FATIMA COLLEGE (AUTONOMOUS)

Re-Accredited with 'A++' (CGPA 3.61) by NAAC (Cycle - IV)
Maryland, Madurai- 625 018, Tamil Nadu, India

NAME OF THE DEPARTMENT : CHEMISTRY

NAME OF THE PROGRAMME : B.Sc. CHEMISTRY

PROGRAMME CODE : UACH

ACADEMIC YEAR : 2022-2023

Fatima College (Autonomous) Madurai-18

The Minutes of the Board of Studies
Department of Chemistry
To be implemented from 2022-2023 onwards
Convened on 21.3.2022. Convened at 2 p.m
Venue : R3

External Members

S.No.	Name	Designation
1	Dr.S. Murugesan Professor, Dept. of Inorg. Chem. SOC, MKU, Madurai-21	University Nominee 21/3/22
2.	Dr. S. Abraham John Prof. of Chemistry GRI (Deemed to be University) Gandhigram Dindigul	Subject Expert 21/3/22
3.	Dr. A. Mary Imelda Jayaseeli Associate Professor & Head Jeyaraj Annapackiam College for Women Periyakulam	Subject Expert 21/3/2022
4.	Mr. S. Manikandan Senior Research Associate Par Pharma, R&D. Dept. Chengalpattu	Industrialist (Absent)
5.	Miss. B. Shobana Research scholar, Research Dept. of Chemistry, Thiagarajar college, Madurai	Alumna. 21/03/22

6	Dr. N. Malathi	Dean of Academic Affairs
7.	Dr. S. Sukumari	Staff Member
8.	Dr. A. Rajeswari	Staff Member
9.	Dr. B. Vinosha	Staff Member
10	Dr. B. Suganthana	Staff Member
11	Dr. Sr. Arul Mary	Staff Member
12	Dr. V. Arul Deepa	Staff Member
13	Mrs. R.M. Nagalakshmi	Staff Member
14.	Dr. M. Priyadharsani	Staff Member
15	Dr. K.M. Subimol	Staff Member
16	Dr. P. Sylvia Reeta	Staff Member

1. Action Taken Report For 2021-2022 - For M.Sc Chemistry

S.No	Common suggestion offered in the Previous Board	Action Taken for the Academic Year 2021-22
1.	21PGC2SL1 - Research methodology - Plagiarism can be added in unit V	Included in unit V
2.	In EDC paper - Instead of fertilizer Oil Analysis can be included	Fertilizers is removed & Oil unit is included as unit V

Change of Course Title

S.No	Old Course Code	New Course Code	Old Course Title	New Course Title	Need for Change
—	—	—	—	NIL	—

New Courses Introduced

For B.Sc.

S.No	Course Code	Course Title	Relevance to				Scope for			Need for
			L	R	N	G	EMP	ENTRE	SD	Introduction
1.	21C2SL A1	Household Products Marketing		R			EMP	ENTRE		To make Leaves Entrepreneurs

Internal Members.

1. Dr. N. Malathi Dean of Academic Affairs. Staff Member - Dept of Chemistry

N. Malathi
24/03/2022

S.NO.	Name	
1.	Dr. B. Medona [Head of the Dept.]	B. Medona.
2	Dr. S. Sukumari	S.
3.	Dr. A. Rajeswari	
4	Dr. B. Vinosha	
5.	Dr. B. Sugantharaj	
6	Dr. Sr. Arul Mary	
7	Dr. V. Arul Deepa	
8.	Mrs. R.M. Nagalakshmi	
9.	Dr. M. Priyadharsini	
10.	Dr. K.M. Subimol	
11.	Dr. P. Silviya Reeka.	

Members Present.

1.	Dr. B. Medona	Head of the Department
2.	Dr. S. Murugesan, Professor, Dept of Inorganic Chemistry, SOC, MKU	University Nominee
3	Dr. S. Abraham John, Professor, Dept of Chemistry, GRI, Dindigul	Subject Expert
4	Dr. A. Mary Imelda Jayaseeli, Head & Associate Prof. of Chemistry JAC, Periyakulam	Subject Expert
5	Miss. B Shobana Research Scholar, Research Dept of Chemistry Thiagarajar College, Madurai	Alumna.

For M. Sc.

