GYANMANJARI INSTITUTE OF TECHNOLOGY

Semester: 4th (Electrical) Subject code – 2140907

Sub Name: Applied Thermal and Hydraulic Engineering

Date:

ASSIGNMENT-1

MODULE -1

Steam Power Cycle (Rankine cycle):

1. Describe Steam Power Cycle (Rankine cycle) with the help of schematic, p-v, T-S, h-s diagram and derive the equation for efficiency.
2. State and explain the different methods of improving thermal efficiency of Steam Power Cycle (Rankine cycle).
3. Name the significant parameters to improve the efficiency of steam power cycle.
4. A steam power plant working on Rankine cycle has range of operation from 40 bars dry saturated to 0.05 bars.
   Determine,
   (i) Cycle efficiency
   (ii) Work ratio
   (iii) Specific steam consumption

Gas Turbine Cycle:

1. Applications of gas turbine?
2. Explain the merits and demerits of gas turbine power plant?
3. Discuss the merits and demerits of open and closed cycle gas turbine power plant.
4. Explain the Air standard cycle for gas turbine (Brayton cycle or closed cycle gas turbine) and with the help of schematic, p-v and T-S diagram and derive the equation for efficiency.
5. State the different methods of improving thermal efficiency of gas turbine power plant. Explain all three in detail.
6. A gas turbine unit has a pressure ratio of 6 and maximum cycle temperature of 610˚C. The isentropic efficiency of the turbine and compressor are 0.82 and 0.8 respectively. Calculate the power output in KW when the air enters the compressor at 15˚C at a rate of 16 kg/s. Take Cp= 1.005 KJ/kg K and $\gamma = 1.4$ for compression process and Cp= 1.11 KJ/kg K and $\gamma = 1.333$ for expansion process.
7. A gas turbine power plant operates between temperatures 15 C and 1100 C. Calculate the following: (i) The optimum pressure ratio for the cycle for maximum power output, (ii) Compressor work, Turbine work, Shaft work and

Work Ratio, and (iii) Plant efficiency. Take for air, Cp=1.005 kJ/kg-K and k = Cp / Cv = 1.4.

Refrigeration:

1. Define:
    a. Refrigeration and its applications
    b. One Tons of refrigeration
    c. Co-efficient of performance (COP)
2. Explain Vapor compression Refrigeration system with it T-s and p-h diagram.
3. Explain air cycle refrigeration system or Bell- Coleman Air refrigeration cycle with neat sketch.
4. Explain simple air craft refrigeration system with neat sketch.
5. Define:
    a. Dry Bulb Temperature (DBT)
    b. Wet Bulb Temperature (WBT)
    c. Wet Bulb Depression
    d. Dew Point Temperature (DPT) ($t_{dp)}$
6. Explain Psychrometric Chart.