



# **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 : 19AUB202 – AUTOMOTIVE SYSTEMS**

**II YEAR / III SEMESTER**

**Unit 5 – Braking System**

**Topic : Mechanical Brakes, Hydraulic Brakes, Power Brakes, Servo Brakes**



# MECHANICAL BRAKE



- ❖ A mechanical brake is a type of braking system that relies on mechanical components, such as cables, levers, and linkages, to transmit force and apply friction to slow down or stop a vehicle.
- ❖ Unlike hydraulic brakes that use brake fluid to transfer force, mechanical brakes operate through direct mechanical action.
- ❖ They are commonly found in bicycles, some older vehicles, and certain industrial applications.



# COMPONENTS



## ❖ Brake lever or pedal:

- The brake lever or pedal is the input device that the driver or rider uses to initiate the braking process.
- When the lever or pedal is activated, it applies force to the mechanical system.

## ❖ Cables:

- Mechanical brakes use cables to transmit the force from the brake lever or pedal to the brake components located at the wheels.
- These cables are flexible and can be routed around corners and through housings.



# COMPONENTS



## ❖ Brake drums or discs:

- The braking components at each wheel may include brake drums (in drum brake systems) or brake discs (in disc brake systems).

## ❖ Brake shoes or pads:

- In drum brake systems, brake shoes are pressed against the brake drum to create friction and slow down the vehicle.
- In disc brake systems, brake pads press against the brake disc to achieve the same effect.



# COMPONENTS



## ❖ Return springs and levers:

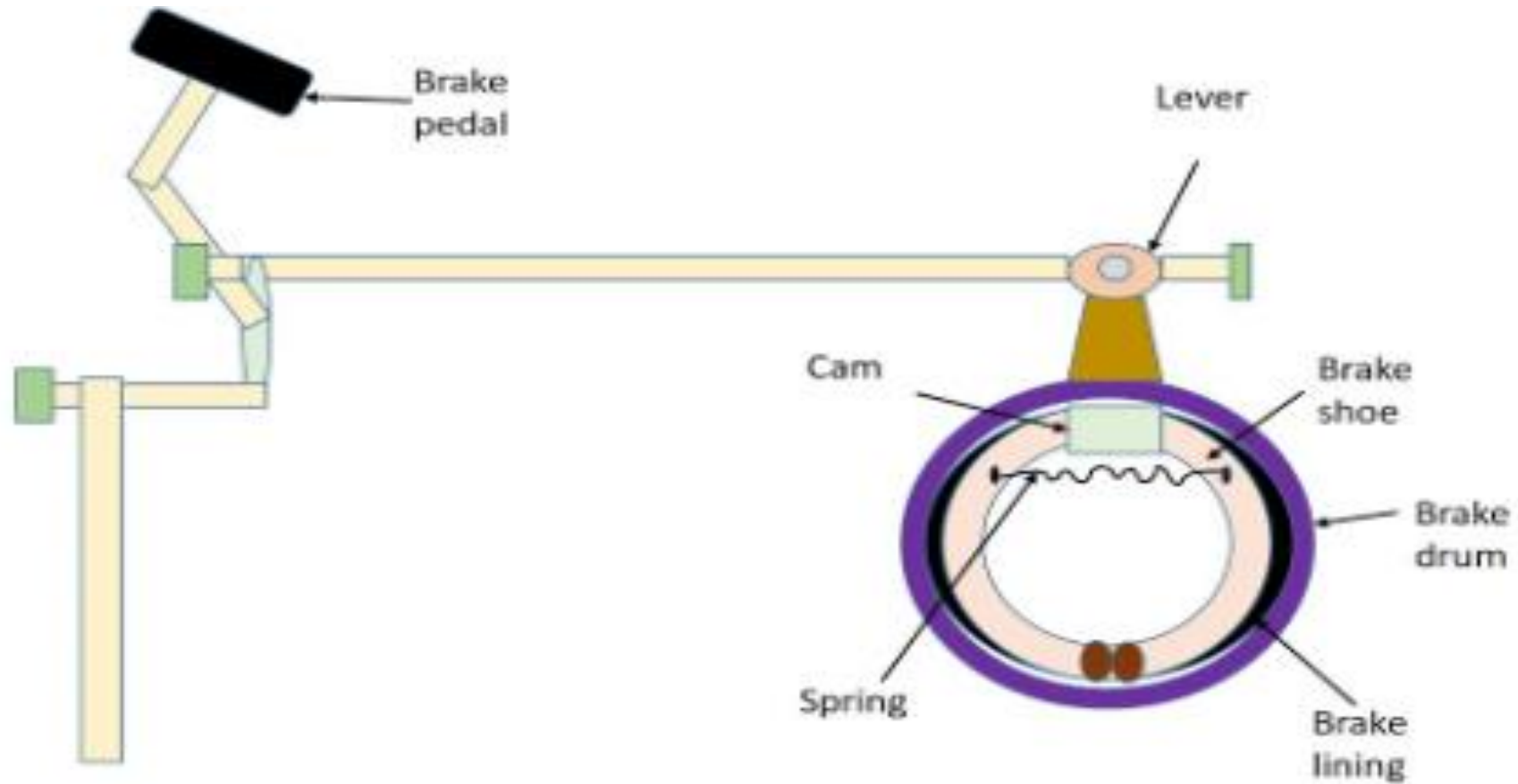
- These components are used to release the brake shoes or pads when the brake pedal is not being pressed, allowing the wheels to rotate freely.

