



Continuous Assessment Test (CAT) – I AUGUST 2025

Programme	:	Integrated M.TECH	Semester	:	FALL 25-26
Course Code & Course Title	:	IACHY102	Class Number	:	CH2025260103126
Faculty	:	Dr. Vinu Mohan A M	Slot	:	C1+TC1
Duration	:	90 minutes	Max. Mark	:	50

General Instructions:

- Write only your registration number on the question paper in the box provided and do not write other information
- Use statistical tables supplied from the exam cell as necessary
- Use graph sheets supplied from the exam cell as necessary
- Only non-programmable calculator without storage is permitted

Answer any Five questions

Q. No	Sub Sec.	Description	Marks	CO	BT Level
1		Explain the role of a catalyst in a chemical reaction. Discuss the different types of catalysts, providing a suitable example of each type along with its mechanism.	10	1	K1
2	i)	One mole of an ideal monoatomic gas at 35°C expands reversibly and adiabatically from a volume of 12 dm ³ to 36 dm ³ . Calculate q, ΔU, W, and ΔH, given that Cv/R=3/2.	7	1	K3
	ii)	State the third law of thermodynamics and explain its significance.	3	1	K1
3		Explain the four processes involved in a Carnot cycle with the aid of a plot. The efficiency of a Carnot engine is 60% when the hot reservoir is at 627°C. If the efficiency increases to 70%, determine the change in the temperature of the cold reservoir.	10	1	K2
4	i)	Derive the rate equation for a first-order reaction and prove that the half-life of a first-order reaction is independent of its initial concentration.	5	1	K2
	ii)	Explain the effect of temperature and trivalent doping on the conductivity of Silicon semiconductor	5	2	K2
5	i)	Discuss the effect of temperature on the rate of a reaction with the appropriate equation and a suitable diagram.	5	1	K2
	ii)	Mention five differences between galvanic cells and electrolytic cells.	5	2	K3
6	i)	The rate constant of a certain reaction becomes three times greater when the temperature is increased from 400 K to 750 K. Calculate the activation energy of the reaction, given R=8.314 J mol ⁻¹ K ⁻¹ .	5	1	K3
	ii)	Write the half cell reaction, the net reaction and calculate EMF of the following cell: Ca Ca ²⁺ (0.2 M) Cu ²⁺ (0.5 M) Cu The standard reduction potentials of Ca ²⁺ and Cu ²⁺ are - 2.86 V and 0.34 V respectively.	5	2	K3

*****All the best *****