

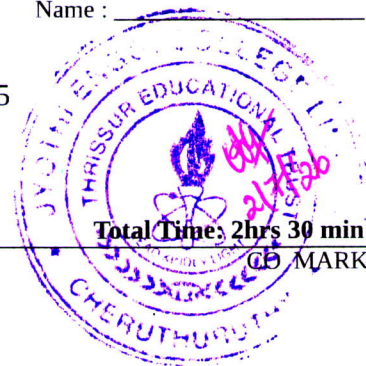
Reg No.: _____

Name : _____



Jyothi Engineering College(Autonomous)
B. Tech Degree S2 (S) Examination, June 2026 (2025 Scheme)

25CHT101 - CHEMISTRY FOR INFORMATION SCIENCE AND ELECTRICAL SCIENCE

Total Mark: 60**Total Time: 2hrs 30 min****60 MARK****PART A****(Answer All Questions. Each question carries 3 marks)**

1. Write anode, cathode reaction and Nernst equation for Daniel cell. CO1 (3)
2. Mention any three conditions required for the standard hydrogen electrode. CO1 (3)
3. Write any three applications of graphene. CO2 (3)
4. Give the structure of PVC and neoprene. CO2 (3)
5. Why does 1,3-Butadiene absorb at a longer wavelength compared to 1,4-Pentadiene and n-butane? CO3 (3)
6. Sketch a typical IR spectrum and indicate the functional group region and fingerprint region. CO3 (3)
7. What is Biochemical Oxygen Demand (BOD), and what is the significance of BOD in water analysis? CO4 (3)
8. Why is soft water preferred for boilers? CO4 (3)

PART B**(Answer any one full question from each module, each question carries 9 marks)****Module - 1**

9. a) State the principle of a lithium-ion battery and write the reactions during charging and discharging. CO1 (5)
- b) A $\text{Zn} | \text{Zn}^{2+} (0.10 \text{ M}) // \text{Ag}^+ (0.010 \text{ M}) | \text{Ag}$ galvanic cell is constructed. CO1 (4)
 - (a) Write the two half-reactions and the balanced overall reaction.
 - (b) Using the standard potentials $E^\circ(\text{Zn}^{2+}/\text{Zn}) = -0.76 \text{ V}$ and $E^\circ(\text{Ag}^+/\text{Ag}) = +0.80 \text{ V}$, calculate the EMF of the cell at 298 K.

OR

10. a) Differentiate between primary cells and secondary cells. Give one example for each type. CO1 (5)
- b) Explain the electrochemical mechanism of corrosion of iron in acidic medium. CO1 (4)

Module - 2

11. a) Describe the working mechanism of a Dye Sensitized Solar Cell (DSSC) in detail with a neat labelled diagram. CO2 (5)
- b) Discuss the classification of CNTs based on the structure. CO2 (4)

OR

12. a) Explain the major constituents of a supercapacitor and describe the materials used for each component. CO2 (5)
- b) Explain the applications of nanomaterials in the agricultural and electronics fields. CO2 (4)

Module - 3

13. a) State the principle of Scanning Electron Microscopy (SEM). What signals are produced in SEM? CO3 (5)
- b) A dye solution of concentration 0.08 M shows absorbance of 0.045 at 530 nm, while a test solution of the same dye shows absorbance of 0.044 under the same conditions. Find the concentration of the test solution. CO3 (4)

OR

14. a) Explain the basic principle of UV-Visible spectroscopy. What is the condition required for a molecule to be UV-Visible active? Mention any two applications of UV-Visible spectroscopy. CO3 (5)
- b) Calculate the fundamental vibrational frequency of the HCl molecule if the force constant of the bond is 483 N m^{-1} . The atomic masses are given as Hydrogen (H) = $1.673 \times 10^{-27} \text{ kg}$, Chlorine (Cl) = $58.06 \times 10^{-27} \text{ kg}$. CO3 (4)

Module - 4

15. a) Write a note on the regeneration of ion-exchange resins used in water softening. Also, list the advantages of the ion-exchange method for softening of hard water. CO4 (5)
- b) List any four SDGs where chemistry plays a crucial role. CO5 (4)

OR

16. a) Describe the construction and working of a UASB reactor used in sewage treatment. CO4 (5)
- b) A sample of hard water contains 29.2 mg/L of $\text{Mg}(\text{HCO}_3)_2$, 16.26 mg/L of $\text{Ca}(\text{HCO}_3)_2$, and 13.66 mg/L of CaSO_4 . Calculate the temporary hardness, permanent hardness, and total hardness of the water sample (express your answers in terms of mg/L of CaCO_3 equivalent). CO4 (4)
