Q.P.Code: 23ME0303 | R23 | H.T.No. [   ]

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)

B.Tech. II Year I Semester Regular & Supplementary Examinations November-2025

THERMODYNAMICS
(Mechanical Engineering)

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

PART-A
(Answer all the Questions 10 x 2 = 20 Marks)

1	a	What is a System in thermodynamics?	CO1	L1	2M
	b	Define the term Surroundings.	CO1	L1	2M
	c	Define the term work.	CO2	L1	2M
	d	State PMM-1.	CO2	L1	2M
	e	State second law of thermodynamics.	CO3	L1	2M
	f	What is PMM-II?	CO3	L1	2M
	g	What do you mean by triple point?	CO4	L1	2M
	h	Explain about steam Calorimeter in brief.	CO4	L2	2M
	i	What is meant by refrigeration?	CO5	L1	2M
	j	Explain the term psychometry in brief.	CO5	L2	2M

PART-B
(Answer all Five Units 5 x 10 = 50 Marks)

UNIT-I

2	a	Distinguish between intensive and extensive property.	CO1	L2	5M
	b	Determine the work done by the air which enters into an evacuated vessel from atmosphere when the valve is opened. The atmospheric pressure is 1.013 bar and 1.5 m³ of air at atmospheric condition enters into the vessel.	CO1	L3	5M

OR

3	a	Explain reversible process with an example.	CO1	L2	5M
	b	With an example explain irreversible process.	CO1	L2	5M

UNIT-II

4	a	Compare work transfer and heat transfer with neat sketches.	CO2	L2	5M
	b	Show that work is a path function and not a property.	CO2	L1	5M

OR

5		State First law of thermodynamics and its applications in brief.	CO2	L1	10M

UNIT-III

6		An iron cube at a temperature of 400°c is dropped into an insulated bath containing 10 kg water at 25°c. The water finally reaches a temperature of 50°c at steadystate. Given that the specific heat of water is equal to 4186J/kgK. Find the entropy changes for the iron cube and water.	CO3	L3	10M

OR

7	a	Describe availability and unavailability.	CO3	L2	5M
	b	Two Carnot engines work in series between the source and sink temperatures of 550 K and 350 K. If both engines develop equal power determine the intermediate temperature.	CO3	L3	5M

UNIT-IV

8		A certain gas has cp = 1.968 kJ/kg K, and cv = 1.507 kJ/kg K. Find its molecular weight and gas constant. A constant volume chamber of 0.3m³ capacity contains 2kg of this gas at 5°C. Heat is transferred to the gas until the temperature is 100°C. Find the work done, heat transferred and the changes in internal energy, enthalpy and entropy.	CO4	L3	10M

OR

9		A piston-cylinder contains 3 kg of wet steam at 1.4 bar. The initial volume is 2.25 m³. The steam is heated until its temperature reaches 400°C. The piston is free to move up or down unless it reaches the stops at the top. When the piston is up against the stops the cylinder volume is 4.65 m³. Determine the amount of work and heat transfer to or from steam.	CO5	L3	10M

UNIT-V

10		A refrigerating system operates on the reversed Carnot cycle. The higher temperature of the refrigerant in the system is 35°C and the lower temperature is – 15°C. The capacity is to be 12 tonnes. Neglect all losses. Determine : (i) Co-efficient of peformance. (ii) Heat rejected from the system per hour. (iii) Power required	CO5	L3	10M

OR

11	a	State the requirements of human comfort in brief.	CO6	L1	5M
	b	Define the following terms: i) Sensible heat load; ii) Latent heat load	CO6	L3	5M

*** END ***