Roll No											

PRESIDENCY UNIVERSITY
BENGALURU

SCHOOL OF ENGINEERING
MID TERM EXAMINATION - OCT 2023

Semester : Semester V - 2021
Course Code : MEC3025
Course Name : Sem V - MEC3025 - Power Plant Engineering
Program : B. TECH

Date : 2-NOV-2023
Time : 9:30AM - 11:00AM
Max Marks : 50
Weightage : 25%

Instructions:
(i) Read all questions carefully and answer accordingly.
(ii) Question paper consists of 3 parts.
(iii) Scientific and non-programmable calculator are permitted.
(iv) Do not write any information on the question paper other than Roll Number.

PART A

DESCRIPTIVE **10 MARKS EACH QUESTION**

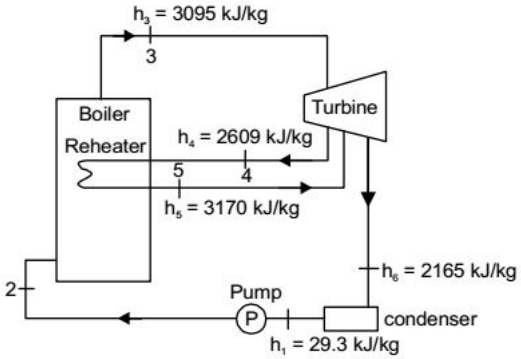
1. What is Boiler. Explain working of water tube boiler with the help of neat and clean diagram.
(CO1) [Application]

2. What is Reheat-Rankine Cycle. Explain working of Reheat Rankine cycle with the help of block diagram. Also draw Temperature Entropy diagram clearly showing all the points. All points on block diagram should clearly match with Temperature Entropy diagram.
Assume that steam is re-heated only one time after boiler.
(CO2) [Application]

PART B

DESCRIPTIVE **15 MARKS EACH**

3. Consider a steam power plant using a reheat cycle as shown. Steam leaves the boiler and enters the turbine at 4 MPa, 350°C (h3 = 3095 kJ/kg). After expansion in the turbine to 400 kPa (h4 = 2609 kJ/kg), the steam is reheated to 350°C (h5 = 3170 kJ/kg), and then expanded in a low pressure turbine to 10 kPa (h6 = 2165 kJ/kg) the specific volume of liquid handled by the pump can be assumed to be v=0.0010025 m^3/kg.



FIND:

a) Thermal efficiency of plant neglecting pump work.

b) Considering pump work, Calculate enthalpy at pump discharge(h_2).

(CO1) [Application]

4. In a steam power plant operating on a ideal Rankine cycle, superheated steam enters the turbine at 3 MPa and 350°C. The condenser pressure is 75 kPa.

For saturated liquid, at P = 75 kPa, hf = 384.39 kJ/kg, vf = 0.001037 m^3/kg, sf = 1.213 kJ/kgK.

For saturated vapour, at P = 75 kPa, hg = 2662.4 kJ/kg, sg = 7.4558 kJ/kg-K. Where hf=enthalpy of saturated liquid, hg=enthalpy of saturated vapour.

sf=entropy of saturated liquid, sg=entropy of saturated vapor. vf=volume of saturated liquid.

At P = 3 MPa and T = 350°C (superheated steam),h = 3115.3 kJ/kg, s = 6.7428 kJ/kgK. where h =enthalpy of superheated steam,s=entropy of superheated steam.

a) Sketch the Temperature-Entropy diagram showing all the points clearly.

b) Find thermal efficiency of the cycle.

(CO2) [Application]