

Ca/D/TY



VIT
Vellore Institute of Technology

Course: BCHY101L - Engineering Chemistry
Class NBR(s): 5009/ 5014 / 5045 / 5047 / 5049 / 5050 / 5051
Time: Three Hours

Final Assessment Test - April 2025

Slot: D2+TD2

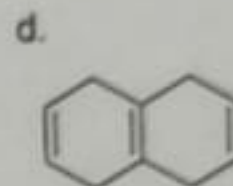
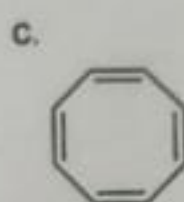
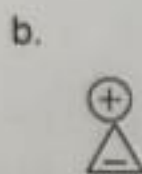
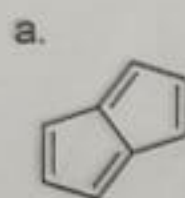
Max. Marks: 100

- Reg. No. [REDACTED]
- KEEPING MOBILE PHONE/ANY ELECTRONIC GADGETS, EVEN IN 'OFF' POSITION IS TREATED AS EXAM MALPRACTICE
- DON'T WRITE ANYTHING ON THE QUESTION PAPER

General Instruction: Write Chemical equations and formulae wherever it is required

Answer ALL Questions
(10 X 10 = 100 Marks)

1. Demonstrate the maximum convertibility of heat into work and show that the efficiency of heat engine depends on the operating temperatures.
2. Discuss the applications of metal complexes in the estimation of metal ions. Elaborate the principle and procedure for the estimation of metal ions by instrumental method of analysis.
3. Arrange the following compounds as aromatic, anti-aromatic and non-aromatic and give justification.



4. Identify the secondary battery used in E-Bikes and write the chemical reactions involved in it with its limitations and advantages.
5. Identify the polymer used as an adhesive and in paints. Give the synthetic methodology and mention its properties and applications.
6. When a sample is subjected to UV-Visible spectroscopic analysis it absorbs light at λ_{max} 550-600 nm. Identify the compound, explain the principle and applications of the UV-Visible spectroscopy.
7. What happens if you reverse the ion-exchange resin columns in deionizer water purification process and also elaborate the working principle with a neat sketch and relevant equations.
8. a) 5 moles of an ideal gas expands reversibly and isothermally from a volume of 5L to 10L at 27 °C . Calculate ΔU and the work done. [5+5]
b) 5.0 g of maleic anhydride undergoes thermal decomposition by following a first order kinetics. After 30 mins, 0.5 g of the compound was remaining. Calculate the half-life of this reaction.
- 9.a) Explain the mechanism of conduction in conducting polymers with appropriate example.

[OR]

- 9.b) Briefly explain any two synthetic methodologies to obtain nanomaterial.

- 10.a) What is cathodic protection? Discuss any two methods to control corrosion using this principle.

[OR]

- 10.b) Explain the constructions of bomb calorimeter and focus on its essential components and their respective functions, with the help of a diagram. Employing the principles and formula, calculate the gross and net calorific values of a coal sample in cal/g assuming the latent heat condensation of steam as 580 cal/g. The coal sample containing 90% C, 6% H and 4% ash exhibited the following data during the estimation of calorific values using bomb calorimeter.

Weight of coal burnt = 0.71g,
Weight of water taken = 1450 g,
Water equivalent of bomb and calorimeter = 1300g,
Rise in temperature = 2.8°C,
Cooling correction = 0.04 °C,
Fuse wire correction = 15 cal.
Acid correction = 55 cal.

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