

MASTER OF SCIENCE (CHEMISTRY) (CBCS - 2018 COURSE)
M.Sc. (Chemistry) Sem-III AC : WINTER- 2022
SUBJECT : THERMAL, RADIO & ELECTRO-ANALYTICAL METHODS

Day : Tuesday

Time : 02:00 PM-05:00 PM

Date : 27-12-2022

W-20159-2022

Max. Marks : 60

N.B.

- 1) All questions are **COMPULSORY**.
- 2) Figures to the **RIGHT** indicate **FULL** marks.
- 3) Answer to both the sections should be written in **SEPARATE** answer book.

SECTION – I

Q.1 Answer **ANY THREE** of the following. **(15)**

- a) Explain in brief what is Hydrodynamic voltammetry?
- b) Describe in brief anodic stripping voltammetry.
- c) What are the applications of coulometric titrations?
- d) Explain the importance of i) supporting electrolyte and ii) Maxima Suppressor in Polarography.
- e) Draw a typical polarographic cell and explain its working and construction.

Q.2 A) Answer **ANY TWO** of the following. **(10)**

- i) Describe 'Half wave potential and Oxygen interference' in polarographic analysis.
- ii) What are the advantages and disadvantages of dropping mercury electrode? Explain its principle and working.
- iii) Explain in brief square wave voltammetry.

B) Solve **ANY ONE** of the following. **(05)**

- i) What is the diffusion current flowing through the cell containing the solution of Cd^{2+} ions having concentration 5 mM / lit if the drop rate is 4.5 seconds and rate of falling mercury is 4 mg/s. The diffusion coefficient of Cd^{2+} ion is $7.0 \times 10^{-6} \text{ cm}^2/\text{s}$.
- ii) 100 ml solution of chloride is coulometrically titrated with Ag ion using a current 1mA. Calculate ion concentration of Cl^- if end point is detected after 102 seconds. (Given : Atomic weight of $\text{Cl}^- = 35.5$)

SECTION – II

Q.3 Answer **ANY THREE** of the following. **(15)**

- a) What is TG ? Describe a typical TG curve with suitable example.
- b) Describe NAA method to analyse metals.
- c) Explain DSC apparatus with description of each part.
- d) Describe thermometric titration with diagram and explain complexometric titration.
- e) Describe the effect of heat on material with suitable example.

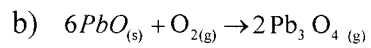
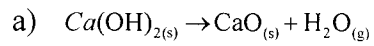
Q.4 A) Answer **ANY TWO** of the following. **(10)**

- i) Explain the principle and applications of spectro-electro chemistry.
- ii) Explain the role of (n, γ) reaction in neutron activation analysis.
- iii) What is isotopic dilution analysis? Explain how it is used in estimation of blood.

P.T.O.

B) Solve ANY ONE of the following. (05)

i) Calculate the percent weight changes (w%) for each of the following reaction



Given : Ca = 40 , H = 1.01, O = 16.0, Pb = 207.2 .

ii) The activity in a 10 mL sample of waste water containing $^{90}_{38}\text{Sr}$ was found to be 9.17×10^6 dps. What is the molar concentration of $^{90}_{38}\text{Sr}$ in the sample? The half-life of $^{90}_{38}\text{Sr}$ is 28 years.

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