PHYSICS

BOOKS - EDUCART PUBLICATION

SAMPLE PAPER 7

Section A

1. If a copper rod carries a direct current, the magnetic field associated with the current will be_____

A. both inside and outside the pipe

B. outside the pipe

C. inside the pipe

D. current will flow in another pipe

Answer: B

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2. $\vec{F}$ is the force on the arm of a square toop suspended in a uniform mdgnetic field. Net : force on remaining arnis is :

A. $-\overrightarrow{F}$

B. $\overrightarrow{F}$

C. $-3\overrightarrow{F}$

D. $3\overrightarrow{F}$

Answer: A

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3. Find the resistance between two diametrically' opposite points A and B of á

wire of resistance $12\Omega m^{-1}$ bent in form of a circle of radius 10 cm:

A. 3Ω

B. $0.6\pi\Omega$

C. 0.3Ω

D. $6\pi\Omega$

Answer: B

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4. The output of a step down transformer is measured to be $48V$ when connected to a $12W$ bulb. The value of peak current is

A. $\frac{1}{\sqrt{2}A}$

B. $\sqrt{2}A$

C. $2A$

D. $2\sqrt{2}A$

Answer: C

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5. The time constant of C-R circuit is

A. $\frac{C}{R}$

B. CR^2

C. $C\sqrt{R}$

D. CR

Answer: D

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6. A particle of mass m, charge e and velocity v moving in a magnetic field E perpendicular to the motion of particle. The radius of its path is:

A. $\frac{Be}{mv}$

B. $\frac{ev}{Bm}$

C. $\frac{Bv}{em}$

D. $\frac{mv}{Be}$

Answer: D

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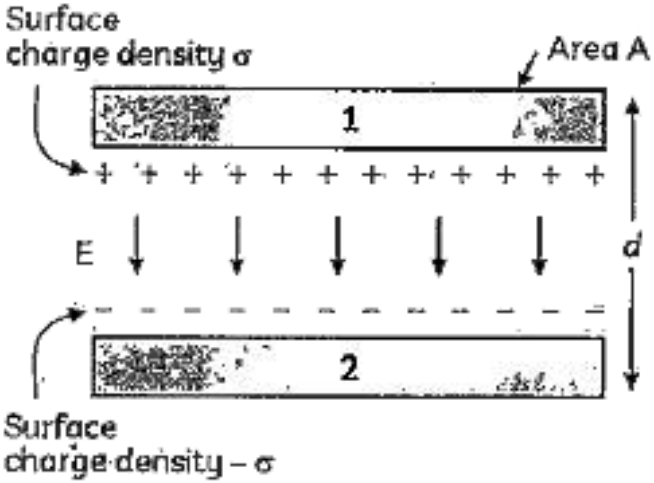

7.

The total capacitance if the parallel plate capacitor has n number of interleaved plates, area A and separation d between them,

A. $\frac{\varepsilon_0 nA}{d}$

B. $\frac{\varepsilon_0 A}{d}$

C. $\frac{\varepsilon_0(n-1)A}{d}$

D. $\frac{\varepsilon_0 n^2 A}{d}$

Answer: C

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8. The radius of spherical capacitor when capacitance is 1 μF is:

A. $1.11m$

B. $9km$

C. $10m$

D. $1.11cm$

Answer: B

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9. A point charge q is placed at the centre of a cube. What is the flux linked.

a with all the faces of the cube?

b. with each face of the cube?

c. if charge is not at the centre, then what will be the answer of parts a and b ?

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

B. 0

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

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

Answer: C

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10. Magnetic meridian is an imaginary:

A. line along N-'s

B. vertical plane

C. horizontal plane

D. point

Answer: B

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11. An an ideal parallel LC circuit, the capacitor is charged by connecting it to a DC source which is then disconnected. The current in the circuit

A. Grows monotonically

B. Decays monotonically

C. Oscillates instantly

D. Becomes zero instantly

Answer: C

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12. Which of the following is responsible for the earth's magnetic field?

