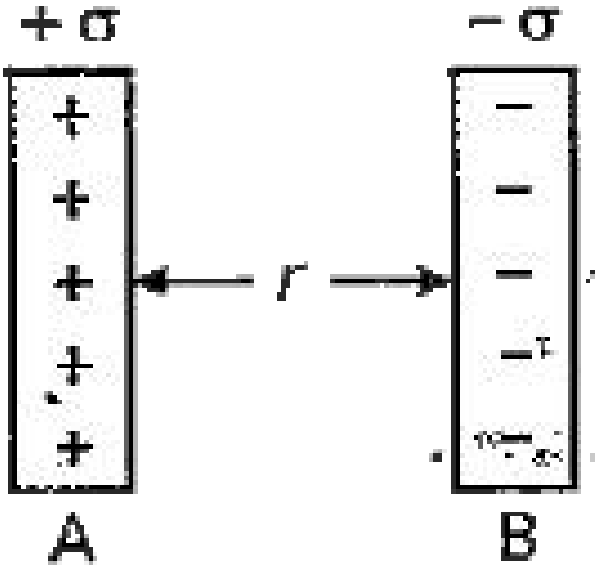

14.

Two large thin metal plates are parallel and close to each other. On their inner surface,

plate have surface charge density of opposing magnitude of $17.0 \times 10^{-22} Cm^{-2}$ as shown.

Electric field in outer region of second plate is:

A. $1.9 \times 10^{-10} \frac{N}{C}$

B. $1.5 \times 10^{-15} \frac{N}{C}$

C. zero

D. $17 \times 10^{10} \frac{N}{C}$

Answer:

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15. What is not possible in a transformer?

A. Direct current

B. Eddy current

C. Induced current

D. Alternating current

Answer:

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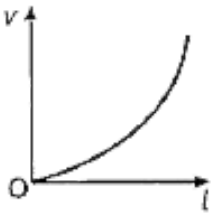
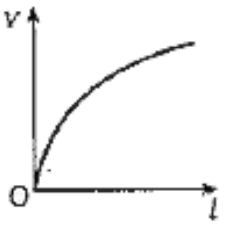
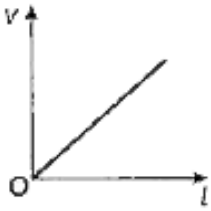
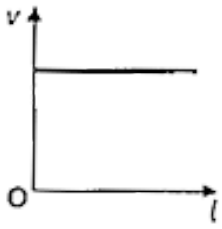
16. Relation between potential drop and length of the potentiometer wire can be graphically represented as:

A. 

B. 

C. 

D. 

Answer:

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17. Two charge $+3\mu C$ and $-3\mu C$ are held in air unit distance. What is the ratio of force experienced by one another:

A. $m_e : m_p$

B. $1:1$

C. $m_p : m_e$

D. $2:3$

Answer:

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18. What is the power dissipated as Joule loss:

A. $\frac{B^2 l^2 v^2}{R}$

B. $\frac{B^2 l^2 v^2}{R^2}$

C. $\frac{B^2 l^2 v}{R}$

D. $\frac{B l^2 v}{R^2}$

Answer:

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19. What is the peak current if the rms value of current in an ac circuit is 10 A:

A. 15.6 A

B. 20.8 A

C. 11.5 A

D. 14.1 A

Answer:

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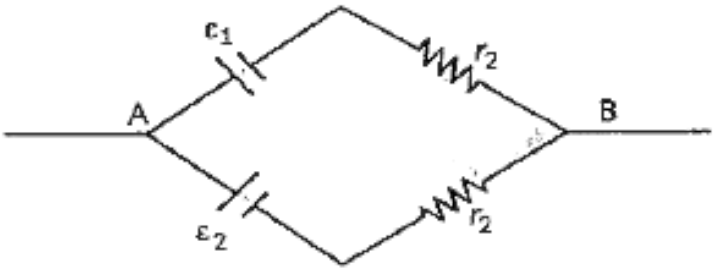
20. Two batteries of emf ε_1 and $\varepsilon_2(\varepsilon_2 > \varepsilon_1)$ and internal resistances r_1 and r_2 respectively are connected in parallel as

shown in figure.



A. The equivalent emf ε_{eq} of the two cells is between ε_1 and ε_2, i.e. $\varepsilon_1 < \varepsilon_{eq} < \varepsilon_2$.

