UNIT-II

We know that in case of Internal Combustion (IC) engines, combustion of air and fuel takes place inside the engine cylinder and the products of combustion expand to produce reciprocating motion of the piston. This reciprocating motion of the piston is in turn converted into rotary motion of the crank shaft through connecting rod and crank. This rotary motion of the crank shaft is in turn used to drive the generators for generating power. We also know that there are 4-cycles of operations viz.: suction; compression; power generation and exhaust. These operations are performed either during the 2-strokes of piston or during 4-strokes of the piston and accordingly they are called as 2-stroke cycle engines and 4-stroke cycle engines. In case of petrol engines during suction operation, charge of air and petrol fuel will be taken in. During compression this charge is compressed by the upward moving piston. And just before the end of compression, the charge of air and petrol fuel will be ignited by means of the spark produced by means of for spark plug. And the ignition system does the function of producing the spark in case of spark ignition engines. Spark gap Metal screw Sealing washer Porceleain insulator Contact Central electrode Gas tight seal Metal tongue

Types of Ignition System

Following are the **types of ignition system:**

1. Battery ignition system or coil ignition system
2. Magneto ignition system.
3. Electronic Ignition System.

Both the ignition system is based on the principle of common electromagnetic induction.
The **battery ignition system** is mostly used in passenger cars and light trucks.

In the battery ignition system, the current in the primary winding is supplied by the battery. In the magneto to the ignition system, the magneto produces and supplies the current in the primary winding.

Ignition System Parts

1. Battery,
2. Switch ignition distributor
3. Ignition coil
4. Spark plugs and
5. Necessary wiring.

Some system uses transistors to reduce the load on the distributor contact points. Other systems use a combination of transistors and magnetic pickup in the distributor.

Compression ignition engine does not have such an ignition system. In a compression ignition engine, only air is compressed in the cylinder. And at the end of the compression stroke, the fuel is injected which catch fire due to the high temperature and pressure of the compressed air.

An Ignition in The Vehicle

The ignition system supplied high voltage surges of current (as high as 30,000 to volts) the spark plug. These surges produce the electric sparks at the spark plug gap. Spark ignite to set fire to the compressed air-fuel mixture in the combustion chamber.

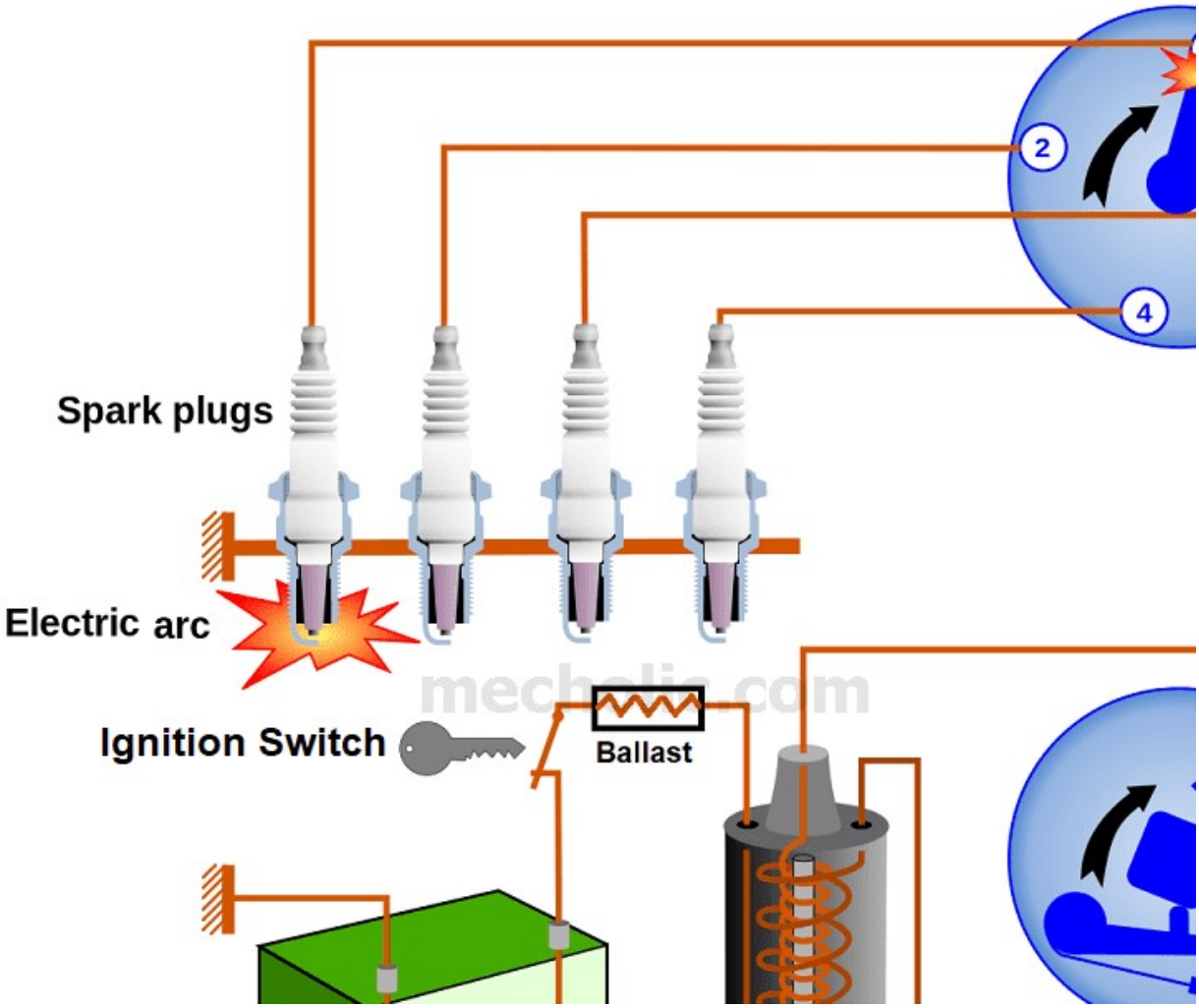
The sparking must take place at the correct time at the end of the compression stroke in every cycle of operation. At high speed or during part throttle operation, the spark is advanced. So that it occurs somewhat earlier in the cycle, the mixture thus has time to burn and deliver its power.