A. Angle of dip

B. Angle of declination

C. Horizontal compound

D. None of these

Answer: D

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13. A circular loop of radius R , carrying I, lies in $x-y$ plane with its origin . The total magnetic flux through $x-y$ plane is

A. directly proportional to R

B. directly proportional to I

C. inversely proportional to R

D. zero

Answer: D

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14. A sphere of radius 5 cm has electrostatic potential at the surface of 50 V. Potential at the centre is:

A. 10V

B. Zero

C. 50 V

D. 250 V

Answer: C

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15. SI unit of permittivity is

A. Nm^2C^{-2}

B. $C^2N^{-2}m^{-2}$

C. $CN^{-1}m^{-1}$

D. $C^2N^{-1}m^{-2}$

Answer: D

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16. How does surface tension change with temperature ?

A. Decreases linearly

B. Increases linearly

C. First increases then decreases

D. First decreases then increases

Answer: B

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17. Unit of emf is

A. Coulomb

B. Volt

C. $\frac{\text{Volt}}{\text{meter}}$

D. $\frac{\text{Volt}}{cm}$

Answer: B

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18. To make the bridge balanced, value of additional resistance in arm BC in series or parallel is

A. 22Ω

B. 44Ω

C. 2Ω

D. 20Ω

Answer: A

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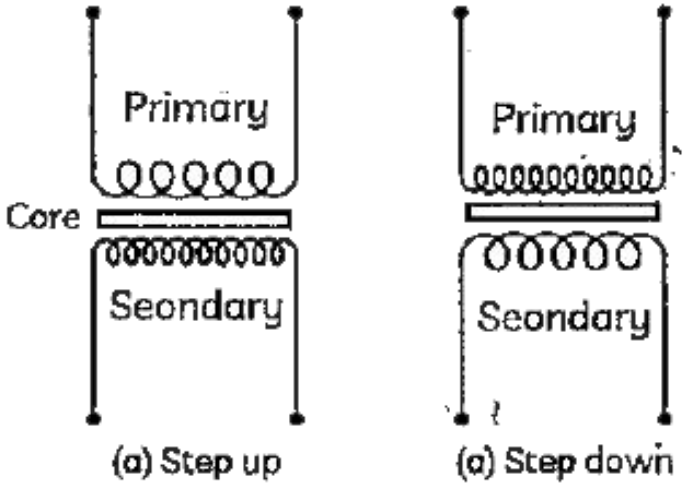

19.

Transformer is used for :

A. Producing DC

B. Producing AC

C. Changing DC to AC

D. Changing AC voltages.

Answer: D

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20. An open coil has:

A. Zero resistance and inductance

B. Infinite resistance and zero inductance

C. Zero resistance and high inductance

D. Both (a) and (b)

Answer: B

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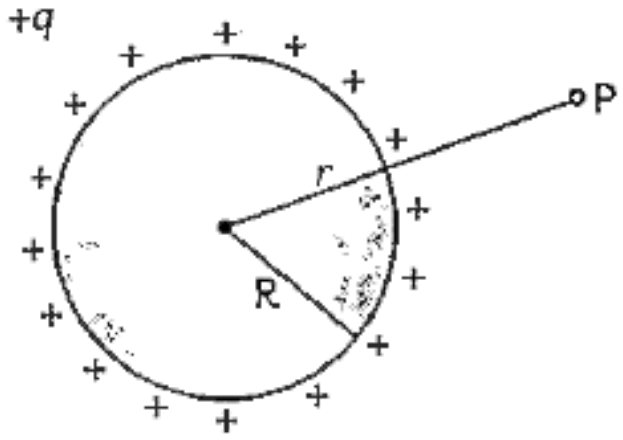
21. Electric field intensity at point P due to charge distributed over a sphere is:



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

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

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

D. $E = 0$

Answer: B

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22. A Coil rotates 25 turns about its vertical diameter with angular speed 40 s^{-1} in a horizontal uniform magnetic field of 0.05 T. The coil is of area $300cm^2$. Maximum emf is:

A. $0.5V$

B. $10V$

C. $1.5V$

D. $2V$

Answer: C

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23. Work done in moving a positive charge on an equipotential surafce is

A. Infinite

B. Zero

C. Cannot determine

D. 1

Answer: B

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24. Why is resistance more in series combination of resistors ?

