Name :
Roll No:

MAR ATHANASIUS COLLEGE OF ENGINEERING, KOTHAMANGALAM – 686 666

DEPARTMENT OF MECHANICAL ENGINEERING
SECOND SESSIONAL EXAMINATION, MARCH 2026
FOURTH SEMESTER (ME)

B24ME2T06 ENGINEERING THERMODYNAMICS

Time – 1.5 Hour **Max: 40 Marks**

PART-A

Answer All Questions

1.	Define entropy and prove that entropy is a property of a system.	**[CO 3]**	**3 Marks**
2.	What is available energy and unavailable energy?	**[CO 3]**	**3 Marks**
3.	What is the difference between critical point and triple point?	**[CO 4]**	**3 Marks**
4.	Define dryness fraction. Draw the p-v-T surface of a substance that contracts on freezing.	**[CO 4]**	**3 Marks**

PART-B

Answer All Questions

5. a	State and prove Clausius' Theorem.	**[CO 3]**	**6 Marks**
5.b	A reversible heat engine operates between two reservoirs at temperatures of 600°C and 40°C. The engine drives a reversible refrigerator which operates between reservoirs at temperatures of 40°C and −20°C. The heat transfer to the heat engine is 2000 kJ and the net work output of the combined engine–refrigerator plant is 360 kJ. (a) Evaluate the heat transfer to the refrigerant and the net heat transfer to the reservoir at 40°C. (b) Reconsider (a) given that the efficiency of the heat engine and the COP of the refrigerator are each 40% of their maximum possible values.	**[CO 3]**	**8 Marks**
6. a	What are saturation states? Express the saturation states on h-s, T-h and T-s diagrams.	**[CO 4]**	**6 Marks**
6. b	A vessel of volume 0.04 m^3 contains a mixture of saturated water and saturated steam at a temperature of 250°C. The mass of the liquid present is 9 kg. Find the pressure, the mass, the specific volume, the enthalpy, the entropy, and the internal energy.	**[CO 4]**	**8 Marks**

VISION

Mentoring to Ensure Excellence

MISSION

- To facilitate comprehensive and integrated development of students by providing quality education that encourages sustainable practices
- To mold disciplined and socially committed engineers capable of assuming professional leadership upholding national integrity