ANNA UNIVERSITY, CHENNAI

NON-AUTONOMOUS COLLEGES AFFILIATED COLLEGES

REGULATIONS 2021

CHOICE BASED CREDIT SYSTEM

B. TECH. TEXTILE CHEMISTRY

1. PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

Bachelor of Textile Chemistry curriculum is designed to prepare the graduates having attitude and knowledge to

a) Have powerful base to pursue a successful professional and technical career
b) Have strong foundation in basic sciences, mathematics, engineering and experimentation skills to comprehend the manufacturing processes and provide practical and innovative solutions.
c) Have knowledge on the theory and practices in the field of textile chemistry and allied areas to manage textile chemical processing industry and provide techno-economic solutions to the problems.
d) Engross in life-long learning to keep abreast with emerging technology
e) Practice and inspire high ethical values and maintain high technical standards

2. PROGRAMME OUTCOME (POs)

1. Apply knowledge of the fundamental principles of mathematics, science and textile wet processing to solve complex technological problems.
2. Identify and analyse, with the aid of relevant research surveys, complex technical problems related to textile chemical processing using modern resources and tools and the fundamental principles of mathematics and engineering sciences
3. Apply creativity in the design of systems, components or processes related to textile chemical processing so as to meet specifications and with due consideration for public health and safety, and those related to cultural, societal and environmental issues.
4. Conduct, analyse and interpret experiments to investigate problems in textile chemical processing and apply the results to improve process and product quality Ability to communicate effectively and work in interdisciplinary groups.
5. Create, select and apply appropriate techniques, resources, and modern technological and IT tools in professional work related to textile chemical processing
6. Apply logical thinking derived from knowledge of textile chemical processing to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to professional work
7. Demonstrate an understanding of the impact of professional textile chemical processing solutions in societal and environmental contexts, and display knowledge of, and the dire need for sustainability

8. Apply ethical principles and commit to professional ethics and responsibilities, and norms of professional practice
9. Function effectively as an individual, and as a member or leader in diverse teams working in textile / garment / textile processing related projects, and in multidisciplinary settings
10. Communicate effectively with the professional community, comprehend and write effective reports, give and receive clear instructions, and make professional presentations effectively
11. Apply knowledge of management principles in project management, finance and continuous improvement in professions related to textile chemical processing
12. Recognise the need for, and display ability to engage in lifelong learning to keep in line with changing technology.

3. PROGRAM SPECIFIC OUTCOMES (PSOs):

By the completion of Textile Chemistry program, the student will have following program specific Outcomes.

1. Foundational knowledge to make a successful career in textile wet processing and textile products sectors.
2. Adequate soft and communication skills to effectively face industry and society.
3. Graduates with professional ethics and social responsibility.
4. Graduates with ability to understand problems of the textile wet processing sector and design and develop solutions.

PEO's – PO's & PSO's MAPPING:

PEO	PO's												PSO's			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
a	3	2	3	2	2	3	-	1	2	1	1	2	3	-	-	1
b	3	2	2	3	-	-	3	-	-	-	-	-	2	2	-	3
c	-	-	2	3	2	-	-	-	-	-	-	-	3	2	1	3
d	-	3	2	-	-	-	-	-	-	-	-	3	1	-	-	-
e	-	-	-	-	-	-	-	3	-	-	-	-	-	1	3	-

PROGRAM ARTICULATION MATRIX

		Course Name	PO												PSO			
			1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
YEAR I	SEM	Professional English - I																
		Matrices and																