A. parallel combination

B. series combination

C. equal in both combination

D. independent resistance

Answer: B

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25. Gauss's Law

A. Net magnetic flux through any closed surface is zero

B. Net magnetic flux through any closed surface is B. Δ S

C. Net magnetic flux through any closed surface is E. ΔS

D. Both (b) and (c)

Answer: B

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Section B

1. Expression of orbital magnetic moment is

A. $\mu_i = evr$

B. $\mu_i = \frac{evr}{2}$

C. $\mu_i = evr^2$

D. $\mu_i = ev^2r$

Answer: D

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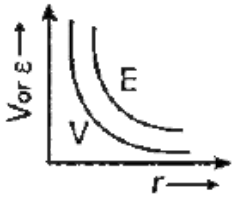
2. Draw E and V versus r on the same graph for a point charge.

A.



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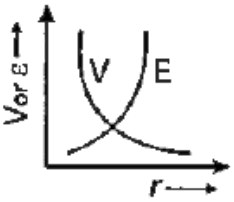
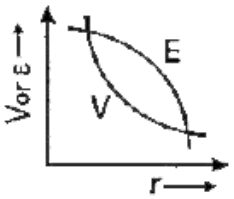
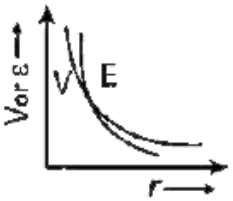


C.



D.



Answer: D

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3. Capacitor of capacitance C with oil between the plates of dielectric constant 2. If oil is removed, the capacitance is .

A. 2 C

B. $\sqrt{2}C$

C. $\frac{C}{\sqrt{2}}$

D. $\frac{C}{2}$

Answer: C

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4. If $10\mu C$ charge exists at center of a square ABCD and $2\mu C$ point charge is moved form A to B. find the work done .

A. 20 J

B. 5 J

C. 0

D. 8 J

Answer: C

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5. Attraction of bits of paper to a plastic scale rubbed with a carpet is due for.

A. Plastic being a good conductor

B. Paper being a good conductor

C. Atoms in paper get polarised by charged scale

D. Scale posses magnetic properties

Answer: C

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6. A long solenoid carries 1 A current has 1000 turns per meter. A soft iron core of μ_r = 1000 is added and heated beyond curie temperature, then:

A. H and B fields in the solenoid are nearly unchanged.

B. The magnetisation in the core reverses direction.

C. H field in the solenoid is nearly unchanged but B field decreases drastically.

D. Magnetization in the core diminishes by factor of 10^{18}

Answer: A

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7. For a magnet placed with its North pole pointing North, neutral point lies on:

A. Equatorial line

B. Axial line

C. Both (a) and (b)

D. Towards south

Answer: A

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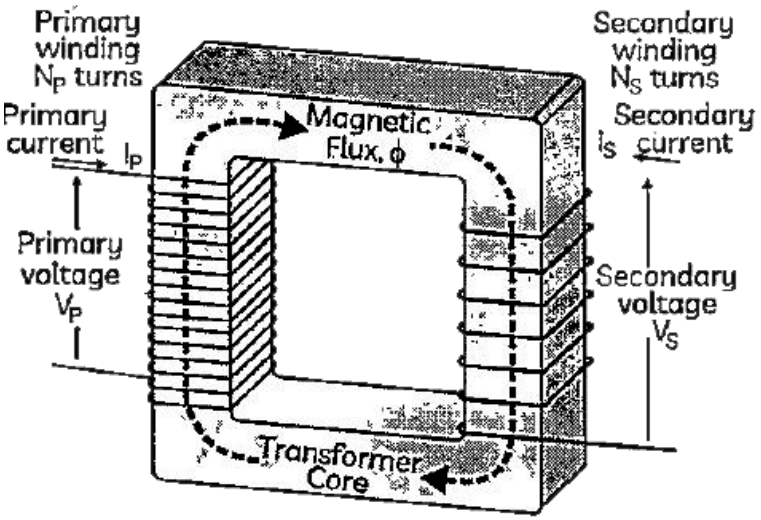

8.

The core is laminated to:

A. Minimize energy loss

B. reduce rusting

C. Reduce weight

D. Increase rusting

Answer: A

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9. In a plane perpendicular to the magnetic meridian, the dip needle will be:

A. verticle

B. inclined equal to the angle of dip at that place

C. horizontal

D. pointing in any direction

Answer: D

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10. At resonance, what will be the phase difference between voltage and a current in a series LCR circuit connected to an ac source?

A. $\frac{\pi}{2}$

B. $\frac{\pi}{4}$

C. $\frac{\pi}{6}$

D. 0

Answer: B

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11. The resistance of a metal rod of length 10 cm and rectangular cross-section of $1cm \times \frac{1}{2}$ connected to a battery across opposite faces

is maximum when the battery is connected across.

A. $10cm \times \frac{1}{2}$ cm faces

B. $1cm \times \frac{1}{2}cm$ cm faces

C. $10cm \times 1$ cm faces

D. $10cm \times \frac{1}{2}cm^2$ faces

Answer: C

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12. In a connection of 10 dry cells each of emf E and internal resistance r in series, two cell is connected opposite. Net emf and net internal resistance will be:

A. $10E$, $10r$

B. $8E$, $8r$

C. $8E$, $10r$

D. $8E$, $\frac{r}{10}$

Answer: D

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13. The potential difference across terminals of cell of 20 V and $r = 2\Omega$ connected to 8Ω external resistance is

A. 16

B. 1.6

C. 160

D. 5

Answer: A

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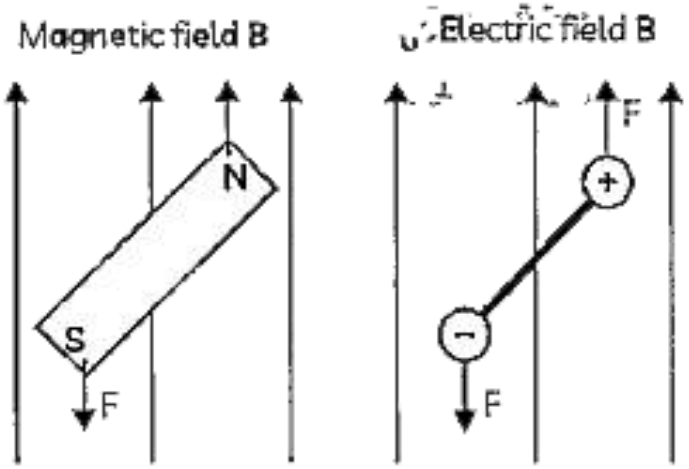
14.



A magnetic dipole of pole strength 20 Am is 10 cm long, The dipole moment is:

A. $2Am^2$

B. $3Am^2$

C. $4Am^2$

D. 0

Answer: A

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15. A metallic rod of length L rotates at an angular speed ω, normal to a uniform magnetic field. If the resitance of rod is R the heat dissipated is:

A. $\frac{1}{4}\frac{B^2L^4\omega^2t}{R}$

B. $\frac{1}{2}\frac{B^2L^2\omega t}{R}$

C. $\frac{1}{4}\frac{B^2L^2\omega^2t^2}{R}$

D. $\frac{1}{4}\frac{BL^2\omega^4t}{R}$

Answer: A

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16. If three capacitors are connected in a parallel capacitor network then, Choose the correct statements out of the following:

(I) Potential difference across each capacitor is same.

