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D6BCH2303 **Reg. No.....**

Name: .....

SIXTH SEMESTER B.Sc. DEGREE EXAMINATION, APRIL 2026

(Regular/Improvement/Supplementary)

CHEMISTRY

GCHE6B11T: PHYSICAL CHEMISTRY–III

Time: 2 Hours **Maximum Marks: 60**

SECTION A: Answer the following questions. Each carries *two* marks.
(Ceiling 20 marks)

1. Write the Nernst equation for a galvanic cell and explain each term.
2. Define surface tension and explain its significance.
3. State Henderson's equation and mention its application in buffer solutions.
4. What is liquid junction potential, and why does it arise in an electrochemical cell?
5. What is the difference between an ideal and a non-ideal solution? Provide one example of each.
6. Differentiate between intrinsic and extrinsic semiconductors with an example.
7. Define Henry’s law and state its applications.
8. What is the Debye-Falkenhagen effect?
9. State Ostwald’s Dilution Law.
10. What is Van’t Hoff's factor? How does it account for deviations in colligative properties?
11. Define Bravais lattice. How many types of Bravais lattices are possible?
12. What are non-stoichiometric defects? Give one example.

SECTION B: Answer the following questions. Each carries *five* marks.
(Ceiling 30 marks)

13. Define molar refraction and explain its significance. Discuss the concept of optical exaltation with an example.
14. Explain the working principle of a hydrogen-oxygen fuel cell with a neat diagram.
15. Discuss the electrochemical theory of corrosion, highlighting the anodic and cathodic reactions involved.

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16. Explain the concept of solubility product and its application in predicting the solubility of sparingly soluble salts. Discuss the common ion effect with an example.
17. Draw and label the (111) and (220) planes in a cubic crystal system.
18. Explain the principles and limitations of Kohlrausch's Law of independent migration of ions.
19. Explain the band theory of solids. Discuss how it differentiates between conductors, insulators, and semiconductors, with suitable diagrams.

SECTION C: Answer any *one* question. The question carries *ten* marks.

20. Define transport number and explain its significance. Briefly describe the Hittorf and moving boundary methods for its determination.
21. Derive Bragg's equation for X-ray diffraction. Explain the principle of X-ray diffraction methods, highlighting the single-crystal and powder diffraction techniques.

(1 × 10 = 10 Marks)