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GA-005-2023

FACULTY OF SCIENCE
B.Sc. (Third Year) (Six Semester)
APRIL/MAY, 2023
(CBCS)
Subject: CHEMISTRY
Paper No.: XV
(Physical+Inorganic Chemistry-XV (CBCS) (New))

(Thursday, 20-04-2023) **Time: 10.00 a.m. to 12.00 Noon**

Time - Two Hours Maximum Marks-40

N.B.: (i) Attempt all questions.
(ii) Use of logarithmic table and calculator is allowed.

1. Answer any three of following **3x5=15 Marks**
   a) What is Na^+/K^+ Pump?
   b) What are carboranes? Explain the preparation of dicarbaclosododecaboranes.
   c) What are metalloboranes? Explain its halogenation properties.
   d) What are boranes? How they are classified?
   e) Explain how Nitrogenase converts atmospheric Nitrogen to ammonia.

2. Answer any three of the following **3x5=15 Marks**
   a) Define the term partial molar free energy. Derive on expression to show variation of chemical potential with temperature.
   b) Derive Law of Mass action thermodynamically.
   c) Derive a relation between the lowering of vapour pressure and molecular weight of dissolved solute.
   d) Discuss the Nernst theory of electrode potential.
   e) What is reduction potential?
   A copper rod is placed in 0.1 m solution of cupric sulphate at 25°C, assuming that the salt is dissociate to the extent of 95 per cent at this dilution. Calculate the reduced potential developed on the electrode at this temperature [E^0 (cu^{++}, cu) = +0.34v]

3. Answer any two of the following **2x5=10 Marks**
   a) Discuss the term work function and free energy. Derive the relation
   $-\Delta G = W_{max} - P\Delta V$
   b) The equilibrium constant of a reaction doubles on raising the temperature from 25°C to 35°C. Calculate the value of $\Delta H°$ of the reaction (R = 8.314 JK^{-1} $mole^{-1}$)
   c) Explain the construction and working of standard hydrogen electrode. Give difficulties in setting the SHE.
   d) 0.440 gm of a substance dissolved in 22.2 gm of benzene lowered the freezing point o 277.928 K. Wile the freezing point of benzene is 278.495 K. Calculate molecular weight of the substance. [Kf = 5.12 K per 1000gm of benzene]