Physics English Classified MCQ Electromagnetism 1992 - 2016

Electromagnetism

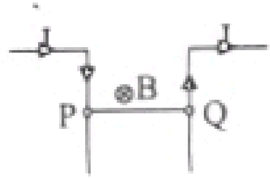
01. Magnetic Fields / Force having on a current carrying conductor

1) A rectangular coil of length 0.10 m and breadth 0.04 m consists 500 turns and is placed in a uniform magnetic field of flux density 0.10 T. If the coil carries a current of 10^{-2} A, the maximum possible torque on the coil is,
1) 10^{-3} Nm 2) 2×10^{-3} Nm 3) 3×10^{-3} Nm
4) 4×10^{-3} Nm 5) 5×10^{-3} Nm (1993)

2) Consider the following statements made about magnets
(A) Most common permanent magnets are made form alloys containing Fe, with Ni or Co.
(B) If a permanent magnet is heated it may loose its magnetism
(C) If a bar magnet is carefully broken into two equal halves along its axis of magnetization, each piece will be an equally strong magnet.
Of the above statements
1) Only B is true 2) Only A and B are true 3) Only A and C are true
4) Only B and C are true 5) all A, B and C are true (1994)

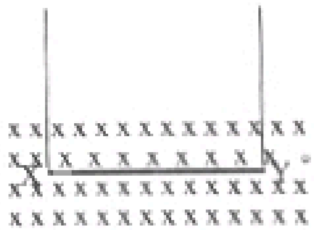
3) Which of the following combinations of units is equivalent to the tesla?
1) $\frac{m}{Cs}$ 2) $\frac{Ns}{C}$ 3) $\frac{N}{Cm}$ 4) $\frac{Ns}{Cm}$ 5) $\frac{Ns}{m}$ (1995)

4) A wire PQ of length 0.15 m and mass 0.015 kg is free to slide on two smooth vertical wire, as shown in the diagram. If a magnetic field of flux density 1.0 T. is applied into the paper, the current I required to keep the wire PQ in equilibrium is,



1) 1 A 2) 3 A 3) 5 A 4) 10 A 5) 15 A (1999)

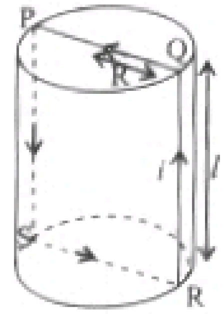
5) A horizontal conducting wire XY of length 20cm and mass 4.5 g is suspended by a pair of light wires in a magnetic field of 0.15 T which is directed into the paper and perpendicular to the wire, as shown in the figure. What magnitude and direction of current in the wire XY are required to nullify the tension in the light wires?



1) 0.15 A, X → Y 2) 0.15 A, Y → X
3) 1.5 A, X → Y 4) 1.5 A, Y → X 5) 0 (2002)

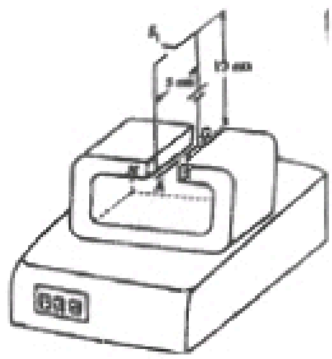
6) The magnitude of the magnetic force acting on a current carrying straight wire in a uniform magnetic field is determined by,
1) The magnetic flux density, the current, the length of the wire and the angle between the magnetic field and the wire only.
2) The magnetic flux density, the current and the length of the wire only
3) the magnetic flux density, the current and the angle between the magnetic field and the wire only.
4) the magnetic flux density and the length of the wire only
5) the magnetic flux density and the current only. (2004)

7) The figure shows a cylinderical stallite with radius R and length l and a wire $PQRS$ wrapped around it in a retangular shape. If a current i is made to flow through $PQRS$ at an instant when the direction of the earth's magnetic field of flux density B is along PQ.



1) A net force of $2RiB$ and a torque of $2RliB$ will act on the satellite.
2) A net force of $2liB$ and a torque of $2RliB$ will act on the satellite.
3) There will be no net force but a torque of $RliB$ will act on the satellite.
4) There will be no net force but a torque of $2RliB$ will act on the satellite.
5) Neither a net force nor a net torque will act on the satellite. (2006)

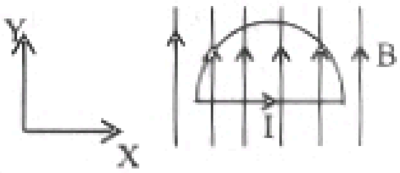
8) A magnet with magnetic flux density of 1.0 T between the poles is placed on an electronic balance. A rectangular wire loop of resistance 10 Ω, which is connected to a 40 V battery with zero internal resistance, is placed in between the poles of the magnet so that the side AB of the loop is completely inside the magnetic field and the plane of the loop is perpendicular to the magnetic field, as shown in the figure. The loop is firmly fixed to avoid any movement. When the switch S_1 is closed, the reading of the electronic balance



1) will decrease by 200 grams
2) will decrease by 20 grams
3) will increase by 200 grams
4) will increase by 20 grams
5) will not changes

(2008)

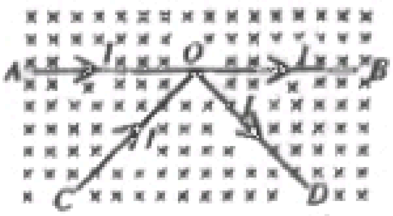
9) A wire bent into the shape of a semicircle forms a closed loop and carries a current I as shown in figure. The loop lies in the XY plane and a uniform magnetic field is present along the Y direction. Which of the following is true regarding the forces acting on the circular and the straight portions of the loop due to the magnetic field?



	Force on the circular portion	Force on the straight portion.
1)	zero	into the paper
2)	zero	out of the paper
3)	into the paper	into the paper
4)	into the paper	out of the paper
5)	out of the paper	into the paper

(2013)

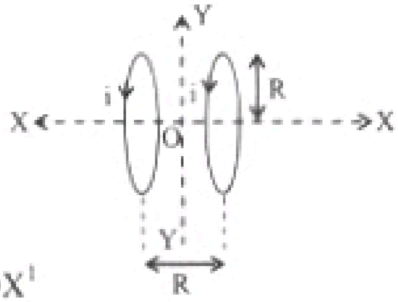
10) A structure consisting of straight wire sections of *AO*, *OB*, *CO* and *OD* of equal lengths arranged so that $A\hat{O}C = B\hat{O}D$, carry currents *I* along the directions shown. When this structure is placed perpendicular to a magnetic field as shown in the figure, due to magnetic field it will experience,



1) A resultant force along the plane of the paper in the upward direction.
2) A resultant force along the plane of the paper in the downward direction.
3) A resultant force along the plane of the paper to the right.
4) A resultant force along the plane of the paper to the left.
5) No resultant force. (2016)

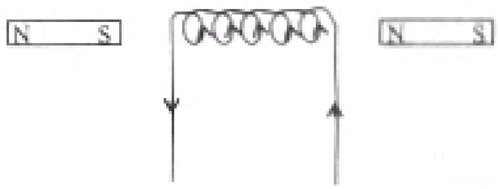
02. Magnetic effect of electric currents

1) Two identical conducting circular loops are arranged a distance R a part which is also equal to their radius R, as shown in the figure current I flows through the loops along the direction indicated the magnetic flux density at the mid point O between the loops

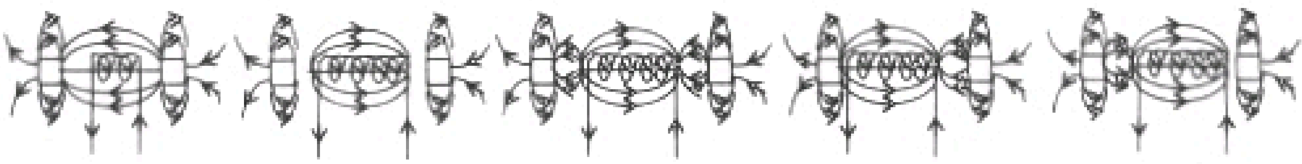


1) is directed along OX
2) v is directed along OX'
3) is directed along OY
4) is directed along OY'
5) is zero (1992)

2) Two bar magnets and a current carrying coil are arranged as shown in the diagram.

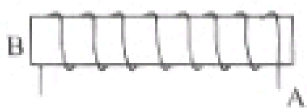


(1) (2) (3) (4) (5)



(1992)

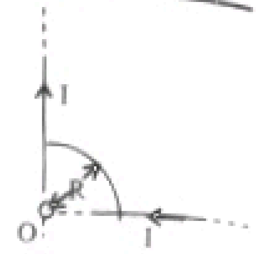
3) The diagram shows an electromagnet with a coil A and B. Which combination of the following would make the magnet stronger?



No.	of turns in A	The core B
1)	small	soft – iron
2)	small	steel
3)	large	soft – iron
4)	large	copper
5)	large	air

(1993)

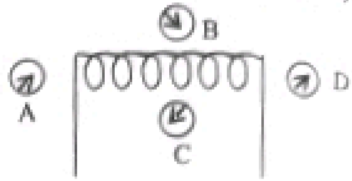
4) Two long straight wires are connected by a circular section that has a radius R as shown in the diagram. All three wires lie in the same plane and carry a steady current I. The magnetic flux density at the centre O is,



1) $\frac{\mu_0 I}{R}$ 2) $\frac{\mu_0 I}{2R}$ 3) $\frac{\mu_0 I}{4R}$ 4) $\frac{\mu_0 I}{8R}$ 5) 0

(1993)

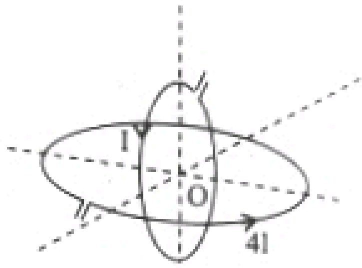
5) Four compass needles A, B, C an D are placed around a strong electromagnet as shown in the figure. If the current through the electromagnet is reversed.



1) the directions of A, B, C and D will remain unchanged.
2) directions of A, B, C and D will be reversed
3) the direction of only A and D will be reversed
4) the directions of only B and C will be reversed
5) the directions of only A and B will be reversed

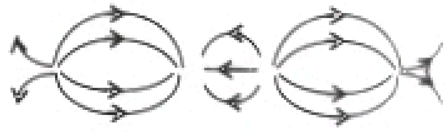
(1993)

6) Two circular conducting loops are placed at right angles to each other as shown in the figure. The radius of the vertical loop is r and it carries a current I. The radius of the horizontal loop is 3r and it carries a current 4I. The magnitude of the magnetic flux density at the common centre O is,



1) $\frac{\mu_0 I}{6r}$ 2) $\frac{\mu_0 I}{3r}$ 3) $\frac{5\mu_0 I}{6r}$ 4) $\frac{7\mu_0 I}{6r}$ 5) $\frac{25\mu_0 I}{18r}$ (1994)

7) Which of the following current carrying solenoid combinations will produce magnetic field lines as shown in the figure?

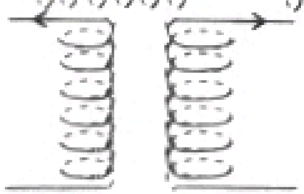


1) 

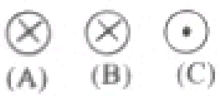
2) 

3) 

4) 

1) 

(1996)

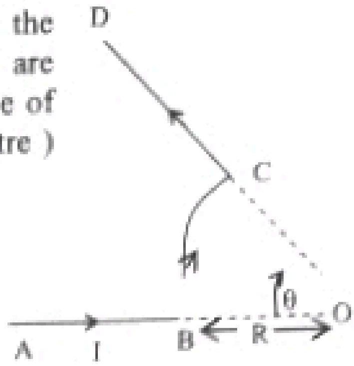
8) 

A, B and C represent three long straight thin wires placed perpendicular to the plane of the paper. The directions of the currents in A and B are into the paper while that in C is out of the paper. The resultant force on B due to the currents in A and C is,

1) zero
2) perpendicular to the line joining A, B and C
3) in a direction from B to C
4) in a direction from B to A
5) in a direction which depends on the magnitudes of the currents

(1996)

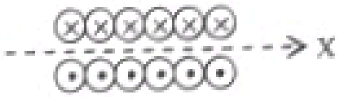
9) A current I flows in the wire ABCD bent into the shape as shown in the figure. AB and CD are straight portions while BC has a shape of an arc of radius R. The magnetic flux density at the centre) is (θ is given in radians)

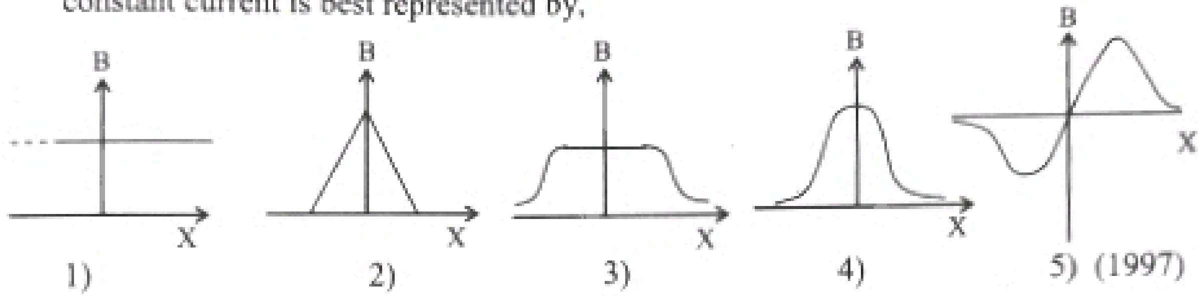


1) $\frac{\mu_0 I\theta}{8\pi R}$ 2) $\frac{\mu_0 I\theta}{4\pi R}$ 3) $\frac{\mu_0 I\theta}{2\pi R}$

4) $\frac{\mu_0 I\theta}{2R}$ 5) $\frac{\mu_0 I\theta}{R}$ (1996)

10) The variation of magnetic flux density, B , along the axis of a short solenoid, shown in figure carrying a constant current is best represented by,





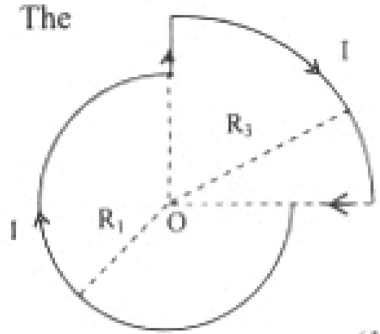
(1997)

11) The loop shown in the figure carries a current I. The magnetic flux density at O is,

1) $\frac{\mu_0 I}{8}\left(\frac{3}{R_1}+\frac{1}{R_2}\right)$ 2) $\frac{\mu_0 I}{4}\left(\frac{3}{R_1}+\frac{1}{R_2}\right)$

