



VIT

Vellore Institute of Technology
(Deemed to be University under section 3 of U.C.C. Act, 1976)

SLOT: D1+TD1

REG.NO.: 24BMTD014

**SCHOOL OF ADVANCED SCIENCES
CONTINUOUS ASSESSMENT TEST (CAT) -II
WINTER SEMESTER 2024-2025**

Programme Name & Branch : B.Tech. (All branches)
Course Code : BCHY101L
Course Name : ENGINEERING CHEMISTRY
Faculty Name(s) : Dr. MOHANA ROOPAN S/ Dr. MADHUMITHA G/
 Dr. SANGEETHA D/ Dr. PRABHAKARAN D/ Dr. AKHILA
 MAHESWARI M/ Dr. SHEELA A/ Dr. AMIT KUMAR TIWARI
Class Number(s) : VL2024250505005/ VL2024250505012/
 VL2024250505028/ VL2024250505029/
 VL2024250505031/ VL2024250505039/
 VL2024250505042
Date of Examination : 19-03-2025
Exam Duration : 90 minutes **Maximum Marks: 50**

General Instruction(s):

- Answer **all** the 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 Statement:
 CO-1: Apply the fundamental concepts in organic, inorganic and physical chemistry.
 CO-3: Discuss energy conversion devices and protective corrosion techniques.

Q. No	Question	M	CO	BL
1.	How can it be proven that engine efficiency depends on the heat source and sink temperatures and not on the working substance? Explain the cyclic process with a diagram and appropriate formulae.	10	1	BL3
2.	a) 1 mole of an ideal gas expands against a constant external pressure of 2 atm from a volume of 30 dm ³ to a volume of 40 dm ³ . Calculate the work done by the gas in Joules. b) How does the mechanism of a homogeneous catalyst affect the decomposition rate of hydrogen peroxide? Explain with its detailed mechanism.	5 + 5	1	BL3
3.	a) If 4.0 g of indole decomposes for 50 minutes, the remaining mass of indole is 0.5 g. What is the half-life of this reaction if it follows first-order kinetics? b) Identify the indicator used in the titration of strong acids with weak bases and provide a detailed description of its synthesis with appropriate mechanism.	5 + 5	1	BL3
4.	a) Which type of high-temperature fuel cell operates using a ceramic electrolyte? Draw a neat diagram and discuss its key components along with the electrochemical reactions involved in electricity generation.	5 + 5	3	BL2

	<p>b) Write the half-cell reaction, the net reaction and cell EMF of the following cell: $\text{Mg} \text{Mg}^{2+} (0.05 \text{ M}) \text{Cu}^{2+} (0.4 \text{ M}) \text{Cu}$ The standard reduction potentials are -2.37 V and 0.34 V respectively.</p>			
5.	<p>Identify an energy device made of high energy density material and widely used in mobile phones and laptops. Explain its working principle along with the necessary mechanism and diagrams.</p>	10	3	BL2
