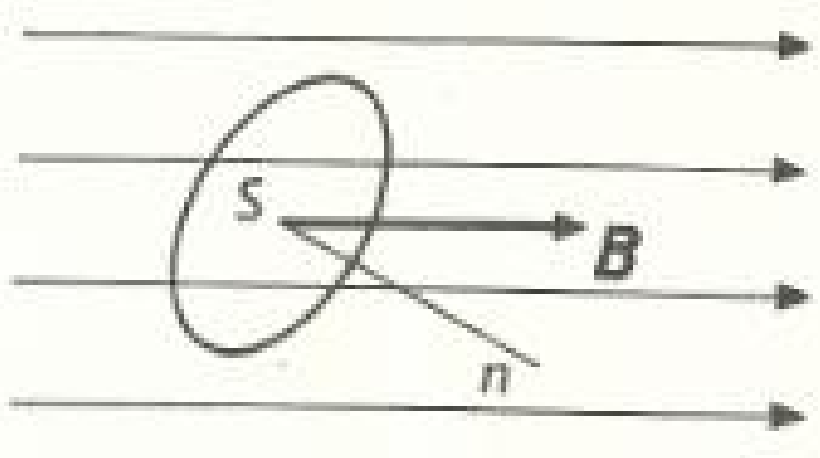
Electromagnetic induction

Magnetic flux:

$\Phi = NB\ S \cos\alpha$,
where:
Φ – magnetic flux (Wb, weber)
N – number of turns (1)
B – magnetic field strength (T. tesla)
S – cross – sectional area (m^2)
$\cos\alpha$ – angle between the magnetic field lines and normal of the cross-sectional area (°)



•Calculate the magnetic flux of rectangular coil with dimensions : a = 4cm, b = 5 cm in a magnetic field with induction of B = 1.1 T, where the angle of the plane of the coil to the direction of magnetic field strength is β =30°.

•What is the magnetic field strength B, where through a circular area with radius r = 5 cm passes magnetic flux of 4.10-2Wb. Surface of the circle is perpendicular to the magnetic field strength lines. (β = 90°)

•What is the radius of a loop of a coil, which axis is at an angle of 30° to the B = 5.89 T and if through the coil passes magnetic flux of 4.10-2Wb.

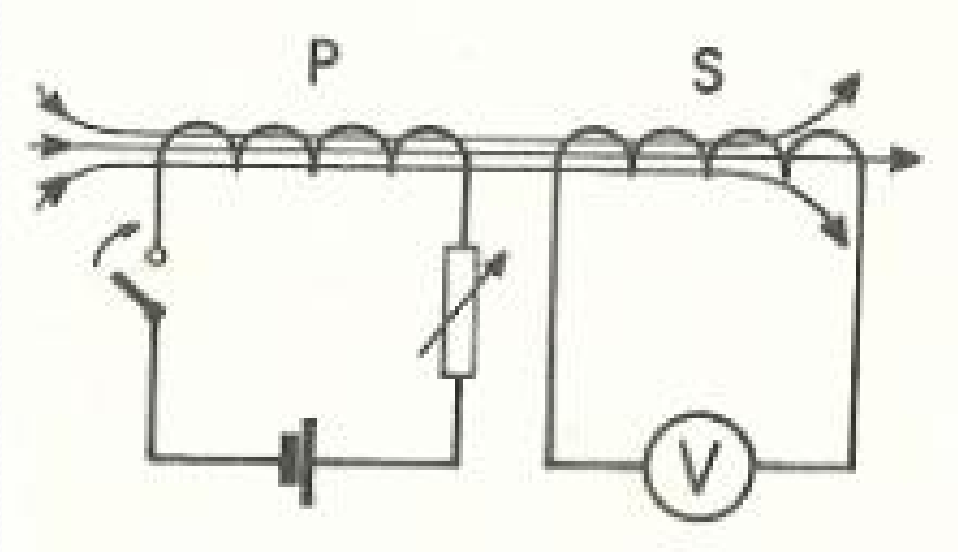
Electromagnetic induction

Electromotic p.d. can be induced:

1.In a wire moving in a constant magnetic field

2.In a wire which isn´t moving in a variable magnetic field

3.In a wire moving in a variable magnetic field



Faraday´s law of electromagnetic induction

Induced e.m.f. (electromotoric p.d. - Ui) is equal to negative change of magnetic flux per a time.

$$Ui = - d\Phi / dt$$

•In which case will be the induced electromotoric p.d. in the conductive loop bigger? If there is magnetic flux of the loop reduced from 1Wb to zero in 0.5 seconds, or if it is increased from zero to 1Wb in 0.1 s? What will be the polarity of the induced electromoric p.d.?

•Horizontal wire with of a length of 2 meters at the time was released and fell freely in the plane perpendicular to the direction north - south (B = 5.10-5T). $\beta = 90°$. Calculate the induced voltage at the ends of the wire per a time of 5 seconds.