

Model Question Paper

Reg. No.

Name

RAJAGIRI SCHOOL OF ENGINEERING & TECHNOLOGY

(AUTONOMOUS)

FIRST SEMESTER B.TECH DEGREE EXAMINATION

101908/CH900B ENGINEERING CHEMISTRY

Max. Marks: 100

Duration: 3 hours

PART A

(Answer **all** questions, **each** question carries 3 marks)

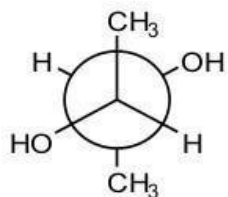
1. What is potentiometric titration? How the end point is determined graphically?
2. What is Galvanic series? How is it different from electrochemical series?
3. Which of the following molecules can give IR absorption? Give reason?

(a)O₂ (b) H₂ (c) N₂ (d) HCl

4. Which of the following molecules show UV-Visible absorption? Give reason.

(a) Ethane (b) Butadiene (c) Benzene

5. What are the visualization techniques used in TLC?
6. Write the three important applications of nanomaterials.
7. Draw the Fischer projection formula and find R-S notation of



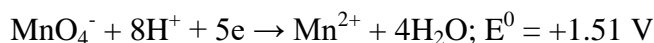
8. Write the structure of a) Polypyrrole b) Kevlar
9. What is break point chlorination?
10. What is reverse osmosis?

PART B

(Answer **one full** question from each module, each question carries **14** marks)

Module –I

11. a) Give the construction of Li-ion cell. Give the reactions that take place at the electrodes during charging and discharging. What happens to anodic material when the cell is 100% charged?
- b) Calculate the standard electrode potential of Cu, if its electrode potential at 25 °C is 0.296 V and the concentration of Cu²⁺ is 0.015 M.
12. a) Explain the mechanism of electrochemical corrosion of iron in oxygen rich and oxygen deficient acidic and basic environments.
- b) Given below are reduction potentials of some species



Use the above data to examine whether the acids, dil. HCl and dil. H₂SO₄, can be used to provide acid medium in redox titrations involving KMnO₄.

Module –II

13. a) What is spin-spin splitting? Draw the NMR spectrum of (i) CH₃CH₂CH₂Br (ii) CH₃CH(Br)CH₃ Explain how NMR spectrum can be used to identify the two isomers.
- b) A dye solution of concentration 0.08M shows absorbance of 0.012 at 600 nm; while a test solution of same dye shows absorbance of 0.084 under same conditions. Find the concentration of the test solution.
14. a) Explain the basic principle of UV-Visible spectroscopy. What are the possible electronic transitions? Explain with examples.
- b) Sketch the vibrational modes of CO₂ and H₂O. Which of them are IR active?

Module –III

15. a) Explain the principle, instrumentation and procedure involved in gas chromatography.
- b) Explain the DTA of $\text{CaC}_2\text{O}_4 \cdot \text{H}_2\text{O}$ with a neat sketch.
16. a) Explain the various chemical methods used for the synthesis of nanomaterial.
- b) How TGA is used to analyse the thermal stability of polymers?

Module –IV

17. a) What are conformers? Draw the cis and trans isomers of 1, 3-dimethylcyclohexane. Which conformer (chair form) is more stable in each case?
- b) What is ABS? Give properties and applications.
18. a) Explain the various structural isomers with suitable example.
- b) What is OLED? Draw a labelled diagram.

Module –V

19. a) What are ion exchange resins? Explain ion exchange process for removal of hardness of water? How exhausted resins are regenerated?
- b) 50 mL sewage water is diluted to 2000 mL with dilution water; the initial dissolved oxygen was 7.7 ppm. The dissolved oxygen level after 5 days of incubation was 2.4 ppm. Find the BOD of the sewage.
20. a) What are the different steps in sewage treatment? Give the flow diagram. Explain the working of trickling filter.
- b) Calculate the temporary and permanent hardness of a water sample which contains $[\text{Ca}^{2+}] = 160 \text{ mg/L}$, $[\text{Mg}^{2+}] = 192 \text{ mg/L}$ and $[\text{HCO}_3^-] = 122 \text{ mg/L}$.