S.No	Course Code	Course Title	Relevance to				Scope for			Need for Introduction
			L	R	N	G	EMP	EMRE	SD	
1.	21PGC2 SL1	Research Methodology				G	EMP		SD	offered to the advanced Learners
2.	21C1EDC / 21C2EDC	Analysis of Soil, Water Food, Cosmetics And oil.			N		EMP		SD	As per the Recommendation of course Teachers

Revised Courses -

S.No	Course code	Course Title	No. & Title of units Revised	% of Revision	Need for Revision	Relevance to				Scope for		
						L	R	N	G	EMP	ENTRE	SD
-	-	-	NIL	-	-	-	-	-	-	-	-	-

2. updation of Open Educational Resources in the list of references of each course.

S.No	Course Code	Course Title	Details of updation
-	-	-	NIL

3 Revision of Courses.

FOR B.SC.

S.No	Course code	Course Title	No. & Title of units Revised with the Revised Content	% of Revision	Need for Revision	Relevance to				Scope for		
						L	R	N	G	EMP	ENTRE	SD
1.	19C4 SB2	NEW TITLE "Dyes and Pigments" Old Title Natural & synthetic Dyes	Unit-IV g-Pigments Title Instead of Structure of Dyes. Revised content - Anthocyanin, Flavones Phthalocyanin, Carotenoids & Chlorophyll	20%	As per the Recommendation of Course Teacher			N		EMP		
2.	19C5CC16	NEW TITLE "Conventional & Green Synthesis OLD TITLE Green chemistry Practicals [Lab Course]	Under Green methods of Preparation of organic compounds - Preparation of Aspirin using MW, use of green Nitrating & Brominating Mixture are used for Nitration & Bromination - Included. Under Conventional Methods - Three New Experiments to be included.	50%	To include Experiments in the revised Lab course, To increase the use of Microwave radiation & Greener Reagents				G	EMP		SD

For M.Sc.

S.No	Course Code	Course Title	No. & Title of units revised with the revised content	% of Revision	Relevance to L	R	N	G	Scope for Emp	Entre	SD
1.	19PG4 CI7	Physical Chemistry -IV	Unit I, II & III Title - to be changed as Rotational & Vibrational Spectroscopy, Electronic Spectroscopy & Spin Resonance & Mossbauer spectroscopy with minor Revisions in unit I, II & V In unit III - NMR Spectroscopy - Frequency, Instrumentation & Comparison of NMR with ESR are Included.	15%				G	Emp	Entre	
2.	19PG4 CE3	Analytical Chemistry	Unit I Title for - Error Analysis Unit II - Chromatography Unit V - Computers in Chemistry with minor Changes in Content. Unit III - DTA to be Included	10%				G	Emp	Entre	SD
3.	19PG1C5	New Title organic Qualitative Analysis & Preparation -I Old Title organic Qualitative Analysis	Spectral Analysis of the Synthesized Compounds Using IR and UV are included.	10%			N		Emp		SD
4	19PG2C10	New Title Organic Estimation & Preparation -II Old Title. Organic Estimation & Preparation -II *Quantitative Analysis	Under Estimation - Estimation of Phenol & Aniline are Included instead of Estmn. Of Glucose by Eynon-Lane Method. Under preparation - Spectral Analysis of the synthesized Compounds using UV & IR are included.	20%			N		Emp		SD

4 New Courses Introduced - For B.Sc.

S.No	Course code	Course Title	Relevance to L	R	N	G	Scope for Emp	Entre	SD	Need for Introduction
1.	22N4SLC4	Textile Colouration			N		Emp	Entre		To make Learners Entrepreneur

For M.Sc

S.No	Course code	Course Title	Relevance to				Scope for			Need for Introduction
			L	R	N	G	EMP	ENTRE	SD	
1.	22PGC4SL3	Batteries and its Application			N		EMP	ENTRE		To increase Employability & Entrepreneurship.

5 Introduction of Purely Skill Embedded Certificate Value added Course

S.No	Course Code	Course Title	MOU with Industry/ Organisation	Skills Sharpened	Course outcome
1.	22PGVACC1	Certificate course on Instrumentation in IR	-	Analytical Skill & Employability	To produce Analytical chemist.
2.	22PGVACC2	Certificate Course on Instrumentation in UV	-		
3.	22PGVACC3	Certificate course on Electrochemical Techniques	-		

6 Approval of Ph.D. Course work Syllabus - NIL
7 Rubrics for Internship/Project - NA
Details of Proposed MOU - Planned to have MOU with Materials Research Centre (MRC) Coimbatore.