3) $\frac{\mu_0 I}{8}\left(\frac{1}{R_1}+\frac{1}{R_2}\right)$ 4) $\frac{\mu_0 I}{8(R_1+R_2)}$

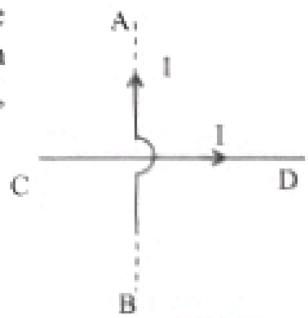
5) $\frac{\mu_0 I}{2}\left(\frac{2}{R_1}+\frac{1}{R_2}\right)$



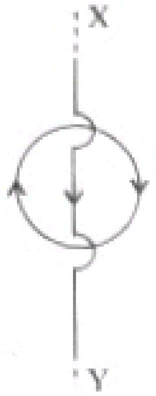
(1997)

12) Two straight wires, AB, and CD carrying equal current I are placed symmetrically and at right angles to each other as shown in the figure. AB is infinitely long and CD has a mite length, The magnetic effect on CD due to AB gives rise to a

1) resultant force and a clock wise couple
2) resultant force and an anti-clock wise couple
3) zero resultant force and a clock wise couple
4) zero resultant force and an anti-clock wise couple
5) zero resultant force and a zero couple



(1997)

13) 

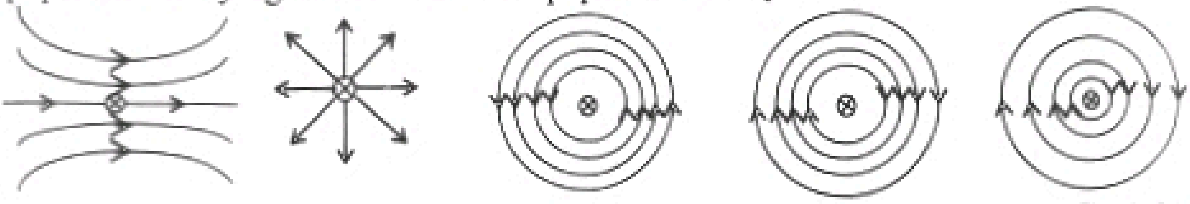
A circular coil of wire carries a current as shown in the diagram XY is a part of a long straight wire carrying a current and passing over the coil through its centre. The direction of the force acting on XY due to the current in the coil is,

1) normal to the plane of the coil and into the page
2) normal to the plane of the coil and out of the page
3) parallel to XY and towards Y
4) at right angles to XY and to the right
5) at right angles to XY and to the left (1998)

14) A current flows in a circular loop consisting of a single turn. If the same wire is bent into a circular loop of two turns and the same current is passed through the loop, the magnetic flux density at the centre of the loop will change by a factor of,

1) $\frac{1}{4}$ 2) $\frac{1}{2}$ 3) 2 4) 4 5) 8 (1998)

15) The magnetic field around a straight wire placed perpendicular to the plane of the paper and carrying a current into the paper is best represented by,

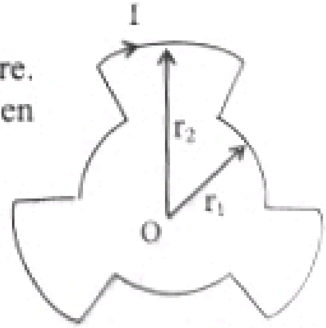


1) 2) 3) 4) 5) (1999)

16) An infinitely long thick conducting a current is placed in a uniform magnetic field at right angles to the direction of the field. In a plane perpendicular to the current, the number of points having a zero resultant magnetic flux density is,

1) zero 2) 1 3) 2 4) 3 5) 4 (2000)

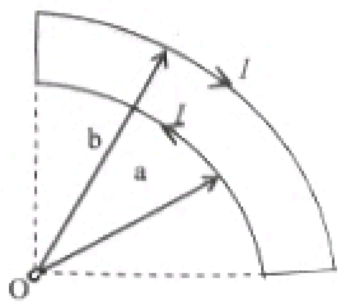
17) A current I flows around a closed loop as shown in the figure. The magnetic flux density produced at the centre O is, given by,



1) $\frac{\mu_0 I}{6}\left[\frac{1}{r_1}+\frac{1}{r_2}\right]$ 2) $\frac{\mu_0 I}{3}\left[\frac{1}{r_1}+\frac{1}{r_2}\right]$ 3) $\frac{\mu_0 I}{4}\left[\frac{1}{r_1}+\frac{1}{r_2}\right]$

4) $\frac{\mu_0 I}{4}\left[\frac{1}{r_1}-\frac{1}{r_2}\right]$ 5) $\frac{\mu_0 I}{6}\left[\frac{1}{r_1}-\frac{1}{r_2}\right]$ (2000)

18) A current I flows around a closed loop as shown in the figure. The magnetic flux density produced at the centre O is given by,

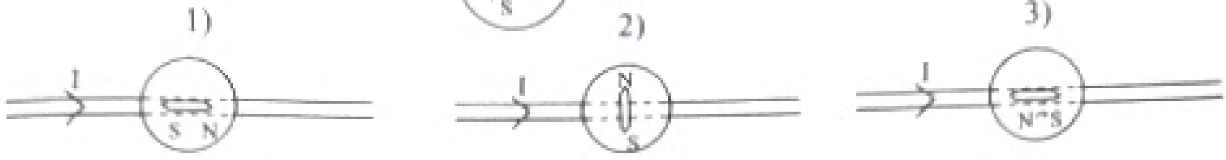


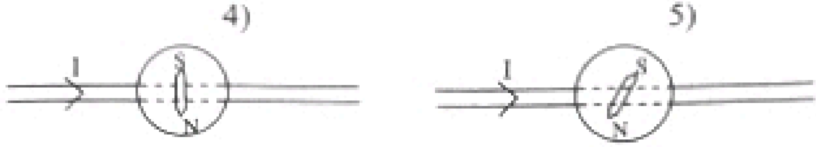
1) $\frac{\mu_0 I}{2}\left(\frac{1}{a}+\frac{1}{b}\right)$ 2) $\frac{\mu_0 I}{4}\left(\frac{1}{a}+\frac{1}{b}\right)$ 3) $\frac{\mu_0 I}{8}\left(\frac{1}{a}+\frac{1}{b}\right)$

4) $\frac{\mu_0 I}{8}\left(\frac{1}{a}-\frac{1}{b}\right)$ 5) $\frac{\mu_0 I}{16}\left(\frac{1}{a}-\frac{1}{b}\right)$

(2001)

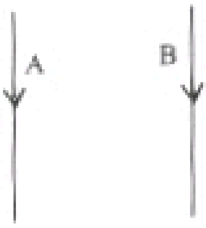
19) A compass is placed on top of a wire as shown in the diagram When a large current is passed through the wire, which one of the following diagrams best represents the direction of the compass needle? Neglect the effects due to the earth's magnetic field

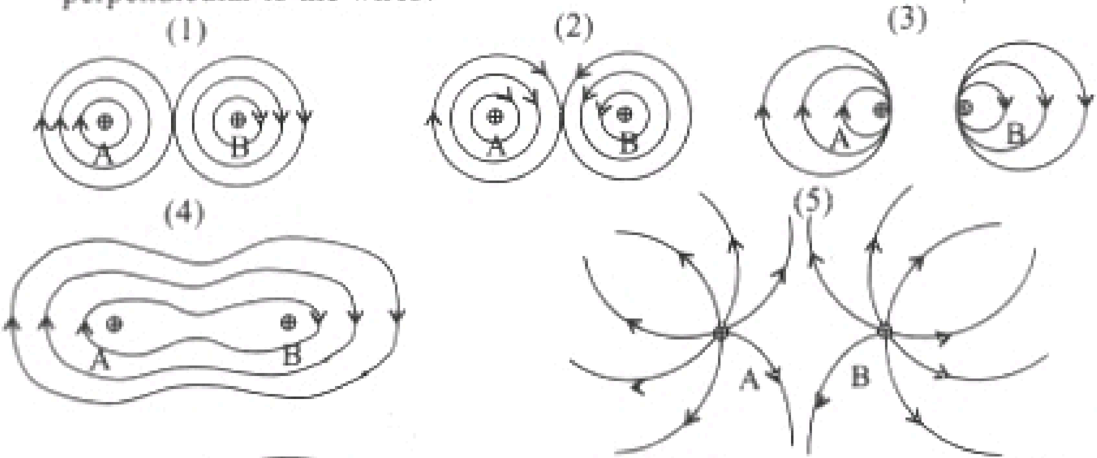




(2001)

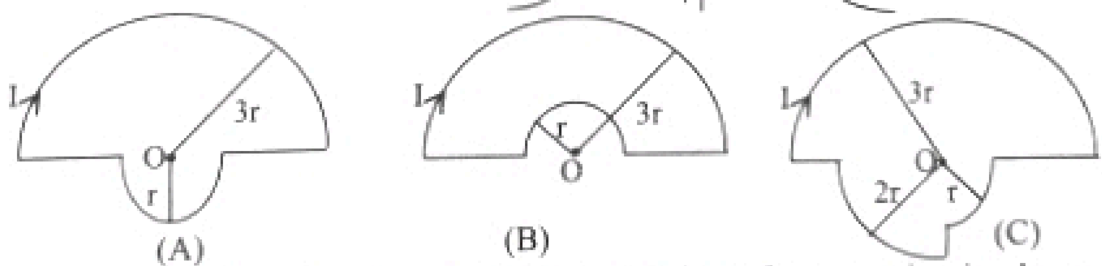
20) Two parallel long wires A and B carry identical currents in the same direction as shown in the diagram. Which of the following diagrams best represents the magnetic field in a plane perpendicular to the wires?





(2001)

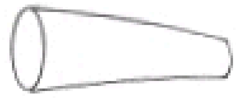
21)



The figure shows three loops A, B and C consisting of concentric circular are (either half or quartet –circles of radii r, 2r, and 3r) . The loops carry the same current I. If the magnetic flux densities produced at O by each loop is BA, BB and BC respectively , then

1) $B_A<B_C>B_B$ 2) $B_A=B_B=B_C$ 3) $B_A>B_B>B_C$ 4) $B_A<B_C<B_B$ 5) $B_A=B_B>B_B$ (2003)

22) The diameter of a current carrying wire decreases as shown in figure, and the current flows through the wire from left to right Consider the following statements,

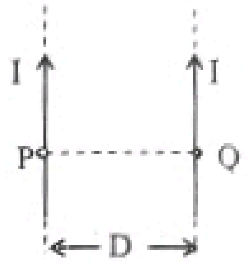


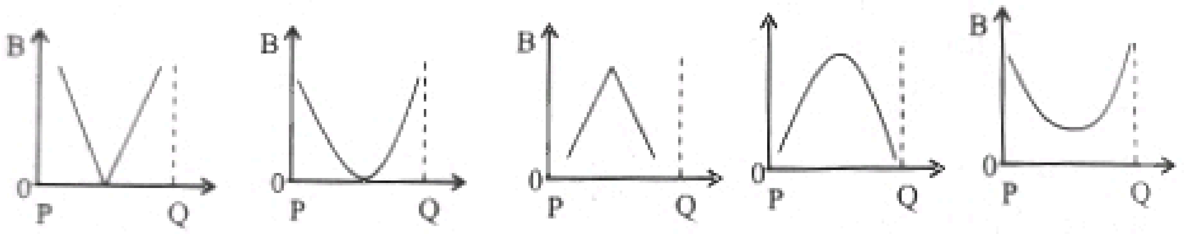
(A) Current decreases along the wire
(B) Potential drop per unit length increases along the wire
(C) Magnetic flux density on the surface of the wire3 due to the current decreases along the wire.

Of the above statements

(1) Only (A) is true (2) Only (B) is true (3) Only (C) is true
(4) Only (B) and (C) are true (5) all (A), (B) and (C) are true

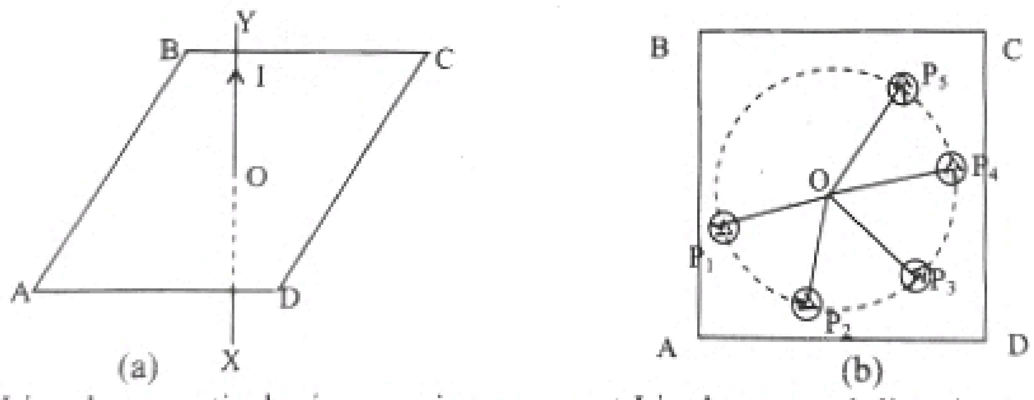
23) Two long parallel thin wires placed at a distance D apart as shown in the figure, carry equal currents I in the same direction. Variation of the magnitude of the resultant magnetic flux density B along the ling PQ from P to Q, is best represented by





(2004)

24)

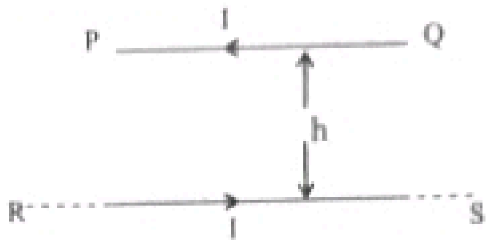


XY is a long vertical wire carrying a current I in the upward direction as shown in figure (a). ABC D is a horizontal plane perpendicular to the wire. The directions of the magnet of a compass kept at positions P_1, P_2,P_3,P_4 and P_5 on the plane ABCD near the wire are shown in figure (b).