		Calculus																
		Engineering Physics																
		Engineering Chemistry																
		Problem Solving and Python Programming																
		Problem Solving and Python Programming Laboratory																
		Physics and Chemistry Laboratory																
	SEMESTER II	Professional English - II																
		Statistics and Numerical Methods																
		Physics for Textile Technologists																
		Basic Electrical, Electronics and Instrumentation Engineering																
		Engineering Graphics																
		Chemistry for Textile Technologists																
		Engineering Practices Laboratory																
		Basic Electrical, Electronics and Instrumentation Engineering Laboratory																
YEAR II	SEMESTER III	Probability and Statistical Methods																
		Polymer And organic Chemistry	1.4	1.5	1	1	1.3	1.4	1.2	1	1	1	0.5	1	2.2	1.2	1.8	1.6
		Preparation of Textiles for Coloration	1.5	2	1.8	2	1.2	1.7	2.2	1.7	2	1.5	0.5	1.6	2	1.4	2	1.4
		Structure and Properties of Fibres	1.6	2	1	1.8	1	2	1.5	0.5	1	1.6	0.5	1.6	1.8	1.2	1.4	1.4
		Technology of Yarn and Fabric Manufacturing	2.4	2.4	2.2	2.4	1.4	1.4	1.4	2.2	2.4	2.2	2.2	2.2	3	2	3	2.4
		Chemistry of	2.	1.	1.	1	1.	2	1.	1.	1.	1.	1	2	1.	1.	1.	2

		Textile Auxiliaries	4	8	2		4		6	6	3	2			8	4	4	
		Yarn and Fabric Manufacturing Laboratory	2.4	1.6	1.4	1.6	1.5	1.6	1.6	1.2	2	1.6	1.2	2.2	2.4	1.2	1.6	2.2
		Fibre Science Laboratory	2.6	2.2	2	1.4	1.2	1	2	1.4	1	2	1	1	2.8	2.2	2	2
	SEMESTER IV	Chemistry and Technology of Intermediates and Dyes	2.4	1.8	1.2	1	1.4	2	1.6	1.6	1	1.2	1	2	2.2	1.4	1.6	2
		Physical Testing of Textile Materials	2.4	2.4	2.2	2.8	1.8	1.6	-	1.6	-	2.6	2.6	-	2.6	3	3	2.4
		Principles and Theory of Dyeing	2.6	2.2	1.6	1.6	1.4	1.6	1.8	1.8	2	1.6	1.2	2.2	2.4	1.6	2.4	2.4
		Dyeing of Cellulosic and Protein Materials	2.6	2.2	1.4	1.8	1.6	1.4	1.6	1.6	1.2	1.6	1.6	2.2	2.6	2.2	1.2	2.2
		Technology of Printing	2.4	2.2	1.6	1.2	2	1.6	1.4	1.6	1	1.8	1.6	2.2	2.4	1.6	2.2	2.4
		Environmental Science and Sustainability																
		Physical Testing of textile Material Laboratory	2	1.4	1.6	2	1.4	1	2	1	1	1.8	1.4	2	2.4	1.4	1.4	2
		Wet Processing Preparation Laboratory	2	1.8	2.6	1.6	1	1.6	1.2	2	1.6	2	2	1	3	2	2	1.6
		Textile Chemical Analysis Laboratory	2	1.4	1.2	1.8	1.2	1.8	1.6	1.4	1.4	1.6	1.2	2	2.4	1.8	1	2
YEAR III	SEMESTER V	Production and Dyeing of Synthetic Materials	3	3	2	2	1.4	1.4	1.8	1.4	2	2	2	2	3	2.6	1.4	2.8
		Life Skills and Soft Skills																
		Textile Dyeing and Printing Laboratory	2.6	2.4	1.6	1.8	1.8	1.2	1.6	1.6	1.6	1.4	1	2	2.2	2	1	2
		Shade Matching And Quality Control Laboratory	2.6	1.8	2.6	1.6	1	1.6	1.2	2	1.6	2	2	1	3	2	1.6	2
	SEMESTER VI	Textile Finishing	2.6	2.8	2	2	1.4	1.4	1.8	1.4	2	2	1	2	3	2.6	1	2.8
		Eco-Friendly dyes, chemicals and Processing	2.6	2	1.8	1.4	1.2	2	2	1.2	1.6	1.8	1	2.2	2	1.6	2	2.6
		Dyeing of Synthetic	3	2.4	1.6	1.8	1.8	1	1.6	1.6	1.6	1.4	1	2	2.2	2	1	2

