



SNS COLLEGE OF TECHNOLOGY

(An Autonomous Institution)



COIMBATORE-35

Accredited by NBA-AICTE and Accredited by NAAC – UGC with A+ Grade

Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

COURSE NAME: 19EEB201 DC MACHINES AND TRANSFORMERS

II YEAR / III SEMESTER

Unit 1 – DC Generator

Topic 2: Principle of operation of DC generator



What We'll Discuss

TOPIC OUTLINE



Case study

Faraday's law

Lenz law

Fleming's Right hand rule

Simple loop generator

Principle of Operation

Assessment



CASE STUDY

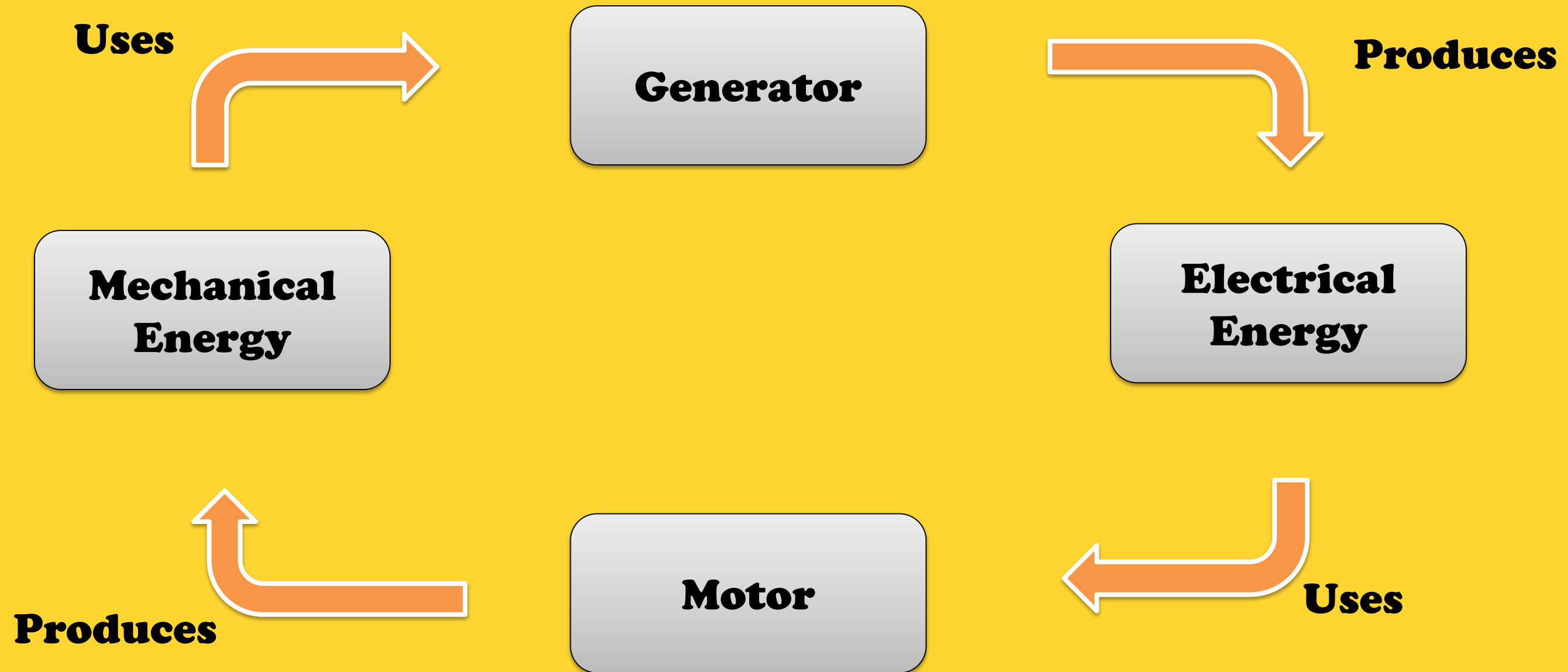


- Sanjay was an 8 year old boy
- On a summer holiday went to his grandpa house
- He also went on a ride with his grandpa in a bicycle
- In the evening he was surprised to see
- In front of the cycle a bulb was glowing yellow in colour
- He enquired about it with his grandpa
- What would his grandpa replied?





Generator / Motor





Faraday's Law of Electromagnetic Induction



First Law :

Whenever the magnetic flux linked with a circuit changes, an e.m.f. is always induced in it.

or

Whenever a conductor cuts magnetic flux, an e.m.f. is induced in that conductor.