Other Suggestions	Commendations
1. No need to have External Exam for Self Learning courses.	1. OUR UG & PG Syllabus is Very Good but too heavy.
2. In 19PG4CM - Unit I - Absorption & Emission LASER, EMR Interaction, Einstein Coefficient Can be deleted.	

Dr. B. Medona Head of the Department

21/3/22 Dr. S. Murugesan University Nominee

21/3/22 Dr. S. Abraham John Subject Expert

21/3/2022 Dr. A. Mary Imelda Jayaseeli Subject Expert

21/03/2022 Ms. B. Shobana Alumna

Name of	Signature
Dean of Academic affairs Dr. N. Malathi	21/03/2
Staff Members	
Dr. S. SUKumari	S.
Dr. A. Rajeswari	
Dr. B. Vinosha	
Dr. B. Sugarthana	
Dr. Sr. Arul Mary	
Dr. V. Arul Deepa	
Mrs. R.M. Nagalakshmi	
Dr M. Priyadharsani	
Dr. K.M. Subimol	
Dr P. Sylvia Reeta	

VISION of the department

To transform the students entrusted in our hands into competent chemists.

MISSION OF THE DEPARTMENT

To Transfer the knowledge of chemistry with values to create globally competent chemists.

To Promote scientific enquiry and inculcate research.

To inculcate in students the skills of problem solving.

To create in them the awareness about ecological concerns.

To train to adopt cost effective and eco-friendly green chemistry methodologies.

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

A graduate of B.Sc. Chemistry programme after five years will be

PEO 1	Our graduates will be academic, digital and information literates, creative, inquisitive, innovative and desirous for the "more" in all aspects
PEO 2	They will be efficient individual and team performers, exhibiting progress, flexibility, transparency and accountability in their professional work
PEO 3	The graduates will be effective managers of all sorts of real – life and professional circumstances, making ethical decisions, pursuing excellence within the time framework and demonstrating apt leadership skills

PEO 4	They will engage locally and globally evincing social and environmental stewardship demonstrating civic responsibilities and employing right skills at the right moment.

GRADUATE ATTRIBUTES (GA)

Fatima College empowers her women graduates holistically. A Fatimite achieves all-round empowerment by acquiring Social, Professional and Ethical competencies. A graduate would sustain and nurture the following attributes:

I. SOCIAL COMPETENCE	
GA 1	Deep disciplinary expertise with a wide range of academic and digital literacy
GA 2	Hone creativity, passion for innovation and aspire excellence
GA 3	Enthusiasm towards emancipation and empowerment of humanity
GA 4	Potentials of being independent
GA 5	Intellectual competence and inquisitiveness with problem solving abilities befitting the field of research
GA 6	Effectiveness in different forms of communications to be employed in personal and professional environments through varied platforms
GA 7	Communicative competence with civic, professional and cyber dignity and decorum
GA 8	Integrity respecting the diversity and pluralism in societies, cultures and religions

GA 9	All – inclusive skill sets to interpret, analyse and solve social and environmental issues in diverse environments
GA 10	Self awareness that would enable them to recognise their uniqueness through continuous self-assessment in order to face and make changes building on their strengths and improving their weaknesses
GA 11	Finesse to co-operate exhibiting team-spirit while working in groups to achieve goals
GA 12	Dexterity in self-management to control their selves in attaining the kind of life that they dream for
GA 13	Resilience to rise up instantly from their intimidating setbacks
GA 14	Virtuosity to use their personal and intellectual autonomy in being life-long learners
GA 15	Digital learning and research attributes
GA 16	Cyber security competence reflecting compassion, care and concern towards the marginalised
GA 17	Rectitude to use digital technology reflecting civic and social responsibilities in local, national and global scenario
II. PROFESSIONAL COMPETENCE	
GA 18	Optimism, flexibility and diligence that would make them professionally competent
GA 19	Prowess to be successful entrepreuners and become employees of trans-national societies
GA 20	Excellence in Local and Global Job Markets
GA 21	Effectiveness in Time Management
GA 22	Efficiency in taking up Initiatives
GA 23	Eagerness to deliver excellent service

