THIRD-YEAR OF BACHELOR OF SCIENCE CHEMISTRY (MAJOR) REVISED SYLLABUS ACCORDING TO CBCS NEP2020

COURSE TITLE: **ANALYTICAL CHEMISTRY-II**

SEMESTER-VI

W.E.F. 2025-2026

RECOMMENDED BY THE BOARD OF STUDIES IN CHEMISTRY
AND
APPROVED BY THE ACADEMIC COUNCIL

Devrukh Shikshan Prasarak Mandal's
Nya. Tatyasaheb Athalye Arts, Ved. S. R. Sapre Commerce, and Vid. Dadasaheb Pitre Science College (Autonomous), Devrukh.
Tal. Sangameshwar, Dist. Ratnagiri-415804, Maharashtra, India

Academic Council Item No: 02/2025

Name of the Implementing Institute	:	Nya. Tatyasaheb Athalye Arts, Ved. S. R. Sapre Commerce, and Vid. Dadasaheb Pitre Science College (Autonomous), Devrukh. Tal. Sangameshwar, Dist. Ratnagiri-415804,
Name of the Parent University	:	University of Mumbai
Name of the Programme	:	Bachelor of Science
Name of the Department	:	Chemistry
Name of the Class	:	Third Year
Semester	:	Sixth (VI)
No. of Credits	:	02
Title of the Course	:	Analytical Chemistry-II
Course Code	:	S315CHT
Name of the Vertical in adherence to NEP 2020	:	Elective
Eligibility for Admission	:	Any student admitted to Third Year of B.Sc. Degree Programme in adherence to Rules and Regulations of the University of Mumbai and Government of Maharashtra
Passing Marks	:	40%
Mode of Assessment	:	Formative and Summative
Level	:	5.5
Pattern of Marks Distribution for SEE and CIA	:	40:60%
Status	:	NEP-CBCS
To be implemented from Academic Year	:	2025-2026
Ordinances /Regulations (if any)		

Syllabus for Third Year of Bachelor of Science in Chemistry

(With effect from the academic year 2025-2026)

SEMESTER-VI **Paper No. IV**

Course Title: Analytical Chemistry-II **No. of Credits - 02**

Type of Vertical: Elective-I **COURSE CODE:** S315CHT

Learning Outcomes Based on BLOOM's Taxonomy:

After Completing the Programme, Student will be able to,

Bloom Level	CO No.	Course Outcome
Understand	CO1	understand the composition and methods of analysis of food products and cosmetics
Understand	CO2	Understand the types, mechanism, applications of ion exchange resins and factors affecting ion exchange
Understand	CO3	Understand the theory, principle and instrumentation of TGA and DTA
Apply	CO4	Employ the theory of TGA, DTA for the study of various materials

Syllabus for Third Year of Bachelor of Science in Chemistry

(With effect from the academic year 2025-2026)

SEMESTER-VI **Paper No.– IV**

Course Title: Analytical Chemistry-II **No. of Credits - 02**

Type of Vertical: Elective-I **COURSE CODE:** S315CHT

COURSE CONTENT			
Module No.	**Content**	**Credits**	**No. of Hours**
1	**FOOD AND COSMETICS ANALYSIS AND ION EXCHANGE CHROMATOGRAPHY** **1.1. Food chemistry (5L)** **1.1.1. Food processing and preservation:** Introduction, need, chemical methods, action of chemicals (Sulphur dioxide, boric acid, sodium benzoate, acetic acid, sodium chloride and sugar) and pH control, Physical methods (Pasteurization and Irradiation) **1.1.2. Study and analysis of following food products and detection of adulterants**: 1) Milk: Composition & nutrients, types of milk (fat free, organic and lactose milk), Analysis of milk for lactose by Lane Eynon's Method, adulterants 2) Honey: Composition, Analysis of reducing sugars in honey by Coles Ferricyanide method, adulterants 3) Tea: Composition, types (green tea and mixed tea), Analysis of Tannin by Lowenthal's method, adulterants **1.2. Cosmetics (5L)** 1.2.1. Introduction and sensory properties Study of cosmetic products: 1) Face powder: Composition, Estimation of calcium and magnesium by complexometry 2) Lipstick: Constituents, Ash analysis for water soluble salts: borates, carbonates & zinc oxide 3) Deodorants and Antiperspirants: Constituents, properties, Estimation of zinc by gravimetrically. **1.3 Ion Exchange Chromatography (5L)** 1.3.1. Introduction, Principle. 1.3.2. Types of Ion Exchangers, Ideal properties of resin. 1.3.3. Ion Exchange equilibria and mechanism, selectivity coefficient & separation factor, factors affecting separation of ions. 1.3.4. Ion exchange capacity and its determination for cation and anion exchangers.	01	15

2	**THERMAL METHODS OF ANALYSIS** **2.1. Thermogravimetric Analysis (TGA)** 2.1.1 Introduction to various thermal methods 2.1.2. Principle, Instrumentation-block diagram, thermobalance (Basic components: balance, furnace, temperature measurement and control, recorder) 2.1.3. Thermogram (TG curve) for $CaC_2O_4.H_2O$ and $CuSO_4.5H_2O$ 2.1.4. Factors affecting thermogram-Instrumental factors and Sample characteristics 2.1.5. Applications: Determination of drying and ignition temperature range, Determination of percent composition of binary mixtures. (Estimation of Calcium and Magnesium oxalate) **2.2. Differential Thermal Analysis (DTA):** 2.2.1. Principle**,** Instrumentation, and Reference material used 2.2.2. Differential thermogram (DTA curve) $CaC_2O_4.H_2O$ and $CuSO_4.5H_2O$ 2.2.3. Applications, Comparison between TGA and DTA.	01	15
	Total	**02**	**30**

Access to the Course

The course is available for all the students admitted for Third Year Bachelor of Science.

Methods of Assessment

The assessment pattern would be 40:60, 60% for Semester End Examination (SEE) and 40% for Continuous Internal Assessment (CIA). The structure of the SEE and CIA would be as recommended by the Board of Studies and approved by the Board of Examination and the Academic Council of the college.

References:

1. D. Harvey, Modern Analytical Chemistry, The McGraw-Hill Pub. 1st Edition (2000).
2. H.S. Ray, R Sridhar and K.P. Abraham, Extraction of Nonferrous Metals, Affiliated East-West Press Pvt. Ltd. New Delhi (1985) reprint 2007.
3. G.H. Jeffery, J. Bassett, J. Mendham and R.C. Denney, Vogel's Textbook of Quantitative Chemical Analysis, Fifth edition, ELBS Publication (1996).
4. D.A. Skoog D.M. West and F.J. Holler, Fundamentals of Analytical Chemistry, 7th Edition (printed in India in 2001) ISBN Publication.
5. Analytical Chemistry, J.G. Dick,1973 Tata McGraw Hill Publishing Co. Ltd. New Delhi.
6. Quantitative analysis, Dey& Underwood, Prentice Hall of India, Pvt. Ltd. New Delhi.
7. Fundamentals of Analytical Chemistry, Skoog 8th edition, Saunders college publishing.

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