

(4)

10. What are the symmetry elements present in the following space groups?

(a) $P2_{1/n}$

(b) $Pca2_1$

11. Depict a flow chart of the processes involved from crystal mounting to structure publication.

12. 'Crystallization is a thermodynamically favourable process but kinetically slow' – Explain your answer.

★ ★ ★

Ex/SC/CHEM/PG/CORE/TH/XI-A/2025

M. Sc. CHEMISTRY EXAMINATION, 2025

(3rd Semester, CBCS)

PAPER : XI-A

(Analytical Chemistry Special)

Time : 2 Hours

Full Marks : 40

(20 marks for each Unit)

Use a separate answer scripts for each Units.

UNIT—A-3111

Answer any *four* question :

5×4

1. Deduce the polarographic reduction wave equation. What will be the form of this equation for an anodic wave?

4+1=5

2. (a) Write down the Randles-Sevcik equation as used in CV. Mention the units of different parameters involved in this equation.

1+2=3

(b) How do you test for the quasi-reversibility of a redox reaction in CV?

2

(2)

3. (a) Mention the working principle of the Fluoride sensor. 3
(b) Describe the construction on an OTTLE as employed in spectroelectrochemistry. 2
4. (a) Enumerate the principle of 'Amperometric Titration' with an example. 2
(b) Write a short note on chronoamperometry. 3
5. (a) Distinguish between Cathodic Stripping Voltammetry (CCV) and Anodic Stripping Voltammetry (ASV). 3
(b) Mention the working principle of CO₂ sensor. 2

UNIT—A – 3112

Answer *any ten* question : 2×10

1. Define screw axis and glide plane.
2. Write down the equivalent position coordinates of the *d*-glide ([⊥]b) and 2₁ screw axis (||b).
3. Draw stereographic plane projection of the following H-M point group notation (*any two*) :
(a) $\bar{4}$, (b) 422, (c) 2mm, and (d) $\bar{3}$

CHEM-1031

[Continued]

(3)

4. In a power diffraction pattern using CuK α X-ray source ($\lambda = 1.54 \text{ \AA}$) two diffraction peaks appeared at $2\theta = 5^\circ$ and 70° . Calculate the corresponding 2θ positions of the above peaks when MoK α ($\lambda = 0.71 \text{ \AA}$) will be used as X-ray source.
5. What is reciprocal lattice and what is its significance in X-ray crystallography?
6. Define isogonal symmetry points groups of crystal with example.
7. Define R-factor and Goodness of fit (Goof)
8. Briefly describe any one of the following techniques for crystal growth :
(i) Liquid (solvent) diffusion
(ii) Slow evaporation
(iii) Hydrothermal method.
9. Write down two differences between a solid crystal and quasicrystal.

CHEM-1031

[Turn Over]