The position at which the direction indicated by the magnet of the compass is the same as the direction of the horizontal component of the earth's magnetic field is,

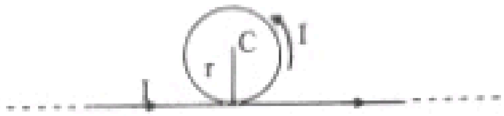
1) P_1 2) P_2 3) P_3 4) P_4 5) P_5 (2004)

25) A thin uniform wire PQ carrying a current I could be held without any mechanical support above an infinitely long horizontal wire RS carrying the same current I. If the mass per unit length of the wire PQ is m, the equilibrium height h of PQ above RS is given by,



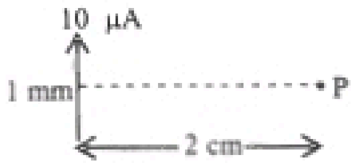
1) $h = \frac{\mu_0 I^2}{mg}$ 2) $h = \frac{\mu_0 I^2}{2mg}$ 3) $h = \frac{\mu_0 I^2}{2\pi mg}$ 4) $h = \frac{\mu_0 I^2}{\pi mg}$ 5) $h = \frac{\mu_0 I^2}{\pi^2 mg}$ (2005)

26) A long insulated wire carrying current I is bent to form a flat circular coil of N turns and radius r. The two straight ends of the wire extend to a large distance as shown. The magnitude of the magnetic flux, density at the centre C of the coil is,



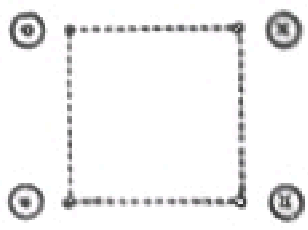
1) O
2) $\frac{N\mu_0 I}{2\pi r} + \frac{\mu_0 I}{2r}$
3) $\frac{N\mu_0 I}{2r} - \frac{\mu_0 I}{2\pi r}$
4) $\frac{N\mu_0 I}{2r} + \frac{\mu_0 I}{2\pi r}$
5) $\frac{N\mu_0 I}{2r} - \frac{\mu_0 I}{2r}$
(2006)

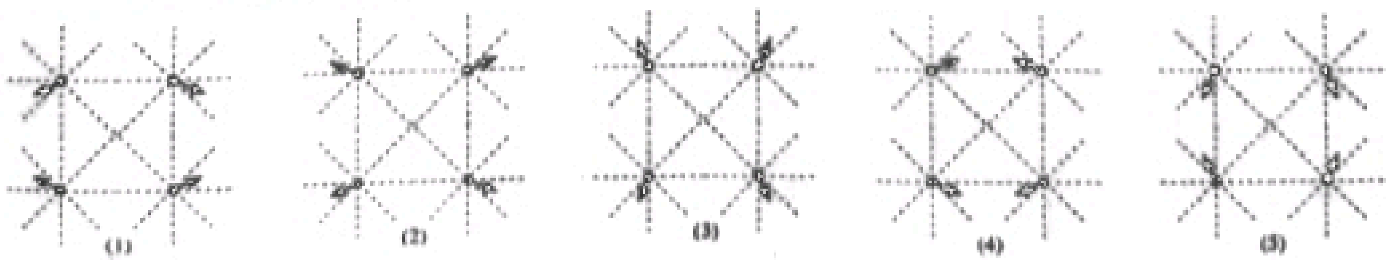
27) When a person performs a certain task a weak current of 10 μA is produced along a conducting path between brain cells. The figure shows such a small path of length 1 mm . The magnitude of the magnetic flux density produced by this current element at a point P at distance of 2 cm from it is ($\mu_0 = 4\pi \times 10^{-7}$ T m A^{-1})



1) 2.5×10^{-10} T
2) 1.0×10^{-10} T
3) 2.5×10^{-11} T
4) 1.0×10^{-11} T
5) 2.5×10^{-12} T
(2009)

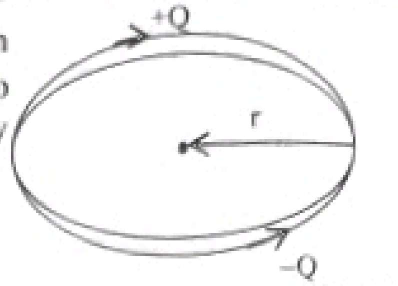
28) Four long, parallel straight wires run normal to the plane of the paper through vertices of a square as shown in the figure. If currents of equal magnitudes are set up in the wires along the directions (⊙ or ⊗) shows, and if the wires are free to move, the arrows in which of the following diagrams correctly represents the directions that the wires will send to move ?





(2009)

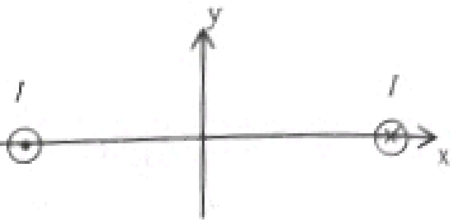
29) Two particles having charges +Q and −Q revolve in opposite directions with the same angular frequency ω each other as shown in the figure. Magnetic flux density at the centre of the circular of the circular paths is,

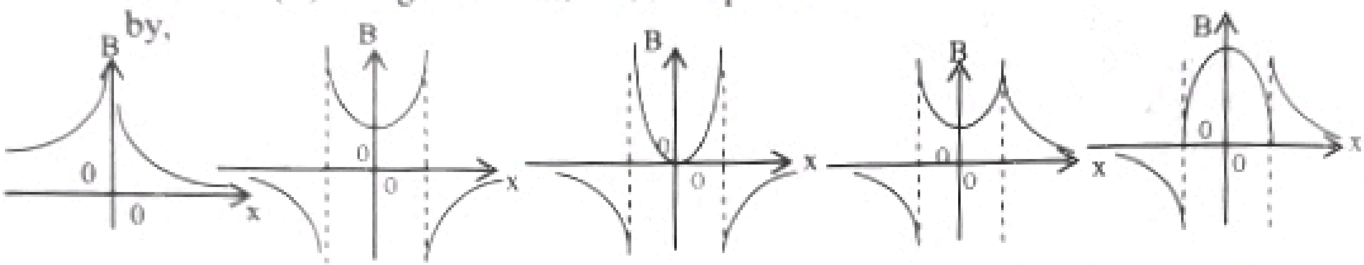


1) zero 2) $\frac{\mu\alpha Q\omega}{4\pi r}$ 3) $\frac{\mu\alpha Q\omega}{2\pi r}$ 4) $\frac{\mu\alpha Q\omega}{2\pi^2 r}$ 5) $\frac{\mu\alpha Q\omega}{4r}$

(2010)

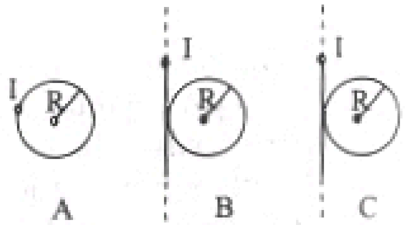
30) Two long parallel wires placed normal to the plane of the paper carry equal currents in opposite directions as shown in the figure. The variation of the component of the magnetic flux density in y direction (B) along the x axis is best represented by,





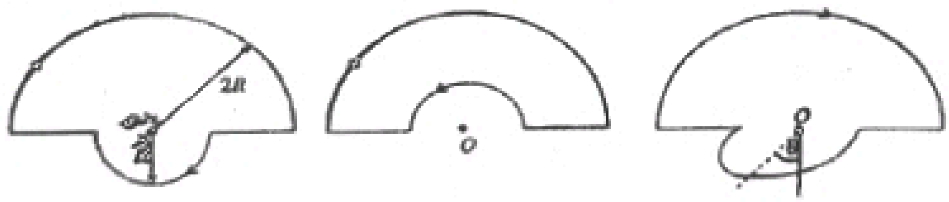
(1) (2) (3) (4) (5)(2010)

31) Equal currents I flow through three isolated wires A, B and C. Wire A is a circular loop of radius R, B and C are infinitely long straight wires, parts of which are bent to form circular loops of radius R as shown in the figure. If B_A, B_B and B_C represent the magnitudes of the magnetic flux densities produced at the centre of respective loops, then,



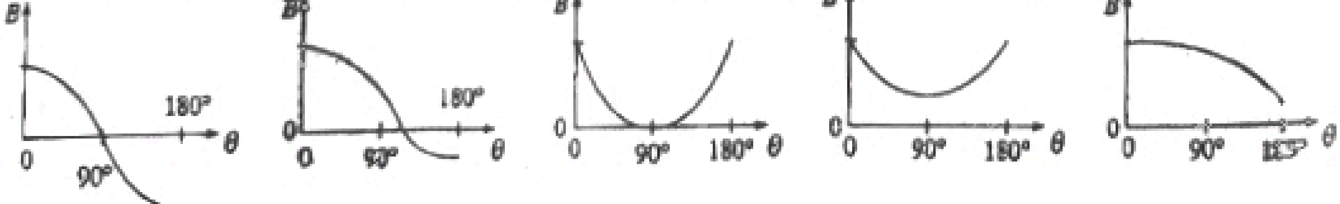
1) $B_A > B_B > B_C$ 2) $B_B > B_A > B_C$ 3) $B_A < B_B < B_C$
4) $B_B = B_C < B_A$ 5) $B_A = B_B = B_C$

32)



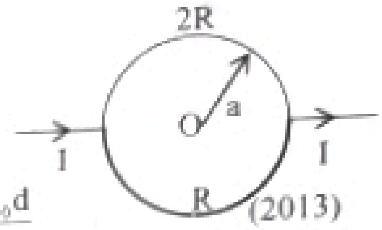
(1) (2) (3)

A current carrying wire loop in figure 1 lies in the plane of the paper and consists of two concentric semicircles of radii 2R and R and two radial lengths. The smaller semicircle in bent out of the plane gradually until the loop is flipped over and lies entirely on the same plane again as shown in figure 2. An intermediate situation of the system when the loop is bent through an angle θ is shown in figure 3. The variation of the component of the magnetic flux density (B) directed into the page at the centre (O) of the loop with angle θ is best represented by,



1) 2) 3) 4) 5) (2012 N)

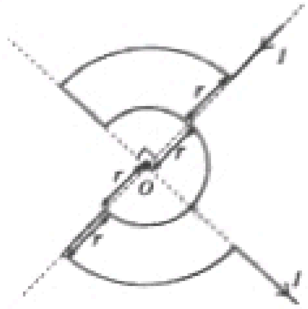
33) Lower half of the circular wire loop of radius a, shown in figure is made of a wire of resistance R and the upper half with a wire of resistance 2R. The magnetic flux density at the center (O) of the wire loop is given by.



1) $\frac{\mu_0 d}{4a}$ 2) $\frac{\mu_0 d}{6a}$ 3) $\frac{\mu_0 d}{12a}$ 4) $\frac{\mu_0 d}{16a}$ 5) $\frac{\mu_0 d}{18a}$

(2013)

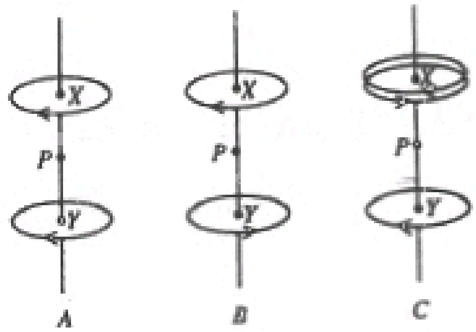
34) A piece of wire is bent into the form shown in figure and a current of I is passed in the direction shown. The magnitude of the magnetic flux density at the point O is,



1) $\frac{\mu_0 I}{4r}$ 2) $\frac{\mu_0 I}{8r}$ 3) $\frac{3\mu_0 I}{2r}$

4) $\frac{\mu_0 I}{2r}$ 4) $\frac{3\mu_0 I}{8r}$

35) Identical loops in the three arrangements A, B and C of circular loops centred around vertical axes, carry equal currents in the directions shown in figure. In the arrangement C there are two separate loops very close to each other with a common centre at X. In all three arrangements the loops are separated by the same distance XY and P is the mid – point of XY. If the magnitudes of the magnetic flux densities at P in the arrangements A, B and C are B_A, B_B and B_C, respectively then

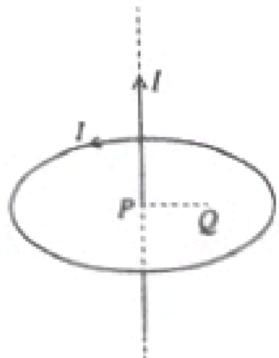


1) $B_A > B_B > B_C$ 2) $B_A > B_C > B_B$ 3) $B_B > B_C > B_A$

4) $B_C > B_B > B_A$ 5) $B_C > B_A > B_B$

(2014)

36) A long straight wire carrying a current I is held along the axis passing through the centre P and perpendicular to the plane of another circular loop carrying a current I as shown in the figure.



Consider the following statements,

(A) The net force and the net torque on the loop due to the current carrying straight wire are zero.

(B) When the current carrying straight wire is moved to point Q parallel to the axis of the loop, there is a net torque on the loop due to the current carrying straight wire.

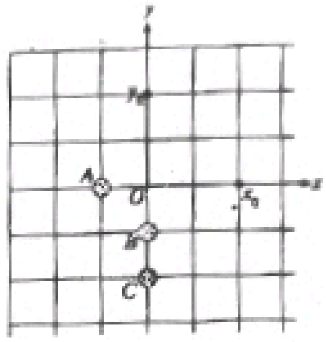
(C) When the current carrying straight wire is moved to point Q parallel to the axis of the loop, the net force on the loop due to the current carrying straight wire is **not** zero.

On the above statements,

1) only A is true
2) only B is true
2) only C is true
3) only A and B are true
3) A, B and C are true

(2015)

37) Three thin long and straight wires carrying equal currents I are held in fixed positions A, B and C perpendicular to the plane of the paper as shown in the figure, where $OA = 1$ m, $OB = 1$ m and $OC = 2$ m. Two other thin, long and straight wires also held perpendicular to the plane of the paper, at points x_0 and y_0 where $x_0 = 2$ m and $y_0 = 2$ m. Which of the following currents set up in the wires at x_0 and y_0 will produce a resultant magnetic field of magnitude $\frac{\mu_0 I}{2\pi}$ in positive y – direction at the point O.

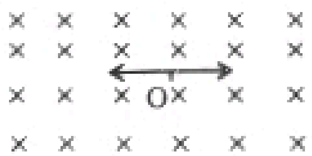


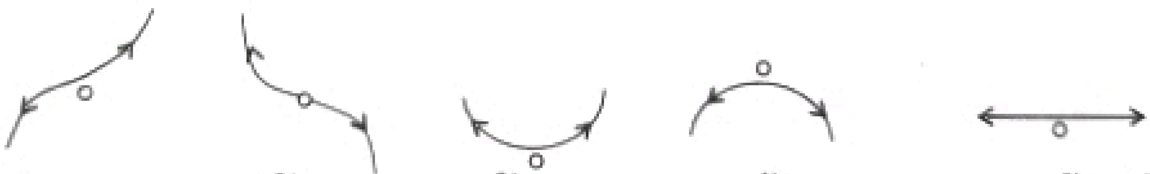
	Current to be set up in the wire at x_0	Current to be set up in the wire at y_0
(1)	$3I$ ⊙	$4I$ ⊗
(2)	$4I$ ⊙	$6I$ ⊙
(3)	$4I$ ⊙	$3I$ ⊙
(4)	$4I$ ⊗	$4I$ ⊙
(5)	$6I$ ⊙	$4I$ ⊙

(2016)

03. Force on a Moving Charge in a Magnetic Field

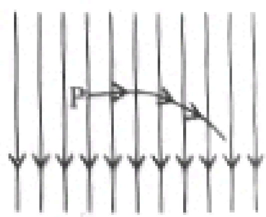
1) A uniform magnetic field is directed vertically into the paper, as shown in the figure. At a point O two electrons are projected horizontally with the same speed but in opposite directions. The subsequent paths of the electrons are best represented by,





1) 2) 3) 4) 5) (1992)

2) A particle P moves in a uniform field on the plane of the paper as shown in the diagram, which of the following combinations of the "type of particle" and the "field" will give rise to the above motion?



