



# **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

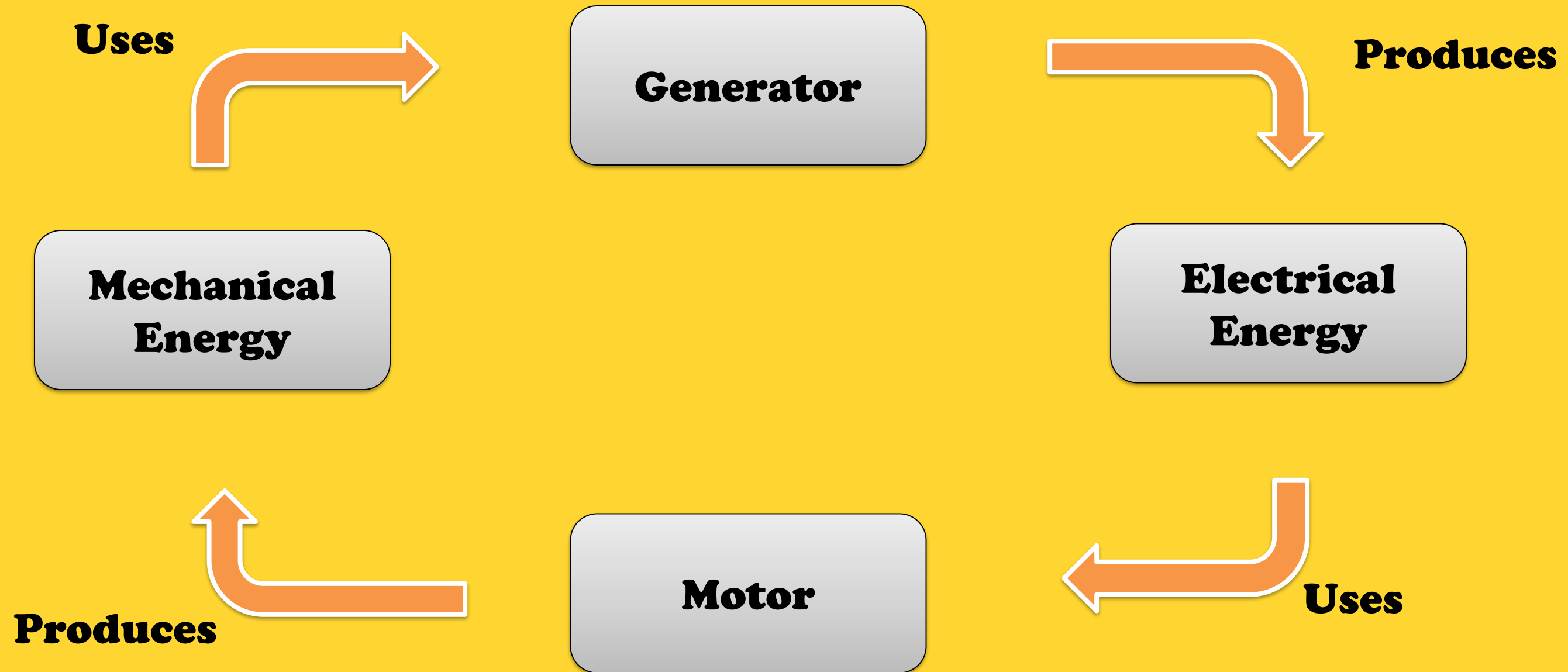


- Sanjay was an 8 year old boy
- On a summer holiday went to his grandpa house
- He also went on a ride with his grandpa in a bicycle
- In the evening he was surprised to see
- In front of the cycle a bulb was glowing yellow in colour
- He enquired about it with his grandpa
- What would his grandpa replied?