		Textile Laboratory																
		Textile Finishing Laboratory	2	1.6	1.4	1.2	1.8	1.4	1.6	1.6	2	1.6	1	2	2.4	1.6	1.4	2.2
YEAR IV	SEMESTER VII	Effluent Treatment and Pollution Control	2.4	1.6	1.4	1.6	1.4	1.2	1.8	1.6	1.4	1.6	1	1.8	2.4	2	1.2	2.2
		Process and Quality control in Textile Wet Processing	2.4	1.8	1.2	1	1.4	2	1.6	1.6	1	1.2	1	2	2.2	1.4	1.6	2
		Ethics and Human values																
		Elective – Management																
		Summer Internship	3	2	2.6	2.8	2	2	2.1	2.1	3	2.4	2.6	2.6	2.8	2.4	1	2
	SEMESTER VIII	Project Work	3	3	3	3	1	1	1	2	2	2	2	1	3	2	1	3

	Course Name	PO												PSO			
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
PROFESSIONAL ELECTIVES	Manufacturing and Processing of Knitted fabric	3	2.4	2	2.4	1.8	2	2	2	1	2	2	2.4	2	3	3	2.4
	Nanotechnology in Textile Processing	2.6	2.8	2	2	1.4	1.4	1.8	1.4	2	2	1	2	3	2.6	2.8	1.4
	Coated and Laminated Textiles	1.8	1.4	1.8	1.8	1	1.4	1.4	1.4	1.4	1.8	1	1.8	2	2.4	1	3
	Functional Finishes	2.6	2.8	2	2	1.4	1.4	1.8	1.4	2	2	1	2	3	2.6	1.4	2.8
	Modern Printing Technology	2.4	2.2	1.6	1.2	2	2	1.4	1.6	1	1.8	1.6	2	2.4	1.6	2.2	2.4
	Advanced Wet Processing Machineries	2.2	1	1	2.6	1	2.4	2.4	2	1	1	1	1.6	2	2	1	3
	Instrumental Methods of Chemical Analysis	2.6	2	1.4	1.4	1.8	2	1.6	1.4	1.6	1.8	1	2	2.4	2.2	1.4	2.6
	Computer colour Matching	2	1.6	1.4	1.2	1.8	1.4	1.6	1.6	2	1.6	1	2	2.4	1.6	1.4	2.2
	Garment Manufacturing Technology	1.6	1.2	1	0.8	1.4	0.8	1.4	1	0.2	1.8	2.4	1	1.8	2.6	1	2.6
	Garment And Denim Processing	3	3	2	2	1.4	1.4	1.8	1.4	2	2	2	2	3	2.6	1.4	2.8

