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AO—28—2017

FACULTY OF SCIENCE

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

MARCH/APRIL, 2018

CHEMISTRY

Paper XV (CH—304)

(Physical and Inorganic Chemistry)

(Monday, 19-03-2018) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

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

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

(*iii*) Use one answer book for both sections A & B.

Section A

(Physical Chemistry)

1. Answer any *five* of the following : 5×2=10

(*i*) Derive the relation between enthalpy change (ΔH) and emf of the cell.

(*ii*) Calculate the electrode potential of the following electrode at 25° :

$Zn \mid Zn^{2+}$ (conc. = 0.1 M)

Given that : $E^{\circ}_{Zn^{2+}, Zn} = -0.76$ V.

(*iii*) State any *two* statements of third law of thermodynamics.

(*iv*) Explain the term chemical potential.

(*v*) Derive Gibbs' Helmholtz equation.

(*vi*) What are paramagnetic substances ? Give its examples.

(*vii*) Define Magnetic Susceptibility ? Give its unit.

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

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

P.T.O.

(*b*) (*i*) Explain variation of chemical potential with pressure.

(*ii*) The equilibrium constant of reaction triples on raising the temperature from 300 K to 500 K. Calculate heat of reaction for the reaction (R = 8.314 JK^{-1} mol^{-1}).

(*c*) How will you determine pH of unknown solution using quinhydrone electrode.

3. Answer any *one* of the following : 7×1=7

(*a*) What are concentration cells ? Derive the equation for emf of concentration cell without transport.

Or

(*b*) Derive Van't Hoff isotherm.

Section B

(Inorganic Chemistry)

4. Solve any *three* of the following : 3×3=9

(*a*) Give any *two* preparations of diborane.

(*b*) What are carboranes ? Give their classification.

(*c*) Describe the structure of $C_2B_9H_{12}^-$ ion of metallocarboranes.

(*d*) Explain the role of Na^+ and K^+ ion in biological system.

(*e*) Describe the structure of haemoglobin.

5. Solve any *two* of the following : 2×2=4

(*a*) What is STYX No. ? Calcualte the STYX No. of B_2H_6.

(*b*) Give any *one* preparation of metalloborane.

(*c*) Describe nidocarborane with suitable example.

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