QUES 02:-

. A square coil of side 10 cm consists of 20 turns and carries a current of 12 A. The coil is suspended vertically and the normal to the plane of the coil makes an angle of 30° with the direction of a uniform horizontal magnetic field of magnitude 0.80 T. What is the magnitude of torque experienced by the coil?

Sol. Given:

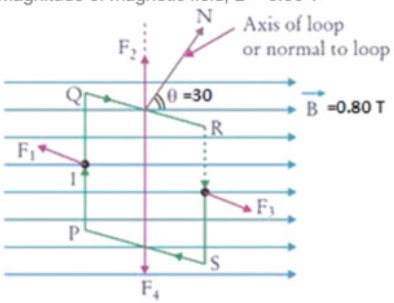
Length of side of square, L = 10 cm

Number of turns, n = 20

Current through the square coil, I = 12 A

Angle between the normal to the coil and uniform magnetic field, $\theta = 30°$

Magnitude of magnetic field, B = 0.80 T



The torque experienced by the coil in a magnetic field is given by,

$\tau = n \times B \times I \times A \times \sin(\theta)$ …(1)

Where,

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$\tau = n \times B \times I \times A \times \sin(\theta)$ …(1)

Where,

n = number of turns consist by square

B = Strength of magnetic field

I = Current through the coil

A = Area of cross-section of coil

$A = L^2 = 0.1 \times 0.1 = 0.01m^2$ …(2)

θ = Angle between normal to cross-section of coil and magnetic field

Now by putting the values in equation (1), we get

$\tau = 20 \times 0.80T \times 12A \times 0.01m^2 \times \sin30°$ and the value of $\sin30^0 = 1/2$

$\Rightarrow \tau = 0.96$ Nm

∴ the magnitude torque experienced by the coil is 0.96 N-m.

Hence the torque experienced by the square coil is 0.96 Nm.