

**R.P. Gogate College of Arts & Science
&
R.V. Jogalekar College of Commerce,
(Autonomous) Ratnagiri**



**Syllabus for
T.Y.B.Sc.
Chemistry
(Applied Component)
Drugs & Dyes
Semester V & VI
Under Choice Based Credit System
(CBCS)**

With Effect from Academic Year 2023-2024

Revised Scheme of Examination
Faculty of Science
(Under-graduate Programmes)
Choice Based Credit System (CBCS)
Scheme of Examination
Bachelor of Science (B.Sc.) Programme

The performance of the learners shall be evaluated into two parts. The learner's performance shall be assessed by Internal Assessment with 40% marks and by conducting the Semester End Examinations with 60% marks. The allocation of marks for the Internal Assessment and Semester End Examinations are as shown below-

A) Internal Assessment: 40 % (40 Marks)

Sr. No.	Particulars	Marks
01	One Periodical Class Test / Written objectives / Assignments/ Short answer Questions / Seminar to be conducted in the given semester.	30
02	Active participation in routine class instructional deliveries and overall conduct as a responsible learner, mannerism and articulation and exhibit of leadership qualities in organizing related academic activities.	10

B) Semester End Examination: 60% (60 Marks)

60 Marks per paper Semester End Theory Examination:

1. Duration - These examinations shall be of two hours duration.
2. Theory question paper pattern:
 - a. There shall be 04 questions each of 12 marks on each unit and one question of 12 marks on all units.
 - b. All questions shall be compulsory with internal choice within the questions.

Standard of Passing

The learner to pass a course shall have to obtain a minimum of 40% marks in aggregate for each course where the course consists of Internal Assessment & Semester End Examination. The learner shall obtain minimum of 40% marks (i.e. 16 out of 40) in the Internal Assessment and 40% marks in Semester End Examination (i.e. 24 out of 60) separately, to pass the course and minimum of Letter Grade "P" in the project component, wherever applicable to pass a particular semester. A learner will be said to have passed the course if the learner passes the Internal Assessment & Semester End Examination together.

**Performance Grading:
Letter Grades and Grade Points**

Semester GPA/ Program CGPA Semester/Program	% of Marks	Alpha-Sign / Letter Grade Result
9.00-10.00	90.0 -100	O (Outstanding)
$8.00 \leq 9.00$	$80.0 \leq 90.0$	A+ (Excellent)
$7.00 \leq 8.00$	$70.0 \leq 80.0$	A (Very Good)
$6.00 \leq 7.00$	$60.0 \leq 70.0$	B+ (Good)
$5.50 \leq 6.00$	$55.0 \leq 60.0$	B (Above Average)
$5.00 \leq 5.50$	$50.0 \leq 55.0$	C (Average)
$4.00 \leq 5.00$	$40.0 \leq 50.0$	P (Pass)
Below 4.00	Below 40	F (Fail)
Ab (Absent)	-	Absent

Syllabus for B.Sc. Chemistry from the year 2023-24

Name of the Course	B.Sc.
Course Code	USACDD501
Class	T.Y. B.Sc.
Semester	V
No of Credits	02
Nature	Theory
Type	AC
Highlight revision specific to employability/ entrepreneurship/ skill development (if any) 100 words	-----

Course Code: USACDD501

Nomenclature: Drugs and Dyes

Course Outcomes: On completing the course, the student will be able to:

CO1 : To get comprehensive information about classification, nomenclature and various routes of drug administration.

CO2 : To study the synthesis of different drug intermediates and drugs.

CO3 : To familiarize with the mode of actions of drugs.

CO4 : To be exposed to the applications of analgesics, antipyretics, antidiabetic, anti-inflammatory drugs etc.

CO5 : To study the concept of dyes, its property and nomenclature dyes.

CO6 : To study the concept of natural and synthetic dyes.

CO7 : To familiarize with the types of fibers, application of dyes and how the dyes are attached to them.

CO8 : To study the concept of optical brighteners and their classes.

CO9 : Learn Witt's theory and complementary colour theory.

CO10: To study the relation between colour and chemical compounds.

CO11: To get insight into various commercially important processes such as nitration, sulphonation and diazotization etc.

CO12: To study the synthesis of Dyes intermediate.

