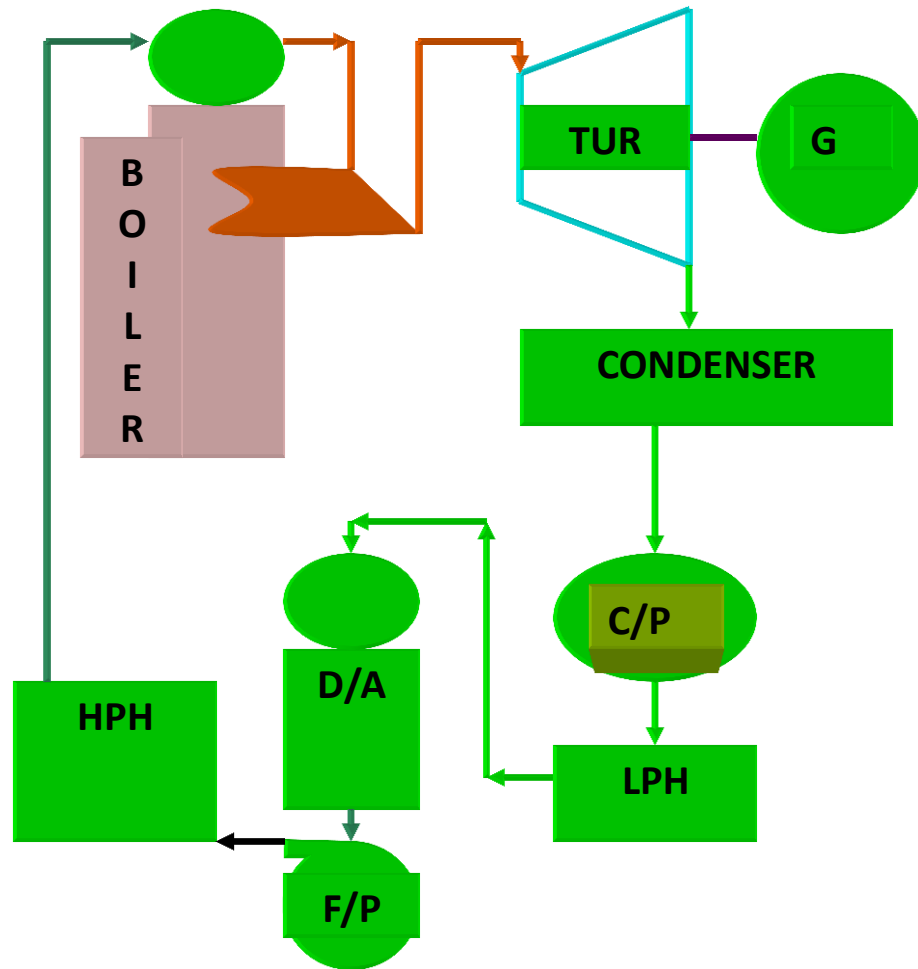


# Dr. T.R.Rangaswamy

## Professor/EEE

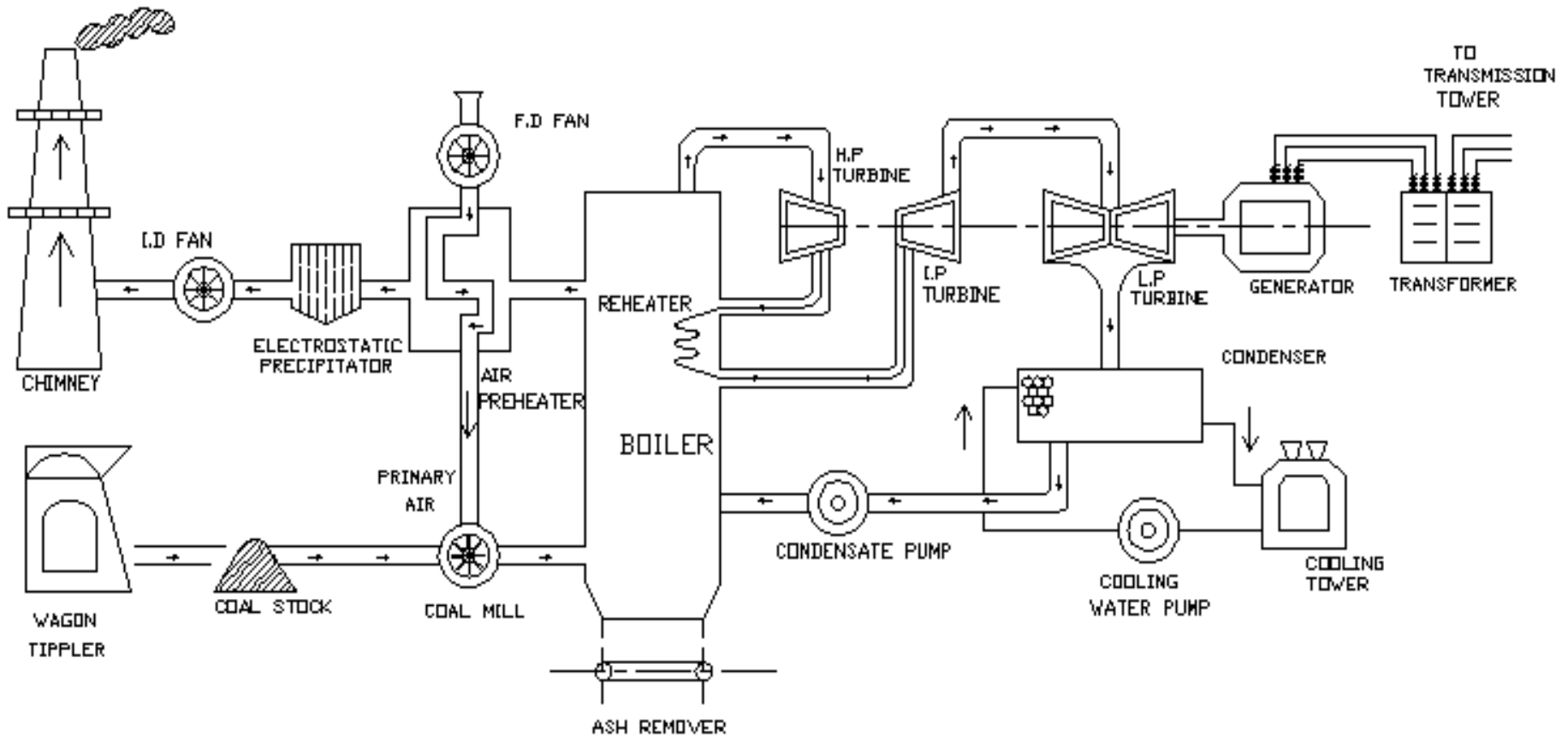


**BEE045 INSTRUMENTATION AND CONTROL IN  
POWER PLANT INDUSTRIES**



## THERMAL POWER PLANT

# SCHEMATIC DIAGRAM



