

This question paper contains 2 printed pages]

W—29—2018

FACULTY OF SCIENCE

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

OCTOBER/NOVEMBER, 2018

CHEMISTRY

Paper XV (CH-304)

(Physical Chemistry and Inorganic Chemistry)

(Wednesday, 10-10-2018)

Time : 10.00 a.m. to 12.00 noon

Time—Two 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) Explain the construction and working of glass electrodes.
- (ii) Define the term magnetic permeability. Explain it briefly.
- (iii) Give characteristics of ferro-magnetic substance.
- (iv) Explain briefly the concept of chemical potential.
- (v) Show that $-\Delta A = W_{\max}$.
- (vi) Give any *two* statements of third law of thermodynamics.
- (vii) Calculate the electrode potential of the following electrode at 25°C :

$$M/M^+(\text{Conc. } 0.1 \text{ M}) \quad E^{\circ}_{M/M^+} = 0.76 \text{ V}$$

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

- (a) Differentiate between paramagnetic and diamagnetic compounds.
- (b) How will you determine pH of an unknown solution using quinhydrone electrode.

P.T.O.

- (c) (i) Derive Gibb's-Duhem equation.
- (ii) The equilibrium constant for a reaction is 30 at 800 K and 20 at 900 K. Calculate heat of reaction. ($R = 8.314 \text{ JK}^{-1} \text{ mole}^{-1}$)
3. Answer any *one* of the following : 1×7=7
- (a) Derive Clausius-Clayperon equation for $L \rightleftharpoons V$ equilibria, with its integrated form. Give its *two* applications.
- (b) What are concentration cells ? Derive EMF of concentration cell without transport.

Section B

(Inorganic Chemistry)

4. Solve any *three* of the following : 3×3=9
- (a) Describe Hydrogen bridge structure of diborane.
- (b) Discuss different isomeric form of dicarba closo do deca carborane.
- (c) Calculate the number of electrons present in the framework of $B_{12}H_{12}^{-2}$ with the help of Wade's rule.
- (d) Describe the structure of Haemoglobin.
- (e) Explain the role of essential trace element Cu^{++} (copper ion) in biological system.
5. Solve any *two* of the following : 2×2=4
- (a) "Diborane is an electron deficient compound." Explain.
- (b) Give the classification of carboranes.
- (c) Give any *one* preparation of metallocarboranes.
- (d) "Nitrogenase converts atmospheric nitrogen to ammonia." Explain.