

**M. Sc. DEGREE END SEMESTER EXAMINATION : MARCH 2023****SEMESTER 4 : CHEMISTRY****COURSE : 21P4CHET15EL : ADVANCED PHYSICAL CHEMISTRY***(For Regular - 2021 Admission)*

Duration : Three Hours

Max. Weights: 30

**PART A****Answer any 8 questions****Weight: 1**

1. With the help of an energy diagram, explain how the solvent polarity favors the exciplex formation and subsequent emission? (An, CO 1)
2. Write down Ilkovic equation and explain the terms involved. (R, CO 4)
3. Discuss the concept of Entropy of Production. (An)
4. Discuss different types of lasers on the basis of light emission. Explain with example (An, CO 1)
5. Give the structure of ATP and justify the selection of ATP as the universal currency of free energy in biological processes. (R)
6. "The analyte is to be deaerated prior to polarographic analysis". Explain (An, CO 4)
7. Obtain an expression for fluorescence intensity and concentration of substance. (A, CO 2)
8. What is fluorescence sensing? Give its application. (A, CO 2)
9. What do you mean by oxidative phosphorylation? Name the important electron carriers involved in the process. (A)
10. What are the functions of inert gases in the hollow cathode lamp? (U, CO 2)  
**(1 x 8 = 8)**

**PART B****Answer any 6 questions****Weights: 2**

11. What are coulometers? Explain the working of Silver and hydrogen-oxygen coulometers. (U, CO 4)
12. Considering the deactivation processes of the singlet excited state in the absence and presence of a quencher, derive the Stern-Volmer equation which expresses the ratio of the fluorescence quantum yields in the presence and absence of a quencher. (E, CO 1)
13. Illustrate the application of metal-ligand complexes as novel fluorophores. (R, CO 2)
14. Write a note on Flame Emission Spectroscopy. (E)
15. Write a note on theories on corrosion of metals. (A, CO 3)
16. Give a brief account of thermoelectric phenomena. (U, CO 5)
17. Explain the applications of neutron diffraction technique. (U, CO 2)
18. Discuss the significance of the formation of triple ions in observing the conductance minima of electrolyte solution (Cr)

**(2 x 6 = 12)**

**PART C**  
**Answer any 2 questions**

**Weights: 5**

19. How does the formation of ionic atmosphere affect the activity coefficient of electrolyte. Derive the Debye-Huckel limiting law equation ? Explain the graphical plot that validate DHLL equation. (U, CO 3)
20. What is the principle of amperometric titration? Explain the application of amperometric titration in qualitative and quantitative analysis. What are the advantages of amperometric titrations? (U, CO 4)
21. What are solar cells? Describe the principle of working and various types of solar cells. Describe the limitations involved in the practical utilization of solar energy. Indicate how these limitations are overcome. (An, CO 1)
22. Describe in details the theories of the electrode double layer. (An, CO 3)  
**(5 x 2 = 10)**

**OBE: Questions to Course Outcome Mapping**

CO	Course Outcome Description	CL	Questions	Total Wt.
CO 1	Describe the physical principles of photochemistry.	U	1, 4, 12, 21	9
CO 2	Explain the methods of fluorescence spectroscopy, electron diffraction and atomic spectroscopic techniques.	A	7, 8, 10, 13, 17	7
CO 3	Describe the principles of electrochemistry and applications of electromotive force.	A	15, 19, 22	12
CO 4	Describe the principles of electrochemistry and applications of electromotive force.	A	2, 6, 11, 20	9
CO 5	Describe the principles of electrochemistry and applications of electromotive force.	U	16	2

Cognitive Level (CL): Cr - CREATE; E - EVALUATE; An - ANALYZE; A - APPLY; U - UNDERSTAND; R - REMEMBER;