Second Law :

The magnitude of the induced e.m.f. is equal to the rate of change of flux linkages.





Lenz Law



“The induced currents in a conductor are in such a direction as to oppose the change in magnetic field that produces them..”

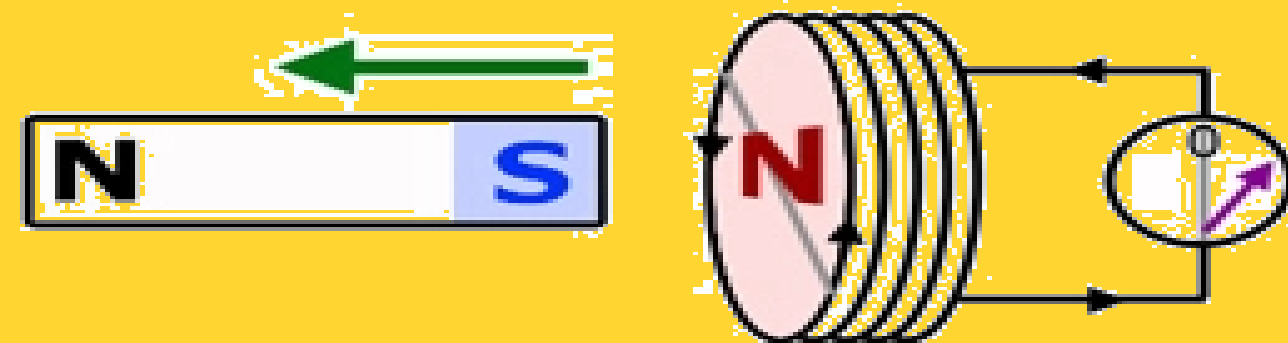
or

“The direction of induced E.M.F in a coil (conductor) is such that it opposes the cause of producing it..”

movement **against** repulsion



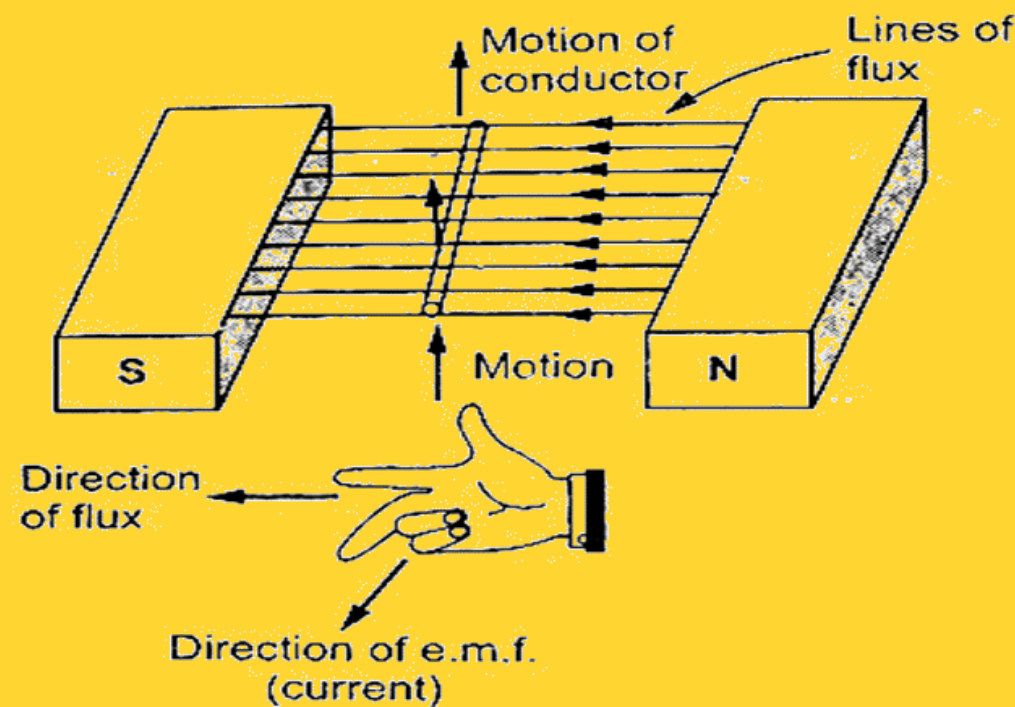
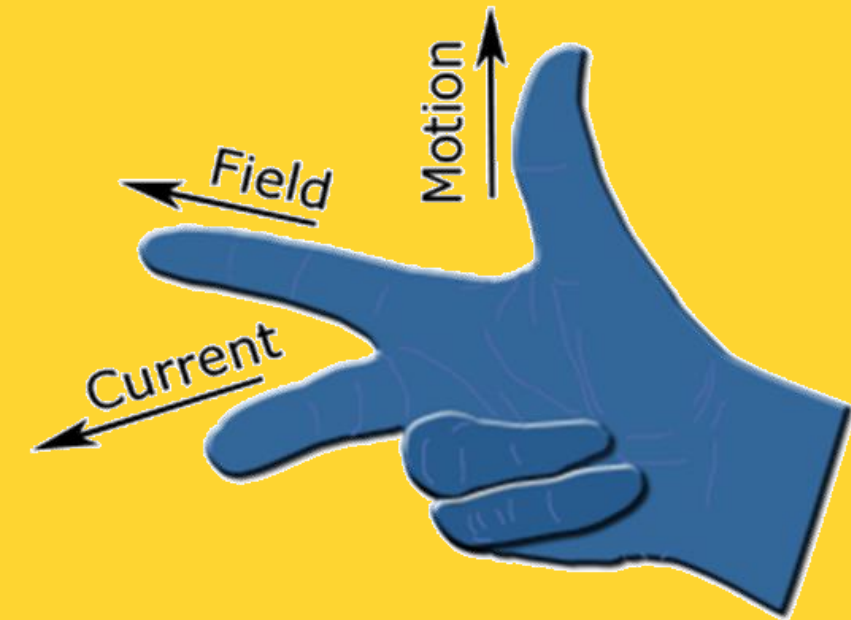
movement **against** attraction