# COMPONENTS OF THERMAL POWER PLANT

**Boiler**

**Cooling Water System**

**Turbine**

**Instrument Air System**

**Generator**

**Service Air System**

**Demineralization  
Plant**

**Potable Water System**

**Ash handling**

**HV/LV Electrical System**

**Fuel Handling**

**Uninterrupted Power Supply**

**Sea Water Intake**

**DCS Network**

**Thermal power plant consists of the following four main circuits :**

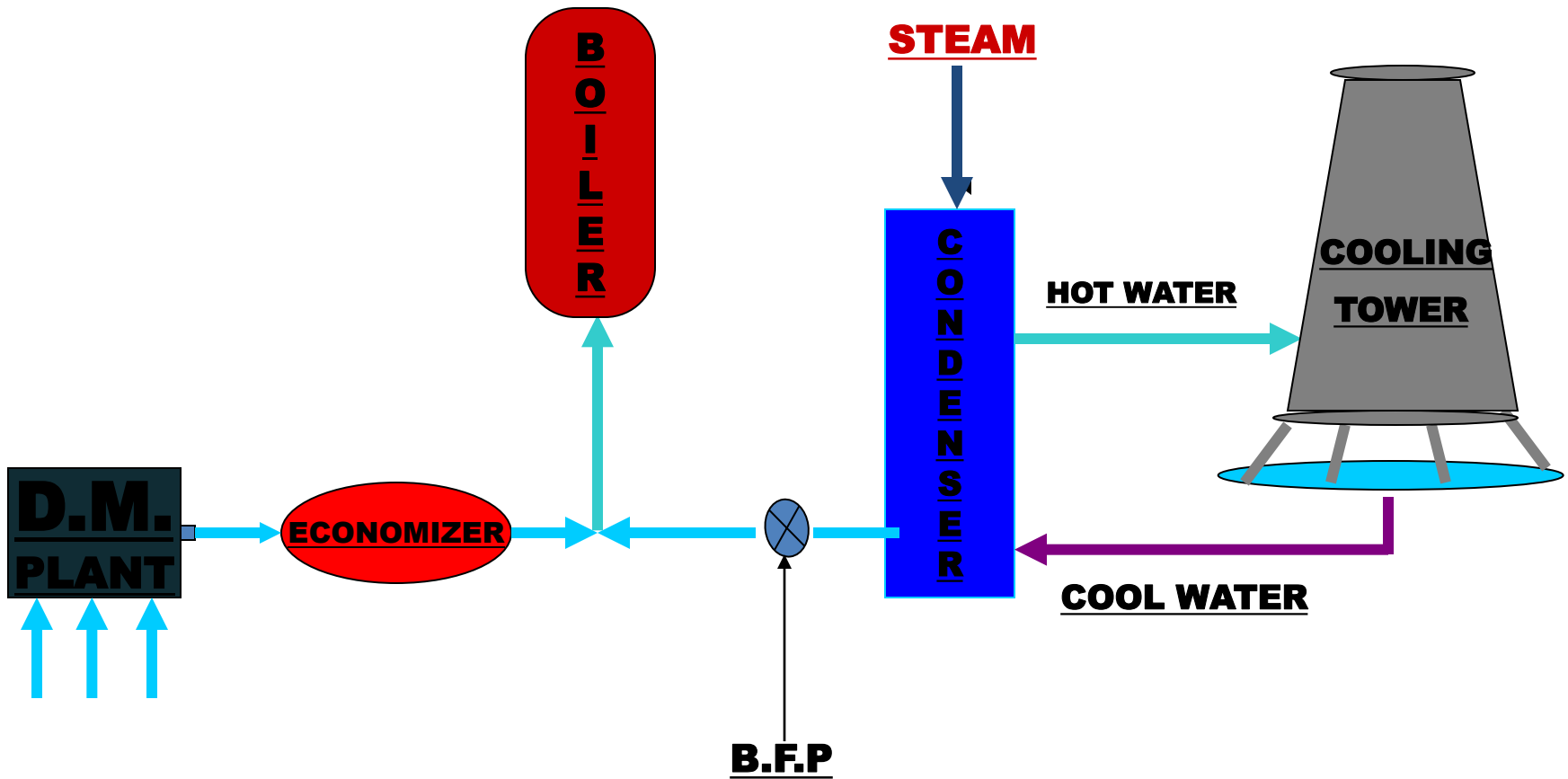
**(a) Feed water and steam flow circuit.**

