

This question paper contains 2 printed pages]

**Y—32—2019**

**FACULTY OF SCIENCE**

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

**OCTOBER/NOVEMBER, 2019**

**(CBCS Pattern)**

**CHEMISTRY**

**Paper XV**

**(Physical and Inorganic Chemistry)**

**(Monday, 14-10-2019)**

**Time : 10.00 a.m. to 12.00 noon**

*Time—2 Hours*

*Maximum Marks—40*

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

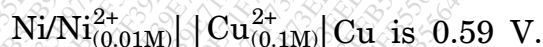
*(ii) Use of logarithmic table and calculator is allowed.*

**(Section-A Physical Chemistry)**

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

(i) Explain the construction and working of glass electrode.

(ii) Calculate the standard electrode potential of Ni<sup>2+</sup>/Ni electrode, if the cell potential of the cell



(iii) State and explain Nernst heat theorem.

(iv) Derive Gibbs'-Helmholtz equation.

(v) Define Gibbs' free energy. Give relation between G and A.

(vi) What are ferromagnetic substances ? Give its examples.

(vii) Explain effect of temperature on paramagnetic substances.

(viii) Explain paramagnetic substances with suitable examples.

P.T.O.

2. Attempt any *two* of the following : 2×5=10
- (a) Give the rules for conventional representation of electrochemical cells with suitable examples.
  - (b) Derive Gibbs-Duhem equation.
  - (c) Define Magnetic susceptibility. Explain Gouy's method for magnetic susceptibility.
3. Attempt any *one* of the following : 7
- (a) What is concentration cell ? Derive the equation for the emf of the cell with transport.
- Or*
- (b) (i) Derive law of mass action thermodynamically.
  - (ii) The equilibrium constant of a reaction increases three times on raising temperature from 27°C to 47°C. Find heat of reaction. (R = 8.314 JK<sup>-1</sup>mole<sup>-1</sup>)

**(Section-B Inorganic Chemistry)**

4. Solve any *three* of the following : 3×3=9
- (a) What is the action of H<sub>2</sub>O, HCl and CO on B<sub>2</sub>H<sub>6</sub> ?
  - (b) Give preparation of metalloboranes.
  - (c) Describe the structure of [C<sub>2</sub>B<sub>9</sub>H<sub>11</sub>]<sup>2-</sup> ion in metallocarboranes.
  - (d) Explain the role of Fe<sup>++</sup> in biological system.
  - (e) What is the porphyrin molecule ? Give any *two* names of metalloporphyrins.
5. Solve any *two* of the following : 2×2=4
- (a) What are carboranes ? How are they prepared ?
  - (b) What are Wade's rules ?
  - (c) "Diborane is an electron deficient compound". Explain.
  - (d) Write a note on "Nitrogen Fixation".