

T.Y.B. Sc. Chemistry Applied Component Syllabus Semester V & VI



Hindi Vidya Prachar Samiti's

Ramniranjan Jhunjhunwala College

of Arts, Science & Commerce

(Autonomous College)

Affiliated to

UNIVERSITY OF MUMBAI

Syllabus for the T.Y. B.Sc. (Applied Component)

Program: B.Sc. (Chemistry)

Course Code: RJSUCHEAC

CBCS : 2020 - 2021

T.Y.B. Sc. Chemistry Applied Component Syllabus Semester V & VI**T.Y. B.Sc. CHEMISTRY SEMESTER V**

Course	Nomenclature	Credits	Topics
RJSUCHEAC505	Paper V (Applied Component – Drugs & Dyes)	2.5	1. General Introduction to Drugs. Routes of Drug Administration and Dosage Forms. Pharmacodynamic agents 2. Analgesics, Antipyretics and Anti-inflammatory, Antihistaminic, Cardiovascular, Antidiabetic, Antiparkinsonism Drugs, Drugs for Respiratory System. 3. Introduction to the dye-stuff Industry. Substrates for Dyes : Types of fibres. Classification of dyes based on applications and dyeing methods. 4. Colour and Chemical Constitution of Dyes. Unit process and Dye Intermediates.
RJSUCHEACPR505	Paper V	6	Applied Component

T.Y. B.Sc. CHEMISTRY SEMESTER VI

Course	Nomenclature	Credits	Topics
RJSUCHEAC605	Paper V (Applied Component – Drugs & Dyes)	2.5	1. Drug Discovery, Design and Development. Drug Metabolism, Chemotherapeutic Agents: Antibiotics and antivirals, Antimalarials, Anthelmintics and Anti-Fungal agents. 2. Chemotherapeutic Agents: Antiamoebic, Antitubercular, Antileprotic, Anti-Neoplastic, Anti- HIV Drugs, Drug Intermediates, Nano particles in Medicinal Chemistry, Drugs and Environmental Aspects. 3. Classification of Dyes based on Chemical Constitution and Synthesis of Selected Dyes. Health and Environmental Hazards of Synthetic Dyes and their Remediation Processes. 4. Non-textile uses of dyes, Pigments, Dyestuff Industry - Indian Perspective
RJSUCHEACPR605	Paper V	6	Applied Component

B.Sc. (Chemistry) Semester – V Paper – V

Course code : RJSUCHEAC505

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SEMESTER V (THEORY)				L	Cr
Paper-V (Applied Component)			Paper Code: RJSUCHEAC505	60	2.5
UNIT I				15	
I	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: Pharmakon, Pharmacology, Pharmacophore, Prodrug, Half-life efficiency, LD ₅₀ , ED ₅₀ ,GI ₅₀ 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.		
	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).		
	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: Classification based on pharmacological actions: CNS Depressants & CNS Stimulants. Concept of sedation and hypnosis, anesthesia. <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)	(4L)	

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			UNIT-II (Drugs)	15 L	
2	2.1		Analgesics, Antipyretics and Anti-inflammatory Drugs.	(4L)	
		2.1.1	Analgesics and Antipyretics <ul style="list-style-type: none"> • Morphine (Phenanthrene alkaloids) • Tramadol (Cyclohexanols) (Synthesis from salicylic acid) • Aspirin (Salicylates) • Paracetamol (p-Amino phenols) 		
		2.1.2	Anti-inflammatory Drugs Mechanism of inflammation and various inflammatory conditions. <ul style="list-style-type: none"> • Steroids: Prednisolone, Betamethasone • Sodium Diclofenac, Aceclofenac (N- Aryl anthranilic acids) (Synthesis from 2,6-dichlorodiphenyl amine) 		
	2.2		Antihistaminic Drugs	(2L)	
			<ul style="list-style-type: none"> • Diphenhydramine (Ethanol amines) • Cetirizine (Piperazine) (Synthesis from 4-Chlorobenzhydryl chloride). • Chlorpheniramine maleate (Ethyl amines). • Pantoprazole (Benzimidazoles). 		
	2.3		Cardiovascular drugs	(3L)	
			Classification based on pharmacological action <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) 		
	2.4		Antidiabetic Agents	(2L)	
			General idea and types of diabetes; Insulin therapy <ul style="list-style-type: none"> • Glibenclamide (Sulphonyl ureas) • Metformin (Biguanides) • Dapagliflozin (Pyranose) • Pioglitazone (Thiazolidinediones) (Synthesis from 2-(5-ethylpyridin-2-yl) ethanol) 		

