



# VIT

Vellore Institute of Technology

(Deemed to be University under section 3 of UTEA, Act 1986)

School of Advanced Sciences

Department of Chemistry

Fall Semester 2022-23

Continuous Assessment Test - II

Course Code : BCHY101L

Duration: 90 Minutes

Max. Marks : 50

Course Name : Engineering Chemistry

Slot : B1+TB1

Note: Students are allowed to carry one hand-written notebook and one textbook to the examination.

Q. No.	Answer <u>ALL</u> the questions (5 X 10 = 50 Marks)	Marks
1	A power station operating with steam has been designed, wherein the excess heat will be released into the environment. Is it possible to attain 100% efficiency in this power station? Justify your answer by correlating the relationship between heat supplied and work done during the cyclic processes.	10
2	a) Calculate the change in Gibb's free energy for melting of ice at (i) $-18^{\circ}\text{C}$ , (ii) $+5^{\circ}\text{C}$ and (iii) $13^{\circ}\text{C}$ . Predict the temperatures at which the process will be spontaneous (Note: Change in enthalpy = $6.01\text{ kJ mol}^{-1}$ & change in entropy = $0.022\text{ kJ mol}^{-1}$ for melting of ice). b) Derive the rate expression for conversion methyl isonitrile to acetonitrile. How can we calculate the rate constant for this reaction using the graphical method?	(5 + 5)
3	a) Describe why are enzyme-catalyzed reactions preferred in a few cases despite the high cost, stability and other issues associated with enzymes. b) Briefly discuss the concept of storing energy using electrostatics. How porous materials could help in enhancing the performance of these devices?	(5 + 5)
4	a) Elucidate the working principle of a light-weight, rechargeable battery system with a neat sketch. b) A futuristic fuel produces $\text{H}_2\text{O}$ as a by-product after being used. Explain the working principle involved in this electrochemical energy conversion system.	(5 + 5)
5	Elaborate on the process of electricity generation using naturally occurring dyes including its construction, working mechanism, merits and demerits.	10