



VIT

Vellore Institute of Technology

(Deemed to be University under section 3 of UGC Act, 1956)

Continuous Assessment Test 1 (CAT 1) – August 2024

Programme :	B.Tech	Semester :	Fall Sem 2024-25
Course :	Engineering Chemistry	Code :	BCHY101L
Faculty :	Ilaiyaraja Perumal	Slot :	B1+TB1 Slot
Time :	1 ½ Hours	Class Nbr :	
		Max. Marks :	50

Answer any FIVE Questions (5 x 10 = 50 Marks)

Q No	Question	Marks
1. ✓	a) 2 moles of argon gas is compressed isothermally and reversibly at 350 K from 16 liters to 4 liters. Calculate q, w, and ΔE for this compression. ✓	5
	b) Given that, ΔH and ΔS for a reaction are 100 kJ mol^{-1} and $200 \text{ JK}^{-1}\text{mol}^{-1}$ respectively. Find out the temperature conditions required for the reaction to be spontaneous and reversible. ✓	5
2. ✓	a) Explain the working of the Carnot cycle with a neat diagram and deduce the equation to calculate its efficiency. ✓	5
	b) The half-life of a first-order reaction is 30 minutes. If 10 grams of the reactant decomposes to X grams in 200 minutes. Determine the value of X. ✓	5
3. ✓	(a) Explain the following with suitable chemical equations for each (i) Homogenous catalysis, (ii) Heterogeneous catalysis ✓	5
	b) Discuss the function of a supercapacitor and compare its advantages with a battery. ✓	5
4. ✓	a) Describe a suitable cell construction with appropriate reactions to carry out the electroplating of copper on the surface of the Iron block. ✓	5
	b) The rate constant of a reaction gets doubled when the temperature is changed from 27°C to 87°C . Calculate the energy of activation for the reaction. ($R = 8.314 \text{ JK}^{-1}\text{mol}^{-1}$) ✓	5
5. ✓	Explain in detail the construction and function of a Lithium-ion battery. Also discuss its advantages and disadvantages. ✓	10
6.	Illustrate construction, function, advantages and disadvantages of solid oxide fuel cell (SOFC).	10