The ignition system should function efficiently at the high and low speeds of the engine. It should be simple to maintain, light, and compact. It should not cause any interference.

Battery Ignition System

The battery ignition system is generally employed in four cylinder engines. A battery of 12 volts is the fully employed. There are two circuits in the system primary and secondary circuits.

The first circuit has the battery, primary winding of the ignition coil, condenser, and contact breaker from the primary circuit. Whereas the secondary winding of the ignition coil, distributor, and spark plugs forms the secondary circuits.

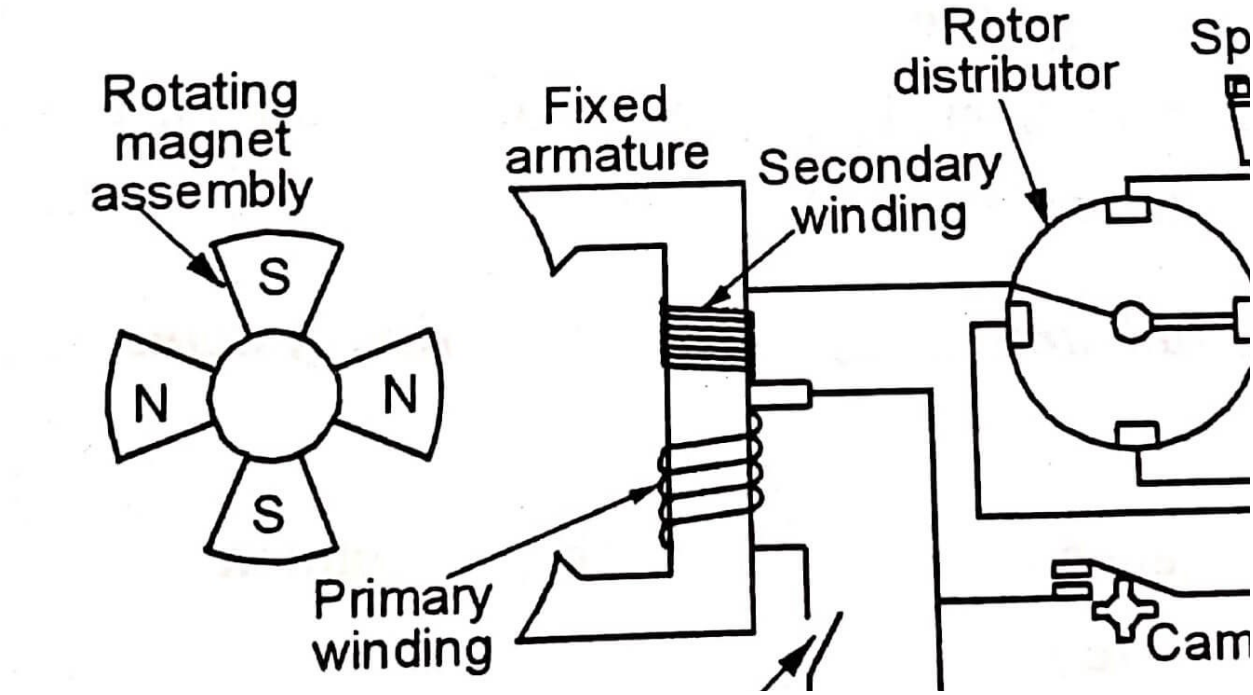


The value of the voltage depends upon the number of turns in each coil. The high voltage, 10,000 to 20,000 volts, then passes to a distributor.

It consists of the cylinder's spark plug in rotation depending upon the engine's firing order. This causes a high-intensity spark jumps across the gap. Thereby ignition of the air-fuel mixture takes place in all the cylinders. The **battery ignition system** has massive use in cars, light trucks, buses, etc.

Magneto Ignition System

The **magneto ignition system** has the same principle of working like that of the battery ignition system. In this, no battery is required, as the magneto acts as its own generator.



It consists of either rotating magnets in fixed coils or rotating coils in fixed magnets. The current produced by the magneto flows to the induction coil, which works like that of the battery ignition system.

This high voltage current is then made to flow to the distributor, which connects the sparking plugs in rotation depending upon the engine's firing order. This type of ignition system is used in small spark-ignition engines, for example, Scooters, Motorcycles, and small motorboat engines.

Electronic Ignition System

The conventional **electro-mechanical ignition system** uses mechanical contact breakers. Though it is very simple, it suffers from certain limitations as follows.

- The contact breaker points handle the heavy current. This results in burn out of contact points. Thus it requires periodical servicing and settings.
- The mechanically operated contact breaker has inertial effects. Hence at higher speeds, the make or break of contact may not be timed.
- At higher speeds, the dwell time for building up the current in the coil to its maximum value is low. Thus the spark strength may be reduced.

To overcome the above drawbacks, in modern automobiles, electronic ignition systems are used. This electronic ignition system performs best at all varying conditions and speeds, unlike electro-mechanical systems.