Magnetic Effect of Current

1. A metallic loop is placed in a magnetic field. If a current is passed through it, then
(a) The ring will feel a force of attraction (b) The ring will feel a force of repulsion
(c) Will move to and from about its centre of gravity (d) None of these

2. Magnetic fields at two points on the axis of a circular coil at a distance of 0.05 *m* and 0.2*m* from the centre are in the ratio 8 : 1. The radius of the coil is
(a) 1.0 *m* (b) 0.1 *m* (c) 0.15 *m* (d) 0.2 *m*

3. Two concentric coplanar circular loops of radii r_1 and r_2 carry currents of respectively i_1 and i_2 in opposite directions (one clock-wise and other anticlockwise). The magnetic induction at the centre of the loops is half due to i_1 alone at the centre. If $r_2 = 2r_1$, the value of i_2 / i_1 is
(a) 2 (b) 1/2 (c) 1/4 (d) 1

4. Two circular coils *P* and *Q* are made from similar wires, but radius of *Q* is twice that of *P*. What should be the value of potential difference across them so that the magnetic induction at their centre may be same
(a) $V_Q = 2V_P$ (b) $V_Q = 3V_P$ (c) $V_Q = 4V_P$ (d) $V_Q = 1/4\,V_P$

5. Two parallel long wires carry currents i_1 and i_2 with $i_1 > i_2$. When the currents are in the same direction, the magnetic field midway between the wires is 15 μT. When the direction of i_2 is reversed, it becomes 40 μT. the ratio i_1 / i_2 is
(a) 3 : 4 (b) 11 : 7 (c) 7 : 11 (d) 11 : 15

6. The magnetic induction at the centre of a solenoid is *B*. If the length of solenoid is reduced to half and the same wire is wound over it in two layers, then the new magnetic induction will be
(a) *B* (b) 2*B* (c) $\frac{B}{2}$ (d) 4*B*

7. The length of a solenoid is 0.1 *m* and its diameter is very small. A wire is wound over it in two layers. the numbers of turns in the inner layer is 50 and that on the outer layer is 40 The strength of current flowing in two layers in the same direction is 3 *A*. The magnetic induction in the middle of the solenoid will be
(a) 3.4×10^{-3} *Tesla* (b) 3.4×10^{-3} *Gauss* (c) 3.4×10^{3} *Tesla* (d) 3.4×10^{3} *Gauss*

8. A particle of charge per unit mass α is released from origin with a velocity $\vec{v} = v_0\hat{i}$ in a uniform magnetic field $\vec{B} = -B_0\hat{k}$. If the particle passes through (0, *y*, 0), then *y* is equal to
(a) $-\frac{2v_0}{B_0\alpha}$ (b) $\frac{v_0}{B_0\alpha}$ (c) $\frac{2v_0}{B_0\alpha}$ (d) $-\frac{v_0}{B_0\alpha}$

9. A charged particle enters a uniform magnetic field with velocity vector at an angle of 45^o with the magnetic field. The pitch of the helical path followed by the particle is *p*. The radius of the helix will be
(a) $\frac{p}{\sqrt{2}\pi}$ (b) $\sqrt{2}p$ (c) $\frac{p}{2\pi}$ (d) $\frac{\sqrt{2}p}{\pi}$

10. A copper wire of diameter 1.6 *mm* carries a current *i*. The maximum magnetic field due to this wire is $5 \times 10^{-3}\,T$. The value of *i* is
(a) 40 A (b) 5 A (c) 20 A (d) 2A

11. The magnetic field existing in a region is given by $\vec{B} = B_0\left(1 + \frac{x}{l}\right)\hat{k}$, A square loop of edge *l* and carrying a current *i*, is placed with its edges parallel to the *X*-*Y* axes. Find the magnitude of the net magnetic force experienced by the loop
(a) $\frac{1}{2} iB_0 l$ (b) Zero (c) $iB_0 l$ (d) $2iB_0 l$

12. In hydrogen atom, the electron is making $6.6 \times 10^{15}\, rev/\sec$ around the nucleus in an orbit of radius 0.528 Å. The magnetic moment $(A - m^2)$ will be
(a) 1×10^{-15} (b) 1×10^{-10} (c) 1×10^{-23} (d) 1×10^{-27}

13. Magnetic field at the centre of a circular loop of area *A* is *B*. Then magnetic moment of the loop will
(a) $\frac{BA^2}{\mu_0\pi}$ (b) $\frac{BA}{\mu_0}\sqrt{A}$ (c) $\frac{BA\sqrt{A}}{\mu_0\pi}$ (d) $\frac{2BA}{\mu_0}\sqrt{\frac{A}{\pi}}$

14. Mean radius of a toroid is 10 *cm* and number of turns are 500. If current flowing through it is 0.1 *A* then value of magnetic induction (in *Tesla*) for toroid
(a) 10^{-2} (b) 10^{-5} (c) 10^{-3} (d) 10^{-4}

15. Which formula does not show the *Ampere's* circuital law
(a) $\oint \vec{B}.\vec{dl} = \mu_0 \Sigma i$ (b) $\frac{W}{m} = \mu_0 \Sigma i$ (c) $\oint \vec{H}.\vec{dl} = \Sigma i$ (d) $\oint \vec{H}.\vec{dl} = \mu_0 \Sigma i$