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Power Plant

1. Gas Turbine.
2. Rankine Cycle → (PS / VCRS)
3. Rec. Comp
4. Cen. Comp
5. AFC
6. IT
7. RT
8. Binary vapour cycle
9. Boiler & its comp.
10. Condn & Cooling Towers } ESE
11. Comp. Flow – Gate
12. Misc? Topic
    (nozzle & diffusers) ×
    (nuclear PP) ×

Ref. Books:

- P K Nag → Inter
- R - Yadav → Num.
- Ganeshan → Gas Turbine
- S.M. Yaha → comp. flow

GAS TURBINE

Engine:

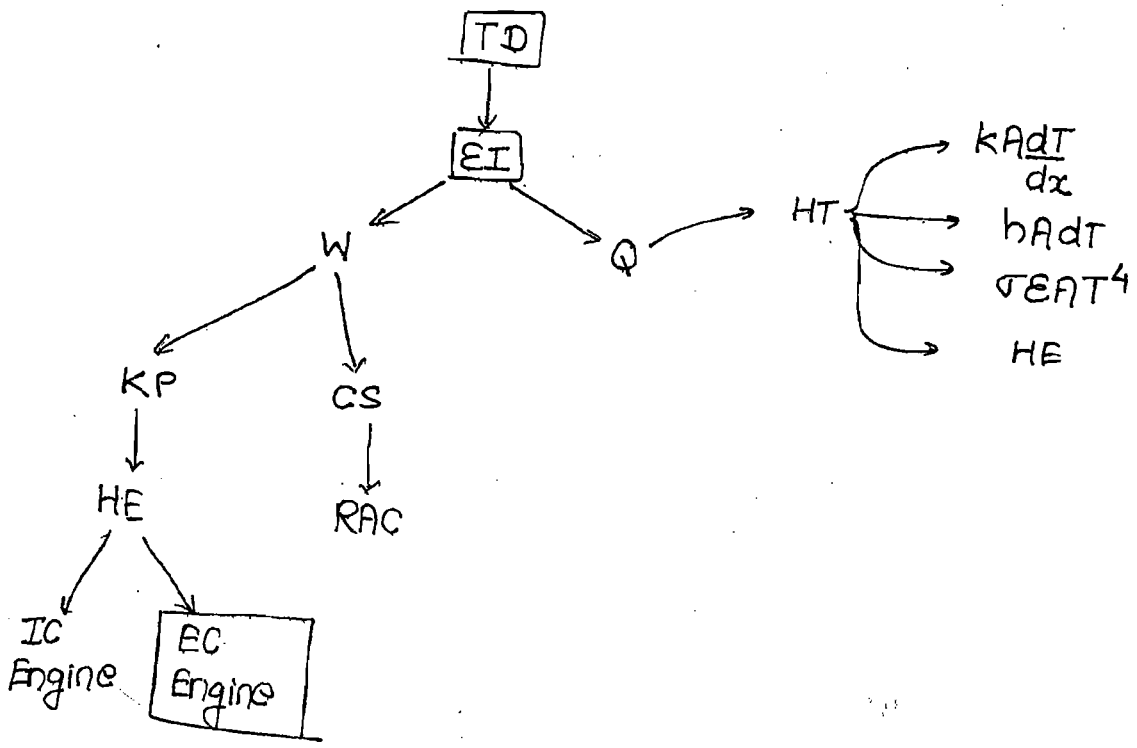
It is a Mechanical Device which convert 1 form of Energy into another useful form of energy.

IC Engine:

In this, combustion & expansion takes place at a same location. (or) fuel itself is the working fluid.

EC Engine:

In this, combustion & expansion takes place at diff. location (or) products of combustion are transfere their heat to the another working fluid. which is utilized for producing some useful output.



Advantage of Gas Turbine over IC Engine:

(i) Compact i.e. Weight to Power Ratio is less.

(ii) These can be rotating at high speed.

(iii) Easy Balacing.

(iv) Simple Mechanism.

Disadvantage of Gas Turbine:

(i) As the compressor is used in the gas turbine, handeling the gaseous phase of the working fluid. Therefore the compressor work is not negligible in comparisn to the turbine work which will reduces the net work o/p. & finally the efficiency decreases.

(1) $\eta = \frac{W_{net}}{Q_s} = \frac{W_T - W_C}{Q_s}$

$\downarrow W_{net} = W_T - W_C \uparrow$

$\downarrow \quad \downarrow$

$\int v_g dP \quad \int v_g dP$

(2) High Heat Resistance Material are required as these are subjected to Higher Temp continuously.

(3) High speed Reduction Gears are required as the value of centrifugal forces are high at Higher Speed.

$F_c = m r \omega^2$

$F_c = m r \left(\frac{2\pi N}{60}\right)^2 \quad \therefore F_c \propto N^2$