GA 24	Managerial Skills to Identify, Commend and tap Potentials
III. ETHICAL COMPETENCE	
GA 25	Integrity and be disciplined in bringing stability leading a systematic life promoting good human behaviour to build better society
GA 26	Honesty in words and deeds
GA 27	Transparency revealing one's own character as well as self-esteem to lead a genuine and authentic life
GA 28	Social and Environmental Stewardship
GA 29	Readiness to make ethical decisions consistently from the galore of conflicting choices paying heed to their conscience
GA 30	Right life skills at the right moment

PROGRAMME OUTCOMES (PO)

On completion of B.Sc. Chemistry programme, the learners would be able to

PO 1	Apply acquired scientific knowledge to solve complex issues.
PO 2	Attain Analytical skills to solve complex cultural, societal and environmental issues.
PO 3	Employ latest and updated tools and technologies to analyse complex issues.
PO 4	Demonstrate Professional Ethics that foster Community, Nation and Environment Building Initiatives.

PROGRAMME SPECIFIC OUTCOMES (PSO)

On completion of B.Sc. Chemistry programme, the learners would be able to

PSO 1	Thorough understanding of all basic concepts and theories pertaining to Chemistry
PSO 2	A comprehensive view of bonding,structure,reactivity and stability of chemical species.
PSO 3	An overall perspective view of physical principles that govern all physical and chemical transformations .
PSO 4	Basic knowledge about instrumentation involving UV,IR,ESR and NMR
PSO 5	Hands on experience of laboratory experiments both qualitative and quantitative
PSO 6	Project undertaking enables presentation of results and strengthens the learners in lab to land procedures that nurture societal need and environmental protection.
PSO 7	Diversified informative sources that equip learners to enter varied fields
PSO 8	Additional in-puts of using appropriate software related to Chemistry and chemical calculations

FATIMA COLLEGE (AUTONOMOUS), MADURAI-18

DEPARTMENT OF CHEMISTRY

(FOR THE ACADEMIC YEAR 2022-2023)

PROGRAMME CODE : UACH

Semester	COURSECODE	COURSE TITLE	HRS	CREDIT	CIA Mks	ESE Mks	TOT. Mks
I	19C1CC1	Inorganic Chemistry –I (Atomic Structure, Periodic Table, Acid and Bases, Non-Aqueous Solvents and s-Block Elements)	4	3	40	60	100
	19C1CC2	Organic Chemistry –I (Reaction mechanism, alkanes, cycloalkanes and alkyl halides)	5	4	40	60	100
	19C1CC3	VolumetricAnlaysis-I	3	2	40	60	100
	21C1ACN1	Allied Chemistry I	3	3	40	60	100
	21C1ACZ1	Allied Chemistry -I	3	3	40	60	100
	19C1NME1	Profitable home Industries	2	2	40	60	100
	21C1ACN2	Allied Chemistry Practicals-I	2	2	40	60	100
	21C1ACZ2	Allied Chemistry Practicals-I	2	2	40	60	100
	19C2CC4	Inorganic Chemistry –II (theories of hard and soft acids –bases, chemical bonding and chemistry of group iii, iv, v & vi elements)	4	3	40	60	100
	19C2CC5	Organic Chemistry –II (Alkenes,alkynes,alkadienes, organo metallic compounds, alcohols and ethers)	5	4	40	60	100

