Resolution Number : AC/II (20-21).2.RUS15

S.P. Mandali's

Ramnarain Ruia Autonomous College

(Affiliated to University of Mumbai)

RUIA COLLEGE

Explore ● Experience ● Excel

Syllabus for Semester V & VI

Program: B.Sc. (Drugs & Dyes)

Program Code :(RUSACDD)

(Credit Based Semester and Grading System with effect from the academic year 2023-24)

PROGRAM OUTCOMES

S. P. Mandali's Ramnarain Ruia Autonomous College has adopted the Outcome Based Education model to make its science graduates globally competent and capable of advancing in their careers. The Bachelors Program in Science also encourages students to reflect on the broader purpose of their education.

PO	Description
A student completing Bachelor's Degree in Science program will be able to:	
PO 1	Recall and explain acquired scientific knowledge in a comprehensive manner and apply the skills acquired in their chosen discipline. Interpret scientific ideas and relate its interconnectedness to various fields in science.
PO 2	Evaluate scientific ideas critically, analyse problems, explore options for practical demonstrations, illustrate work plans and execute them, organise data and draw inferences.
PO 3	Explore and evaluate digital information and use it for knowledge upgradation. Apply relevant information so gathered for analysis and communication using appropriate digital tools.
PO 4	Ask relevant questions, understand scientific relevance, hypothesize a scientific problem, construct and execute a project plan and analyse results.
PO 5	Take complex challenges, work responsibly and independently, as well as in cohesion with a team for completion of a task. Communicate effectively, convincingly and in an articulate manner.
PO 6	Apply scientific information with sensitivity to values of different cultural groups. Disseminate scientific knowledge effectively for upliftment of the society.
PO 7	Follow ethical practices at work place and be unbiased and critical in interpretation of scientific data. Understand the environmental issues and explore sustainable solutions for it.
PO 8	Keep abreast with current scientific developments in the specific discipline and adapt to technological advancements for better application of scientific knowledge as a lifelong learner.

PROGRAM SPECIFIC OUTCOMES

PSO	Description
A student completing Bachelor's Degree in Science program with applied component as Drugs & Dyes will be able to:	
PSO 1	Appreciate the vista of applications of chemistry in the fields of drugs and dyes..
PSO 2	Become aware of the ways in which the science has, and can be applied to real problems.
PSO 3	Become cognizant of the important contributions of chemistry in the two fields of drugs and dyes, and apply their knowledge of molecules and the way in which they prefer to behave in specific situations.

PROGRAM OUTLINE

SEMESTER V			
Course Code	**Unit**	**Course Title / Unit Title**	**Credits**
RUSACDD501		**Drugs and Dyes**	
	I	General Introduction to Drugs Routes of Drug Administration and Dosage Forms Pharmacodynamic agents	**2**
	II	Anti-Neoplastic Drugs Anti HIV Drugs Cardiovascular Drugs Antidiabetic Agents Anti parkinsonism Drugs Drugs for Respiratory System	
	III	Introduction to Dyestuff Chemistry Classification of dyes based on constitution Classification Based on Application	
	IV	Intermediates Preparation of intermediates Dyeing method of cotton fibres	
RUSACPDD501		**Practical**	**2**

Semester VI			
Course Code	**Unit**	**Course Title/Unit Title**	**Credits**
RUSACDD601	**Drugs & Dyes**		
	I	Drug Discovery, Design and Development Drug Metabolism Chemotherapeutic Agents Antibiotics Antimalarials	**2**
	II	Anti-inflammatory Drugs Antiamoebic Drugs Antitubercular Drugs Antileprotic Drugs Drug Intermediates Nano particles in Medicinal Chemistry	
	III	Colour and chemical constitution of dyes Non-textile Uses of Dyes Optical brighteners Organic Pigments	
	IV	Synthesis of specific dyes and their uses Types of fibres and classes of dyes applicable to them Ecology and toxicity of dyes	
RUSACPDD601	**Practical**		**2**

Semester V
Course Code: RUSACDD501
Course Title: Drugs & Dyes
Academic year 2020-21

Course Outcomes:

After completing the course, the learner will be able to -	
CO 1	Understand various pharmacodynamic agents with respect to their chemical structure, chemical class, therapeutic uses, and side effects.
CO 2	Understand different routes of drug administration.
CO 3	Describe the metabolism of drugs inside the human body.
CO 4	Enlist different routes of drug administration.
CO 5	Classify dyes based on their constitution and application.
CO 6	Correlate color and chemical constitution of dyes.
CO 7	Write the reactions involved in the synthesis of some representative drugs and dye intermediates.

