PHYSICS

BOOKS - NEET PREVIOUS YEAR (YEARWISE + CHAPTERWISE)

ELECTROMAGNETIC INDUCTION

Physics

1. A long solenoid of diameter 0.1 m has 2×10^4 turns per meter. At centre of the

solenoid is 100 turns coil of radius 0.01 m placed with its axis coinciding with solenoid axis. The current in the solenoid reduce at a constant rate to 0A from 4 a in 0.05 s . If the resistance of the coil is $10\pi^2\Omega$, the total charge flowing through the coil during this time is

A. $32\pi\mu C$

B. $16\mu C$

C. $32\mu C$

D. $16\pi\mu C$

Answer: c

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2. A long solenoid has 1000 turns. When a current of $4A$ flows through it, the magnetic flux linked with each turn of the solenoid is $4 \times 10^{-3} Wb$. The self-inductance of the solenoid is

A. $3H$

B. $2H$

C. $1H$

D. $4H$

Answer: c

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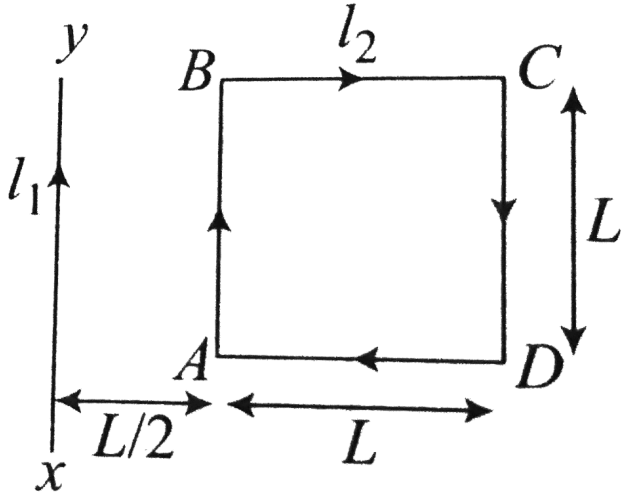
3. A sqaure loop $ABCD$, carrying a current I_2 is placed near and coplanar with a long straight conductor XY, carrying a current I_1 as shwon in Figure. The net force on the loop

will be



A. $\frac{\mu_0 li}{2\pi}$

B. $\frac{2\mu_0 liL}{3\pi}$

C. $\frac{\mu_0 liL}{2\pi}$

D. $\frac{2\mu_0 li}{3\pi}$

Answer: d

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4. Two identical charged spheres suspended from a common point by two mass-less strings of length l are initially at a distance d ($d << l$) apart because of their mutual repulsion . The charge begins to leak from both the spheres at a constant rate. As a result the charge approach each other with a velocity v. Then as a function of distance x between them .

A. $v \propto x$

B. $v \propto x^{-\frac{1}{2}}$

C. $v \propto x^{-1}$

D. $v \propto x^{\frac{1}{2}}$

Answer: b

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5. A unifrom magnetic filed is restricated with in a region if radius r. The magnetic field change with time at a rate $\frac{dB}{dt}$.Loop 1 of

radius Rgt r encloses the region r and loop 2 of radius R is outside the region ogf magnetic feield as show in the figure. Then , the emf generated is