# 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

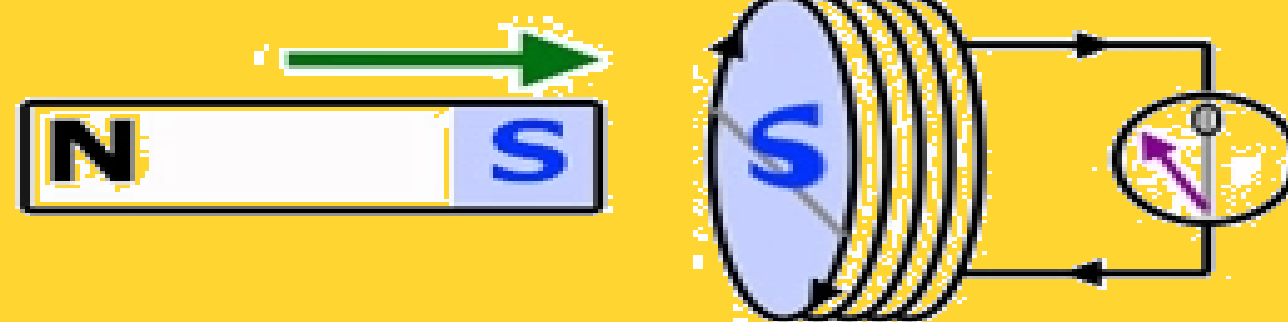


“The induced currents in a conductor are in such a direction as to oppose the change in magnetic field that produces them..”