II	19C2CC6	VOLUMETRIC ANLAYSIS-II	3	2	40	60	100
	21C2ACN3	Allied Chemistry -II	3	3	40	60	100
	21C2ACZ3	Allied Chemistry -II	3	3	40	60	100
	21C2ACN4	Allied chemistry Practicals	2	2	40	60	100
	21C2ACZ4	Allied chemistry Practicals	2	2	40	60	100
	19C2NME2	Profitable home Industries	2	2	40	60	100
III	19C3CC7	Organic &Inorganic Chemistry (Aromatic Hydrocarbons, Aromatic Electrophilic, Nucleophilic Substitution, Chemistry Of VIIGroup, d-Block Elements)	5	4	40	60	100
	19C3CC8	Physical chemistry-I (Gaseous state, Solutions,dilute solutions,radio activity & Nuclear transformations and nuclear chemistry)	4	3	40	60	100
	19C3SB1	Agricultural chemistry	2	2	40	60	100
	19C3SB1(A)	Dairy Chemistry	2	2	40	60	100
	19C3CC9	Inorganic Qualitative Analysis	3	2	40	60	100
	19P3ACC1	Allied Chemistry –I **(**Theory behind chemical bonding, quantitative and qualitative analysis, kinetics of chemical reactions and thermodynamics**)**	3	3	40	60	100
	19P3ACC2	Allied Chemistry Practicals-I	2	2	40	60	100
	19C4CC10	Inorganic Chemistry-III (Coordination chemistry)	5	4	40	60	100

IV	19C4CC11	Physical chemistry-II (Chemical Kinetics, Solid State And Distribution Law)	4	3	40	60	100
	19C4SB2	Dyes and Pigments	2	2	40	60	100
	19C4SB2(A)	Health and Chemistry	2	2	40	60	100
	19C4CC12	Organic Qualitative Analysis	3	2	40	60	100
	19P4ACC3	Allied Chemistry –I	3	3	40	60	100
	19P4ACC4	Allied Chemistry practicals-II	3	3	40	60	100
V	19C5CC13	Organic chemistry –III (Aldehydes And Ketones, CarboxylicAcids And Their Derivatives, Steroisomerism, Amines And Diazo Compounds And Carbohydrates)	6	4	40	60	100
	19C5CC14	Physical chemistry –III (Thermodynamics, Phase Rule & GroupTheory)	6	4	40	60	100
	19C5ME1	Spectroscopy	5	5	40	60	100
	19C5ME2	Bio-Chemistry	5	5	40	60	100
	19C5SB3	Medicinal chemistry	2	2	40	60	100
	19C5SB4	Nano Science	2	2	40	60	100
	19C5CC15	INORGANIC PRACTICALS (Gravimetric Analysis)	4	2	40	60	100
	22C5CC16	Conventional and Green synthesis	4	2	40	60	100

VI	19C6CC17	Organic chemistry –IV (Polynuclear Hydrocarbons, Heterocyclic Compounds, Amino Acids And Proteins)	5	4	40	60	100
	19C6CC18	Physical chemistry-IV (Electrolytic Conductance And Electrochemistry)	5	4	40	60	100
	19C6ME3	Advanced Organic Chemistry	5	5	40	60	100
	19C6ME4	Polymer Chemistry	5	5	40	60	100
	19C6ME5	Advanced Physical chemistry	5	5	40	60	100
	19C6ME6	Advanced Inorganic chemistry	5	5	40	60	100
	19C6SB5	Computers in Chemistry	2	2	40	60	100
	19C6SB6	Green chemistry	2	2	40	60	100
	19C6CC19	Physical Practicals	6	4	40	60	100

CHEMISTRY- SELF LEARNING

COURSE CODE	COURSE TITLE	Credits	Semester in which the course is offered	CIA Mks	ESE Mks	Total Marks
21UG2SLCA	House Hold Products And Marketing	2	II	40	60	100
22UG4SLNC	Textile Coloration	**2**	**IV**	40	60	100

III.B.Sc.Chemistry
Semester-V
For those joined in 2021-24 Batch onwards

PROGRAME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UACH	22C5CC16	Conventional and Green Synthesis	Lab	4	2

Course description

After the completion of the course the students are able to

- To understand the concept of solvent free reactions
- To know about the use of microwave irradiations in organic synthesis.
- To identify the greener nitrating mixture and brominating agent.
- To learn about the preparation of organic compounds by using conventional methods
- To familiarise about the nanoparticles synthesis by green methods

Course Objective: This paper includes the greener methods of preparationof Organic compounds and nano particles and conventional methods of preparation of organic compounds

i) Greener methods of preparation of organic compounds

1. Preparation of bis-naphthol in solvent free conditions
2. Preparation of Aryl nitro compounds using greener nitrating mixture.
3. Preparation of *p*-bromoacetanilide from acetanilide using greener brominating agent.
4. Preparation of Aspirin using micro wave irradiation
5. Preparation of Benzillic acid from Benzil using greener method.

ii) Greener methods of preparation of Nanomaterials (Demonstration)

1. Preparationof Silver nanoparticles from Silver nitrate
2. Preparation of Zinc oxide from Zinc acetate

Conventional Methods:

1) Preparation of Benzoic acid from Benzaldehyde

2 Preparation of Salicylic acid from methyl salicylate

3) Preparation of Benzoic acid from Benzamide.

