Code No.: ME305PC | R20 | H.T.No. | | | 8 | R | | | | | |

CMR ENGINEERING COLLEGE: : HYDERABAD
UGC AUTONOMOUS
II–B.TECH–I–Semester End Examinations (Supply) -February- 2024
THERMODYNAMICS
(MECH)

[Time: 3 Hours] **[Max. Marks: 70]**

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 20 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART-A **(20 Marks)**

1. a) Define state. [2M]
   b) What is heat? [2M]
   c) Discuss the term control volume. [2M]
   d) Write the processes in a Carnot cycle. [2M]
   e) Write in detail about phase transformation. [2M]
   f) What is meant by work transfer? [2M]
   g) Define mole fraction. [2M]
   h) What is wet bulb temperature? [2M]
   i) Explain Sterling cycle. [2M]
   j) Draw the p-V and T-s diagram for Otto cycle. [2M]

PART-B **(50 Marks)**

2. Differentiate Macroscopic and Microscopic approaches [10M]

OR

3. A fluid at a pressure of 3 bar and with specific volume of 0.18 m^3/kg contained in a cylinder behind a piston, expands reversibly to a pressure of 0.6 bar, according to a law, $p = C/v^2$, where C is a constant. Calculate the work done by the fluid on the piston. [10M]

4. Derive steady flow energy equation and write assumptions. [10M]

OR

5. What is perpetual motion machine (PMM1) of first kind and Explain? [10M]

6. Steam expands isentropically in a nozzle from 1 MPa, 250°C to 10 kPa. The steam flow rate is 1 kg/s. Find the velocity of steam at the exit from the nozzle, and the exit area of the nozzle. Neglect the velocity of steam at the inlet to the nozzle. [10M]

OR

7. Derive an expression for work done during Constant temperature process in a closed system. [10M]

8. Derive the equation for a perfect gas. [10M]

OR

9. The atmospheric conditions are 20^0C DBT and specific humidity of 0.0095 kg/kg of dry air. Calculate the following i) partial pressure of vapours ii) Relative humidity iii) Dew point temperature. [10M]

10. An engine of 250 mm bore and 375 mm stroke works on Otto cycle. The clearance volume is 0.00263 m^3. The initial pressure and temperature are 1 bar and 50°C. If the maximum pressure is limited to 25 bar, find the following: (i) The air standard efficiency of the cycle. (ii) The mean effective pressure for the cycle. Assume the ideal conditions. [10M]

OR

11. A Carnot engine working between 400°C and 40°C produces 130 kJ of work. Determine: (i) The engine thermal efficiency. (ii) The heat added. (iii) The entropy changes during heat rejection process. [10M]

****