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**B—33—2019**

**FACULTY OF SCIENCE**

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

**MARCH/APRIL, 2019**

**(CGPA Pattern)**

**CHEMISTRY**

**Paper-XV (CH-304)**

**(Physical and Inorganic Chemistry)**

**(Tuesday, 19-3-2019)**

**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 calculator is allowed.*

**Section A**

**(Physical Chemistry)**

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

(i) Give the principle of potentiometric titration.

(ii) What are paramagnetic substances ? Give examples.

(iii) Define ferromagnetic substances. Give examples.

(iv) Give statements of third law of thermodynamics.

(v) Show that :

$$-\Delta G = W_{\text{useful}}$$

(vi) Derive Gibbs-Helmholtz equation.

(vii) Calculate the reduction of potential of a half cell consisting of Ag electrode in 0.1 M Ag<sup>+</sup> ion solution at 25°C ( $E^{\circ}_{\text{Ag}^+/\text{Ag}} = 0.81 \text{ V}$ ).

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

(i) Give the principle and working of Gouy's balance for the determination of Magnetic susceptibility.

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- (ii) Give the principle of potentiometric titration. Explain redox potentiometric titration.
- (iii) (a) Explain variation of chemical potential with pressure.  
(b) The equilibrium constant of reaction triples on raising the temp. from 325 K to 350 K. Calculate  $\Delta H^\circ$  for the reaction  $R = 8.314 \text{ JK}^{-1} \text{ mol}^{-1}$ .
3. Answer any *one* of the following : 1×7=7
- (a) Derive the equation for change in standard free energy at constant temp. (Van't Hoff isotherm).
- (b) What are concentration cells ? Derive the equation for emf of concentration cells with transport.

### Section B

#### (Inorganic Chemistry)

4. Solve any *three* of the following : 3×3=9
- (a) Describe “Three centred electron pair bond” in diborane.
- (b) Give the preparation of dicarbocloso-dodecaborane.
- (c) What are metalloboranes ? Explain its halogenation properties.
- (d) Discuss the biological role of  $\text{Na}^+$  and  $\text{K}^+$  in the body of living organism.
- (e) Define porphin molecule. Draw their structure and give name of some metalloporphyrins.
5. Solve any *two* of the following : 2×2=4
- (a) Give any *two* preparations of diboranes.
- (b) Draw the structure of  $\text{C}_2\text{B}_9\text{H}_{12}^-$  (dicarbollide)
- (c) What are carboranes ? Give their classification.
- (d) Give an account of Myoglobin.