O P JINDAL SCHOOL, SAVITRINAGAR

CLASS TEST & PRACTICE

ANSWER KEY

CLASS XII PHYSICS TOPIC : MOVING CHARGES AND MAGNETISM

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1 Two identical current carrying coaxial loops, carry current I in an opposite sense. A simple amperian loop passes through both of them once. Calling the loop as C,

(a) $\oint_C B.dl = \pm 2\mu_0 I.$

(b) the value of $\oint_C B.dl$ is independent of sense of C. 1

(c) there may be a point on C where, B and dl are parallel.

(d) B vanishes everywhere on C.

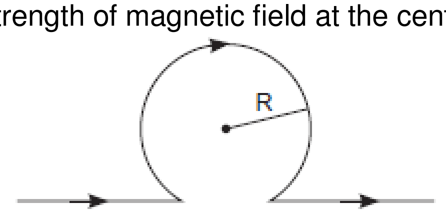
ANS: (b) Ampere's law gives another method to calculate the magnetic field due to a given current distribution. Applying the Ampere's circuital law, we have

Applying the Ampere's circuital law, we have

$\oint B.dl = i_0(I - I) = 0$ (because current is in opposite sense).

Also, there may be a point on C where B and dl are perpendicular and hence $\oint_C B.dl = 0$

2 The strength of magnetic field at the centre of circular coil is



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(a) $\frac{\mu_0 I}{R}\left(1-\frac{1}{\pi}\right)$ (b) $\frac{\mu_0 I}{\pi R}$

(c) $\frac{\mu_0 I}{2R}\left(1-\frac{1}{\pi}\right)$ (d) $\frac{\mu_0 I}{2R}\left(1+\frac{1}{\pi}\right)$

ANS: (c) B = Field to circular portion – Field due to straight portion

$$= \left(\frac{\mu_0 I}{2R} - \frac{\mu_0 I}{2\pi R}\right) = \frac{\mu_0 I}{2R}\left(1-\frac{1}{\pi}\right)$$

3 If a charged particle moves through a magnetic field perpendicular to it

(a) both momentum and energy of particle change.

(b) momentum as well as energy are constant. 1

(c) energy is constant but momentum changes.

(d) momentum is constant but energy changes.

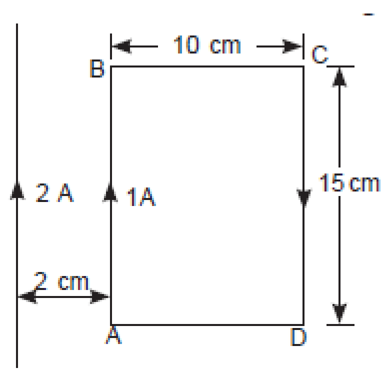
ANS: (c) Since the direction of velocity of a particle varies so momentum changes but direction of magnetic force is always perpendicular to direction of charged particle. So no work is done, i.e. energy remains the same.

4 A current carrying closed loop of an irregular shape lying in more than one plane when placed in uniform magnetic field, the force acting on it
(a) will be more in the plane where its larger position is covered. 1
(b) is zero.
(c) is infinite.
(d) may or may not be zero.

ANS: (b) A current carrying closed loop of any shape when placed in a uniform magnetic field does not experience any force.

5 The maximum current that can be measured by a galvanometer of resistance 40 Ω is 10 mA. It is converted into voltmeter that can read upto 50 V. The resistance to be connected in the series with the galvanometer is 1
(a) 2010 Ω (b) 4050 Ω
(c) 5040 Ω (d) 4960 Ω

ANS: (*d*) $R = \frac{V}{I_g} - G = \frac{50}{10 \times 10^{-3}} - 40 = 4960\ \Omega$

6 

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What is the net force on the rectangular coil? (a) 25 × 10^{-7} N towards wire.
(b) 25 × 10^{-7} N away from wire.
(c) 35 × 10^{-7} N towards wire.
(d) 35 × 10^{-7} N away from wire.

ANS: (*a*) Since force,

$$F_{AB} = \frac{\mu_0 I_1 I_2}{2\pi r} l = 30 \times 10^{-7}\ \text{N (attractive)}$$

$$F_{CD} = 5 \times 10^{-7}\ \text{N (repulsive)}$$

$$F_{\text{net}} = F_{AB} - F_{CD} = 25 \times 10^{-7}\ \text{N towards wire}$$

7 If the beams of electrons and protons move parallel to each other in the same direction, then they
(a) attract each other. 1
(b) repel each other.
(c) no relation.
(d) neither attract nor repel.

ANS: (b) As current carried by electrons and protons are in opposite direction.

8 The magnetic field due to a straight current carrying conductor of infinite length at a perpendicular distance a is equal to ________. 1

ANS: $B = \frac{\mu_0 I}{2\pi a}$

9 Relation between S.I. unit and C.G.S unit magnetic field is ________. 1

ANS: 1 T = 10^4 G

10 According to ampere circuital law, the line integral of the magnetic field $\vec{B}$ around any closed path enclosing current I, is equal to ________. 1

ANS: $\mu_0 I$