	Type of particle	Field
A.	Positively charged	Electric
B.	Negatively charged	Magnetic
C.	Uncharged	Gravitational

Of the above combinations

1) Only A is true
2) Only B is true
3) Only C is true
4) Only A and B are true.
5) Only A and C are true

(1992)

3) A dense beam of protons all moving in the same direction has a tendency to spread out as it advances, consider the following statements.

A. A dense beam of protons all moving in the same direction will have a tendency to shrink.

B. A dense beam of negative ions all moving in the same direction will have a tendency to spread out.

C. Two overlapping dense beams of protons and electrons of equal densities moving in opposite directions will have a tendency to shrink.

Of the above statements

1) Only A is true 2) Only B is true 3) Only C is true

4) Only B and C are true. 5) all A, B and C are true. (1992)

4) An electron passes through a space with a constant velocity. If E and B represent the magnitudes of the electric field intensity and the magnetic flux density of the electric and magnetic fields respectively, this region of space may have

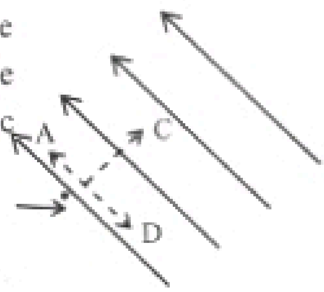
(A) $E = 0, B \neq o$ (B) $E \neq o, B = 0$ (C) $E \neq 0, B \neq 0$

Of the above conditions

1) only (A) is true 2) Only (B) is true 3) Only (C) is true

4) Only (A) and (C) are true 5) all (A), (B) and (C) are true. (1993)

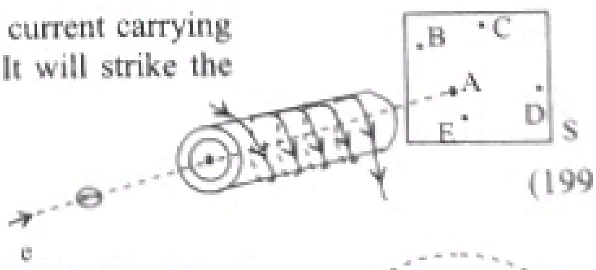
5) An electron moving horizontally enters a region of space with a uniform magnetic field acting at an angle with the horizontal as indicated in the figure. Due to the magnetic field the electron will experiences a force in a direction



1) Perpendicular and into the paper
2) perpendicular and out of the paper
3) towards A
4) towards C
5) towards D

(1994)

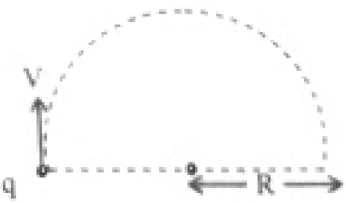
6) An electron is fired along the axis of a current carrying long solenoid as shown in the figure. It will strike the fluorescent screen S at the point,



1) A 2) B 3) C

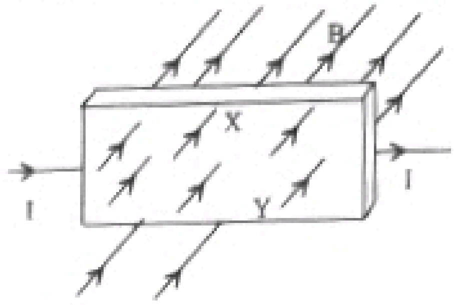
4) D 5) E (1995)

7) A charged particle having a velocity V enters perpendicular to a uniform magnetic field of flux density B and follows a circular path of radius R as shown in the figure. If the charge on the particle is q, the mass of the particle is,



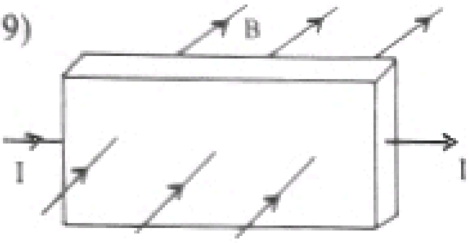
1) $\frac{BqR}{V}$ 2) $\frac{Bq}{R}$ 3) $\frac{BqR}{V^2}$ 4) $\frac{BqR^2}{V}$ 5) $\frac{BqV^2}{R}$ (1997)

8) A flat copper plate is placed perpendicular to a uniform magnetic field B and a current I is passed through the plate as shown in the figure. At the steady state,



1) a current will flow from X to Y
2) a current will flow from Y to X
3) a negative voltage will develop at X with respect of Y
4) a positive voltage will develop at X with respect of Y
5) neither a current flow nor a voltage drop will be resulted across X and Y.

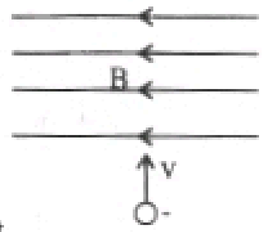
(1997)

9) 

A flat rectangular metal plate is placed perpendicular to a uniform horizontal magnetic field of flux density B as shown in the figure. When a current I is passed through the plate horizontally a vertical electric field E is established in the plate. The drift velocity of electrons inside the metal plate is,

1) $\frac{E}{B}$ 2) $\frac{B}{E}$ 3) $\frac{IE}{B}$ 4) $\frac{IB}{E}$ 5) IBE (1998)

10) In vacuum a beam of electrons is projected into a region of uniform magnetic field B as shown in the figure. If both the electron beam and the magnetic field are in the plane of the paper, then the path of the electrons is,



1) not affected by the magnetic field
2) bent towards the left
3) bent towards the right
4) bent upwards out of the paper
5) bent downwards into the paper

(1999)

11) Consider the following statements made regarding the Hall effect,

(A) The sign (positive or negative) of the Hall voltage is independent of the sign (positive or negative) of the current carriers inside the metal

(B) A Hall voltage is not generated when the direction of the magnetic field is parallel to the direction of the current.

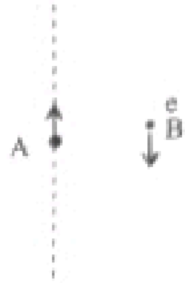
(C) The Hall effect is a consequence of the force acting on a moving charge in a magnetic field.

Of the above statements

1) Only (A) is true
2) Only (B) is true
3) Only (B) and (C) are true
4) Only (A) and (B) are true
5) all (A), (B) and (C) are true

(2000)

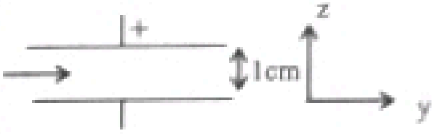
12) A beam of positively charged particles passes through a point A in the upward direction, and an electron passes through B with a velocity in the downward direction as shown in the figure. The directions of electrostatic (F_e) and magnetic (F_m) forces on the electron are that



1) F_e towards A and F_m away from A
2) F_e and F_m both away from A
3) F_e and Fm both towards A
4) F_e towards A and F_m out of the ⊙ paper
5) F_e towards A and F_m into the ⊗ paper

(2002)

13) A beam of electrons enters the region between two charged parallel plates with speed 10^6 ms^{-1} as shown in the figure. The potential difference across the plates is 200V. Magnetic field required to keep the beam along the y direction is,



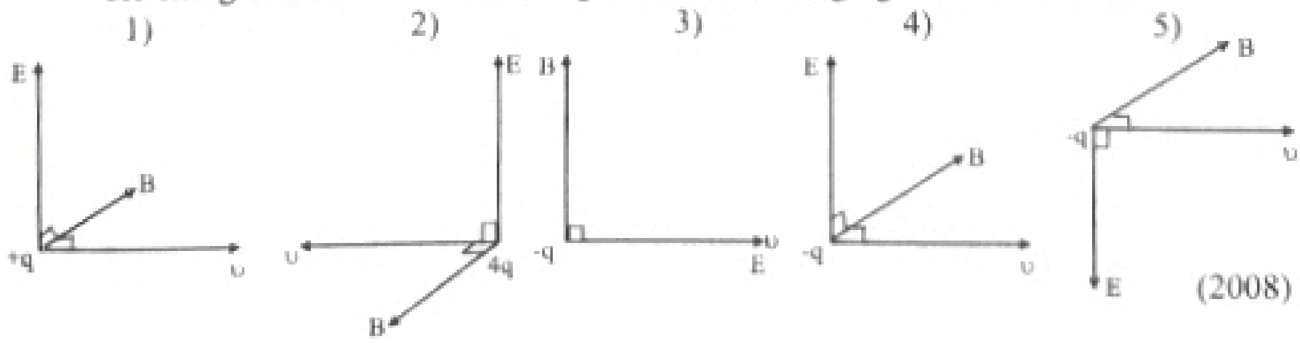
1) 2.0×10^{-4} T along the direction of the beam
2) 2.0×10^{-4} T into the paper
3) 2.0×10^{-2} T along the direction of the beam
4) 2.0×10^{-2} T into the paper
5) 2.0×10^{-2} T out of the paper

(2005)

14) A particle with charge q and mass m travels perpendicular to a uniform magnetic field along a circular path of radius R with frequency f. The magnitude of the magnetic flux density is given by,

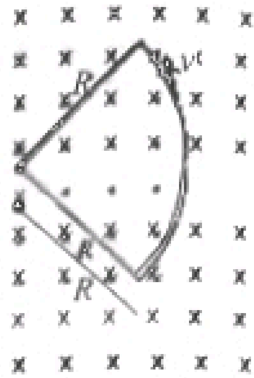
1) $\frac{mf}{q}$ 2) $\frac{2\pi fm}{q}$ 3) $\frac{m}{2\pi fq}$ 4) $\frac{m}{qR}$ 5) $\frac{qf}{2\pi R}$ (2007)

15) Diagrams below show situations where two charged $+q$ and $-q$ moving with a uniform velocity (υ) and separately entering five regions having a uniform electric field (E) and a uniform magnetic field (B). Vectors E and B are always perpendicular to each other, and the vector υ can be either perpendicular to E and B or parallel to E. Which of the following configurations may provide a possibility for charges to move across the region without changing their directions?



(2008)

16) Figure shows the path of an electron travelling also an arc of a circle of radius R with a speed υ in a unifrom magnetic field. The magnitude (B) of the magnetic flux density is given by (m =mass of an electron ; e = charge of an electron)



1) $B = \sqrt{\frac{m\upsilon}{eR}}$ 2) $B = \left(\frac{m\upsilon}{eR}\right)^2$ 3) $B = \frac{m\upsilon}{2eR}$

4) $B = \frac{m\upsilon}{eR}$ 5) $B = \frac{2m\upsilon}{eR}$ (2009)

17) A particle having an electric charge is travelling along a circular path under the influence of a uniform magnetic field. Consider the following statements,

(A) Direction of the velocity of the particle is always perpendicular to the direction of the magnetic field.

(B) Time required for the particle to make one revolution is independent of the radius of the circular path

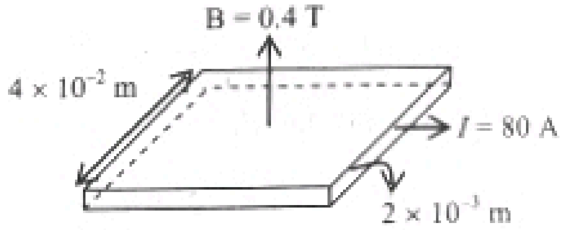
(C) Speed of the particle is directly proportional to its $\frac{\text{mass}}{\text{charge}}$ ratio,

Of the above statements,

1) only (A) is true
2) only (B) and (C) are true
3) only (A) and (B) are true
4) only (A) and (C) are true.
5) all (A), (B) and (C) are true

(2010)

18) A plate of copper 2×10^{-3} m thick and 4×10^{-2} m wide is placed in a uniform magnetic field of flux density B of 0.4T as shown in the figure. When a current of 80A is being passed through the plate, it generates a Hall voltage of 0.8×10^{-6} V.

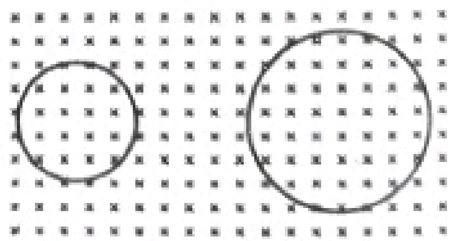


What is the number of free electrons per unit volume of copper? ($e = 1.6 \times 10^{-16}$ C)

1) $1.25 \times 10^{29}\ m^{-3}$ 2) $1.25 \times 10^{28}\ m^{-3}$ 3) $5 \times 10^{27}\ m^{-3}$

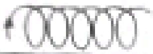
4) $5 \times 10^{28}\ m^{-3}$ 5) $2 \times 10^{10}\ m^{-3}$ (2011 NS)

19) An electron and a proton travel with equal speeds around two circular paths shown in the diagram (drawn not to scale) under the influence of a uniform magnetic field. If the direction of magnetic field is perpendicular and into the plane of hte paper,



1) the electron travels clockwise around the small circular path and the proton travels counter-clockwise around the large circular path.
2) the electron travels counter-clockwise around the small circular path and the proton travels clockwise around the large circular path.
3) the electron travels clockwise around the large circular path and the proton travels clockwise around the small circular path.
4) the electron travels counter-clockwise around the large circular path and the proton travels clockwise around the small circular path.
5) the electron travels counter-clockwise around the small circular path and the proton travels counter-clockwise around the large circular path. (2014)

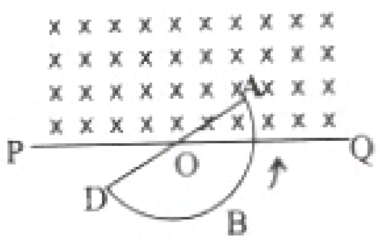
20) Paths of three charges moving separately in three uniform fields are shown in figure (A), (B) and (C). Which of the following responses correctly indicates the static electric field or magnetic field necessary to produce the paths shown?

