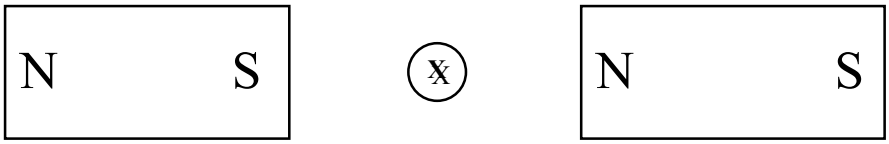
CS1025

Problem Sheet 5

1. Draw the magnetic flux for both the magnet and the conductor below. Indicate what direction the conductor below will be forced to move in when current is flowing in the direction shown.



In what direction will the conductor move if the polarity of the magnet is changed? In what direction will it move, if both the polarity of the magnet and the direction of current are changed?

2. A current carrying conductor is situated at right-angles to a magnetic field of 0.3 Tesla. If the length of the conductor is 20 cm, what is the force on it when the current is 200A.

3. A conductor 30 cm long is moved at a speed of 10 m/s at right-angles to it's length and a magnetic field of 0.4 Tesla. Calculate the e.m.finduced in it.

4. An aeroplane having a wing span of 50 m is flying horizontally at a speed of 600 km/h. Assuming that the vertical component of the earth's magnetic field is 40 μT, calculate the e.m.f. generated between the wing tips.

5. A DC Motor / Generator consists of a circuit containing a 120 V battery, a small resistor of 0.3 Ω, and a conductor which is at right angles to a magnetic field. If the conductor is 2.5 m long and the magnetic field density is 0.1 T, calculate the following :

- The on-load-current generated when a force of 20 N is applied.
- The 'back e.m.f' generated when this force is applied such that the circuit is acting as a Motor.
- What is the maximum speed (i.e on-load-speed) in m/s that this circuit can achieve when the circuit is acting as a Motor?