## ❖ CAM:

- The cam is a rotating component connected to the brake linkage.
- As the brake pedal is depressed, it activates the cam mechanism.
- The cam's rotation causes the brake shoes to move outward against the inner surface of the brake drum.
- This movement creates friction between the brake linings and the drum, generating the braking force that slows down or stops the vehicle.



# COMPONENTS





# HYDRAULIC BRAKE



- ❖ A hydraulic brake is a type of braking system that uses brake fluid to transmit force and apply pressure to the brake components ultimately slowing down or stopping a vehicle.
- ❖ It is commonly used in automobiles, motorcycles, bicycles, and other vehicles.



# COMPONENTS



## ❖ Pedal:

- The brake pedal is the input device that the driver uses to initiate the braking process.
- When the driver presses the brake pedal, it activates the brake system.

## ❖ Master cylinder:

- The master cylinder is located near the brake pedal and is connected to it.
- When the brake pedal is pressed, the master cylinder generates hydraulic pressure in the brake fluid.





# COMPONENTS



## ❖ Brake lines:

- Brake lines are a network of tubes or hoses that carry the brake fluid from the master cylinder to the brake calipers or wheel cylinders at each wheel.

## ❖ Brake calipers (or wheel cylinders):

- In disc brake systems, calipers are used to apply pressure to the brake pads, which then press against the brake disc (rotor) to generate friction and slow down the vehicle
- . In drum brake systems, wheel cylinders push brake shoes against the brake drum to achieve the same effect.

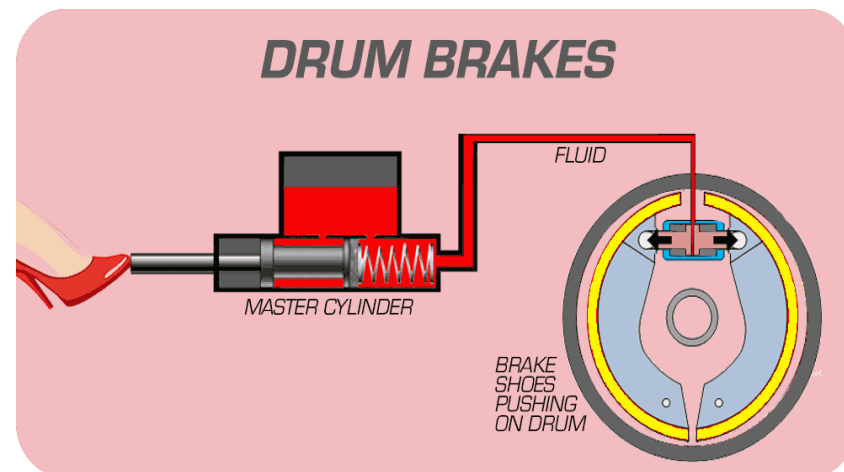


# COMPONENTS



## ❖ Brake fluid:

- Brake fluid is a specially formulated hydraulic fluid that is used to transmit the pressure created by the master cylinder to the brake calipers or wheel cylinders.
- It has a high boiling point to withstand the heat generated during braking.





