



VIT

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

REG. NO.:

SCHOOL OF ADVANCED SCIENCES
CONTINUOUS ASSESSMENT TEST - I
FALL SEMESTER 2025-2026

SLOT: G1+TG1

Programme Name & Branch : B. Tech - Computer Science and Engineering

Course Code and Course Name : BACHY105 and Applied Chemistry

Faculty Name(s) : Dr. Kamini Mishra, Dr. Arya JS, Dr. Nawaz Khan F, Dr. Karthikeyan S, Dr. Akhila Maheswari M, Dr. Sukanta C, Dr. Sai Saraswathi V, Dr. Satish Kumar G, Dr. Asharani I.V, Dr. Bhawana Pandey, Dr. Mohana Roopan S, Dr. Madhvesh Pathak, Dr. Sangeetha D, Dr. Prabhakaran D, Dr. Madhumitha G

Class Number(s) : VL2025260106525, 6529, 6533, 6537, 6541, 6545, 6549, 6553, 6557, 6561, 6565, 6569, 6573, 6575, 6579

Date of Examination : 23/08/2025

Exam Duration : 90 minutes **Maximum Marks: 50**

General instruction(s):

- Answer All Questions
- M - Max mark; CO - Course Outcome; BL - Bloom's Taxonomy Level (1 - Remember, 2 - Understand, 3 - Apply, 4 - Analyse, 5 - Evaluate, 6 - Create)
- **Course Outcome:**
 - CO1- Understand the fundamental concepts in physical, analytical, and materials chemistry.

Q N	Question	M	CO	BL
1.	Explain in detail the four thermodynamic processes involved in a Carnot cycle with the help of a P-V diagram. Derive expressions for the work done and the efficiency of a Carnot engine. Prove that all reversible heat engines operating between the same two temperatures have the same efficiency.	10	1	2
2.	Using the Gibbs-Helmholtz equation, explain how the spontaneity of a chemical reaction is predicted in terms of enthalpy (ΔH) and entropy (ΔS). Apply this concept to explain why adsorption of gas molecules onto a solid surface can be spontaneous even when entropy decreases ($\Delta S < 0$). Discuss the role of enthalpy and temperature in such cases.	10	1	3
3.	(a) One mole of an ideal gas undergoes a reversible isothermal expansion at 300 K, increasing its volume from 5 L to 20 L. Calculate the work done (w) during the process. Determine the values of heat exchanged (q), change in internal energy (ΔU), and change in enthalpy (ΔH). Give the data in Joules.	5	1	3
	(b) One mole of an ideal monoatomic gas is heated from 400 K to 1000 K at constant pressure. Calculate the change in entropy for the process. $C_p = 5R/2$.	5		



VIT[®]

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

REG. NO.:

SCHOOL OF ADVANCED SCIENCES
CONTINUOUS ASSESSMENT TEST - I
FALL SEMESTER 2025-2026

SLOT: G1+TG1

4.	(a) With the help of a labeled energy diagram, explain how catalysts influence the rate of a chemical reaction. Justify your answer with appropriate reasoning related to activation energy.	5	1	2
	(b) Ammonium nitrate decomposes thermally and follows first-order kinetics. When 5.0 g of the substance is heated at 80 °C for 15 minutes, only 0.5 g remains undecomposed. Calculate the rate constant (k) and half-life ($t_{1/2}$) of the decomposition.	5		
5.	Discuss with an <u>example</u> how temperature affects the rate of a chemical reaction with reference to the collision theory and activation energy, with appropriate illustrations. Show graphically how the distribution of molecular kinetic energies changes with increasing temperature, and explain how this influences the reaction rate. Write the Arrhenius equation and clearly define each of its terms.	10	1	1