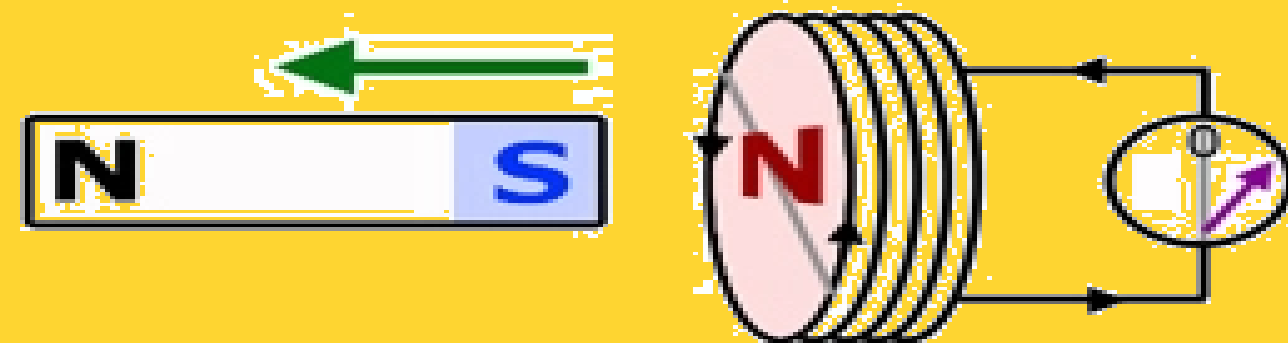
or

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

movement **against** repulsion



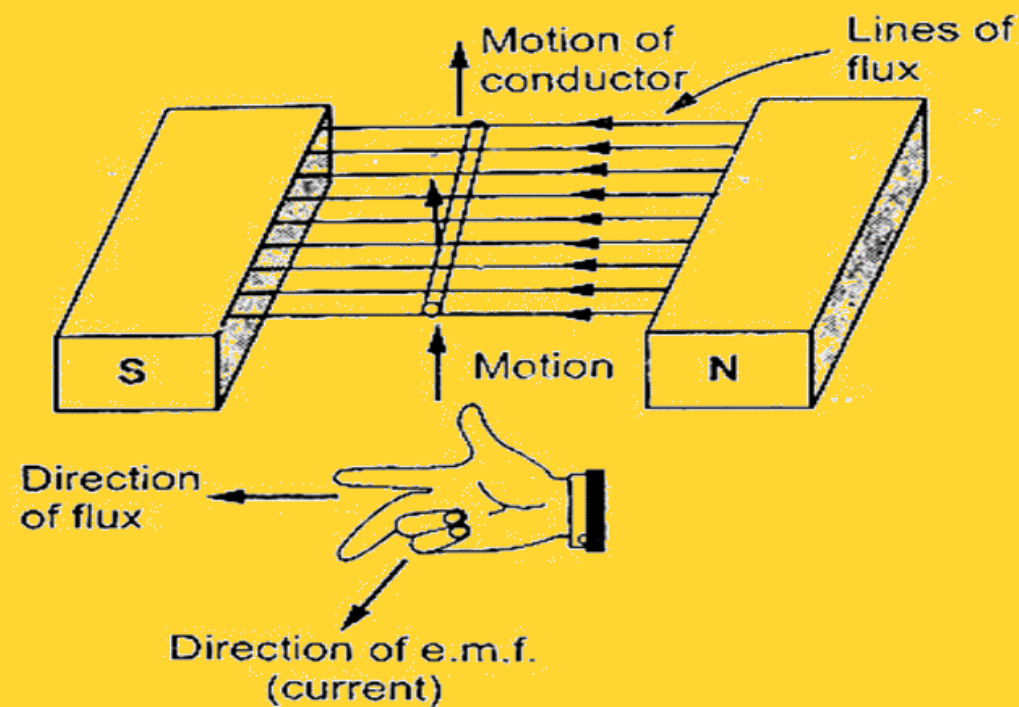
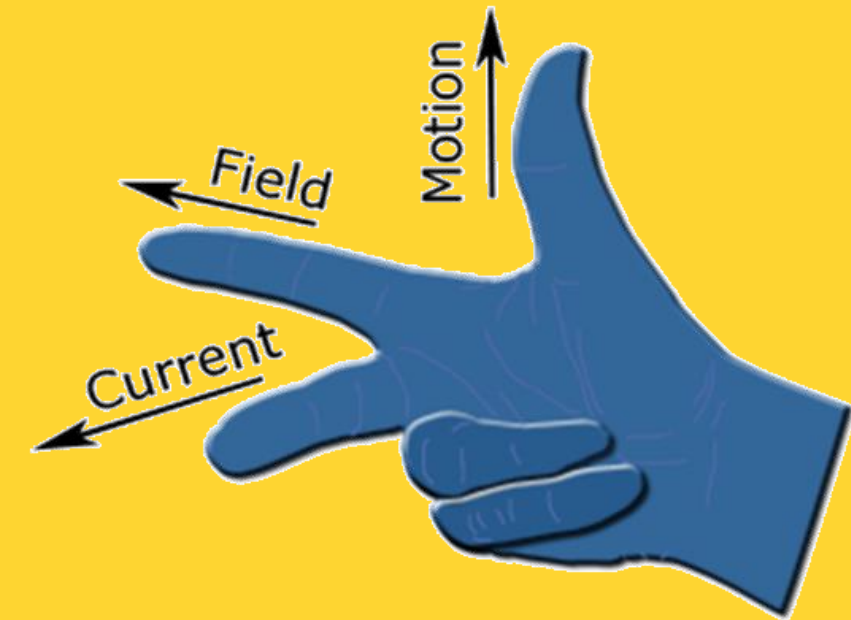
movement **against** attraction





