19P214 (Pages: 2) Name……..…………….

Reg. No.....……………..

SECOND SEMESTER M.Sc. DEGREE EXAMINATION, APRIL 2020
(CUCSS - PG)
CC19P CHE2 C08 - ELECTROCHEMISTRY, SOLID STATE CHEMISTRY AND STATISTICAL THERMODYNAMICS
(Chemistry)
(2019 Admissions - Regular)

Time: Three Hours   Maximum: 30 Weightage

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

1. Write Tafel equation. Explain the significance of slope and intercept of a Tafel plot.

2. Write Hermann Maugin symbol for (a) D_{4h} (b) C_{2v}

3. Explain residual entropy with an example.

4. What is law of equipartition of energy?

5. Write electrode reactions for H_2-O_2 fuel cell under alkaline conditions.

6. Electrons never follow Maxwell Boltzman statistics. Justify the statement.

7. Show that molecular partition function is the product of partition function for various degrees of freedom.

8. Define thermodynamic probability. How is it related to entropy?

9. Find characteristic temperature of HCl. The fundamental vibrational frequency is 2990 cm^{-1}.

10. Calculate the activity coefficient of Ca^{2+} and Cl^- in 0.01 molal $CaCl_2$ in water. The "A" value in Debye-Huckel equation is 0.509.

(8 x 1 = 8 Weightage)

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

11. Calculate the thickness of ion atmosphere around K^+ in 0.01 molal KCl at 25^0C. in water. Dielectric constant of water is 78.5.

12. Discuss screw axis and glide plane with examples.

13. Show that 5-fold axis of symmetry is absent in solids.

14. Briefly explain Meisner effect.

15. Derive Butler-Volmer equation for anodic current.

16. Write a brief account of the various models of electrical double layer.

17. What is Hall effect? Discuss its applications.

18. What are the advantages of 'dropping mercury electrode" in polarography?

19. Briefly describe the theory of Oxygen overvoltage.

(6 x 2 = 12 Weightage)

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

20. Derive Debye-Huckel limiting law.

21. Discuss briefly band theory of solids.

22. Based on Boltzmann distribution concept, arrive at partition function. What are the rotational, translational and vibrational contributions to total partition function?

23. Apply Fermi Dirac statistics for electrons in metals. Discuss.

(2 x 5 = 10 Weightage)

****