

Swami Ramanand Teerth Marathwada University,
Nanded



Faculty of Science

B. O. S. IN CHEMISTRY
B. SC. THIRD YEAR (**Dyes and Drugs**)
SEMESTER- V & VI
CBCS Course
Effective from JUNE – 2018

B. Sc. Third Year (Semester V & VI)
Total credits semester V and VI: 12

Semester	Paper No.	Name of the Course	Instruction Hrs/ week	Total period	Internal Evaluation	Marks of Semester	Total Marks	Credits
V	DSECDD I [(Section A) Elective]	Chemistry of Synthetic Dyes - I(P-XII)	03	45	10	40	50	2
	DSECDD I (Section B)	Chemistry of Synthetic Drugs-(P-XIII) B1 OR Natural Dyes For Industrial Applications B2	03	45	10	40	50	2
	DSECDDP-I (DECDD- I & II) (section A)	Practical's based on P-XII & P-XIV (P-XVI)	04	20 Practicals	10	40	50	2
	DSECDD P-II (DSECDD- I & II) (section A)	SEC III (1Skill)			15x3=45			(02)*
VI	DSECDD II (Section A)	Chemistry of Synthetic Dyes - II. (P-IVX)	03	45	10	40	50	2
	DSECDD II [(Section B) Elective]	Unit Operation and Pharmaceutical Dosage forms (P-XV) B1 OR Principles of Drug Design (P-XV) B2	03	45	10	40	50	2
	DSECDDP-III (DSECDD- I & II) (section B)	Practical's based on P-XIII & P-XV (P-XVII)	04	20 Practicals	10	40	50	2
	DSECDDP-IV (section B)	SEC IV			50		50	(02)*
Total credits semester I and II:								12(4)*

Note:

- The syllabus is based on six (3x2) theory periods and four practical periods per batch per week.
- Candidates should require passing separately in theory and practical examination.
- Theory examination 40 marks (30+10 MCQ for each paper).
- Internal evaluation 10 marks (test for assignment and attendance).
- At least twenty practical should be taken: 10 practical from Section A and 10 from Section B.

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Choice Based Credit System (CBCS) Course Structure (New scheme)

B. Sc. Third year (Semester - V)

Semester Pattern effective from -2018

DYES AND DRUGS

DSECDD I (Section-A) (Elective-1)

Chemistry of Synthetic Dyes- I (P-XII)

Credits: 02 Marks: 50

Periods: 45

UNIT I

I. Action of light on dyes and dyed fibres **12 periods**

1. Factors affecting fastness of dyed fibres
 - a. General consideration
 - b. fluorescence, phototropy, mechanism of fading
2. Constitution of dyes and light fastness with respect to Nitro dyes, Azo dyes, basic dyes, sulphur dyes, Indigo dyes, anthraquinones.
3. Light fastness of pigments

UNIT II

I. Disperse dyes: **13 periods**

1. Introduction
2. Ionamines, disperse acetate dyes and solacet dyes
3. Chemical structure of disperse dyes
4. Dispersion process
5. Function of dispersing agents
6. Disperse dyeing process
7. Fiber swelling in dyeing
8. Use of carriers in dyeing
1. Use of heat energy in dyeing.

UNIT III

I. Reactive dyes **10 periods**

1. Introduction
2. Constitutional aspects of reactive dyes (flexibility through chromogen, reactive group)
3. Study of vinyl sulfone dyes, sulphatoethyl sulfone dyes, acryl amide dyes
4. Reactive mordants
5. Cross linkage agents
6. Dyers requirement

UNIT IV

I. Mordant Dyes **10 periods**

1. Introduction
2. Natural mordant dyes
3. Synthetic mordant dyes
4. Methods of application (brief study)
 - a. Chrome mordant process
 - b. After chrome process
 - c. Metachrome process.

