

Paper II (Physical & General Chemistry) 60 hrs (4 h / w)

PHYSICAL CHEMISTRY 30 hrs (2h / w)

UNIT-I

Solidstate

10h

Symmetry in crystals. Law of constancy of interfacial angles. The law of rationality of indices. The law of symmetry. Definition of lattice point, space lattice, unit cell. Bravis lattices and crystal systems. X-ray diffraction and crystal structure. Bragg's law. Determination of crystal structure by Bragg's method. Indexing of planes and structure of NaCl and KCl crystals. Defects in crystals. Stoichiometric and non-stoichiometric defects.

UNIT-II

1.Gaseous state

6 h

Compression factors, deviation of real gases from ideal behavior. Vander Waal's equation of state. P-V Isotherms of real gases, Andrew's isotherms of carbon dioxide, continuity of state. Critical phenomena. The vander Waal's equation and the critical state. Law of corresponding states. Relationship between critical constants and vander Waal's constants. Joule Thomson effect.

2.Liquid state

4 h

Structural differences between solids, liquids and gases. Liquid crystals, the mesomorphic state. Classification of liquid crystals into Smectic and Nematic. Differences between liquid crystal and solid/liquid. Application of liquid crystals as LCD devices.

UNIT-III

Solutions

10h

Liquid-liquid - ideal solutions, Raoult's law. Ideally dilute solutions, Henry's law. Non-ideal solutions. Vapour pressure - composition and vapour pressure- temperature curves. Azeotropes-HCl-H₂O, ethanol-water systems and fractional distillation. Partially miscible liquids-phenol-water, trimethylamine-water, nicotine-water systems. Effect of impurity on consulate temperature. Immiscible liquids and steam distillation. Nernst distribution law. Calculation of the partition coefficient. Applications of distribution law.

GENERAL CHEMISTRY 30 hrs (2h / w)

UNIT-IV

1. Surface chemistry

8 h

Definition of colloids. Solids in liquids (sols), preparation, purification, properties - kinetic, optical, electrical. Stability of colloids, Hardy-Schulze law, protective colloid.

Liquids in liquids (emulsions) preparation, properties, uses. Liquids in solids (gels) preparation, uses.

Adsorption: Physical adsorption, chemisorption. Freundlich, Langmuir adsorption isotherms. Applications of adsorption

2. Chemical Bonding

7h

Valence bond theory, hybridization, VB theory as applied to ClF_3 , $\text{Ni}(\text{CO})_4$, Molecular orbital theory - LCAO method, construction of M.O. diagrams for homo-nuclear and hetero-nuclear diatomic molecules (N_2 , O_2 , CO and NO).

UNIT-V

Stereochemistry of carbon compounds

15 h

Molecular representations- Wedge, Fischer, Newman and Saw-Horse formulae.

Optical isomerism: Optical activity- wave nature of light, plane polarised light, optical rotation and specific rotation.

Chiral molecules- definition and criteria (Symmetry elements)- Definition of enantiomers and diastereomers – Explanation of optical isomerism with examples Glycerinaldehyde, Lactic acid, Alanine, Tartaric acid, 2,3-dibromopentane.

D,L and R,S configuration methods and E,Z- configuration with examples.

LABORATORY COURSE -II
Practical-II (At the end of Semester-II)30 hrs (3 h / w)

Qualitative inorganic analysis

40 Marks

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

Anions: Carbonate, sulphate, chloride, bromide, iodide, acetate, nitrate, borate, phosphate.

Cations: Lead, copper, iron, aluminum, zinc, manganese, calcium, strontium, barium, potassium and ammonium.

Record

10 Marks

Total : 50 Marks

List of Text Books

1. Advanced physical chemistry by Gurudeep Raj
2. Advanced physical chemistry by Bahl and Tuli
3. Advanced Inorganic Chemistry Vol-I by Satyaprakash, Tuli, Basu and Madan
4. Stereochemistry by P.S.Kelsi
5. Stereochemistry of Organic compounds by D. Nasipuri
6. Telugu Academy Textbook of Chemistry Vol- I (English medium)
7. Unified chemistry Vol- I by K.Ramarao and Y. R. Sharma (Kalyani Publishers)
8. Unified chemistry Vol- I by O.P.Agarwal

List of Reference Books

1. Principles of physical chemistry by Prutton and Marron
2. Solid State Chemistry and its applications by Anthony R. West
3. Text book of physical chemistry by K L Kapoor
4. Text book of physical chemistry by S Glasstone
5. Stereochemistry of Organic compounds by E L Eliel
6. Advanced Organic Chemistry by F A Carey and R J Sundberg

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13/01

SRI VENKATESWARA UNIVERSITY

Model Question paper for 2nd Semester of B.Sc degree course from the academic year 2015-16

Name of the Subject: CHEMISTRY

Section - I

Answer any **Five** of the following:

1. Write notes on Bravis Lattices
2. Write notes on Joule-Thomson effect.
3. What are liquid crystals? Write any two important applications of them.
4. State and explain Nernst Distribution law
5. Write the difference between physical adsorption and chemical adsorption
6. Explain the structure of Ni(CO)₄ based on Valence Bond Theory
7. What are enantiomers and diastereomers
8. Write notes on Newman Projection formula.

Section - II

Answer **All** the Questions

9. a) Explain the defects in crystals
(OR)
b) State Bragg's law and explain how crystal structure is determined by Bragg's method?
10. a) Deduce the values of Critical constants in terms of Vander waal's constants
(OR)
b) i). Explain smectic liquid crystals.
ii). State and explain law of corresponding states.
11. a) What is critical solution temperature? Explain phenol-water system?
(OR)
b) Explain Henry's law and Azeotropic mixtures with examples.
12. a) Define colloids? Explain different preparatory methods of colloids.
(OR)
b) Derive Langmuir adsorption isotherm.
13. a) Draw the molecular orbital diagrams of O₂ and N₂. Calculate the bond order in these molecules.
(OR)
b) i) Explain E-Z configuration in alkenes
ii) Explain optical isomerism in tartaric acid.

Handwritten notes and diagrams for question 13. It includes a molecular orbital diagram for O₂ and N₂ with labels like σ_{2s} , σ_{2s}^* , σ_{2p} , π_{2p} , π_{2p}^* , σ_{2p}^* and bond order calculations. The date 11.1.16 is written twice.