DETAILED SYLLABUS

Course Code	**Drugs & Dyes**		**Credits-02**
RUSACDD501	**Unit**	**Unit Title**	**Lectures**
	I	**1.1 General Introduction to Drugs**	**(6L)**
		1.1.1 Definition of a drug, 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, Pharmacophore, Prodrug, Half-life efficiency, LD50, ED50, Therapeutic Index.	**(2L)** **(7L)**

		1.1.4 Brief idea of the following terms: Receptors, 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** **1.2.1** Oral and Parenteral routes with advantages and disadvantages. **1.2.2** Formulations, Different dosage forms (emphasis on sustained release formulations.) **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, Concept of sedation and hypnosis, anaesthesia. Phenobarbitone (Barbiturates – mode of action), Phenytoin (Hydantoins), Trimethadione (Oxazolidinediones), Piracetam (Pyranones), Midazolam, Alprazolam (Benzodiazepines) Methylphenidate (Piperidines) Chlorpromazine (Phenothiazines) Fluoxetine (Phenyl propyl amines)	

		Synthesis of Trimethadione, Methylphenidate, Phenytoin. **1.3.2 Analgesics and Antipyretics** Morphine (Phenanthrene alkaloids), Tramadol (Cyclohexanols), Aspirin (Salicylates), Paracetamol (p-Aminophenols), Synthesis of Tramadol, Paracetamol.	
	II	**2.1 Anti-Neoplastic Drugs** **2.1.1.** Idea of malignancy; Types of Cancer, Causes of cancer, Treatment of cancer (surgery, radiation therapy, chemotherapy). **2.1.2.** Chemotherapeutic agents used in the treatment (Structures not expected):Lomustine (Nitrosoureas), Mitomycin C (Antibiotics), Vincristine; vinblastine; (mechanism of action), Cisplatin (mechanism of action), Fluorouracil (Pyrimidines) **2.1.3.** Synthesis of 5-Fluorouracil from urea. **2.2 Anti-HIV Drugs** **2.2.1.** Introduction of AIDS and HIV, pathogenecity, Symptoms of AIDS, mode of transmission, prevention, Diagnosis and treatment **2.2.2.** Reverse transcriptase inhibitors (AZT, Stavudine (Pyrimidines), DDI (Purines) **2.3 Cardiovascular drugs**	**(3L)** **(2L)** **(3L)** **(2L)** **(2L)** **(3L)**

		2.3.1. Introduction, Classification based on pharmacological action **2.3.2.** Enalapril (-amino acids), Isosorbide dinitrate (Nitrates), Atenoldol (Aryloxy propanol amines), Nifedipine (Pyridines), Furosemide (Sulfamyl benzoic acid), Synthesis of Furosemide, Atenolol **2.3.3.** Drug Therapy and Renin-Angiotensin System. **2.4 Antidiabetic Agents** **2.4.1.** Introduction and types of diabetes; Insulin therapy **2.4.2.** Antidiabetic agents - Glibenclamide (sulphonyl ureas – mode of action), Metformin (Biguanides) **2.5 Antiparkinsonism Drugs** **2.5.1.** Introduction **2.5.2.** Procyclidine hydrochloride (Pyrrolidines), Ethopropazine hydrochloride (Phenothiazines), Laevodopa (alpha-amino acids) Synthesis of Levodopa from Vanillin. **2.6 Drugs for Respiratory System** **2.6.1.** General idea of Expectorants; Mucolytes; Bronchodilators Decongestants and Antitussives **2.6.2.** Bromhexine hydrochloride (Phenyl methyl amines), Salbutamol, Pseudo-ephedrine (Phenyl ethyl amines) Oxymetazoline (Imidazolines) Codeine Phosphate (Opiates)	

		Synthesis of Salbutamol	
	III	**3.1 Introduction to Dyestuff Chemistry** **3.1.1** Important landmark in the history of dyes **3.1.2**. Natural colouring matter and their limitations: e.g., Heena, Turmeric, kesar, Chlorolphyll, Indigo, Alizarine from roots of madder plants, Logwood. Tyrian Purple. **3.1.3.** Synthetic Dyes: Important milestones, i.e. Mauve, Diazotization, aniline Yellow, Congo Red, Synthesis and structure of Indigo, disperse Dye, fluorescent Brighteners, procion reactive Dyes, Remazole Dyes. (Emphasis on Name of the Scientist and dyes and the year of the discovery is required and structure is not expected. **3.1.4.**Definition of dyes, Properties i.e. colour, Chromophore and Auxochrome, Solubility, Linearity, Coplanarity, fastness properties, substantivity, Economic viability. **3.1.5.** Explanation of nomenclature of commercial dyes with at least one example. Suffixes-G, O, R, B, 6B, GK, 3GK, 6GK, L, S Explanation: naming of dyes by colour index(two examples) **3.2. Classification of dyes based on constitution**	**(5L)** **(5L)** **(5L)**