	Apparel Production Planning and Control	-	1	2.6	2	2	1	1	2.4	2	1.2	1	-	2	2	2	2
	Apparel Costing	-	-	1	-	2.2	1	-	2	2	-	2	0.4	-	2	2	-
	Retail Management And Visual Merchandising	-	-	1	-	2.2	-	-	1.6	2	2.4	3	2	-	1	1	1
	Sustainable Textiles	1	-	2	1	2	2.4	1.4	-	1	2	-	2.6	2.2	2	1	2.2
	Enterprise Resource Planning for Garment Industry	-	-	2.2	-	3	-	-	2	2	1	2.4	1	-	2	1	-
	Industrial Engineering in Textile Industry	1.2	2	3	3	2	1	1.2	2	2	1	2.4	2	1	1	-	1
	Supply Chain Management	-	-	2.4	1.4	2.4	-	-	2	2.4	2	2.4	1	2	1	-	1
	Brand Management	-	-	1	1.4	2	-	-	1	2.4	2	2.4	1	2	1	2	1
	Apparel Entrepreneurship	-	-	1.2	1.4	1	-	-	1.4	2	1	3	2	1.6	1	1	2
	Financial Management in Textile Industry	-	-	2.4	-	2.6	1	-	2	2	2	2.4	1	-	2	1	-
	Textile Export Marketing	-	-	2.4	-	2.6	1.6	-	1	2	2	2.4	1	-	2	1	-
	Textile EXIM Management	-	1.2	2	1	2.6	-	-	2	2.2	1.2	2.2	1	2	1	-	1
	Energy Management and Conservation in Textile Industry	-	-	2	-	1	-	1.6	1.6	2	2	2.6	1.8	-	1	-	1
	Operations Research In Textile Industry	-	-	2	-	3	-	-	1	2	1	2	-	-	1	-	1
	Bonded Fabrics	2.4	2.4	2.2	2.8	1.8	1.6	-	1.6	-	2.6	2.6	1	2.6	3	3	2.4
	Smart textiles	-	-	2.2	-	-	2.2	2.2	2	1	2	2.6	1	-	3	2	2.4
	Home Textiles	1.8	2.4	2.6	2.8	1.6	2	2.2	1	1	1.8	1	1	2.4	2.2	1.8	2.6
	Technical Textiles	1.6	1.2	3	3	-	2.4	2	2	1	2	3	3	2	3	1	2.4
	Medical Textiles	1.4	2	2.8	2.6	1	2.4	2.4	2.4	1	1.4	1	2	2.4	2.2	1	2.6
	Protective Textile	-	2	3	2.2	-	1.6	1.6	1.8	1	1.2	1	1.6	2	1.4	1	2
	Recycling in Textiles	2	1.2	1.6	1.4	2.2	1.8	1.2	1.4	1.6	1.6	1.6	2.4	2.2	1.6	1.2	2.4
	High Performance Fibres	1.4	2.8	2	3	1	1	1	1	1	2	2	1	2	1.4	1.8	3

ANNA UNIVERSITY,
NON-AUTONOMOUS COLLEGES AFFILIATED COLLEGES
REGULATIONS 2021
B. TECH. TEXTILE CHEMISTRY
CHOICE BASED CREDIT SYSTEM
CURRICULUM FOR SEMESTERS I TO VIII AND SYLLABI FOR SEMESTERS III AND IV

SEMESTER I

S. No.	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	IP3151	Induction Programme	-	-	-	-	-	0
THEORY								
2.	HS3151	Professional English - I	HSMC	3	0	0	3	3
3.	MA3151	Matrices and Calculus	BSC	3	1	0	4	4
4.	PH3151	Engineering Physics	BSC	3	0	0	3	3
5.	CY3151	Engineering Chemistry	BSC	3	0	0	3	3
6.	GE3151	Problem Solving and Python Programming	ESC	3	0	0	3	3
7.	GE3172	அறிவியல் தமிழ் / Scientific Thoughts in Tamil	HSMC	1	0	0	1	1
PRACTICALS								
8.	GE3171	Problem Solving and Python Programming Laboratory	ESC	0	0	4	4	2
9.	BS3171	Physics and Chemistry Laboratory	BSC	0	0	4	4	2
10.	GE3172	English Laboratory $	EEC	0	0	2	2	1
			TOTAL	**16**	**1**	**10**	**27**	**22**

$ Skill Based Course

SEMESTER II

SI. NO.	COURSE CODE	COURSETITLE	CATE-GORY	PERIODS PERWEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.	HS3251	Professional English - II	HSMC	2	0	0	2	2
2.	MA3251	Statistics and Numerical Methods	BSC	3	1	0	4	4
3.	PH3257	Physics for Textile Technologists	BSC	3	0	0	3	3
4.	BE3252	Basic Electrical, Electronics and Instrumentation Engineering	ESC	3	0	0	3	3
5.	GE3251	Engineering Graphics	ESC	2	0	4	6	4
6.	CY3252	Chemistry for Textile Technologists	BSC	3	0	0	3	3
7.	GE3252	தமிழர் மரபு / Heritage of Tamils	HSMC	1	0	0	1	1
8.		NCC Credit Course Level 1*	-	2	0	0	2	2