Curriculum:

Unit	Title	Learning Points	No of Lectures
I	General Introduction to Drugs	<p>1.1 General Introduction to Drugs (8L) 1.1.1 Definition of a drug, sources of drugs, requirements of an ideal drug, classification of drugs (based on therapeutic action), 1.1.2 Nomenclature of drugs: Generic name, Brand name, Systematic name 1.1.3 Definition of the following medicinal terms: Pharmacon, Pharmacology, Pharmacophore, Prodrug, Half-life efficiency, LD₅₀, ED₅₀, GI₅₀ Therapeutic Index. 1.1.4 Brief idea of the following terms: Receptors, Agonists, Antagonists, Drug-receptor interaction, Drug Potency, Bioavailability, Drug toxicity, Drug addiction, Spurious Drugs, Misbranded Drugs, Adulterated Drugs, Pharmacopoeia.</p> <p>1.2 Routes of Drug Administration and Dosage Forms (3L) 1.2.1 Oral and Parenteral routes with advantages and disadvantages. 1.2.2 Formulations & combination formulation, Different dosage forms (including Patches & Adhesives, emphasis on sustained release formulations and enteric coated tablets).</p> <p>1.3 Pharmacodynamic agents: A brief introduction of the following pharmacodynamic agents and the study with respect to their chemical structure, chemical class, therapeutic uses, and side effects. 1.3.1 CNS Drugs: (4L) Classification based on pharmacological actions: CNS Depressants & CNS Stimulants. Concept of sedation and hypnosis, anaesthesia.</p> <ul style="list-style-type: none"> • Phenytoin (Hydantoin) • Trimethadione (Oxazolidinediones) (Synthesis from acetone) • Alprazolam (Benzodiazepines) • Levetiracetam (Pyrrolidines) • Amphetamine (Phenethylamine) (Asymmetric synthesis from phenyl acetic acid) • Chlorpromazine (Phenothiazines) 	15L
II	Analgesics, Antipyretics and Anti-inflammatory Drugs.	<p>2.1 Analgesics, Antipyretics and Anti-inflammatory Drugs. (4L) 2.1.1 Analgesics and Antipyretics</p> <ul style="list-style-type: none"> • Morphine (Phenanthrene alkaloids) • Tramadol (Cyclohexanols) (Synthesis from salicylic 	15L