# 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

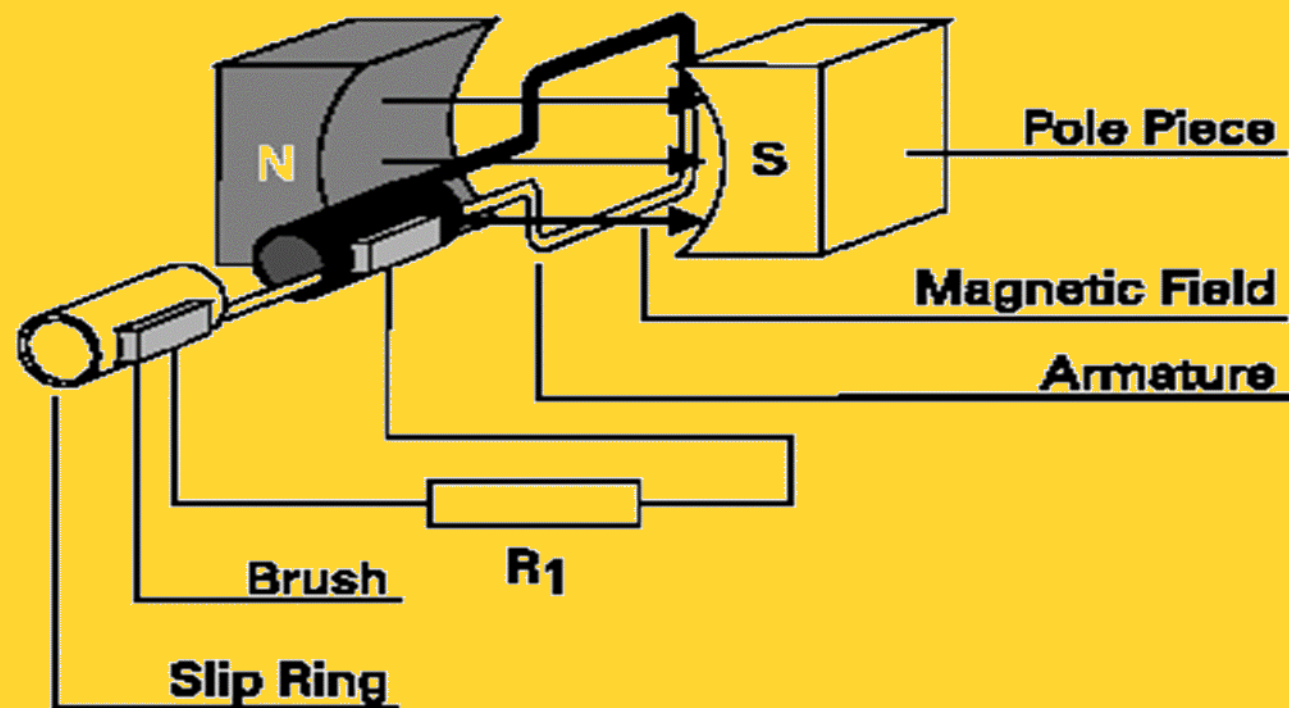




# Basic requirements to be satisfied for generation of E.M.F



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)