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	2.5		Antiparkinsonian Drugs	(2L)	
			<p>Idea of Parkinson's disease.</p> <ul style="list-style-type: none"> • Procyclidine hydrochloride (Pyrrolidines) • Ethopropazine hydrochloride (Phenothiazines) • Levodopa (Amino acids) (Synthesis from Vanillin) 		
	2.6		<p>Drugs for Respiratory System</p> <p>General idea of: Expectorants; Mucolytics; Bronchodilators; Decongestants; Antitussives.</p> <ul style="list-style-type: none"> • Ambroxol (Cyclohexanol) (Synthesis from paracetamol) • Salbutamol (Phenyl ethyl amines) • Oxymetazoline (Imidazolines) • Codeine Phosphate (Opiates) 	(2L)	
			<u>Unit III (Dyes)</u>	15 L	
3	3.1		Introduction to the dye-stuff Industry	(5L)	
		3.1.1	Dyes		
			<p>Definition of dyes, requirements of a good dye i.e. Colour, Chromophore and Auxochrome, Solubility, Linearity, Coplanarity, Fastness, Substantivity, Economic viability.</p> <p>Definition of fastness and its properties and Mordants with examples</p> <p>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,</p> <p>Naming of dyes by colour index (two examples) used in dye industries.</p>		
		3.1.2	Natural and Synthetic Dyes		
			<p>Natural Dyes: Definition and limitations of natural dyes.</p> <p>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],</p> <p>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>		

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	3.2		Substrates for Dyes: Types of fibers.	(3L)	
		3.2.1	Natural: cellulosic and proteinaceous fibres, examples-wool, silk and cotton structures and names of dyes applied on each of them.		
		3.2.2	Semi – synthetic: definition and examples [structures not expected]		
		3.2.3	Synthetic: Nylon, Polyesters and Polyamides structures and names of dyes applied on each of them		
		3.2.4	Blended fabrics: definition and examples [structures not expected]		
		3.2.5	Binding forces of dyes on substrate: ionic forces, covalent linkages, hydrogen bonding, Van der Waals forces		
	3.3		Classification of dyes based on applications and dyeing methods	(7L)	
		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		
		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 orange R. 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,		

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		3.3.3	Optical Brighteners: General idea, important characteristics of optical brighteners and their classes [Stilbene, Coumarin, Heterocyclic vinylene derivatives, Diarylpyrazolines, Naphthylamide derivatives] general structure of each class.		
			<u>Unit – IV (Dyes)</u>		
4	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.		
			(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.		
	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)		
		4.2.2	Preparation of the Following Intermediates	(8L)	
			<u>Benzene derivatives:</u> Benzenesulphonic acid; 1,3-Benzenedisulphonic acid; sulphanilic acid; o-, m-, p-chloronitrobenzenes; o-, m-, p-nitroanilines; o-, m-, p-phenylene diamines; Naphthol ASG		
			<u>Naphthalene Derivative:</u> Schaeffer acid; Tobias acid; Naphthionic acid; N.W. acid; cleve-6-acid; H-acid; Naphthol AS		

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			<u>Anthracene Derivative</u> : 1-Nitroanthraquinone; 1-Aminoanthraquinone Anthraquinone-2-sulphonic acid; Benzanthrone.		
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T.Y.BSc	Semester V Theory
RJSUCHEAC505 Paper V Applied Component	Course Outcomes: on completion of this course student will <ul style="list-style-type: none"> ➤ understand the basic medicinal terms and its importance. ➤ know the different drug dosage forms and its different routes of administration.