B. The equivalent emf ε_{eq} is smaller than ε_1

C. The ε_{eq} is given by $\varepsilon_{eq} = \varepsilon_1 + \varepsilon_2$ always.

D. ε_{eq} is independent of internal resistances r_1 and r_2.

Answer:

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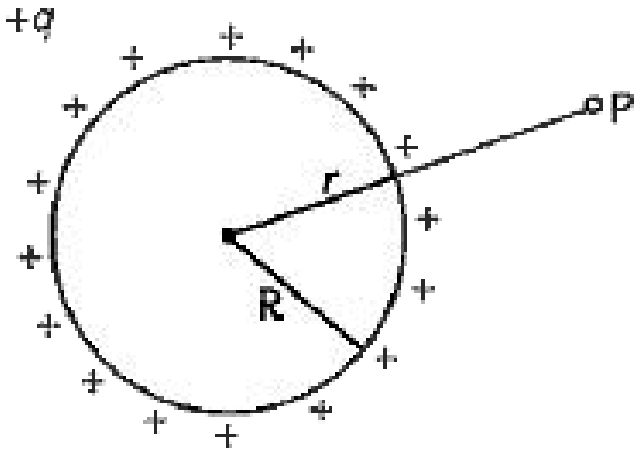
21. Electric field intensity' at point P due to 'charge distributed over a sphere is: '



A. $E = \frac{1}{4\pi\varepsilon_0}\frac{q}{r}$

B. $E = \frac{\sigma R^2}{\varepsilon_0 r^2}$

C. $E = \frac{1}{4\pi\varepsilon_0}\frac{r}{q}$

D. E = 0

Answer:

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22. What is the flux through two opposite faces of the cube when a charge q_0 is placed at the centre of the cube?

A. $\frac{q_0}{\varepsilon_0}$

B. 0

C. $\frac{q_0}{3\varepsilon_0}$

D. $\frac{q_0}{6\varepsilon_0}$

Answer:

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23. A circular coil of area $200cm^2$ and 25 turns rotate about its vertical diameter with angular speed of 20 m/s in a uniform horizontal

magnetic field of magnitude 0.05 T. Maximum voltage induced by the coil is:

A. 1.5.V

B. 0.5 V

C. 2.0 V

D. 2.5 V

Answer:

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24. Potentiometer can be used to measure:

A. internal resistance of the cell

B. emf of the cell

C. both (a) and (b)

D. drift speed

Answer:

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25. Voltage V is applied to a capacitor of capacitance C. It is then connected in parallel with a series combination of two uncharged capacitors each of capacitance C. The charge that flows through the connecting wires is

A. CV

B. Zero

C. $\frac{CV}{3}$

D. $\frac{2CV}{3}$

Answer:

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Section B

1. Find out $\vec{E}$ at x = 4 if the potential at a point x due to some charges situated on x-axis is $v_{(x)} = \frac{20}{(x^2 - 4)} V$:

A. $\frac{9}{10} V / \mu m$

B. $\frac{18}{12} V / \mu m$

C. $\frac{80}{120} V / \mu m$

D. $\frac{10}{9} V / \mu m$

Answer:

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2. A circular coil of radius 8 cm with current 6 A has 30 turns. It is suspended vertically in a uniform horizontal magnetic field of 1 T. which makes an angle of 60° with normal of the coil. The magnitude of counter torque applied to prevent the coil from turning will be:

A. 3 N-m

B. 3.9 Nm

C. 3.133 Nm

D. 0

Answer:

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3. The emf of the battery is equal to its terminal potential difference.

A. only when the battery is being charged

B. only when the large current is in the battery

C. only when there is no current in the battery.

D. under all conditions

Answer:

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4. The current passing through a choke coil of self-inductance 5 H is decreased at the rate of 2 A/s. The induced emf developed across the coil is:

A. 10 V

B. -10 V

C. 2.5 V

D. $-$ 2.5 V

Answer:

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5. The magnetic flux linked with the coil is given by $\phi = 5t^2 + 3t + 16$. The induced emf in the coil in the fourth second will be:

A. 10 V

B. $-10V$

C. 43 V

D. -43 V

Answer:

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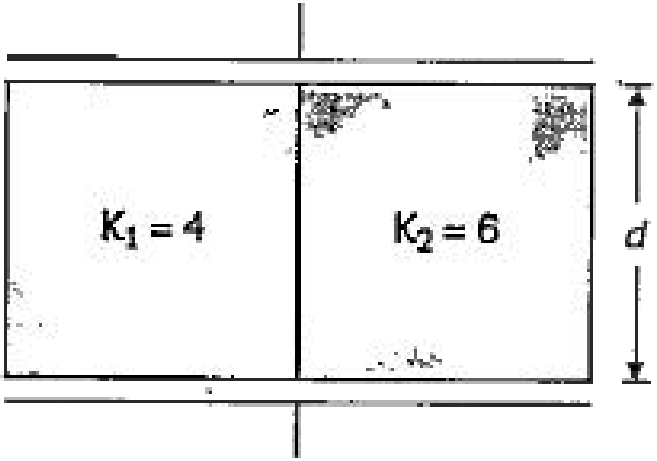
6. Find the new capacitance if two dielectric of dielectric constant 4 and 6 are filled in a capacitor of capacitance $1\mu F$



A. $4\mu F$

B. $10\mu F$

C. $5\mu F$

D. $7\mu F$

Answer:

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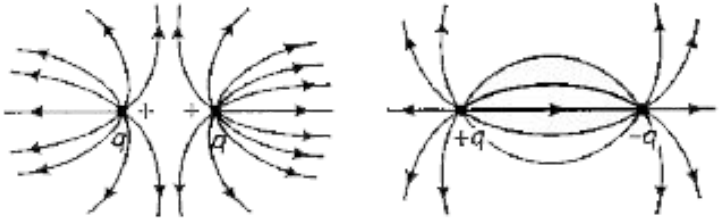
7. 

Coulomb force $\left(\overrightarrow{F}_{12}\right)$ in vector form is:

A. $\frac{1}{4\pi\varepsilon_0} \times \frac{q_1 q_2}{r_{12}} \hat{r}_{12}$

B. $\frac{1}{4\pi\varepsilon_0} \times \frac{q_1 q_2}{q_{12}^3} \hat{r}_{12}$

C. $\frac{1}{4\pi\varepsilon_0} \times \frac{q_1 q_2}{q_{12}^2} \hat{r}_{12}$

D. $\frac{1}{4\pi\varepsilon_0} \times \frac{q_1 q_2}{r_{12}} \hat{r}_{12}$

Answer:

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8. Where is the energy stored in a capacitor?

A. Region outside the first plate

B. Region between the plates

C. Region outside the second plate

D. No energy can be stored

Answer:

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9. Five equal capacitors are connected in series and have net capacitance C_1 and when connected in parallel, they have capacitance C_2. The value of $\frac{C_1}{C_2}$:

A. $\frac{1}{25}$

B. $\frac{1}{15}$

C. $\frac{1}{5}$

D. 1

Answer:

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10. The potential differences across the resistance, capacitance and inductance are

$80V$, $40V$ and $100V$ respectively in an L-C-R circuit. The power factor of this circuit is

A. 1

B. 0.8

C. 0.5

D. 0.4

Answer:

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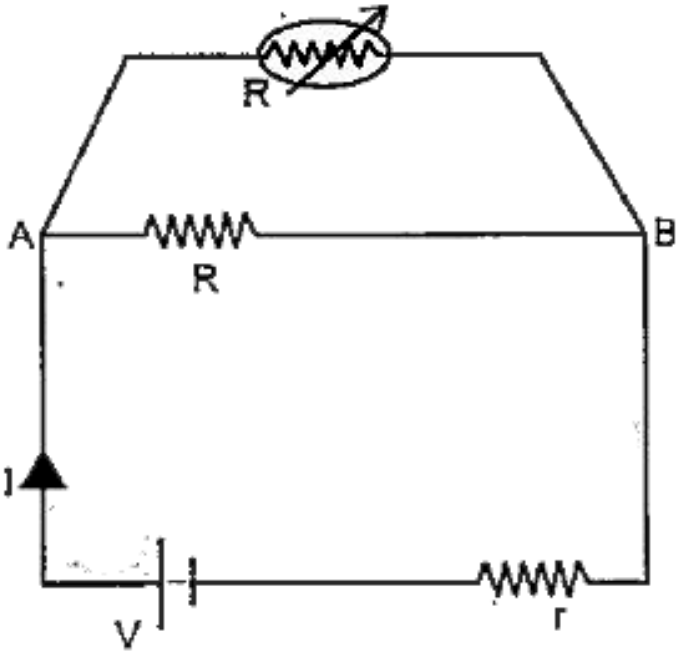
11. Consider a simple circuit shown in Fig. stands for a variable resistance R'R' can vary from Ro to infinity. r is internal resistance of the battery $(r < \ < R < R_0)$