(II) For each capacitor, charges is different

(III) Voltage applied is different for each capacitor.

(IV)For each capacitor, charges are same.

A. (II) and (III)

B. (I) and (II)

C. (I) and (III)

D. (III) and (IV)

Answer: B

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17. Electric field between the plates is given by:

value of sigma is =17x10^(-22)

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: A

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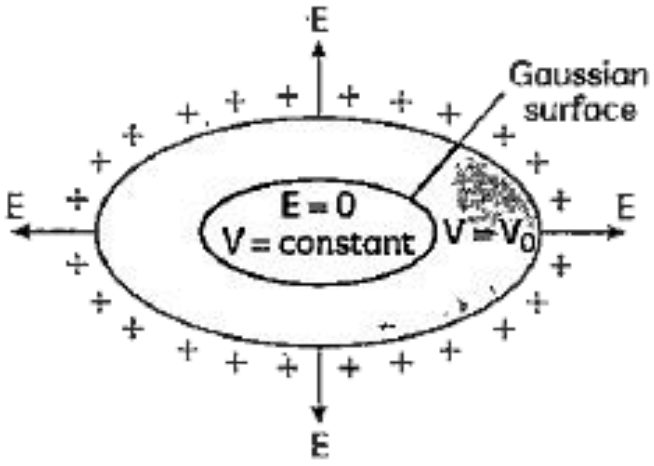

18.

In the region of constant potential:

A. the electric field is uniform

B. there can be no charge inside the region

C. the electric field is zero

D. both (b) and (c)

Answer: C

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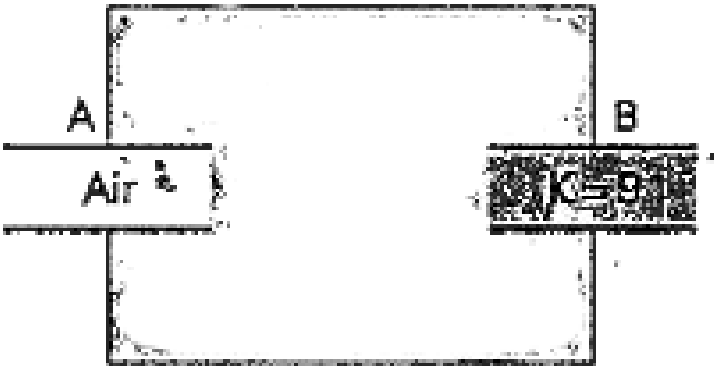
19. Find the energy if the dielectric slab is replaced from capacitor A to capacitor B:



A. $1.1 \times 10^{-5} J$

B. $3.1 \times 10^{-5} J$

C. $2.6 \times 10^{-5} J$

D. $2 \times 10^{-5} J$

Answer: A

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20. Assertion (A): By lamination of metal, eddy currents can be minimized.

Reason (R): To cut eddy currents specific arrangements are required.

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: A

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21. Assertion (A): Induced current in a coil is maintained only by a change in magnetic field.
Reason (R): The presence of large magnetic flux through a coil maintains a current in the coil if the circuit is continuous.

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: C

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22. Assertion : Voltmeter is connected in parallel with the circuit

Reason : Resistance of a voltmeter is very large.

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: A

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23. Assertion (A): Resistances connected in parallel has higher equivalent resistance.

Reason (R): $R_P = R_1 + R_2 + \ldots + R_n$

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 but (R) is also false.

Answer: D

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24. Assertion (A): Conductivity is due to mobile charge carriers of the body.

Reason (R): Charge is transfer by conduction and acquired by the body.

