**Semester – IV**

**COURSE**

CH-202: Physical and Inorganic Chemistry

Section - I (Physical Chemistry)

**XRD pattern of nanocrystalline CdS**

**COURSE SCHEDULE**

**DIVISION A**

Alternate Monday (Time: 1.30 to 2.30 pm)

Every Saturday (Time: 1.30 to 2.30 pm)

Class room: B-304

**DIVISION B**

Every Wednesday (Time: 1.30 to 3.30 pm)

Alternate Monday (Time: 1.30 to 2.30 pm)

Class room: B-305

**COURSE MARKS**

ISA I (ASSIGNMENT) – 10 marks + ISA II (WRITTEN TEST) – 10 marks + SEE – 40 marks

**SYLLABUS**

**SEMESTER – IV**

**CH – 202:Physical and Inorganic Chemistry**

**Section - I (Physical Chemistry)**

**I. Electrochemistry 12 L**

Electrical transport –conduction in metals and in electrolyte solutions, specific conductance and equivalent conductance measurement of equivalent conductance, variation of equivalent and specific conductance with dilution. Migration of ions and Kohlrausch law, Arrhenius theory of electrolyte dissociation and its limitations, weak and strong electrolytes , ostwald’s dilution law its uses and limitations. Debye –Huckel-Onsager’s equation for strong electrolytes (elementary treatment only). Transport number, definition and determination by Hittorf method andmoving boundary method. Applications of conductivity measurements: determination of degree of dissociation, determination of ka of acids , determination of solubility product of a sparingly soluble salt, conductometric titrations .

**II. Solid State 11 L**

Defination of space lattice, unit cell. Laws of crystallography –(i) law of constancy of interfacial angels (ii) law of rationality of indices (iii) law of symmetry elements in crystals. X-ray diffraction by crystals. Derivation of Bragg equation. Determination of crystal structure of NaCl, KCl and CsCl (Laue’s method and powder method).

**III. Colloidal State 07 L**

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, preparation and properties, inhibition, general applications of colloids

**Text Books**

1. P.W. Atkins et al., Physical Chemistry, 7th edition

2. J.D. Lee, Concise Inorganic Chemistry, ELBS Publications, 4th Edition

**Reference Book**s

1. Puri, Sharma, Pathania,Principles of Physical Chemistry by

Vishal Publishing Company, Oxford University Press

2. G. K. Vemulapalli, Physical Chemistry, Prentice Hall India, 1993,

3. Donald McQuarrie, Physical Chemistry

4. Bahl A., Bahl B.S. and Tuli G.D., *Essentials of Physical Chemistry*,S. Chand & Company Ltd., New Delhi, 1st Multicolor Revised Edition, 2009.

5. Raj G., Advanced Physical Chemistry, Goel Publishing House, Meerut, 21st Edition, 1996-97.

**TENTATIVE SCHEDULE FOR SEMESTER IV**

**ACADEMIC YEAR 2015-2016**

**S. Y. B. Sc.**

**(CH - 202: PHYSICAL AND INORGANIC CHEMISTRY)**

**SECTION I**

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| --- | --- | --- | --- |
| **LECTURE NUMBER** | **TOPIC** | **REFERENCE** | PAGE NUMBER |
| 1 | **Colloidal State**Definition of colloids, classification of colloids  | 45 | 807-809933-934 |
| 2 | Solids in liquids (sols): properties –kinetic, optical and electrical | 4 | 815-823 |
| 3 | Stability of colloids,protective action, Hardy- schulze law gold number | 45 | 824-825986-998 |
| 4 | Liquids in liquids (emulsions): types of emulsions, preparation. Emulsifier | 45 | 826-8271011-1015 |
| 5 | Liquids in solids (gels): classification, preparation and properties, inhibition, General applications of colloids | 45 | 828-8311003-1011 |
| 6 | Electrical transport –conduction in metals and in electrolyte solutions | 45 | 860-8641107-1109 |
| 7 | Specificconductance and equivalent conductance measurement of equivalent conductance,variation of equivalent and specific conductance with dilution | 45 | 865-8691110-1115 |
| 8 | Migration of ions and Kohlrausch law | 45 | 884-8981116-1120 |
| 9 | Arrhenius theory of electrolyte dissociation andits limitations | 45 | 883-8841132-1135 |
| 10 | Weak and strong electrolytes | 45 | 871 |
| 11 | Ostwald’s dilution law its uses andlimitations | 45 | 909-9111129-1132 |
| 12 | Debye –Huckel-Onsager’s equation for strong electrolytes  | 45 | 911-9141135-1145 |
| 13 | Transport number, definition and determination by Hittorf method and moving boundary method | 45 | 888-8941179-1190 |
| 14 | Applications of conductivity measurements :determination of degree of dissociation ,determination of ka of acids , determination of solubility product of a sparingly solublesalt, conductometric titrations | 45 | 898-9011118-1120 |
| 15 | Definition of space lattice  | 4 | 447-453 |
| 16 | Unit cell | 4 | 452-456 |
| 17 | Laws of crystallography –(i) law of constancy of interfacial angels(ii) law of rationality of indices (iii) law of symmetry elements in crystals | 4 | 449 |
| 18 | X-ray diffraction by crystals | 4 | 456 |
| 19 | Derivation of Bragg equation | 4 | 456-461 |
| 20 | Determination of crystal structure of NaCl, CsCl, KCl | 4 | 461-464 |

**COURSE OBJECTIVE, INDICATIVE CONTENT AND LEARNING OUTCOMES**

**OBJECTIVE:**

The main objectives of this course is to study

1. Electrolytic conductance, its variation and applications
2. Solid state chemistry, X-ray diffraction, principles and applications
3. Chemistry of colloids, their properties and uses

**INDICATIVE CONTENT:**

The first topic ‘Electrochemistry’ deals with electrolytic conductance, its variation with dilution and theories of electrolytic dissociation. The applications of conductivity measurements form an integral part of this topic.

The second topic ‘Solid State’ deals composition of unit cell, space lattice and laws of crystallography. X ray diffraction method of characterisation of materials is also covered in this topic.

The third topic ‘Colloidal State’ deals with substances in particle size range of 1-100 nm. The topic covers classification, properties and applications of colliods.

**LEARNING OUTCOMES:**

**Upon completion of Course students will be able to**

1. Understand electrolytic dissociation, composition of materials in solid state and properties and applications of colloids

2. Draw conductometric titration graphs

3. Interpret X ray diffraction patterns