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B. Sc. Third year (Semester - V)

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DYES AND DRUGS

DSECDD I (Section-B)

Chemistry of Synthetic Drugs (P-XIII)

Credits: 02 Marks: 50

Periods: 45

UNIT I

I. Cardiovascular drugs :

12 Periods

1) Introduction, classification.

a) Cardiac Glycosides i) Study of Digoxin and Digitoxin, their Mechanism of Action.

b) Antihypertensive and Hypotensive Drugs: synthesis and applications of

i) Hydralaxine ii) Minogdadil iii) Lidocaine iv) Methyl dopa v) Diazoxide

c) Antiarrhythmic Agents, i) Dexpropranolol ii) Procainamide iii) Disopyramide

iv) Propranolol

d) Vasopressor Drugs i) Isoxsupurine ii) Prenylamine

UNIT II

I. Antineoplastic drugs:

08 Periods

1. Introduction

2. cancer causing agents

a. Environmental Risk Factors b. Hereditary Risk Factors

3. cancer chemotherapy. a. Cytotoxic Agents b. Antimetabolites c. Hormones

d. Antibiotics e. Alkaloids f. Miscellaneous Drug

UNIT III

I. Autonomic drugs:

08 Periods

1. Introduction, classification.

a) Sympathomimetic Drugs. b) Antiadrenergic Drugs. c) Cholinomimetic Drugs.

d) Antimuscarinic Drugs. e) Ganglionic Blocking Agents. f) Adrenergic Neurone Blocking Agents.

2. Synthesis and uses of following

a) Ephedrine b) Epinephrine c) Salbutamol d) Propranolol e) Acetylcholine f) Atropine

(Condensation of Tropic Acid and Tropine) g) Mecamylamine and h) Bethanidine UNIT IV

II. Diuretics

10 Periods

a. Introduction b. Classification c. Synthesis and application of the following

i) hlormerodrin ii) Meralluride iii) Chlorothiazide iv) Benzthiazide v) Acetazolamide

vi) Quinethazone vii) Chlortalidone viii) Furosemide

UNIT IV

I. Anti tubercular drugs

07 Periods

Periods

a. Introduction b. Characteristics of antitubercular drugs

c. Synthesis and application of the following

i) p-amino salicylic acid (PAS) ii) Isoniazide iii) Ethambutol iv) Pyrazinamide

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DYES AND DRUGS

DSECDD I (Section-A) (Elective)

Natural Dyes For Industrial Applications (P-XIII)

Credits: 02 Marks: 50

Periods: 45

UNIT I

I. History of natural dyes

10 periods

- a) Promotion of Natural Dyes
- b) Sources of Natural Dyes
- c) Constitutional aspects
- d) Requisites of a True Dye
- e) Types of Dye
- f) Chemical Entities Responsible for Colors
- g) Classification i) Based on Chemical Nature ii) Classification Based on Colors

UNIT II

10 periods

I. Basics of Natural Dyeing

- 1. Advantages of Natural Colors/Vegetable Dyes
- 2. Natural Dyeing Principles
 - a. Nature of Material to be Dyed
 - b. Measurements of Mordants and Dyestuffs
 - c. Temperature
 - d. Agitation
 - e. Wet Fibers Look Darker
 - f. Rinsing

UNIT III

10 periods

Natural Colorants in Textile Dyeing

- 1 Introduction
- 2 Reasons for Natural Coloration
- 3 Dyeing Technology a) Mordanting b) Standardization of the Coloration Process c) Mixtures of Plant Material

UNIT IV

I. Natural Dyes on an Industrial Scale

15 periods

- a) Hank Dyeing of Woolen Yarn and Production of Woolen Caps
- b) Dyeing of Cones in a Yarn Dyeing Machine
- c) Dyeing of Cotton Fabric on a Jet Dyeing Machine
- d) Dyeing of Cotton Fabric on a Jig Dyeing Machine
- e) Fabric Dyeing on a Garment Dyeing Machine
- f) Dyeing of Polyamide Tights in a Paddle Dyeing Machine

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DYES AND DRUGS
DSECDD II (Section-A)
Chemistry of Synthetic Dyes- II (P-XIV)

Credits: 02 Marks: 50

Periods: 45

UNIT I

- I. Sulfur dyes** **13 periods**
1. Introduction
 2. Classification of sulphur dyes on the basis of colour and application
 3. Condition of thionation
 4. General properties and application of sulphur dyes.
 5. Fastness properties of sulphur dyes
 6. Sulphur side chain in sulphur dyes
 7. Carbon-carbon linkage in sulphur dyes

UNIT II

- I. Fluorescent brightening agents** **10 periods**
2. Introduction
 3. Fluorescence, mechanism of fluorescence
 4. Characteristic properties of fluorescent brightening agents.
 5. Fluorescent brighteners for
 - a. cellulosic fibers
 - b. acrylic fibers
 6. Toxicity of fluorescent brightener.