**(b) Coal and ash circuit.**

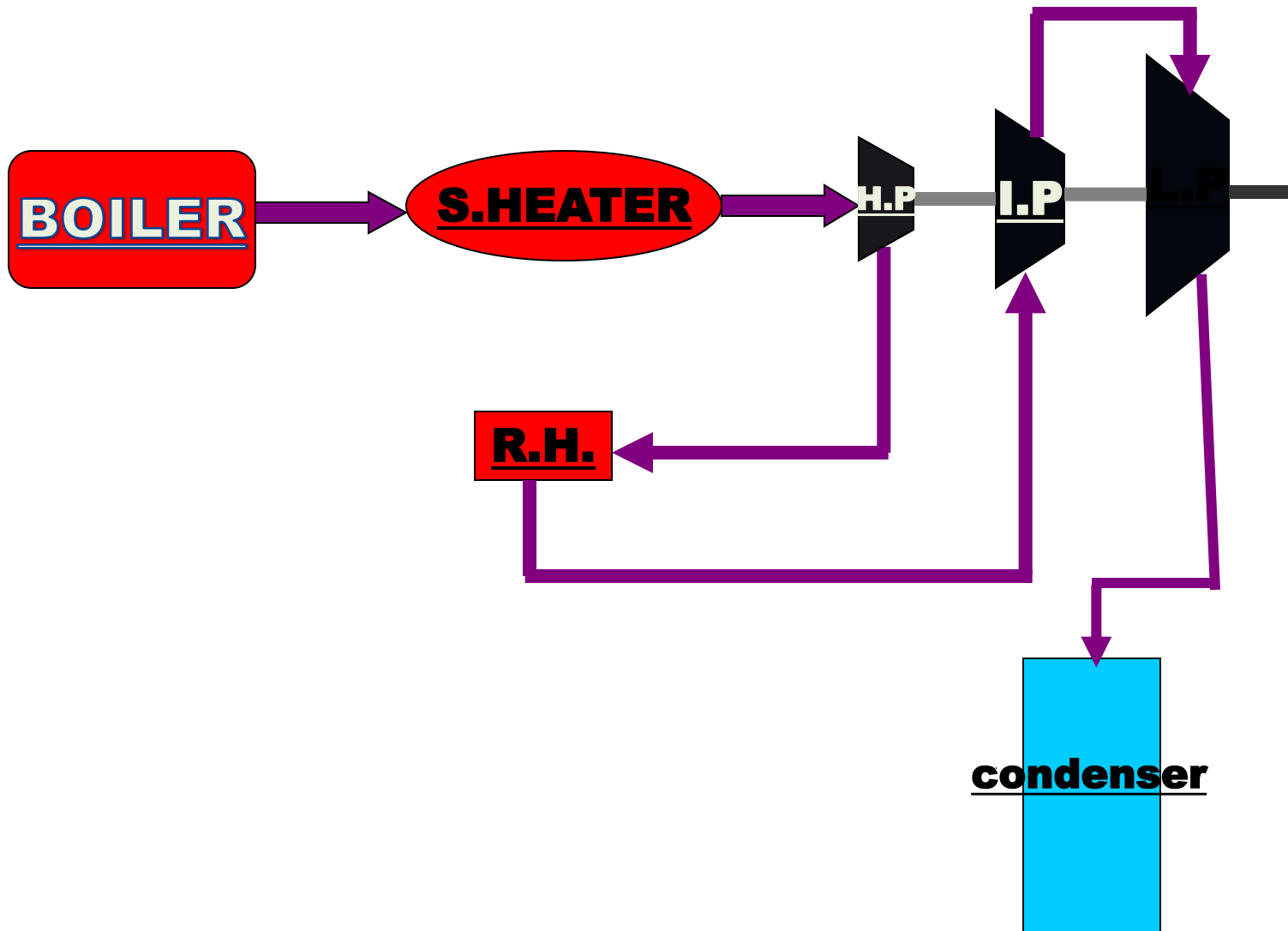
**(c) Air and gas circuit.**

**(d) Cooling water circuit.**

# WATER SYSTEM



# STEAM SYSTEM



## **Boiler System**

**This system consists of**

- **Furnace System**
- **Super Heater System**
- **Re heater System**
- **LTSH System**
- **Economiser System**
- **Air Heater System**
- **PA System**
- **SA System**
- **I D System**
- **Mill System**



# Turbine System

This consists of

- HP Turbine
- IP Turbine
- LP Turbine
- **Regeneration Heating System consists of**
  1. HP Heaters
  2. LP Heaters
  3. Deaerator
  4. Condenser
  5. CEP and BFP
  6. CW System

# **Generator Components**

- Stator
- Rotor
- Exciter
- Stator water cooling system
- Rotor & Stator Hydrogen cooling System
- Hydrogen Seal oil System
- Bus Ducts
- Generator synchronising system

