

BSL-103-A	Inorganic Chemistry	L	T	P	Cr.
		4	0	0	4

(For B.Sc. General)

External marks (Theory) =100

Internal marks (Theory) =50

Section-A

Unit1:Atomic Structure:

Idea of de Broglie matter waves, Heisenberg uncertainty principle, atomic orbitals, quantum numbers, Aufbau and Pauli Exclusion principles, Hund's multiplicity rule. Electronic configurations and atomic models of elements, shapes of s, p, d orbital's, effective nuclear charge.

Unit-2 Periodic Table & Periodic properties

Modern periodic law; long form of periodic table, s, p d and f block elements; atomic and ionic radii, ionization energy; electron affinity & electro negativity-definition, trends in periodic table and applications in predicting and explaining the chemical behavior, isotope, Isobar, Isotones.

Unit-3 Chemical Bonding:

Definition of chemical bonding, types of chemical bonds, Valence bond theory and its limitations, various types of hybridization with examples, valence shell electron pair repulsion (VSEPR) theory to NH₃, H₃O⁺, SF₄, ClF₃, ICl₂ I₃ and H₂O, molecular orbital (MO) theory, homonuclear and heteronuclear (CO & NO) diatomic molecules, bond strength, bond energy, percentage ionic character from dipole moment and electro negativity difference

Section-B

Unit-4 Ionic Solids –

Ionic structures, radius ratio effect and coordination number, lattice defects, semiconductors, lattice energy and Born-Haber cycle, polarizing power and polarisability of ions, Fajan's rule, Metallic bond-free electron.

Weak Interactions – Hydrogen bonding, Vander Waals force.

Unit-5 S-Block Elements:

Comparative study, diagonal relationship, salient features of hydrides, solvation and complexation tendencies including their function in bios stems, an introduction to alkyls and aryls.

Unit-6 Chemistry of Noble Gasses:

Chemical properties of the noble gases, chemistry of xenon, structure and bonding in xenon compounds.

NOTE:

1. The syllabus is divided into 2 sections comprising three units each. Total seven questions would be set. One question would be compulsory that would comprise all the units. Remaining six questions will be set from both the sections taking three questions from each section. Students need to attempt at least two questions from each section. A student has to attempt five questions in all.
2. 20% numerical problems are to be set.
3. Use of Scientific (non-programmable) calculator is allowed

Books Suggested:**Text Books:**

1. U.G.C. Inorganic Chemistry Vol-I by S.C. Khera , Pragati prakashan .
2. Inorganic Chemistry vol-I by Dr. K.K.Bhasin. Pradeep's Publications, Jalandhar(India).
3. Inorganic chemistry vol-I by Ramesh Kapoor,R.S.Chopra,S.K.Vasisht.R Chand's &Co. publications,New Delhi.
4. Inorganic chemistry vol-I by Jagdamba, Pragati prakashan ,Meerut
5. Inorganic Chemistry –I , Modern Publication

Reference Books:

1. Advanced Inorganic Chemistry, FA Cotton and Wilkinson, John Wiley.
2. Inorganic Chemistry, J.E. Huhey, Harpes & Row.
3. Chemistry of the Elements, N.N. Greenwood and A. Earnshaw, Pergamon

BSP-103-A	Practical Chemistry-I	L	T	P	Cr.
		0	0	3	2

(For B.Sc. General)

LIST OF EXPERIMENTS:

1. To determine the percentage purity of given sample of $MgSO_4 \cdot 7H_2O$. Provided N/20 EDTA solution.
2. To determine the strength of $ZnSO_4 \cdot 7H_2O$ in the given solution Provided approximately N/20 EDTA solution.
3. To determine the % age purity of ferrous sulphate ($FeSO_4 \cdot 7H_2O$) in the given solution of known strength (15 g/L) using standard potassium permanganate solution (M/100).
4. To identify the ions of Co(II) and Ni(II) by means of paper chromatography.
5. To identify chloride, bromide and iodide ions by ascending paper chromatography.
6. To determine the number of molecules of water of crystallization in the given sample of oxalic acid .Provided N/20 $KMnO_4$ solution.
7. You are provided with a solution containing 13.9 gms of green vitriol ($FeSO_4 \cdot xH_2O$) per litre. Determine the value of 'x' in the given sample. Provided approximately N/20 $KMnO_4$ solution.
8. You are provided a mixture of ferrous sulphate and ferric sulphate. Determine volumetrically the percentage composition of the mixture .Given N/20 $KMnO_4$.
9. A given solution contains 20.5 gms of an impure sample of Mohr's salt. Determine volumetrically the percentage purity of the sample. Provided $K_2Cr_2O_7$.
10. To determine the strength of given solution of Mohr's salt, $FeSO_4 \cdot 6H_2O$ by titrating with standard solution of $KMnO_4$.
11. Standardise the given solution of sodium thiosulphate provided solid potassium dichromate.
12. To estimate the total hardness of water by EDTA method.
13. To estimate the total alkalinity in the given sample of water by titrating against standard solution of sulphuric acid using methyl orange as indicator.
14. To determine the strength of the given solution of NaOH by titrating against standard solution of Oxalic acid using phenolphthalein as indicator.

NOTE:

1. Do any eight experiments.
2. The students are required to calculate the error involved in a particular experiment (Percentage error).
3. The practical examination will be held in one session of 3 hours.

