

## **Automobile & Electric Vehicles – Task**

### **1. What is an Automobile?**

An automobile is a self-propelled vehicle used to transport passengers or goods from one place to another. Automobiles operate using different types of power sources such as mechanical power from internal combustion engines, electrical power from batteries, or a combination of both systems.

Automobiles are widely used in transportation, logistics, and daily commuting, making them an essential part of modern society.

### **2. Major Systems of a Conventional Automobile**

#### **Engine System**

The engine is the main power unit of a conventional vehicle. It converts fuel energy into mechanical energy through combustion. Common types of engines include petrol and diesel engine

#### **Transmission System**

The transmission system transfers power from the engine to the wheels. It controls speed and torque of the vehicle. Major components include clutch, gearbox, and differential.

#### **Braking System**

The braking system helps in slowing down or stopping the vehicle safely. Types of braking systems include drum brakes, disc brakes, and Anti-Lock Braking System (ABS).

#### **Steering System**

The steering system controls the direction of the vehicle. It allows the driver to turn the vehicle left or right. Types include manual steering and power steering.

#### **Suspension System**

The suspension system provides comfort and stability to passengers. It absorbs shocks and vibrations from uneven road surfaces.

#### **Electrical System**

The electrical system powers various vehicle components such as battery, alternator, lighting system, and sensors.

### **3. What is an Electric Vehicle (EV)?**

An electric vehicle is a vehicle powered by an electric motor instead of a conventional engine. EVs store energy in rechargeable batteries and do not require fossil fuels.

Examples of electric vehicles include electric cars, electric scooters, and electric buses. Electric vehicles help reduce pollution and improve energy efficiency.

## **4. Major Components of Electric Vehicles**

### **Battery Pack**

The battery pack stores electrical energy required to power the electric vehicle. Most EVs use lithium-ion batteries because they are lightweight and efficient.

### **Electric Motor**

The electric motor converts electrical energy into mechanical energy that rotates the wheels. Common motor types include BLDC motor, PMSM motor, and induction motor.

### **Inverter**

The inverter converts DC power stored in the battery into AC power required by the electric motor.

### **Battery Management System (BMS)**

The Battery Management System monitors battery temperature, voltage, and overall health. It ensures safe and efficient battery operation.

### **Charger**

The charger supplies electricity to recharge the vehicle battery. Chargers can be on-board or off-board depending on vehicle design.

### **Controller**

The controller regulates power supply from battery to motor and controls vehicle speed and performance.

## **5. Working Principle of ICE vs Electric Vehicles**

### **ICE Vehicle Working**

1. Fuel is burned inside the engine.
2. Heat energy is converted into mechanical energy.
3. Power is transmitted through gearbox.
4. Wheels rotate and vehicle moves.

### **Electric Vehicle Working**

1. Battery supplies electrical energy.
2. Inverter converts DC power into AC power.
3. Electric motor rotates using electrical energy.
4. Wheels rotate and vehicle moves.

## 6. ICE vs Electric Vehicle Comparison

Parameter	ICE Vehicle	Electric Vehicle
Energy Source	Petrol / Diesel	Electricity
Emissions	High pollution	Zero tailpipe emission
Noise	High noise	Very low noise
Maintenance	High maintenance	Low maintenance
Efficiency	Low efficiency	High efficiency
Running Cost	Expensive	Economical

## 7. Advantages and Challenges of Electric Vehicles

### Advantages

- Environment friendly
- Lower running cost
- Reduced maintenance
- Quiet operation
- Higher energy efficiency

### Challenges

- Limited charging infrastructure
- High battery cost
- Longer charging time
- Range anxiety

## 8. Current Trends in Electric Vehicle Industry

The automobile industry is rapidly shifting toward electric mobility. Governments across the world are promoting EV adoption through subsidies and policies. EV startups and major automobile manufacturers are investing heavily in electric vehicle technology. Charging

infrastructure is expanding rapidly, and future developments focus on improving battery technology, increasing driving range, and reducing charging time.