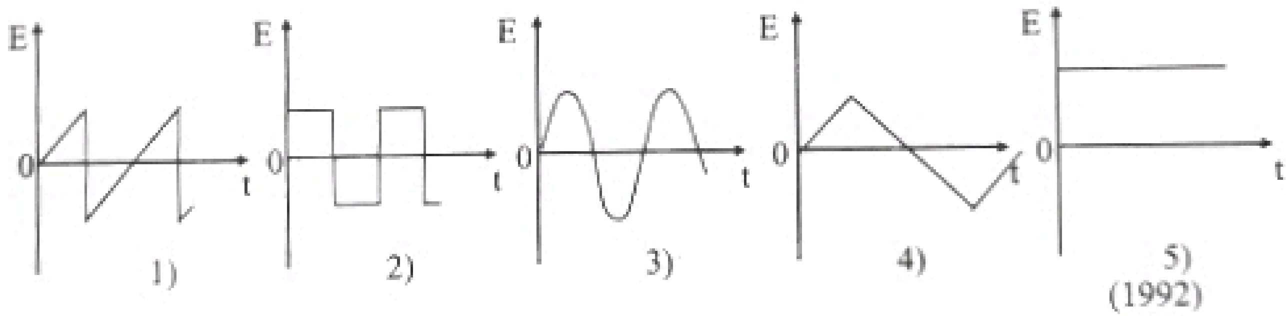
	(A) 	(B) 	(C) 
(1)	Electric field	Electric field	Electric field
(2)	Magnetic field	Magnetic field	Magnetic field
(3)	Electric field	Electric field	Magnetic field
(4)	Magnetic field	Magnetic field	Electric field
(5)	Magnetic field	Electric field	Electric field

(2015)

04. Electro Magnetic Induction

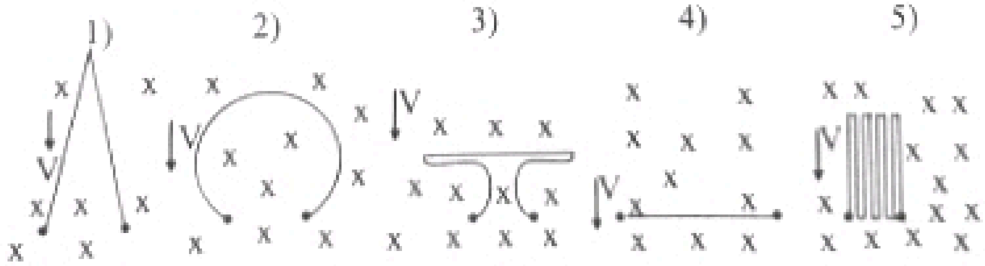
1) A semicircular conducting wire in the form of a loop OABDO is free to rotate around as axis passing through the centre O and perpendicular to the paper. As shown in the figure a uniform magnetic field is directed into the paper in the region above the line POQ. When the loop of the wire relates around O in the anticlockwise direction with a constant rate, the e.m.f. (E) induced in the loop varies with time (t) as in,





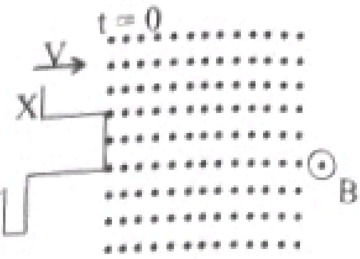
(1992)

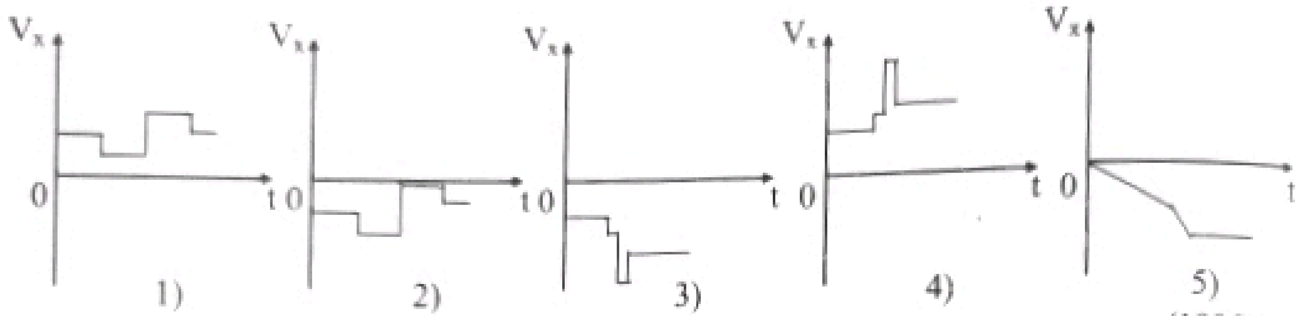
2) Five pieces of wire are bent as shown in diagrams and are made to move with a constant velocity V maintaining their planes perpendicular to a uniform magnetic field. Which of the wires will develop the largest induced e.m.f. across its ends?



(1993)

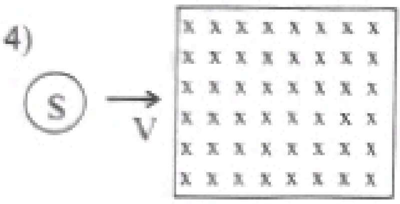
3) A piece of metal wire XY bent into the form shown in the figure and moving at a constant velocity V in the direction shown, enters a region with an uniform magnetic field, at time t = 0
The potential (Vx) induced at the end X with respect to the end Y with time (t) can be best represented by,

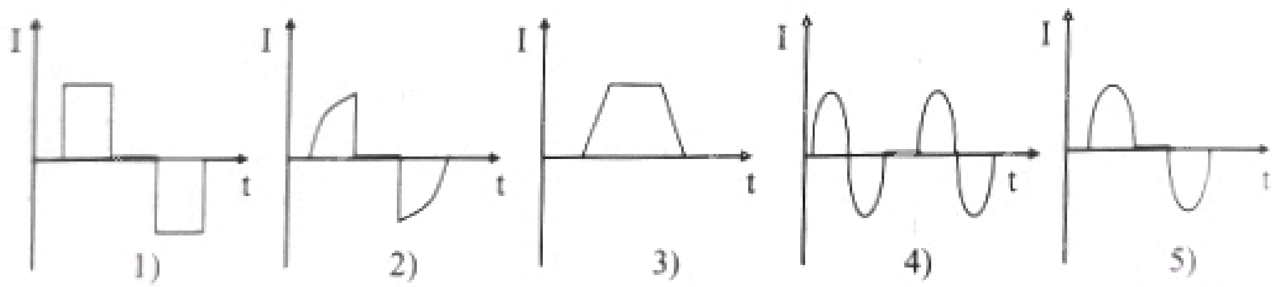




(1995)

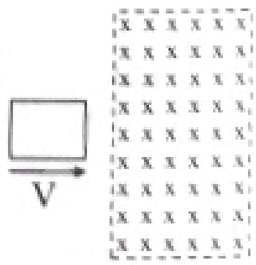
4) A circular conducting loop S passes through a region of uniform magnetic field with a constant velocity as shown in the figure. Which of the following graphs best represents the variation of the induced current (1) in the loop with time (t)?

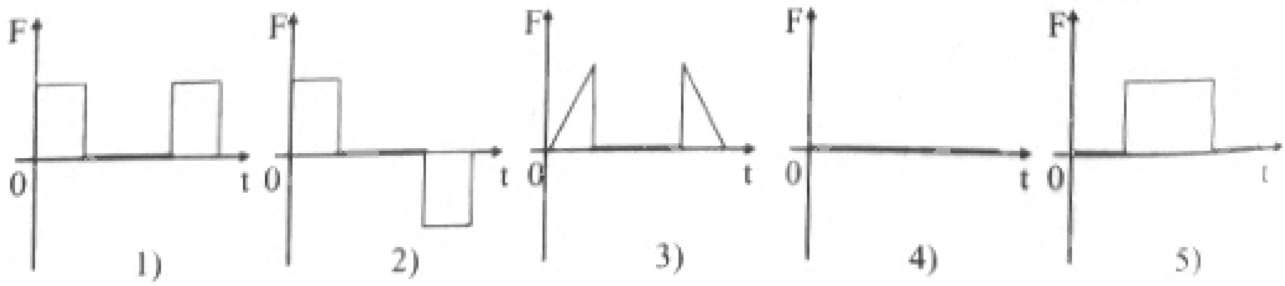




(1996)

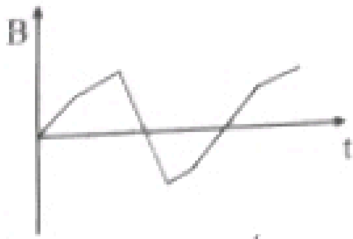
5) A small square loop of a wire having a negligible mass is moved at a constant velocity V across a uniform magnetic field as shown it the figure. The variation of the external force F that has to be applied to maintain its constant velocity V with time (t) is best represented by,

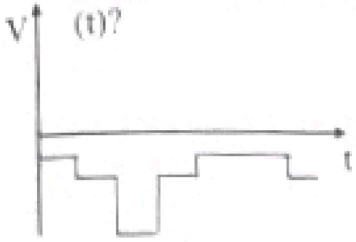




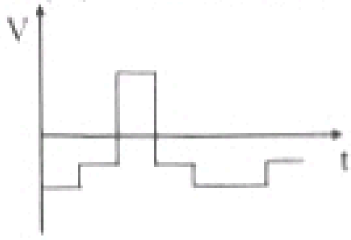
(1997)

6) A conducting rod is placed normal to a time varying magnetic field, if the magnetic flux density (B) of the field varies with time (t) as shown in the figure, Which of the following curves correctly represents the variation of the potential difference (V) across the rod with time (t)?

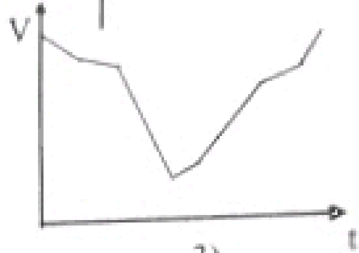




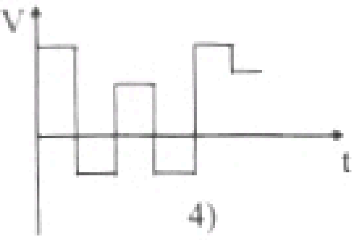
1)



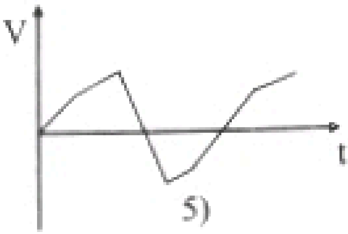
2)



3)



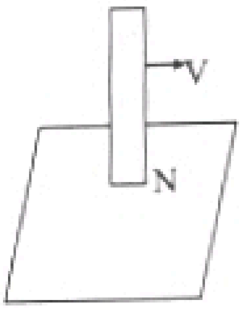
4)

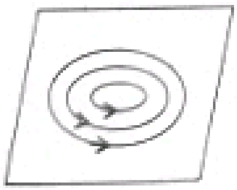


5)

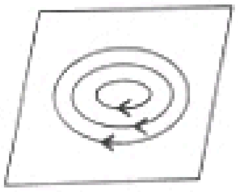
(1998)

7) A long bar magnet is held vertically and made to move with a constant velocity, V in the direction shown so that its north pole is very close to a horizontal conducting sheet. Which of the following diagrams best represents the eddy currents induced in the sheet

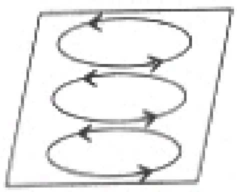




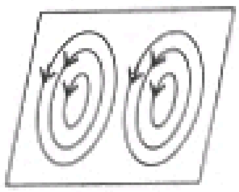
1)



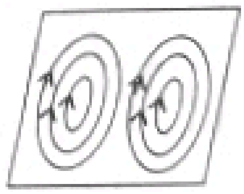
2)



3)

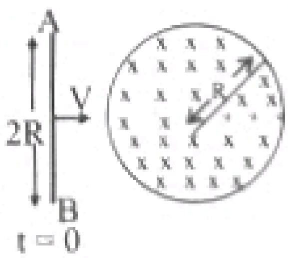


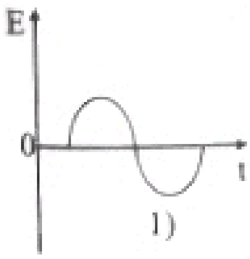
4)



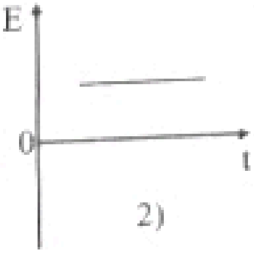
5) (1999)

8) A metal rod AB of length 2R moving with a constant velocity V is passing over a uniform magnetic field confined to a circular region of radius R, as shown in figure, the variation of the e.m.f. (E) induced across the rod with time (t) is best represented by

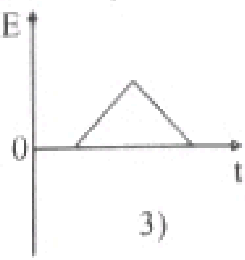




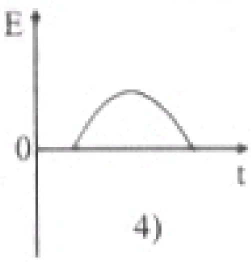
1)



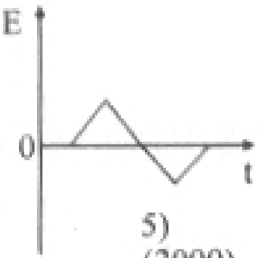
2)



3)



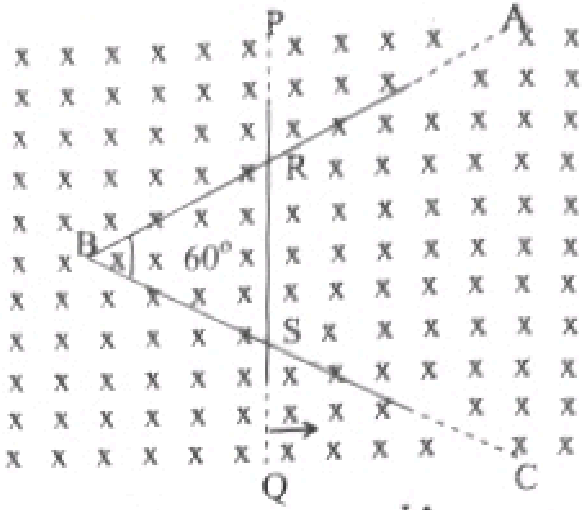
4)