# **BOILER CONTROLS**

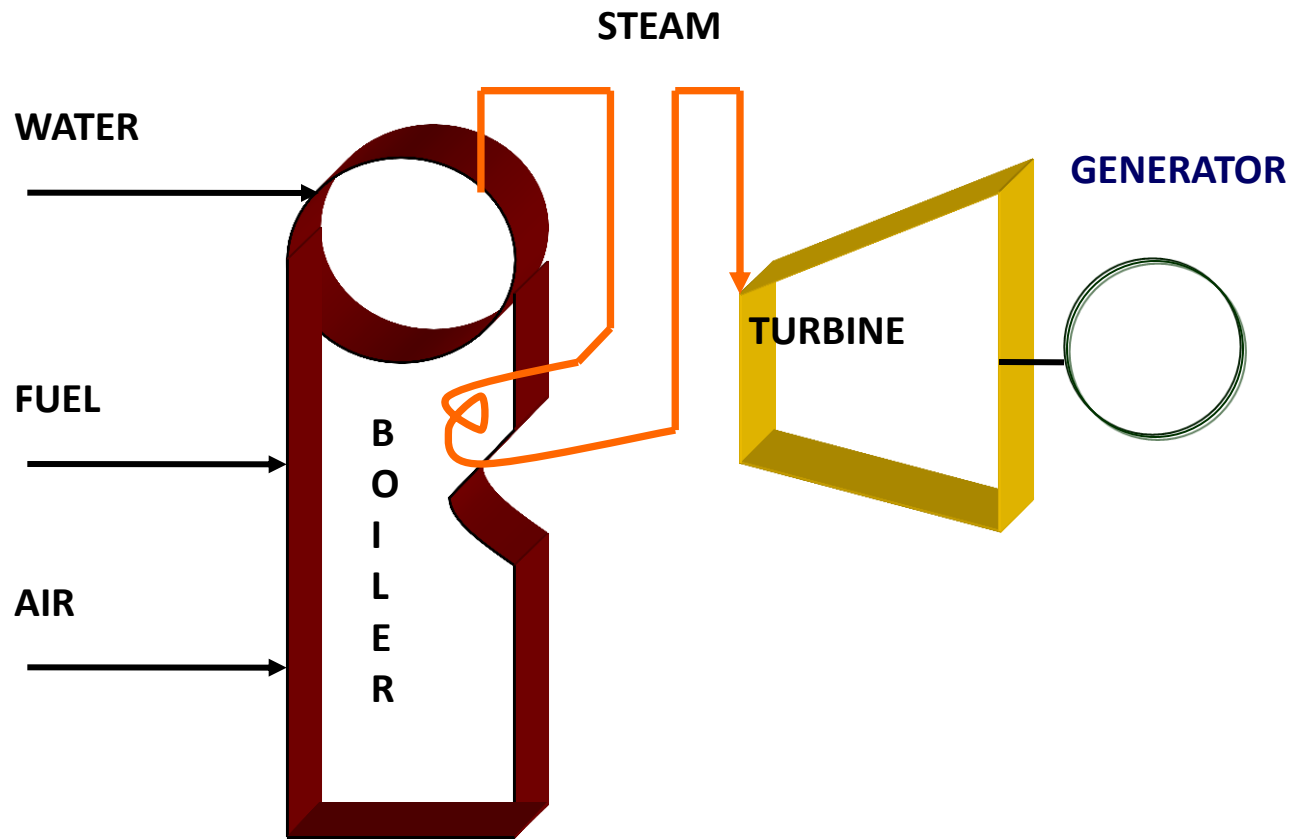
- **Drum Level Control**
- **Combustion Control**
- **Furnace Draft Control**
- **Super Heater Temperature Control**
- **Reheater Temperature Control**
- **Feed Water Systems Control**

