**Classification of Engines**

**1. Based on Energy Source**

1. **Internal Combustion Engines (ICE):**
	* Energy from combustion of fuel inside the engine.
	* Examples: Petrol, diesel, gas engines.
2. **External Combustion Engines (ECE):**
	* Combustion occurs outside the engine; heat is transferred to the working fluid.
	* Examples: Steam engines, steam turbines.

**2. Based on Working Cycle**

1. **Four-Stroke Engines:**
	* Complete thermodynamic cycle in four strokes of the piston (intake, compression, power, exhaust).
	* Examples: Most automotive engines.
2. **Two-Stroke Engines:**
	* Complete thermodynamic cycle in two strokes of the piston (intake/exhaust, compression/power).
	* Examples: Motorcycles, small power tools.

**3. Based on Fuel Type**

1. **Petrol Engines:**
	* Spark ignition engines using petrol.
	* Examples: Cars, motorcycles.
2. **Diesel Engines:**
	* Compression ignition engines using diesel.
	* Examples: Trucks, buses.
3. **Gas Engines:**
	* Use gaseous fuels like natural gas, CNG, or biogas.
	* Examples: Generators, industrial engines.

**4. Based on Ignition System**

1. **Spark Ignition (SI) Engines:**
	* Ignition initiated by a spark plug.
	* Examples: Petrol engines.
2. **Compression Ignition (CI) Engines:**
	* Ignition initiated by heat from compressed air.
	* Examples: Diesel engines.

**5. Based on Number of Cylinders**

1. **Single-Cylinder Engines:**
	* One cylinder; simple, low power.
	* Examples: Small motorcycles.
2. **Multi-Cylinder Engines:**
	* Multiple cylinders for higher power output.
	* Examples: Cars, trucks.

**Components of an Engine and Their Functions**

**Major Components:**

1. **Cylinder**
	* Houses the combustion process.
	* Function: Contains the piston, where fuel combustion occurs.
2. **Piston**
	* A cylindrical component moving back and forth inside the cylinder.
	* Function: Converts pressure energy from combustion into mechanical energy.
3. **Connecting Rod**
	* Connects the piston to the crankshaft.
	* Function: Transmits motion and force from the piston to the crankshaft.
4. **Crankshaft**
	* Rotating shaft driven by the piston through the connecting rod.
	* Function: Converts reciprocating motion into rotational motion.
5. **Cylinder Head**
	* Covers the top of the cylinder, housing valves and spark plugs/injectors.
	* Function: Seals the combustion chamber and directs fuel-air mixture and exhaust gases.
6. **Valves**
	* **Intake Valve**: Allows the air-fuel mixture (SI) or air (CI) into the cylinder.
	* **Exhaust Valve**: Releases combustion gases.
	* Function: Regulate flow in and out of the cylinder.
7. **Camshaft**
	* A shaft with cams that operate the valves.
	* Function: Opens and closes valves in sync with the engine cycle.
8. **Spark Plug (SI Engines)**
	* Produces a spark to ignite the air-fuel mixture.
	* Function: Initiates combustion.
9. **Fuel Injector (CI Engines)**
	* Injects fuel directly into the combustion chamber.
	* Function: Ensures efficient fuel delivery.
10. **Flywheel**
	* A heavy rotating disc attached to the crankshaft.
	* Function: Stores rotational energy and ensures smooth operation by minimizing speed fluctuations.

**Auxiliary Components:**

1. **Carburetor**
	* (Older engines) Mixes air and fuel in the correct ratio.
	* Function: Supplies the air-fuel mixture to the cylinder.
2. **Turbocharger**
	* Uses exhaust gases to compress intake air.
	* Function: Improves engine efficiency and power.
3. **Radiator**
	* Part of the cooling system.
	* Function: Dissipates excess heat from the engine.
4. **Oil Pump**
	* Circulates lubricant throughout the engine.
	* Function: Reduces friction and cools moving parts.
5. **Exhaust System**
	* Includes manifold, catalytic converter, and muffler.
	* Function: Removes exhaust gases and reduces noise.

**Functions of an Engine**

1. **Energy Conversion:** Converts chemical energy of fuel into mechanical energy.
2. **Power Generation:** Provides power to vehicles, machinery, or power plants.
3. **Heat Management:** Manages heat generated during combustion for efficiency.
4. **Emission Control:** Incorporates systems to reduce pollutants in exhaust gases.