C 1115 (Pages : 3) Name.....

Reg. No.....

SIXTH SEMESTER (CUCBCSS—UG) DEGREE EXAMINATION, MARCH 2021

Chemistry

CHE 6B 11—PHYSICAL CHEMISTRY–III

Time : Three Hours Maximum : 80 Marks

Section A (One Word)

Answer **all** *questions.*
Each question carries 1 *mark.*

1. In galvanic cell, the positive electrode is ————.
2. Write the reaction in the cell Zn(s) $|Zn^{2+}(aq) \| Ag^{+}(aq)$ | Ag(s)
3. ———— is the conductance of a conductor of unit length and unit area of cross-section.
4. The Henderson-Hasselbalch equation is ————.
5. The pKa values of four acids are given below. Arrange them in the increasing order of acidity.

Acid	CH_3COOH	$ClCH_2COOH$	$(CH_3)_3CCOOH$	CH_3OCH_2OH
pKa	4.8	2.86	5.05	3.53

6. The van't Hoff equation for osmotic pressure of a dilute solution is ————.
7. ———— is defined as the elevation of boiling point produced by dissolution of 1 mole of a solute in 1000g of the solvent.
8. Mathematically, the ———— point groups can produce 230 space groups.
9. Imperfection due to missing atoms, displaced atoms or extra atoms is called ————.
10. An example for body centred cubic lattice is ————.

(10 × 1 = 10 marks)

Section B (Short Answer)

Answer at least **five** *questions.*
Each question carries 4 *marks.*
All questions can be attended.
Overall Ceiling 20.

11. What is Debye Falkenhagen effect ?
12. Write down the Debye-Huckel Onsagar equation and explain the terms.

Turn over

13. In the electrochemical cell $Zn|Zn^{2+}$ (0.001M) $\|Ag^{+}$ (0.1M)|Ag at 298 K, given E° Zn2+/Zn is –0.76 V and E° Ag^{+}/Ag is 0.80V. Calculate the EMF of the cell.

14. How will you set up a calomel electrode ?

15. What is meant by over voltage ?

16. Define pH of a solution. The pH of a solution is 5.2. Calculate the concentration of hydrogen ions in dm^{-3}.

17. What is molal depression constant ? How it is related to depression in freezing point ?

18. What is : i) van't Hoff factor ; and ii) abnormal molecular mass.

19. What is law of rational indices ?

20. A metallic element has a cubic lattice and each edge of the unit cell is 2.88 A°. Taking density of the metal as 7.20 g/cm^3, calculate the number of unit cells in 100g of the metal.

21. Define radius ratio. How the co-ordination number vary with radius ratio ?

22. Distinguish between amorphous and crystalline solids.

(5 × 4 = 20 marks)

Section C (Paragraph)

Answer at least **four** *questions.*
Each question carries 7 marks.
All questions can be attended.
Overall Ceiling 28.

23. State Ostwald's dilution law. What are its uses and limitations ?

24. Discuss the application of Gibbs- Helmholtz equation to electrochemistry.

25. Explain the principle and applications of potentiometric titration.

26. How to measure the pH using glass electrode ?

27. Define degree of hydrolysis. Derive the relation between hydrolysis constant and degree of hydrolysis of salt of strong acid and weak base.

28. Briefly explain the Rast method for determination of molar mass of solutes.

29. Explain the Swarm theory of liquid crystals. Mention any two applications.

30. Discuss briefly metal deficiency and metal excess defects.

(4 × 7 = 28 marks)

Section D (Essay)

Answer any **two** *questions.*
Each question carries 11 *marks.*

31. Write detailed notes on any four applications of conductance measurements.

32. i) What is meant by osmotic pressure of a solution ?

    ii) Describe Berkley and Hartley's method for the determination of osmotic pressure.

33. Derive the relation between lowering of vapour pressure and depression in freezing point.

34. a) Derive Bragg's equation for the diffraction of X-rays by crystal lattice.

    b) Discuss briefly Debye Scherrer powder diffraction method.

(2 × 11 = 22 marks)