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A.C. generator

CLASS-XII

SUBJECT : PHYSICS
CHAPTER NUMBER: 07
CHAPTER NAME : ALTERNATING CURRENT

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LEARNING OUTCOME

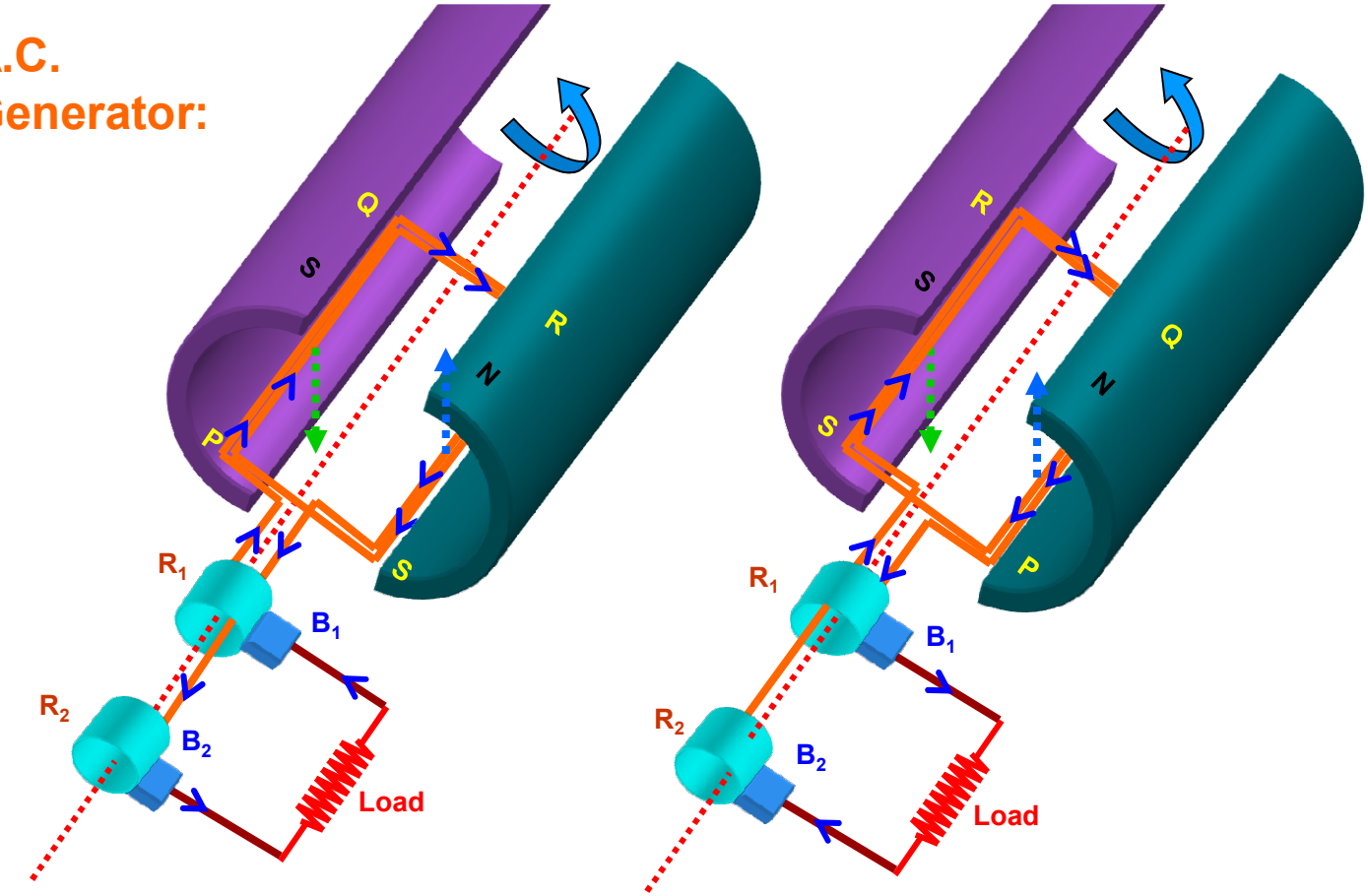
After this lesson, students will be able:

- Explain from where electricity comes and how we use it.
- Define electrical energy in terms of charge, voltage, current and resistance.
- Identify the types of engineering careers that work primarily with electrical energy.