		<p>acid)</p> <ul style="list-style-type: none"> Aspirin (Salicylates) Paracetamol (p-Amino phenols) <p>2.1.2 Anti-inflammatory Drugs Mechanism of inflammation and various inflammatory conditions.</p> <ul style="list-style-type: none"> Steroids: Prednisolone, Betamethasone Sodium Diclofenac, Aceclofenac (N- Aryl anthranilic acids) (Synthesis from 2,6-dichlorodiphenyl amine) <p>2.2 Antihistaminic Drugs (2L)</p> <ul style="list-style-type: none"> Diphenhydramine (Ethanol amines) Cetirizine (Piperazine) (Synthesis from 4-Chlorobenzhydryl chloride) Chlorpheniramine maleate (Ethyl amines) Pantoprazole (Benzimidazoles) <p>2.3 Cardiovascular drugs (3L) Classification based on pharmacological action</p> <ul style="list-style-type: none"> Isosorbide dinitrate (Nitrates) Valsartan (Amino acids) (structure not expected) Atenolol (Aryloxy propanol amines) (Synthesis from 3-Hydroxy phenyl acetamide) Amlodipine (Pyridines) Frusemide /Furosemide (Sulfamoyl benzoic acid) Rosuvastatin (Pyrimidine) <p>2.4 Antidiabetic Agents (2L) General idea and types of diabetes; Insulin therapy</p> <ul style="list-style-type: none"> Glibenclamide (Sulphonyl ureas) Metformin (Biguanides) Dapagliflozin (Pyranose) Pioglitazone (Thiazolidinediones) (Synthesis from 2-(5-ethylpyridin-2-yl) ethanol) <p>2.5 Antiparkinsonism Drugs (2L) Idea of Parkinson's disease.</p> <ul style="list-style-type: none"> Procyclidine hydrochloride (Pyrrolidines) Ethopropazine hydrochloride (Phenothiazines) Levodopa (Amino acids) (Synthesis from Vanillin) <p>2.6 Drugs for Respiratory System (2L) General idea of: Expectorants; Mucolytes; Bronchodilators; Decongestants; Antitussives</p> <ul style="list-style-type: none"> Ambroxol (Cyclohexanol) (Synthesis from paracetamol) Salbutamol (Phenyl ethyl amines) Oxymetazoline (Imidazolines) Codeine Phosphate (Opiates) 	
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III	Introduction to the dye-stuff Industry	<p>3.1 Introduction to the dye-stuff Industry (5L)</p> <p>3.1.1 Dyes Definition of dyes, requirements of a good dye i.e. Colour, Chromophore and Auxochrome, Solubility, Linearity, Coplanarity, Fastness, Substantivity, Economic viability. Definition of fastness and its properties and Mordants with examples Explanation of nomenclature or abbreviations of commercial dyes with at least one example suffixes – G, O, R, B, K, L, C, S H, 6B, GK, 6GK, Naming of dyes by colour index (two examples) used in dye industries.</p> <p>3.1.2 Natural and Synthetic Dyes Natural Dyes: Definition and limitations of natural dyes. Examples and uses of natural dyes w.r.t Heena, Turmeric, Saffron, Indigo, Madder, Chlorophyll –names of the chief dyeing material/s in each natural dye [structures not expected], Synthetic dyes: Definition of synthetic dyes, primaries and intermediates. Important milestones in the development of synthetic dyes -Emphasis on Name of the Scientist, dyes and the year of the discovery is required. (structure is not expected)</p> <p>3.2 Substrates for Dyes : Types of fibres (3L)</p> <p>3.2.1 Natural: cellulosic and proteinaceous fibres, examples – wool, silk and cotton structures and names of dyes applied on each of them.</p> <p>3.2.2 Semi – synthetic: definition and examples [structures not expected]</p> <p>3.2.3 Synthetic: Nylon, Polyesters and Polyamides structures and names of dyes applied on each of them</p> <p>3.2.4 Blended fabrics: definition and examples [structures not expected]</p> <p>3.2.5 Binding forces of dyes on substrate: ionic forces, covalent linkages, hydrogen bonding, vander-walls forces</p> <p>3.3 Classification of dyes based on applications and dyeing methods (7L)</p> <p>3.3.1 Dyeing methods Basic Operations involved in dyeing process: i. Preparation of fibres ii. Preparation of dyebath iii. Application of dyes iv. Finishing Dyeing Method of Cotton Fibres: (i) Direct dyeing (ii) Vat dyeing (iii) Mordant dyeing (iv) Disperse dyeing</p> <p>3.3.2 Classification of dyes based on applicability on substrates (examples with structures) (a) Acid Dyes- Orange II, (b) Basic Dyes-methyl violet, (c) Direct cotton Dyes- Benzofast Yellow 5GL (d) Azoic Dyes – Diazo components; Fast yellow G, Fast</p>	15L
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		<p>orange R.</p> <p>Coupling components. Naphthol AS, Naphthol ASG (e) Mordant Dyes-Eriochrome Black A, Alizarin. (f) Vat Dyes- Indanthrene brown RRD, (g) Sulphur Dyes- Sulphur Black T (no structure) (h) Disperse Dyes-Celliton Fast brown 3R, (i) Reactive Dyes- Cibacron Brilliant Red B,</p> <p>3.3.3 Optical Brighteners: General idea, important characteristics of optical brighteners and their classes [Stilbene, Coumarin, Heterocyclic vinylene derivatives, Diaryl pyrazolines, Naphthylamide derivatives] general structure of each class.</p>	
IV	Colour and Chemical Constitution of Dyes	<p>4.1 Colour and Chemical Constitution of Dyes (4L) 4.1.1 Absorption of visible light, Colour of wavelength absorbed, Complementary colour. 4.1.2 Relation between colour and chemical constitution.</p> <ol style="list-style-type: none"> i. Armstrong theory (quinonoid theory) and its limitations. ii. Witt's Theory: Chromophore, Auxochrome, Bathochromic & Hypsochromic Shift, Hypochromic & Hyperchromic effect iii. Valence Bond theory, comparative study and relation of colour in the following classes of compounds/dyes: Benzene, Nitrobenzene, Nitroanilines, Nitrophenols, Benzoquinones, Azo, Triphenyl methane, Anthraquinones. iv. Molecular Orbital Theory. <p>4.2 Unit process and Dye Intermediates 4.2.1 A brief idea of Unit Processes (3L) Introduction to primaries and intermediates Unit processes: definition and brief ideas of below unit processes: (a) Nitration (b) Sulphonation (c) Halogenation (d) Diazotization: (3 different methods & its importance) (e) Ammonolysis (f) Oxidation NB: Definition, Reagents, Examples of each unit processes mentioned above with reaction conditions (mechanism is not expected)</p> <p>4.2.2 Preparation of the Following Intermediates (8L) Benzene derivatives: Benzenesulphonic acid; 1,3-Benzenedisulphonic acid; sulphanilic acid; o-, m-, p-chloronitrobenzenes; o-, m-, p-nitroanilines; o-, m-, p-phenylene diamines; Naphthol ASG Naphthalene Derivative: Schaeffer acid; Tobias acid; Naphthionic acid; N.W. acid; cleve-6-acid; H-acid; Naphthol AS Anthracene Derivative: 1-Nitroanthraquinone; 1-Aminoanthraquinone Anthraquinone-2-sulphonic acid; Benzanthrone.</p>	15L

References:

Units I & II

1. Foye's principles of medicinal chemistry. 6th Edition, Edited by Davis William & Thomas Lemke, Indian edition by B I Publication Pvt Ltd, Lippincott Williams & Wilkins.
2. Text book of organic medicinal & pharmaceutical chemistry. Wilson & Gisovolds, 11th Edition by John H Block, John M Beale Jr.
3. Medicinal chemistry. Ashutosh Kar, New Age International Pvt. Ltd Publisher. 4th edition.
4. Burger's Medicinal Chemistry, Drug Discovery and Development. Abraham and Rotella. Wiley.
5. Medicinal chemistry. Ashutosh Kar, New Age International Pvt. Ltd Publisher. 4th edition.
6. Medicinal chemistry. V.K. Ahluwalia and Madhu Chopra, CRC Press.
7. Principle of medicinal chemistry. Vol 1 & 2 S. S. Kadam, K. R. Mahadik, K. G. Bothara
8. The Art of Drug synthesis. Johnson and Li. Wiley, 2007.
9. The organic chemistry of drug design & drug action. 2nd ed. By Richard B Silvermann, Academic Press.
10. The Organic Chemistry of Drug Synthesis. Lednicer and Mitscher, Wiley.

Units III & IV:

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

Evaluation Pattern:**A) Continuous Evaluation (40%) : 40 Marks**

Sr. No.	Particulars	Marks
01	Unit Test (MCQ / Descriptive – Based on Theory and/or Problems - Online/Offline – 1 unit test of 20 marks / 2 unit tests of 10 marks each .	20
02	Assignment / seminar / class test / worksheets	10
03	Active participation in routine class instructional deliveries and overall conduct as a responsible learner, mannerism and articulation and exhibit of leadership qualities in organizing related academic activities	10
Total Marks		40

B) Semester End Evaluation (Paper Pattern) (60 Marks – 2 hours): 60 Marks**Guidelines for paper pattern for Semester End Evaluation:**

1. As far as possible, one fifth weightage of the total should be given to numerical examples in above paper pattern.
2. All questions will be compulsory and may be divided into sub-questions.
3. Descriptive type of questions, derivation-based questions, problem solving/ numerical based questions, etc., will contain internal options.
4. Question Number one consist of MCQs, fill in the blanks, match the following, true or false, etc., type of questions.

Question Number	Unit	Marks
1	I	12
2	II	12
3	III	12
4	IV	12
5	I, II, III, IV	12

CIE/ Internal	Semester End	Total Marks
40	60	100

Syllabus for B.Sc. Chemistry from the year 2023-24

Name of the Course	B.Sc.
Course Code	USACDD5P1
Class	T.Y. B.Sc.
Semester	V
No of Credits	02
Nature	Practical
Type	AC
Highlight revision specific to employability/ entrepreneurship/ skill development (if any) 100 words	-----

Course Code: USACDD5P1

Nomenclature: Drugs and Dyes Practical

Course Outcomes: On completing the course, the student will be able to:

- CO1 : Will gain hands on experience to synthesise aspirin.
- CO2 : To get quantitative determination of drug ibuprofen.
- CO3 : To learn estimate acid neutralizing capacity of an antacid.
- CO4 : Independently separates natural pigments by paper chromatography.
- CO5 : To study methylation of beta naphthol.
- CO6 : To introduce students to synthesis of a commercial dye.
- CO7 : Independently separate mixture of dyes by thin layer chromatography.

Curriculum:

Unit	Title	Learning Points	No of Credits
I	Estimations	1. Estimation of Ibuprofen from the commercial tablet (back titration method). 2. Estimation of Acid neutralizing capacity of a drug. 3. Estimation of Tincture iodine from commercial sample.	02
II	Preparations	4. Preparation of Aspirin from salicylic acid. 5. Preparation of Fluorescein. 6. O-Methylation of β -naphthol 7. Separation of components of natural pigments by paper chromatography (eg: chlorophylls). 8. TLC of a mixture of dyes (safranin- T, Indigo carmine, methylene blue).	

References:

1. Practical organic chemistry – A. I. Vogel
2. Practical organic chemistry – H. Middleton.
3. Practical organic chemistry – O.P. Aggarwal.

Evaluation Pattern: Practical Total Marks : 100

A. CIE/ Internal Assessment: 40 % (40 Marks)

Sr.No.	Particulars	Marks
01	Performance during practical session Skill, Accuracy, precision of measurement, Record of observation, calculations, graph, result and conclusion. Timely submission of journal	30
02	Overall performance (attendance, punctuality, interaction during Practical session throughout semester	10
Total		40

B. Semester End Examination: 60% (30 Marks)

Sr. No.	Title	Experimental work	Journal	Viva	Total
1.	Estimation	40	05	05	50
2.	Preparation	40	05	05	50
Total					100

Marks in SEE practical examination will be converted into 60 marks.