# TURBINE CONTROLS.

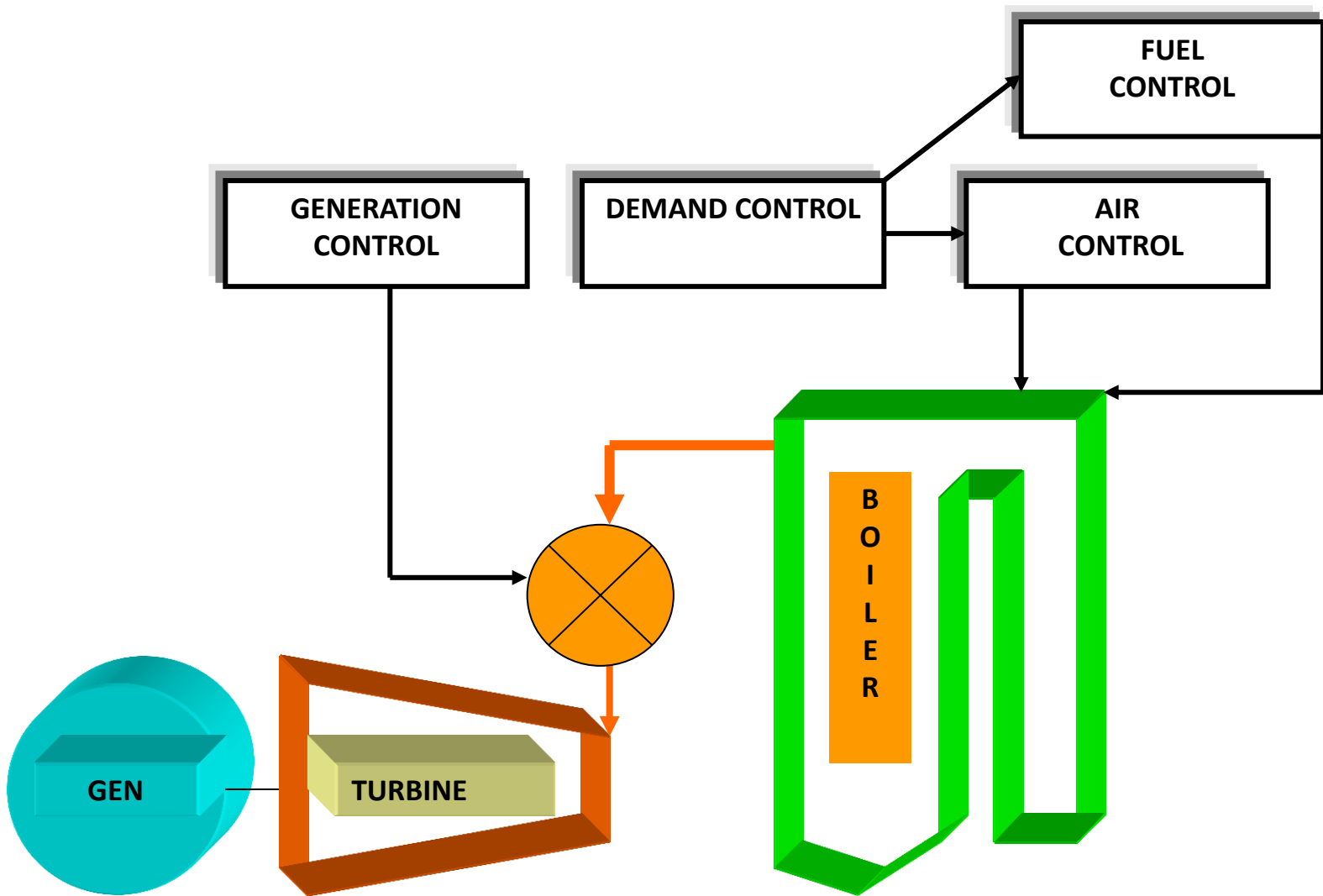
- **Speed Governor**
- **Load Governor**
- **Pressure Governor**
- **Gland seal steam header pressure control**
- **Condenser hot well level control**
- **LP Heater level control**
- **HP Heater level control**
- **Deaerator level control**
- **Speed control**
- **Fast runback control**
- **Lube oil pressure control**

