



# **SNS COLLEGE OF TECHNOLOGY**

**(An Autonomous Institution)**

**COIMBATORE-35.**



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

## **DEPARTMENT OF AUTOMOBILE ENGINEERING**

**COURSE NAME : 19AUB204 – AUTOMOTIVE ELECTRICAL AND ELECTRONICS ENGINEERING**

**II YEAR / IV SEMESTER**

**Unit 3 – Charging System**

**Topic : Alternator**



# ALTERNATOR



- ❖ An alternator responsible for converting mechanical energy from the engine into electrical energy to power various components and recharge the battery.
- ❖ Alternators typically consist of a rotor, stator, and diode assembly. As the engine runs, the alternator generates an alternating current (AC) that's then converted into direct current (DC) by the diodes.
- ❖ This DC current powers the vehicle's electrical systems and charges the battery.
- ❖ Alternators play a crucial role in maintaining a vehicle's electrical functions, including powering lights, the radio, and other accessories, while also ensuring the battery remains charged for starting the engine.



# COMPONENTS



- ❖ **Rotor:** The rotor is the rotating part of the alternator. It consists of a coil of wire wound around an iron core and is mounted on a shaft. When the engine is running, the rotor spins inside the stator, inducing an electromagnetic field.
- ❖ **Stator:** The stator is the stationary part of the alternator that surrounds the rotor. It contains multiple coils of wire wound around iron cores. As the rotor spins, it induces an alternating current (AC) in the stator windings due to electromagnetic induction.



# COMPONENTS



- ❖ **Diode Rectifier Assembly:** The alternating current (AC) generated in the stator windings is converted into direct current (DC) by the diode rectifier assembly. This assembly consists of a set of diodes arranged in a bridge configuration, which rectifies the AC output of the alternator into a pulsating DC output.
- ❖ **Voltage Regulator:** The voltage regulator is responsible for controlling the output voltage of the alternator to ensure a consistent voltage supply to the vehicle's electrical system. It monitors the electrical system's voltage and adjusts the field current in the rotor to regulate the alternator's output voltage.



# COMPONENTS



- ❖ **Bearings:** Bearings support the rotor shaft and allow it to rotate smoothly within the alternator housing. They reduce friction and wear, helping to extend the lifespan of the alternator.
- ❖ **Cooling Fan:** Many alternators include a cooling fan mounted on the rotor shaft or integrated into the housing. The cooling fan helps dissipate heat generated during operation, preventing overheating of the alternator components.



# WORKING



- ❖ The alternator is typically driven by a belt connected to the engine's crankshaft.
- ❖ As the engine runs, it rotates the crankshaft, which in turn spins the alternator's rotor.
- ❖ The rotor of the alternator consists of a coil of wire wrapped around an iron core.
- ❖ As it spins, it creates a rotating magnetic field around the stationary stator.
- ❖ The stator contains stationary coils of wire.
- ❖ As the rotor's magnetic field sweeps across these coils, it induces an alternating current (AC) in them through electromagnetic induction.
- ❖ The AC produced in the stator windings is characterized by constantly changing polarity.



# WORKING



- ❖ The AC output from the stator needs to be converted into direct current (DC) to power the vehicle's electrical systems and charge the battery.
- ❖ This conversion is achieved by the diode rectifier assembly, which allows current to flow in only one direction, effectively converting the AC to DC.
- ❖ The voltage regulator monitors the electrical system's voltage and adjusts the field current supplied to the rotor to maintain a stable output voltage.
- ❖ This ensures that the alternator produces the correct voltage to power the vehicle's electrical components and charge the battery.



