PHYSICS

BOOKS - EDUCART PUBLICATION

SAMPLE PAPER 3

Secntion A

1. n capacitors identical to each other joined in parallel are charged to a common potential V. The battery is disconnected. Now the

capacitors are joined in series. For the new combination:

A. Energy and potential becomes n times.

B. Energy becomes n times, potential difference remains V.

C. Energy will remain same, potential difference becomes nv.

D. Energy and potential, both remains unchanged.

Answer: A

2. Electric field of an infinitely long straight wire is proportional to:

A. r

B. $\dfrac{1}{r^2}$

C. $\dfrac{1}{r^3}$

D. $\dfrac{1}{r}$

Answer: D

3. F is the force and r is the distance between two charges q. If charges are halved and distance is doubled, then the new force will

A. $\dfrac{F}{8}$

B. $\dfrac{F}{16}$

C. 4F

D. $\dfrac{F}{4}$

Answer: B

4. The radius of spherical capacitor when capacitance is $1\mu F$ is:

A. $1 \cdot 11m$

B. 9 km

C. 10 m

D. $1 \cdot 11cm$

Answer: B

5. Force acting on two charges is given by $F = k\dfrac{q_1 q_2}{r^2}$ Here k depends in :

   A. Strength charge

   B. Medium

   C. Distance between the charges

   D. Both (a) and (b)

Answer: B

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6. In induction charging:

    A. body to be charged must be a semiconductor

    B. body to be charged must be a conductor

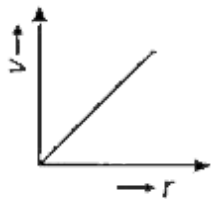   C. only type of body can be charged by induction

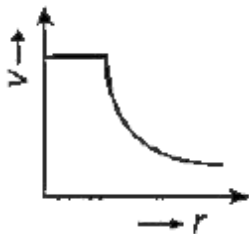   D. body to be charged must be an insulator

Answer: B

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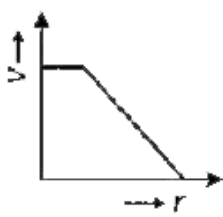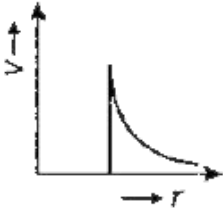**7.** For charged metallic sphere, potential changes with respect to distance from the centre as:

A.

B.

C.

D.

Answer: B

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8. Which of the following obey's Ohm's law?

A. Transistor

B. Nichrome

C. Diode

D. Liquid electrolyte

Answer: B

9. R is the equivalent resistance of n resistors of same resistance in series. If the connection is turned parallel then equivalent resistance will be:

A. $n^2 R$

B. nR

C. $\dfrac{R}{n}$

D. $\dfrac{R}{n^2}$

Answer: D

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10. As the temperature increases, resistivity of semi-conductor:

A. increases

B. decreases

C. independent

D. increases exponentially

Answer: A

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11. Kirchhoff's current law is consequence of

A. conservation of momentum

B. conservation of charge

C. conservation of mass

D. conservation of energy

Answer: B

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12. A cell of 2.1 V gives 0.2 A current through resistance 10Ω The internal resistance is:

A. 5Ω

B. 50Ω

C. 0.05Ω

D. 0.5Ω

Answer: D

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13. Sensitivity of a moving coil galvanometer increases as:

A. number of turns decreases

B. number of turns increases

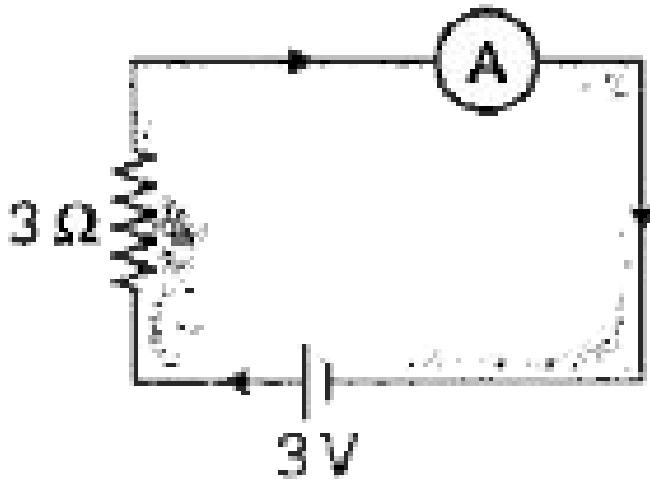C. torsional rigidity increases

D. area of coil decreases

Answer: B

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$3\,\Omega$

$3\,V$

A

14.