A. Potential drop across AB is nearly constant as R' is varied.

B. Current through R' is nearly a constant as R' is varied.

C. Current I depends sensitively on R'.

D. $1 \geq V /$ (r+R) always.

Answer:

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12. To rotate a bar magnet from. 0° to 120°, the work done is:

A. 1MB

B. $\frac{1}{2}$MB

C. $\frac{2}{3}$ MB

D. $\frac{3}{2}$ MB

Answer:

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13. The horizontal component of earth's magnetic field is 0.26 and vertical component is 0.52 G. The angle of dip will be:

A. 0°

B. 45°

C. 60°

D. 90°

Answer:

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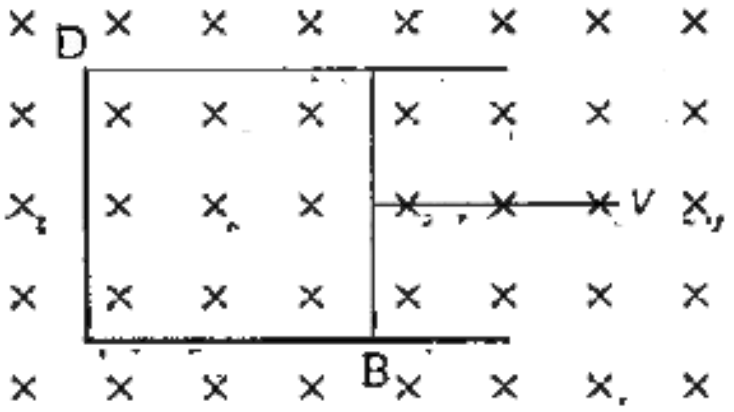
14. A rectangular loop ABCD' with movable arm AB of length 10 cm and resistance 2Ω is placed in a uniform magnetic field of 0-1 T. The field is perpendicular to the plane of the loop. The resistance of arms CB, BA and CD is negligible.



What is the current induced in the loop when PQ is moving with the velocity of $20ms^{-1}$

A. 0.1 A

B. 0.2 A

C. 0.3 A

D. 0.4 V

Answer:

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15. A source of an alternating potential V = 200 sin $(100\pi t)$ V is connected with a resistance of

20Ω Time taken by current to change from its peak value to rms value is:

A. 0.52 s

B. $25 \times 10^{-3} s$

C. 0.2 s

D. $2.5 \times 10^{-3} s$

Answer:

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16. Coefficient of coupling is given by:

A. $k = \frac{M}{L_1 L_2}$

B. $k = \frac{M}{\sqrt{L_1 L_2}}$

C. $k = \frac{L_1 L_2}{\sqrt{M}}$

D. Both (a) and (c)

Answer:

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17. For 2 hr, a television of 100 W is used. Find the units used:

A. 20 kW

B. 2 kW

C. 0.2 kW

D. 2 kW

Answer:

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18. Assertion (A): The dimension formula for product of conductance and resistance is same as of dielectric constant.

Reason (R): Both have dimensions of time constant.

A. Both (A) and (R) are true and (R) is the correct explanation of (A).

B. Both (A) and (R) are true but (R) is not the correct explanation of (A).

C. (A) is true but (R) is false.

D. (A) is false and (R) is also false.

Answer:

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19. Assertion (A): 1 m wire is used to make meter bridge useful.

Reason (R): A bridge cannot be made out of shorter wire.

A. Both (A) and (R) are true and (R) is the correct explanation of (A).

B. Both (A) and (R) are true but (R) is not the correct explanation of (A).

C. (A) is true but (R) is false.

D. (A) is false and (R) is also false.

Answer:

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20. Assertion (A): We use thick wire in the secondary coil of a step down transformer to reduce the production of heat.

Reason (R): If the plane of armature is parallel to the lines of force of magnetic field the magnitude of induced EMF is maximum.

A. Both (A) and (R) are true and (R) is the correct explanation of (A).

B. Both (A) and (R) are true but (R) is not the correct explanation of (A).

C. (A) is true but (R) is false.

D. (A) is false and (R) is also false.

Answer:

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21. Assertion (A): For phenomena of resonance both L·& Care to be present in circuit.

Reason (R): Voltage across L and C cancel each other and the total source voltage appearing across our causes resonance.