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: A

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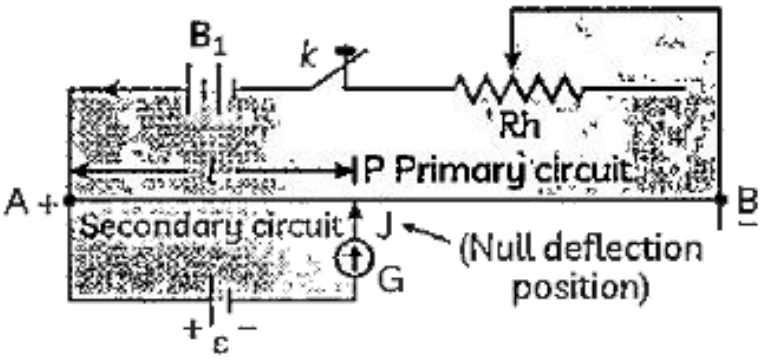
Section C

1. 

The null point of a potentiometer is at 56 cm with standard cell of 1.02 V. If the null point is at 70 cm, the value of another cell is:

A. $1.5V$

B. $1.275V$

C. $1V$

D. $1.02V$

Answer: B

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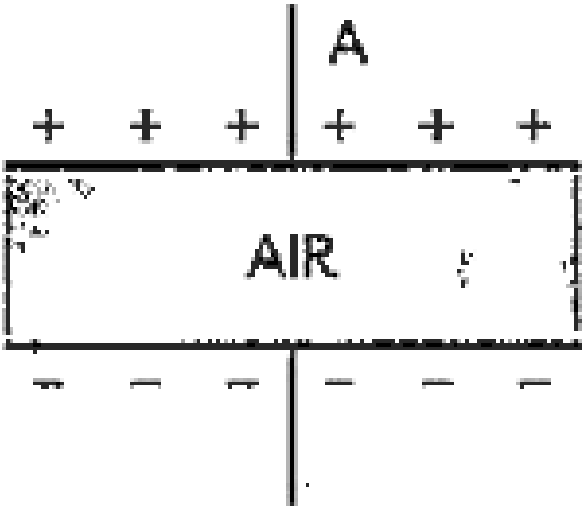
2. Find the work done by external agency in removing the slab A when battery is disconnected and dielectric slab is removed:



A. $6.3 \times 10^{-5} J$

B. $6 \times 10^{-5} J$

C. $4.84 \times 10^{-5} J$

D. $4.84 \times 10^{-4} J$

Answer: C

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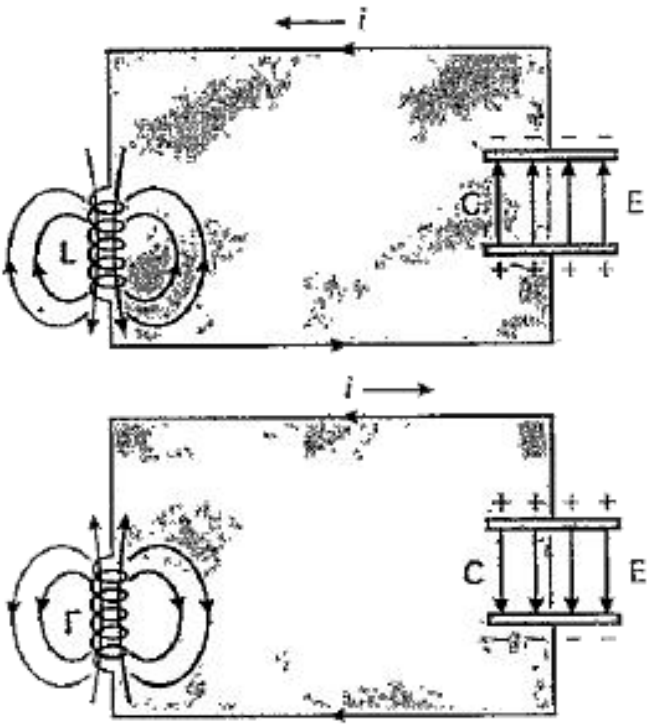
3. Energy can be stored by an LC circuit oscillating at its natural frequency. Energy stored in a capacitor is in form of electric field

