

## Odd Semester Lecture Plan

**Name of the college:** Government College of Arts, Science and Commerce, Sanquelim – Goa.

**Name of Faculty:** Ms. Rosalina Desilva

**Subject:** Chemistry

**Paper code:** CHC- 200 Concepts in Inorganic and Physical Chemistry

**Program/Course:** S.Y. B.Sc.

**Division:** A

**Academic year:** 2025 - 2026

**Semester:** III

**Total Lectures:** 15

### Course Objectives:

**Theory** - To learn the postulates of Valence Bond Theory, Molecular Orbital Theory and Valence Shell Electron Pair Repulsion Theory and To study the general characteristics of covalent and ionic compounds through theories of bonding.

**Practical**- To prepare standard solutions and determine strength of solutions, to synthesize metal oxalates and estimate the metal ions by volumetric and gravimetric methods, to introduce colligative properties and their applications, to study the Nernst distribution law and its applications.

### Course Learning Outcome:

**Theory** - At the end of the course, students will be able to: construct and interpret the molecular orbital diagram of homonuclear and heteronuclear molecules.

**Practical** - Calculate distribution coefficient of binary systems, prepare normal and molar solutions, calculate amount of substance in given solutions, carry out volumetric and gravimetric experiments to estimate unknown substances, deduce the lattice parameters of crystalline solids

| Month     | Lectures From: To: | No. of lectures allotted | Topic, Subtopic to be covered                                                                                                                            | Learning outcome                                                                                                  | ICT Tools   | Reference books                                                                                                                                                                                                                         |
|-----------|--------------------|--------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| June 2025 | 23/6/25 - 28/6/25  | 01<br><br>02             | Covalent bonding, Lewis theory, octet rule, the concept of Formal Charge.<br>B- I & B-II General Instructions and safety measures<br>B-II Volumetry – Ca | <b>Students will be able to:</b><br>define important terms and explain theories, carry out volumetric experiments | Smart board | 1. Satya Prakash, G.D. Tuli, S.K. Basu, R.D. Madan, Advanced Inorganic Chemistry, Vol. I, 19th edn., S. Chand Publishers (2016) 2. P. L. Soni and Mohan Katyal, Textbook of Inorganic Chemistry by, Sultan Chand and Sons, 20th Edition |

