VIT

Vellore Institute of Technology

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

SCHOOL OF ADVANCED SCIENCES

Department of Chemistry

Fall Semester 2023-24

Continuous Assessment Test – 2

Course Code: ICHY101L **Duration** : 90 Minutes **Slot:** B2 +TB2

Course Name: Engineering Chemistry **Max. Marks :** 50

Class Numbers: VL2023240106307, 6309, 6311, 6313, 6315

Faculty Names: Dr. Badal Kumar Mandal, Dr. Thanmozhi K, Dr. Tapas Ghatak, Dr. Akhila Maheswari M, Dr. Kamini Mishra

Q N	Answer ALL the questions (5 X 10 = 50 Marks)	Marks	CO	BL
1	Deduce the work done under reversible isothermal expansion and irreversible isothermal expansion and comment on the maximum possible work done between the two aforementioned processes.	10	CO2	BL2
2	**(a)** At 27 °C, one mole of an ideal gas is expanded isothermally and reversibly from a pressure of 100 atm and 20 atm. Calculate ΔU and q. ($R = 2$ cal K^{-1} mol^{-1}) **(b)** Elucidate the equation that delineates the interrelation between temperature and the activation energy of a chemical reaction, whilst providing a comprehensive explication of the terminologies included within said equation.	5 + 5	CO2	BL2
3	**(a)** What is the name of the crucial enzyme involved in the breakdown of H_2O_2? Provide the whole reaction while explaining the process of breakdown using graphic representations. **(b)** Calculate the temperature for a reaction. Given $A = 5000 \times 10^{10}$ s^{-1} $E_a = 10^5$ J mol^{-1}, and $k = 5.78 \times 10^{-3}$ s^{-1}	5 + 5	CO2	BL2
4	**(a)** Elucidate the intricate steps involved by which the pharmaceutical compound employed in the treatment of Kawasaki diseases is synthesized. **(b)** How would you synthesize an acid-base indicator with an azo-linkage and what chemical reactions would be involved?	5+5	CO1	BL1

Aspirin.

methyl orange.

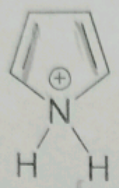
$K = Ae^{-Ea/RT}$

$\log k = -Ea + \log A$

5	Determine if the following compounds are AROMATIC, ANTI-AROMATIC or NON-AROMATIC with suitable justification.	**10**	CO1	BL2

I A

II N



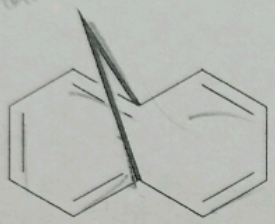
III A

8e⁻ Anti aromatic

→ Anion

→ protonated pyrole

Non



IV N

V Anti

→ 4π e⁻ only

Anti aromatic