IIT PHYSICS CENTRE

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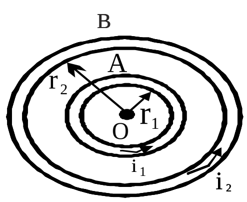
1. Two particle X and Y having equal charges, after being accelerated through the same potential difference, enter a region of uniform magnetic field and describe circular paths of radii R_1 and R_2 respectively. The ratio of the mass of X to that of Y is

(A) $(R_1/R_2)^{1/2}$ **(B)** R_2/R_1 **(C)** $(R_1/R_2)^2$ **(D)** R_1/R_2

2. Two very long, straight, parallel wires carry steady currents I and $-I$ respectively. The distance between the wires is d. At a certain instant of time, a point charge q is at a point equidistant from the two wires, in the plane of the wires, Its instantaneous velocity v is perpendicular to this plane. The magnitude of the force due to the magnetic field acting on the charge at this instant is

(A) $\frac{\mu_0 Iqv}{2\pi d}$ **(B)** $\frac{\mu_0 Iqv}{\pi d}$ **(C)** $\frac{2\mu_0 Iqv}{\pi d}$ **(D)** 0

3. A and B are two concentric circular conductors of centre O and carrying current i_1 and i_2 as shown in the adjectent figure.If ratio of their radii is 1 : 2 and ratio of the flux densities at O due to A and B is 1 : 3, then the value of i_1/i_2 is.



(A) 1/6 **(B)** 1/4 **(C)** 1/3 **(D)** 1/2

4. A long solenoid of length L has a mean diameter D. It has n layer of widings of N turns each. If it carries a current 'i' the magnetic field at its centre will be

(A) Proportional to D
(B) Inversely proportional to D
(C) Independent to D **(D)** Proportional to L

5. A long solenoid has 200 turns per cm and carries a current of 2.5 amps. The magnetic field at its centre is $(\mu_0 = 4\pi \times 10^{-7}\ weber/amp-m)$.

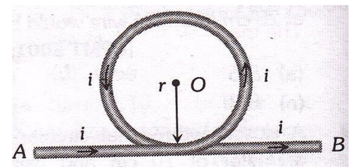
(A) $3.14\times10^{-2}\ weber/m^2$ **(B)** $6.28\times10^{-2}\ weber/m^2$

(C) $9.42\times10^{-2}\ weber/m^2$ **(D)** $12.56\times10^{-2}\ weber/m^2$

6. A long solenoid has n turns per meter and current I A is flowing through it. The magnetic field at the ends of the solenoid is

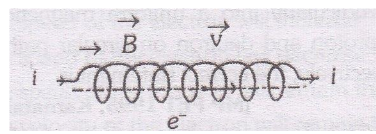
(A) $\frac{\mu_0 nI}{2}$ **(B)** $\mu_0 nI$ **(C)** Zero **(D)** $2\mu_0 nI$

7. A part of a long wire carrying a current i is bent into a circle of radius r as shown in figure. The net magnetic field at the centre O of the circular loop is



(A) $\frac{\mu_0 i}{4r}$ **(B)** $\frac{\mu_0 i}{2r}$ **(C)** $\frac{\mu_0 i}{2\pi r}(\pi+1)$ **(D)** $\frac{\mu_0 i}{2\pi r}(\pi-1)$

8. Work done on an electronmoving in a soleniod along its axis is equal to

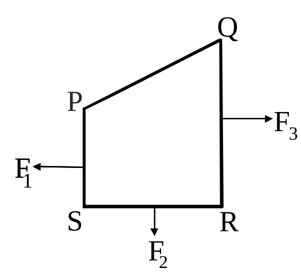


(A) Zero **(B)** –evB **(C)** i/B **(D)** None.

9. A circular coil of radius 4 cm and of 20 turns carries a current of 3 amperes. It is placed in a magnetic field of intensity of 0.5 $weber/m^2$. The magnetic dipole moment of the coil is

(A) 0.15 ampere – m^2 **(B)** 0.3 ampere – m^2
(C) 0.45 ampere – m^2 **(D)** 0.6 ampere – m^2

10. A closed loop PQRS carrying a current is placed in a uniform magnetic field. If the magnetic forces on segment PS, SR and RQ are F_1, F_2 and F_3 respec tively and are in the plane of the paper and along the direction shown, the force on the segment QP is



(A) $\sqrt{(F_3 - F_1)^2 - F_2^2}$ **(B)** $F_3 + F_1 - F_2$

(C) $F_3 - F_1 + F_2$ **(D)** $\sqrt{(F_3 - F_1)^2 + F_2^2}$

11. A current carrying straight wire is kept along the axis of a circular loop carrying a current. The straight wire
(A) Will exert an inward force on the circular loop
(B) Will exert an outward force on the circular loop
(C) Will exert a force on the circular loop parallel to itself
(D) Will not exert any force on the circular loop