CHAPTER: 1

Thermal Power Plant

1. Explain general layout of Modern Thermal power plant.
2. Explain site selection of Modern thermal power plant.
3. Present status of power generation in India.

CHAPTER: 2

High pressure boiler & accessories

1. Explain unique features of High pr. Boilers
2. Explain LAMONT boiler
3. Explain BENSON boiler.
4. Explain super critical boiler
5. Explain principle, types & advantages of FBC (Fluidized Bed Combustion)

CHAPTER: 3

Coal and Ash handling system

1. Explain out plant handling of coal
2. Coal preparation plant.
3. Coal handling equipments from storage to boiler furnace

CHAPTER : 4

Draught system

1. Explain Natural draught and design of chimney.
2. Define draught and losses in the Air-gas loop system and its measurement.
3. Prove that draught produced in mm of water head by a chimney is given by,

   $Hw = 353\ H\ (1/Ta - 1/Tg\,(ma+1/ma+1))$

Chapter 5

Steam Nozzles

1. Derive equation of critical pressure ratio of nozzle and explain its significance. Calculate its value for superheated steam
2. Derive the condition and then equation of maximum discharge through the nozzle, also write maximum discharge for different condition of steam

EXAMPLES

1 The pressure and temperature of steam entering the nozzle are 12 bar and 200 C and steam leave the nozzle at 1 bar. The diameter of the nozzle at throat is 10 mm. Calculate the mass flow rate of steam in a nozzle and which type of nozzle is required?

2 Steam is expanded in nozzle from 15 bar and 350 ºC to 1 bar. Find the throat and exit area if flow rate is 1 kg/sec. What should be coefficient of velocity if exit velocity is 1150 m/sec?

Chapter 6

Steam Turbine

1. Explain pressure-velocity compounding of impulse turbine with diagram
2. Define blade efficiency and derive an expression for maximum blade efficiency for single stage impulse steam turbine
3. State and explain losses in steam turbine
4. Nozzle governing system

EXAMPLES

1. Steam issues from the nozzles at angle of 18□ at a velocity of 450 m/sec. the friction factor is 0.88. For a single stage turbine designed for maximum efficiency,
   determine (i) Blade velocity (ii) Moving blade angles for equi-angular blades (iii) blade efficiency (iv) stage efficiency if the nozzle efficiency is 95% (v) Power developed for a mass flow rate of steam of 4 kg/sec.

2. The Data pertaining to an impulse turbine is as: Blade speed = 300 m/s, Isenthalpic enthalpy drop in nozzle = 450 kJ/kg, Nozzle efficiency = 90 %, Nozzle angle = 20º, Blade velocity co efficient = 0.85, Blade exit angle = 25º.
   Calculate for a mass of 1 kg/sec;
   (1) Inlet angle of moving blades (2) The axial thrust
   (3) The driving force on the wheel (4) The diagram power
   (5) The energy lost in blades due to friction (6) Blade efficiency

3. A reaction turbine runs at 3000 RPM and steam consumption is 18000 kg/hr. The pressure of Steam at a certain pair is 2 bar, its dryness fraction is 0.94 and the power developed by the pair is 52 kW. The discharge blade angle is 20□ for both fix and moving blades and the axial flow velocity is 0.72 times the blade velocity. Find out the drum diameter and blade height. Take the tip leakage steam as 8 %. Neglect the Blade thickness

4. The data refer to a stage of Parson's reaction turbine:
   The mean diameter of blade ring is 680 mm. Running speed is 3100 rpm. The steam velocity at exit from fixed blades is 160 m/s. Blade outlet angle is 21°. Steam flow rate through blades is 7.4 kg per second.
   Draw the velocity diagram and find:(i) Blade inlet angle(ii) Power developed in the stage.(iii) The maximum blade efficiency.

CHAPTER : 7

Condensers and Cooling Towers

1. Types of steam condensers and difference between mix type and non mix type (Jet type & Surface type).
2. Short note on cooling tower and explain Hyperbolic cooling tower.

CHAPTER : 8

Feed water treatment

1. Different impurities in water.

2 .pH value of water and its importance

3. Electro chemical theory of corrosion

4. Explain Sodium Zeolite softener.

CHAPTER: 9

Gas Turbine

1. Explain the parameters affected on work ratio in gas turbine power plant

2. Derive an expression for air standard efficiency of ideal Bryton cycle in terms of pressure ratio. State the assumption made.
3. A short note on Gas turbine with Inter cooling, Regeneration and Reheating
4. Combined cycle power plant
5. Explain the effect of operating variables on the thermal efficiency of a gas turbine cycle.

EXAMPLES

1. A gas turbine operates on Brayton cycle. The temperature range is 1050 K and 288 K. Find pressure ratio for maximum power output. Also determine thermal efficiency, work ratio and power output, if the mass flow rate of air is 20 kg/sec.
   Take Cp = 1.005 kJ/kg K and ϒ = 1.4 for compression and expansion process.

2. A gas turbine plant is operated between 1 bar and 9 bar pressures and minimum and maximum cycle temperatures are 25 □C and 1250 □C. A compression is carried out in two stages with perfect intercooling. The gases coming out from H.P. turbine are heated to 1250 □C before entering into L.P. turbine. The expansions in both turbines are arranged in such a way that each stage develops same power.
   Assuming compressors and turbines isentropic efficiencies as 83 %. (a) Determine the cycle efficiency assuming ideal regenerator. (b) Find the power developed by the cycle in kW if the air flow through the power plant is 16.5 kg/sec. Neglect the mass of fuel. All the components are mounted on a single shaft.

CHAPTER : 10

Nuclear Power Plant

1. List the nuclear reactors. Explain working of Pressurized water reactor
2. Explain with neat sketch construction and working of CANDU type reactor
3. Main components of nuclear reactor and nuclear control
4. Discuss Boiling Water Reactor (BWR) with neat sketch
5. Chain Reaction in Nuclear Power plant
6. What is the difference between fissionable and fertile materials?

CHAPTER : 11

Jet Propulsion

1. Explain construction and working of Turbojet.
2. Explain the principle of jet and rocket propulsion with neat sketch.
3. Discuss Turbojet Engine, also discuss equations of thrust, Thrust power, Propulsive efficiency and Thermal efficiency
4. Explain the working principle of Turboprop engine with neat sketch

CHAPTER : 12

Economics of Power Generation

Explain following terms

- Load curves,
- Load duration curves,
- Connected load
- Maximum load,
- Peak load, Base load
- peak load power plants,
- Load factor,
- Plant capacity factor,
- Plant use factor,
- Demand factor,
- Diversity factor