



Ch—04 Moving Charges and Magnetism

Daily Practice Problem 08

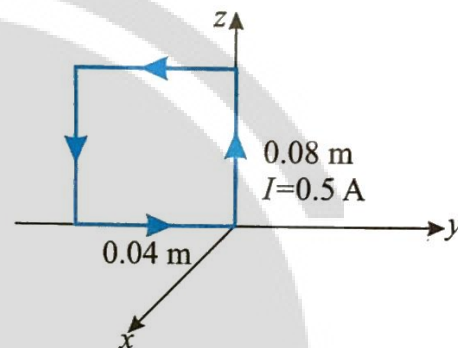
Q1. A circular coil of wire 8 cm in diameter has 12 turns and carries a current of 5 A . The coil is in a field where the magnetic induction is 0.6 T .

- What is the maximum torque on the coil?
- In what position would the torque be half as great as in (a)?

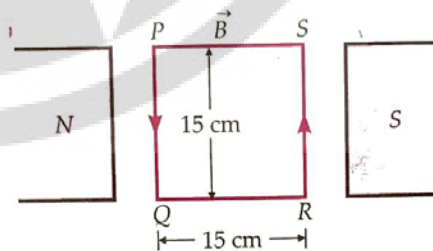
Q2. A coil in the shape of an equilateral triangle of side 0.02 m is suspended from a vertex such that it is hanging in a vertical plane between the pole pieces of a permanent magnet producing a horizontal magnetic field of 5×10^{-2} . Find the couple acting on the coil when a current of 0.1 A passed through it and the magnetic field is parallel to its plane

Q3. A circular coil of 100 turns to and having a radius of 0.05 m carries a current of 0.1 A . Calculate the work required to turn the coil in an external field of 1.5 T through 180° about an axis perpendicular to the magnetic field? The plane of coil is initially at right angles to magnetic field.

Q4. The rectangular coil having 100 turns is placed in a uniform magnetic field of $(0.05\sqrt{2})\hat{j}$ tesla as shown in figure. Find the torque acting on the loop.



Q5. A 100-turns coil kept in a magnetic field $\vec{B} = 0.05\text{ Wb m}^{-2}$, carries a current of 1 A , as shown in Fig. Find the torque acting on the coil.



Q6. A 100 turn closely wound circular coil of radius 10 cm carries a current of 3.2 A.

- a. What is the field at the center of the coil?
- b. What is the magnetic moment of this arrangement?

The coil is placed in a vertical plane and is free to rotate about a horizontal axis which coincides with its diameter. A uniform magnetic field of 2 T in the horizontal

direction exists such that initially the axis of the coil is in the direction of the field. The coil rotates through an angle of 90° under the influence of the magnetic field.

- c. What are the magnitudes of the torques on the coil in the initial and final position?
- d. What is the angular speed acquired by the coil when it has rotated by 90° ? The M.I. of the coil is 0.1 kg m^2 .

ANSWERS

1. a. 0.18 Nm

b. $\theta = 30^\circ$

2. $8.66 \times 10^{-7} \text{ Nm}$

3. 0.2355 J

4. $4\sqrt{2} \times 10^{-3} (\text{Nm})\hat{k}$

5. 1.125 Nm

6. a. $2 \times 10^{-3} \text{ T}$

b. 10 Am^2

c. 20 Nm

d. 20 rad s^{-1}