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SB—06—2022

FACULTY OF SCIENCE

B.Sc. (Third Year) (Sixth Semester) EXAMINATION

MAY/JUNE, 2022

(CBCS/Old Pattern)

CHEMISTRY

Paper XV

(Physical and Inorganic Chemistry)

(Saturday, 4-6-2022) **Time : 10.00 a.m. to 12.30 p.m.**

Time—2½ *Hours* *Maximum Marks*—40

N.B. :— (*i*) *All* questions are compulsory.

(*ii*) Use of logarithmic table and calculator is allowed.

1. Answer any *three* of the following : 3×5=15

(*a*) What is Na^+/K^+ pump ?

(*b*) Write a note on nitrogen fixation.

(*c*) What are boranes ? Explain types of boranes.

(*d*) What are metalloboranes ? Explain the Wade's rule.

(*e*) What is carborane ? Explain the preparation of dicarba-closododecaborane.

2. Answer any *three* of the following : 3×5=15

(*a*) State the principle of Gouy's method for the measurement of magnetic susceptibility. Give construction and working of Gouy's balance.

(*b*) Explain the concept of electrode potential on the basis of Nernst theory.

(*c*) Obtain an expression for change in work function with temperature and volume, hence at constant temperature and constant volume.

P.T.O.

(*d*) Derive an expression for emf of concentration cell with transport.

(*e*) The equilibrium constant k_p for a reaction is 20.2 atm^{-1} at 945°C and 9.1 atm^{-1} at 1065°C. Calculate $\Delta H°$ for the reaction.

[R = 8.314 JK^{-1} mol^{-1}]

3. Answer any *two* of the following : 2×5=10

(*a*) What are Paramagnetic substances ? Give its examples. Explain the effect of temperature on paramagnetic substances.

(*b*) Derive the Gibb's and Helmholtz equation.

(*c*) Obtain Clausius-Clapeyron equation for $L \rightleftharpoons V$ equilibrium. Give its any *two* applications.

(*d*) Derive Nernst equation for the emf of reversible cell and give its application to reduction half cell.