		(Examples are mentioned below with structures) Nitro Dyes-Napyhol yellow S, Nitroso Dye-Gambine Y, Azo Dyes- (a) Monoazo Dyes- Metanil yellow (b) DiazoDyes- Napthol Blue Black (c)Triazodyes -Chloroamine Green B, Diphenymethane Dyes-Auramine G, Triphenyl methane Dyes- (a) Malachite Green Series- Naphthalene green V (b) Magenta Series- Acid Magenta (c) Rosolic acid series-Chrome Violet, Heterocyclic Dyes, Xanthene-Rhodamine 6G, Acridines-Acriflavine, Azines-Safranine B, Oxazines-Capri blue, Thiazines-Methylene Green, Quiolines-Quinoline Yellow, Thiazoles-Primuline, Benzoquinones and naphthaquinones – Napthazarin, Anthraquinone Dyes-Indanthrene, Turquoise Blue 3GK, Indigoids-Indigo Caramine, Pthacyanines-Sirius Light green FFGL **3.3 Classification Based on Application** Definition, fastness properties & applicability on substrates examples with structures (a) Acid Dyes- Orange II, (b) Basic Dyes-methyl violet, Victoria Blue B (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-Erichrome Black A, Alizarin. (f) Vat Dyes- Indanthrene brown RRD, Indanthrene Red 5GK. (g) Sulphur Dyes- Sulphur Black T (no structure) (h) Disperse Dyes-Celliton Fast brown 3R, perlon fastblue FFR (i) Reactive Dyes-cibacron Brillant Red B,procion briilant Blue HB.	
	IV	**4.1 Intermediates** **4.1.1.** A brief idea of Unit processes **4.1.2.** Introduction of primary intermediates, unit processes **4.1.3.** Nitration, Sulphonation, Halogenation, Diazotization: 3 different methods, importance, Ammonolysis, Oxidation N.B.: Definition, Reagents Examples with reaction conditions (mechanism is not expected) **4.2 Preparation of the following Intermediates**. **4.2.1** Benzene derivatives: Benzenesulphonic acid; 1,3-Benzenedisulphonic acid; phenol; resorcinol; sulphanilic acid; o-,m-,p-chloronitrobenzenes; o-,m-,p-nitroanilines; o-,m-p- phenylene diamines; Naphthol ASG. **4.2.2** Naphthalene derivatives: α,β-Naphthols; α,β-Naphthylamines; Schaeffer acid, Tobias acid;	**(5L)** **(7 L)** **(3L)**

		Naphthionic acid; N.W. acid; Clev-6-acid; H acid; Naphthol AS. **4.2.3** Anthracene derivatives: 1Nitroanthraquinone;1Aminoanthraquinone;2-Aminoanthraquinone; 2-Methylanthraquinone; anthraquinone-1-sulphonic acid; Anthraquinnone-2-sulphonic acid; 1-Chloroanthraquinone; Chloroanthraquinone; Benzanthrone. **4.3 Dyeing Method of Cotton Fibres** **4.3.1** Direct dyeing, Vat dyeing, Mordant dyeing, Disperse dyeing **4.3.2** Forces binding of dyes to the fibres: Ionic forces, Hydrogen bonds, Van-der-Wall's forces, Covalent linkages.	

