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**SB—05—2022**

**FACULTY OF SCIENCE**

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

**MAY/JUNE, 2022**

**(CBCS/New Pattern)**

**CHEMISTRY**

**Paper—XV**

**(Physical & Inorganic Chemistry)**

**(Saturday, 4-6-2022)**

**Time : 10.00 a.m. to 12.30 p.m.**

**Time— 2½ Hours**

**Maximum Marks—40**

**N.B. :— (i) Attempt All questions.**

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

**1. Answer any three of the following : 3×5=15**

- (a) What are boranes ? Explain any two properties of diboranes.
- (b) Explain the structure and bonding in diborane.
- (c) What are carboranes ? How are they classified ?
- (d) Discuss the role of Haemoglobin in living organism and draw the structure of porphyrine ring.
- (e) Discuss the biological role of alkaline earth metal.

**2. Answer any three of the following : 3×5=15**

- (a) Derive Nernst equation for the *emf* of reversible cell and its application to oxidation half cell.
- (b) What is Gibb's free energy ? Derive an expression for variation of change in free energy with temperature and pressure. Hence at constant temperature and constant pressure.
- (c) Obtain an expression thermodynamically for law of mass action.
- (d) Define Ebullioscopic constant :

Acetone boils at 56.38°C and a solution of 1.41 gm of organic solid in 20 gm of acetone boils at 56.88°C. If K for acetone per 1000 gm is 1.67. Calculate the mass of one mole of the organic solid.

**P.T.O.**

- (e) The equilibrium constant  $kp$  for a reaction is 3.0 at 400°C and 4.0 at 500°C. Calculate the value of  $\Delta H^\circ$  for the reaction. ( $R = 8.314 \text{ Jk}^{-1} \text{ mole}^{-1}$ ).
3. Answer any *two* of the following : 2×5=10
- (a) Explain the construction and working of calomel electrode. Give its advantages.
- (b) What is chemical potential ? Discuss the variation of chemical potential with temperature.
- (c) Describe the determination of molecular weight of a solute from relative lowering of vapour pressure.
- (d) A zinc rod is placed in 0.1 M solution of zinc sulphate at 25°C. Assuming that the salt is dissociated to the extent of 85 percent at this dilution, calculate the potential of the electrode at this temperature ( $E_{\text{zn}^{++}/\text{Zn}}^\circ = -0.76\text{V}$ ).