



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

**COURSE TITLE: DYESTUFF CHEMISTRY
SEMESTER-V
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	:	Fifth (V)
No. of Credits	:	02
Title of the Course	:	Dyestuff Chemistry
Course Code	:	CHVS302
Name of the Vertical in adherence to NEP 2020	:	Vocational Skill Course (VSC)
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	:	Summative at the end of semester
Level	:	5.5
Pattern of Marks Distribution for SEE and CIA	:	100%
Status	:	NEP-CBCS
To be implemented from Academic Year	:	2025-2026
Ordinances /Regulations (if any)		

Nya. Tatyasaheb Athalye Arts, Ved. S. R. Sapre Commerce and Vid. Dadasaheb Pitre Science College, Devrukh (An Autonomous College Affiliated with University of Mumbai)

Syllabus for Third Year of Bachelor of Science in Chemistry

(With effect from the academic year 2025-2026)

SEMESTER-V

Paper No. IV

Course Title: Dyestuff Chemistry

No. of Credits - 02

Type of Vertical: VSC

COURSE CODE: CHVS302

Learning Outcomes Based on BLOOM's Taxonomy:

After Completing the Programme, Student will be able to,

Bloom Level	CO No.	Course Outcome
Understand	CO1	describe the requirements, classes and substrates for dyes.
Understand	CO2	generalize chemical constitution of dyes, optical brighteners, and pigments
Understand	CO3	predict health and environmental hazards of synthetic dyes and their remediation processes
Apply	CO4	prepare and separate the dyes and apply to fabrics by suitable dyeing methods.

Syllabus for Third Year of Bachelor of Science in Chemistry

(With effect from the academic year 2025-2026)

SEMESTER-V

Paper No.– IV

Course Title: Dyestuff Chemistry

No. of Credits - 02

Type of Vertical: VSC

COURSE CODE: CHVS302

COURSE CONTENT			
Module No.	Content	Credits	No. of Hours
1	Introduction to the dye-stuff Industry (30L) 2.1. Introduction to Dyes (2L) - Definition of dyes, requirements of a good dye - Colour, Chromophore and Auxochrome, Solubility, Linearity, Coplanarity, Fastness, Substantivity, Economic viability. 2.2. Natural and Synthetic Dyes (1L) – Definition, examples, Advantages and limitations. 2.3. Substrates for Dyes (3L) Types of fibres – Natural (wool, silk and cotton), Semi-synthetic (Viscose Rayon), Synthetic (Nylon, Polyesters and Polyamides), Blended fabrics. Binding forces of dyes on substrate: ionic forces, covalent linkages, hydrogen bonding, Vander-walls forces 2.4. Classification of dyes based on applications and dyeing methods (4L) Classification of dyes based on applicability on substrates: Acid Dyes, Basic Dyes, Direct Dyes, Azoic Dyes, Mordant Dyes, Vat Dyes, Disperse Dyes, Reactive Dyes (one example of each class). 2.5. Optical Brighteners (2L): General idea, important characteristics of optical brighteners and their important classes (Stilbene, Coumarin) 2.6. Dyeing Methods (4L): Basic Operations involved in dyeing process: i. Preparation of fibres ii. Preparation of dye bath iii. Application of dyes iv. Finishing Dyeing Method of Cotton Fibres: (i) Direct dyeing (ii) Vat dyeing (iii) Mordant dyeing (iv) Disperse dyeing. 2.7. Colour and Chemical Constitution of Dyes (4L) Absorption of visible light, Colour of wavelength absorbed, Complementary colour; Relation between colour and chemical constitution: (i) Armstrong theory; (ii) Witt's Theory; (iii) Valence Bond theory; (iv) Molecular Orbital Theory. 2.8. Unit process and Dye Intermediates (4L) Introduction to primaries and intermediates; Unit processes: definition and brief ideas of below unit processes: (a) Nitration	01	30

	(b) Sulphonation (c) Halogenation (d) Diazotization: (3 different methods & its importance) (e) Ammonolysis (f) Oxidation 2.9. Pigments (3L) Definition of pigments, examples, properties of pigments, difference between dyes and pigments. Definition of Lakes and Toners 2.10. Health and Environmental Hazards of Synthetic Dyes and their Remediation Processes (3L) 3.2.1. Impact of the textile and leather dye Industry on the environment with special emphasis on water pollution 3.2.2. Health Hazards: Toxicity of dyes w.r.t food colours. 3.2.3. Effluent Treatment Strategies: 3.2.3.1. Brief introduction to effluent treatment plants (ETP) 3.2.3.2. <i>Primary Remediation processes:</i> (Physical Processes) Sedimentation, Aeration, Sorption. 3.2.3.3. <i>Secondary Remediation processes:</i> Biological Remediation – Biosorption, bioremediation and biodegradation 3.2.3.4. <i>Chemical Remediation:</i> Oxidation Processes (chlorination), Coagulation-flocculation-Precipitation		
2	Preparation, separation and applications of dyes (30L) 1. Preparation of methyl orange dye (semi-microscale 1.0g) 2. Preparation of Fluorescein 3. Separation of components of natural pigments by paper chromatography (eg: chlorophyll) 4. Separation of components by TLC from a mixture of dyes (safranin-T, Indigo carmine, methylene blue) 5. Preparation of Orange II dye (semi-microscale 1.0g) 6. Application of methyl orange and orange-II dyes for dyeing different fabrics	01	30
	Total	02	60

Access to the Course

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

Methods of Assessment

Practical courses, vocational skill courses, skill enhancement courses and the courses having laboratory sessions shall be assessed at the end of each semester.

References:

1. Chemistry of Synthetic Dyes, Vol I – VIII, Venkatraman K., Academic Press 1972.
2. The Chemistry of Synthetic Dyes and Pigments, Lubs H.A., Robert E Krieger Publishing Company, NY, 1995.
3. Chemistry of Dyes and Principles of Dyeing, Shenai V.A., Sevak Publications, 1973.

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