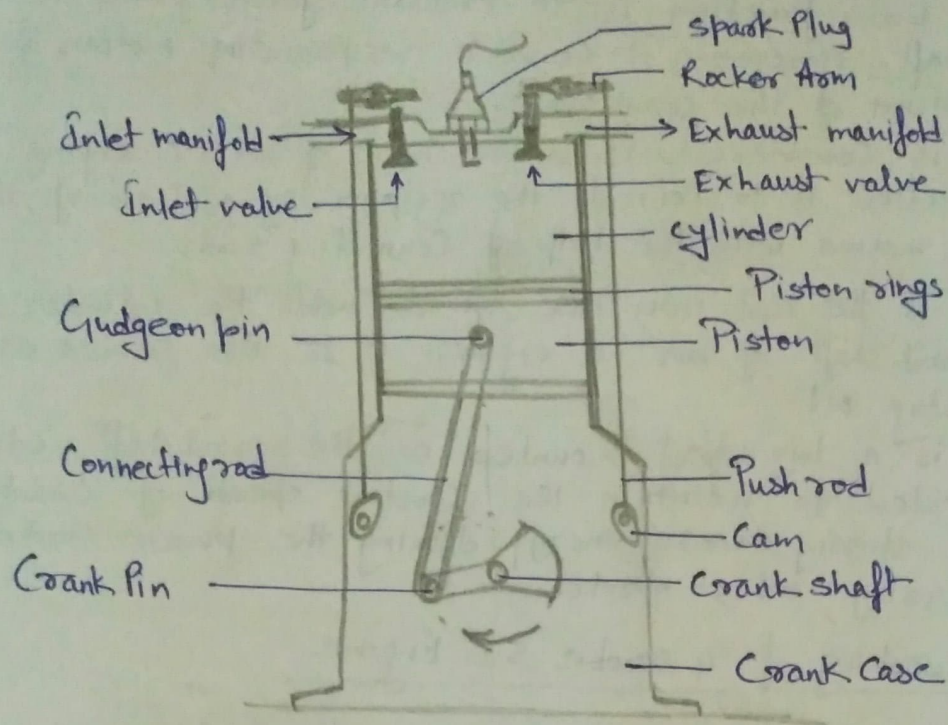


** Construction & working of 4-stroke S.I Engine →

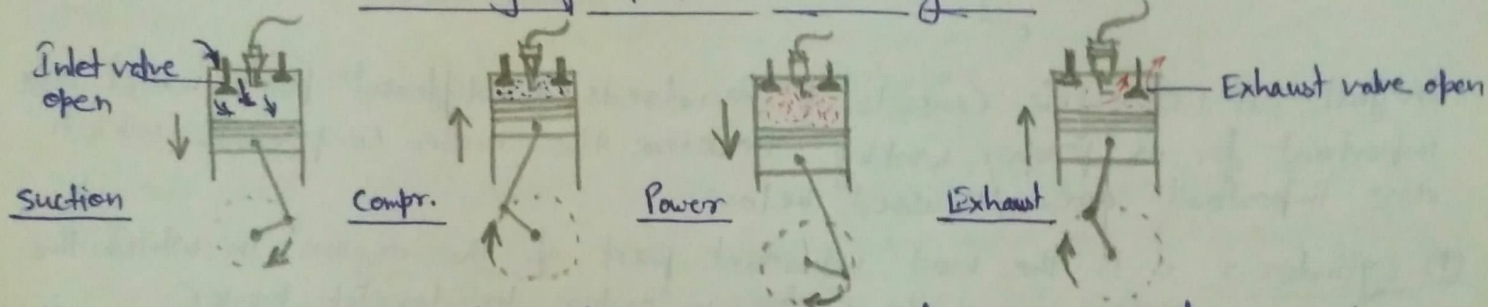


In fact, an I.C engine consists of hundreds of different parts which are important for its proper working. However the main components which are important are discussed below -