PRACTICALS								
9.	GE3271	Engineering Practices Laboratory	ESC	0	0	4	4	2
10.	BE3272	Basic Electrical, Electronics and Instrumentation Engineering Laboratory	ESC	0	0	4	4	2
11.	GE3272	Communication Laboratory / Foreign Language $	EEC	0	0	4	4	2
			TOTAL	**17**	**1**	**16**	**34**	**26**

 # NCC Credit Course level 1 is offered for NCC students only. The grades earned by the students will be recorded in the Mark Sheet, however the same shall not be considered for the computation of CGPA.
$ Skill Based Course

SEMESTER III

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.	MA3357	Probability and Statistical Methods	BSC	3	1	0	4	4
2.	TC3301	Polymer and organic Chemistry	ESC	3	0	0	3	3
3.	TC3302	Preparation of Textiles for Coloration	PCC	3	0	0	3	3
4.	TC3303	Structure and Properties of Fibres	PCC	3	0	0	3	3
5.	TC3304	Technology of Yarn and Fabric Manufacturing	PCC	3	0	0	3	3
6.	TC3305	Chemistry of Textile Auxiliaries	PCC	3	0	0	3	3
PRACTICALS								
7.	TC3311	Yarn and Fabric Manufacturing Laboratory	PCC	0	0	3	3	1.5
8.	TC3312	Fibre Science Laboratory	PCC	0	0	2	2	1
9.	GE33361	Professional Development$	EEC	0	0	2	2	1
			TOTAL	18	1	7	26	**22.5**

$ Skill Based Course

SEMESTER IV

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.	TC3401	Chemistry and Technology of Intermediates and Dyes	PCC	3	0	0	3	3
2.	TT3591	Testing of Textile Materials	PCC	3	0	0	3	3
3.	TC3402	Principles and Theory of Dyeing	PCC	3	0	0	3	3
4.	TC3403	Dyeing of Cellulosic and Protein Materials	PCC	3	0	0	3	3
5.	TC3404	Technology of Printing	PCC	3	0	0	3	3
6.	GE3451	Environmental Sciences and Sustainability	BSC	2	0	0	2	2
7.		NCC Credit Course Level 2#		3	0	0	3	3 #
PRACTICALS								
8.	TT3581	Testing of textile Material Laboratory	PCC	0	0	3	3	1.5
9.	TC3411	Wet Processing Preparation Laboratory	PCC	0	0	3	3	1.5

10.	TC3412	Textile Chemical Analysis Laboratory	PCC	0	0	3	3	1.5
11.	TC3513	Industrial Training/Internship I*	EEC	-	-	-	-	-
			TOTAL	**17**	**0**	**9**	**26**	**21.5**

NCC Credit Course level 2 is offered for NCC students only. The grades earned by the students will be recorded in the Mark Sheet, however the same shall not be considered for the computation of CGPA.

*Four weeks industrial training/internship carries two credits. Industrial training/internship during IV Semester Summer Vacation will be evaluated in V semester

ANNA UNIVERSITY
PROGRESS THROUGH KNOWLEDGE

SEMESTER V

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.	TC3501	Production and Dyeing of Synthetic Textiles	PCC	3	0	0	3	3
2.		Professional Elective I	PEC	3	0	0	3	3
3.		Professional Elective II	PEC	3	0	0	3	3
4.		Professional Elective III	PEC	3	0	0	3	3
5.		Professional Elective IV	PEC	3	0	0	3	3
6.		Mandatory Course-I[&]	MC	3	0	0	3	0
PRACTICALS								
7.	TC3511	Textile Dyeing and Printing Laboratory	PCC	0	0	3	3	1.5
8.	TC3512	Shade Matching And Quality Control Laboratory	PCC	0	0	3	3	1.5
9.	TC3513	Industrial Training/Internship I**	EEC	0	0	0	0	2
		TOTAL		**15**	**0**	**6**	**21**	**20**

[&] Mandatory Course-I is a Non-credit Course (Student shall select one course from the list given under MC-I)

****Four weeks industrial training/internship carries two credits. Industrial training/internship during IV Semester Summer Vacation will be evaluated in V semester**