Fleming's Right Hand Rule

- The Thumb represents the direction of Motion of the conductor.
- The First finger (four finger) represents Field.
- The Second finger (Middle finger) represents Current

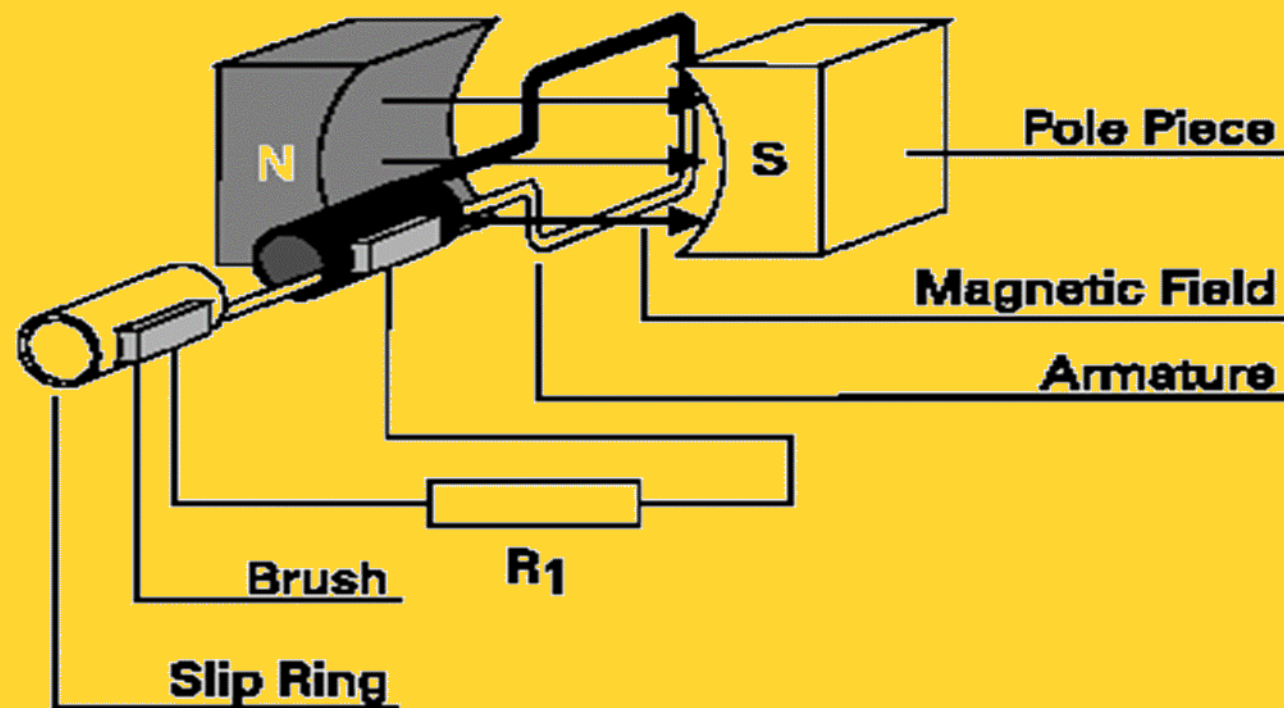




Basic requirements to be satisfied for generation of E.M.F



1. A uniform Magnetic field
2. A System of conductors
