

## **EXPERIMENT:-01**

### **AIM OF THE EXPERIMENT**

**Study the differential mechanism and determine the differential ratio.**

### **APPARATUS REQUIRED**

<i>SL.NO</i>	<i>EQUIPMENT</i>	<i>SPECIFICATION</i>	<i>QUANTITY</i>
01	MODEL OF A DIFFERENTIAL		01

### **THEORY**

- ❖ Generally the two rear wheels turn on the road exactly at the same speed when a vehicle travels in a straight line. There is no relative movement between the two rear wheels.
- ❖ The propeller shaft which is geared rigidly with the rear axle must rotate the rear wheels simultaneously.
- ❖ But when vehicle takes a turn, the outer wheel travels a longer radius than the inner wheel. The outer wheel turns faster than the inner wheel, so that there is a relative movement between the two rear wheels.
- ❖ If the two rear wheels are rigidly fixed to a rear axle the inner wheel will slip which will cause rapid tyre wear, steering difficulties and poor road holding.
- ❖ The purpose of the differential is to provide the relative movement to the two rear wheels when the vehicle is taking a turn. The torque transmitted to each wheel is however always equal.

### **CONSTRUCTION:-**

- ✓ A differential consists of a sun gears which are mounted on the inner end of each rear axle.
- ✓ A differential cage is assembled on the left axle. A ring gear called crown gear is attached to the cage, so that the cage rotates with the crown gear.
- ✓ The crown gear is driven by the bevel pinion. Both the crown wheel and cage are free on the left rear axle.
- ✓ The cage supports two planet pinions on a shaft which mesh with the two sun gears.
- ✓ Thus, when the differential cage is rotate and both wheels turn which are attached to the outer end of the rear axle.

## **OPERATION**

- ✓ When the differential cage is rotated, the planet gears will also rotate as they run around on the stationary axle sun gear.
- ✓ While rotating in this manner, the planet pinions carry rotary motion to the other axle sun gear, and rotate.
- ✓ When the vehicle taking a turn, the planet gears spin on its shaft transmitting more rotary motion to one rear wheel than to other.
- ✓ Thus when the car is running in a straight line, the crown wheel, differential cage, planet pinions and the sun gear are turns as a unit without any relative motion.
- ✓ But when the car takes a turn, the planet pinions rotate on their shaft to permit the outer rear wheel to turn more rapidly than the inner wheel.

## **CONCLUSION:-**

Hence we have successfully studied about the differential mechanism.

## **EXPERIMENT:-02**

### **AIM OF THE EXPERIMENT**

## Checking the spark plug, setting the port and check the ignition in the spark plug.

### APPARATUS REQUIRED

<i>SL.NO</i>	<i>EQUIPMENTS</i>	<i>SPECIFICATION</i>	<i>QUANTITY</i>
01	Model of a spark plug		01
02	Condenser		01
03	Distributor		01
04	Battery	12v	01

### THEORY:-

- ❖ Spark plug is device to produce electric spark to ignite the compressed air-fuel mixture inside the engine cylinder. The spark plug is screwed in the top of the cylinder, so that its electrodes projects in the combustion chamber.
- ❖ It must produce the spark at the correct movement at the end of the compression stroke.
- ❖ A proper gas is to be maintained between the two electrodes of the spark plug, so that the sparking may takes place.
- ❖ When the spark plug is screwed in the cylinder head, the ground electrode is said to be connected with ground.
- ❖ The terminal of the centre electrode is directly connected with H.T. lead of the ignition coil in case of single cylinder engine, or through the distributor in case of multi cylinder engine.
- ❖ The secondary circuit of the electrical system is to be completed through the gap between the electrodes. When the H.T. current passes through the circuit, it jumps the gap producing a spark, which ignites the compressed air fuel mixture in the cylinder.

### CONSTRUCTION:-

A spark plug is a device consists of mainly three parts:-

1. centre electrode or insulated electrode.
2. ground electrode or insulated electrode.
3. Insulation separating the two electrodes.

- ❖ The upper end of the centre electrode is connected to the spark plug terminal, where H.T cable from the ignition coil is connected. It is surrounded by porcelain insulator.
- ❖ The lower half portion of the insulator is fastened with a metal shell. The lower portion of the shell has a short electrode attached to one side and bent in towards the centre electrodes, so that there is a gap between the two electrodes.
- ❖ The two electrodes are thus separated by insulator. The sealing gaskets are provided between the insulator and the shell to prevent the escape of gases under various temperature and pressure condition.
- ❖ The lower part of the shell has screw threads and the upper part is made in hexagonal shape like a nut, so that the spark plug may be screwed in or unscrewed from the cylinder head.
- ❖ The material used in the construction of a spark plug are as follows:-

#### ***1. SHELL:-STEEL***

**2.INSULATION:-** PORCELAIN,MICA(the porcelain has disadvantages of brittleness and low resistance to thermal shocks .mica is somewhat attacked by fuels ,sintered alumina is now almost extensively used for insulation.).

