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GIET UNIVERSITY, GUNUPUR – 765022
M. Sc. (Fourth Semester) Examinations, May ' 2021
CHPC 402 - PHYSICAL CHEMISTRY III
(Chemistry)

Time: 2 hrs

Maximum: 50 Marks

(The figures in the right hand margin indicate marks.)

PART – A**(2 x 10 = 20 Marks)****Q.1. Answer all the questions**

- What is Debye Huckel theory of strong electrolyte?
- A particular mass of charcoal absorbs a large volume of ammonia than hydrogen at a given temperature. Explain.
- Differentiate between adsorption isotherm and adsorption isobar.
- Explain the working of methanol-oxygen fuel cell.
- Explain pitting corrosion with example.
- Draw the setup for calomel electrode and write the reaction(s) involved.
- Sketch the (120) crystallographic planes for the cubic system.
- Explain the possible E~K diagrams of semiconductor materials.
- Show that if $\Delta G_f^0(\text{H}^+, \text{aq}) = 0$ for all T, the potential of standard hydrogen electrode is zero.
- Calculate the planar atomic density in atoms per square millimetre for (110) plane in BCC chromium, which has a lattice constant 0.28846 nm.

PART – B**(6 x 5 = 30 Marks)****Answer ANY FIVE questions**

Marks

- Using the Debye-Hückel limiting law, calculate the value of γ_{\pm} in: (6)
 - 7.2×10^{-3} m solution of NaBr
 - 7.5×10^{-4} m solution of SrCl_2
- Derive the expression for activity coefficients of electrolyte solutions. (6)
- Write short note on glass electrode and show how the EMF of the cell can be correlated to the pH of the external solution. (6)
- The EMF of the cell $\text{Cd.CdCl}_2.2.5\text{H}_2\text{O}(\text{saturated}) \parallel \text{AgCl}(\text{s}), \text{Ag}$ in which the cell reaction is (6)

$$\text{Cd}(\text{s}) + 2\text{AgCl}(\text{s}) + \text{aq} \rightleftharpoons \text{CdCl}_2.5/2 \text{H}_2\text{O}(\text{sat.}) + 2\text{Ag}(\text{s})$$
 is 0.673 volt at 25 °C and 0.6915 volt at 0 °C. Calculate the enthalpy change (ΔH) and entropy change (ΔS) of the cell reaction at 25 °C.
- What is critical micelle concentrations. Explain any one method to determine the CMC. (6)
- What is Langmuir's theory of adsorption of gases on solid surface? (6)
- What is meant by band gap of a semiconductor? Explain direct and indirect band gap. (6)
- What is Frenkel defect and derive the number of Frenkel defect in a crystal system which contains N number of ions. (6)

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