Semester V
Practical

RUSACPDD501	Drugs & Dyes		Credits
		Drug preparation	**02**
	1.	Preparation of Methyl Salicylate from Salicylic Acid	
	2.	To write the monograph of Paracetamol and Aspirin from I.P.	
		Drug Estimation	
	1.	Estimation of Ibuprofen	
	2.	Estimation of Acid neutralizing capacity of antacid	
		Dyes Preparation	
	1.	Preparation of Orange-II	
	2.	Preparation of p-Nitroacetanilide from Acetanilide	
		Dyes Estimation	
	1.	Estimation of Primary amino group by diazotization	

References:

1. Medical Chemistry by V K Ahluwalia, Madhu Chopra, Ane's Books Pvt. Ltd.
2. Organic Chemistry of Drug Discovery and Drug Design – Richard B. Silvermann
3. Medicinal Chemistry – Shreeram and Yogeshwari (Pearson)
4. Chemistry of dyes and principles of dyeing, Shenai V.A., Sevak publications, 1973

MODALITY OF ASSESSMENT

Theory Examination Pattern:

A) Internal Assessment 40% **40 Marks**

Sr No	Evaluation type	Marks
1	One Assignment	10
2	One class Test (multiple choice questions / objective/ drawing structure of drugs and dyes)	20
3	Active participation in class	05
4	Overall conduct, participation in curricular and co-curricular activities.	05

B) External Examination – 60% (60 Marks)

Semester End Theory Examination-

i. **Duration-** These examinations shall be of **two hours** duration

ii. **Theory question paper pattern**: There shall be **four questions** each of **15 marks,** one on each unit**.** All questions shall be compulsory with internal choice within the questions.

Questions	Options	Marks	Questions on
Q.1) a)	Any 3 out of 5	12	Unit I
Q.1) b)	Any 1 out of 2	03	
Q.2) a)	Any 3 out of 5	12	Unit II
Q.2) b)	Any 1 out of 2	03	
Q.3) a)	Any 3 out of 5	12	Unit III
Q.3) b)	Any 1 out of 2	03	
Q.4) a)	Any 3 out of 5	12	Unit IV
Q.4) b)	Any 1 out of 2	03	

Practical Examination Pattern:

A) Internal Examination

Particulars	Marks
Journal	05
Experimental Work	30
Active Participation	05
Total	**40**

B) External Examination: Semester end practical examination 60 M

Sr.No.	Particulars	Marks
1)	**Laboratory Work**	25 + 25
2)	**Viva- Voce**	05 + 05
	Total	60

PRACTICAL BOOK / JOURNAL:

The students are required to present a duly certified journal for appearing at the practical examination, failing which they will not be allowed to appear for the examination.

In case of loss of Journal and/ or Report, a Lost Certificate should be obtained from Head/ Coordinator / In charge of the department; failing which the student will not be allowed to appear for the practical examination.

Overall Examination and Marks Distribution Pattern

Course	RUSACDD501		Total
	Internal	External	
Theory	40	60	100
Practical's	40	60	100

SEMESTER VI
Course Code: RUSACDD601
Course Title: Drugs & Dyes
Academic year 2020-21

Course Outcomes :

After studying the course, the learner will be able to:	
CO 1	Outline the principles involved in drug designing and metabolism of drugs inside the human body.
CO 2	Classify various chemotherapeutic agents with respect to their chemical structure, chemical class, therapeutic uses, and side effects
CO 3	Compare the relation between color and chemical constitution of dyes.
CO 4	Explore various applications of dyes.
CO 5	Write the reactions involved in the synthesis of some representative drugs and dye intermediates.

DETAILED SYLLABUS

Course Code		**Drugs & Dyes**	**Credits-02**
RUSACDD601	**Unit**	**Unit Title**	**Lectures**
	I	**1.1 Drug Discovery, Design and Development** **1.1.1** Discovery of a Lead compound: Screening, drug metabolism studies and clinical observation. **1.1.2** Drug development from Natural Sources: Anti infective agents Anti cancer agents CNS agent **1.1.3** Development of drug: The Pharmacophore identification, modification of structure or functional	**(5L)** **(4L)** **(6L)**

		group, Structure activity relationship (Benzodiazepines, Sulphonamides). **1.1.4** Structure modification to increase potency: Homologation, Chain branching, Ring-chain transformation, Extension of the structure. **1.1.5** Computer assisted drug design. **1.2 Drug Metabolism** **1.2.1.** Introduction, Absorption, Distribution, Bio-transformation, Excretion. **1.2.2.** Different types of chemical transformation of drugs with specific example 1**.3 Chemotherapeutic Agents** Study of the following chemotherapeutic agents with respect to their chemical structure, chemical class, therapeutic uses, and side effects. **1.3.1 Antibiotics** Definition, Characteristics and properties of: Amoxicillin; Cloxicillin (lactum antibiotics) Cephalexin (Cephalosporins), Doxycycline (Tetracyclines), Gentamycin (Aminoglycosides), Ciprofloxacin (Quinolones) Synthesis of Ciprofloxacin **1.3.2 Antimalarials** Types of malaria: Symptoms; pathological detection during window period (Life cycle of the parasites not o be discussed) Chloroquine (3-Amino quinolines) Paludrine (Biguanides) Pyrimethamine (Diamino pyrimidines) Artemether (Benzodioxepins)	