- ① Cylinder → it is the most important part of the engine, in which the piston moves to & fro in order to develop power.
Generally the cylinder is made up of cast iron, steel alloys & Aluminium alloys, because it has to withstand a high pr (more than 50 bar) & tempr more than (2000°C).
- ② Cylinder Head → it is fitted on one end of the cylinder, and acts as a cover to close the cylinder bore.
Generally, the cylinder head contains inlet & exit valve & in case of petrol engine it is also fitted with an spark plug & in case of diesel engine it is fitted with fuel nozzle (fuel injector, fuel valve).
- ③ Piston → it is considered as a heart of an I.C engine, whose main function is to transmit the force exerted by the burning of charge to the connecting rod. it is generally made up of Al. Alloys.
- ④ Piston rings → these are circular rings which is made of special steel alloys which retain elastic properties even at high tempr. Generally, there are two sets of rings mounted on the piston. the function of upper rings is to provide air tight seal to prevent leakage of the burnt gases into the lower portion and similarly the lower rings is to prevent leakage of mobile oil, into the engine cylinder.

- ⑤ Connecting rod → it is a link betⁿ the piston and crankshaft, whose main function is to transmit force from the piston to the crankshaft. Moreover, it converts reciprocating motion of the piston into circular motion of the crankshaft.
- ⑥ Crankshaft → it is considered as a backbone of an I.C. engine, whose function is to convert the reciprocating motion of the piston into the rotary motion with the help of connecting rod.
- ⑦ Crank Case → it is the cast-iron case, which holds the cylinder and crankshaft of an I.C. engine. it also serves as a sump for the lubricating oil.
- ⑧ Flywheel → it is a big wheel, mounted on the crankshaft, which is provided to maintain the constant speed of crankshaft. it is done by storing excess energy during the power stroke, which is returned during other strokes.

