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Introduction :

Heat engine : It can be defined as any engine that converts thermal energy to mechanical work output. Examples of heat engines include: steam engine, diesel engine, and gasoline (petrol) engine.



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Classification of I.C. ENGINES

- I.C.ENGINES are may be classified according to

Type of fuel used as

- (1)Petrol engine
- (2)Diesel engine
- (3)Gas engines
- (4)Bi-fuel engine (two fuel engine)

Nature of thermodynamic cycle as:

- (1)Otto cycle engine
- (2)Diesel engine cycle
- (3) Duel or mixed cycle engine

Number of stroke per cycle as :

- (1) Four stroke engine
- (2) Two stroke engine



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- In an **Internal combustion engine**, combustion takes place inside the engine cylinder.
 - Petrol engine is an example of internal combustion engine, where the working fluid is a mixture of air and fuel .
- In an **External combustion engine**, combustion takes place outside the engine cylinder.
- Steam engine is an example of external combustion engine, where the working fluid is steam.



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- Internal combustion engines may be classified as :
- Spark Ignition engines.
 - Compression Ignition engines.
- **Spark ignition engine (SI engine):** An engine in which the combustion process in each cycle is started by use of an external spark.
 - **Compression ignition engine (CI engine):** An engine in which the combustion process starts when the air-fuel mixture self ignites due to high temperature in the combustion chamber caused by high compression.
 - Spark ignition and Compression Ignition engine operate on either a four stroke cycle or a two stroke cycle.



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Internal combustion Engine Components:

- **Block** : Body of the engine containing cylinders, made of cast iron or aluminium.
- **Cylinder** : The circular cylinders in the engine block in which the pistons reciprocate back and forth.
- **Head** : The piece which closes the end of the cylinders, usually containing part of the clearance volume of the combustion chamber.



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- **Crankshaft** : Rotating shaft through which engine work output is supplied to external systems.
- **Connecting rod** : Rod connecting the piston with the rotating crankshaft, usually made of steel or alloy forging in most engines but may be aluminum in some small engines.
- **Piston rings**: Metal rings that fit into circumferential grooves around the piston and form a sliding surface against the cylinder walls.



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- **Crankcase** : Part of the engine block surrounding the crankshaft.
 - In many engines the oil pan makes up part of the crankcase housing.
- **Exhaust manifold** : Piping system which carries exhaust gases away from the engine cylinders, usually made of cast iron .



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- **Combustion chamber:** The end of the cylinder between the head and the piston face where combustion occurs.
 - The size of combustion chamber continuously changes from minimum volume when the piston is at TDC to a maximum volume when the piston at BDC.
- **Spark plug :** Electrical device used to initiate combustion in an SI engine by creating high voltage discharge across an electrode gap.



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- **Camshaft** : Rotating shaft used to push open valves at the proper time in the engine cycle, either directly or through mechanical or hydraulic linkage (push rods, rocker arms, tappets) .
- **Push rods** : The mechanical linkage between the camshaft and valves on overhead valve engines with the camshaft in the crankcase.



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- **Intake manifold** :Piping system which delivers incoming air to the cylinders, usually made of cast metal, plastic, or composite material. In most SI engines, fuel is added to the air in the intake manifold system either by fuel injectors or with a carburetor.
- **Carburetor** : A device which meters the proper amount of fuel into the air flow by means of pressure differential.
 - For many decades it was the basic fuel metering system on all automobile (and other) engines.