

B.Sc. (CBCS) DEGREE EXAMINATION,
NOVEMBER 2023.

Fifth Semester

Chemistry — Core

PHYSICAL CHEMISTRY — II

(For those who joined in July 2020 only)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

- Which of the following is a state function
(a) entropy (b) heat
(c) work (d) dq
- The mathematical form of first law is
(a) $\Delta E = Q + w$ (b) $\Delta E = q - ue$
(c) $\Delta E = W - Q$ (d) $E = Q - W$

- The unit of specific conductance is
(a) Siemen (b) Volts
(c) K (d) Siemen cm⁻¹
- The arrangement of elements in the order of their increasing electrode potential values is known as
(a) electro chemical series
(b) single electrode potential
(c) calomel electrode
(d) standard hydrogen electrode
- The excess potential required for the discharge of an ion as an electrode over and above the equilibrium potential of the electrode
(a) Concentration cell
(b) Over voltage
(c) Polarization
(d) Decomposition voltage

PART B — (5 × 5 = 25 marks)

Answer ALL questions by choosing (a) or (b).

Each answer should not exceed 250 words.

- (a) Explain the types of systems with examples.
Or
(b) State Joule Thomson coefficient and explain its significances.

- The chemical energy per mole of two substance is known as
(a) entropy (b) enthalpy
(c) chemical potential (d) free energy
- As absolute zero is approached, the entropy for a chemical transformation approaches
(a) 1 (b) 2
(c) 0 (d) 0.5
- The maximum number of logically independent values is known as
(a) Component (b) phase
(c) Degree of freedom (d) phase rule
- Which one of the term used to describe a situation where the volume of a system remains constant
(a) Isotherom (b) Isochore
(c) Isobar (d) entropy
- _____ acetic acid and with sodium acetate is an example for
(a) Solibility product (b) buffer solution
(c) Weak electrolyte (d) Strong electrolyte

- (a) How will you explain when entropy as a function of T and P.
Or
(b) State III law of thermodynamics and its applications.
- (a) How the application of law of mass action is useful to homogeneous and heterogeneous equilibrium?
Or
(b) Explain Water- Sulphur system.
- (a) Define solubility product and explain the application of solubility product.
Or
(b) Write a note on Debye - Falkenhagen effect.
- (a) Explain standard reduction potential.
Or
(b) Write a note on standard Hydrogen electrode.



PART C — (5 × 8 = 40 marks)

Answer ALL questions by choosing (a) or (b).

Each answer should not exceed 600 words.

16. (a) (i) Describe on the heat capacities at constant volume and at constant pressure. (6)

- (ii) Define inversion temperature. (2)

Or

- (b) Explain the following :

- (i) Zeroth law of thermodynamics (4)

- (ii) First law of thermodynamics. (4)

17. (a) (i) List out the general conditions of equilibrium and spontaneity. (6)

- (ii) Define free energy. (2)

Or

- (b) (i) Derive Gibbs Helmholtz equation (6)

- (ii) Define Activity coefficient. (2)

Page 5 Code No. : 20322 E

18. (a) (i) Explain Van't hoff reaction isotherm and isochores (6)

- (ii) Define law of mass action. (2)

Or

- (b) (i) Describe on simple eutectic system with as example (6)

- (ii) Define phase rule. (2)

19. (a) (i) Describe on the measurement of conductance and cell constant

- (ii) Define Kohlrausch's law. (2)

Or

- (b) (i) Explain Debye-Huckel Onsager theory (6)

- (ii) Define specific conductance. (2)

20. (a) (i) Explain Galvanic cells (4)

- (ii) Explain Types of reversible single electrodes. (4)

Or

- (b) (i) Describe on concentration cells (6)

- (ii) Define decomposition voltage. (2)

Page 6 Code No. : 20322 E