# GENERATOR CONTROLS

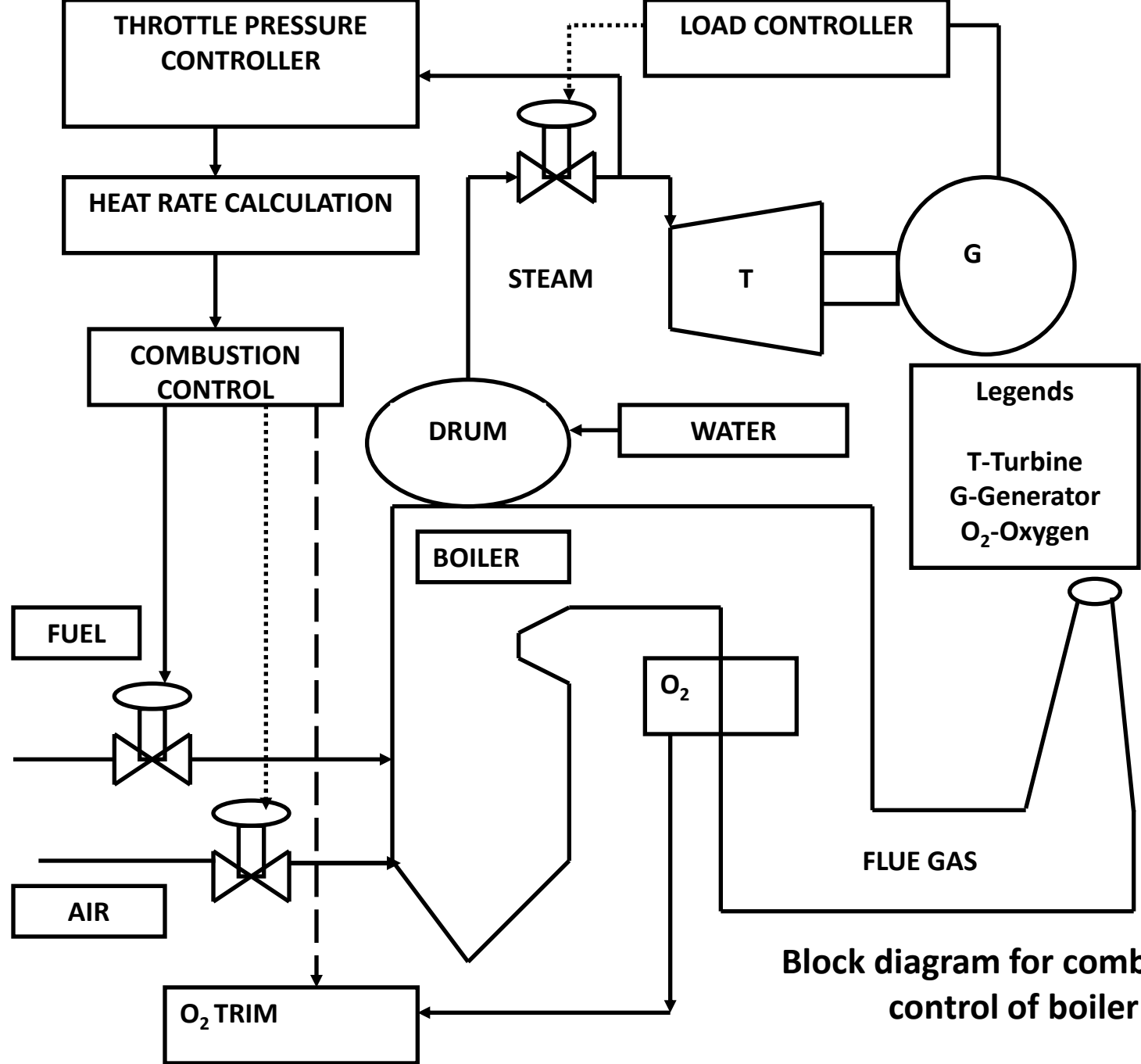
- **MW control**
- **Runback control**
- **Capability of the Generator**
- **Variation of terminal voltage**
- **Frequency variation**
- **Temperature of the coolants**
- **Over loading**
- **Stator winding temperature**



INPUT/OUTPUT



### CONTROL&DEMAND SIGNAL



**Block diagram for combustion control of boiler**



# CONTROLLERS

- **PID Based Controller**
- **Feed forward Controller**
- **Feedback Controller**
- **Feed forward - Feedback Controller**
- **Cascade Controller**
- **Split-Range Controller**
- **Ratio Controller**

# ADVANCED CONTROLLERS

- **Adaptive Controller**
- **Scheduled Adaptive Controller**
- **Self-adaptive Controller**
- **Model-Reference Adaptive Controller**
- **Gain Scheduled Controller**
- **Predictive controllers**
- **Intelligent controllers**

