REG. NO.:

VIT

Vellore Institute of Technology

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

SCHOOL OF ADVANCED SCIENCES
CONTINUOUS ASSESSMENT TEST - II
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 : 11/10/25
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:**
  - CO-2: Use chemical concepts for the advancement of materials in electrical, magnetic, and energy domains
  - CO-3: Demonstrate UV-Visible spectroscopic and X-ray diffraction techniques

QN	Questions	M	CO	BL
1.	A widely used rechargeable battery in portable electronics works on the principle of reversible insertion and removal of ions into layered solid materials. Illustrate its working mechanism with a neat diagram, write the balanced chemical equations for the charge–discharge process, and explain why such layered solid electrode materials allow repeated cycling compared to batteries based only on redox reactions in solution.	10	CO2	3
2.	Natural pigments, such as anthocyanin or betanin, can absorb visible light and transfer excited electrons to a semiconducting material, which creates an electrical current. Show the construction of an electricity generation system using a detailed diagram, explaining each event with justification.	10	CO2	3
3	(a) A material often displays dramatically different physical, chemical, and electronic behavior when reduced from bulk to the nanoscale. Discuss the fundamental factors responsible for these differences, supporting your discussion with a relevant example. (b) Describe a chemical strategy to convert a silica-based precursor into nanosilica, and clearly explain the underlying principles that govern particle size control and nanoscale formation.	5+5	CO2	2

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 - II
FALL SEMESTER 2025-2026

SLOT: G1+TG1

4	Explain the working principle of spectroscopy that utilises EMR in the range of 200-800 nm, accompanied by a neat sketch. Envisage color differences in benzene (colourless), nitrobenzene (yellow), and 4-nitrophenol (intense yellow) based on molecular structure and substituent effect.	10	CO3	2
5	(a)An electrochemical cell is constructed as follows: $Zn_{(s)}\|Zn^{2+}(?)\|\|Ag^{+}(0.1\ M)\|Ag_{(s)}$ The standard reduction potentials are -0.76 V and 0.8 V, respectively, and the measured cell potential is 1.50 V at 25°C. Calculate the concentration of Zn^{2+} in the anode compartment. (b) A material has been characterised using powder X-ray diffraction (p-XRD). One of its diffraction peaks appears at 2θ = 36.50° with a full width at half maximum (FWHM) of 0.85°. The X-ray wavelength used is λ = 1.5406 Å, and k = 0.9. Determine the crystallite size of the material and comment on the size of the material based on the result.	5+5	CO3	3

****