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	<ul style="list-style-type: none"> ➤ To Know the terms analgesics, antipyretics and anti-inflammatory drugs with their examples. ➤ To study cardiovascular drugs, antidiabetic agents, antiparkinsonian drugs and drugs used for the respiratory system. ➤ To study the synthesis of some important class of the drug. ➤ Various natural dyes, important milestone in synthesis of synthetic dyes and classification of dyes based on their constitution and application. ➤ Relation between colour and chemical constitution ➤ Synthesis of dyes intermediates. <p>Learning outcomes:</p> <ul style="list-style-type: none"> ➤ Study basic information about the drug and related medicinal terms. ➤ Get acquainted with the synthesis of some important class of the drug. ➤ Know the different routes of drug administration and different dosage forms. ➤ Know the different CNS drugs and its methods of synthesis. ➤ Learn the terms analgesics, antipyretics, and anti-inflammatory drugs and their examples. ➤ Know the concept of antihistaminic drugs and cardiovascular drugs. ➤ Get acquainted with the synthesis of some important class of the drug. ➤ Know the drugs used for antidiabetic, cardiovascular and antihistaminic conditions. ➤ The concept of dyes, its property and nomenclature dyes. ➤ The concept of natural and synthetic dyes. ➤ The classification of dyes based on application and uses. ➤ The different types of fibers, application of dyes and the concept of dye fibre attachment ➤ Classification of dyes and the concept of optical brighteners and their classes. ➤ The relation between colour and chemical constitution of dyes. ➤ The concept of Unit process and Dye Intermediates. ➤ The synthesis of Dyes intermediate.
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B.Sc. (Chemistry) Semester – V Paper – V Practical

Course code: RJSUCHEACPR505

Course outcome:

After completing course, the learner will be able to:

- Estimation and preparation of various drugs, separation of natural pigment by chromatography.
- Dying of cotton fabric

Learning outcomes:

On successful completion of this course students will be able to:

- Understand methods of estimation of drugs.
- Understand dying of cotton fabric by direct dyeing.

Practicals

1. Estimation of Ibuprofen (back titration method)
2. Estimation of Acid neutralizing capacity of a drug
3. Preparation of Aspirin from salicylic acid.
4. Preparation p-nitroacetanilide from acetanilide
5. Separation of components of natural pigments by paper chromatography (e.g. chlorophyll)

Project: Dying of cotton fabric using Congo red dye

B.Sc. (Chemistry) Semester – VI Paper – V

Course code: RJSUCHEAC605

SEMESTER VI (THEORY)					L	Cr	
Paper-V (Applied Component)			Paper Code: RJSUCHEAC605		60	2.5	
UNIT – I (Drugs)					15 L		
1	1.1		Drug Discovery, Design and Development			(6L)	

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	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.		
1.2		Drug Metabolism: Introduction, Absorption, Distribution, Bio-transformation, Excretion Different types of chemical transformation of drugs with specific examples.	(3L)	
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.		
	1.3.1	Antibiotics and antivirals: Definition, <ul style="list-style-type: none"> ● Amoxicillin (@- lactum antibiotics) ● Cefpodoxime (Cephalosporins) ● Doxycycline (Tetracyclines) ● Levofloxacin (Quinolones) (Synthesis from 2,3,4 – Trifluoro -1-nitrobenzene) ● Aciclovir/Acyclovir (Purines) 	(2L)	
	1.3.2	Antimalarials: 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)	(2L)	
	1.3.3	Anthelmintics and Anti-Fungal agents 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) ● Clotrimazole (Imidazole) 	(2L)	

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			<ul style="list-style-type: none"> Fluconazole (Triazole) (Synthesis from 1- Bromo – 2,4-difluorobenzene) 		
			UNIT – II(Drugs) Chemotherapeutic Agents continued.	15L	
2	2.1		Antiamoebic Drugs Types of Amoebiasis. <ul style="list-style-type: none"> Metronidazole, Ornidazole, Tinidazole (Imidazoles) Synthesis of Metronidazole from glyoxal by Debus-Radziszewski imidazole synthesis route Following combination therapy to be discussed: Ciprofloxacin-Tinidazole.	(1L)	
	2.2		Antitubercular and Antileprotic Drugs: Types of Tuberculosis; Symptoms and diagnosis of Tuberculosis. Types of Leprosy. General idea of Antibiotics used in their treatment. <ul style="list-style-type: none"> PAS (Amino salicylates) Isoniazid (Hydrazides) Pyrazinamide (Pyrazines) (+) Ethambutol (Aliphatic diamines) (Synthesis from 1- Nitropropane) Dapsone(Sulphonamides) (Synthesis from 4- Chloronitrobenzene) Clofazimine (Phenazines) Bedaquiline (Quinoline) Following combination therapy to be discussed: (i) Rifampin + Ethambutol + Pyrazinamide (ii) Rifampin + Isoniazid + Pyrazinamide	(3L)	
	2.3		Anti-Neoplastic Drugs Idea of malignancy; Causes of cancer. Brief idea of Immuno Stimulants &Immuno depressants. <ul style="list-style-type: none"> Lomoustine (Nitrosoureas) 	(2L)	