SEMESTER VI

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.	TC3601	Textile Finishing	PCC	3	0	0	3	3
2.	TC3602	Eco-Friendly dyes, chemicals and Processing	PCC	3	0	0	3	3
3.	TC3603	Financial management for textile industry	PCC	3	0	0	3	3
4.		Open Elective – I*	OEC	3	0	0	3	3
5.		Professional Elective V	PEC	3	0	0	3	3
6.		Professional Elective VI	PEC	3	0	0	3	3
7.		Mandatory Course II[&]	MC	3	0	0	3	0
8.		NCC Credit Course Level 3#		3	0	0	3	3 #
PRACTICALS								
9.	TC3611	Dyeing of Synthetic Textile Laboratory	PCC	0	0	3	3	1.5
10.	TC3612	Textile Finishing Laboratory	PCC	0	0	3	3	1.5
11.	TC3711	Industrial Training/Internship II**	EEC	-	-	-	-	-
		TOTAL		**21**	**0**	**6**	**27**	**21**

***Open Elective – I shall be chosen from the emerging technologies.**

****Two weeks industrial training/internship carries one credit. Industrial training/Internship during VI Semester Summer Vacation will be evaluated in VII semester**

[&] Mandatory Course-II is a Non-credit Course (Student shall select one course from the list given under MC- II)

[#] NCC Credit Course level 3 is offered for NCC students only. The grades earned by the students will be recorded in the Mark Sheet, however the same shall not be considered for the computation of CGPA.

SEMESTER VII/VIII*

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.	TC3701	Effluent Treatment and Pollution Control	PCC	3	0	0	3	3
2.	TC3702	Process and Quality control in Textile Wet Processing	PCC	3	0	0	3	3
3.	GE3791	Human values and Ethics	HSMC	2	0	0	2	2
4.		Elective – Management#	HSMC	3	0	0	3	3
5.		Open Elective – II**	OEC	3	0	0	3	3
6.		Open Elective – III***	OEC	3	0	0	3	3
7.		Open Elective – IV***	OEC	3	0	0	3	3
PRACTICALS								
8.	TC3711	Industrial Training/Internship II##	EEC	-	-	-	-	2
			TOTAL	**20**	**0**	**0**	**20**	**22**

***If students undergo internship in Semester VII, then the courses offered during semester VII will be offered during semester VIII.**

****Open Elective – II shall be chosen from the emerging technologies.**

*****Open Elective III and IV (Shall be chosen from the list of open electives offered by other Programmes**

 # Elective- Management shall be chosen from the Elective Management courses

##Two weeks industrial training/internship carries one credit. Industrial training/Internship during VI Semester Summer Vacation will be evaluated in VII semester

SEMESTER VIII/VII*

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
PRACTICALS								
1.	TC3811	Internship#/ Project Work	EEC	0	0	20	20	10
			TOTAL	**0**	**0**	**20**	**20**	**10**

***If students undergo internship in Semester VII, then the courses offered during semester VII will be offered during semester VIII.**

#15 weeks of continuous Internship in an organization carries 10 credits.

TOTAL CREDITS: 165

ELECTIVE – MANAGEMENT COURSES

SL. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PERWEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	GE3751	Principles of Management	HSMC	3	0	0	3	3
2.	GE3752	Total Quality Management	HSMC	3	0	0	3	3
3.	GE3753	Engineering Economics and Financial Accounting	HSMC	3	0	0	3	3
4.	GE3754	Human Resource Management	HSMC	3	0	0	3	3
5.	GE3755	Knowledge Management	HSMC	3	0	0	3	3
6.	GE3792	Industrial Management	HSMC	3	0	0	3	3

MANDATORY COURSES I

SL. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	MX3081	Introduction to Women and Gender Studies	MC	3	0	0	3	0
2.	MX3082	Elements of Literature	MC	3	0	0	3	0
3.	MX3083	Film Appreciation	MC	3	0	0	3	0
4.	MX3084	Disaster Management	MC	3	0	0	3	0

