SEMESTER – I

Course I (Inorganic&PhysicalChemistry) 60 hrs. (4h/w)

Course outcomes:

At the end of the course, the student will be able to;

1. Understand the basic concepts of p-block elements.
2. Explain the difference between solid, liquid and gases in terms of inter molecular interactions.
3. Apply the concepts of gas equations, pH and electrolytes while studying other chemistry courses.

INORGANICCHEMISTRY 24 h

UNIT–I

Chemistry ofp-blockelements 8h

Group 13: Preparation & structure of Diborane, Borazine

Group 14: Preparation, classification and uses of silicones

Group 15: Preparation & structures of Phosphonitrilic halides $\{(PNCl_2)_n$ where$n=3, 4$

Group 16: Oxides and Oxoacids of Sulphur (structures only)

Group 17: Pseudohalogens, Structures of Interhalogen compounds.

UNIT-II

1. Chemistry ofd-blockelements: 6h

Characteristics of d-block elements with special reference to electronic configuration, variable valence, magnetic properties, catalytic properties and ability to form complexes. Stability of various oxidationstates.

2. Chemistry off-blockelements: 6h

Chemistry of lanthanides - electronic structure, oxidation states, lanthanide contraction, consequences of lanthanide contraction, magnetic properties. Extraction of lanthanides by solvent extractionChemistry of actinides - electronic configuration, oxidation states, actinide contraction, comparison of lanthanides and actinides.

3. Theories of bonding in metals: 4h

Valence bond theory and Free electron theory, explanation of thermal and electrical conductivity of metals based on these theories, Band theory- formation of valance and conduction band, band gap, explanation of conductors, semiconductors and insulators.

PHYSICALCHEMISTRY **36h**

UNIT-III

Solidstate **10h**

Symmetry in crystals. Law of constancy of interfacial angles. The law of rationality of indices. The law of symmetry. Miller indices, Definition of lattice point, space lattice, unit cell. Bravais lattices and crystal systems. X-ray diffraction and crystal structure. Bragg's law. Powder method. Defects in crystals. Stoichiometric and non-stoichiometric defects.

UNIT-IV

1. Gaseousstate **6h**

van der Waal's equation of state. Andrew's isotherms of carbon dioxide, continuity of state. Critical phenomena. Relationship between critical constants and vander Waal's constants. Lawof corresponding states. Joule- Thomson effect. Inversion temperature.

2.Liquidstate **4h**

Liquid crystals, mesomorphic state. Differences between liquid crystal and solid/liquid. Classification of liquid crystals into Smectic and Nematic. Application of liquid crystals as LCD devices.

UNIT-V

Solutions, Ionic equilibrium& dilute solutions

1. Solutions **6h**

Azeotropes-HCl-H_2O system and ethanol-water system. Partially miscible liquids-phenol-water system. Critical solution temperature (CST), Effect of impurity on consulate temperature. Immiscible liquids and steam distillation.Nernst distribution law. Calculation of the partition coefficient. Applications of distribution law.

2. Ionicequilibrium **3h**

Ionic product, common ion effect, solubility and solubility product. Calculations based on solubility product.

3. Dilutesolutions **7h**

Colligative properties- RLVP, Osmotic pressure, Elevation in boing point and depression in freezing point. Experimental methods for the determination of molar mass of a non-volatile solute using osmotic pressure, Elevation in boing point and depression in freezing point. Abnormal colligative properties. Van't Hoff factor.

Co-curricular activities and Assessment Methods

1. ContinuousEvaluation:Monitoringtheprogressofstudent'slearning
2. ClassTests,WorksheetsandQuizzes
3. Presentations,ProjectsandAssignmentsandGroupDiscussions:Enhancescriticalthinking skillsand personality
4. Semester-endExamination:criticalindicatorofstudent'slearningandteachingmethodsadoptedby teachersthroughoutthesemester.

List of Reference Books

1. Principles of physical chemistry by Prutton andMarron
2. Solid State Chemistry and its applications by Anthony R.West
3. Text book of physical chemistry by K LKapoor
4. Text book of physical chemistry by SGlasstone
5. Advanced physical chemistry by Bahl andTuli
6. Inorganic Chemistry byJ.E.Huheey
7. Basic Inorganic Chemistry by Cotton andWilkinson
8. A textbook of qualitative inorganic analysis by A.I.Vogel
9. Atkins,P.W.&Paula,J.deAtkin'sPhysicalChemistryEd.,OxfordUniversityPress 10thEd(2014).
10. Castellan,G.W.PhysicalChemistry4thEd.Narosa(2004).
11. Mortimer,R. G.PhysicalChemistry3rdEd. Elsevier:NOIDA,UP(2009).
12. Barrow,G.M.PhysicalChemistry

LABORATORYCOURSE-I **30**hrs (2 h /w)

Practical-I Analysis of SALT MIXTURE

(At the end of Semester-I)

Qualitative inorganic analysis (Minimum of Six mixtures should be analysed)

50 M

Course outcomes:

At the end of the course, the student will be able to;

1. Understand the basic concepts of qualitative analysis of inorganicmixture
2. Use glassware, equipment and chemicals and follow experimental procedures in the laboratory
3. Apply the concepts of common ion effect, solubility product and concepts related to qualitativeanalysis

Analysis ofSALTMIXTURE **50M**

Analysis of mixture salt containing two anions and two cations (From two different groups) from the following:

Anions: Carbonate, Sulphate, Chloride, Bromide, Acetate, Nitrate, Borate, Phosphate.

Cations: Lead, Copper, Iron, Aluminium, Zinc, Nickel, Manganese, Calcium, Strontium, Barium, Potassium and Ammonium.

MODEL PAPER

FIRST YEAR B.Sc., DEGREE EXAMINATION

SEMESTER-I

CHEMISTRY Course-I: INORGANIC & PHYSICAL CHEMISTRY

Time: 3 hours Maximum Marks: 75

PART- A 5 X 5 = 25 Marks

Answer any **FIVE** of the following questions. Each carries **FIVE** marks

1. Explain the preparation & structures of Phosphonitriliccompounds.
2. Explain in brief, catalytic properties & stability of various oxidation states of d-blockelements.
3. Write short note on Bravais lattices and crystalsystems.
4. What are Smectic&Nematic liquid Crystals?Explain.
5. Write an account on Common ion effect & Solubilityproduct.
6. Describe Andrew's isotherms of carbondioxide.
7. Explain Actinidecontraction.
8. Explain the structure ofBorazine.

PART- B 5 X 10 = 50 Marks

Answer **ALL** the questions. Each carries **TEN** marks

9(a). Explain Classification, Preparations & uses ofSilicones

(or)

(b). (i) What are Pseudohalogens.
(ii) Explain the Structures of any one AX_3& AX_5interhalogen compounds.

10 (a). What is Lanthanide Contraction? Explain the Consequences of Lanthanide Contraction.

(or)

(b). (i) Explain the magnetic properties of d- block elements.
(ii) Explain about Conductors, Semi-Conductors& Insulators using Band Theory.

11.(a). Write an essay on Crystal defects.

(or)

(b). What is Bragg's Law. Explain the determination of structure of a crystal by powdermethod.

12.(a). Derive the relationship between Critical constants &Vanderwaalconstants.

(or)

(b).(i) Write any 5 differences between liquid crystals & liquids, solids
(ii) Write the applications of Liquidcrystals.

13.(a). Explain Nernst distribution Law. Explain its applications

(or)

(b).What are colligative properties. Write experimental methods for determination of molar mass of a non-volatile solute by using Elevation in boiling point & depression in freezing point.

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