3. Relative motion between the magnetic field and conductors



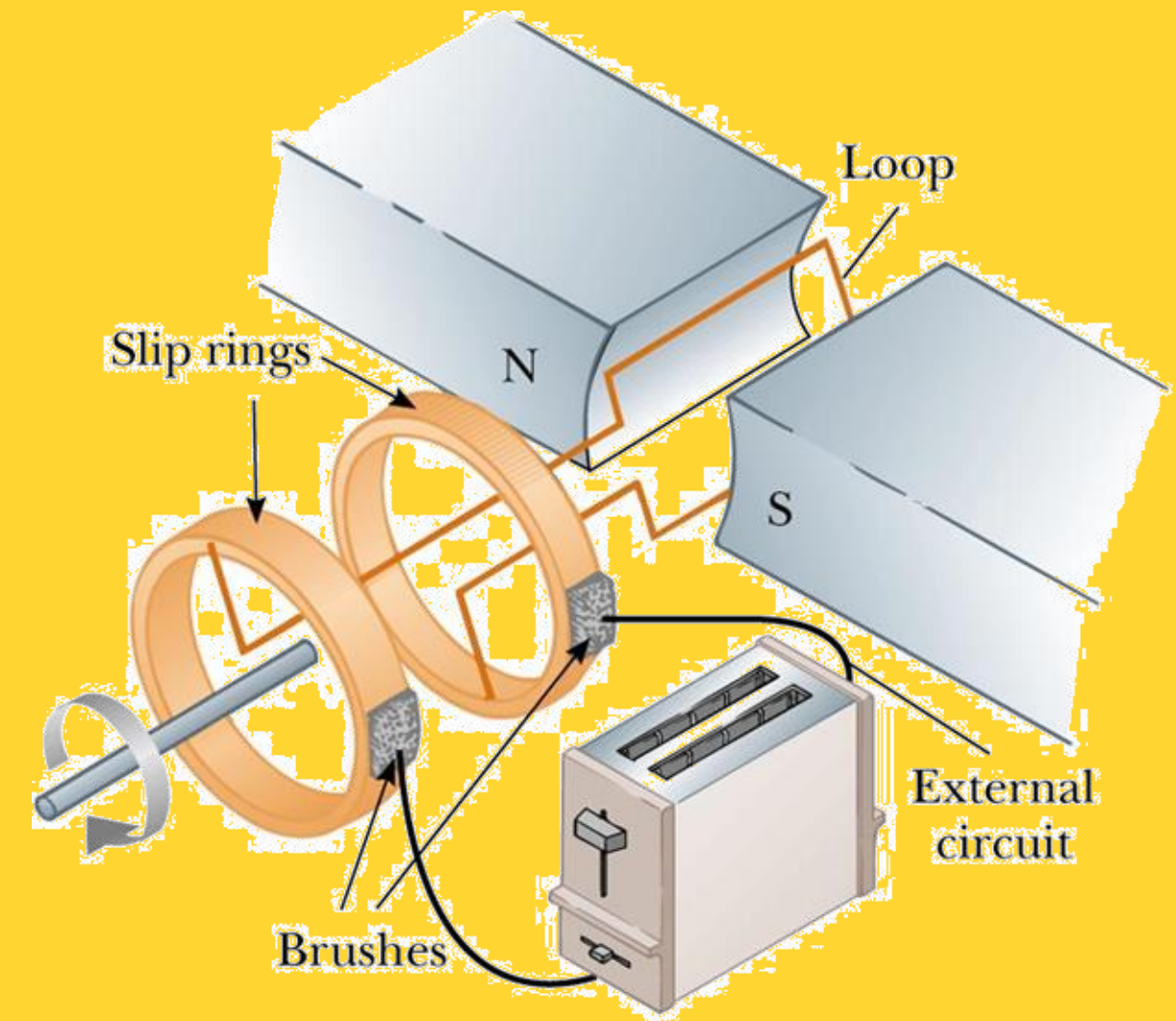
Magnetic field :-	Permanent Magnet (or) Electro Magnet (practical)
Conductor :-	Copper (or) Aluminum bars placed in slots cut around the periphery of cylindrical rotor
Relative motion:-	By Prime Mover Turbine I.C Engine (Internal combustion)