Slide 2

3	@Format for content and slide heading is missing? Just like you have mentioned in DOC., We need to specify, for each slide's heading and text content, what will be the font style +amanrouniyar@odmegroup.org _Assigned to you_ -Swoyan Satyendu , 6/17/2020

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:

A.C. Generator is based on the principle of 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:

Let the armature be rotated in such a way that the arm 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 $PQRSR_2B_2B_1R_1P$.

After half the rotation of the coil, the arm PQ comes up and RS goes down into the plane of the diagram. By Fleming's Right Hand Rule, the direction of the current is $PR_1B_1B_2R_2SRQP$.

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

Therefore the current is said to be alternating and the corresponding wave is sinusoidal.

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 $\theta = 0°$)

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

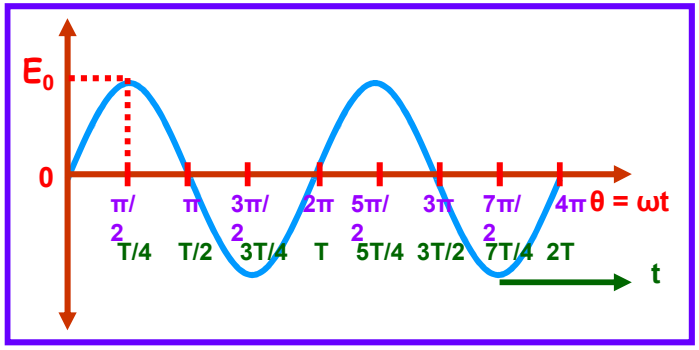
Differentiating w.r.t. t,

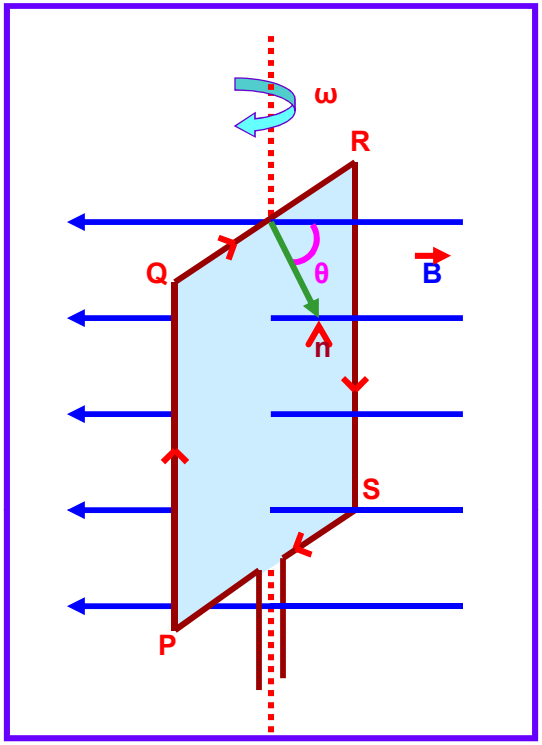
$d\Phi / dt = - NBA\omega \sin\omega t$

$E = - d\Phi / dt$

$E = NBA\omega \sin\omega t$

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





End of Alternating Currents

HOME ASSIGNMENT

1. Two bulbs are rated $(P_1, V)\ and (P_2, V)$. If they are connected (i) in series and (ii) in parallel across a supply V, find the power dissipated in the two combinations in terms of P_1 and P_2 .
2. Two electric bulbs P and Q have their resistances in the ratio of 1:2. They are connected in series across a battery. Find the ratio of the power dissipation in these bulbs.

3. A 25 W and a 100W bulb are joined in (i) series (ii) parallel and connected to the main. Which bulb glows brighter?

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THANKING YOU

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