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102128 (Pages : 2) Name.....

Reg. No.....

SECOND SEMESTER M.Sc. (CBCSS) REGULAR/SUPPLEMENTARY DEGREE EXAMINATION, APRIL 2024

Chemistry

CHE 2C 08—ELECTRO CHEMISTRY, SOLID STATE CHEMISTRY AND STATISTICAL THERMODYNAMICS

(2019 Admission onwards)

Time : Three Hours Maximum Weightage : 30

Section A

Answer any **eight** *questions.*
Each question carries weightage 1.

1. Write electrode reactions in methanol fuel cell.
2. Device an electrochemical reaction in which the reaction $AgBr_{(s)} \rightarrow Ag^{+} + Br^{-}$ is taking place.
3. Write Helmholtz model of electrical double layer. What are its drawbacks ?
4. Explain the term 'electrode polarization'.
5. Write Hermann-Mauguin symbol for (a) C_{2h} ; (b) D_{2d}.
6. A plane cuts the x, y and z axes at $3a$, $2b$ and $1c$. Write the corresponding Miller indices.
7. Explain with example 'color centers' in solids.
8. Explain the term 'most probable distribution'. How would you identify it ?
9. Write symmetry number for (a) CH_4 ; (b) Ethylene.
10. State and explain equipartition principle.

(8 × 1 = 8 weightage)

Section B

Answer any **six** *questions.*
Each question carries weightage 2.

11. Write Debye Hückel limiting law. How is it verified experimentally ?
12. The EMF of the cell $Pt\left|H_2\right|_{(1b)}\left|HCl\right|_{0.1_{mz}}\left|AgCl_{(s)}\right|Ag$ is 0.3524 V at 25°C. The standard electrode potential of $Cl^{-}\left|AgCl_{(s)}\right|Ag$ is 0.2224 V. Calculate the mean ionic activtiy coefficient of 0.1 molal HCl.

Turn over

13. Briefly discuss one of the theories of hydrogen over voltage.
14. Draw stereographic projection for a triclinic system. Discuss.
15. Briefly discuss working of a two stage laser.
16. Derive equations to show the relationship between partition function and
17. Calculate the heat capacity of diamond at 1000 K. Its characteristic temperature
18. Derive Fermi Dirac distribution law.

Section C

(6 × 2 = 12

Answer any **two** *questions.*
Each question carries weightage 5.

19. Derive Butler-Volmer equation. Discuss.
20. Briefly discuss Bore-Einstein condensation.
21. Briefly discuss band theory of solids.
22. What are the drawbacks of Einstein's theory of heat capacity of solids ? How are the by Debye ? Discuss.

(2 × 5 = 10