D 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 $C\bar{l}\left|AgCl_{(s)}\right|Ag$ 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 (a) U ; (b) S.
17. Calculate the heat capacity of diamond at 1000 K. Its characteristic temperature is 1860 K.
18. Derive Fermi Dirac distribution law.

(6 × 2 = 12 weightage)

Section C

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 they overcome by Debye ? Discuss.

(2 × 5 = 10 weightage)