

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

**SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)**

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

**THIRD SEMESTER B.TECH DEGREE EXAMINATION (Regular), DECEMBER 2022****CHEMICAL ENGINEERING****(2020 SCHEME)****Course Code : 20CHT201****Course Name: Chemistry for Process Engineering****Max. Marks : 100****Duration: 3 Hours****PART A*****(Answer all questions. Each question carries 3 marks)***

1. Write a note on electrochemical sensors.
2. How diffusion current is related to concentration of an ion?
3. Write a note on Auger electron spectroscopy.
4. Briefly explain the principle of AAS.
5. What is the critical solution temperature?
6. The half-life period of a first order reaction is 200 s. How long will it take for 90% completion?
7. What is CMC? Briefly explain various factors affect CMC.
8. How will you determine the zeta potential of colloids?
9. What are transient and secular equilibria?
10. Write a note on liquid drop model of nucleus.

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

11. a) Explain the principle and applications of conductometric titrations. (7)  
b) Discuss the principle and applications of polarography. (7)

**OR**

12. a) Differentiate between voltammetry and amperometry. (7)  
b) How will you determine the equivalence points of potentiometric complexometric titrations? (7)

**MODULE II**

13. a) Explain the principle and applications of mass spectrometry. (7)  
b) What are the differences between XPS and XRD? (7)

**OR**

14. a) Differentiate between SEM and STM. (7)  
b) Explain the principle and applications of atomic force microscopy. (7)

**MODULE III**

15. a) Write the thermodynamic derivation of Nernst distribution law. (7)  
b) Explain the principle of solvent extraction. (7)

**OR**

16. a) Explain various methods to determine the order of reactions. (7)  
b) In the distribution of succinic acid between ether and water at 15 °C, 20 ml of the ethereal layer contains 0.092 g of the acid. Find out the weight of the acid present in 50 ml of the aqueous solution in equilibrium with it, if the distribution coefficient for succinic acid between water and ether is 5.2. (7)

**MODULE IV**

17. a) Derive Langmuir adsorption isotherm and explain various factors involved. (7)  
b) How will you determine the surface area of adsorption using BET adsorption isotherm? (7)

**OR**

18. a) What are emulsions? Explain its properties and applications. (7)  
b) Explain the types and uses of surfactants. (7)

**MODULE V**

19. a) Explain the principle and applications of neutron activation analysis. (7)  
b) Explain the kinetics of Hydrogen-Chlorine reaction. (7)

**OR**

20. a) Explain the Jablonski diagram with various photophysical processes involved. (7)  
b) Determine the age of a sample of charcoal which is giving off 25 counts per hour, if carbon-14 from a just made piece of charcoal gives off 85 counts per hour. The half- life of carbon-14 is 5730 years. (7)

\*\*\*\*\*