



# UNIT III

# GAS POWER PLANT

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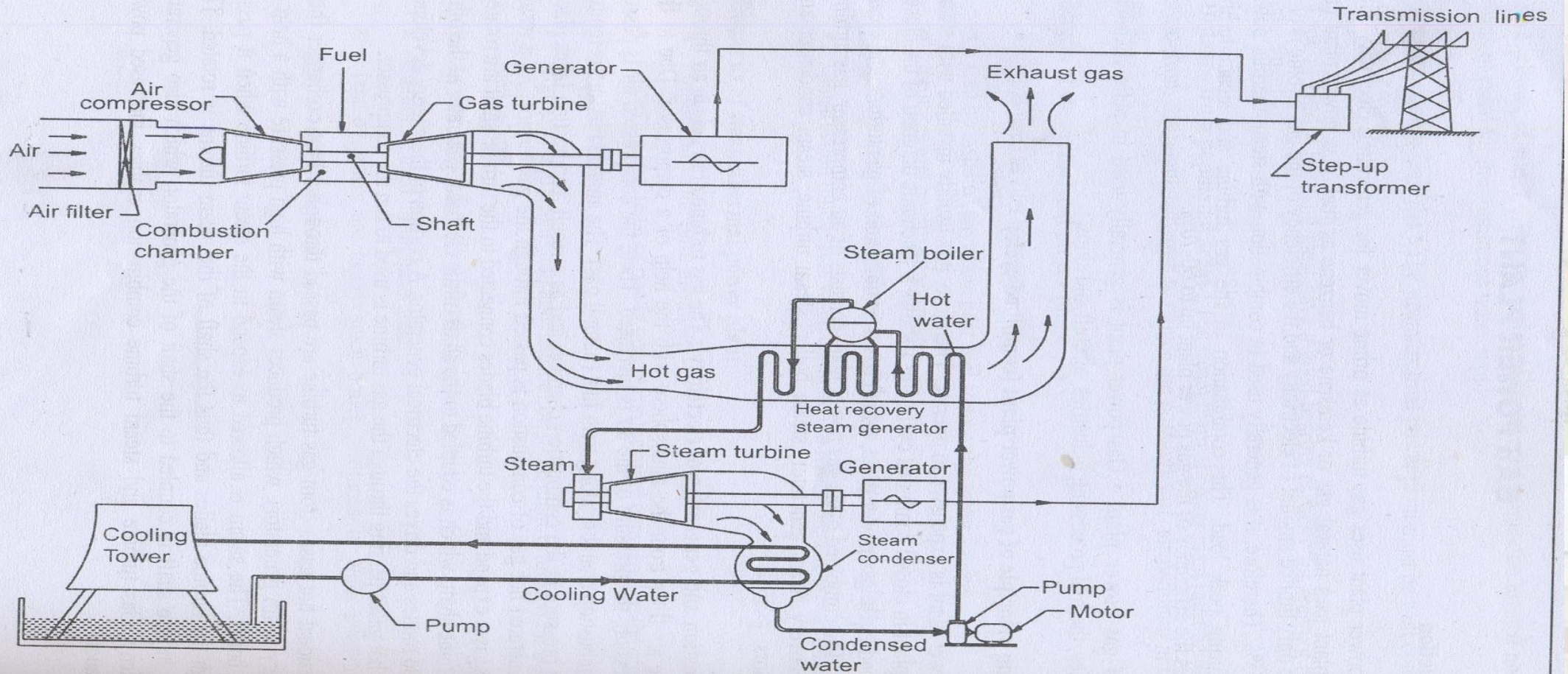
# GAS POWER PLANT



- A gas power plant uses gas turbine as the prime mover for generating electricity.
- It uses natural gas or kerosene or benzene as fuel.
- Gas plant can produce only limited amount of the electricity.
- Efficiency of the plant is only 35%
- Generally a gas plant is expensive to operate.
- Hence it is usually installed with steam power plant in closed combined cycle.
- It is generally used in combination with steam/thermal power plant during peak load
- When the gas power plant is combined with thermal/steam power plant efficiency of the plant is up to 60% - 70%



# LAYOUT OF THE GAS TURBINE POWER PLANT





# GAS POWER PLANT – WORKING PRINCIPLE



## Combustion and generation of electricity:

- Gas turbine draws clean air into through air filter from atmosphere, with the help of a compressor.
- During the compression pressure of the air is increased.
- Compressed air is passed through to a combustion chamber along with fuel (Natural gas).
- The air fuel mixture is ignited at high pressure in the combustion chamber.
- Combustion takes place.
- The generated hot gas of compression is passed through the gas turbine.
- Hot gases expand, and the turbine blades are connected to the turbine shaft are rotated.
- The turbine shaft which is coupled to the shaft of the electrical generator at the other end also rotates and drives the electrical generator.
- A portion of the energy developed by the hot gases through the gas turbine is used to run the compressor



# GAS POWER PLANT – WORKING PRINCIPLE



- The residual hot gases from gas turbine are passed through a heat exchanger (heat recovery steam generator)
- The heat exchanger produces steam with high pressure with the help of a steam boiler.
- The steam is allowed to expand in the steam turbine.
- when it passes through the turbine blades, the turbine shaft is rotated. The shaft is coupled to the generator, which generates electricity.
- Gas turbine and steam turbine combination enables increased power generation



# GAS POWER PLANT – WORKING PRINCIPLE



## TRANSMISSION AND DISTRIBUTION :

- The generated electricity from both gas and steam turbines is fed to the step up transformer where its voltage is increased.
- Then the electricity is conveyed through transmission lines for distribution.



# GAS TURBINE - MERITS

- Natural gas is readily available.
- Setting up cost can be reduced if the plant is installed near the source of natural gas.
- Less gas storage cost
- Less space occupation.
- Compared to steam power plant, smaller in size.
- Low operating cost.
- Low maintenance cost.
- No standby losses.
- Cheaper fuels like natural gas.



# GAS TURBINE PLANT – DE MERITS

- $\frac{2}{3}$  rd of generated power is used for driving the compressor.
- Gas turbine has low thermal efficiency.
- Has starting problem.
- Efficient only in combined cycle configuration.
- Temperature of combustion chamber is too high, which results in shorter life time.





**THANK YOU**