If the value of R_g is 60Ω the value of current

is:

A. $0.5A$

B. $0.04A$

C. $0.1A$

D. Zero

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15. Find the dimensional formulae of resistance.

A. $\left[LM^2T^{-2}A^{-2}\right]$

B. $\left[LM^3T^{-3}A^{-3}\right]$

C. $\left[LM^2T^{-2}A^{-2}\right]$

D. $\left[LM^2T^{-3}A^{-2}\right]$

Answer: D

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16. Path of an electron entering perpendicular in a uniform magnetic field will be:

A. Lineasr

B. paraobolic

C. ellipse

D. circular

Answer: D

17. A short bar magnet placed with its axis at $30°$ to a uniform magnetic field of 0.2 T experience torque of 0.6 Nm. Then magnetic moment will be:

A. $1.0 Am^2$

B. $1.5 Am^2$

C. $0.6 Am^2$

D. $0.2 Am^2$

Answer: C

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18. The value of angle of dip at a place where vertical component of earth's magnetic field is $\sqrt{3}$ times the horizontal component is:

A. $30°$

B. $45°$

C. $60°$

D. $90°$

Answer: C

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19. At equator value of angle of dip is zero because on equator:

A. value of V is zero

B. value of H is zero

C. value of V and H zero

D. V and H are equal

Answer: A

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20. Mutual inductance depends on:

A. medium between the coils

B. seperation between the coils

C. both (a) and (b)

D. it is independent of medium

Answer: C

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21. Average emf of a circuit 'is 200 V when current falls from 5 A to OA in 0.1 second. Self-inductance of the circuit is:

A. 1 H

B. 2 H

C. 3 H

D. 4 H

Answer: D

22. Emf induced in coil at t = 2 s when instantaneous flux linked is $\phi = \left(5t^3 - 100t + 300\right)$ Wb:

A. 300 V

B. 140 V

C. 40 V

D. $-40V$

Answer: C

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23. Over a long distance, of large distance and distribution of electrical energy is done by:

A. Capacitor

B. Dynamo

C. Transformer

D. Generator

Answer: C

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24. What is the rms current through a resistor of 50Ω when an alternating voltage given by $V140\sin(314)t$ is connected to it?

A. $1.5A$

B. $1.98A$

C. $2.5A$

D. $2.98A$

Answer: B

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25. Reduction of resonant frequency in LCR circuit with a generator is done by:

A. Removing dielectric in a capacitor

B. Removing iron core of the inductor

C. Removing generator frequency

D. Adding another capacitor in parallel to

Answer: D

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Secntion B

1. What is the permittivity, if the electric constant of water is 80?

    A. $708 \times 10^{-12} F/m$

    B. $700 \times 10^{-12} F/m$

    C. $708 \times 10^{-14} F/m$

    D. $708.32 \times 10^{-2} F/m$

Answer: D

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2. An uniform electric field of magnitude $5 \times 10^4 NC^{-1}$ has a dipole of dipole moment $4 \times 10^{-9} cm$ aligned at $30°$ with the direction of field. Calculate the magnitude of torque acting on the dipole:

A. $10^{-4}Nm$

B. $2 \times 10^{-3}Nm$

C. $2 \times 10^{-5}Nm$

D. $10^{-5}Nm$

Answer: A

3. Why do cell phones lose signal inside an elevator?

A. Elevators have their own electric field

B. Elevators, are made of conducting material

C. both (a) and (b)

D. Elevators are non-conducting in nature

Answer: B

4. The potential difference $V_A - V_B$ will be:

A. Positive

B. Negative

C. Zero

D. Cannot be determined

Answer: A

5. Potential difference of 11 V is applied across three capacitors of capacitance $1\mu F$, $2\mu F$ and $3\mu F$ connected in series. Potential difference across capacitor of $1\mu F$ is:

A. 4 V

B. 6 V

C. 1 V

D. 2 V

Answer: A

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6. Inductive reactance is directly proportional

    A. Inductance

    B. Frequency of the current

    C. both (a) and (b)

    D. Amplitude of the current

Answer: C

7. Inductor at a high frequency will behave as a

:

A. Good conductor

B. Bad conductor

C. Capacitor

D. Inductor only
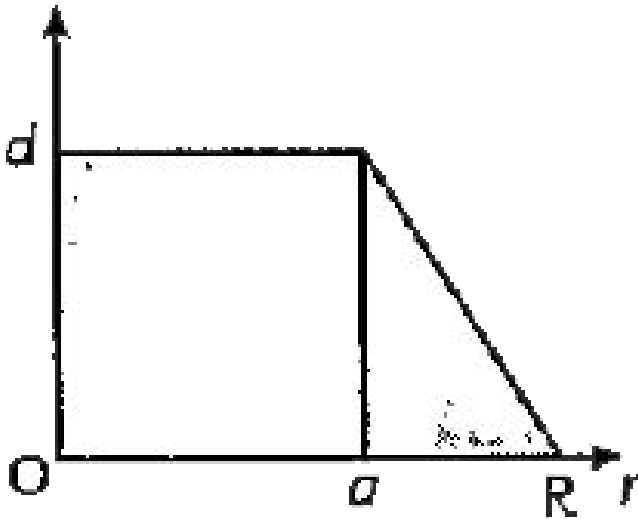
Answer: B

8. $\overrightarrow{E}$ at R= r is

A. Independent of a

B. directly proportional to a

C. directly proportional to a^2

D. inversely proportional to a

Answer: A

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9. For determining the value of potential at a point, the external force at every point of the path is to be equal and opposite to the:

A. Electrostatic force on the test charge at

that point

B. Work done

C. Both (a) and (b)

D. Neither (a) nor (b)

Answer: A

10. Heat produced by 100 W heater in 2 minutes is:

    A. 10.5 kcal

    B. 16.3 kcal

    C. 2.8 kcal

    D. 14.2 kcal

Answer: C

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11. In a potentiometer, if we increase the value of R, in which direction does the balance J shift?

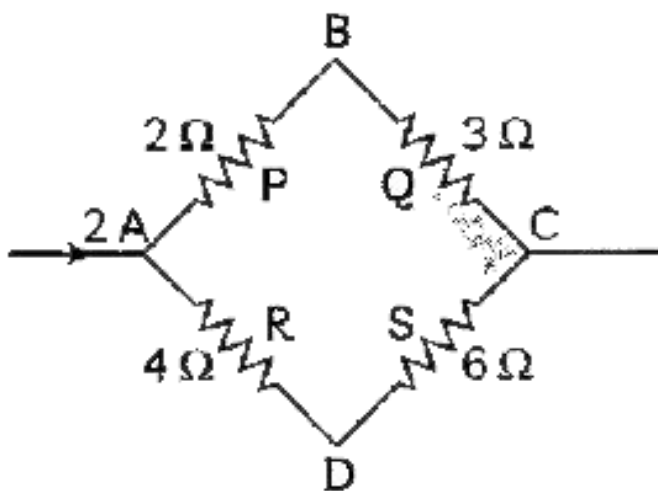   A. Same as initial point

    B. Towards B

    C. Towards A

    D. Shift to entrance end

Answer: B

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12. Find the potential difference $(V_B - V_D)$ in balanced condition if 2 A current is flowing through the circuit:

A. 4 V

B. 6 V

C. 12 V

D. Zero

Answer: D

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13. If the value of magnetic field is reduced to half and velocity of charged particle is doubled then the radius of path of charged particle will be:

A. 2 times

B. 8 times

C. 3 times

D. 4 times

Answer: D

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14. According to Biot-Savart's law, an electron moving with velocity produces a magnetic field B such that:

A. B is parallel to v

B. B is perpendicular to v

C. It obeys inverse cube law

D. H is along the line joining the electron

and point of observation

Answer: B

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

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

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

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

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

Answer: D

16. A bar magnet of length 3cm has points A and B along its axis at distance of $24cm$ and $48cm$ on the opposite sides. Ratio of magnetic field at these points will be

A. 3

B. 8

C. $\dfrac{1}{2}\sqrt{2}$

D. 4

Answer: B

17. If number of turns in a coil is tripled, the value of magnetic flux will:

A. becomes $\dfrac{1}{3}$

B. be tripled

C. remain unchanged

D. none of these

Answer: B

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18. To reach a place $10°$ South of West, in which direction ship should be steered if the declination at place is $18°$ West of North:

A. $90°$

B. $82°$

C. $70°$

D. $63°$

Answer: B

19. The couple acting on a magnet of length 10cm and pole strength 15A-m, kept in a field of $B = 2 \times 10^{-5}$, at an anlge of $30°$ is

A. $1.5 \times 10^{-2} Nm$

B. $1.5 \times 10^{-3} Nm$

C. $1.5 \times 10^{-5} Nm$

D. $1.5 \times 10^{-6} Nm$

Answer: C

20. Assertion (A): The resistivity of semiconductor' decreases with increase of temperature.

Reason (R): in a conducting solid, the rate of collision increases with increase of temperature.

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): Resistance is unaffected when wire is bent.

Reason (R): Resistance of wire is proportional to material resistivity

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: B

22. Assertion (A): If the distance between the plates is increased for a disconnected capacitor, its potential energy decreases.

Reason (R): Energy , is inversely proportional to distance between the plates.

   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: D

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23. Assertion (A): Permeability of the core

material does not affects the self-inductance

of a coil.

Reason (R): Self-inductance only depends on number of turns and A of cross-section.

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: D

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24. Assertion (A): In balanced condition of a wheat stone bridge the potential difference is maximum.

Reason (R): When the sum of resistance is equal to the voltage supplied, the condition is said to be balanced.

   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

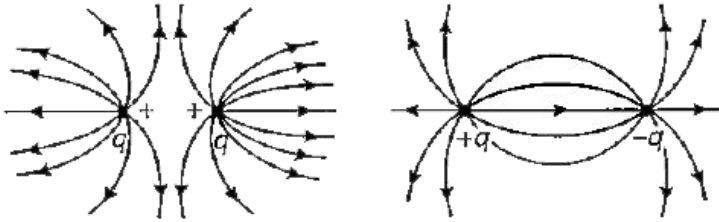the correct explanation of (A).

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

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

Answer: D

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Secntion C

1.

A point charge + q placed at distanced from

on isolated conducting plane. Field at point P

on other side of the plane is directed:

A. perpendicular to the plane but towards

the plane

B. perpendicular to the plane but away

from the plane

C. radially away from the point charge

D. Radially towards the point charge

Answer: B

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2. In EMI, line integral of induced field around a closed path is …………. and induced electric field is ……………

A. zero, non-conservative

B. non-zero, non-conservative

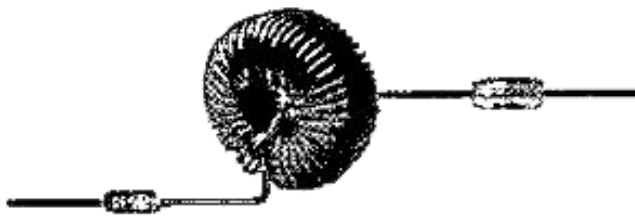C. non-zero, conservative

D. zero, conservative

Answer: B

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3. Case Study: Read the following paragraph and answer the questions: Electrical resonance takes place in series LCR circuit when the circuit allows maximum current for a

given frequency of the source of alternating supply for which capacitive reactance becomes equal to the inductive reactance, Current in this LCR circuit in maximum and the impedance is minimum.. Resonant circuits are used to respond selectively to signals of a given frequency, while discriminating against signals of different.frequencies. The circuit has higher selectivity or sharpness when the response of the circuit is more narrowly peaked around the chosen frequency.

