22P410 (Pages: 2) Name: .....

Reg.No: .....

FOURTH SEMESTER M.Sc. DEGREE EXAMINATION, APRIL 2024

(CBCSS - PG)

(Regular/Supplementary/Improvement)

CC19P CHE4 C12 - INSTRUMENTAL METHODS OF ANALYSIS

(Chemistry)

(2019 Admission onwards)

Time : 3 Hours Maximum : 30 Weightage

Section A

Answer any ***eight*** questions. Each question carries 1 weightage.

1. What is meant by heavy atom effect in fluorometry?
2. Which frequency range is most important in IR analyses? Why?
3. Give an account of column packings in ion-exchange chromatography.
4. What are guard columns in HPLC?
5. How is TGA used to determine the composition of rubber filled with carbon black?
6. What are the requirements for an organic compound to be analyzed by polarography?
7. What is confidence interval ? What is the significance of confidence interval ?
8. How can we minimize co-precipitation in gravimetric analysis?
9. What is meant by migration with respect to concentration polarization?
10. Write the expression for the kinetic energy of the Auger electron and explain the terms.
11. What is formal potential?
12. Give an account of thin layer plates.

(8 × 1 = 8 Weightage)

Section B

Answer any ***four*** questions. Each question carries 3 weightage.

13. Give an account of arc sources used in atomic emission spectroscopy.
14. Give an idea about chromatogram development in TLC.
15. Explain the process and applications of neutron actvation analysis.
16. Write a note on ion-exchange field effect transistor.

17. For titrating 10ml of a solution with the help of microburette, the volumes of the titrant used are 9.98, 9.99, 9.98, 9.95 amd 10.00 ml. Calculate the standard deviation.

18. Discuss the theory of redox indicators.

19. How force between the cantilever tip and surface is determined in an AFM?

(4 × 3 = 12 Weightage)

Section C

Answer any ***two*** questions. Each question carries 5 weightage.

20. Discuss about the sources and various atomization techniqus used in atomic absorption spectroscopy.

21. Give an account of CHN analysis by GC.

22. (a) The following values were obtained for the determination of cadmium in a sample of dust: 4.3, 4.1, 4.0 and 3.2 μgg-1. Should the value 3.2 be rejected ? Q critical is 0.831 for a sample of size of 4.
    (b) Discuss the theory of redox indicators.

23. (i) Suppose that a solution containing 0.20 M Cu2+ and 1.0 M H+ is electrolyzed to deposit Cu(s) on a Pt cathode and to liberate O_2 at a Pt anode. Calculate the voltage needed for electrolysis. If the resistance of this cell is 0.44 ohm, estimate the voltage needed to maintain a current of 2.0 A. Assume that the anode overpotential is 1.28 V and there is no concentration polarization.
    (ii) What are the causes of concentration polarization?

(2 × 5 = 10 Weightage)

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