



VIT

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

SLOT: F2+TF2

REG.NO.: 248EC0336

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

Programme Name & Branch : B.Tech
Course Code : BCHY101L
Course Name : Engineering Chemistry
Faculty Name(s) : Dr. Sathishkumar P
Class Number(s) : VL2024250505999
Date of Examination : 21.03.2025
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.	Derive an expression for the work done by a system a) Having an ideal gas as a working substance wherein heat is absorbed reversibly and without changing the internal energy. b) Having carbon dioxide as a working substance that comes out at high pressure and expands at atmosphere pressure without absorbing heat.	10	1	BL3
2.	a) A Carnot engine works between 27° C and 127° C. What maximum useful work the engine can do if it is supplied with a 400 kJ of heat energy? b) How is Arrhenius equation related to collision theory? Explain how the geometry of an activated complex is different from those of reactant and product with an example.	5 + 5	1	BL3
3.	a) Distinguish between second order and pseudo-first order reactions. How can a second order reaction be converted into a pseudo-first order reaction? Explain with an example. b) What are the reaction products formed when salicylic acid reacts with any acetylating agent? Give the reaction mechanism.	5 + 5	1	BL3
4.	a) Briefly explain how an organic dye can convert the electromagnetic radiation into electrical energy. b) Write the half-cell reaction, the net reaction and cell EMF of the following cell: $Cd Cd^{2+} (0.05 M) Cu^{2+} (0.5 M) Cu$ The standard reduction potentials of Cd/Cd ²⁺ and Cu ²⁺ /Cu are – 0.80 V and 0.68 V respectively.	5 + 5	3	BL2
5.	Explain the working principle of an energy device that has wide application in space vehicles and, explain its “pros and cons”.	10	3	BL2