COURSE WISE BREAKUP

Fourth Year Seventh Semester

SPECILIZATION ANALYTICAL CHEMISTRY

THEORY

COURSE CODE	TITLE	CREDIT HOURS	MARKS
CHEM- 411	PAPER-I: ANALYTICAL CHEMISTRY	03	100
CHEM- 412	PAPER-II: ANALYTICAL CHEMISTRY	03	100
CHEM- 413	PAPER-III: ANALYTICAL CHEMISTRY	03	100

PRACTICALS

COURSE CODE	TITLE	CREDIT HOURS	MARKS
CHEM- 411	PAPER-I: ANALYTICAL CHEMISTRY	02	50
CHEM- 412	PAPER-II: ANALYTICAL CHEMISTRY	02	50
CHEM- 413	PAPER-III: ANALYTICAL CHEMISTRY	02	50

- **Total Credits of the Semester = 15 (theory 09 & practicles 06 credits)**
- **Maximum Marks = 450 (theory 300 & practicles 150 marks)**

4th Year; 7th Semester

PAPER-I

Title of the Course: **ANALYTICAL CHEMISTRY** Code: **CHEM-411** Credit Hours: **03** Marks: **100**

Course Contents:

Spectroscopic Methods of Analysis

1. **Molecular Absorption Spectroscopy:**

   Electromagnetic radtions, electionic excitation, absorption by molecules, magnitude of absorption of radiations, instrumentation, various sources of light, filers and monochromators and their efficiency, Detectors, single beam and double beam spectrophotometers. Sources of error and optimum conditions. Analytical applications in quantative analysis of organic, inorganic and Bioanalytical compounds.

2. **Photoluminescence Spectroscopy:**

   Principles of photoluminescence, spectrofluoremetry, and spectrophosphoremetry, excitation and de-excitation processes, variables affecting fluorescence and phosphorescence, measurement of fluorescence, instruments and analytical applications of photoluminescence.

3. **Atomic Absorption Spectroscopy:**

   Basic principle of atomic absorption phenomena, Instrumentation, different light-courses, atomizers, flame and flameless atomizers, photometric system and detectors. Modulation and analytical applications.

4th Year; 7th Semester

PAPER-II

Title of the Course: **ANALYTICAL CHEMISTRY** Code: **CHEM-412** Credit Hours: **03** Marks: **100**

Course Contents:

Electrochemical Methods

1. **Electrode Phenomena:**

   The electrochemical cell, Oxidation and reduction potentiometric methods, various types of electrodes and their use, over potentials, membrane potentials, some well known

Redox reactions of analytical importance, ion-selective electrodes, direct potentiometric measurements, potentiometric titration.

2. Principles of Voltametry

Principles of voltammetry, instrumentation, different modes of Voltametry. Applications for the analyses of inorganic and organic compounds.

4th Year; 7th Semester

PAPER-III

Title of the Course: **ANALYTICAL CHEMISTRY** Code: **CHEM-413** Credit Hours: **03** Marks: **100**

Course Contents:

Emission Spectroscopy and Radiolectrochemical Methods

1. Atomic Emission Spectroscopic Methods

Types of emission spectroscopic techniques. Flamte Emission Spectroscopy: basic principle, instrumentation and applications. Atomic Fluorescence Spectroscopy: basic principle, instrumentation and applications. Plasama Emission Spectroscopy, Inductively Coupled Plasama (ICP) and Direct Current (DC) Plasama, Applications of plasama emission spectroscopy, Comparision of atomic emission spectroscopic techniques.

2. Radiolectrochemical Methods:

Nuclear emissions: alpha particles, beta particles and gama rays. Detectors: Gas ionization, scintillation and semi-conductor detectors. Radiochemical analysis: neutron activation analysis, isotope dilution method, radiometric titrations, radioactive tracers.

4th Year; 7th Semester

PAPER-I

Title of the Practicals: **ANALYTICAL CHEMISTRY** Code: **CHEM-411** Credit Hours: **02** Marks: **50**

1. Calibration of a uv-visible spectrophotometer as per requirements of British Pharmacopoeia
2. Experimental determination of limits of detection and quantitation by use of spectrophotometry

3. Experimental determination of precision, accuracy and specificity
4. Two experiments for quantitative determination of analytes of interest by spectrophotometry
5. Two experiments for quantitative determination of analytes of interest by atomic spectrometry
6. Three experiments based on electrochemical techniques

4th Year; 7th Semester

PAPER-II

Title of the Practicals: **ANALYTICAL CHEMISTRY** Code: **CHEM-412**

Credit Hours: **02** Marks: **50**

4th Year; 7th Semester

PAPER-III

Title of the Practicals: **ANALYTICAL CHEMISTRY** Code: **CHEM-413**

Credit Hours: **02** Marks: **50**

RECOMMENDED BOOKS:

1. Analytical Chemistry by Gary D. Christian; 6th ed. 2004; John Wiley & Sons, Inc.
2. Fundamentals of Analytical Chemistry by Douglas A. Skoog, Donald M. West, F. James Holler, Stanley R. Crouch; 8th ed. 2003; Saunders College Publishing, Philadelphia.
3. Instrumental Methods of Analysis by Hobert H.Willard D.L. Merrit & J.R.J.A. Dean, Frank A. Settle; 7th Sub edition 1988; Wadsworth Publishing Company.
4. British Pharmacopoeia
5. United States Pharmacopoeia
6. Laboratory Manual of Analytical Chemistry by C. Reilly; Allyn and Bacon, London.
7. Quantitative Analysis by W. J. Blaedal and V. W. Medloche; Harper & Row, N. Y.
8. Most of the experiments prescribed can be found on various websites.