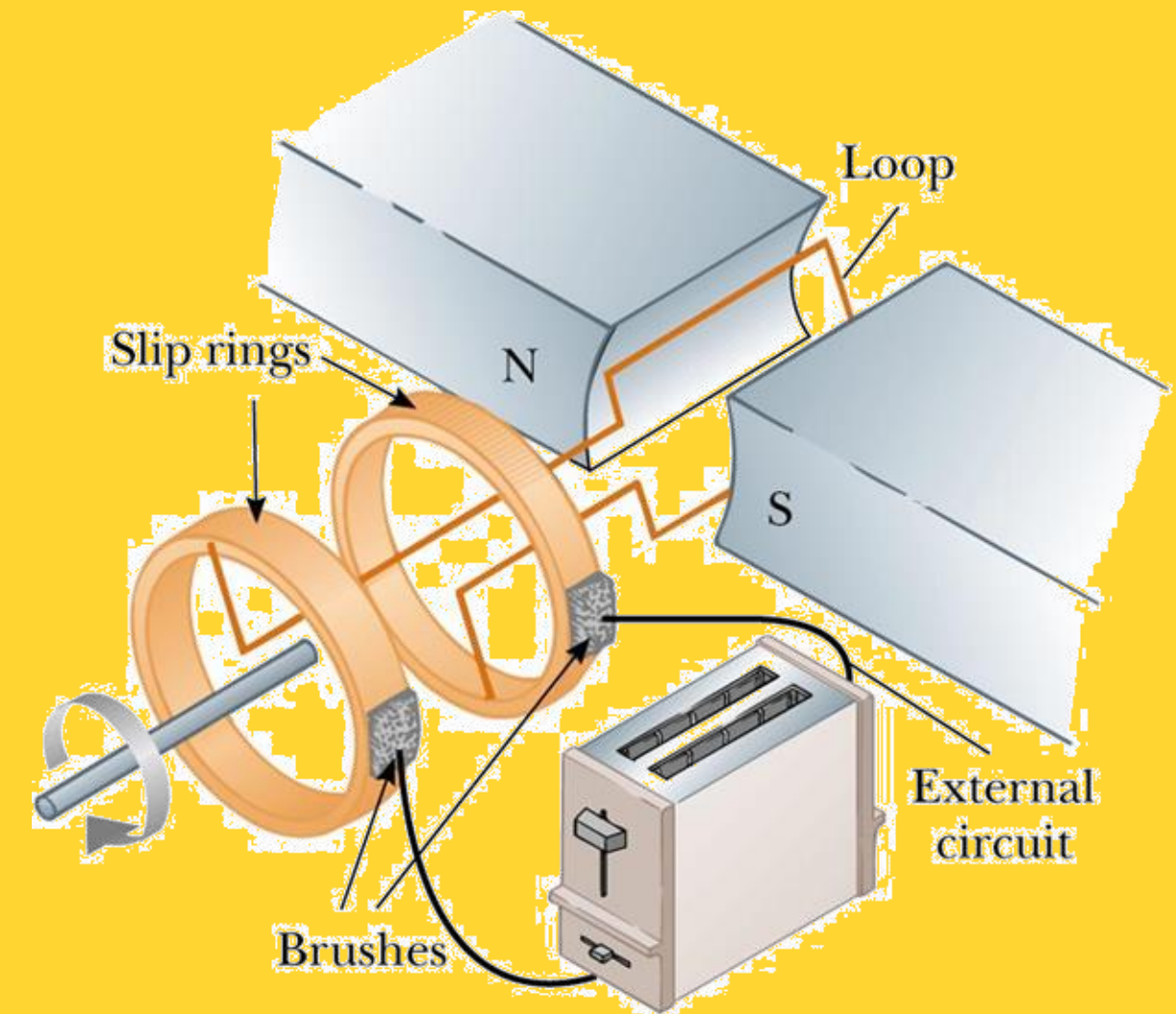




# PRINCIPLE OF OPERATION

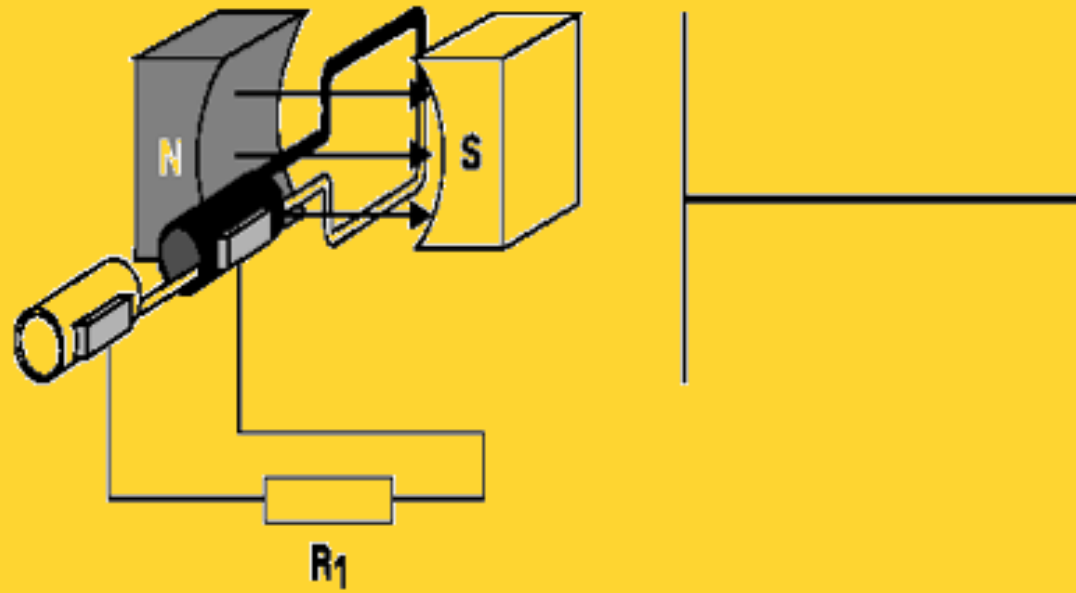


- DC generator converts mechanical energy into electrical energy.
- when a conductor move in a magnetic field in such a way conductors cuts across a magnetic flux of lines and e.m.f. produces in a generator and it is defined by faradays law of electromagnetic induction e.m.f. causes current to flow if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

