

**MODULE -V**  
**ENERGY SOURCES & STORAGE DEVICES**

**5.6 Electric Vehicles**



## 5.6 ELECTRIC VEHICLES

An EV is defined as a vehicle that can be powered by an electric motor that draws electricity from a battery and is capable of being charged from an external source. These are also referred to as battery electric vehicles. They have an electric motor instead of an internal combustion engine (IC). Running costs are very low as they have less moving parts for maintaining. As it runs on electricity the vehicle emits no exhaust gases.

### Working Principle

Electric vehicles work by plugging into a charge point and taking electricity from the grid. They store electricity in rechargeable batteries that power an electric motor, which rotates the wheels. Electric vehicles accelerate faster than traditional fuel engines. So they feel lighter to drive.

### Various steps of working

**Step 1:** Controller takes and regulates electrical energy from battery to inverter.

**Step 2:** The inverter then senses a certain amount of electrical energy to the motor.

**Step 3:** The motor converts electrical energy into mechanical energy (rotation).

**Step 4:** Rotation of the motor rotor rotates the transmission, so the wheels turn and then the vehicle moves.

**Step 5:** When the brakes are pressed, the motor becomes an alternator and produces power, which is sent back to the battery.

### Components Electric vehicle

**1. Battery:** It provides electricity to power the vehicles.

**2. Charge port:** It allows the vehicle to connect to an external power supply to recharge the battery.

**3. DC converter:** It converts higher voltage DC power from battery to lower voltage DC power.

**4. Electric motor:** It drives the vehicle's wheels.

**5. On-board charger:** It converts AC electricity to DC power for charging the battery.

**6. Power Electronics controller:** It controls the flow of Electrical energy from battery to motor and controls the speed.

**7. Thermal System(Cooling):** It maintains the proper operating temperature range of the engine, motor etc.,

**8. Transmission:** It transfers mechanical power from the motor to drive the wheels.

### **Advantages**

- Electric vehicles are more efficient
- Produce zero emissions
- Low maintenance costs.
- Easy to drive and quiet.
- EVs have the potential to significantly reduce greenhouse gas emissions and combat climate change.
- EVs protect fossil fuels from depleting by using electricity (battery-powered)
- EVs help reduce carbon dioxide (CO<sub>2</sub>) and other pollutants that contribute to air pollution, smog, and global warming

### **Disadvantages**

- High initial cost especially for top variants
- Electricity is not free
- Longer recharge time
- Not best for those cities that facing shortage of power.
- Fewer alternatives in terms of car designs, models, features, etc.

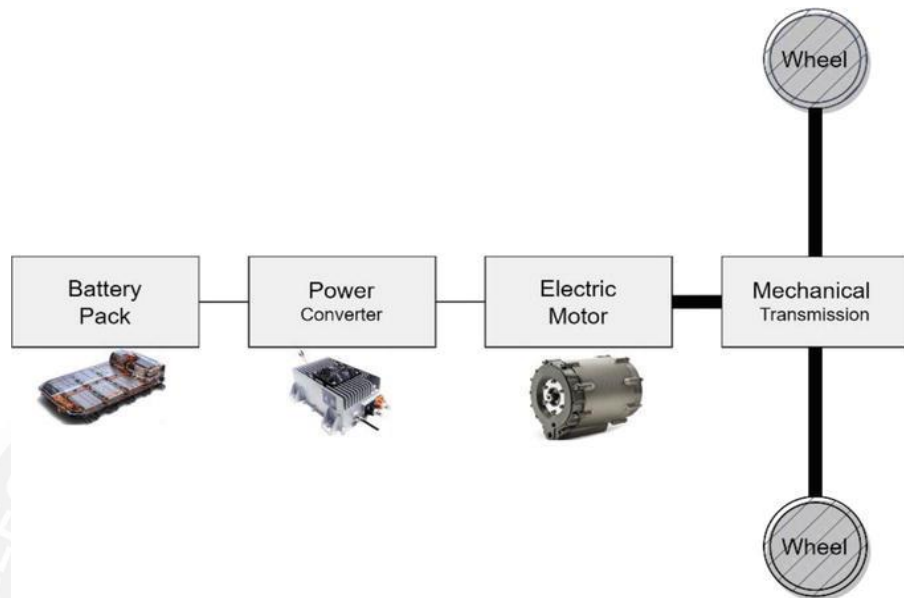


Fig:1-Electric vehicle working diagram

sources: Online sources