working of 4-stroke S.I. Engine

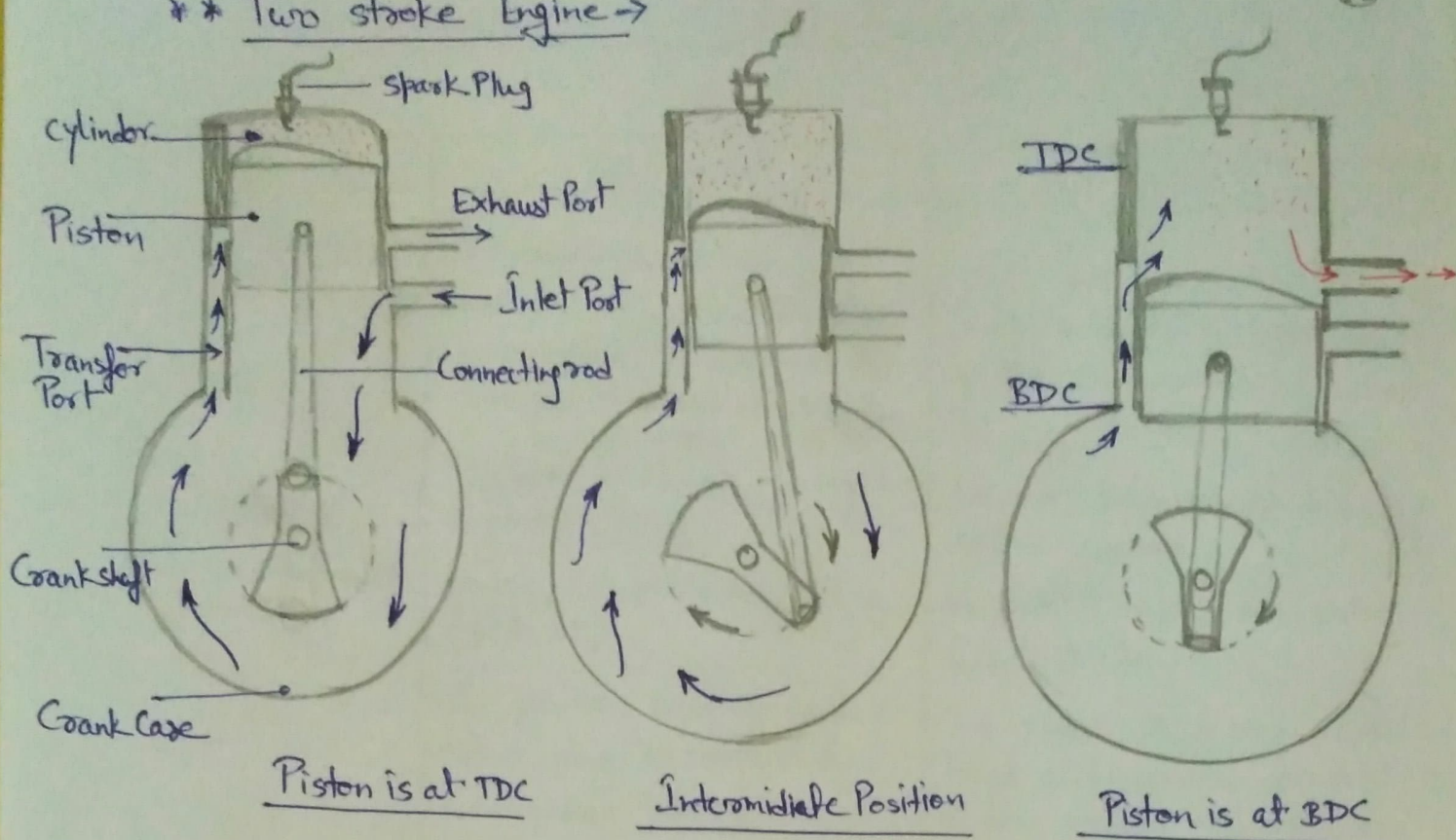


it is also known as otto cycle. it requires four strokes of the piston to complete one cycle of operation.

- ① Suction or charging stroke → In this stroke, the inlet valve open and charge (Air-fuel mixture) is sucked into the cylinder as the piston moves downwards from TDC to BDC.
- ② Compression stroke → In this stroke both the inlet & exhaust valves are closed and the charge is compressed as the piston moves upwards from BDC to TDC. As the result of compression the pr. and tempr. of the charges increases considerably. and now the crankshaft completed one revolution.
- ③ Power (Expansion or working) stroke → shortly before the piston reaches TDC during compr. stroke, the charge is ignited with the help of spark-plug. it suddenly increases the pr. & tempr. of combustion but the vol., remain const. Due to rise in pr. the piston pushed down with great force. During this expansion some of heat energy is transferred into mechanical work. it may be noted that during this stroke the inlet & exhaust valves are closed & piston moves from TDC to BDC.
- ④ Exhaust stroke → Now the piston moves from BDC to TDC. in this stroke the exhaust valve is open, the movement of the piston pushes out the products of combustion, from engine cylinder through the exhaust valve into the atmosphere. this completes the cycle & the engine cylinder is ready to suck the charge again.

** Two stroke Engine →

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A two stroke cycle petrol engine was devised by Dugled Clerk in 1880. In this cycle, the suction, compression, expansion & exhaust takes place during two stroke of the piston. (when the piston move upward from BDC to TDC & when the piston move ~~for~~ downwards from ~~TDC~~ to BDC) It means that there is one working stroke after every revolution of the crankshaft.

Upward stroke → During upward stroke, the piston moves upward from BDC to TDC, compressing the charges (Air-petrol mixture) in Combustion chamber of the cylinder. Due to upward movement of the piston a partial vacuum is created in the crank case and the new charge is drawn into the crank case through the uncovered inlet port. the exhaust port and transfer ports are covered when the piston is at TDC position. the compressed charge is ignited in the combustion chamber by a spark given by the spark-plug.

Downward stroke → As soon as the charge is ignited the hot gases compress the piston which moves downwards, rotating the crankshaft thus doing the usefull work. Downward movement of the piston first uncovers the exhaust port and then the transfer port and hence the exhaust starts through the exhaust port. As soon as the transfer port opens, the charge through it is forced into the cylinder. and pushes out most of the exhaust gases. the piston is now at BDC position, the cylinder is completely filled with the fresh charge, although it is somewhat diluted with the exhaust gases. the cycle of events is then repeated.