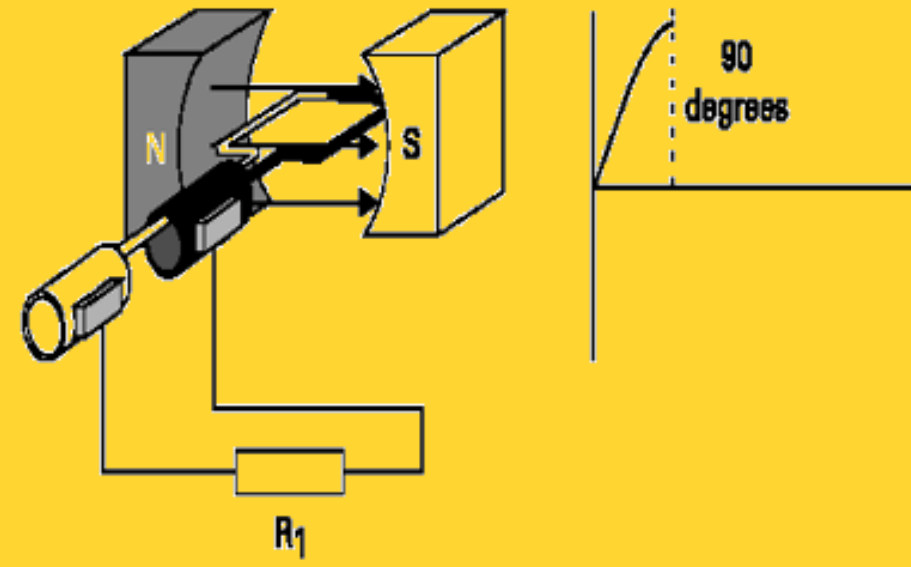




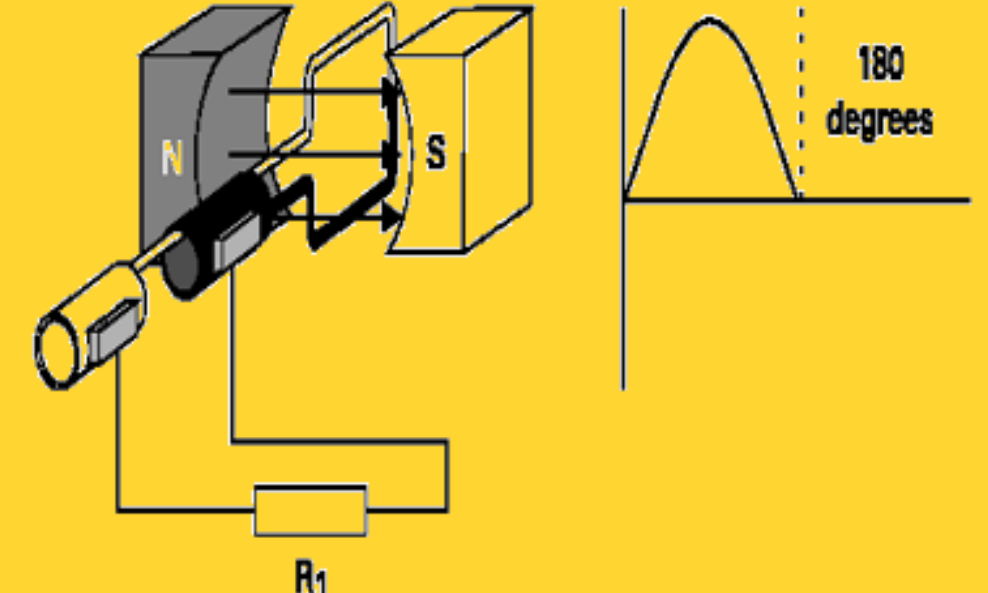
# Operation of a Generator



