

Advanced Chemistry – I

S.E. Sem. III [CHEM]

EVALUATION SYSTEM

| | Time | Marks |
|----------------|-------|-------|
| Theory Exam | 3 Hrs | 100 |
| Practical Exam | – | 25 |
| Oral Exam | – | – |
| Term Work | – | 25 |

SYLLABUS

1. Chemical Bonding and Molecular Structures

Ionic and covalent bonds, Exceptions of Octet rule, Resonance, Variable Valency, Hydrogen bond, Valence band-Theory, Crystal field theory, Ligand field theory, Structures of molecules with lone pair electrons, H₂O, NH₃, BCl₃, SF₄, PCl₃, PCl₅, Molecular orbital theory, Non-bonding and antibonding orbitals, LCAO method, VSEPR theory, Molecular orbital structures of homonuclear and heteronuclear molecules H₂, HC₂, BC₂, B₂, C₂, N₂, O₂, F₂, CO, HF, NO₂. Metallic band, Bloch's theory, Pauling theory.

2. Co-ordination Chemistry

Co-ordination dative bond, complexions, co-ordinations number or ligancy, Werner's co-ordination theory, Effective Atomic number, Nomenclatures and isomerism in co-ordination compounds with respect to co-ordination number 4 and 6. Application of CFT to tetrahedral and octahedral complexes, Drawbacks of CFT, MOT as applied to the octahedral complexes of Fe and Ni, Measurement of CFSE (10 D₂), Numerical based on EAN and 10 D₂ measurement.

3. Organometallic Compounds

- Chemistry of Fe-carbonyls with respect to preparation, properties, structure and bonding.
- Bi-inorganic Chemistry of Iron : Classification of biomolecules containing metalions, Bio-Chemistry of proteins containing Cu, Fe and Zn, Chemistry of cytochromes and their applications, O₂ atom transfer reactions of biomolecular reaction containing Fe.

4. Dyes and Drug

- Dyes : Sensation of colour, colour and constitution, nomenclature, classification based on chemical composition and mode of application. Synthetic and uses of (1) Fast Printing Green, (2) Methyl Orange, (3) Methyl red, (4) Congo red, (5) Alizarin.
- Drugs : Synthesis and uses of (1) Ibuprofen, (2) Aspirin, (3) Vitamin – C, (4) P-nitro aniline, (5) O-Chlorobenzoic acid.

5. Electrochemistry

Introduction – conductance, Effect of temperature on conductivity, mobility of ions, transport number and its determination, theories of electrolytic conductance, Debye Huckel theory of strong electrolytes, Concentration cells with and without transference, standard cells, standard electrode potential, reference electrode, Use of EMF measurements and other techniques for determination of dissociation constants of acids and bases, solubility product, hydrolysis constant, hydrogenion concentration, theory of acid base indicators, Electrometric titrations.

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