# G. VENKATASWAMY NAIDU COLLEGE (AUTONOMOUS), KOVILPATTI – 628 502.

## UG DEGREE END SEMESTER EXAMINATIONS - NOVEMBER 2024.

(For those admitted in June 2021 and later)

### PROGRAMME AND BRANCH: B.Sc., CHEMISTRY

| SEM | CATEGORY | COMPONENT | COURSE CODE | COURSE TITLE |
|-----|----------|-----------|-------------|--------------|
| IV | PART – III | CORE - 7 | U21CH407 | PHYSICAL CHEMISTRY – II |

**Date & Session: 12.11.2024 / AN**     **Time : 3 hours**     **Maximum: 75 Marks**

| Course Outcome | Bloom's K-level | Q. No. | SECTION – A (10 X 1 = 10 Marks) Answer ALL Questions. |
|---|---|---|---|
| CO1 | K1 | 1. | For isobaric process, <br> a) $\Delta T=0$    b) $\Delta P = 0$    c) $\Delta V = 0$    d) $Q = 0$ |
| CO1 | K2 | 2. | The relationship between Cp and Cv is given by _____. <br> a) $Cv – Cp = RT$   b) $Cp – Cv = R$   c) $Cp – Cv = KT$   d) $Cp/ Cv = R$ |
| CO2 | K1 | 3. | The unit of entropy is _____. <br> a) $JK^{-1}$    b) $mol\ J^{-1}K^{-1}$    c) $JK^{-1}\ mol^{-1}$    d) $J/Kg/K$ |
| CO2 | K2 | 4. | The Gibb's –Helmotz equation for a reaction at constant volume is expressed as _____. <br><br> a) $\Delta A = \Delta U + T(\frac{\partial(\Delta A)}{\partial T})_v$    b) $\Delta G = \Delta H + P(\frac{\partial(\Delta G)}{\partial T})_v$ <br><br> c) $\Delta G = \Delta H + T(\frac{\partial(\Delta G)}{\partial T})_p$    d) $\Delta A = \Delta U + T(\frac{\partial(\Delta G)}{\partial T})_v$ |
| CO3 | K1 | 5. | For a chemical reaction in which number of moles of the products and reactants are equal, which one of the following is correct. <br> a) $Kp=Kc$   b) $Kp=2 \times Kc$   c) $Kp=Kx/Kc$   d) $Kc=2X\ Kp$ |
| CO3 | K2 | 6. | The temperature dependence of equilibrium constant is given by _____. <br> a) Claussius equation      b) van't Hoff eqaution <br> c) Le-Chatelier principle      d) de Donder's relationship |
| CO4 | K1 | 7. | Lyotrophic mesomorphism explain the transformation to intermediate states by the interaction of _____. <br> a) Thermal process   b) solvent    c) pressure     d) electrolyte |
| CO4 | K2 | 8. | The sum of mole fractions of solute and solvent of a solution is equal to _____. <br> a) 2      b) 0      c) 3      d) 1 |
| CO5 | K1 | 9. | The rule that relates the equivalent conductivity and viscosity of the solvent for a specific electrolyte is _____. <br> a) Charles rule   b) Kohlrausch's law   c) Walden rule   d) Gibb's phase rule |
| CO5 | K2 | 10. | At 25°C, the value of ionic product of water is _____. <br> a) $1\times10^{-14}$.    b) $1\times10^{-7}$    c) $1\times10^{14}$.    d) $1\times10^7$ |

| Course Outcome | Bloom's K-level | Q. No. | SECTION – B (5 X 5 = 25 Marks) Answer ALL Questions choosing either (a) or (b) |
|---|---|---|---|
| CO1 | K3 | 11a. | Derive relationship between Cp and Cv. |
| CO1 | K3 | 11b. | **(OR)** Apply first law of the thermodynamics in finding work done by a system. |
| CO2 | K3 | 12a. | Deduce expressions for entropy change accompanying change of phases. **(OR)** |
| CO2 | K3 | 12b. | How does free energy vary with temperature? |
| CO3 | K4 | 13a. | Examine relationship between Kp & Kc for an ideal gas. **(OR)** |
| CO3 | K4 | 13b. | Apply law of mass action to dissociation of $N_2O_4$. |
| CO4 | K4 | 14a. | State Henry's law and analyze on its limitations. **(OR)** |
| CO4 | K4 | 14b. | State Raoult's law and analyze on the deviation of solutions from ideal behaviour. |
| CO5 | K5 | 15a. | Review on variation of conductance with dilution. **(OR)** |
| CO5 | K5 | 15b. | Illustrate Debye –Falkenhagen effect. |

| Course Outcome | Bloom's K-level | Q. No. | SECTION – C (5 X 8 = 40 Marks) Answer ALL Questions choosing either (a) or (b) |
|---|---|---|---|
| CO1 | K3 | 16a. | Derive an expression for Joule-Thomson coefficient. **(OR)** |
| CO1 | K3 | 16b. | Distinguish between (i)state functions and path functions (ii) Open and closed system (iii) Exact and inexact differentials. |
| CO2 | K4 | 17a. | Relate free energy and enthlapy using Gibbs Helmholtz equation. **(OR)** |
| CO2 | K4 | 17b. | Analyze on entropy change in reversible processes. |
| CO3 | K4 | 18a. | Derive an integrated vant Hoff's equation for temperature dependence of equilibrium constant. **(OR)** |
| CO3 | K4 | 18b. | Analyze the effect of change of pressure and temperature on the formation of ammonia based on Le- Chatelier principle. |
| CO4 | K5 | 19a. | How will you estimate the concentration of solutions in terms of molarity, molality, mole fraction and normality? **(OR)** |
| CO4 | K5 | 19b. | Review on different types of Liquid crystals. |
| CO5 | K5 | 20a. | Determine the transport number by Hittorf and moving boundary methods. |
| CO5 | K5 | 20b. | **(OR)** Evaluate Debye – Huckel – Onsager theory of strong electrolytes. |