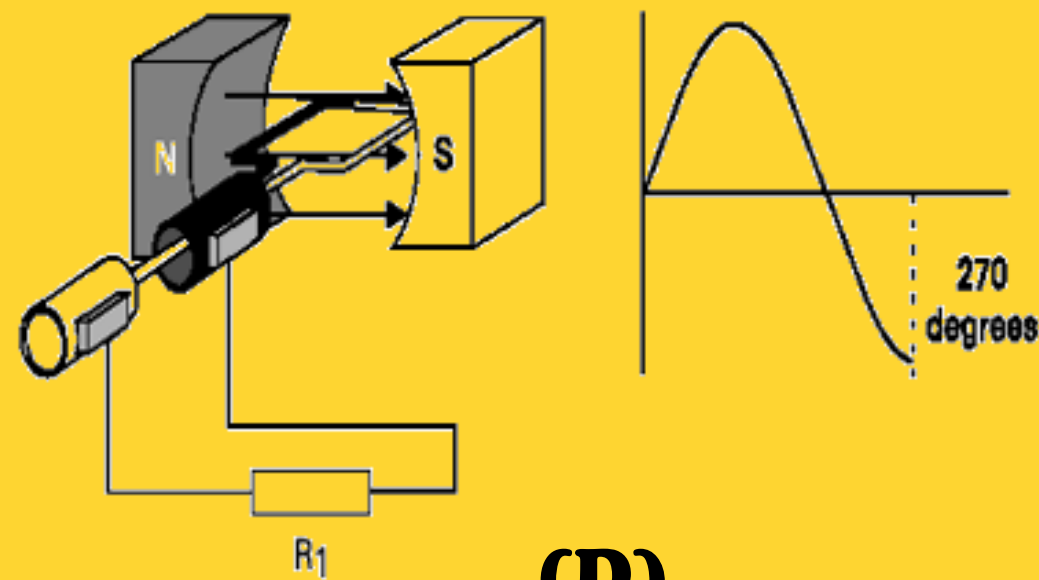
**(A)**



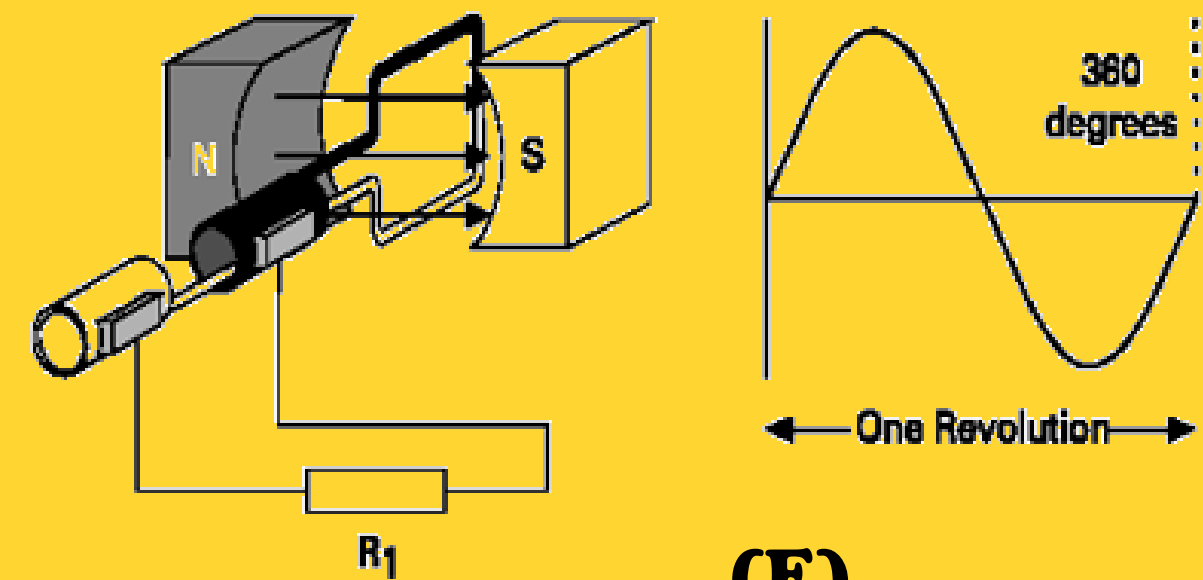
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**(C)**



