



# VIT

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

**NAME OF THE SCHOOL OF ADVANCED SCIENCES  
CONTINUOUS ASSESSMENT TEST - II  
FALL SEMESTER 2024-2025**

REG.NO.:

SLOT: G2 + TG2

**Programme Name & Branch** : BBT & B.Tech Computer Engineering  
**Course Code and Course Name** : BCHY101L and Engineering Chemistry  
**Faculty Name(s)** : NAWAZ KHAN F; PRABHAKARAN D; RAJASEKHARA REDDY SABBASANI;  
 SUSANTA KUMAR; MADHVESH PATHAK; SRIRAGHAVAN K; MANJU S L; VEERA VENKATA RAMESH E; SANGEETHA D;  
 ARUNPRASAD M; SOVAN ROY; RAJAGOPAL D; THENMOZHI K; LOGANATHAN RANGASAMY; MAUSUMI GOSWAMI

**Class Number(s)** : VL2024250106757; 6764; 6768; 6777; 6782; 6791; 6793; 7042;  
 7043; 7093; 7094; 7096; 7196; 7237; 8578

**Date of Examination** : 19-10-2024

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

**General instruction(s):** Students are allowed to carry their self-handwritten note book/ textbook to the examination. Use of scientific calculators is permitted.

- Answer All Questions.
- M - Max mark; CO - Course Outcome; BL - Blooms Taxonomy Level (1 - Remember, 2 - Understand, 3 - Apply, 4 - Analyse, 5 - Evaluate, 6 - Create)
- Course Outcomes:  
 CO1: Apply the fundamental concepts in organic, inorganic and physical chemistry.  
 CO3: Discuss energy conversion devices and protective corrosion techniques.

Q. No	Question	M	CO	BL
1.	Examine the idea that a heat engine's performance efficiency depends less on the particulars of the working material and more on the temperature differential between the heat source and heat sink. Explain, how can this theory be proven or validated? Calculate the maximum efficiency of the heat engine operating between 300K and 600K. If it consumes 1000KJ in each cycle, what is the work done?	10	1	3
2.	Describe the graphical representation of first order reaction to calculate the rate constant. The decomposition of Cl <sub>2</sub> O <sub>7</sub> at 500K in the gas phase to Cl <sub>2</sub> and O <sub>2</sub> is a first order reaction. After 1 minute at 500K, the pressure of Cl <sub>2</sub> O <sub>7</sub> falls from 0.08 to 0.04 atm. Calculate the rate constant in s <sup>-1</sup> .	10	1	3
3.	a) Name the products and the biocatalyst used in the biocatalysis of H <sub>2</sub> O <sub>2</sub> . Write the reaction and predict the mechanism.	5	1	3
	b) Write down the detailed synthetic route and reaction mechanism of an analgesic which can be readily absorbed in the gastrointestinal tract.	5		
4.	a) Calculate the EMF of the cell given, Zn / Zn <sup>2+</sup> (0.001M) // Ag <sup>+</sup> ( 0.1M) /Ag 2Ag <sup>+</sup> + 2e <sup>-</sup> -----2Ag      E <sup>0</sup> = + 0.80 V and Zn -----Zn <sup>2+</sup> +2e <sup>-</sup> E <sup>0</sup> = - 0.76 V at 25 ° C.	5	3	2
	b) Which electricity producing device use ceramic components? Explain their function using a schematic diagram. Despite the high operating temperature, why is this energy device still preferred?	5		
5.	The natural Betanin pigment of Beetroot is used as an important component in an energy-harvesting device. Identify the device and discuss the working mechanism with a neat diagram.	10	3	2