B. Sc. DEGREE END SEMESTER EXAMINATION - MARCH 2025
SEMESTER 4 : CHEMISTRY (COMPLEMENTARY COURSE FOR PHYSICS)
COURSE : **19U4CPCHE4.1 : ADVANCED PHYSICAL CHEMISTRY - II**
(For Regular 2023 Admission and Improvement/Supplementary 2022/ 2021/2020/2019 Admissions)

Time : Three Hours

Max. Marks: 60

PART A
Answer All (1 mark each)

1. Comment on the acidic / basic nature of CH_3COONH_4 solution in water.

2. Define a red shift in UV spectroscopy.

3. Define activation energy of a reaction.

4. Give one example each for an oxidising agent and reducing agent used in Redox titrations.

5. Write cell equation for determination of pH using Glass electrode.

6. Give an example for external indicator used in dichrometric titrations.

7. Glow sticks uses the principle of ------------------.

8. Why is hydrogen molecule microwave inactive?

(1 x 8 = 8)

PART B
Answer any 6 (2 marks each)

9. What is effect of electrolyte concentration on electrode potential?

10. Give the integrated rate expression for a first order reaction and explain the terms in it.

11. Explain photosensitization with an examples.

12. Give the applications of Infra Red spectroscopy.

13. Point out the reason for the colour change when diphenylamine is used as an indictor in redox titration.

14. What is the effect of dilution on specific conductance?

15. How is determination of solubility and solubility product of sparingly soluble salts done using Kohlrausch law?

16. Give the construction of a salt bridge.

(2 x 6 = 12)

PART C
Answer any 4 (5 marks each)

17. A first order reaction takes 40 min for 30% decomposition. Calculate the half-life period for the reaction.

18. Write a short note on the dichromate titration using an external indicator.

19. Derive an expression for the moment of inertia of a diatomic molecule.

20. Describe the conductometric titration of a strong acid against a weak base

21. What is liquid junction potential and explain its equation. How can you eliminate Liquid junction potential.

22. What is quantum yield? Discribe the reasons for higher and lower quantum yield with examples.

(5 x 4 = 20)

PART D
Answer any 2 (10 marks each)

23. Describe the determination pH using a) quinhydrone electrode b) Glass electrode. Mention its advantages

24. (a) Derive expressions for the integrated rate and half-life period of a first order reaction.
    (b) If the half-life of a first order reaction is 2 min, how long will it take to reach (i) 25% of its initial concentration (ii) 10% of its initial concentration?

25. Briefly discuss the theory of:
    a) UV-Visible spectroscopy
    b) Microwave spectroscopy

26. What are the applications of conductance measurements?

(10 x 2 = 20)