**Semester – VI**

**COURSE**

CH-342: Analytical Chemistry

Section - I

**COURSE SCHEDULE**

Every Monday (Time: 9.30 to 9.30 am)

Alternate Friday (Time: 9.30 to 10.30 pm)

Class room: B-206

**COURSE MARKS**

ISA I – 10 marks + ISA II – 10 marks + SEE – 40 marks

**SYLLABUS**

**SEMESTER – VI**

**CH - 342: Analytical Chemistry**

**Section I**

**I. UV-Visible Spectroscopy 12 L**

Interaction of electromagnetic radiation with matter,Quantative calculations- Beer’s and

Lambert’s law. Deviations from Beer’s law

Principles of instrumentation: Sources, monochromators, cells.Types of instruments.

Photoelectric colorimeters:Single & Double beam photoelectric colorimeters;comparison

between colorimeter and spectrophotometer ; applications of colorimetry and/or

spectrophotometry ; quantative analysis; identification of structural groups in a molcule ;

study of co-ordination compound, photometric titrations, cis-trans isomerism; chemical

kinetics & others limitations. *(numerical problems are expected to be solved)*

**II. Chromatographic Methods 18 L**

Principles. Classification of chromatographic techniques

Techniques of column chromatography

Paper and thin layer chromatography:Principles, techniques and applications of

paper and thin layer chromatography.

Theory of chromatographic separation :Distribution Equilibria, Rateof travel,

Retention time, Retention volume and relative retention.

Ion exchange chromatography: Principles, classification of ion exchange

materials, Nature of exchanging ions, Ion exchange capacity, applications in

analytical chemistry.

Gas chromatography and HPLC :

Gas chromatography: Basic principles, Graphic diagram of apparatus, Explanation

of factors affecting separation, Thermal conductivity and Flame ionization

detectors, Identification and estimation of sample components, Applications

GC-MS and HPLC in detail. HPLC: principles equipment for HPLC , applications.

*(Numerical problems are to be solved.)*

**TENTATIVE SCHEDULE FOR SEMESTER VI**

**ACADEMIC YEAR 2015-2016**

**PAPER IV SECTION I (CH - 342: ANALYTICAL CHEMISTRY)**

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| --- | --- | --- | --- |
| **LECTURE NUMBER** | **TOPIC** | **REFERENCE** | **PAGE NUMBER** |
| 1 | **Chromatographic methods**  Principles. Classification of chromatographic techniques | 9 | 75-78 |
| 2 | Techniques of column chromatography | 9 | 78-87 |
| 3 | Paper chromatography: Principles | 9 | 93-94 |
| 4 | Paper chromatography:  Techniques and applications | 9 | 94-100 |
| 5 | Thin layer chromatography.  Principles, Techniques and applications | 9 | 87-93 |
| 6 | Theory of chromatographic separation: Distribution Equilibria, Rate of travel, Retention time, Retention volume and relative retention | 9 | 101-107 |
| 7 | Ion exchange chromatography: Principles, | 9 | 122-123 |
| 8 | Classification of ion exchange materials, Nature of exchanging ions, Ion exchange capacity | 9 | 123-131 |
| 9 | Applications in analytical chemistry. | 9 | 131-137 |
| 10 | Gas chromatography: Basic principles, Graphic diagram of apparatus | 9 | 101-113 |
| 11 | Explanation of factors affecting separation, Thermal conductivity and Flame ionization detectors | 9 | 113-117 |
| 12 | Identification and estimation of sample components, Applications | 9 | 117-121 |
| 13 | GC-MS and HPLC in detail. HPLC: principles equipment for HPLC, applications | 9 | 141-145 |
| 14 | **UV and Visible Spectroscopy**  Interaction of electromagnetic radiation with matter, Quantitative calculations- Beer’s and Lambert’s law | 10 | 131-135 |
| 15 | .Deviations from Beer’s law | 10 | 135-137 |
| 16 | Principles of instrumentation: Sources, monochromators, cells. Types of instruments Photoelectric colorimeters: Single beam photoelectric colorimeters; | 10 | 137-140 |
| 17 | Single beam spectrophotometer | 10 | 141-144 |
| 18 | Double beam spectrophotometer | 10 | 144-146 |
| 19 | comparison between colorimeter and spectrophotometer; | 10 | 147 |
| 20 | applications of colorimetry and/or spectrophotometer; | 10 | 147-152 |
| 21 | quantitative analysis; identification of structural groups in a molecule ; study of co-ordination compound, photometric titrations | 10 | 156-157 |
| 22 | Cis-trans isomerism; chemical kinetics & others limitations. | 10 | 159-160 |
| 23 | Revision |  |  |

**TEXT BOOK**

B.K. Sharma; Instrumental Methods of Chemical Analysis; Goel Publishing House, Meerut

**REFERENCE BOOKS**

1. G. D. Christian; Analytical Chemistry; 5th edition, Wiley publications
2. G. Chatwal and S. Anand; Instrumental Methods of Chemical Analysis; 5th edition (reprint 2003), Himalaya publication
3. B. S. Baliga and A. Zaveri; College Analytical Chemistry; 15th edition, Himalaya Publishing House, 2004
4. Vogel’s Textbook of Quantitative Inorganic Analysis, 4th edition ELBS
5. Willard, Meritt and Dean; Instrumental Methods of Analysis
6. Skoog and Leary; Principles of Analytical Chemistry, 4th International edition
7. P. R. Trivedi and Gurdeep Raj; Environmental Water and Soil Analysis; Akashdeep Publishing House, New Delhi
8. A. K. De, Environmental Chemistry; Wiley Eastern Ltd
9. K. Raghuraman, D.V. Prabhu, C. S. Prabhu, P.A. Sathe; Basic Principle in Analytical Chemistry, 6th edition, Sheth Publishers.
10. K. Raghuraman, D.V. Prabhu, C. S. Prabhu, P.A. Sathe; Basic Principle in Analytical Chemistry, 12th edition, 2008 Sheth Publishers.

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

**OBJECTIVE:**

The main objectives of this course is to study

1. Chromatographic techniques
2. UV and visible spectroscopy

**INDICATIVE CONTENT:**

The first topic ‘Chromatographic techniques’ deals with separation techniques and applications of chromatography.

The second topic ‘UV and visible spectroscopy’ deals with the theory, instrumentation and applications of UV and visible spectroscopy.

**LEARNING OUTCOMES:**

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

1. Understand the principles, techniques and applications of Chromatography
2. Understand principles and applications of UV and visible spectroscopy.