

S.B. Roll No.....

THERMODYNAMICS-I
4th Exam/Mech./5253/Feb'2021
(For 2018 batch onwards)

Duration: 1.15Hrs.

M.Marks:25

SECTION-A

Q1. Attempt any three questions.

3x5=15

- i. Explain Zeroth law and First law of thermodynamics.
- ii. Compare reciprocating compressor with rotary compressor.
- iii. 2m^3 of a gas at 30°C receives heat at constant pressure so that the final temperature is 210°C . Find out final volume and increase in volume during the process.
- iv. What do you mean by isothermal process? Write equations representing this process.
- v. Explain Kelvin Planck and Clausius statements.
- vi. Explain Mollier chart.
- vii. Compare fire tube boiler with water tube boiler.

SECTION-B

Q2. Attempt any one question.

1x10=10

- a. Write the principle, construction and working of Babcock and Wilcox boiler with a neat sketch.
- b. If the compression ratio of an Otto engine is changed from 7 to 9, what will be the change in efficiency, if γ for air = 1.4. Also calculate the percentage change in efficiency.
- c. 2m^3 of a gas is contained in a piston cylinder arrangement. Initial pressure and temperature of gas is 20 bar and 100°C respectively. If the heat is supplied to this gas at constant pressure so that the volume of gas is increased to 5m^3 , then calculate:
 - i. Change in internal energy of the gas
 - ii. External work done and
 - iii. Change in enthalpy of the gasTake $C_p = 1\text{ kJ/Kg}$ and $C_v = 0.714\text{ kJ/Kg}$.
- d. A boiler is made of iron plates 12 mm thick. If the temperature of outside surface is 120°C and that of inner is 100°C . calculate the mass of water evaporated per hour. Assume that the area of heating surface is 5m^2 and K for iron is 84 W/mK .