

Code No.: ME305PC

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CMR ENGINEERING COLLEGE: HYDERABAD
UGC AUTONOMOUS
II-B. TECH-I-Semester End Examinations (Supply)- June- 2022
THERMODYNAMICS
(MECH)

[Time: 3 Hours]

[Max. Marks: 70]

- Note:** 1. Answer any FIVE questions. Each question carries 14 marks.
2. All questions carry equal marks.
3. Illustrate your answers with NEAT sketches wherever necessary.

5X14=70

1. a) Compare Macroscopic and Microscopic approaches in thermodynamic studies? [7M]
b) Show that work is a path function and not a property [7M]
2. a) A heat engine receives heat at the rate of 1500 kJ/min and gives an output of 8.2 kW. [6M]
Determine:
i. The thermal efficiency. ii. The rate of heat rejection
b) Define Gibb's and Helmholtz's functions? Compare the importance of them. [8M]
3. a) The Initial volume of 0.18 kg of a certain gas was 0.15m^3 at a temperature of 15°C and a pressure of 1 bar. After Adiabatic Compression to 0.056m^3 the pressure was found to be 4 bar. Find [8M]
i. Final temperature ii. Workdone iii. Change in enthalpy iv. Change in Internal Energy.
b) Discuss about triple point and critical state. [6M]
4. a) Define the terms Dry bulb temperature, Wet bulb temperature, Dew point temperature and Degree of saturation. [7M]
b) State Dalton's law of partial pressures and Avogadro's laws of additive volumes. [7M]
- a) In an air standard diesel cycle, the compression ratio is 15, and at the beginning of isentropic compression, the temperature is 15°C and the pressure is 0.1 MPa. Heat is added until the temperature at the end of constant pressure process is 1480°C . Calculate: i. Cutoff ratio ii. Heat supplied per kg of air iii. Cycle efficiency iv. Mean effective pressure. [7M]
b) Explain the working of Bell Coleman cycle. [7M]
6. a) Define Thermodynamic system? Explain different types of systems with suitable example. [7M]
b) Explain the Zeroth law of thermodynamics with neat sketch. Explain how it is important in establishing the temperature scale? [7M]
7. a) Establish the equivalence of Kelvin- Planck and Clausius statements [7M]
b) State the First Law of thermodynamics and also the limitations of first law of thermodynamics. [7M]
8. a) A 0.568m^3 capacity insulated vessel of oxygen at a pressure of 2 bar is stirred by an internal paddle until the pressure becomes 2.4 bar. Find out i. Heat Transferred ii. Work output and iii. Change in Entropy [7M]
b) Determine the Condition of steam in the following cases: [7M]
i. At a Pressure of 10 bar and temperature 200°C
ii. At a Pressure of 10 bar and Volume of $0.175\text{m}^3/\text{Kg}$.