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		<ul style="list-style-type: none"> Anastrozole(Triazoles) (Synthesis from 3,5-bis (bromo methyl) toluene) Cisplatin (Cis-DiamminedichloroplatinumI) Vincristine, Vinblastine, Vindesine) (Vinca alkaloids) (structure not expected) 		
	2.4	Anti-HIV Drugs Idea of HIV pathogenicity, Symptoms of AIDS. <ul style="list-style-type: none"> AZT/Zidovudine, Lamivudine, DDI (Purines) 	(1L)	
	2.5	Drug Intermediates: Synthesis and uses of : <ol style="list-style-type: none"> 2,3,6-Triamino-6- hydroxypyrimidine from Guanidine p-[2'-(5-Chloro-2-methoxy benzamido) ethyl]-benzenesulphonamide from Methyl-5-chloro-2- methoxybenzene 3-(p-Chlorophenyl)-3- hydroxypiperidine from 3-Chloroacetophenone p-Acetyl amino benzenesulphonyl chloride from Aniline Epichlorohydrine from propene 	(2L)	
	2.6	Nano particles in Medicinal Chemistry Introduction; Carbon nano particles (structures) and Carbon nano tubes: <ul style="list-style-type: none"> Functionalization for Pharmaceutical applications. Targeted drug delivery. In vaccine (Foot and mouth disease). Use in Bio-physical treatment. Gold nano particles in treatment of: Cancer; Parkinson and Alzheimer. <ul style="list-style-type: none"> Silver nano particles: Antimicrobial activity. 	(4L)	
	2.7	Drugs and Environmental Aspects <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 Helsinki Declaration”. 	(2L)	
		<u>Unit – III (Dyes)</u>		
3	3.1	Classification of Dyes based on Chemical Constitution and Synthesis of Selected Dyes (Synthesis of the dyes marked with * is expected)	(12L)	
		i) Nitro Dye: Naphthol Yellow S		
		ii) Nitroso Dye: Gambine Y		

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			iii) Azo dyes: a) Monoazo dyes: Orange IV * (from sulphanilic acid) & Eriochrome Black T* (from β - naphthol) b) Bisazo dyes: Congo Red* (from nitrobenzene) c) Trisazo Dye: Direct Deep Black EW* (from benzidine)		
			iv) Diphenylmethane dye: Auramine O* (from N,N-dimethyl aniline)		
			v) Triphenylmethane dye: a) Diamine series: Malachite Green* (from benzaldehyde) b) Triamine series: Acid Magenta c) Phenol series: Rosolic acid		
			vi) Heterocyclic Dyes: a) Thiazine dyes: Methylene Blue b) Azine dyes: Safranin T* (from o-toluidine) c) Xanthene Dyes: Eosin* (from phthalic anhydride) d) Oxazine Dyes: Capri Blue e) Acridine Dyes: Acriflavine		
			vii) Quinone Dyes: a) Naphthaquinone: Naphthazarin b) Anthraquinone Dyes: Indanthrene Blue* (from anthraquinone)		
			viii) Indigoid Dyes: Indigo* (from aniline + monochloroacetic acid)		
			ix) Phthalocyanine Dyes: Monastral Fast Blue B		
	3.2		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:		

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			<p>Brief introduction to effluent treatment plants (ETP)</p> <p>Primary Remediation processes:(Physical Processes) Sedimentation, Aeration, Sorption (activated charcoal, fly ash etc.)</p> <p>Secondary Remediation processes: Biological Remediation – Biosorption, bioremediation and biodegradation</p> <p>Chemical Remediation: Oxidation Processes (chlorination), Coagulation-flocculation-Precipitation</p>		
			<u>Unit – IV (Dyes)</u>		
4	4.1		Non-textile uses of dyes:	(8L)	
		4.1.1	<p>Biomedical uses of dyes</p> <p>i) Dyes used in formulations (Tablets, capsules, syrups etc) Indigo carmine, Sunset yellow, Tartrazine</p> <p>ii) Biological staining agents Methylene blue, Crystal violet and Safranin T</p> <p>iii) DNA markers Bromophenol blue, Orange G, Cresol red</p> <p>iv) Dyes as therapeutics Mercurochrome, Acriflavine, Crystal Violet, Prontosil</p>		
		4.1.2	<p>Dyes used in food and cosmetics:</p> <p>i) Properties of dyes used in food and cosmetics</p> <p>ii) Introduction to FDA and FSSAI</p> <p>iii) Commonly used food colours and their limits</p>		
		4.1.3	<p>Paper and leather dyes</p> <p>i) Structural features of paper and leather</p> <p>ii) Dyes applicable to paper and leather</p>		
		4.1.4	<p>Miscellaneous dyes</p> <p>i) Hair dyes</p> <p>ii) Laser dyes</p> <p>iii) Indicators</p> <p>iv) Security inks</p> <p>iv) Coloured smokes and camouflage colours</p>		
	4.2		Pigments	(3L)	