UNIT III

- I. Identification and Evaluation of dyes:** **12 periods**
1. Identification and purification of commercial dyes
 2. Separation of azo, basic and vat dyes
 3. Evaluation of dyes by
 - a) chemical analysis
 - b) colorimetry,.
 - c) Experimental dyeing.

UNIT IV

- I. Application of Chromatography technique in analysis of dyes:** **10 periods**
1. Concept of chromatography
 2. Types of chromatography
 - a. Adsorption chromatography
 - b. Partition chromatography
 - i) Paper chromatography
 - ii) Thin layer chromatography
 3. Chromatography of Dyes

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B. Sc. Third year (Semester - VI)
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DYES AND DRUGS
DSECDD II (Section-B)

Unit Operation and Pharmaceutical Dosage forms (P-XV)

Credits: 02 Marks: 50

Periods: 45

UNIT I

Material used for pharmaceutical plant construction **06 Periods**

1. Factors affecting the selection of material for pharmaceutical plant construction
2. Metallic and non metallic materials used for construction of pharmaceutical plant:

a) Metallic materials: Cast Iron, Steel, Copper, Aluminium, Chromium, Nickel, Silver, Lead, and tin.

b) Non-metallic materials: i) Inorganic: Glass, stonewares, bricks, concrete, asbestos. ii) organic: Timber, rubber, plastic.

UNIT II

Principles of Unit operation **10 Periods**

1. Introduction, need for preparation of drugs on large scale
2. Concept of unit operation, basis of study of unit operation.
3. Fluid flow properties, mechanism of fluid flow by Reynold's experiment
 - a. Significance of Reynold's number, distribution of velocities of fluid across a tube, boundary layers.
4. Heat transfer: properties of steam, use of steam on heating medium

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UNIT III

Modes of Unit operation **12 Periods**

- a. **Distillation** : Principles of simple fractional distillation, molecular distillation types of fractionating column.
- b. Size reduction: objectives of size reduction and significance of particle size factors affecting size reduction, mechanism size reduction, methods of size reduction.
- c. **Crystallization**: Introduction, types of crystallizers
- d. **Mixing** : concept, objectives of mixing types of mixing.
- e. **Drying** : Types of dryers, dryers for dilute solution and suspension, construction, working advantages disadvantages of drum and spray dryers.

UNIT IV

Pharmaceutical Dosage forms

I. Principles of Drug Formulations: **5 Periods**

1. Introduction to drug formulation.
2. Principal pharmaceutical ingredients used in drug formulation
3. General consideration in drug product formulation.

II. Preparation of dosage forms: **12 Periods**

1. Solvents for oral preparation, Preparation of
 - a. Potassium iodide solution b. Strong Iodine solution c. Magnesium citrate and citric acid oral solution
2. **Syrups**: components of syrups, different methods of preparation of syrups:

acacia, cocoa, simple syrup, ferrous sulphate.

3. **Elixirs**: Introduction, preparation of medicated and non-medicated elixiers.
4. **Suspensions**: Preparation of antacid, antihelminthic antibacetiral suspension.
5. **Emulsions** : Methods of prepration of emulsion.
6. **Tablets**: Methods of preparation of tablets.

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B. Sc. Third year (Semester - VI)
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DYES AND DRUGS
DSECDD II (Section-B) (Elective)
Principles of Drug Design (P-XV)

Credits: 02 Marks: 50

Periods: 45

UNIT I

I. A Rational Approach to Drug design

8 periods

1. Introduction
2. Analogues and Prodrugs
3. Concept of Lead
4. Factors Governing Drug-Design
5. Rational Approach to Drug-Design
 - a). Quantum Mechanical Approach
 - b) Molecular Orbital Approach
 - c) Molecular Connectivity Approach

UNIT II

Method of Drug design

10 periods

1. Drug-Design : The Method of Variation
 - a) Drug Design Through Disjunction
 - b) Drug Design Through Conjunction
2. Drug Design and Development:
3. Molecular Hybridization
4. Rigidity and Flexibility Vs Drug Design
5. Tailoring of Drugs