between the plates. An inductor stores energy in form of magnetic field. If the inductor connected across capacitor, the voltage across the capacitor will drive the current through inductor, building up a magnetic field around it. The voltage across the capacitor falls to zero as the charge is used up by the current flow. Now the energy stored in the coil's magnetic field induces a voltage across the coil, because inductor opposes the current change. Thus energy required to charge the capacitor is extracted from the magnetic field.



For LC oscillator, the frequency of oscillator is:

A. Proportional to square of Lor C

B. Independent of the value of Lor C

C. Directly proportional to the value of L or C

D. Inversely proportional te square foot of L or C

Answer: D

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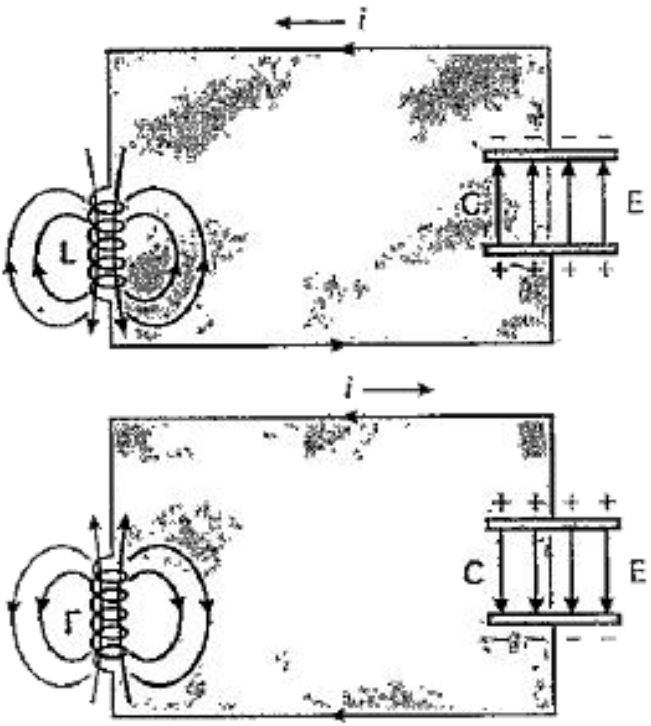
4. Energy can be stored by an LC circuit oscillating at its natural frequency. Energy stored in a capacitor is in form of electric field between the plates. An inductor stores energy in form of magnetic field. If the inductor

connected across capacitor, the voltage across the capacitor will drive the current through inductor, building up a magnetic field around it. The voltage across the capacitor falls to zero as the charge is used up by the current flow. Now the energy stored in the coil's magnetic field induces a voltage across the coil, because inductor opposes the current change. Thus energy required to charge the capacitor is extracted from the magnetic field.



We cannot use LC oscillator:to, produce:

A. Very high frequencies

B. Very low.frequencies

C. High frequencies

D. Audio frequencies

Answer: B

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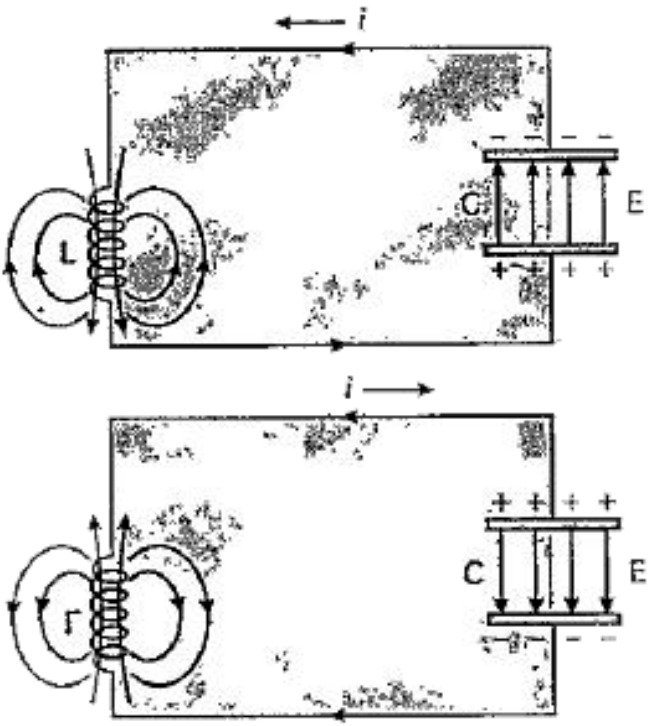
5. Energy can be stored by an LC circuit oscillating at its natural frequency. Energy stored in a capacitor is in form of electric field between the plates. An inductor stores energy in form of magnetic field. If the inductor connected across capacitor, the voltage across the capacitor will drive the current through inductor, building up a magnetic field around

it. The voltage across the capacitor falls to zero as the charge is used up by the current flow. Now the energy stored in the coil's magnetic field induces a voltage across the coil, because inductor opposes the current change. Thus energy required to charge the capacitor is extracted from the magnetic field.



If we increase the value or L four times in LC oscillator, the frequency of oscillation is:

A. Increased 4 times

B. Decreased 4 times

C. Increased 2 times

D. Decreased 2 times

Answer: D

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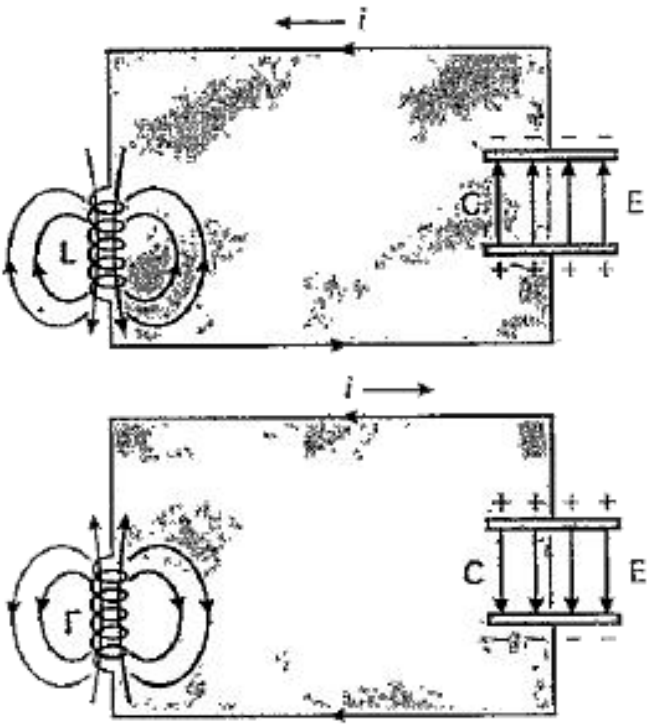
6. Energy can be stored by an LC circuit oscillating at its natural frequency. Energy stored in a capacitor is in form of electric field between the plates. An inductor stores energy in form of magnetic field. If the inductor connected across capacitor, the voltage across

the capacitor will drive the current through inductor, building up a magnetic field around it. The voltage across the capacitor falls to zero as the charge is used up by the current flow. Now the energy stored in the coil's magnetic field induces a voltage across the coil, because inductor opposes the current change. Thus energy required to charge the capacitor is extracted from the magnetic field.



A capacitor of $25\mu F$ and inductor of 0.6 H are in an LC circuit. When the charge on capacitor is$3 \times 10^{-5}C$, what is the rate of change of current:

A. 2 A/s

B. 3 A/s

C. 4 A/s

D. 6 A/s

Answer: A

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