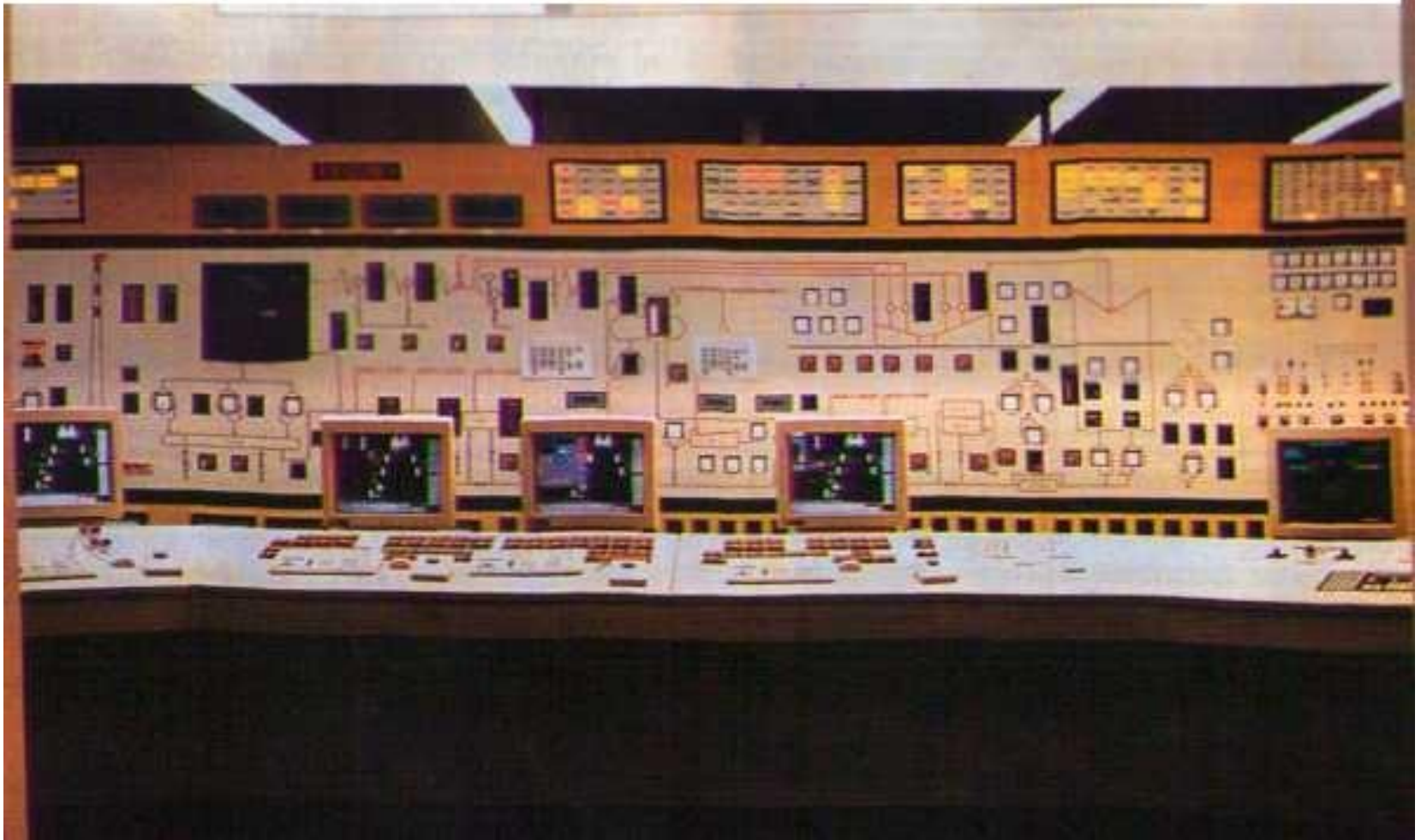
# **INTELLIGENT CONTROLLERS**

**NEURAL NETWORK**

**FUZZY CONTROLLERS**

**NEURO-FUZZY CONTROLLERS**

**EXPERT CONTROLLERS**



## CONTROL ROOM