PRINCIPLE OF OPERATION

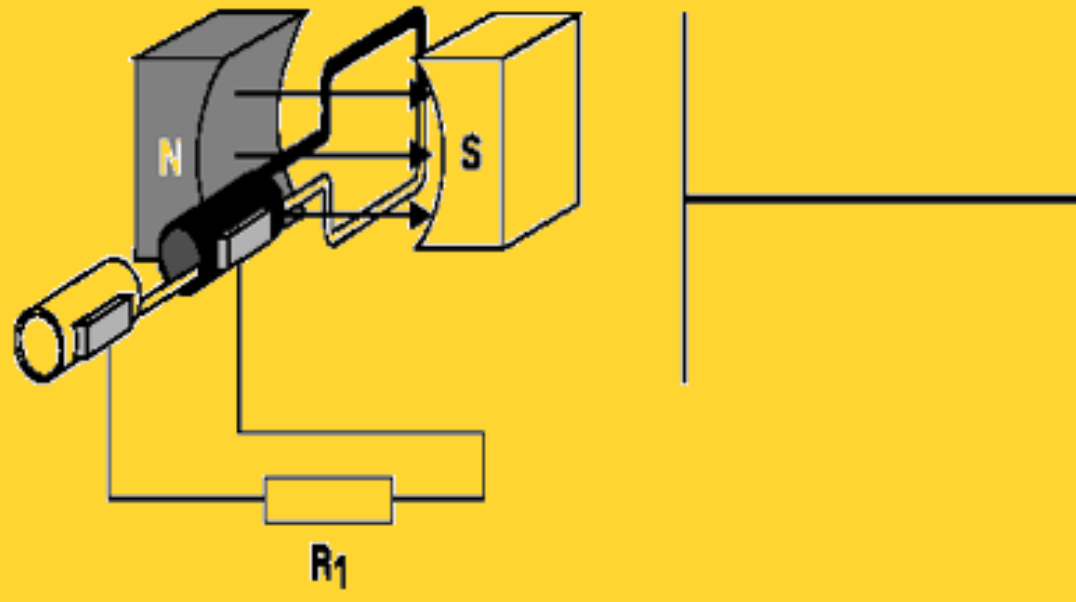


- DC generator converts mechanical energy into electrical energy.
- when a conductor move in a magnetic field in such a way conductors cuts across a magnetic flux of lines and e.m.f. produces in a generator and it is defined by faradays law of electromagnetic induction e.m.f. causes current to flow if the conductor circuit is closed.

