

Reg. No.....

Name.....

**B. Sc. DEGREE END SEMESTER EXAMINATION – JULY 2021**  
**SEMESTER – 4: CHEMISTRY (COMPLEMENTARY COURSE FOR PHYSICS)**  
**COURSE: 15U4PCHE4.1 – ADVANCED PHYSICAL CHEMISTRY II**  
*(Common for Supplementary 2018/2017/2016/2015 Admissions)*

Time: Three Hours

Max. Marks: 60

**SECTION A*****Answer all questions, each question carries 1 mark***

1. Arrange the following radiations in increasing order of energy: X-Ray, Microwave, IR
2. What is the integrated rate equation for first order reaction?
3. Give any two examples for photosensitizers.
4. What is meant by chemiluminescence?
5. What is the unit of molar conductivity?
6. Define reduction by electronic concept.
7. Write the example for a salt of strong acid and weak base.
8. The oxidation state of Mn in  $\text{KMnO}_4$

(1 x 8 = 8)

**SECTION B*****Answer any six questions, Each question carries 2 marks***

9. Whether hydrogen molecule is IR active? Give explanation for your answer.
10. Distinguish between fluorescence and phosphorescence
11. What is half life of a reaction?
12. State Beer-Lambert's law.
13. What is Frank Condon principle?
14. Represent the cell in which the cell reaction is  $\text{Zn} + \text{Cu}^{2+} \rightarrow \text{Zn}^{2+} + \text{Cu}$ .
15. State any two rules for determining oxidation number.
16. Write Nernst equation and explain the terms

(2 x 6 = 12)

**SECTION C*****Answer any four questions, each question carries 5 marks***

17. Explain the principle of IR spectroscopy
18. Discuss the Faraday's laws of electrolysis.
19. How will you determine  $p^{\text{H}}$  using hydrogen electrode?
20. The activation energy of a reaction is  $95.32 \text{ kJ mol}^{-1}$  and the value of rate constant at 300K is  $2.5 \times 10^{-5} \text{ s}^{-1}$ . Calculate frequency factor 'A'. ( $R = 8.314 \text{ J/K/mol}$ )
21. Explain the principle of fuel cells with example
22. Explain the factors which increases the rate of the reaction?

(5 x 4 = 20)

## SECTION D

***Answer any two questions, Each question carries 10 marks***

23. Write a brief note on rotational spectroscopy. Discuss how it helps in determining the bond length of diatomic molecules.
24. Derive the integrated rate equation for a first order reaction.
25. Give an account of conductometric titrations. What are its advantages?
26. Give an account on
- a) Potentiometric titrations
  - b) Laws of Photochemistry
- (10 x 2 = 20)

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