CLASS: B.TECH.   SEMESTER : III/ADD
BRANCH: CHEMICAL ENGG. & FET   SESSION : MO/2024

SUBJECT: CL201 THERMODYNAMICS
TIME: 02 Hours   FULL MARKS: 25

INSTRUCTIONS:
1. The question paper contains 5 questions each of 5 marks and total 25 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
4. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates

----

			CO	BL
Q.1(a)	Compare between state function and path function.	[2]	1	2
Q.1(b)	Prove that in an adiabatic process, PV^{γ} = constant	[3]	1	5
Q.2(a)	Calculate the vapour pressure of water at 363 °K, if the vapour pressure at 373 °K is101.3 kPa. The mean heat of vaporization in this temperature range is 2275 kJ/kg.	[2]	3	5
Q.2(b)	Elaborate the concept of Helmholtz Energy (A). Show that: $A = - W_{rev}$	[3]	1	2
Q.3(a)	Briefly discuss Joule Thomson effect with proper thermodynamic parameters.	[2]	2	2
Q.3(b)	A hot steel rod is quenched in 150 kg of oil (C_p = 2.5 kJ/kg/K) at 300K. If entropy change of oil is 26.13 kJ/K, estimate the final temperature of oil and write opinion on the obtained value.	[3]	1	5
Q.4(a)	Define residual property and Gibb's free energy as a generating function	[2]	2	1
Q.4(b)	Demonstrate $\left(\dfrac{\partial v}{\partial T}\right)_P = -\left(\dfrac{\partial s}{\partial P}\right)_T$	[3]	1	2
Q.5(a)	Propane gas is throttled from 20 bar and 400 K to 1bar pressure. Evaluate the final temperature of the gas if μ = 1.053 K/bar and write opinion on the obtained value. Also, explain the nature of the gas if μ → 0 .	[2]	2	5
Q.5(b)	List the assumptions used to modify Clapeyron equation to Clausius-Clapeyron equation and analyze the significance of max. inversion temperature with the help of a characteristic graph. Also, calculate ΔG and predict the nature of a process taking ΔH from 2(a) and ΔS as 9.80 kJ/kg/K at T of 298 K	[3]	3	4,5

::::::19/09/2024::::::E