A. Zero in loop 1 and Zero in loop 2

B. $-\frac{dB}{dt}\pi r^2$ in loop 1 and $-\frac{db}{dt}\pi r^2$

C. $-\frac{db}{dt}\pi R^2$ in loop 1 zero in loop 2

D. $-\frac{db}{dt}\pi r^2$ in loop 1 and zero in loop 2

Answer: c

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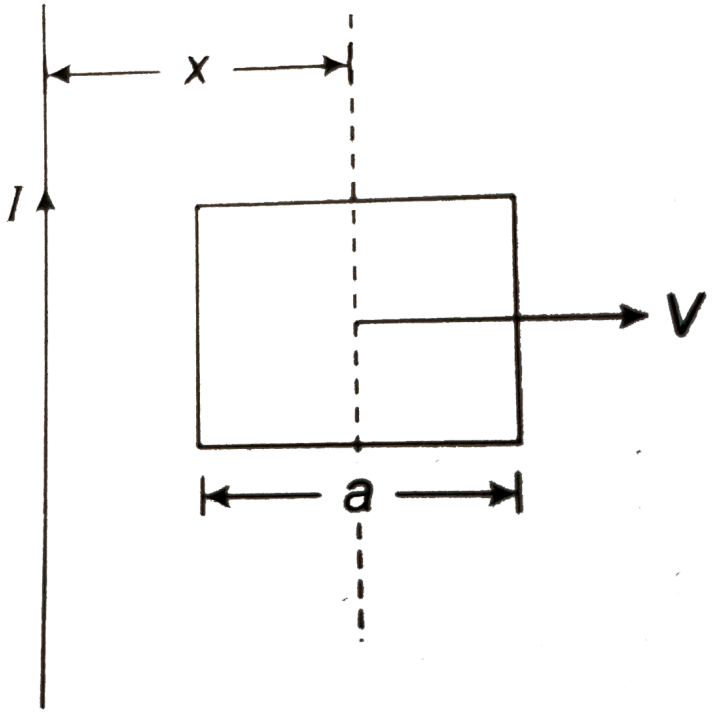
6. A conducting square frame of side $'a'$ and a long straight wire carrying current I are located in the same plane as shown in the figure. The frame moves to the right with a constant velocity $'V'$. The emf induced in the

frame will be proportional to



A. $\frac{1}{x^2}$

B. $\frac{1}{(2x-a)^2}$

C. $\frac{1}{(2x-a)^2}$

D. $\frac{1}{(2x-a)(2x-a)}$

Answer: d

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7. A recantagular coil of length $0.12m$ and width $0.1m$ having 50 turns of wire is suspended vertically in unifrom magnetic field of srenght 0.2 $Weber/m^2$. The coil carres a current of 2 A. If the plane of the coil is inclined at an angl,e of 30° with the direction

of the feld the torque required to keep the coil in stable equilibrium will be

A. $0.15Nm$

B. $0.20Nm$

C. $0.24Nm$

D. $0.12Nm$

Answer: b

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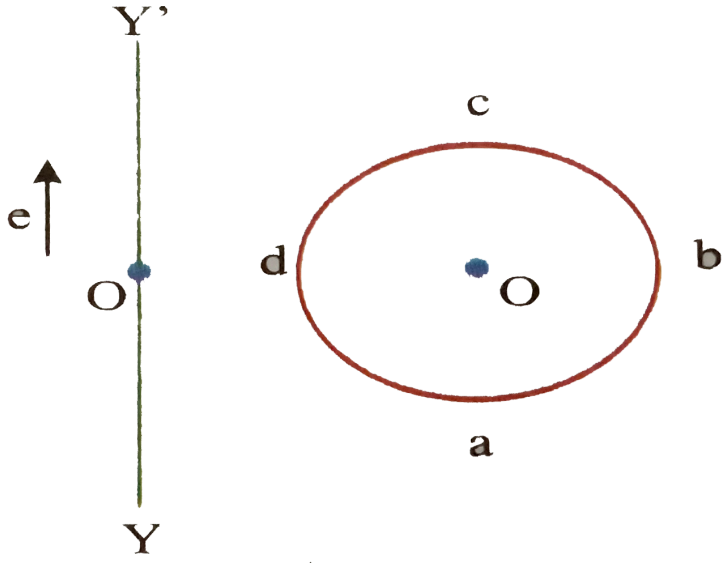
8. An electron moves on a straight line path YY' as shown in figure. A coil is kept on the right such that YY' is the plane of the coil. At the instant when the electron gets closest to the coil (neglect self-induction of the coil)