A. Both (A) and (R) are true and (R) is the correct explanation of (A).

B. Both (A) and (R) are true but (R) is not the correct explanation of (A).

C. (A) is true but (R) is false.

D. (A) is false and (R) is also false.

Answer:

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22. In a series LCR circuit, at resonant frequency.

A. Both (A) and (R) are true and (R) is the correct explanation of (A).

B. Both (A) and (R) are true but (R) is not the correct explanation of (A).

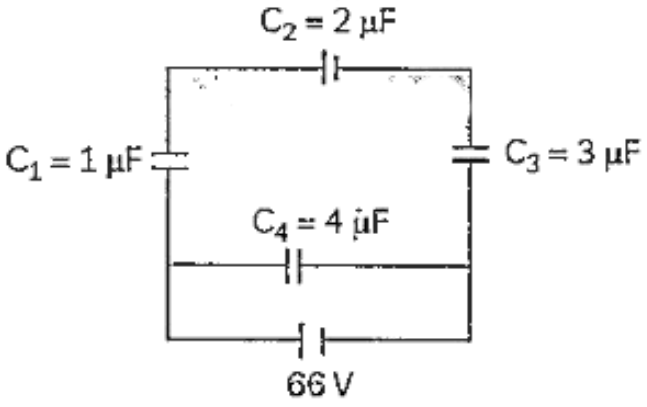
C. (A) is true but (R) is false.

D. (A) is false and (R) is also false.

Answer:

Section C

1. In the given figure charge on capacitor C_2 is:



A. $22\mu C$

B. $44\mu C$

C. $18\mu C$

D. $36\mu C$

Answer:

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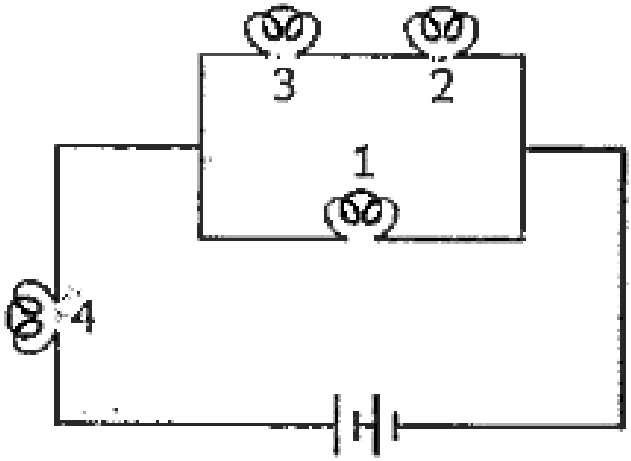
2.



As shown in the figure, four bulb consume same power. The resistance of bulb 1 is 36Ω .

The resistance of bulb 3 is:

A. 9Ω

B. 18Ω

C. 12Ω

D. 4Ω

Answer:

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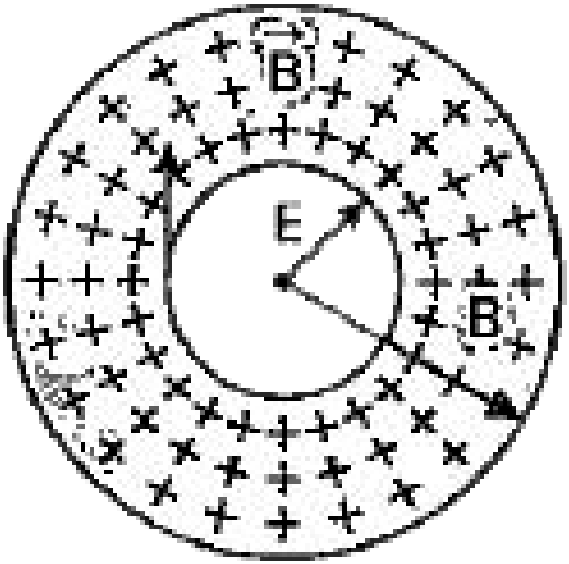
3. Magnetic field $\overrightarrow{B}$ is produced by a current. On the basis of this concept, Maxwell explained the existence of EM. Magnetic field

is generally directed towards circumference of circular loop and ris the radius whose plane is perpendicular to direction of current carrying wire, which is centered symmetrically with respect to the wire



Conduction of current due to:

A. Current through conductor

B. Current through loop

C. Current on surface

D. Current between capacitor

Answer:

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