|             |                   |              |                                                                                                                               |                                                                               |             |                                                                                                                                                                                              |
|-------------|-------------------|--------------|-------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| June- July  | 30/6/25 - 05/7/25 | 01<br><br>02 | Valence bond theory:<br>Interaction between two hydrogen atoms, Potential energy diagram , Corrections<br>B-II Volumetry – Ca | Explain VBT theory<br><br>carry out volumetric experiments                    | Smart board | 3. Puri, Sharma and Kalia, Principles of Inorganic Chemistry, 33rd Edition, Vishal Publishing Co. (2018).<br>4. Krishna Mohan Srivastava, Essentials of Inorganic Chemistry, Bio-Green Books |
| July        | 07/7/25 - 12/7/25 | 01<br><br>02 | Resonance rules / Canonical Structures, $sp^3$ hybridisation in $CH_4$ , $NH_3$ and $H_2O$<br>B-II Volumetry $Na_2CO_3$ -HCl  | Explain important concepts, hybridisation<br>carry out volumetric experiments | Smart board | 5. L. Pauling, The Nature of The Chemical Bond, 3rd Ed.; Cornell University, Press,<br>6. J. D. Lee, Concise Inorganic Chemistry by, Chaman and Hall, 5th ed. (1996).                        |
| July        | 14/7/25 - 19/7/25 | 01<br>02     | Hybridisation - $sp$ , $sp^2$ $sp^3$<br>B-II Volumetry $Na_2CO_3$ -HCl                                                        | Explain hybridization<br>Carry out titrations                                 | Smart board | 1. J. Mendham, R. C. Denney, J. D. Barnes, M. Thomas, B. Sivasankar, Vogel's Textbook of Quantitative Chemical Analysis, 6th Edn. Pearson Education.                                         |
| July        | 21/7/25 - 26/7/25 | 01<br>02     | $sp^3d$ , $sp^3d^2$ and $sp^3d^3$<br>Gravimetry- $BaSO_4 + NH_4Cl$                                                            | Explain hybridization,<br>Skills in gravimetry                                | Smart board | 2. G. Marr and B. W. Rockett, Practical inorganic Chemistry, Van Nostrand Reinhold Company, London. (1972)                                                                                   |
| July-August | 28/7/25 - 02/8/25 | 01<br><br>02 | Co-ordinate covalent bond:<br>VSEPR Theory:<br>Gravimetry-Fe- $Fe_2O_3$                                                       | Explain VSEPR theory<br><br>Skills in gravimetry                              | Smart board | 3. S. W. Rajbhoj and T. K. Chondhekar, Systematic Experimental Physical Chemistry, Anjali Publication, Second Edn                                                                            |
| August      | 04/8/25 - 09/8/25 | 01<br>02     | geometry $H_2O$ , $NH_3$ , $TiCl_4$ , $ClF_3$ ,<br>Inorganic preparations                                                     | Deduce geometry<br>Synthesise oxalates                                        | Smart board | 4. Khosla, B. D.; Garg, V. C. & Gulati, A. Senior Practical Physical Chemistry, R. Chand & Co.: New Delhi, 2018.                                                                             |
| August      | 11/8/25 - 16/8/25 | 01<br>02     | geometry of $OF_2$ , $NH_4^+ ICl_2^-$ .<br>Inorganic preparations                                                             | Deduce geometry<br>Synthesise oxalates                                        | Smart board |                                                                                                                                                                                              |
| August      | 18/8/25 - 23/8/25 | 01<br><br>02 | MOT-LCAO-MO diagrams<br>Phase diagram of binary mixtures                                                                      | Explain MOT<br><br>Draw Phase diagram                                         | Smart board |                                                                                                                                                                                              |

|                       |                       |              |                                                                                                                                                                          |                                                                       |             |  |
|-----------------------|-----------------------|--------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|-------------|--|
| August                | 25/8/25               | 02           | Partition coefficient $I_2 + CH_2Cl_2$                                                                                                                                   | Calculate distribution coefficient                                    |             |  |
| September             | 02/09/25-<br>06/09/25 | 01<br>02     | MOD of $O_2$ , $N_2$<br>Data analysis: Volumetry- Ca                                                                                                                     | Draw MOD<br>Data analysis                                             | Smart board |  |
| September             | 08/09/25-<br>13/09/25 | 01<br>02     | MOD of CO, NO and $NO^+$<br>Partition coefficient Benzoic acid                                                                                                           | Draw MOD                                                              | Smart board |  |
| September             | 15/09/25-<br>20/09/25 | 01<br><br>02 | stability/reactivity, magnetic nature $O_2$ , $O_2^+$ , $O_2^-$ , $O_2^{2-}$ .<br>Comparison of VBT and MOT<br>Indexing, lattice parameters of Simple cubic, FCC and BCC | Apply MOT<br><br>deduce the lattice parameters of crystalline solids. | Smart board |  |
| September             | 22/09/25-<br>27/09/25 | 01<br>02     | Ionic bonding: Energy changes<br>Indexing, lattice parameters of Simple cubic, FCC and BCC                                                                               | Explain ionic bond<br>Deduce the lattice parameters of solids.        | Smart board |  |
| September-<br>October | 29/09/25-<br>04/10/25 | 01<br>02     | Born-Landé, Born-Haber cycles<br>Molal B.P elevation constant                                                                                                            | Explain energy changes                                                |             |  |
| October               | 06/10/25-<br>11/10/25 | 01<br>02     | Polarizing power polarizability, Fajan's rules<br>Determination of molal F.P depression constant                                                                         | Explain polarisation                                                  | Smart board |  |
| October               | 13/10/25-<br>18/10/25 | 01<br>02     | Revision<br><br>Repetition                                                                                                                                               | Questions<br><br>Journal Certification                                |             |  |
|                       |                       |              | -----X-----                                                                                                                                                              |                                                                       |             |  |