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**W—39A—2018**

**FACULTY OF SCIENCE**

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

**OCTOBER/NOVEMBER, 2018**

**(CBCS Pattern)**

**CHEMISTRY**

**Paper XIII**

[Physical and Inorganic Chemistry (B<sub>2</sub>)]

**(Thursday, 11-10-2018)**

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

*Time—Two Hours*

*Maximum Marks—40*

*N.B. :— (i) Use same answer-book for Section A and Section B.*

*(ii) Use of Logarithmic table and non-functional calculator is allowed.*

*(iii) Attempt all questions.*

**Section A**

**(Physical Chemistry)**

1. Answer any *five* of the following : 5×2=10
- (a) What is polarogram ? Draw a diagrammatic sketch of the polarographic cell assembly.
  - (b) Discuss the term vapour pressure of ideal solution.
  - (c) Find out the relation between activities and mole fraction of the component in an ideal solution.
  - (d) Show that volume change of mixing [ $\Delta V_{\text{mix}}$ ] for an ideal solution is zero.
  - (e) Derive an equation for the dependence of vapour pressure on temperature for the solution.
  - (f) How osmotic pressure is used in determination of molecular weight ?
  - (g) Describe Ostwald and Walker's method to determine lowering of vapour pressure.

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- (h) Derive the relation between elevation in boiling point and molecular weight of solute.
2. Answer any *two* of the following : 2×5=10
- (a) Derive an expression for chemical potential in ideal and non-ideal solution.
- (b) Define cryoscopic constant.
- An aqueous solution containing  $0.25 \times 10^{-3}$  kg of solution dissolved in  $20 \times 10^{-3}$  kg of water froze at 272.58 K. Calculate molar mass of the solute ( $K_f = 1.85 \text{ K kg mol}^{-1}$ ).
- (c) Discuss the application of polarography in estimation of inorganic and organic substance.
3. Answer any *one* of the following : 1×7=7
- (a) Derive an expression for half wave potential.
- (b) Derive Gibbs-Duhem-Margules equation. Hence give its application to ideal solution.

### Section B

#### (Inorganic Chemistry)

4. Solve any *three* of the following : 3×3=9
- (a) What are poly acids ? Explain different types of poly acids with suitable example.
- (b) Give an account of heteropoly acids.
- (c) Describe the structure of  $[\text{Mo}_7\text{O}_{24}]^{-6}$ .
- (d) Explain isolobality fragments.
- (e) Discuss the structure of  $\text{Os}(\text{CO})_4$ .

5. Solve any *two* of the following :

2×2=4

- (a) How are heteropoly molybdates prepared ?
- (b) Draw the structure of  $\text{WO}_6$ .
- (c) Name the different types of isopoly tungstates.
- (d) Draw the structure of  $(\text{CH}_2)_4$  and  $\text{P}_4$ .