		Following combination to be discussed (i) Sulfadosine-Pyrimethamine (ii) Atremether-Lumefantrine (no structure) Synthesis of Paludrine.	
	II	**2.1 Anti-inflammatory Drugs** **2.1.1.** Mechanism of inflammation and various inflammatory conditions. **2.1.2.** Prednisolone, Betamethasone (Steroids), Aceclofenac (N- Aryl anthranilic acids), Mefanic Acid (N-Aryl anthranilic acids). Synthesis of Aceclofenac. **2.2 Antiamoebic Drugs** **2.2.1.** Types of Amoebiasis **2.2.2.** Metronidazole; Diloxamide furoate (Furans) **2.2.3.** Following combination therapy to be discussed: Ciprofloxacin-Tinidazo Synthesis of Metronidazole **2.3 Antitubercular Drugs** **2.3.1.** Types of Tuberculosis; Symptoms and diagnosis of Tubeculosis. **2.3.2.** General idea of Antibiotics used in their treatment. **2.3.3.**Streptomycin, Rifampin, PAS (Aminosalicylates), Isoniazide (Hydrazides), Pyrazinamide (Pyrazines), (+) Ethambutol (Aliphatic diamines) Synthesis of Ethambutol. **2.4 Antileprotic Drugs**	**(2L)** **(3L)** **(2L)** **(3L)** **(2L)** **(3L)**

		2.4.1. Introduction, Types **2.4.2** Classification of anti-leprotic agents Ethionamide (Thioamides), Dapsone (Sulfonamides), Clofazimine (Phenazines) Synthesis of Dapsone **2.4.3.** Following combination therapy to be discussed for the treatment of Tuberculosis and Leprosy: (i) Rifampin + Ethambutol + Pyrazinamide (ii) Rifampin + Isoniazide + Pyrazinamide (iii) Rifampin + Clofazimine + Ethionamide. **2.5 Drug Intermediates: Synthesis and uses** (i) 2,4,5-Triamino-6-hydroxypyrimidine from Guanidine. (ii) 3-Chloro-5-sulphonyl amino anthranilic acid from 3-Chloro-2-toludine (iii) p-[2'-(5-Chloro-2-methoxy benzamido) ethyl]-benzenesulphonamide from Methyl-5-chloro-2-methoxybenzoate (iv) 4-(p-Chlorophenyl)-4-hydroxypiperidine from 4-Chloroacetophenone. (v) p-Acetyl amino benzenesulphonyl chloride from Aniline (vi) Epichlorohydrine from propene. **2.6 Nano particles in Medicinal Chemistry**	

		2.6.1. Introduction, Carbon nano particles (structures), Carbon nano tubes: Functionalisation for Pharmaceutical applications. Targeted drug delivery in vaccine (Foot and mouth disease) Use in Bio-physical treatment. **2.6.2** Gold nano particles in treatment of cancer, Parkinsonism, Alzheimer. **2.6.3.** Silver nano particles: Antimicrobial activity.	
	III	**3. 1 Colour and chemical constitution of dyes** **3.1.1** Absorption of visible light, colour of wavelength absorbed, complementary colour. **3.1.2** Relation between colour and chemical constitution. (i) Armstrong theory (quinonoid theory) and its limitations (ii) 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 (iii) Molecular Orbital Theory. **3.2. Non-textile Uses of Dyes** Structural features of the substrate, fastness and other property requirements and main classes of dyes used to be mentioned as applicable. (Two examples with structures for each of the following.) 1. Leather 2. Paper 3. Foodstuff 4. Cosmetics 5. Medicinal 6. Biological Stains 7.	**(5L)** **(6L)** **(2L)** **(2L)**