CIE/ Internal	Semester End	Total Marks
40	60	100

Syllabus for B.Sc. Chemistry from the year 2023-24

Name of the Course	B.Sc.
Course Code	USACDD601
Class	T.Y. B.Sc.
Semester	VI
No of Credits	02
Nature	Theory
Type	AC
Highlight revision specific to employability/ entrepreneurship/ skill development (if any) 100 words	-----

Course Code : USACDD601

Nomenclature: Drugs and Dyes

Course Outcomes: On completing the course, the student will be able to:

- CO1 :** To study the discovery of drug from different sources.
- CO2 :** To know the uses and the side effects of certain drugs for various diseases.
- CO3 :** To study the basic concept of drug designing.
- CO4 :** To study the different class of chemotherapeutic agents.
- CO5 :** To study the synthesis of drug intermediate.
- CO6 :** To study the importance of nanomaterial in medicinal chemistry.
- CO7 :** To study the classification of dyes based on chemical constitution, its synthesis and applications.
- CO8 :** To create an awareness of the current concern about the toxicity of dyes and their effect on ecology.
- CO9 :** To study the non-textile use of dyes.
- CO10:** To familiarize the students with the application of dyes in medical field.
- CO11:** To study the concept of pigments.

Curriculum:

Unit	Title	Learning Points	No of Lectures
I	Drug Discovery, Design and Development	<p>1.1 Drug Discovery, Design and Development (6L) 1.1.1 Discovery of a Lead compound: Screening, drug metabolism studies and clinical observation, Lipinski's rule of 5 1.1.2 Medicinal properties of compounds from Natural Sources: Anti-infective and anticancer properties of Turmeric (Curcumin) 1.1.3 Development of drug: The Pharmacophore identification, modification of structure or functional group, Structure activity relationship (Sulphonamides). 1.1.4 Structure modification to increase potency: Homologation, Chain branching and Extension of the structure. 1.1.5 Computer assisted drug design.</p> <p>1.2 Drug Metabolism: (3L) Introduction, Absorption, Distribution, Biotransformation, Excretion Different types of chemical transformation of drugs with specific examples.</p> <p>1.3 Chemotherapeutic Agents: Study of the following chemotherapeutic agents with respect to their chemical structure, chemical class, therapeutic uses, side effects and introduction to MDR wherever applicable.</p> <p>1.3.1 Antibiotics and antivirals: (2L) Definition, <ul style="list-style-type: none"> • Amoxicillin (β-lactum antibiotics) • Cefpodoxime (Cephalosporins) • Doxycycline (Tetracyclines) • Levofloxacin (Quinolones) (Synthesis from 2,3,4 - Trifluoro -1-nitrobenzene) • Aciclovir/Acyclovir (Purines) </p> <p>1.3.2 Antimalarials: (2L) Types of malaria; Symptoms; Pathological detection during window period (Life cycle of the parasites not to be discussed) <ul style="list-style-type: none"> • Chloroquine (3-Amino quinolones) • Artemether(Benzodioxepins) Following combination to be discussed: Atremether-Lumefantrine (no structure) </p> <p>1.3.3 Anthelmintics and AntiFungal agents (2L) Drugs effective in the treatment of Nematodes and Cestodes infestations. <ul style="list-style-type: none"> • Diethyl carbamazine (Piperazines) • Albendazole (Benzimidazoles) (Synthesis from 2-Nitroaniline) </p>	15 L

