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



**UG DEGREE END SEMESTER EXAMINATIONS - NOVEMBER 2025.**

(For those admitted in June 2023 and later)

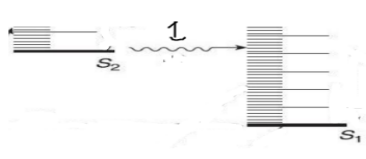
**PROGRAMME AND BRANCH: B.Sc., CHEMISTRY**

| SEM | CATEGORY   | COMPONENT | COURSE CODE | COURSE TITLE         |
|-----|------------|-----------|-------------|----------------------|
| V   | PART - III | CORE-7    | U23CH507    | PHYSICAL CHEMISTRY-I |

**Date & Session: 08.11.2025/FN**

**Time: 3 hours**

**Maximum: 75 Marks**

| Course Outcome | Bloom's K-level | Q. No. | <p><b>SECTION – A (10 X 1 = 10 Marks)</b><br/> <b>Answer ALL Questions.</b></p>                                                                                                                                                            |
|----------------|-----------------|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CO1            | K1              | 1.     | Which is not colligative property?<br>a) Vapour pressure    b) Boiling point    c) Freezing point    d) melting point                                                                                                                      |
| CO1            | K2              | 2.     | Solutions having same osmotic pressure are called as---- solutions.<br>a) Isotonic    b) Isochoric    c) Isomorphous    d) Isobaric                                                                                                        |
| CO2            | K1              | 3.     | The $t_{1/2}$ of a second order chemical reaction is inversely proportional to ----.<br>a) Initial concentration    b) $2 \times$ Initial concentration<br>c) $(\text{Initial concentration})^{1/2}$ d) $(\text{Initial concentration})^2$ |
| CO2            | K2              | 4.     | In the rate equation, when the concentration of reactants is unity then the rate is equal to----.<br>a) specific rate constant    b) 2<br>c) instantaneous rate constant    d) average rate constant                                       |
| CO3            | K1              | 5.     | Adsorption of benzene on silica gel at $50^\circ\text{C}$ serves as an example for ---- adsorption isotherm.<br>a) Type I    b) Type II    c) Type III    d) Type IV                                                                       |
| CO3            | K2              | 6.     | The rate of reaction in contact process is retarded by the presence of -----.<br>a) Iodine    b) Arsenic    c) Argon    d) Iron                                                                                                            |
| CO4            | K1              | 7.     | Choose the hydrophilic gels from the following.<br>a) agar-agar    b) silica gel    c) alumina gel    d) calciumacetate                                                                                                                    |
| CO4            | K2              | 8.     | The lyophilic colloids are also called as _____.<br>a) sols    b) gels<br>c) solvent-loving colloids    d) solvent-fearing colloids                                                                                                        |
| CO5            | K1              | 9.     | Which of the following are the principle laws of photochemistry?<br>a) Lambert's and Beer's law    b) Raoult's and Henry's law<br>c) Raoult's and Dalton's law    d) Grothus-Draper and Stark-Einstein law                                 |
| CO5            | K2              | 10.    |  <p>In fig, What is the process 1?<br/>a) IC &amp; ISC    b) IC only    c) ISC only    d) IC &amp; VC</p>                                              |

| Course Outcome | Bloom's K-level | Q. No. | <p align="center"><b>SECTION – B (5 X 5 = 25 Marks)</b><br/> <b>Answer <u>ALL</u> Questions choosing either (a) or (b)</b></p>                                   |
|----------------|-----------------|--------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CO1            | K3              | 11a.   | Derive relationship between osmotic pressure and vapour pressure lowering of an ideal solution.<br><b>(OR)</b>                                                   |
| CO1            | K3              | 11b.   | A five percent aqueous solution by mass of a non-volatile solute boils at 100.15°C. Calculate the molar mass of the solute. $K_b = 0.52 \text{ K Kg mol}^{-1}$ . |
| CO2            | K3              | 12a.   | Derive an expression for rate law of unimolecular reactions on the basis of Lindemann theory.<br><b>(OR)</b>                                                     |
| CO2            | K3              | 12b.   | What is the influence of temperature on rate of the reaction? Explain.                                                                                           |
| CO3            | K4              | 13a.   | Distinguish chemical and physical adsorption.<br><b>(OR)</b>                                                                                                     |
| CO3            | K4              | 13b.   | Distinguish competitive, noncompetitive and uncompetitive types of enzyme inhibition.                                                                            |
| CO4            | K4              | 14a.   | Analyse on different electrokinetic phenomena.<br><b>(OR)</b>                                                                                                    |
| CO4            | K4              | 14b.   | Analyse on the optical and electrical properties of sols.                                                                                                        |
| CO5            | K5              | 15a.   | Compare fluorescence and phosphorescence.<br><b>(OR)</b>                                                                                                         |
| CO5            | K5              | 15b.   | Sketch Jablonski diagram and analyze the various consequences of light absorption processes.                                                                     |

| Course Outcome | Bloom's K-level | Q. No. | <p align="center"><b>SECTION – C (5 X 8 = 40 Marks)</b><br/> <b>Answer <u>ALL</u> Questions choosing either (a) or (b)</b></p>                                     |
|----------------|-----------------|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CO1            | K3              | 16a.   | Discuss on the abnormal behaviour of molar masses of solutes by relating with van't Hoff factor in terms of degree of dissociation and association.<br><b>(OR)</b> |
| CO1            | K3              | 16b.   | Derive relationship between boiling point elevation of solution and mole fraction of the dissolved solute.                                                         |
| CO2            | K4              | 17a.   | Integrate the expression for a first order reaction and thereby obtain an expression for half-life period of the reaction.<br><b>(OR)</b>                          |
| CO2            | K4              | 17b.   | Derive an expression for rate constant of bimolecular gaseous reactions on the basis of collision theory.                                                          |
| CO3            | K4              | 18a.   | Derive an expression for BET equation.<br><b>(OR)</b>                                                                                                              |
| CO3            | K4              | 18b.   | Discuss the kinetics of acid-base catalysed reactions.                                                                                                             |
| CO4            | K5              | 19a.   | Evaluate the merits of Gouy-Chapman model of electrical double layer.<br><b>(OR)</b>                                                                               |
| CO4            | K5              | 19b.   | Assess the importance and applications of collids.                                                                                                                 |
| CO5            | K5              | 20a.   | Deduce the mechanism and kinetics of photochemical reaction between $\text{H}_2$ and $\text{Cl}_2$<br><b>(OR)</b>                                                  |
| CO5            | K5              | 20b.   | Deduce the mechanism and kinetics of decomposition of $\text{H}_2\text{-I}_2$ reaction.                                                                            |