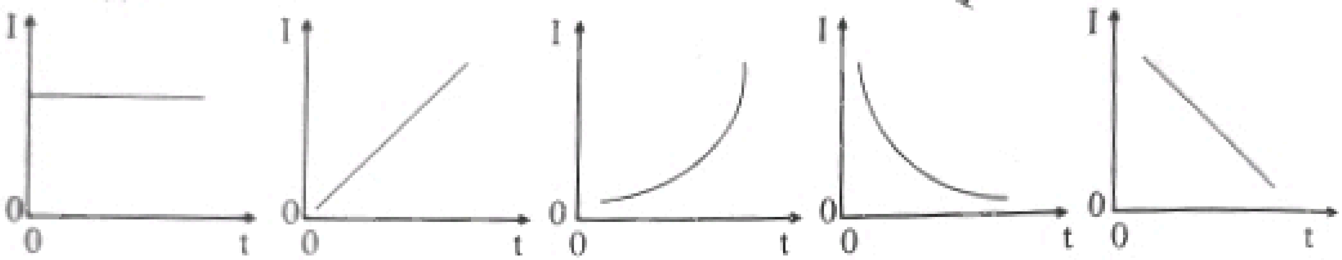


5)

(2000)

9) A long wire ABC is bent to form a 60^0 angle and kept in a plane perpendicular to a uniform magnetic field, as shown in the figure. Another long straight wire PQ made of the same material with the same cross-sectional area is pulled with a constant velocity on the wire ABC, so that the triangle RBS is always equilateral. The induced current (I) in the triangle RBS varies with time (t) as

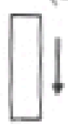


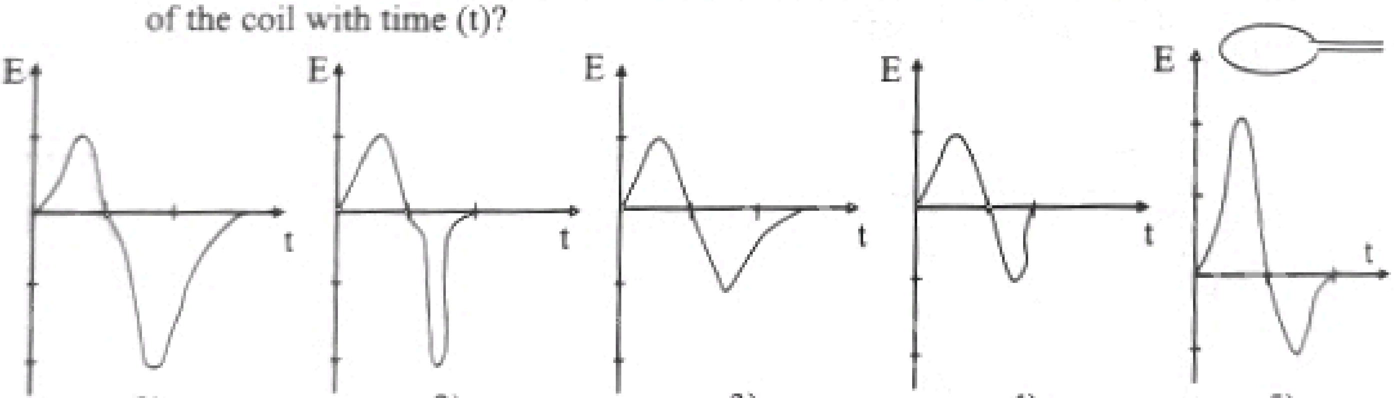


1) 2) 3) 4) 5)

(2001)

10) A bar magnet is dropped with its axis vertical and it accelerates through a coil as shown in the figure. Which of the following figures indicates represents the variation of the induced e.m.f. (E) of the coil with time (t)?

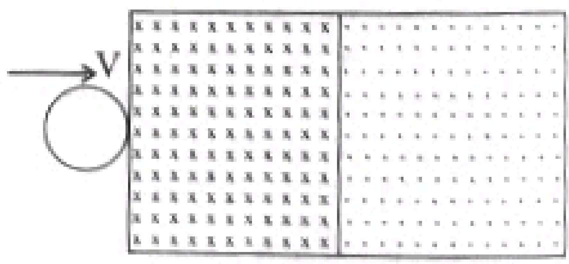




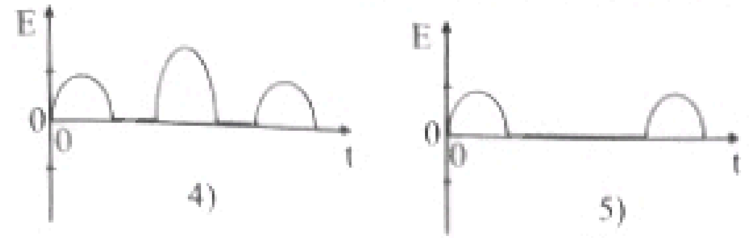
1) 2) 3) 4) 5)

(2002)

11) A circular conducting loop moves at a constant velocity through two regions consisting of magnetic fields. The magnetic fields in the two regions are uniform and have the same magnitude but acting in opposite directions as shown in the figure. The induced e.m.f. (E) in the loop varies with time (t) as

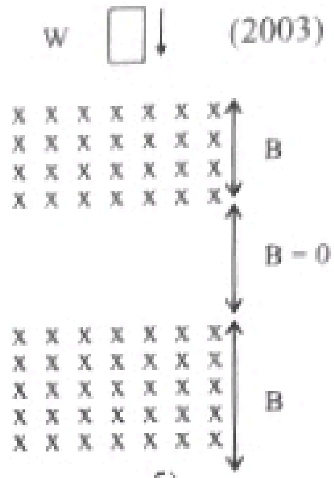


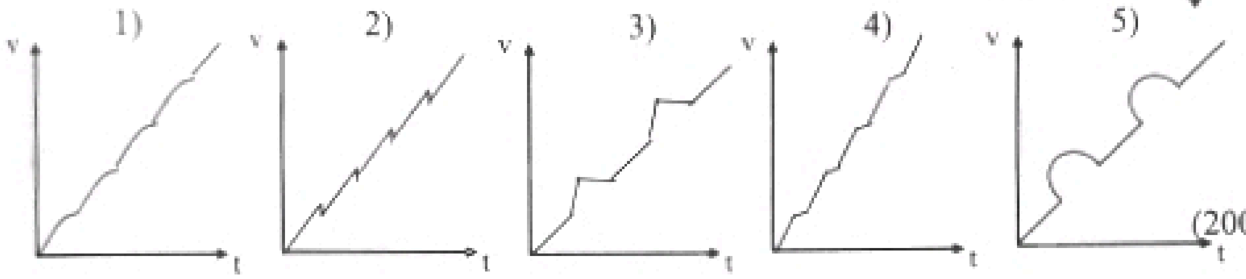
1) 2) 3)



(2003)

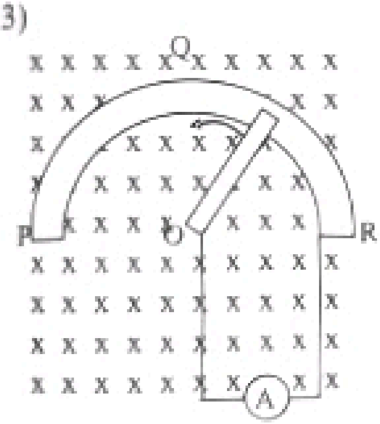
12) A closed rectangular wire loop (W) falls vertically through two uniform magnetic field regions of flux density B as shown in the figure. If viscous and up thrust forces on the loop are negligible, the velocity (v) time (t) graph of the loop is best represented by

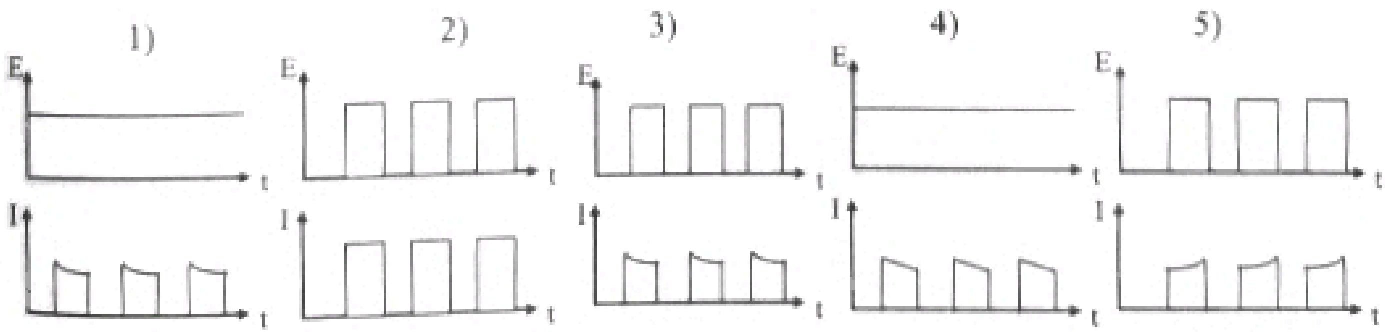




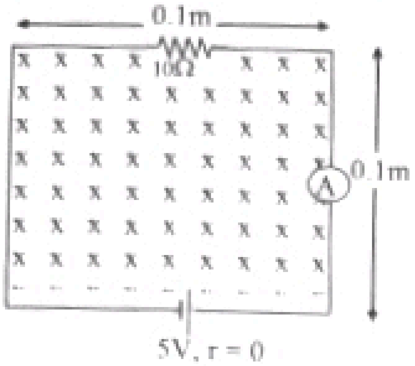
(2004)

13) A semicircular conductor *PQR* having a uniform cross – sectional area is placed vertically in a horizontal uniform magnetic field as shown in the figure. A conducting rod *OA* pivoted at the centre *O* of the semicircular conductor, rotates with a constant angular speed about a horizontal axis passing through, *O* parallel to the magnetic field. *PQR* and *OA* are made of a material with the same resistivity. An ammeter is connected to the two ends *O* and *R*. If the end *A* touches *PQR*, the variation of the e . m . f . *E* induced across *OA* and the current *I* through the ammeter with time *t* are best represented by the pair of graphs.



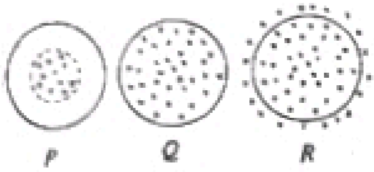


(2005)

14) 

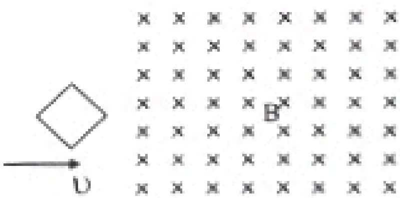
The circuit shown is placed in a uniform magnetic field that is acting into the page. This magnetic field is decrasing in magnitude at a rate of 150 Ts^{-1}. The reading of the ammeter is,
1) 0.15 A
2) 0.35 A
3) 0.50 A
4) 0.65 A
5) 0.80 A (2006)

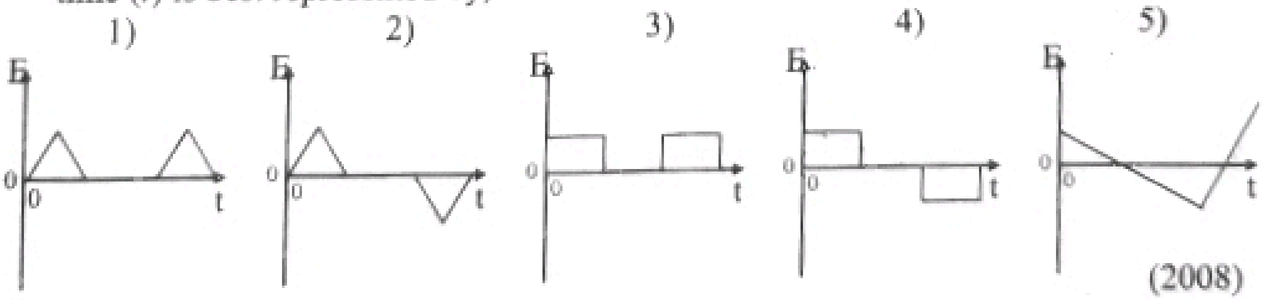
15) An e.m.f is induced across the length of a wire when it is moving in a uniform magnetic field. This e.m.f. does not depends on,
1) velocity of the wire.
2) radius of the wire.
3) length of the wire.
4) flux density of the magnetic field.
5) the angle that the wire makes with the magnetic field. (2007)

16) 

Three identical circular wire loops are placed perpendicularly to uniform magnetic fields of flux density B. The extent of the magnetic field are different from one another in situation *P*, *Q* and *R* as shown in figure.
The extent of the magnetiv field as *Q* is equal to the area of the loop. When the flux density B varies with time at the same constant rate, the induced e.m.f.s of the repective wire loops are E_P, E_Q and E_R. Which of the following is true regarding the magnitude of E_P, E_Q and E_R ?
1) $E_P = 0, E_Q = E_R$
2) $E_P = 0, E_R > E_Q$
3) $E_P = E_Q = 0, E_R \neq 0$
4) $E_P < E_Q$, $E_Q = E_R$
5) $E_P < E_Q < E_R$ (2007)

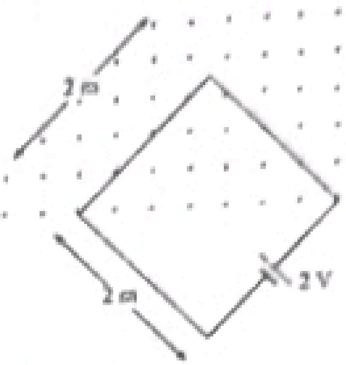
17) A conducting wire loop be at in the shape of a parallelogram enters a uniform magnetic field with a constant speed as shown in the figure. The variation of the induced e.m.f (*E*) in the loop with time (*t*) is best represented by,





(2008)

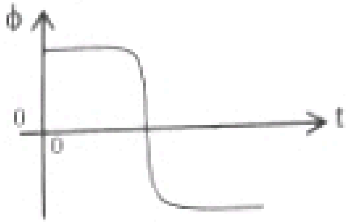
18) A part of a conducting square wire loop of side length 2m is placed in a uniform magnetic field as shown in the figure. If the magnitude of the magnetic flux density decreases at a constant rate of 0.8 T s^{-1}, the net e. m. f in the circuit would be,

