C 22505 (Pages : 3) 13 Name.....

Reg. No.....

FOURTH SEMESTER M.Sc. DEGREE [REGULAR/SUPPLEMENTARY] EXAMINATION, APRIL 2022

(CBCSS)

Chemistry

CHE 4C 12—INSTRUMENTAL METHODS OF ANALYSIS

(2019 Admission onwards)

Time : Three Hours Maximum : 30 Weightage

General Instructions

1. *In cases where choices are provided, students can attend* **all** *questions in each section.*
2. *The minimum number of questions to be attended from the Section / Part shall remain the same.*
3. *The instruction if any, to attend a minimum number of questions from each sub section / sub part / sub division may be ignored.*
4. *There will be an overall ceiling for each Section / Part that is equivalent to the maximum weightage of the Section / Part.*

Section A

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

1. Calculate the co-efficient of variation for the following set of analytical data of a sample A : 4.68, 4.70, 4.04, 4.31, 4.14 mg.
2. During the titration of Fe^{2+} against potassium dichromate in acid medium using diphenylamine indicator, orthophosphoric acid is added ; why ?
3. Define half-wave potential. Explain its significance in polarography.
4. What is anodic stripping voltammetry ? Explain.
5. Explain the principle of fluorimetry.
6. Outline the principle involved in ESCA.

Turn over

7. The DTA profile of calcium oxalate monohydrate shows an exothermic peak in oxygen atmosph but not in nitrogen atmosphere. Account for this observation.

8. Mention two substances that can be used for column chromatography. What should be their ge characteristics ?

9. Define : a) Student's t-test ; and b) Q-test.

10. Describe the function of an adsorption indicator, with a suitable example.

(8 × 1 = 8 weig

Section B

Answer any **six** *questions.*

Each question carries a weightage of 2.

11. Discuss the method of least square for the treatment of analytical data. What do you m linear correlation coefficient.

12. Write briefly on titrations in non-aqueous media.

13. Critically evaluate the graphical methods for determining the end point in potentiometric tit

14. What are the parameters involved in coulometric titrations. Mention the advantages technique.

15. Discuss the principle of hollow cathode lamp ? What are its main advantages.

16. What is Auger effect ? How do you distinguish between XPS peaks and AES peaks in an spectrum ?

17. Explain the principle involved in isotope dilution method. Mention its important applicat

18. What are the characteristics of an ideal detector of gas chromatography ?

(6 × 2 = 12 we

Section C

Answer any **two** *questions.*

Each question carries a weightage of 5.

19. Discuss the theory and experimental setup involved in polarography. Explain its i applications.

20. What is the principal information to be obtained in the UV-Visible region ? Sketch the and explain the basic principle, instrumentation and applications of a double beam U spectrophotometer. What is meant by the term 'signal to noise ratio' in a spectrophotome

21. Describe the principle, instrumental setup and applications of HPLC. What are advantages of HPLC when compared to other methods of chromatography ?

22. Write briefly on :

a) Indicator electrodes.

b) Theory of SEM and its application in surface analysis.

c) Neutron activation analysis.

(2 × 5 = 10 weightage)