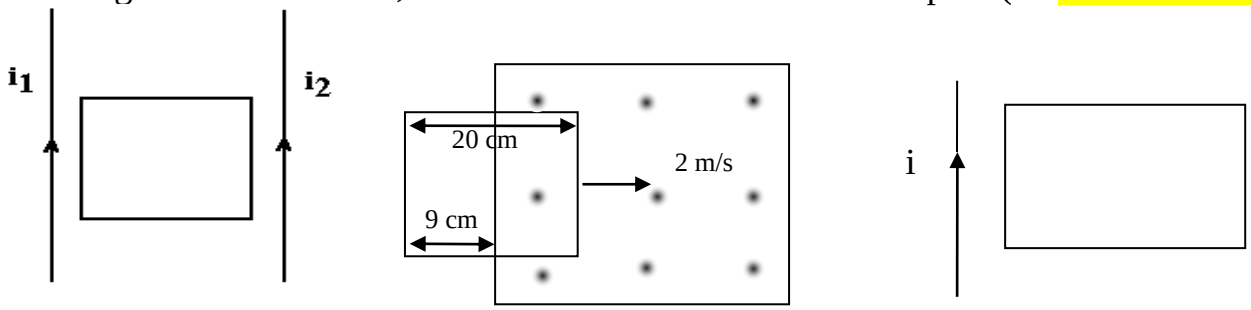
Chapter 30 (Induction and Inductance)

1- A single turn plane loop of wire of cross sectional area 40 cm^2 is perpendicular to a magnetic field that increases uniformly in magnitude from 0.5 T to 5.5 T in 2.0 seconds. What is the resistance of the wire if the induced current has a value of 1.0×10^{-3} A? (A: 10 Ohms]

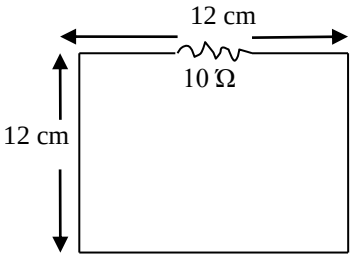
2- A 2.0 Tesla uniform magnetic field makes an angle of 60 degrees with the *xy*-plane. The magnetic flux through an area of 3 m^2 portion of the *xy*-plane is : (A: 5.2 Wb)

3- A rectangular loop of wire is placed midway between two long straight parallel conductors as shown in figure. The conductors carry currents $\mathbf{i_1}$ and $\mathbf{i_2}$ as indicated. If i1 is increasing and $\mathbf{i_2}$ is constant, then the induced current in the loop is: (A: counterclockwise)



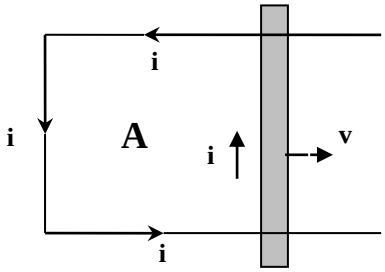
4- The square coil shown in the figure is 20 cm on a side and has 15 turns of wire on it. It is moving to the right at 2 m/s. Find the induced emf in it at the instant shown, and the direction of the induced current in the coil. (The magnetic field is 0.2 T and its direction is out of the page). (A: 1.2 V, clockwise)

5- A long straight wire is in the plane of a rectangular conducting loop as shown in the figure. The straight wire carries an increasing current "**i**" in the direction shown. The current in the rectangular is: (A: counter clockwise)



6- The circuit shown in figure is in a uniform magnetic field that is into the page and is decreasing in magnitude at a rate of 150 T/s. The current in the circuit is: (A: 0.22 A)

7- The figure shows a bar moving to the right on two conducting rails. To make an induced current in the direction indicated, a constant magnetic field in region "A" should be in what direction? (A: Into the page)



8- A 400-turn coil of total resistance 6.0 ohm has a cross sectional area of 30 cm^2. How rapidly should a magnetic field parallel to the coil axis change in order to induce a current of 0.3 A in the coil? (A : 1.5 T/s)

9- A circular wire loop of area 0.5 m^2 is perpendicular to a magnetic field of 0.8 T. If the coil is removed completely from the field in 0.1 s, the average emf induced in the loop has a magnitude: (A: 4.0 V)