I.C.ENGINES
Objectives

• To introduce the concept of internal combustion engines and its nomenclature
• To separate different types of engines
• To comprehend the idea of 4 stroke & 2 stroke engines of petrol and diesel fuels
Heat engine

- Converts thermal energy into mechanical energy
• External combustion: Heat addition process or the combustion process occurs outside the chamber where work is obtained
• Eg: Steam engine
• Internal combustion: Heat addition process or the combustion process occurs inside the chamber where work is obtained.
Analogy

Working of engine similar to that of firing of a cannon
• Discovery Channel - Massive Engines - Racing Cars part 1 of 2.avi [www.keepvid.com].mp4
Nomenclature
• Cylinder bore : inner dia of an engine cylinder
• Top dead centre TDC : the top most position of piston within the cylinder
• Bottom dead centre BDC : the bottom most position of the piston within the engine cylinder
• Stroke; the distance moved by the piston from TDC to BDC or vice versa
• stroke volume: The volume covered by the piston during one stroke (Vs)
• Clearance volume; the volume of cylinder between the top dead center and cylinder head (Vc)
• Compression ratio: \[ \frac{Vs + Vc}{Vc} \]
Classification of internal combustion engines
Classification of engines
Petrol cycle
Assumptions made while analyzing cycle

1. The air in the piston–cylinder assembly is the closed system.
2. The compression and expansion processes are adiabatic.
3. All processes are internally reversible.
4. The air is modeled as an ideal gas.
5. Kinetic and potential energy effects are negligible.
Fig. 2. P-V and T-S diagrams of ideal Otto Cycle
4 strokes

- Suction stroke
- Compression stroke
- Power stroke
- Exhaust stroke
- There is a separate stroke for each and every process occurring in a cycle
WORKING OF 4 STROKE PETROL ENGINE

Air–fuel mixture

Intake stroke

Compression stroke
Power (expansion) stroke

Exhaust stroke

Exhaust gases
WORKING OF 4 STROKE PETROL ENGINE
4 strokes of the engine
2 stroke engine

- Entire process is completed within two strokes of the piston
- Two strokes:
  - Compression stroke
  - Power stroke
2 STROKE PETROL ENGINE

TRANSFER PORT

INLET

CRANK CASE

SPARK PLUG

EXHAUST PORT
How Two-stroke Engines Work.mp4
STAGES OF WORKING OF 2 STROKE PETROL ENGINE

Compression stroke
• Stimulating questions
• Which engine removes the exhaust gases more effectively.
• Is there any possible alternative fuel which can work properly in otto cycle