A. abcd

B. adcb

C. The current will reverse its directon as the electron goes past the coil

D. No current induced

Answer: d

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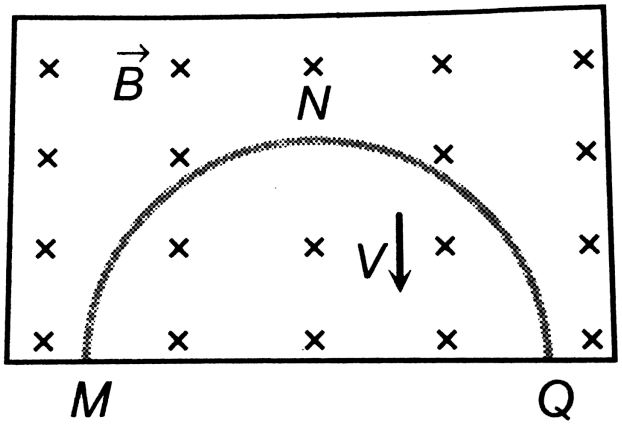
9. A thin semicircular conducting ring of radius R is falling with its plane verticle in a horizontal magnetic inducting B. At the

position MNQ, the speed of the ring is V and the potential difference developed across the ring is



A. Zero

B. $Bc\pi r^2/2$ and p is the at higher potential

C. πrBv and R is at higher potential

D. $2rBv$ and R is at higher potential

Answer: d

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10. A wire loop is rotated in magneitc field. The frequency of change of direction of the induced e.m.f. is.

A. Once per revolution

B. twice per revolution

C. four times per revoution

D. six time per revolution

Answer: b

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11. A coil of resistance 400Ω is placed in a magnetic field. If the magnetic flux ϕ (wb) linked with the coil varies with time t (sec) as $f = 50t^2 + 4$, the current in the coil at $t = 2$ sec is

A. $0.5A$

B. $0.1A$

C. $2A$

D. $1A$

Answer: a

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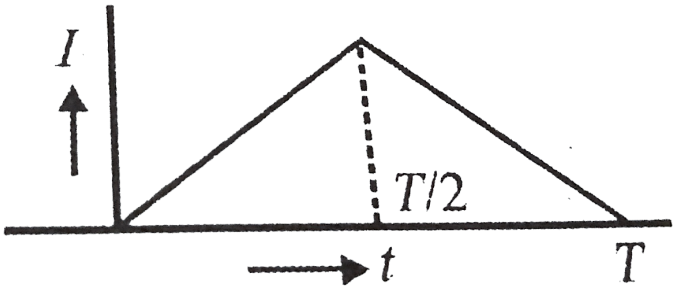
12. The current (I) in the inductance is varying with time according to the plot shown in figure.



Which one of the following is the correct variation of voltage with time in the coil?

A. 

B. 

C. 

D. 

Answer: d

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13. The current I and a coil varies with time as shows in the figure .Tghe variation of induced emf with time would be

A. 

B. 

C. 

D. 

Answer: d

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14. A conducting circualr loop is placed in a unifrom magentic field , B= 0.025 T with its plane perpendicular to the loop .The radius of the loop is made to shrink at a constant rate of 1 mms^{-1} .The induced emf when the radius is $2cm$,is

A. $2\pi\mu V$

B. $\pi\mu V$

C. $\frac{\pi}{2}\mu V$

D. $2\mu V$

Answer: b

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15. A rectangular, a square , a circular and an elliptical loop, all in the $(x-y)$ plane, are moving out of a uniform magnetic field with a constant velocity $\overrightarrow{v}=v\hat{i}$. The magnetic field is directed along the negative z-axis direction. The induced emf, during the passage of these

loops , out of the field region, will not remain constant for :

A. the rectangular , circular and elliceptical loops

B. the circular and the ellitical loops

C. only the elliptical loop

D. any of the four loops

Answer: b

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16. A conducting circular loop is placed in a uniform magnetic field $0.04T$ with its plane perpendicular to the magnetic field. The radius of the loop starts shrinking at $2mm/\sec$. The induced emf in the loop when the radius is $2cm$ is

A. $3.2\pi\mu V$

B. $4.8\pi\mu V$

C. $0.8\pi\mu V$

D. $1.6\pi\mu V$

Answer: a

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17. A circular disc of radius $0.2m$ is placed in a uniform magnetic fied of induction $\frac{1}{\pi}\left(\frac{Wb}{m^2}\right)$ in such a way that its axis makes an angle of 60° with The magnetic flux linked with the disc is