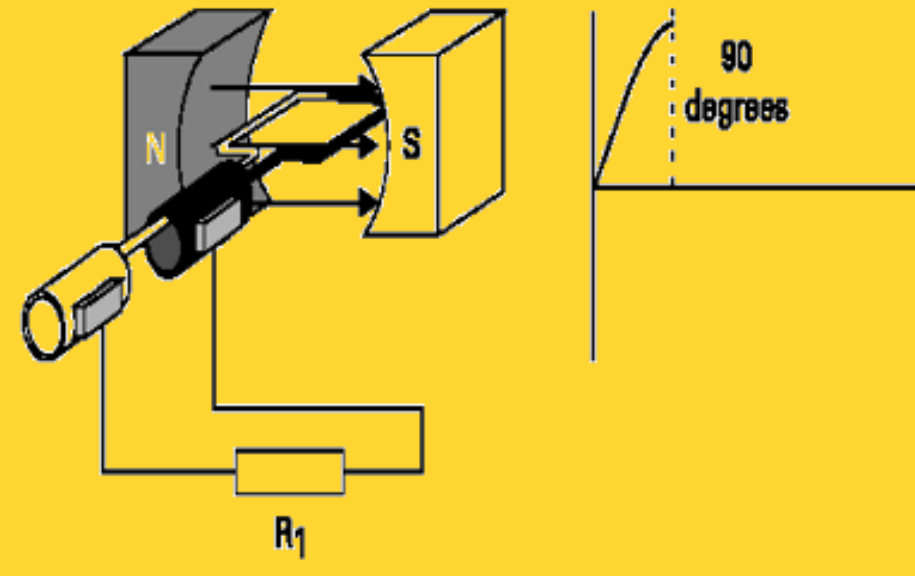




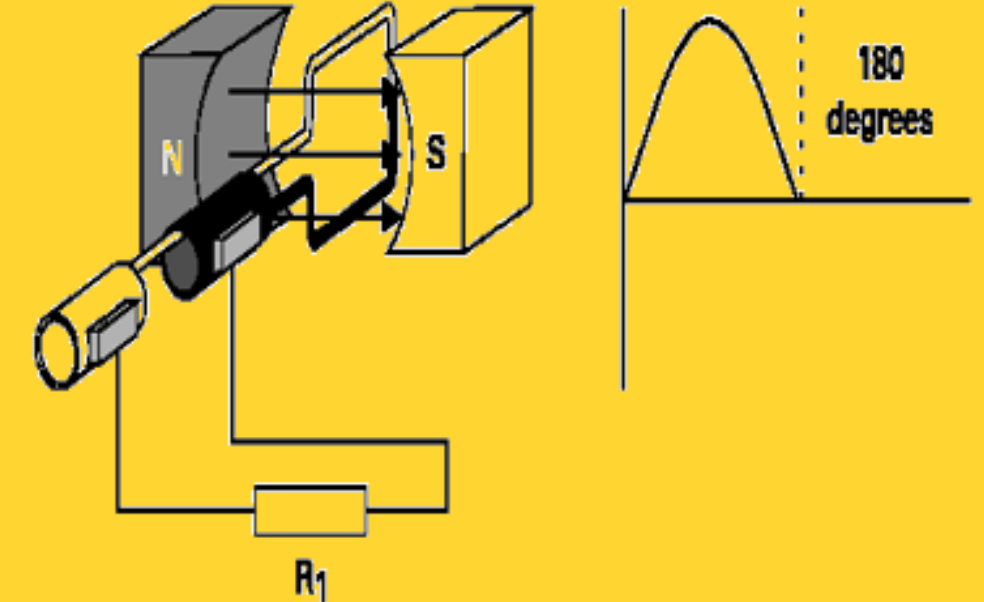
Operation of a Generator



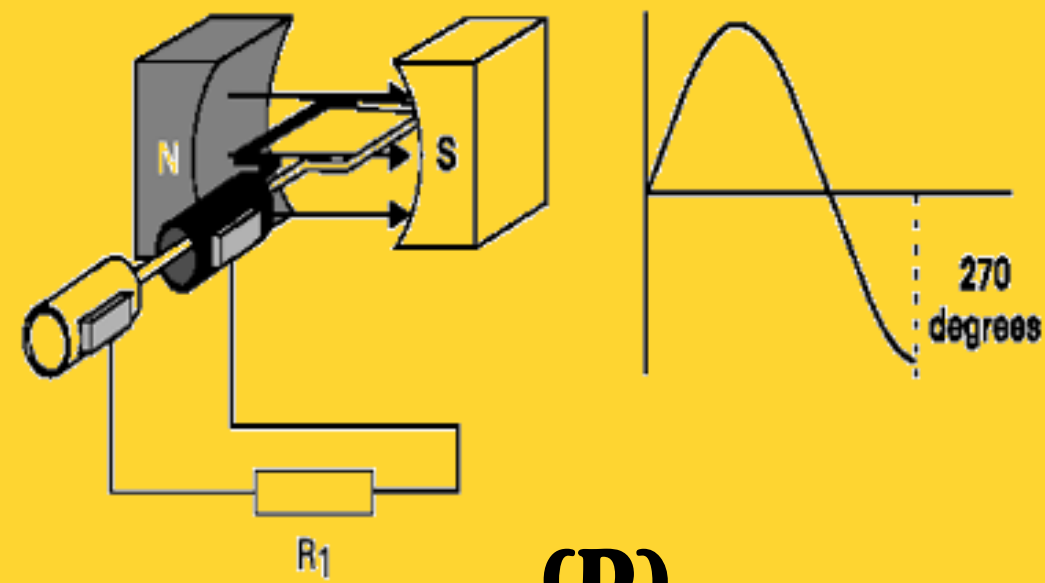
(A)