# WORKING

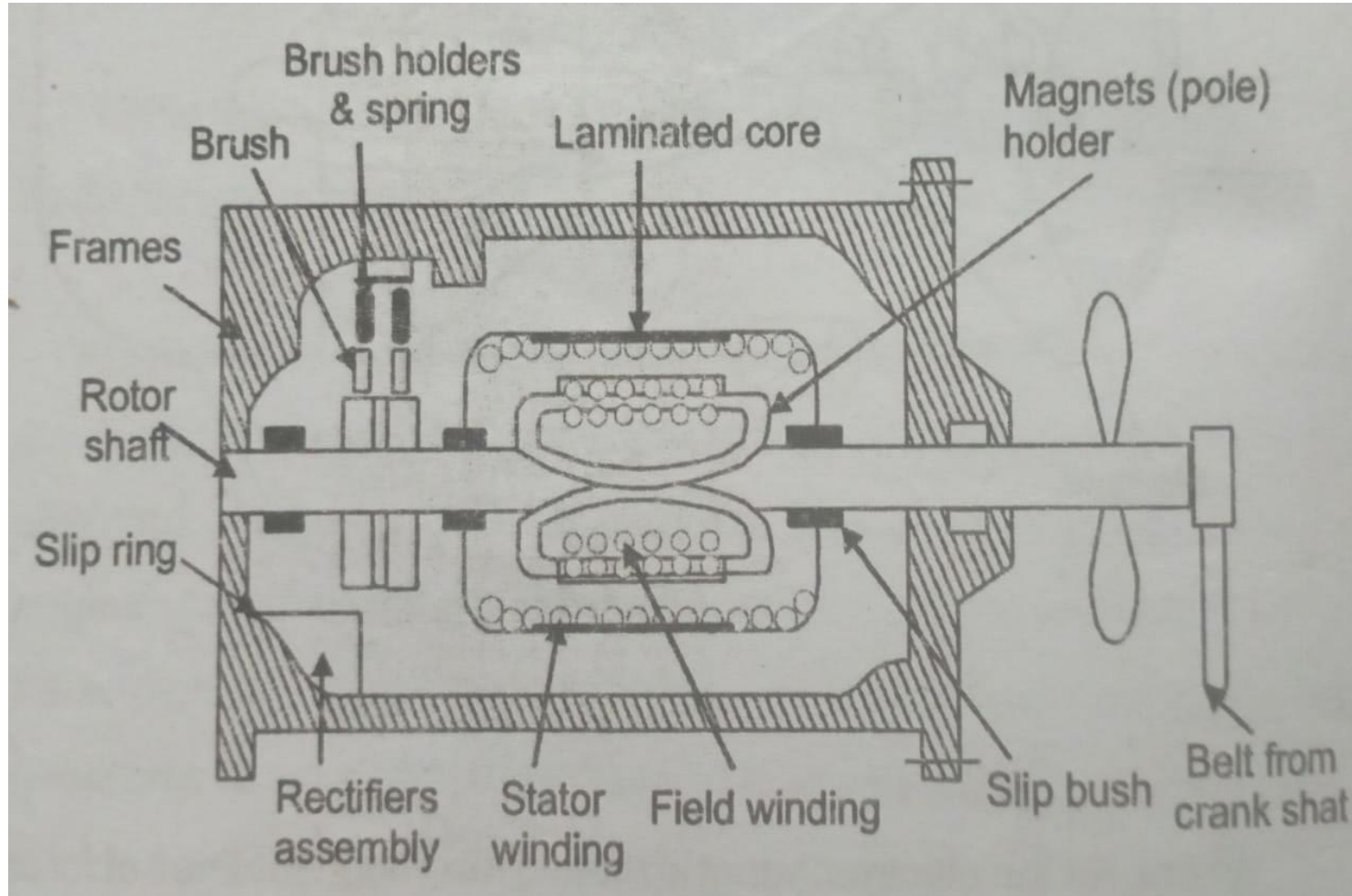


- ❖ The DC output from the alternator is then used to power various electrical components in the vehicle, such as lights, ignition system, audio system, and more.
- ❖ Additionally, any excess electrical power generated by the alternator is used to recharge the vehicle's battery.
- ❖ Alternators can generate heat during operation due to electrical resistance and mechanical friction.
- ❖ Many alternators have built-in cooling systems, such as airflow from the vehicle's engine or dedicated cooling fans, to dissipate this heat and prevent overheating.





# WORKING





THANK YOU !!!