

## Answer on Question 59064, Physics, Electric Circuits

### Question:

A conductor 2 cm long carrying a current of 8 A lies at right angles to a magnetic field of which the flux density is 1.0 T. Calculate the force exerted on the conductor:

a) 0.20 N

b) 0.16 N

c) 0.25 N

d) 0.45 N

### Solution:

We can calculate the force exerted on the conductor from the equation  $\mathbf{F}_B = I\mathbf{L} \times \mathbf{B}$ , where  $\mathbf{F}_B$  is the magnetic force,  $I$  is the current in the conductor,  $\mathbf{L}$  is a vector that points in the direction of the current  $I$  and has a magnitude equal to the length  $L$  of the conductor,  $\mathbf{B}$  is the magnetic field. Therefore, the magnitude of this force is:

$$F = BIL\sin\theta,$$

here,  $\theta$  is the angle between the current and magnetic field (and from the initial condition of the task we know that  $\theta = 90^\circ$ ).

Thus, we get:

$$F = BIL\sin\theta = 1.0 \text{ T} \cdot 8 \text{ A} \cdot 0.02 \text{ m} \cdot \sin 90^\circ = 1.0 \text{ T} \cdot 8 \text{ A} \cdot 0.02 \text{ m} \cdot 1 = 0.16 \text{ N}.$$

### Answer:

$$F = 0.16 \text{ N}.$$