		Indicator & Analytical Reagents 8. Coloured Smokes & Camouflage colours 9. Laser Dyes. **3.3 Optical Brighteners** General idea and important characteristics of optical brighteners, one example eachwith structure of the following classes: Stilbene, Coumarin, Heterocyclic vinylene derivatives, Diaryl pyrazolines, Naphthalimide derivatives. **3.4 Organic Pigments** General idea, distinguish between dyes and pigments, important characteristics of organic pigments, Toners, Lakes, Classification of organic pigments with suitable examples, i.e. Ionic Pigments-Lake of acid and basic dyes. Non-ionic pigments-Azo, Indigoid, Anthraquinone, Quinacridone, Phthalocyanine (Copper phthalocyanine).	
	IV	**4.1 Synthesis of Specific Dyes and their Uses** **i.** Orange IV from sulphanilic acid **ii.** Eriochrome Black T from β-naphthol **iii.** Eriochrome Red B by using ethyl aceto acetate and 1-amino-2-naphthol-4-sulphonic Acid. **iv.** Direct Deep Black EW by using benzidine, H acid, aniline, and m-phenylen diamine. **v.** Congo Red from nitrobenzene **vi.** Diamond Black F by using 5-amino salicylic acid, N.W. acid and α-naphthylamine.	**(12L)** **(1L)**

		vii. Malachite Green by using benzaldehyde and N,N-dimethylaniline. **viii.** Auramine O from dimethylaniline **ix.** Methylene Blue by using 4-amino-N,N-dimethylaniline and N,N-dimethylaniline **x.** Safranine T by using o-toluidine and aniline **xi.** Pararosaniline by using p-toluidine and aniline **xii.** Alizarine Cyanine Green G by using phthalic anhydride and p-cholorophenol **xiii.** Indanthrene from anthraquinone **xiv.** Disperse Yellow 6G from benzanthrone **xv.** Indigo from aniline **xvi.** Eosine by using phthalic anhydride and resorcinol **xvii.** Bismark Brown from m-phenylenediamine. **4.2 Types of Fibres and Classes of Dyes Applicable to them** Introduction to the following types of fibres with structures and classes of dyes applicable to it. Cotton, Wool, Silk, Polyester. **4.3 Ecology and Toxicity of Dyes** With reference to the textile dyes, food colours, benzidine etc.	**(2L)**

Semester VI
Practical

RUSACPDD601	Drugs & Dyes		Credits
	Drug Preparation		**02**
	1.	Preparation of Aspirin from Salicylic Acid	
	Drug Estimation		
	1.	Estimation of Tincture of Iodine	
	Dye Preparation		
	1.	Preparation of m-dinitrobenzene	
	2.	Preparation of m-nitroaniline	
	Dye Estimation		
	1.	Estimation of Methyl Orange/ Eriochrome Black T/Eosin/Congo Red by colorimetry	
	Dyeing of fabric (cotton)by Direct Dyeing or by Vat Dyeing.		

References:

1. Medical Chemistry by V K Ahluwalia, Madhu Chopra, Ane's Books Pvt. Ltd.
2. Organic Chemistry of Drug Discovery and Drug Design – Richard B. Silvermann
3. Medicinal Chemistry – Shreeram and Yogeshwari (Pearson)
4. Chemistry of dyes and principles of dyeing, Shenai V.A., Sevak publications, 1973

MODALITY OF ASSESSMENT

Theory Examination Pattern:

A) Internal Assessment 40% **40 Marks**

Sr No	Evaluation type	Marks
1	One Assignment	10
2	One class Test (multiple choice questions / objective/ drawing structure of drugs and dyes)	20
3	Active participation in class	05
4	Overall conduct, participation in curricular and co-curricular activities.	05

B) External Examination – 60% (60 Marks)

Semester End Theory Examination-

iii. **Duration-** These examinations shall be of **two hours** duration

iv. **Theory question paper pattern**: There shall be **four questions** each of **15 marks,** one on each unit**.** All questions shall be compulsory with internal choice within the questions.

Questions	Options	Marks	Questions on
Q.1) a)	Any 3 out of 5	12	Unit I
Q.1) b)	Any 1 out of 2	03	
Q.2) a)	Any 3 out of 5	12	Unit II
Q.2) b)	Any 1 out of 2	03	
Q.3) a)	Any 3 out of 5	12	Unit III
Q.3) b)	Any 1 out of 2	03	
Q.4) a)	Any 3 out of 5	12	Unit IV
Q.4) b)	Any 1 out of 2	03	

Practical Examination Pattern:

A) Internal Examination

Particulars	Marks
Journal	05
Experimental Work	30
Active Participation	05
Total	**40**

B) External Examination: Semester end practical examination

(60 Marks)

Sr.No.	Particulars	Marks
1)	**Laboratory Work**	25 +25
2)	**Viva- Voce**	05 + 05
	Total	60

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Overall Examination and Marks Distribution Pattern

Course	RUSACDD601		Total
	Internal	External	
Theory	40	60	100
Practical's	40	60	100