PS1GPHC601 Reg. No.: | | | | | | | | |

St Aloysius (Deemed to be University)

Mangaluru

School of Physical Sciences (PG Programme)

M.Sc. Chemistry - Semester III – PG Examination

October/November - 2025

ELECTROCHEMISTRY AND THERMO-ANALYTICAL METHODS

Time: $2^1/_2$ Hours **Max Marks: 60**

SECTION – A

Answer any FIVE of the following. **(5x2=10)**

1. Define electrical conductivity in solutions.
2. In the context of the electrical double layer, what does the Guoy-Chapman model describe?
3. How does a silver/silver chloride (Ag/AgCl) reference electrode maintain a stable potential over time?
4. Describe the advantages of amperometry as a technique for titrations in comparison to traditional volumetric titrations.
5. What are the primary function of an electrochemical energy system.
6. Differentiate between photovoltaic cells and photogalvanic cells.
7. Propose a scenario where thermogravimetric analysis (TGA) could be applied to investigate a material's stability.
8. Name one factor that can affect the accuracy of DTA results.

SECTION - B

Answer any TEN of the following. **(10x5=50)**

9. Describe the structural aspects of ion-solvent interaction as explained by the Born model. How does it account for solvation energy?
10. What is the primary objective of the spectroscopic approach in the study of ion-solvent interactions?
11. Explain in detail the flip-up and flip-down state of the solvent at the electrode interface with neat diagrams.
12. Compare and contrast the working principles and applications of the calomel electrode and the hydrogen electrode as reference electrodes. How do these principles influence their suitability for specific experiments?
13. How do you analyse a given ion using polarography?
14. What is half wave potential? Explain its significance in polarography.
15. Explain the working of photoelectrochemical cells.
16. Differentiate between primary batteries and secondary batteries.
17. Comment with equations on the working and construction of an alkaline battery.
18. Explain the Evans diagram.
19. Write the electrochemical phenomenon of rusting.
20. Discuss the importance of the galvanic series in understanding corrosion and selecting materials for specific applications.

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