A. $0.02Wb$

B. $0.06Wb$

C. $0.08Wb$

D. $0.01Wb$

Answer: a

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18. A long solenoid has 500 turne. When a current of 2 A is passed thriough it, the resulting magnetic flux linked with each turn of the dolenoid id $4 \times 10^{-3} wb$. The self-inductance of the solenoid is

A. $2.5H$

B. $2H$

C. $1H$

D. $4H$

Answer: c

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19. Two coils of self-inductance $2mH$ and $8mH$ are placed so close together that the effective flux in one coil is completely linked

with the other. The mutual inductance between these coil is

A. $10mH$

B. $6mH$

C. $4mH$

D. $16mH$

Answer: c

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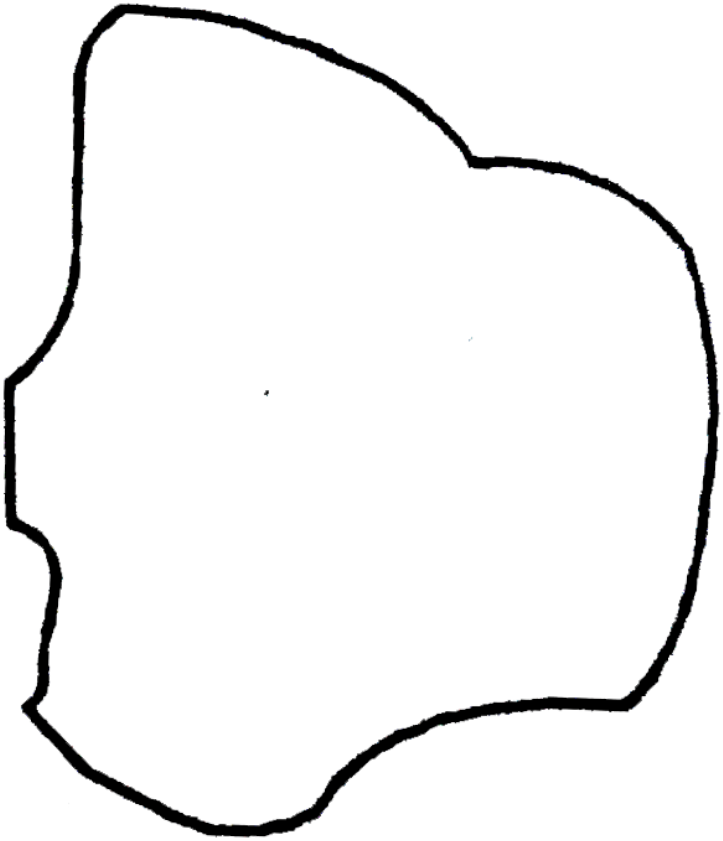
20. As a result of change in the magnetic flux linked to the closed loop shown in the fig, an e.m.f. V volt is induced in the loop. The work done (joule) in taking a charge Q coulomb

once along the loop is



A. qv

B. Zero

C. 2qv

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

Answer: a

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21. The magnetic flux through a circuit of resistance R changes by an amount $\Delta\phi$ in a time Δt. Then the total quantity of electric charge Q that passes any point in the circuit during the time Δt is represent by

A. $q = \frac{1}{R} \cdot \frac{\Delta\phi}{\Delta t}$

B. $q = \frac{\Delta\phi}{R}$

C. $q = \frac{\Delta\phi}{\Delta t}$

D. $q = R.\ \frac{\Delta\phi}{\Delta t}$

Answer: b

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22. In an inductor of self-inductance L=2 mH, current changes with time according to relation $i = t^2 e^{-t}$. At what time emf is zero ?