**3.ELECTRODE:-** Nickel, alloy of nickel, manganese and silicon , Platinum alloys are better for electrodes ,but their high cost limit their use.

## **PROCEDURE**

- ⇒ First connect the terminal of the condenser to the terminal of the battery
- ⇒ Then connect the black terminal to positive and red terminal to negative terminal of the battery from the condenser.
- ⇒ Then ON the main switch of the spark plug model.
- ⇒ When we switch is ON , the ignition system supply high voltage surges of current to the spark plug .
- ⇒ The ignition coil steps 12 volts from the battery to the high tension voltage of about 20,000 to 30,000 volts required to jump the spark at the spark plug gap , which ignites to combustible charge in the engine cylinder .
- ⇒ The rotor of the distributor revolves and distributes the current to the four segments which in turn , send it to the spark plugs
- ⇒ The distributor then directs this high voltage to the proper spark plug when it jumps the gap , producing a spark which ignites the combustible mixture in the cylinder .

## **CONCLUSION**

From the above experiment we have successfully set the port and check the ignition in the spark plug.

## **EXPERIMENT:-03**

### **AIM OF THE EXPERIMENT**

**Study and demonstration of different circuit of carburetor.**

## APPARATUS REQUIRED

<i>SL.NO</i>	<i>EQUIPMENT</i>	<i>SPECIFICATION</i>	<i>QUANTITY</i>
01	Model of a carburetor	Simple	01

## THEORY:-

The carburetor is a device for atomizing and vaporizing the fuel and mixing it with the air in carrying proportion to suit the changing condition of spark ignition engine. The air fuel mixture so obtained from the carburetor is called the combustible mixture. The process of mixing the gasoline fuel with air is called carburetion.

### MAIN PARTS OF SIMPLE CARBURETOR:-

- i) Venture
- ii) Throttle valve
- iii) Metering system

### Venture:-

- ❖ A venture is a narrow space, through which the air passes at a high speed.
- ❖ There is a discharge jet which is usually located just below the narrowest section of the venture, so that the suction is greatest.
- ❖ There is a mixing chamber just below the discharge jet, which mixes gasoline spread from nozzle and the air entering through venture forming a combustible mixture. This mixture then passes through the intake main fold into the cylinder.

### Throttle valve:-

- ❖ The Throttle valve is like a circular dick which is located in the mixing chamber. It is connected to accelerator pedal in the drivers compartment.
- ❖ The operator which operates the accelerator pedal according to the operating requirement and the throttle valve is adjusted simultaneously.
- ❖ When tilted is open, more air fuel mixture goes to the cylinder developing more power and tends to run faster.
- ❖ When tilted is close, less air fuel mixture goes to the cylinder developing less power and tends to run slowly.

### Metering system:-

- ❖ To maintain correct air fuel mixture at high speed some automatic compensating devices must be provided which acts either to increase the air supply or to increase the fuel supply as the suction above the jet increase or decreases.
- ❖ The compensating devices used are metering rods, air-bleed jet, economizers, compound jets, auxiliary air valve, these are used to determine the metering system.

## **CONCLUSION**

From the above experiment we have successfully studied about simple carburetor.

## **EXPERIMENT:-04**

### **AIM OF THE EXPERIMENT**

**Study of parking system (Hydraulic /Air brake)**

### **APPARATUS REQUIRED:-**

<i>SL.NO</i>	<i>EQUIPMENT</i>	<i>SPECIFICATION</i>	<i>QUANTITY</i>
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01	MODEL OF A BRAKING BSYSTEM	HYDRAULIC	01
02	HYDRAULIC OIL	SAE40	

## **THEORY:-**

❖ A brake is a mechanical device which decreases speed of a vehicle. Its opposite component is a clutch. The function of the brakes are :-

1. To stop or slow down the vehicle in the shortest possible distance in an emergency.
2. To control the vehicle to be retained when descending a hill.
  - The hydraulic brakes are applied by the liquid pressure. The pedal force is transmitted to the brake shoe by means of a confined liquid through a system of force transmission.
  - The force applied to the pedal is multiplied and transmitted to all the brake shoes by a force transmission system.
  - It essentially consists of two main components i.e., master cylinder and wheel cylinder.
  - The master cylinder is connected by tubing to the wheel cylinder at each of the four wheels.
  - The system is filled with the liquid under light pressure, when the brakes are not in operation.
  - The liquid is known as brake fluid, and is usually a mixture of glycerin and alcohol or castor oil, denatured alcohol and some additives.