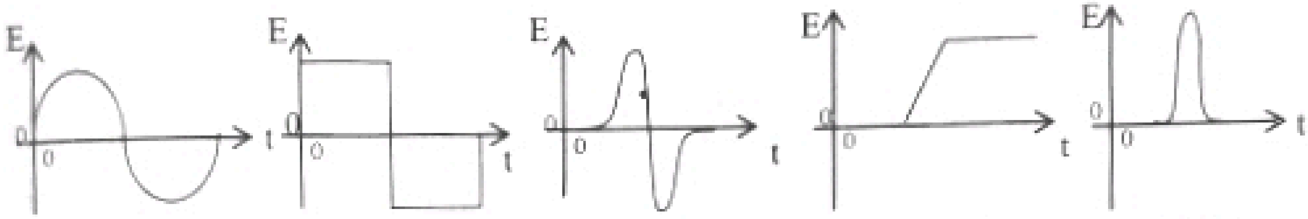


1) 0.4 V 2) 1.2 V 3) 2.8 V
4) 3.6 V 5) 5.2 V

(2009)

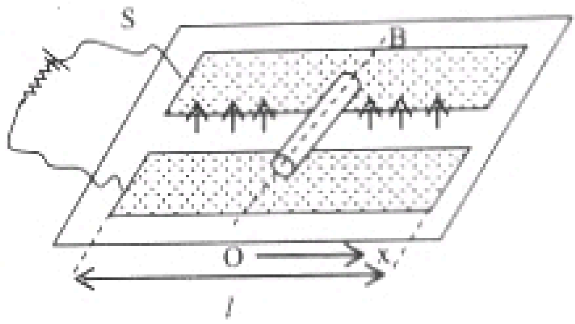
19) The graph shows the variation of a magnitude flux (ϕ) through a coil with time (t),
The variations of the corresponding induced e. m. f. (E) with time (t) in best represented by



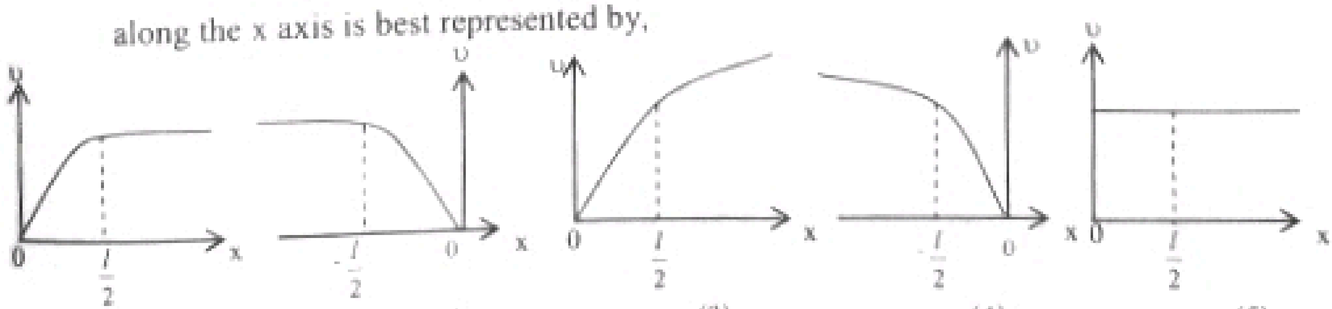


1) 2) 3) 4) 5)(2010)

20) The diagram shows two thin smooth strips of aluminium of length l pasted on a flat smooth horizontal wooden surface S. Strips are connected to a battery at one ane. A uniform upward magnetic field is setup, perpendicular to the surface, throughout the region between the aluminium strips. When a steel rod is placed on the two aluminium strips as shown,

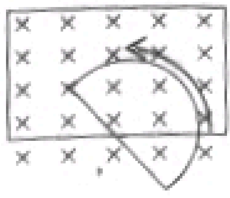


the rod starts to move. The variation of the velocity (υ), of the rod with distance along the x axis is best represented by,

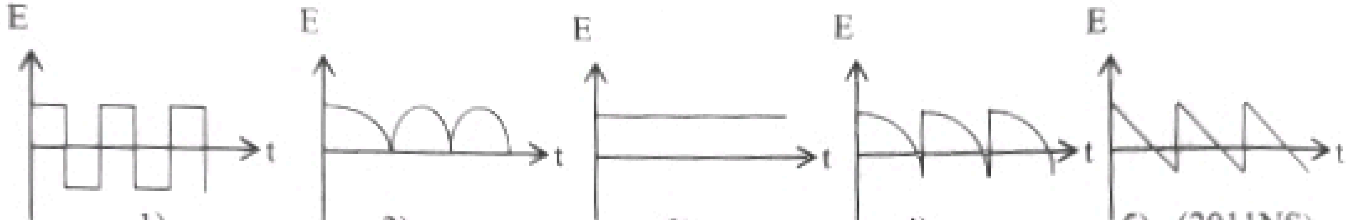


(1) (2) (3) (4) (5)
(2010)

21) A uniform magnetic field is directed perpendicularly into the plane of the paper everywhere within a rectangular region as shown. A wire loop in the shape of a semicircle, is rotated counter clockwise with a constant angular velocity in the plane of the paper about an axis perpendicular to the paper and passing through A.

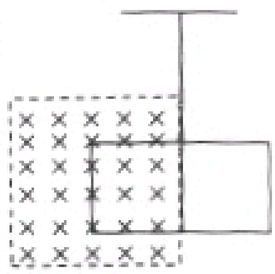


W hich of the following graphs best represents the variation of the e. m. f (D) induced in the loop with time t ?



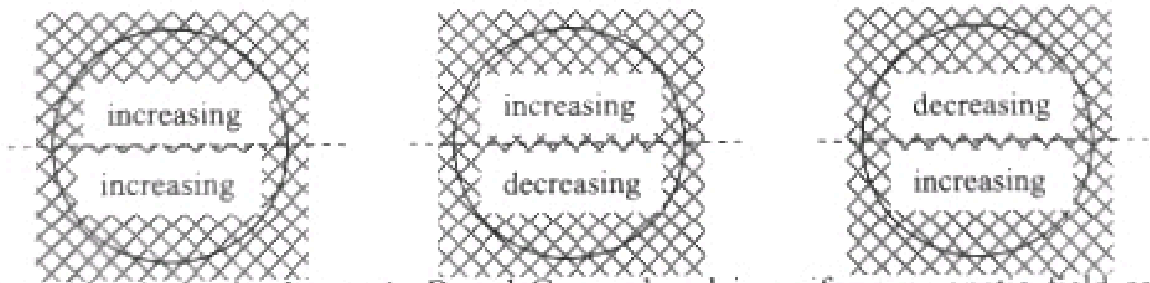
1) 2) 3) 4) 5) (2011NS)

22) A light conducting loop is suspended freely, and a half of the loop is inserted into a magnetic field as shown in the figure. If the magnetic field begins to increase rapidly is strength,



1) the loop begins to move in the direction of the magnetic field.
2) the loop begins to move against the direction of the magnetic field.
3) the loop begins to move (to the left) into the field.
4) the loop begins to move (to the right) out of the field.
5) the loop does not move at all. (2012)

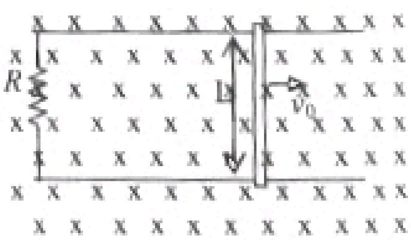
23)



Three identical wire loops A, B and C are placed in uniform magnetic field as shown in figure. Magnetic fields are either increasing or decreasing in magnitude at the same rate. If i_1, i_2 and i_3 are the magnitudes of the induced currents in loops A, B and C respectively then,

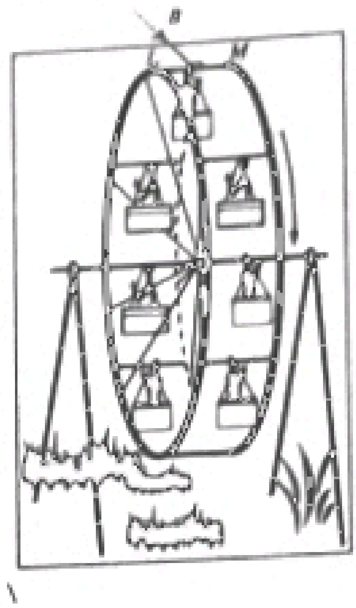
1) $i_1 > i_2 > i_3$ 2) $i_1 < i_2 < i_3$ 3) $i_1 = i_2 = i_3$ 4) $i_1 = i_2 ; i_3 = 0$ 5) $i_1 = i_2 = i_3 = 0$ (2012)

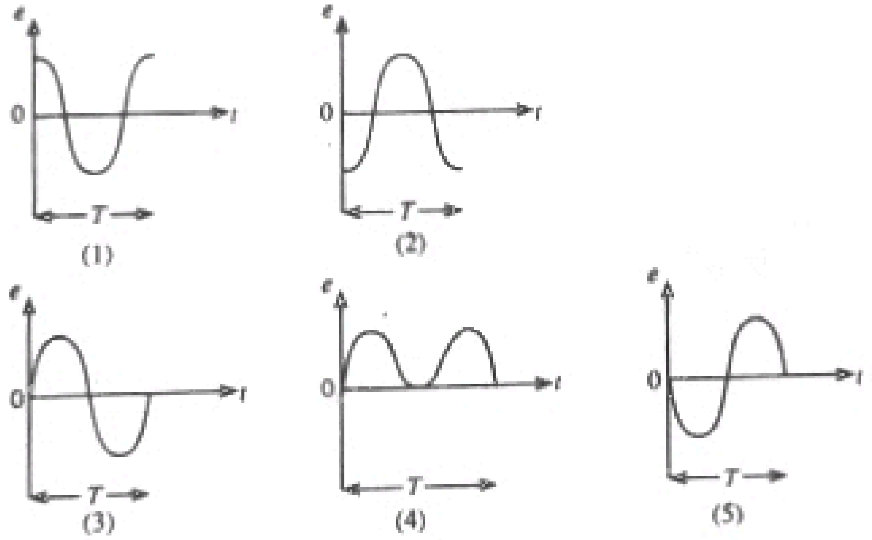
24) A metal rod of mass M and length L is placed on a frictionless parallel horizontal rail in a magnetic field of flux density B directed into the paper as shown in figure. (The rail is a conductor and a resistor of value R is connected to the rail as shown) If an initial velocity of υ_0 is given to the rod and released as shown, it will begin to move in the direction of υ_0, with an acceleration of.



1) $-\dfrac{BL\upsilon_0^2}{MR}$ 2) $\dfrac{RB^2L^2\upsilon_0^2}{M}$ 3) $\dfrac{B^2L\upsilon_0}{MR}$ 4) $\dfrac{B^2L^2\upsilon_0}{MR}$ 5) $\dfrac{MBL\upsilon_0}{R}$ (2013)

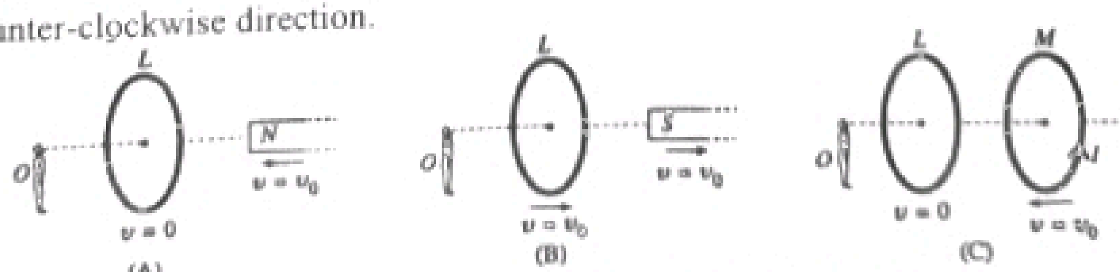
25) A Ferris wheel which consists of two parallel large wooden wheels joined together with metal cross bars as shown in figure, is erected so that the planes of wheels are in the north south direction, and the cross bars are perpendicular to the direction of the earth's magnetic field B which is horizontal at this location. The Ferris wheel rotates around the horizontal axis passing through the centres of the two wheels at a constant period of rotation T in the direction shown. LM is a metal cross bar which is at the highest position as shown when time t = 0. Variation of the induced electromotive force (e) at the end L of the cross bar with respect to the end M with time (t) is best represented by





(2014)

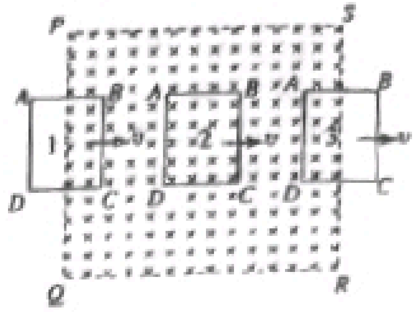
26) A bar magnet and/or conducting loop/s are arranged separately as shown in figure (A), (B) and (C). As observed by the observer O, the magnet and the loop/s move with he velocities υ as indicated. Loop M in the figure (C) carries a current I in the counter-clockwise direction.



As observed by the observer O, the induced current in the loop L is,

1) clockwise in A and B, and zero in C.
2) clockwise in A and C, and zero in B.
3) clockwise in A and C, and counter-clockwise in B.
4) counter-clockwise in A and B and zero in C.
5) counter-clockwise in A and C and zero in B. (2015)

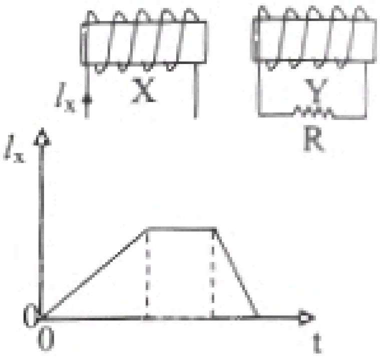
27) As shown in the figure, a rectangular wire loop ABCD is inserted perpendicular to a uniform magnetic field confined to a region PQRS from position 1 and taken across the field with a constant velocity υ. It passes through position 2 and finally taken out of the magnetic field at position 3 with the same velocity. Which of the following statements is **not true**?

