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C 4715 (Pages : 2) Name.....

Reg. No.....

# SECOND SEMESTER M.Sc. DEGREE (REGULAR/SUPPLEMENTARY) EXAMINATION, APRIL 2021

(CBCSS)

Chemistry

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

(2019 Admissions)

Time : Three Hours Maximum : 30 Weightage

### General Instructions

1. *In cases where choices are provided, students can attend* **all** *questions in each section.*
2. *The minimum number of questions to be attended from the Section / Part shall remain the same.*
3. *There will be an overall ceiling for each Section / Part that is equivalent to the maximum weightage of the Section / Part.*

### Section A

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

1. Write electrode reactions for $H_2 - O_2$ fuel cell under alkaline conditions.
2. Find electrode potential for a calomel electrode with 0.1 M kCl. The standard electrode potential is 0.268 V, T = 298 K.
3. What is Stern model of electrical double layer ?
4. What is half wave potential ? Explain its significance.
5. Write Schoenflies symbol for (a) 222 ; (b) mmm.
6. Account for the semiconductivity of nonstoichiometric ZnO.
7. Explain ferrimagnetism. Write one example.
8. Explain thermodynamic probability. How is it related to entropy ?
9. Find symmetry number for (a) $C_6H_6$ ; (b) $CH_4$.
10. Calculate the heat capacity for diamond at 1.86 K characteristic temperature is 1860 K.

(8 × 1 = 8 weightage)

**Turn over**

## Section B

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

11. Calculate the concentration of $Ag^+$ at equilibrium, when excess of finely divided me added to 0.05 molal ferric nitrate. The standard electrode potentials of $Ag^+/Ag$ and $Fe$ are 0.799 and 0.771 V respectively. T = 298 K.

12. Calculate the thickness of ion atmosphere around $k^+$ in 0.01 KCl at 25°C in water. Di constant = 78.5.

13. Discuss one of the theories of hydrogen over voltage.

14. List the seven crystal systems and corresponding Bravais lattices. Discuss.

15. What is Piezoelectricity ? Discuss its applications.

16. Define partition function. Derive equation to show its relationship with internal ener

17. Calculate absolute entry of He at 0°C and 1 atmosphere pressure.

18. Show that all particles obey Maxwell-Boltzman statistics under dilute system condition

(6 × 2 = 12

## Section C

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

19. What are the assumptions of Debye Huckel theory ? Using the theory derive Debye Hue law.

20. Derive Butler-Volmer equation.

21. Briefly discuss free electron theory of metals.

22. Discuss Debye's theory of heat capacity of solids.

(2 × 5 = 1