A C Generator

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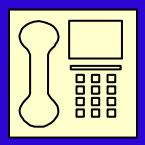

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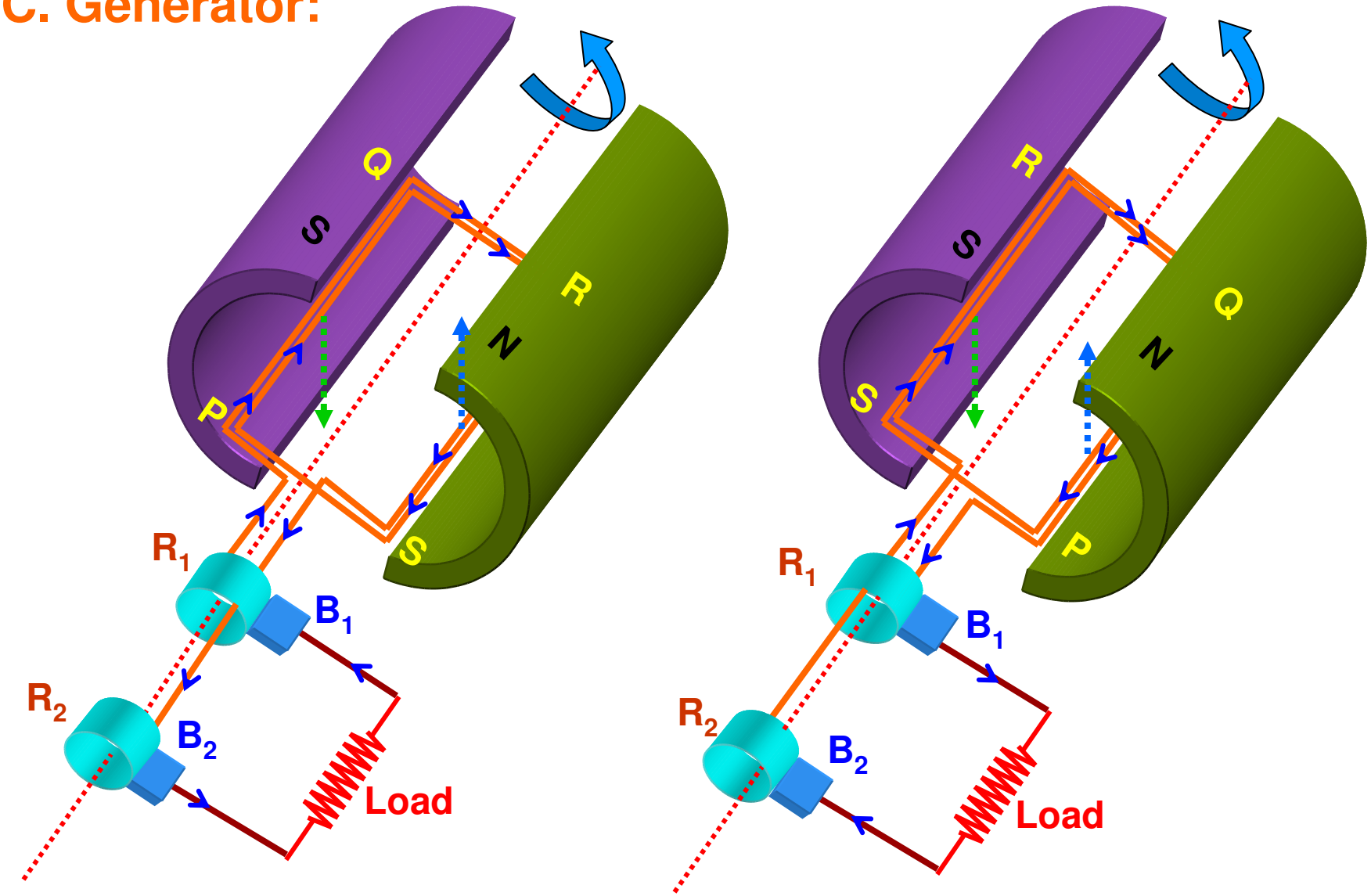
A.C. Generator:



A.C. Generator or A.C. Dynamo or Alternator is a device which converts mechanical energy into alternating current (electrical energy).

Principle:

Electromagnetic Induction.

Construction:

(i) Field Magnet with poles N and S
(ii) Armature (Coil) PQRS
(iii)Slip Rings (R_1 and R_2)
(iv)Brushes (B_1 and B_2)
(v) Load

Working:

When PQ goes down and RS comes up from the plane of the diagram. Induced emf and hence current is set up in the coil. By Fleming's Right Hand Rule, the direction of the current is PQRS

After half the rotation of the coil, the arm PQ comes up and RS goes into. By Fleming's Right Hand Rule, the direction of the current is SRQP.

If one way of current is taken +ve, then the reverse current is taken –ve.

Therefore the current is said to be alternating

Theory:

$\Phi = N B A \cos\theta$

At time t, with angular velocity ω,

$\theta = \omega t$ (at t = 0, loop is assumed to be perpendicular to the magnetic field and $\theta = 0°$)

$\therefore \Phi = N B A \cos\omega t$

Differentiating

$d\Phi / dt = - NBA\omega \sin\omega t$

$E = - d\Phi / dt$

$\boxed{E = NBA\omega \sin\omega t}$

$E = E_0 \sin\omega t$ (where $E_0 = NBA\omega$)