DISTRIBUTION OF MARKS:

- External Practical Examination: 30 Marks
- Internal Evaluation: 20 Marks
- **Total: 50 Marks**

Books Suggested:

1. Practical Chemistry B.Sc.part-I by R.L.Madan, Modern Publishers.
2. Practical Engineering Chemistry by Sanjay Sharma, Dhanpat Rai Publications.
3. Unique tablet of practical chemistry for B.Sc. 1st year by Beena Sethi

BSL -104-A	Physical Chemistry	L	T	P	Cr.
		4	0	0	4

(For B.Sc. General)

External marks (Theory) =100

Internal marks (Theory) =50

Section-A

Unit-1

Liquid States:

Intermolecular forces, structure of liquids (a qualitative description), Properties of liquids – surface tension, viscosity and viscosity index, vapour pressure and optical rotations, Structural differences between solids, liquids & gases; liquid crystals: distinction between liquid crystal, solid and liquid; liquid crystal formulation selection, seven segment cell, application of liquid crystals.

Unit-2

Solid States:

Definition of space lattice, unit cell; Laws of crystallography – (i) Law of constancy of interfacial angles, (ii) Law of rationality of indices (iii) Law of symmetry, Symmetry elements in crystals. X-ray diffraction by crystals, Derivation of Bragg equation.

Unit-3

Chemical Kinetics:

Introduction, rate of reaction, factors influencing the rate of a reaction-concentration, temperature, pressure, solvent, catalyst. Order of a reaction, integrated rate expression for zero order, first order, second and third order reactions. Half life period of a reaction. Effect of temperature on the rate of reaction – Arrhenius equation. Simple collision theory.

Section-B

Unit-4

Electrochemistry:

Introduction, electrolytic conduction, factors affecting electrolytic conduction, specific conductance, molar conductance, equivalent conductance. Arrhenius theory of ionization, Ostwald's Dilution Law. Transport number,. Applications of conductivity measurements: determination of degree of dissociation, determination of K_a of acids, determination of solubility product of sparingly soluble salts, Definition of pH and pKa , Buffer solution, Buffer action, Henderson - Hazel equation.

Unit-5

Catalysis:

Characteristics of catalysed reactions, classification of catalysis homogeneous and heterogeneous catalysis, enzyme catalysis, miscellaneous examples.

Unit-6

Colloidal State:

Definition of colloids, classification of colloids; Solids in liquids (sols): properties – kinetic, optical and electrical; stability of colloids, protective action, Hardy Schulze law, gold number. Liquids in liquids (emulsions) : types of emulsions, preparation, Emulsifier, Liquids in solids (gels) : classification.

NOTE:

1. The syllabus is divided into 2 sections comprising three units each. Total seven questions would be set. One question would be compulsory that would comprise all the units. Remaining six questions will be set from both the sections taking three questions from each section. Students need to attempt at least two questions from each section. A student has to attempt five questions in all.
2. 20% numerical problems are to be set.
3. Use of Scientific (non-programmable) calculator is allowed

Books Suggested:

Text Books:

1. U.G.C. Physical chemistry Vol-I by J.N. Gurtu (Gurtu & Gurtu), Pragati Prakashan.
2. U.G.C. Physical chemistry Vol-I by K.N. Gurtu and Amit Khera, Pragati Prakashan, Meerut
3. Physical chemistry, vol-I by Dr.S.K.Kheterpal. Pradeep Publications, Jalandhar (India)
4. Physical Chemistry vol-I by Jagdamba, Pragati Prakashan, Meerut.
5. Physical Chemistry-I, Modern Publication

Reference Books:

1. Chemical Kinetics, K. J. Laidler, McGraw-Hill.
2. Kinetics and Mechanism of Chemical Transformations, J. Rajaraman and J. Kuriacose, McMillan.
3. A Text book on Physical Chemistry 5th Ed., by K.K. Sharma and L.K. Sharma, Vikas publishing House pvt.Ltd.

BSP-104-A	Practical Chemistry-II	L	T	P	Cr.
		0	0	3	2

(For B.Sc. General)

LIST OF EXPERIMENTS:

- To determine the surface tension of a given liquid by drop number method.
- To determine the coefficient of viscosity of the given liquid at room temperature.
- To determine the viscosity and viscosity index of given sample of lubricating oil using Redwood viscometer or Ostwald's viscometer
- To determine the specific refractivity of a given compound using Abbe's refractometer.
- Determination of distribution coefficient of Iodine between carbon tetra chloride and water at room temperature.
- To determine the Flash point and Fire point of a given lubricant by Pensky-Martens apparatus.
- To determine the pH of various water samples and analyse them.
- To determine the pH of an acid (strength of an acid) pH-metrically.
- To determine the strength of given unknown HCl solution by titrating it against standard NaOH solution conductometrically.
- To study the kinetics of hydrolysis of ethyl acetate by HCl at room temperature.
- To determine the equivalent conductivity and dissociation constant of acetic acid (a weak electrolyte).
- To investigate the reaction between acetone and Iodine.
- To determine the solubility of sparingly soluble salt BaSO₄ (Barium Sulphate) in water.

. NOTE:

- Do any eight experiments.
- The students are required to calculate the error involved in a particular experiment (Percentage error).
- The practical examination will be held in one session of 3 hours.

DISTRIBUTION OF MARKS:

- External Practical Examination: 30 Marks
- Internal Evaluation: 20 Marks
- Total: 50 Marks**

Books Suggested:

- Practical Chemistry B.Sc. part-I by R.L.Madan, Modern Publishers.
- Practical Engineering Chemistry By Sanjay Sharma, Dhanpat Rai Publications.
- Unique tablet of practical chemistry for B.Sc. 1st year by Beena Sethi.