# POWER BRAKE



- ❖ A power brake, commonly known as power brakes or power-assisted brakes, is a system in automobiles that helps drivers apply the brakes with less physical effort.
- ❖ The primary purpose of power brakes is to reduce the force required by the driver to actuate the brake pedal.
- ❖ Types – Vacuum power assisted, Hydraulic power assisted, Electrohydraulic power assisted



# COMPONENTS



## ❖ Pedal:

- The brake pedal is the input device that the driver uses to initiate the braking process.
- When the driver presses the brake pedal, it activates the brake system.

## Vacuum Brake Booster:

- The vacuum brake booster is a critical component that provides power assistance to the braking system.
- It typically contains a diaphragm and a valve mechanism.
- The diaphragm is connected to the brake pedal, and the booster is connected to the engine's vacuum source.



# COMPONENTS



## ❖ Vacuum Hose:

- A vacuum hose connects the vacuum brake booster to the intake manifold of the engine.
- It allows the brake booster to utilize engine vacuum for power assistance.

## ❖ Master Cylinder:

- The master cylinder is a hydraulic component that converts the force applied by the driver on the brake pedal into hydraulic pressure.
- It contains pistons and a reservoir filled with brake fluid.



# COMPONENTS



## ❖ Hydraulic Lines:

- Hydraulic lines or brake lines carry the hydraulic pressure from the master cylinder to the brake calipers (in disc brake systems) or wheel cylinders (in drum brake systems).

## ❖ Brake Calipers or Wheel Cylinders:

- In disc brake systems, calipers squeeze brake pads against a rotating disc to create friction and slow down the vehicle.
- In drum brake systems, wheel cylinders push brake shoes against the inside of a rotating drum to achieve braking.

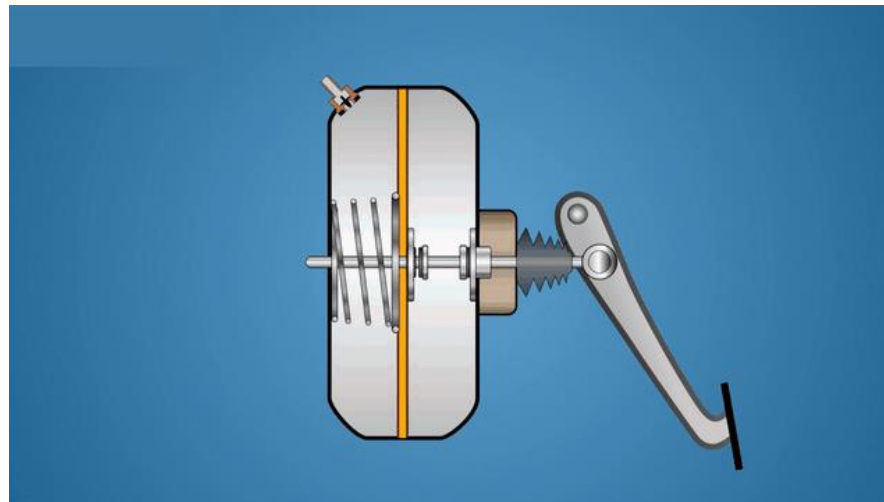


# COMPONENTS



## ❖ Brake fluid:

- Brake fluid is a specially formulated hydraulic fluid that is used to transmit the pressure created by the master cylinder to the brake calipers or wheel cylinders.
- It has a high boiling point to withstand the heat generated during braking.





# WORKING



- ❖ When the driver presses the brake pedal, a force is applied to a pushrod connected to the brake pedal.
- ❖ The pushrod is connected to a diaphragm inside the vacuum brake booster.
- ❖ As the driver applies force to the brake pedal, the pushrod moves forward, causing the diaphragm to move as well.
- ❖ The vacuum brake booster is connected to the intake manifold of the engine via a vacuum hose.
- ❖ The engine, during its operation, creates a vacuum in the intake manifold.





# WORKING



- ❖ The movement of the diaphragm in the brake booster changes the pressure within the booster.
- ❖ A valve in the booster opens, allowing engine vacuum to enter one side of the diaphragm, while the other side is exposed to atmospheric pressure.
- ❖ The pressure difference between the vacuum side and atmospheric side of the diaphragm creates a force that assists in multiplying the force applied by the driver on the brake pedal.
- ❖ This force is then transmitted to the master cylinder.



THANK YOU !!!