		<ul style="list-style-type: none"> • Clotrimazole (Imidazole) • Fluconazole (Triazole) (Synthesis from 1- Bromo - 2,4-difluorobenzene) 	
II		<p>2.1 Antiamoebic Drugs (1L) Types of Amoebiasis</p> <ul style="list-style-type: none"> • Metronidazole, Ornidazole, Tinidazole (Imidazole) <p>Synthesis of Metronidazole from glyoxal by Debus-Radziszewski imidazole synthesis route Following combination therapy to be discussed: Ciprofloxacin- Tinidazole</p> <p>2.2 Antitubercular and Antileprotic Drugs (3L) Types of Tuberculosis; Symptoms and diagnosis of Tuberculosis. Types of Leprosy. General idea of Antibiotics used in their treatment.</p> <ul style="list-style-type: none"> • PAS (Amino salicylates) • Isoniazide (Hydrazides) • Pyrazinamide (Pyrazines) • (+) Ethambutol (Aliphatic diamines) (Synthesis from 1- Nitropropane) • Dapsone(Sulphonamides) (Synthesis from 4-Chloronitrobenzene) • Clofazimine (Phenazines) • Bedaquiline (Quinoline) <p>Following combination therapy to be discussed: (i) Rifampin + Ethambutol + Pyrazinamide (ii) Rifampin + Isoniazide + Pyrazinamide</p> <p>2.3 Anti-Neoplastic Drugs (2L) Idea of malignancy; Causes of cancer Brief idea of Immuno Stimulants &Immuno depressants</p> <ul style="list-style-type: none"> • Lomoustine (Nitrosoureas) • Anastrozole(Triazoles) (Synthesis from 3,5-bis (bromo methyl) toluene) • Cisplatin (Chloro Platinum) • Vincristine, Vinblastine, Vindesine) (Vinca alkaloids) (structure not expected) <p>2.4 Anti-HIV Drugs (1L) Idea of HIV pathogenicity, Symptoms of AIDS</p> <ul style="list-style-type: none"> • AZT/Zidovudine, Lamivudine,DDI (Purines) <p>2.5 Drug Intermediates: (2L) Synthesis and uses</p> <ol style="list-style-type: none"> 1. 2,3,6-Triamino-6- hydroxypyrimidine from Guanidine 2. p-[2'-(5-Chloro-2-methoxy benzamido) ethyl]-benzenesulphonamide from Methyl-5-chloro-2-methoxybenzene 3. 3-(p-Chlorophenyl)-3- hydroxypiperidine from 3-Chloroacetophenone 4. p-Acetyl amino benzenesulphonyl chloride from 	15L

		<p>Aniline.</p> <p>5. Epichlorohydrine from propene.</p> <p>2.6 Nano particles in Medicinal Chemistry (4L) Introduction; Carbon nano particles (structures) and Carbon nano tubes:</p> <ul style="list-style-type: none"> • Functionalization for Pharmaceutical applications • Targeted drug delivery • In vaccine (Foot and mouth disease) • Use in Bio-physical treatment. <p>Gold nano particles in treatment of: Cancer; Parkinsonism; Alzheimer.</p> <p>Silver nano particles: Antimicrobial activity.</p> <p>2.7 Drugs and Environmental Aspects (2L)</p> <ul style="list-style-type: none"> • Impact of Pharma-industry on environment, • International regulation for human experimentation with reference to: “The Nuremberg Code” and “The 5. Helsinki Declaration”. 	
III	Classification of Dyes based on Chemical Constitution and Synthesis of Selected Dyes	<p>3.1 Classification of Dyes based on Chemical Constitution and Synthesis of Selected Dyes(12L) (Synthesis of the dyes marked with * is expected)</p> <p>i) Nitro Dye: Naphthol Yellow S</p> <p>ii) Nitroso Dye: Gambine Y</p> <p>iii) Azo dyes:</p> <p>a) Monoazo dyes: Orange IV *(from sulphanilic acid) & Eriochrome Black T* (from β- naphthol)</p> <p>b) Bisazo dyes: Congo Red* (from nitrobenzene)</p> <p>c) Trisazo Dye: Direct Deep Black EW* (from benzidine)</p> <p>iv) Diphenylmethane dye: Auramine O* (from N,N-dimethyl aniline)</p> <p>v) Triphenylmethane dye:</p> <p>a) Diamine series: Malachite Green* (from benzaldehyde)</p> <p>b) Triamine series: Acid Magenta</p> <p>c) Phenol series: Rosolic acid</p> <p>vi) Heterocyclic Dyes:</p> <p>a) Thiazine dyes: Methylene Blue</p> <p>b) Azine dyes: Safranin T* (from o-toluidine)</p> <p>c) Xanthene Dyes: Eosin* (from phthalic anhydride)</p> <p>d) Oxazine Dyes: Capri Blue</p> <p>e) Acridine Dyes: Acriflavine</p> <p>vii) Quinone Dyes:</p> <p>a) Naphthaquinone: Naphthazarin</p> <p>b) Anthraquinone Dyes: Indanthrene Blue* (from anthraquinone)</p> <p>viii) Indigoid Dyes: Indigo* (from aniline + monochloroacetic acid)</p> <p>ix) Phthalocyanine Dyes: Monastral Fast Blue B</p> <p>3.2 Health and Environmental Hazards of Synthetic Dyes and their Remediation Processes</p>	15L