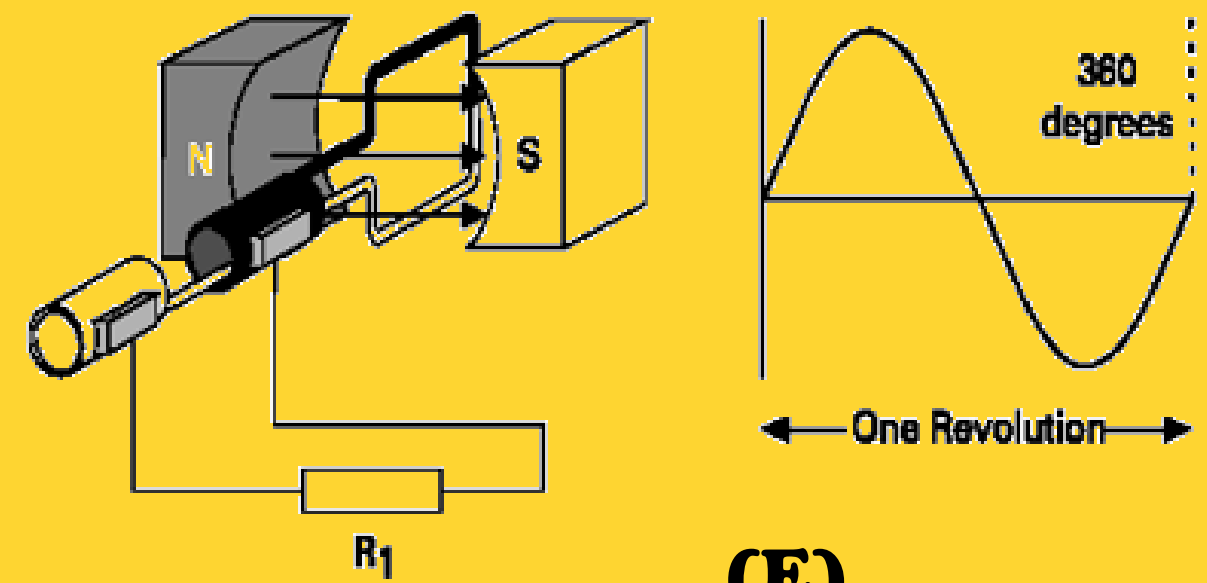
(B)



(C)



(D)



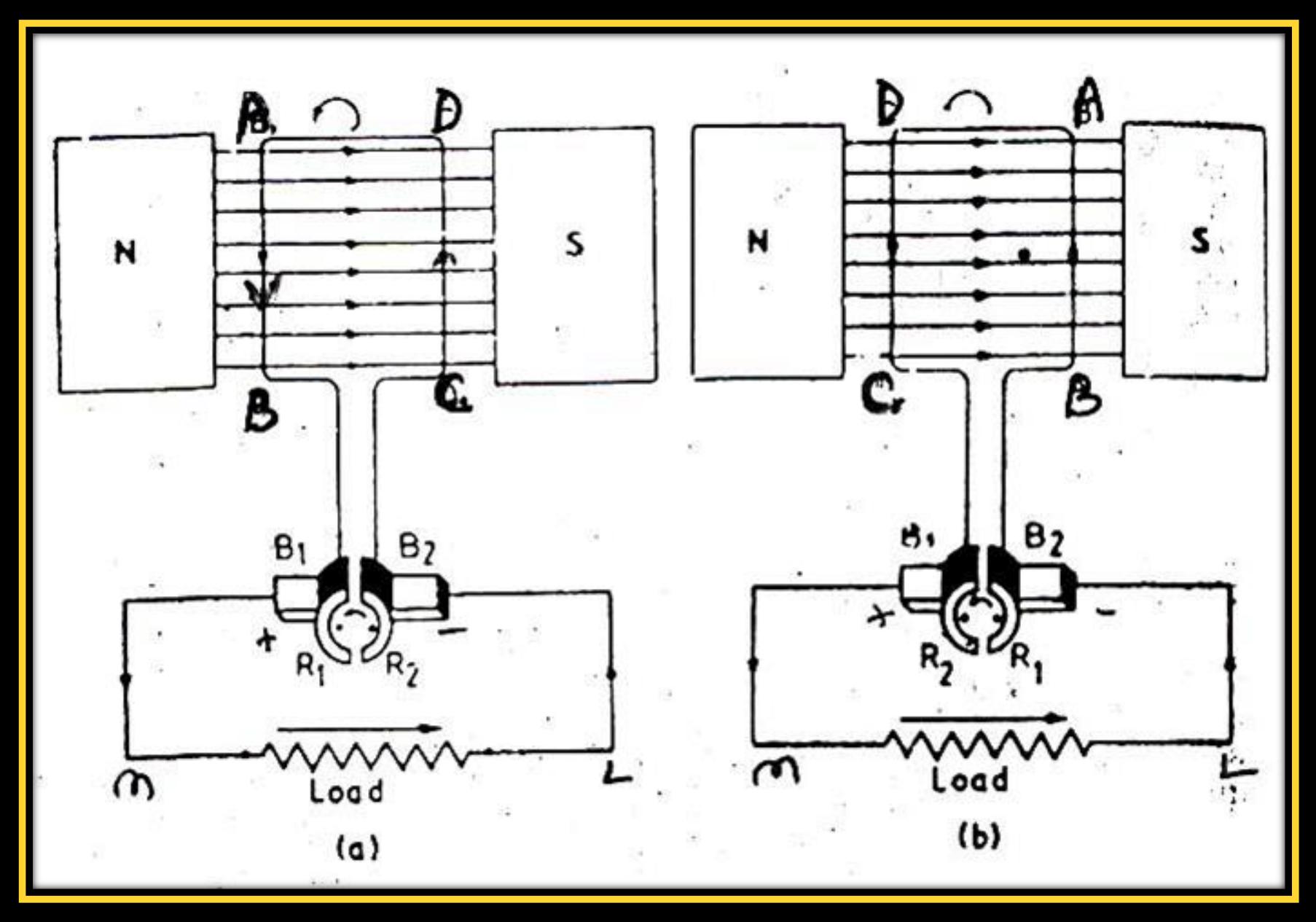
(E)