## **OPERATION:-**

- a. Within a hydraulic brake system, as the brake pedal is pressed, a push rod exerts force on the piston in the master cylinder causing fluid from the brake fluid reservoir to flow into a pressure chamber through a compensating port which results in an increase in the pressure of the entire hydraulic system.
- b. This pressure is conducted instantaneously to the wheel cylinder on each of the four brakes, where it forces the wheel cylinder piston outwards.
- c. These pistons in turn, force the brake shoes out against the brake drums.
- d. When the driver releases the brake pedals, the master cylinder piston returns to its original position due to the return spring pressure, and thus the fluid pressure in the entire system drops to its original low value, which allows the retracting spring on wheel brakes to pull the brake shoes out of contact with the brake drum into their original position. This causes the wheel cylinder pistons also to come back to their original position. Thus the brakes are released.

## **CONCLUSION:-**

**From the above experiment we have successfully studied about hydraulic braking system.**

## **EXPERIMENT NO:-05**

### **AIM OF THE EXPERIMENT**

**Calibration of strain gauge.**

### **APPARATUS REQUIRED**

<i>SL.NO</i>	<i>EQUIPMENT</i>	<i>SPECIFICATION</i>	<i>QUANTITY</i>
01	STRAIN GAUGE KIT	DIGITAL	01
02	WEIGHTS	100gms.	10
03	WEIGHTS	50gms.	05

## **THEORY**

- ❖ If a metal conductor is stretched or compressed its resistance change on account of the fact that both length and diameter of the conductor change.
- ❖ There is a change in the value of resistivity of the conductor when it is strained and this property is called piezoresistive effect.
- ❖ If a conductor of elastic material is subjected to tension or in other words positively strained, its longitudinal dimension will increase while there will be a reduction in the lateral dimensions.
- ❖ So when a gauge is subjected to a positive strain its length increases while its area of cross-section decreases.
- ❖ Since the resistance of a conductor is proportional to its area of cross-section the resistance of the gauge increases with positive strain.

## **PROCEDURE**

- ❖ Open the top cover of the trainer kit wooden box.
- ❖ Connect the cantilever beam leads with the trainer kit terminal.
- ❖ Connect the three pin mains plug of the kit to the main socket.
- ❖ Keep DVM switch at “ $\mu\text{s}$ ” position.
- ❖ Connect patch cord between o/p terminal and DVM terminal.
- ❖ Switch on the trainer kit, the display will light up and will show some reading.
- ❖ Adjust zero pot to set 0.00 reading on display, without apply any load on the pan.
- ❖ Put 1kgs weight on the pan of the cantilever beam, and adjust span pot to show reading on display.
- ❖ Now apply loads in steps of 50/100gms .And note down the readings in the following table in increasing and decreasing mode.

## **TABULATION**

SL.NO	READING IN INCREASING MODE				READING IN DEACREASING MODE			
	APPLIED LOAD (GMS)	LOAD(N)	CALCULATED STRAIN IN $\mu\text{S}$	DVM READING IN $\mu\text{S}$	APPLIED LOAD (GMS)	LOAD(N)	CALCULATED STRAIN IN $\mu\text{S}$	DVM READING IN $\mu\text{S}$
01								
02								
03								



04								
05								

## **CONCLUSION**

From the above experiment we have successfully test the performance of strain gauge.

## **EXPERIMENT NO:-06**

### **AIM OF THE EXPERIMENT**

**Study the electrical system of automobile.**

### **APPARATUS REQUIRED**

<i>SL. NO</i>	<i>EQUIPMENT</i>	<i>SPECIFICATION</i>	<i>QUANTITY</i>
01	ENGINE	DIESEL	01

02	BATTERY	12VOLT.DC.	01
03	CIRCUIT OF ELECTRICAL SYSTEM		

## **THEORY**

- ❖ The wiring circuit of a typical passenger car lighting system uses one wire for positive terminal connection and body is itself ground. The power/current is supplied to the system from the battery of 6 volt or 12 volt.
- ❖ The circuit begins at the battery and passes through the armature and a fuse before it reaches to any switch .
- ❖ The hand lamp circuit generally contains a foot operated dimmer switch which determines the flow of current to the upper or lower filament .
- ❖ The dome light is controlled either by a hand operated pillar switch or by an automatic door switch that completes the circuit .
- ❖ The stop light is controlled by stop light switch in the brake system so that when the brakes are applied the switch is ON .
- ❖ All other lights are controlled by light switch on the instrument panel .

## **CONCLUSION**

From the above experiment we have successfully studied about the electrical wiring system of an automobile