UNIT III

Physical-Chemical Factors and Biological Activities

15 periods

1. Introduction
2. Physical Properties
 - a) Features Governing Drug Action in Active Site
 - b). Structurally Specific and non-Specific Drugs
 - c) Meyer-Overton and Meyer-Hemmi Theory
 - d) Ferguson's Theory
 - e) Van der Waal's Constants
- 3) Factors Governing Ability of Drugs to Reach Active Site
 - a) Absorption
 - b) Distribution
 - c) Metabolism (Biotransformation)
 - d) Excretion
- 4) Isosterism and Bio-Isosterism
- 5) Stereochemistry and Drug Action
- 6). Conformationally Flexible to Conformationally Rigid Molecule
7. Chemical Properties

UNIT IV

15 periods

Molecular Modeling and Drug Design

1. Introduction
2. Methodologies : Molecular Modeling
3. Known Receptor Sites
 - a) 3D Structure of Macromolecular Targets
 - b) Structure-Based Drug-Design
 - c) Ligand Receptor Recognition
 - d) Active Site for a Target Molecule
 - e) Meaning of Site
 - f) Characterization of Site
 - g) Hydrogen Bonding and Other Group Binding Sites
 - h) Electrostatic and Hydrophobic Fields
4. Design of Ligands
 4. Unknown Receptor Sites
 - a) Pharmacophore Vs Binding-site Models
 - b) Pharmacophore Models
 - c) Binding-Site Models

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DYES AND DRUGS

Practical paper DSECDDP I (Section-A) (P-XVI)

Credits: 02

Marks: 50

(Any sixteen experiments are to be covered)

- i. Preparation of Dyes (any three)
 - a. Phenyazo- β -naphthol
 - b. Magneson II
 - c. Chrysoidine
1. Estmation of Dyes by reduction method using Titanu chloride (any Five)
 - a. Indigo carmine
 - b. Amarnath
 - c. Crystal Violet
 - d. Eosine
 - e. Methylene Blue
 - f. Malachite Green
2. Estmation of coupling component by Diazonium salt solution (any Four)
 - a. R-Acid
 - b. B-Naphthol
 - c. Resorcinol
 - d. J-acid
3. Chomatography
 - a. Separation of given mixture by Thin layer Chromatography (Two Mixture)
 - b. Separation of given mixture by Paper Chromatography (Two Mixture)
 - c. Separation of given mixture by Column Chromatography (Two Mixture)
4. Separation of Azo, Basic and Vat dyes by chemical method (Two Mixture)

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DYES AND DRUGS

Practical paper DSECDDP III (Section-B) (P-XVII)

Credits: 02

Marks: 50

(Any sixteen experiments are to be covered)

1. To determine percentage purity of calcium gluconate in a given drug by complexometric titration

2 Assay of ascorbic acid as a given drugs.

3. Assay of isoniazide in a given drug.

4. Assay of Chloroquine in a given drug

5. Assay of Riboflavin in a given drug

6. Formulations: Preparation of representative examples of drugs in the following

forms (Any seven)

i) Glycerines: - Borax glycerine, Phenol

ii) Syrups Simple syrup by IPS USP. - Lemon syrup

iii) Oral solution -Sodium citrate and citric acid solution,
KI oral solution .strong iodine solution

iv)Emulsion - Cod liver oil emulsion, Turpentine Emulsion, Castor
oil emulsion, Acacion emulsion

v) Lotions - Calamine lotion, Zinc sulphate lotion

vi) Ointments - Simple ointment, Sulphur ointment

vii) Elixirs _ Simple elixi

viii) Ear Drops _H₂O₂ ear drops, sodium bicarbonate ear drops

7. Preparation of granules of different powder drugs (Two drugs).

8 Determination of refractive index of following drugs by refractometer

a. Methyl salicylate

b. Eugenol

c. Cinnamon Oil

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Choice Based Credit System (CBCS) Course Structure

B. Sc. Third year (Semester- V)

Semester Pattern effective from June -2018

DYES AND DRUGS

Skill Enhancement Course (III) DSECDDP II (Section-A)

CHEMISTRY OF DYE (02 credits)

Basic Concept of Dyes Color Relation Between Color and Constitution Characterization of Natural Dyes Solubility Studies

1. Thin Layer & Column Chromatographic Studies (activity)
2. Ultra Violet-visible Spectrophotometric Studies (activity)
3. Fourier Transform Infra-red Studies (activity)
4. High Performance Liquid Chromatographic Studies
5. Gas Chromatography studies
6. Mass Spectro-photometric Studies
7. Mordants used in Dyeing (activity)
8. Mordant Tannins and Tannic Acid (activity)
9. Metal Salts or Metallic Mordants Oil (activity)
10. Mordants Techniques used for Dyeing (activity)
11. Mechanism of Dyeing Fastness Properties
12. Fastness Properties of Dyed Materials