**(D)**



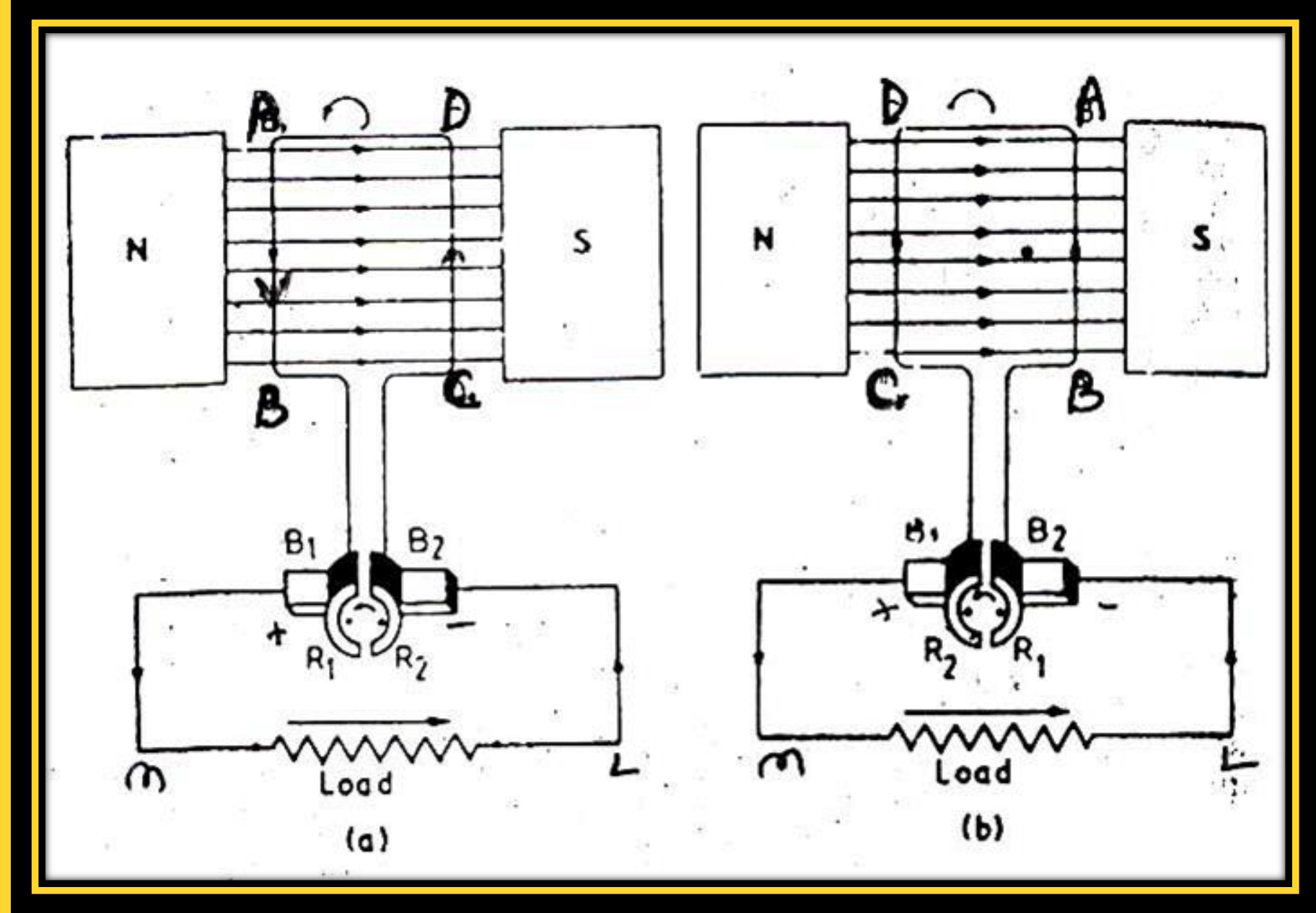
**(E)**



# Operation of DC Generator -

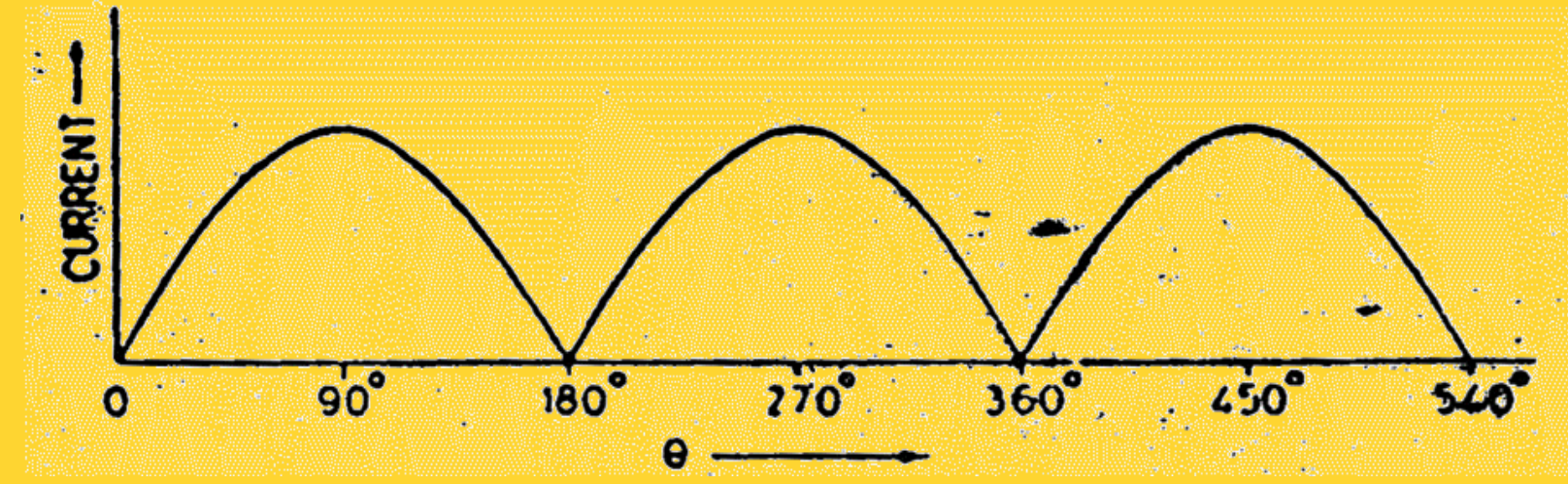


## Split Rings



1st half cycle( $0^{\circ}$  to  $180^{\circ}$ ) Path of current  
 $ABR_1B_1MLR_2B_2CD$

2st half cycle( $180^{\circ}$  to  $360^{\circ}$ ) 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