M. Sc. DEGREE END SEMESTER EXAMINATION - MARCH 2024
SEMESTER 4 - CHEMISTRY
COURSE : **21P4CHET15EL - ADVANCED PHYSICAL CHEMISTRY**
(For Regular - 2022 Admission and Supplementary - 2021 Admission)

Duration : Three Hours　　　　　　　　　　　　　　　　　Max. Weights: 30

PART A
Answer any 8 questions　　　　　　　　　　　　　　　Weight: 1

1.	What are the light sources in fluorescence spectroscopy?	(R, CO 2)
2.	Explain the bioenergetics of coupled reactions.	()
3.	Explain the terms half wave potential and limiting current density.	(R, CO 4)
4.	What is an actinometer? Describe how a uranyl oxalate actinometer may be used.	(U, CO 1)
5.	Give the significance of migration current in Polarography.	(U, CO 4)
6.	What are fluorescent indicators? Give examples.	(U, CO 2)
7.	Define Seebeck effect. Give the expression for thermoelectric power (ε) of a thermocouple.	(U, CO 5)
8.	Explain Wierl's equation.	(An)
9.	Account for the sign and magnitude of ΔG for ATP hydrolysis.	()
10.	A certain system absorbs 2×10^{16} quanta per second. At the end of 20 minutes, it is observed that 0.002 mole of the irradiated substance has reacted. What is the quantum yield of the process?	(A, CO 1)

(1 x 8 = 8)

PART B
Answer any 6 questions　　　　　　　　　　　　　　　Weights: 2

11.	Compare and contrast the electron and neutron diffraction methods.	(U, CO 2)
12.	Discuss the principle of two photon absorption spectroscopy.	(U, CO 1)
13.	Describe corrosion control methods.	(U, CO 3)
14.	Discuss the origin of AES citing the advantages and disadvantages.	(A, CO 2)
15.	Write briefly on the Standard Addition Methods (SAM) used in Polarography.	(R, CO 4)
16.	Derive the Tafel equation for anodic and cathodic process. Explain the significance of Tafel plot.	(U, CO 3)
17.	Differentiate between direct and indirect sensing in fluorescence spectroscopy.	(U, CO 2)
18.	The emf of a thermocouple, one junction of which is at 0 ^{0}C is given by; $E = 1600t - 4t^2$ where, t is the temperature of the hot junction expressed in ^{0}C. Calculate Peltier coefficient at 27 ^{0}C.	(A, CO 5)

(2 x 6 = 12)

Answer any 2 questions   **Weights: 5**

19. (a) Explain the principle, procedure, merits and demerits of amperometric titrations.
     (b) Briefly discuss the principle and applications of Coulmetric titrations in
     (i) Neutralisation titration
     (ii) Complex formation titrations
     (iii) Redox titrations   (U, CO 4)

20. What do you mean by electric double layer? Elaborate on different models of a double layer.   (E, CO 3)

21. Discuss the influence of following factors that affect the conductance of strong electrolyte solution. a) Viscosity and Dielectric constant of the medium b) Temperature c) High frequency AC and applied potential.   (U, CO 3)

22. 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)

                                                                          (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	4, 10, 12, 22	9
CO 2	Explain the methods of fluorescence spectroscopy, electron diffraction and atomic spectroscopic techniques.	A	1, 6, 11, 14, 17	8
CO 3	Describe the principles of electrochemistry and applications of electromotive force.	A	13, 16, 20, 21	14
CO 4	Describe the principles of electrochemistry and applications of electromotive force.	A	3, 5, 15, 19	9
CO 5	Describe the principles of electrochemistry and applications of electromotive force.	U	7, 18	3

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