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES	PSOs ADDRESSED
CO 1	To understand concept of solvent free reactions	PSO1,PSO5& PSO6
CO 2	To know about the use of microwave irradiations in organic synthesis.	PSO1, PSO5, PSO6& PSO7
CO 3	To identify the greener nitrating mixture and brominating agent	PSO1,PSO5& PSO6
CO 4	To learn about the preparation of organic compounds using conventional methods	PSO1, PSO5& PSO6
CO 5	To familiarise about the silver nanoparticles by green synthesis	PSO1,PSO5, PSO6 & PSO7

Mapping of COs with PSOs

CO/ PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8
CO1	3	1	1	1	3	3	3	1
CO2	3	1	1	1	3	3	3	1
CO3	3	1	1	1	3	3	3	1
CO4	3	1	1	1	3	3	3	1
CO5	3	1	1	1	3	3	3	1

Mapping of COs with POs

CO/ PSO	PO1	PO2	PO3	PO4
CO1	3	3	3	3
CO2	3	3	3	3
CO3	3	3	3	3
CO4	3	3	3	3
CO5	3	3	3	3

Note: ♦ Strongly Correlated – **3** ♦ Moderately Correlated – **2**

♦ Weakly Correlated -**1**

COURSE DESIGNER

1. **Dr.Sr.ArulMary.J**
2. **Dr. S.Sukumari**

Forwarded By

HOD'S Signature & Name

SELF LEARNING INTERDISCIPLINARY COURSE

SEMESTER –IV

Offered by The Research Centre of Home Science and Department of Chemistry

(For those who joined in 2021 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UAHS	22UG4SLNC	Textile Coloration	Self Learning	-	2

COURSE DESCRIPTION

This course enlightens the students on the textile fibres, dyes and the coloration process. It also deals with the application process of mordant and disperse dyes.

COURSE OBJECTIVES

CO1: To gain knowledge about textile fibres and dyes
CO2: To understand the textile coloration process
CO3: To develop familiarity with the machinery used for dyeing and the application process
CO4: To study the concept of mordant dyes and properties
CO5: To learn about disperse dyes and the process of dispersion

UNITS

UNIT –I FIBRES AND DYES

Classification of textile fibres, types of dyes, suitability to textile fibres.

UNIT –II COLORATION PROCESS

Stages of dyeing. Methods of dyeing fabrics: jet dyeing, jig dyeing, pad dyeing and beam dyeing.

UNIT –III MACHINERY AND APPLICATION

Machinery: Conical-pan-loose-stock machine, The Hussong machine, Package dyeing machine, The Winch dyeing machine.

Application process: Forces by which dye molecules are bound to fibre (i) ionic force (ii) hydrogen bonding(iii) van der Waals forces (iv) covalent chemical linkages

UNIT –IV MORDANT DYES

Introduction -Natural mordant dyes - Synthetic mordant dyes- structure and properties of Eriochrome Black A and Alizarin.

UNIT –V DISPERSE DYES

Introduction – Ion amines, disperse acetate dyes and solacet dyes - Chemical structure of disperse dyes- Dispersion process -Function of dispersing agents

UNIT –VI DYNAMISM (Evaluation Pattern-CIA only)

REFERENCES:

1. Shailaja D.Naik, Jacquie A Wilson, 'Surface Designing of Textile Fabrics', New Age International(P) Ltd; Publishers, New Delhi (2006)

2.P.V.Vidyasagar, 'Handbook of Textiles', Mittal Publications, New Delhi (1998)

3. SusheelaDhantyagi, 'Fundamentals of Textiles and their care', Orient Longman, New Delhi. (1991)

4. B.K.Sharma-—Industrial Chemistry , Goel Publishing co,1997
5. R.Chatwal —Synthetic Dyes‖-Himalayan Publishing House,1995
6. V.A.Shenai, Chemistry of Dyes and Principles of Dyeing.

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