Operation of DC Generator -

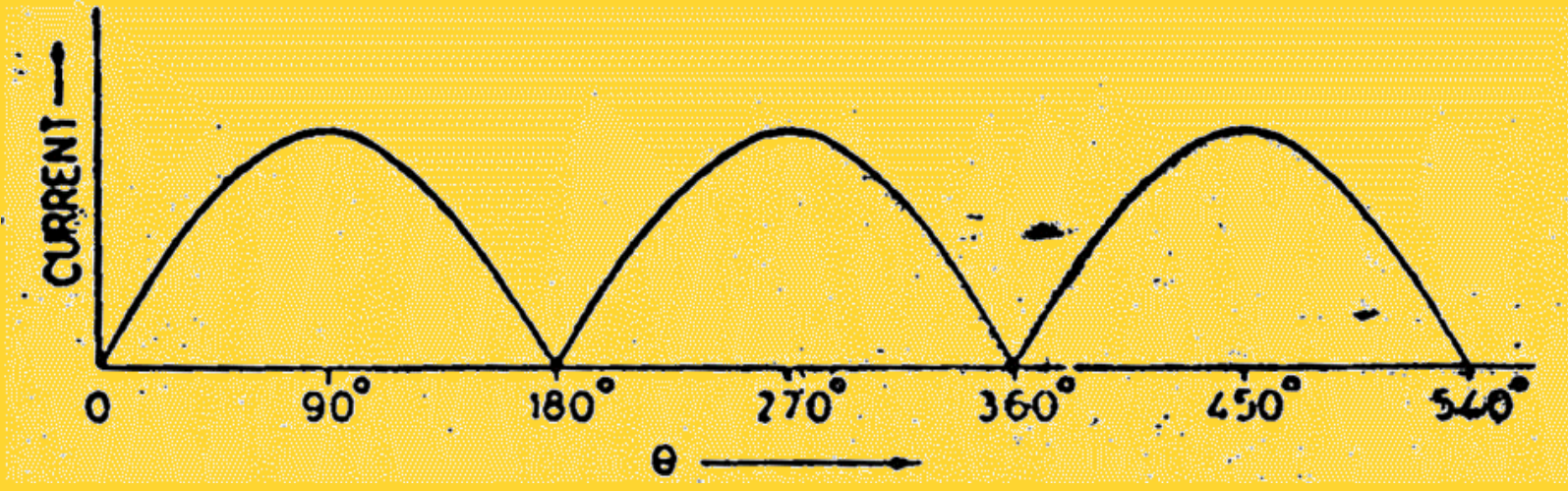


Split Rings



1st half cycle(0° to 180°) Path of current
 $ABR_1B_1MLR_2B_2CD$

2st half cycle(180° to 360°) Path of current
 $DCR_2B_1MLB_2R_1BA$





RECALL

1. Whenever the ----- linked with a circuit changes, an e.m.f. is always induced in it.
2. The above law is called ----- law
3. The direction of induced E.M.F in a coil is such that it ----- the cause of producing it.
4. The above equation is stated by which law?



THANK YOU