

Register No.: Name:

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

SECOND SEMESTER B.TECH DEGREE EXAMINATION (S), AUGUST 2023**(2020 SCHEME)****Course Code : 20CYT100****Course Name: Engineering Chemistry****Max. Marks : 100****Duration: 3 Hours****PART A****(Answer all questions. Each question carries 3 marks)**

1. What is galvanic series? How is galvanic series advantageous over electrochemical series in corrosion chemistry?
2. How will you determine the standard electrode potential of Fe/Fe²⁺ electrode using calomel electrode?
3. Which of the following molecules can give IR absorption? Give reason.
(a) N₂ (b) H₂O (c) O₂ (d) HCl
4. CHCl₃ gives a singlet at 7.26 ppm, while CH₃Cl shows singlet at 3.06 ppm in the ¹H NMR spectrum. Give reason.
5. What is the difference between isocratic elution and gradient elution in chromatography?
6. Write any three applications of DTA.
7. How is Polyaniline synthesized?
8. Give the preparation and any two applications of Kevlar.
9. What are the important sources of water pollution?
10. Explain breakpoint chlorination with the help of graph.

PART B**(Answer one full question from each module, each question carries 14 marks)****MODULE I**

11. a) Derive Nernst equation for electrode potential and apply it for the emf of Daniel cell. Give any three applications of Nernst equation. (10)
b) Define conductivity. How cell constant of a conductivity cell is determined? (4)

OR

12. a) Explain various types of cathodic protection using diagrams. (7)
b) Explain the principle of electroless copper plating and give two applications. (7)

MODULE II

13. a) Explain chemical shift in NMR spectroscopy. Discuss any four factors affecting chemical shift with proper examples. (10)
- b) Draw the vibrational modes of carbon dioxide and determine which modes are IR active. (4)

OR

14. a) Draw the molecular orbital energy diagram of i) Ethene, ii) 1, 3-butadiene iii) 1,3,5 hexatriene and iv) benzene to explain their UV-Vis absorption. (8)
- b) Explain the origin of spin-spin splitting in the NMR spectra and draw the splitting pattern of $\text{CH}_3\text{-COO-CH}_2\text{-CH}_3$. (6)

MODULE III

15. a) Explain the principle, instrumentation, procedure and any two applications of Gas Chromatography. (10)
- b) Explain the instrumentation of scanning electron microscope with a neat sketch. (4)

OR

16. a) What is Thin Layer Chromatography? Explain the procedure and visualisation techniques. (7)
- b) Explain the instrumentation of Thermogravimetric analysis. Illustrate the thermogram of $\text{CaC}_2\text{O}_4 \cdot \text{H}_2\text{O}$. (7)

MODULE IV

17. a) Explain the construction and working of OLED with the help of a neat labelled sketch. (7)
- b) What is ABS? How it is synthesised? Discuss any two properties and applications. (7)

OR

18. a) Explain the classification of conducting polymer. (8)
- b) Write the structure of all possible isomers for $\text{C}_4\text{H}_9\text{Cl}$. Classify them as optically active or inactive. (6)

MODULE V

19. a) Explain the estimation of hardness of water by EDTA method. (10)
- b) Explain the ion exchange process in water treatment. (4)

OR

20. a) Explain primary, secondary and tertiary processes involved in sewage water treatment with the help of flow diagram. (8)
- b) Define COD (chemical oxygen demand) and briefly explain the procedure for the estimation of COD. (6)
