(6 pages) **Reg. No. :** .....

Code No. : 10482 E **Sub. Code : CMCH 63**

B.Sc. (CBCS) DEGREE EXAMINATION, APRIL 2024

Sixth Semester

Chemistry – Core

PHYSICAL CHEMISTRY – III

(For those who joined in July 2021 – 2022)

Time : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. The number of electrons involved in the cell reaction $Zn + Cu^{2+} \rightarrow Zn^{2+} + Cu$ is

   (a) 0 (b) 3

   (c) 2 (d) None of these

2. When ΔG° of a reaction is +ve, standard Em7 E° is

   (a) Positive (b) Zero

   (c) Negative (d) Fraction

3. Consider the following reaction $N_2 + 3H_2 \rightleftarrows 2NH_3$. Its equilibrium constant K is equal to

   (a) $\frac{[NH_3]^2}{[N_2][H_2]^3}$ (b) $\frac{[NH_3]^2}{[N_2]^3[H_2]}$

   (c) $\frac{[NH_3]}{[N_2][H_2]}$ (d) $[N_2]^2[H_2]^3$

4. Promoter is a

   (a) Catalyst

   (b) Catalytic poison

   (c) A substance that increase the activity of the catalyst

   (d) All these

5. Hydrolysis of ester catalyzed by an alkali is an example of _____ order reaction.

   (a) First (b) Second

   (c) Third (d) Zero

6. According to Arrhenius equation, the rate constant is

   (a) $Ae^{-Ea/RT}$ (b) $Ae^{Ea/RT}$

   (c) Ae^{Ea/RT^2} (d) Ae^{Ea}

7. The principal axis in H_2O molecule is

(a) C_2 (b) C_3

(c) C_4 (d) C_6

8. The point group of $B7_3$ molecule is

(a) D_{3h} (b) C_{2v}

(c) T_d (d) O_h

9. The number of lines in the ESR spectrum of Hydrogen is

(a) 2 (b) 4

(c) 6 (d) 8

10. The number of lines in the ESR spectrum of methyl radical is

(a) 2 (b) 3

(c) 4 (d) 6

PART B — ($5 \times 5 = 25$ marks)

Answer ALL questions choosing either (a) or (b).
Each answer should not exceed 250 words.

11. (a) Describe

(i) Galvanic cell

(ii) Standard Hydrogen electrode.

Or

(b) What is Em7 of a cell? How is it determined experimentally.

12. (a) Derive Van't Hoff reaction isotherm and write its significance.

Or

(b) Write a note on Freundlich adsorption isotherm, its significance and limitations.

13. (a) Write the differences between order and molecularity.

Or

(b) Explain Vant Hoff's differential method.

14. (a) Explain C_2 axis with an example.

Or

(b) Explain the symmetry elements of $B7_3$.

15. (a) Describe chemical shift in NMR spectrum.

Or

(b) Write short notes on the principles of NGR spectroscopy.

PART C — (5 × 8 = 40 marks)

Answer ALL questions choosing either (a) or (b).
Each answer should not exceed 600 words.

16. (a) How is p^H determined using Hydrogen and glass electrode?

Or

(b) Derive Nernst equation for emf of cells. Write any one of its significance.

17. (a) Derive the relation between K_p, K_c and K_x.

Or

(b) Explain Lechatelier's principle. Write its applications.

18. (a) Explain ARRT of reaction rates.

Or

(b) Give an account of Flash Photolysis.

19. (a) Explain Group multiplication table of NH_3.

Or

(b) Discuss symmetry elements and symmetry operations.

20. (a) Give an account of applications of NMR spectra.

Or

(b) Describe the principles of ESR spectroscopy.

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