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BF—29—2016

FACULTY OF SCIENCE

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

OCTOBER/NOVEMBER, 2016

CHEMISTRY

Paper XV (CH-304)

(Physical and Inorganic Chemistry)

(Monday, 10-10-2016)

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 : 10
 - (i) What are reversible cells ? Give example.
 - (ii) Calculate reduction potential of half cell consisting of Mg electrode in 0.01 M Mg^{++} ions solution at 25°C ($E_{\text{red}}^\circ = -2.52 \text{ V}$).
 - (iii) Derive an expression for the variation of work function change with temperature.
 - (iv) State and explain third law of thermodynamics.
 - (v) Show that decrease in Gibbs' free energy ($-\Delta G$) is equal to useful work done ($-\Delta G = W_{\text{useful}}$).
 - (vi) What are ferromagnetic substances ? Give examples.
 - (vii) Write the characteristics of paramagnetic substances.
2. Answer any *two* of the following : 10
 - (a) Explain construction and working of calomel electrode.
 - (b) Describe Gouy's method for the determination of magnetic susceptibility of a substance.
 - (c) Derive Gibbs-Helmholtz equation.

P.T.O.

3. Answer any *one* of the following :
- (a) Explain the method of determination of pH of unknown solution using glass electrode. 7
 - (b) (i) Give the applications of Clausius-Clapeyron equation. 3
 - (ii) The equilibrium constant of a reaction doubles on raising the temperature from 27°C to 37°C. Calculate heat of reaction ($R = 8.314 \text{ Jk}^{-1} \text{ mole}^{-1}$). 4
4. Solve any *three* of the following : 3×3=9
- (a) What are carboranes ? How are they prepared ?
 - (b) What is the action of H_2O , HCl and NH_3 on B_2H_6 ?
 - (c) Give the properties of metalloboranes.
 - (d) Discuss the role of haemoglobin in living systems.
 - (e) Give an account of biological role of sodium ion.
5. Solve any *two* of the following : 2×2=4
- (a) What are boranes ? Draw the ethane like structure of diborane.
 - (b) Define metallocarboranes. Give *one* method of preparation of metallocarborane.
 - (c) Give the classification of carborane.
 - (d) What are metalloporphyrins ? Draw the structure of metalloporphyrin.