		<p>(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: Brief introduction to effluent treatment plants (ETP) Primary Remediation processes:(Physical Processes) Sedimentation, Aeration, Sorption (activated charcoal, fly ash etc.) Secondary Remediation processes: Biological Remediation – Biosorption, bioremediation and biodegradation Chemical Remediation: Oxidation Processes (chlorination), Coagulation-flocculation –Precipitation</p>	
IV	Non-textile uses of dyes	<p>4.1 Non-textile uses of dyes: (8L) 4.1.1 Biomedical uses of dyes i) Dyes used in formulations (Tablets, capsules, syrups etc) Indigo carmine, Sunset yellow, Tartrazine ii) Biological staining agents Methylene blue, Crystal violet and Safranin T iii) DNA markers Bromophenol blue, Orange G, Cresol red iv) Dyes as therapeutics Mercurochrome, Acriflavine, Crystal Violet, Prontosil 4.1.2 Dyes used in food and cosmetics: i) Properties of dyes used in food and cosmetics ii) Introduction to FDA and FSSAI iii) Commonly used food colours and their limits 4.1.3 Paper and leather dyes i) Structural features of paper and leather ii) Dyes applicable to paper and leather 4.1.4 Miscellaneous dyes i) Hair dyes ii) Laser dyes iii) Indicators iv) Security inks iv) Coloured smokes and camouflage colours 4.2 Pigments (3L) Definition of pigments, examples, properties of pigments, difference between dyes and pigments. Definition of Lakes and Toners 4.3 Dyestuff Industry - Indian Perspective (4L) 4.3.1 Growth and development of the Indian Dyestuff Industry 4.3.2 Strengths, Weaknesses, Opportunities and Challenges of the Dyestuff industry in India Make in India - Future Prospects of the Dye Industry.</p>	15L

References:

Units I & II

1. Foye's principles of medicinal chemistry. 6th Edition, Edited by Davis William & Thomas Lemke, Indian edition by B I Publication Pvt Ltd, Lippincott Williams & Wilkins.
2. Text book of organic medicinal & pharmaceutical chemistry. Wilson & Gisovolds, 11th Edition by John H Block, John M Beale Jr.
3. Medicinal chemistry. Ashutosh Kar, New Age International Pvt. Ltd Publisher. 4th edition.
4. Burger's Medicinal Chemistry, Drug Discovery & Development. Abraham & Rotella. Wiley
5. Medicinal chemistry. Ashutosh Kar, New Age International Pvt. Ltd Publisher. 4th edition.
6. Medicinal chemistry. V.K. Ahluwalia and Madhu Chopra, CRC Press.
7. Principle of medicinal chemistry. Vol 1 & 2 S. S. Kadam, K. R. Mahadik, K. G. Bothara
8. The Art of Drug synthesis. Johnson and Li. Wiley, 2007.
9. The organic chemistry of drug design & drug action. 2nd ed. By Richard B Silvermann, Academic Press.
10. The Organic Chemistry of Drug Synthesis. Lednicer and Mitscher, Wiley.
11. Text book of drug design and discovery. Povl-Krog-Sgaard-Larsen, Tommy Liljefors and ULF Madsen, 3rd Edition Taylor & Francis.
12. Bio-applications of nanoparticles. Edited by Warren C.W. Chan, Springer Publication.
13. Nanoparticle and technology for drug delivery (Drugs and pharmaceutical sciences). Ram B. Gupta & Uday B. Kompella Pub. Informa Healthcare.
14. Nano forms of carbon and its applications. Edited by Maheshwar Sharon and Madhuri Sharon. Monad Nanotech Pvt. Ltd.
15. Environmental Chemistry. A. K. De
16. Text Book on Law and Medicine. Chokhani and Ghormade. 2nd Edition. Hind Law House, Pune.
17. Essentials of Medical Pharmacology. K D Tripathi, Jaypee Brothers Medical publishers Pvt. Ltd. Practical organic chemistry, Vogel.

Units III & IV

1. Chemistry of Synthetic Dyes, Vol I – IV, 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
4. Environmental Studies, Joseph Benny, Tata McGraw Hill Education, 2005
5. Fundamental Concepts of Environmental Chemistry, Sodhi. G. S., Alpha Science International, 2009.
6. Planning Commission, Niti Aayog, FSSAI and FDA websites.
7. Green Chemistry for Dyes Removal from Waste Water- Research Trends and Applications, Ed. Sharma S.K., Wiley, 2015.
8. Environmental Pollution- Monitoring and Control, Khopkar S.M., New Age International (P) Ltd, New Delhi, 1982.

Evaluation Pattern:

A. Continuous Evaluation (40%) : 40 Marks

Sr. No.	Particulars	Marks
01	Unit Test (MCQ / Descriptive – Based on Theory and/or Problems - Online/Offline – 1 unit test of 20 marks / 2 unit tests of 10 marks each .	20
02	Assignment / seminar / class test / worksheets	10
03	Active participation in routine class instructional deliveries and overall conduct as a responsible learner, mannerism and articulation and exhibit of leadership qualities in organizing related academic activities	10
	Total	40

B. Semester End Evaluation (Paper Pattern) (60 Marks – 2 hours): 60 Marks

Guidelines for paper pattern for Semester End Evaluation:

1. As far as possible, one fifth weightage of the total should be given to numerical examples in above paper pattern.
2. All questions will be compulsory and may be divided into sub-questions.
3. Descriptive type of questions, derivation-based questions, problem solving/ numerical based questions, etc., will contain internal options.
4. Question Number one consist of MCQs, fill in the blanks, match the following, true or false, etc., type of questions.