OR

Photographic Dyes (02 credits)

I. Cyanine Dyes

- a) Introduction
- b) Fundamental Aspects
- c) Application of Sensitizing Dyes
- d) Production of Sensitizing Dyes
- e) Cyanine Dyes as Sensitizers (activity)

II. Merocyanine Dyes

III. Oxonol Dyes

IV. Azomethine and Indoaniline Image Dyes

- a) Introduction
- b) Color Developers
 - i) Yellow Azomethine Dyes (activity)
 - ii) Magenta Azomethine Dyes (activity)

V. Cyan Indoaniline Dyes

VI. Azo Dyes (activity)

VII Diffusion-Transfer Imaging Systems

VIII. Silver Dye Bleach Processes (activity)

IX. Color Masking (activity)

- a) Metallized Dyes
- b) Xanthene Dyes
- c) Triarylmethane Dyes
- d) Anthraquinone Dyes

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Choice Based Credit System (CBCS) Course Structure

B. Sc. Third year (Semester- VI)

Semester Pattern effective from June -2018

DYES AND DRUGS

Skill Enhancement Course (IV) DSECDDP IV (Section-B)

Study Expectorants and Antitussives (02 credits)

1. Introduction
2. Classification
 - a) Sedative Expectorants
 - b) Stimulant (Irritant) Expectorants
 - c) Centrally Acting Antitussive Agents
3. Synthesis*/study and use and mechanism of action of following
 - a) Noscapine
 - b) cetylcysteine*
 - c) Bromhexine
 - d) Ammonium Chloride
 - e) pectacuanha
 - f) Cocillana
 - g) Potassium Iodide
 - h) Creosote*
 - i) Eucalyptol
 - j) Terpin Hydrate
 - k) Sulfogaiacol*
 - l) Benzonatate
 - m) Carbetapentane*
 - n) Dextromethorphan
 - o) Levopropoxyphene*

Students are expected to perform Minimum six activities (Preparation)

OR

Study of Antiviral Drugs (02 credits)

1. Introduction
 - a) Replication and Transformation
2. Classification
 - a) Substances that Inhibit Early Stages of Viral Replication
 - b) Substances that Interfere with Viral Nucleic Acid Replication
 - c). Substances that Affect Translation on Cell Ribosomes
3. Synthesis*/study and use and mechanism of action of following
 - a) Amantidine*
 - b) Idoxuridine*
 - c) Acyclovir
 - d) Vidarabine
 - e) Ribavirin
 - f) Methisazone
 - g) Arildone

Students are expected to perform Minimum six activities (Preparation of charts on mechanism of action)

Reference Books:

1. The Chemistry of Synthetic Dyes Vol I and II By K. Venkataraman
2. Synthetic Dyes By Rajbir Singh
3. Synthetic Dyes by Dr. Gurdeep R. Chatwal
4. Synthetic Dyes by M.S. Yadav
5. Dyes and their Intermediates by Chatwal.
6. Introduction to the Chemistry of Dyestuffs by V.A. Shenai,
7. Dyes and Dyeing by Charles E. Pellow;
8. Handbook on Natural Dyes for Industrial Applications by Dr. Padma S Vankar (Author)
9. Fundamental Processes of Dye Chemistry by Fierz-David.
10. Handbook of Natural Colorants by Thomas Bechtold and Rita Mussak
11. Synthetic Drugs By Rajbir Singh
12. Synthetic Drugs by Dr. Gurdeep R. Chatwal
13. Synthetic Drugs by S.K. Agarwal Publisher
14. Principles of Organic Medicinal Chemistry by Rama Rao Nadendla
15. Practical Pharmaceutical Chemistry – I By Dr. A. V. Kasture, Dr. S. G. Wadodkar, Mr. S. B. Gokhale
16. Vogel's Textbook of Practical Organic Chemistry
17. British Pharmacopea
18. Indian Pharmacopea
19. Pharmacology and pharmacotherapeutics : Satoskar and Bhandarkar
20. Practical Pharmaceutical chemistry A.H. Beckett and J.B. Stelnake