Bandwidth of the resonant LCR circuit is:

A. $\dfrac{R}{2\pi L}$

B. $\dfrac{4R\pi}{L}$
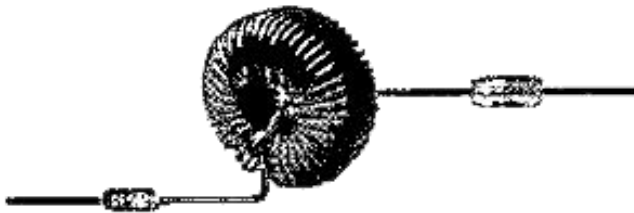
C. $\dfrac{R\pi}{L}$

D. $\dfrac{2R\pi}{L}$

Answer: A

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4. Case Study: Read the following paragraph and answer the questions: Electrical resonance takes place in series LCR circuit when the circuit allows maximum current for a given frequency of the source of alternating supply for which capacitive reactance becomes equal to the inductive reactance, Current in this LCR circuit in maximum and the impedance is minimum.. Resonant circuits are used to respond selectively to signals of a given frequency, while discriminating against signals of different.frequencies. The circuit has

higher selectivity or sharpness when the response of the circuit is more narrowly peaked around the chosen frequency.

In an LCR series circuit with a generator,resonant frequency can be reduced by:

A. Iron core of inductor should be removed

B. Another capacitor should be added in parallel to first

C. Dielectric in the capacitor should be removed
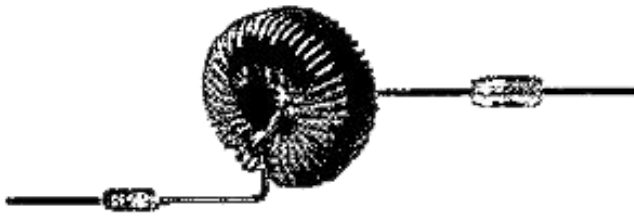
D. The generator frequency should be reduced.

Answer: B

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5. Case Study: Read the following paragraph and answer the questions: Electrical resonance takes place in series LCR circuit

when the circuit allows maximum current for a given frequency of the source of alternating supply for which capacitive reactance becomes equal to the inductive reactance, Current in this LCR circuit in maximum and the impedance is minimum.. Resonant circuits are used to respond selectively to signals of a given frequency, while discriminating against signals of different.frequencies. The circuit has higher selectivity or sharpness when the response of the circuit is more narrowly peaked around the chosen frequency.

What will be the nature of circuit for frequencies higher than the resonant frequency on nonresonant circuit?

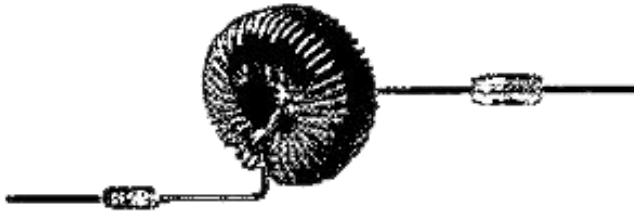A. Capacitive

B. Resistive

C. Inductive

D. Both (a) and (c)

Answer: C

6. Case Study: Read the following paragraph and answer the questions: Electrical resonance takes place in series LCR circuit when the circuit allows maximum current for a given frequency of the source of alternating supply for which capacitive reactance becomes equal to the inductive reactance, Current in this LCR circuit in maximum and the impedance is minimum.. Resonant circuits are used to respond selectively to signals of a

given frequency, while discriminating against signals of different.frequencies. The circuit has higher selectivity or sharpness when the response of the circuit is more narrowly peaked around the chosen frequency.

The source frequency which drives the given circuit is:

A. 50 Hz

B. $\dfrac{50}{\pi} Hz$

C. 25 Hz

D. $\dfrac{25}{\pi} Hz$

Answer: D

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