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			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		
		4.3.3	Make in India - Future Prospects of the Dye Industry		

T.Y.BSc	Semester VI Theory
RJSUCHEAC505 Paper VI Applied Component	Course Outcomes : on completion of this course student will : <ul style="list-style-type: none"> ➤ To study discovery of lead compounds, development of drug and structure modification to increase potency. ➤ To study drug metabolism studies. ➤ To study chemotherapeutic agents involves antibiotics, antivirals, antimalarials and anthelmintics and antifungal agents. ➤ Classify various chemotherapeutic agents with respect to chemical class, structure, uses and side effects. ➤ Classification of Dyes based on Chemical Constitution and Synthesis of some selected dyes ➤ Understand and explain the biomedical applications of dyes. ➤ Understand the role and importance of FDA and FSSAI. ➤ Understand and justify the application of pigments. Learning outcomes: <ul style="list-style-type: none"> ➤ Know steps involved in drug discovery, design and development.

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	<ul style="list-style-type: none">➤ Study different chemotherapeutic agents with their uses.➤ get acquainted with drug metabolism study.➤ understand the synthesis of different class of drug molecule.➤ The different classes of Chemotherapeutic Agents.➤ The preparation, uses and the side effects of certain drugs in the treatment of various diseases.➤ The synthesis of an important drug intermediate for medicinal purpose.➤ The development and importance of nanomaterial in medicinal chemistry.➤ The aspect of drugs and environment.➤ The classification of dyes based on chemical constitution, its synthesis and applications.➤ Syntheses of some representative dyes.➤ The awareness regarding the toxicity of dyes and their effect on human health and environment including remediation process.➤ know the biomedical applications of the dyes.➤ know the applications of dyes in food, cosmetics, paper and leather industries.➤ know the role of FDA and FSSAI in the dye regulations.➤ understand the concept of pigment and its applications.➤ understand the role of the Indian dye industry in the development and production of dyes .
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B.Sc. (Chemistry) Semester – VI Paper – V Practicals

Course code: RJSUCHEACPR605

Course outcomes:

- After completion of course student will able to understand preparation of dye intermediates and estimation of amine and tincture iodine
- student will be also exposed to concept of thin layer chromatography

Learning outcomes:

On successful completion of this course students will be able to:

- Know preparation methods of dye intermediates.
- Understand Pharmacopeia.

Practicals

1. O-Methylation of β -naphthol.

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2. Preparation of anthraquinone
3. Estimation of aromatic primary amine.
4. Estimation of Tincture iodine in iodine solution.
5. TLC of a mixture of dyes (safranin-T, Indigo carmine, methylene blue)

Project:

- **Preparation of monograph of any one drug from syllabus by I.P. method.**
- **Industrial visit**

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B.Sc. (Chemistry) Semester – V & VI

Exam Pattern

Internal exam

Paper pattern of internal exam

Internal I – 20 Marks MCQ

Internal II – 20 Marks short questions (All questions will be compulsory)

Unit 1 – 5 marks

Unit 2 – 5 marks

Unit 3 – 5 marks

Unit 4 – 5 marks

Semester end exam paper pattern

Total marks: 60

- Each question paper will have 5 questions of 12 marks each.
- All questions will be compulsory.
- The nature of Q.1 (from unit 1), Q.2 (from unit 2), Q.3 (from unit 3), Q.4 (from unit 4) will be as follows:

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- Learners to answer any **3** questions out of 5 (each of 4 marks)
- Q.5 will be of type:
 - A or A from unit 1 of 3 marks
 - B or B from unit 2 of 3 marks
 - C or C from unit 3 of 3 marks
 - D or D from unit 4 of 3 marks

Semester end practical exam pattern

50 marks per course

- Journal: 5 marks per course
- Written test /Viva based on theory behind all the experiments conducted per course: 10 marks
- Experiment: 35 marks