Question Number	Unit	Marks
1	I	12
2	II	12
3	III	12
4	IV	12
5	I, II, III, IV	12

CIE/ Internal	Semester End	Total Marks
40	60	100

Syllabus for B.Sc. Chemistry from the year 2023-24

Name of the Course	B.Sc.
Course Code	USACDD6P2
Class	T.Y. B.Sc.
Semester	VI
No of Credits	02
Nature	Case Study
Type	AC
Highlight revision specific to employability/ entrepreneurship/ skill development (if any) 100 words	-----

Course Code: USACDD6P2

Nomenclature: The Regional Case-Study Project

Course Outcomes: After completing course, students will be able to:

- CO1 :** Gain an understanding of rural/urban life, culture and social realities
- CO2 :** Gain an understanding real-life problems
- CO3 :** Develop a sense of empathy and bonds of mutuality with local community
- CO4 :** Learn to value the local knowledge and wisdom of the community
- CO5 :** Identify opportunities for contributing to community's socio-economic improvement

Curriculum:

Unit	Title	Learning Points	No of Credits
I	Theory of case study	<ul style="list-style-type: none">• Introduction to case study• What is a case study?• Types of case studies• Planning a Case Study• Researching a Case Study• Strengths and Weaknesses of Case Studies• Writing a Case Study• References	02
II	Case study Project (Field work)	<p>Typical Key Areas for field-based project activities:</p> <ul style="list-style-type: none">• Environmental Problems: For example estimation of PAH from soil/sewage samples, estimation of water pollution in nearby locality, estimation of the micro plastics in Soil in the nearby locality, study of solid and liquid waste generation in a Ward/city/village etc.• Analysis of food Material: For example identification and estimation of food Adulterants, estimation of selenium content in bread available in the local market etc.• Soil, Water, material analysis: For example, examination and analysis water quality in nearby locality, study of materials and dyes used in a local industry, conduct soil health test (for analysis of Pb, N, P, K, S, C, moisture content, pH and micronutrient Contents such as Cu, Zn, Mn, Fe) etc.• Study of government development programs: For example effects of Swachh Bharat Abhiyan on the quality of soil and water, to prepare a village sanitation plan, Energy use and fuel efficiency surveys etc.• Agriculture: For example, Organize orientation programmes for farmers regarding organic cultivation, rational use of irrigation and fertilizers and promotion of traditional species of crops and plants etc.	

References:

1. Abramson, P.R. (1992). A Case for Case Studies: An Immigrant's Journal. Newbury Park: Sage.
2. Bassey, M. (1999). Case Study Research in Educational Settings. Buckingham: Open University.
3. Campbell, D.T. & Stanley, J.C. (1966) Experimental and Quasi-experimental Designs for Research. Chicago: Rand McNally.
4. Kazdin, A. E. (1982). Single-case Research Designs: Methods for Clinical and Applied Settings. New York: Oxford Press.
5. Zaidah Zainal, Case study as a research method, JurnalKemanusiaan bil.9, (2007)
6. WALTER ISARD, Methods of Regional Analysis: An Introduction to Regional Science, THE M. I. T. PRESS, Cambridge, Massachusetts, (1960).

Case-Study Project Evaluation:**Project Report:**

After successful completion of a case-study project, the student group will prepare a consolidated report covering title, Rational and gap analysis, objectives, hypothesis, project design and methodology, preliminary work/survey, expected out-come, benefits to society (Project outcome), SWOC analysis and important references etc.

Project presentation (by students Group):

The students group will present the case study project at the time of practical examination.

Evolution Pattern:

Evaluation of student based on Part I	20 Marks
Identification of problem, Rational, Problem statement and expected benefits	10 Marks
Case-study design and methodology, Data management and interpretation, , clarity, coherence and appropriateness of case study design, Organization and logical flow of ideas and materials	30 Marks
Presentation skills, role, responsibilities involvement of group members, learning mechanism in group, clear, concise and thoughtful responses to questions, team work.	30 Marks
Major findings and outcome reported, Stakeholders feedback	10 Marks
Total	100 Marks

Date: 04/11/2023

Chairperson BoS

(Dr. M. G. Gove)

**R. P. Gogate College of Arts & Science and R. V. Jogalekar College of Commerce,
Ratnagiri (Autonomous) 22 | Page**