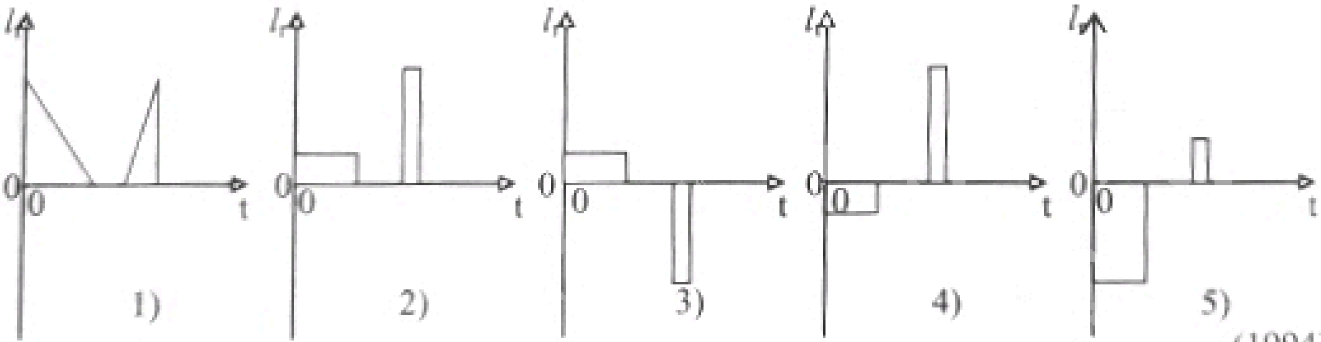


1) When the loop passes through position 1, a constant e.m.f. will be induced only across section BC of the wire loop.
2) As the loop passes through position 2, constant e.m.f.s will be induced across AD and BC, and they are equal and opposite to each other.
3) At position 3, a constant e.m.f. will be induced only across AD.
4) At position 2, the resultant force on the loop due to magnetic field is zero.
5) The directions of the forces due to magnetic field on the loop at positions 1 and 3 are opposite to each other. (2016)

05. Mutual Induction

1) Two conducting coils X and Y are placed close to each other with their axes in the same line as shown in the figure. The current, i_x in coil X is varied with time t, as shown Which of the following graphs best represents the variation of the induced current, i_y through the resistor R with t? (consider the direction of the current through R to the left to be positive)





(1994)

2) The following three methods have been suggested by a student as possible ways of obtaining a steady voltage of 3 v using a single 1 V cell

(A) By connecting the cell to a step – up transformer having primary to secondary turns ration of 1:3

(B) By taking the voltage across a cross a series connection of three 1 Ω resistors after connection the cell across any one of the resistors.

(C) By charging three identical capacitors to 1 V separately using the cell, then connecting them in series taking the voltage across the combination

Of the above methods

1) Only (A) can generate 3V
2) Only (C) can generate 3 V
3) Only (A) and (C) can generate 3 V
4) all can generate 3 V
5) none can generate 3V

(1995)

3) During a power cut a person tried to use twenty, 12V car batteries to power some domestic electric appliances. Which of the following appliances will not work?

1) An iron
2) a filament bulb
3) A ceiling fan
4) A hot plate
5) An immersion coil

(1996)

4) The primary winding of an ideal transformer has 200 turns and its secondary winding has 50 turns. If the current in the secondary is 40A, the current in the primary is,

1) 5 A
2) 10 A
3) 80 A
4) 120 A
5) 160 A

(1997)

5) An alternating voltage of peak value 10 V is applied to an electric bulb. Which of the following direct voltages would make the bulb light with the same brightness?

1) 14.1V
2) 10V
3) 7.07V
4) 5v
5) 3.3V

(1998)

6) A 240 V ac electric power source is used to run a 12V, 60W ac motor using an ideal transformer. The current in the primary winding of the transformer is,

1) 0.25 A
2) 0.5 A
3) $\sqrt{5}$ A
4) 5 A
5) 20 A

(1999)

7) Consider the following statements made above the root mean square value, $I_{r.m.s.}$ of an alternating current

(A) $I_{r.m.s.}$ is related to the peak current I_0 by $I_{r.m.s} = \dfrac{I_0}{\sqrt{2}}$

(B) $I_{r.m.s}$ is the average value of the current over a cycle

(C) $I_{r.m.s}$ is the equivalent de current that would produce the same average power loss in a resistor as the alternating current.

Of the above statements

1) Only (A) is true
2) Only (A) and (B) is true
3) Only (A) and (C) are true
4) Only (B) and (C) are true
5) all (A), (B) and (C) are true

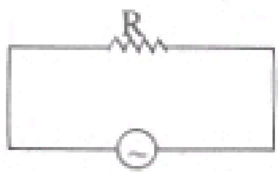
(1999)

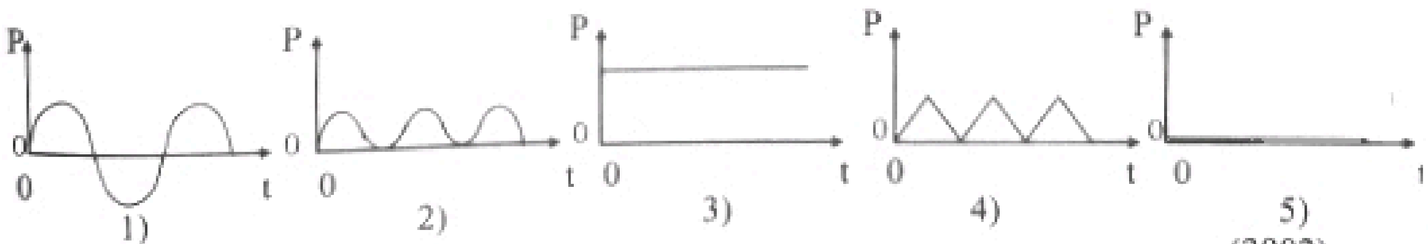
8) An ideal transformer has 100 windings in the primary and 200 windings in the secondary. The primary is connected to an A, C. Supply of 120 V at 10A. Then the 'voltage / current' in the secondary is,

1) 240V / 5A
2) 240V / 10A
3) 240V / 2.5A
4) 120V / 5A
5) 120V / 2.5A

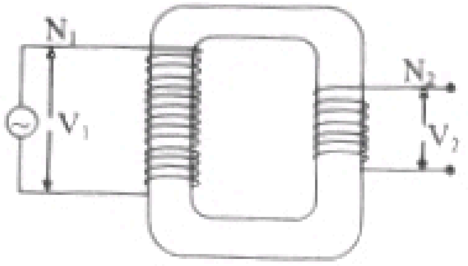
(2002)

9) A sinusoidal A, C voltage is applied across a resistor R. The power (P) dissipated by the resistor with time (t) is best represented by,





(2002)

10) 

The transformer shows in the figure has N_1 turns in the primary N_2 turns in the secondary. Root mean square voltages across primary and secondary are V_1 and V_2 respectively. The correct statement regarding the transformer is,

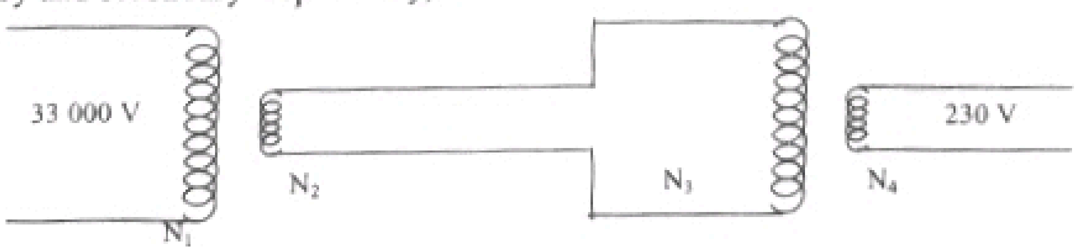
1) $V_1 N_1 = V_2 N_2$
2) If the AC source is replaced by a battery with the same voltage V_1 will remains the same.
3) When the secondary is connected to a lead the current in the secondary will not depends on the load.
4) The only reason why the core becomes warm after sometime is the heat generated due to the resistance of the coil.
5) If the core is removed V_2 will decrease (2005)

11) Consider the following statements made regarding a transformer.
A) The core of a transformer is usually made of soft iron in order to maintain a better flux linkage.
B) The wire diameter of the secondary coil of a step – down transformer is usually larger that that of the primary coil.
C) When wiring transformers, wires without insulated coating must be used.
Of the above statements.
1) only (A) is true
2) only (B) is true.
3) only (A) and (B) are true
4) only (A) and (C) are true
5) all (A), (B) and (C) are true (2006)

12) A transformer having which of the following characteristics is suitable to reduce a 220V are voltage to 20V are (2009)

	transformer type	$\dfrac{\text{Numbers of turns in secondary coil}}{\text{Numbers of turns in primary coil}}$
1)	step down	$\frac{1}{22}$
2)	step down	$\frac{1}{11}$
3)	step down	11
4)	step up	$\frac{1}{11}$
5)	step up	11

13) The figure shows two transformers A and B connected to power lines. The primary coil of A is connected to a voltage of 33000 V ac and the secondary coil of B provides of 230 V ac for domestic use. Transformers A has N_1 and N_2 turns in its primary and secondary respectively. Transformer B has N_3 and N_4 turns in its primary and secondary respectively,

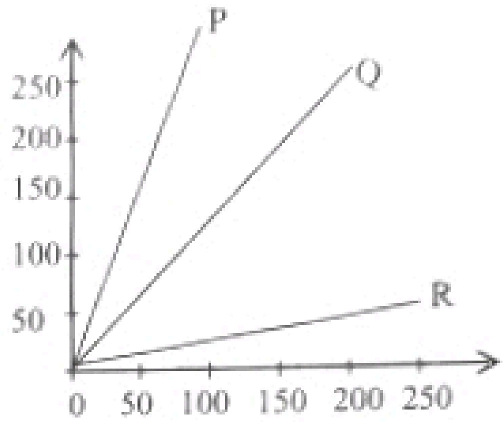


If the power losses in the system are neglected, which of the following is true ?

1) $\frac{N_1}{N_4} = \frac{33000}{230}$ 2) $\frac{N_4}{N_1} = \frac{33000}{230}$ 3) $\frac{N_1N_3}{N_2N_4} = \frac{33000}{230}$

4) $\frac{N_2N_4}{N_1N_3} = \frac{33000}{230}$ 5) $\frac{N_1N_4}{N_2N_3} = \frac{33000}{230}$ (2010)

14) Input (V_P) – output (V_S) voltage characteristics of three ideal transformers P, Q and R which can be connected to 230V ac mains are shown in the figure.



Consider following statements,

(A) Transformers P can deliver a larger current than Q at a given value of V_P.

(B) Transformer of the type P is suitable to construct a low voltage dc power supply.

(C) Transformers of the type R has the ratio $\frac{\text{number of turns in the secondary}}{\text{number of turns in the primary}}$ less than 1.

Of the above statements,

1) only (A) is true 2) only (B) is true 3) only (C) is true

4) only (B) and (C) are true 5) All (A), (B) and (C) are true. (2011N)

15) An ideal transformer operates ata $V_p = 12.0$ kV ac on the primary side and supplies electricity to a number of nearly houses at $V_s = 240$ V, ac. The turns ratio,

$\frac{\text{number of turns in the primary}}{\text{number of turns in the secondary}}$ of the transformer is,

1) 0.02 2) 0.2 3) 25 4) 50 5) 100 (2012)

16) Consider the following statements made regarding a transformer.

(A) The core of the transformer is made out of laminated plates of soft iron.

(B) Both Joule heating and eddy currents contribute to the energy loss of a transformer.

(C) Power can be amplified using a transformer.

Of the above statements

1) only (A) is true 2) only (B) is true 3) only (A) and (B) are true

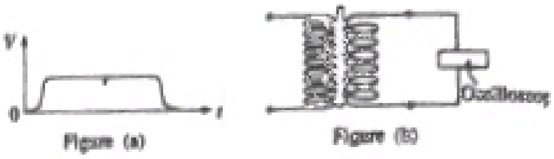
4) only (B) and (C) are true 5) all (A), (B) and (C) are true. (2013)

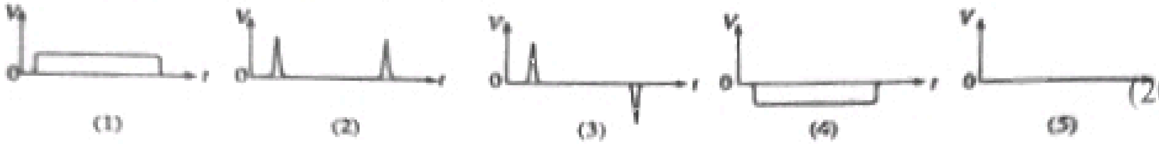
17) A 5W electronic device having a resistance of 5Ω is operated by receiving power from a 230 V main supply through a transformer. The ratio,

$\frac{\text{Number of turns in the primary coil}}{\text{Number of turns in the secondary coil}}$ of the transformer is

1) 46 2) 23 3) $\frac{10}{23}$ 4) $\frac{1}{23}$ 5) $\frac{1}{46}$ (2014)

18) Voltage waveform shown in figure *(a)* is applied to the primary of a step down transformer shown in figure (b) and the output waveform from the secondary is observed on an oscilloscope. Which of the following figures shows the waveform on the oscilloscope?





(1) (2) (3) (4) (5)

(2015)

19) In a certain transformer there are 360 turns in the primary coil and 30 turns in the secondary coil. Which of the following voltage conversions is done using this transformer? (AC = Alternating current, DC = Direct current)

1) 240 V AC voltage to 12 V DC voltage.
2) 240 V AC voltage to 2 880 V AC voltage.
3) 240 V DC voltage to 20 V DC voltage.
4) 240 V AC voltage to 20 V AC voltage.
5) 240 V DC voltage to 2 880 V DC voltage. (2016)

ANSWERS

ELECTROMAGNETISM

1) Magnetic Field

(01)	2	(02)	5	(03)	4	(04)	1	(05)	3	(06)	1
(07)	4	(08)	2	(09)	4	(10)	1				

2) Electromagnetism

(01)	1, 2	(02)	3	(03)	3	(04)	4	(05)	2
(06)	3	(07)	2	(08)	4	(09)	2	(10)	3
(11)	1	(12)	4	(13)	4	(14)	4	(15)	3
(16)	2	(17)	3	(18)	4	(19)	4	(20)	4
(21)	1	(22)	2	(23)	2	(24)	3	(25)	3
(26)	4	(27)	5	(28)	1	(29)	3	(30)	2
(31)	2	(32)	2	(33)	3	(34)	1	(35)	2
(36)	4	(37)	3						

3) Force acting on a moving Charge in a Magnetic Field

(01)	2	(02)	5	(03)	4	(04)	4	(05)	1
(06)	1	(07)	1	(08)	3	(09)	1	(10)	5
(11)	3	(12)	3	(13)	4	(14)	2	(15)	5
(16)	4	(17)	3	(18)	1	(19)	1	(20)	5

4) Electro Magnetic Induction

(01)	2	(02)	4	(03)	3	(04)	5	(05)	1	(06)	2	(07)	5	(08)	4	(09)	1	(10)	2
(11)	1	(12)	1	(13)	1	(14)	2	(15)	2	(16)	4	(17)	2	(18)	4	(19)	5	(20)	2
(21)	1	(22)	4	(23)	4	(24)	4	(25)	3	(26)	2	(27)	5						

5) Mutual Induction

(01)	4	(02)	2	(03)	3	(04)	2	(05)	3	(06)	1	(07)	3	(08)	1	(09)	2	(10)	5
(11)	3	(12)	2	(13)	3	(14)	3	(15)	4	(16)	3	(17)	1	(18)	3	(19)	4		