A. $4s$

B. $3s$

C. $2s$

D. $1s$

Answer: c

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23. Two coils have a mutual inductance $0.005H$. The current changes in the first coil according to equation $I = I_0 \sin \omega t$, where

$I_0 = 10A$ and $\omega = 100\pi$radian//sec`. The maximum value of e.m.f. in the second coil is

A. 2π

B. 5π

C. π

D. 4π

Answer: b

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24. A varying current ina coils chagre from 10 A to zero in $0.5s$ .If the average emf induced in the coils is 220 V , the self- inductance of the coils is

A. $5H$

B. $6H$

C. $11H$

D. $12H$

Answer: c

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25. Aconductor of lengfht 0.4 m is moving with a speed of 7 m/s perpendicular to a magnetic field of intensity$0.9Wb/m^2$ .The induced emf across the coduct is

A. $1.26V$

B. $2.52V$

C. $5.04V$

D. $25.2V$

Answer: b

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26. If $'N'$ is the number of turns in a coil, the value of self inductance varies as

A. N^0

B. N

C. N^2

D. N^{-2}

Answer: c

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27. What id the self -inductance of a coil which product 5 V when the current changes from 3 A to 2 A in one millisecond ?

A. 5000 H

B. 5 mH

C. 50 H

D. 5 H

Answer: b

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28. The total charge induced in a conducting loop when it is moved in magnetic field depends on

A. the rate of charge of magnetic flux

B. intial magetic flux

C. the total change in magentic flux

D. final magentic flux

Answer: c

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29. A rectangular coil of 20 turns and area of cross-section $25cm^2$ has a resistance of $100ohm$. If a magnetic field which is perpendicular to the plane of the coil changes at the rate of 1000 telsa per second, the current in the coil is

A. $1A$

B. 50 A

C. 0.5 A

D. $5A$

Answer: c

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30. A 100 mHcoil carries a current of 1A. Energy stored in its magetic field is

A. 0.5 J

B. $1A$

C. 0.05 J

D. 0.1 J

Answer: c

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31. If the number of turns per units length of a coils of solenoid is doubled , the self-inductance of the soleniod will

A. remain uncharged

B. be halved

C. be doubled

D. become four times

Answer: d

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32. A magnetic field of $2 \times 10^{-2} T$ acts at right angles to a coil of area $100 cm^2$ with 50 turns. The average emf induced in the coil is $0.1 V$,

when it is removed from the field in time t. The value of t is

A. 10 s

B. 0.1 s

C. 0.01 s

D. 1 s

Answer: b

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33. The current in drlf -inducatance $L = 40$ mH is to be be increased uniformly from 1 A to 11 A is 4 millisecond . The emf induce in inductor during the process is

A. 100 v

B. 0.4 v

C. 4 v

D. 440 v

Answer: a

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34. An inductor may store energy in

A. its electric field

B. its coils

C. its magentic field

D. Both in electric and magnatic field

Answer: c

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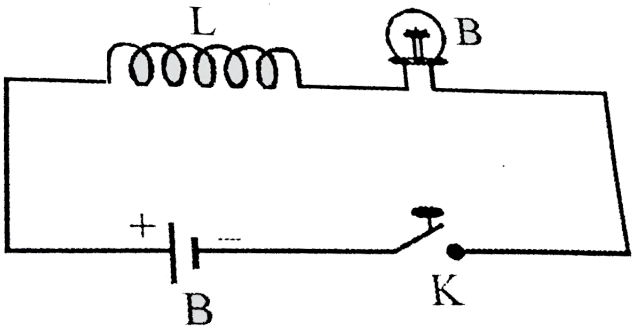
35. In the circuit of Fig, the bulb will become suddenly bright if



A. contact id made or borken

B. contact is made

C. contant is broken

D. None of these

Answer: c

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36. In a region of uniform magnetic inductance $B = 10^{-2}$tesla. A circular coil of radius $30cm$ and resistance $\pi^2 ohm$ is rotated about an axis which is perpendicular to the direction of B and which forms a dimater of the coil. If the coil rotates at 200 r.p.m the amplitude of the alternatic current induced in the coil is

A. $4\pi^2 mA$

B. $30mA$

C. $6mA$

D. $200mA$

Answer: c

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37. Energy in a current carrying coils is stored in the from of

A. electron field

B. magnetic field

C. sieclectric strenght

D. heat

Answer: b

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38. Eddy current are produce when

A. a metal is kept in varing magnetic field

B. a metal is kept in steady magnetic field

C. a circular coils is planced in a magnetic field

D. current is passed through a circular coil

Answer: a

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