

Register No.: ..... Name: .....

**SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)**

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

**FIRST SEMESTER B.TECH DEGREE EXAMINATION (Regular), DECEMBER 2022****(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. How is Helmholtz Electrical Double layer formed?
2. Give any three advantages of glass electrode.
3. State Beer –Lambert’s law. Write any one limitation of the law.
4. Which of the following molecules can give IR absorption? Give reason.  
(a) H<sub>2</sub> (b) CO (c) O<sub>2</sub> (d) HCl
5. Write any three applications of TGA.
6. Explain any one reduction method for the synthesis of nanomaterials.
7. How is polyaniline synthesized?
8. Give the preparation and any two applications of ABS.
9. A sample of water on analysis gives the following results; Ca<sup>2+</sup> = 200 mg/L, Mg<sup>2+</sup> = 180 mg/L, HCO<sub>3</sub><sup>-</sup> = 360 mg/L, Cl<sup>-</sup> = 200 mg/L and Na<sup>+</sup> = 80 mg/L. Calculate temporary and permanent hardness.
10. Explain any one disinfection method for treating water.

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

11. a) Derive Nernst equation for single electrode potential. Give the Nernst expression for the cell potential of Daniel cell. Give any two applications of Nernst equation. (8)  
b) Describe the principle and applications of electroless copper plating. (6)

**OR**

12. a) Describe the construction and working of Li-ion battery. Give any two advantages and applications. (10)  
b) Distinguish between Galvanic series and electrochemical series. (4)

**MODULE II**

13. 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) Write the various modes of vibrations possible for CO<sub>2</sub> and H<sub>2</sub>O. (6)
- Which modes of vibration are IR active? Give reason.

**OR**

14. a) Define chemical shift in NMR and explain the factors affecting chemical shift with examples. (8)
- b) Explain the origin of spin-spin splitting and draw the splitting pattern in CH<sub>3</sub>-CH<sub>2</sub>-Br. (6)

**MODULE III**

15. a) Explain the principle, instrumentation, procedure and any two applications of HPLC. (10)
- b) Explain the visualization techniques used in Thin Layer Chromatography. (4)

**OR**

16. a) Explain the principle, instrumentation and any four applications of DTA. Interpret DTA curve of CaC<sub>2</sub>O<sub>4</sub>.H<sub>2</sub>O. (10)
- b) Explain the instrumentation of SEM with the help of a diagram. (4)

**MODULE IV**

17. a) Explain the various structural isomerism with suitable examples. (10)
- b) Explain the construction and any two advantages of OLED. (4)

**OR**

18. a) Draw the chair conformations of 1, 3-dimethyl cyclohexane for its cis and trans isomers. Which will be optically active? Which conformer is more stable and why? (8)
- b) What is Kevlar? Give its any two properties and applications. (6)

**MODULE V**

19. a) Explain the estimation of total, permanent and temporary hardness of water by EDTA method. (10)
- b) Distinguish between BOD and COD. (4)

**OR**

20. a) What are the different steps in sewage treatment? Give the flow diagram. Explain the working of Trickling filter with a diagram. (10)
- b) Describe any one method used for desalination of water. (4)

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