MANDATORY COURSES II

SL. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	MX3085	Well Being with traditional practices (Yoga, Ayurveda and Siddha)	MC	3	0	0	3	0
2.	MX3086	History of Science and Technology in India	MC	3	0	0	3	0
3.	MX3087	Political and Economic Thought for a Humane Society	MC	3	0	0	3	0
4.	MX3088	State, Nation Building and Politics in India	MC	3	0	0	3	0
5.	MX3089	Industrial Safety	MC	3	0	0	3	0

PROFESSIONAL ELECTIVE COURSES : VERTICALS

Vertical I Chemical Processing	Vertical II Apparel Manufacturing and Processing	Vertical III Management	Vertical IV Technical Textiles
Manufacturing and Processing of Knitted fabrics	Garment Manufacturing Technology	Supply Chain Management	Recycling in Textiles
Functional Finishes	Garment And Denim Processing	Brand Management	Technical Textiles
Modern Printing Technology	Apparel Production Planning and Process Control	Apparel Entrepreneurship	Home Textiles
Advanced Wet Processing Machineries	Industrial Engineering in Apparel Industry	Energy Management and Conservation in Textile Industry	Technology of Non wovens
Instrumental Methods of Chemical Analysis	Retail Management And Visual Merchandising	Operations Research In Textile Industry	Medical Textiles
Computer colour Matching	Enterprise Resource Planning for Garment Industry	Textile and apparel EXIM Management	Protective Textile

Registration of Professional Elective Courses from Verticals:

Professional Elective Courses will be registered in Semesters V and VI. These courses are listed in groups called verticals that represent a particular area of specialisation. Students are permitted to choose all Professional Electives from a particular vertical or from different verticals. Further, only one Professional Elective course shall be chosen in a semester horizontally (row-wise). However, two courses are permitted from the same row, provided one course is enrolled in Semester V and another in semester VI.

The registration of courses for B.E./B.Tech (Honours) or Minor degree shall be done from Semester V to VIII. The procedure for registration of courses explained above shall be followed for the courses of B.E/B.Tech (Honours) or Minor degree also. For more details on B.E./B.Tech (Honours) or Minor degree shall be obtained from Regulations 2021 Clause 4.10.

PROGRESS THROUGH KNOWLEDGE

PROFESSIONAL ELECTIVE COURSES : VERTICALS

VERTICAL 1: CHEMICAL PROCESSING

SL. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	TC3001	Manufacturing and Processing of Knitted fabrics	PEC	3	0	0	3	3
2.	TC3002	Functional Finishes	PEC	3	0	0	3	3
3.	TC3003	Modern Printing Technology	PEC	3	0	0	3	3
4.	TC3004	Advanced Wet Processing Machineries	PEC	3	0	0	3	3
5.	TC3005	Instrumental Methods of Chemical Analysis	PEC	3	0	0	3	3
6.	TC3006	Computer colour Matching	PEC	3	0	0	3	3

VERTICAL 2: APPAREL MANUFACTURING AND PROCESSING

SL. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	TC3007	Garment Manufacturing Technology	PEC	3	0	0	3	3
2.	TC3008	Garment And Denim Processing	PEC	3	0	0	3	3
3.	FT3591	Apparel Production Planning and Process Control	PEC	3	0	0	3	3
4.	TC3009	Industrial Engineering in Apparel Industry	PEC	3	0	0	3	3
5.	TC3010	Retail Management And Visual Merchandising	PEC	3	0	0	3	3
6.	CTT336	Enterprise Resource Planning for Garment Industry	PEC	0	0	6	3	6

VERTICAL 3: MANAGEMENT

SL. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	TC3011	Supply Chain Management	PEC	3	0	0	3	3
2.	TC3012	Brand Management	PEC	3	0	0	3	3
3.	TC3013	Apparel Entrepreneurship	PEC	3	0	0	3	3
4.	TC3014	Energy Management and Conservation in Textile Industry	PEC	3	0	0	3	3
5.	TC3015	Operations Research In Textile Industry	PEC	3	0	0	3	3
6.	TC3016	Textile EXIM Management	PEC	3	0	0	3	3

VERTICAL 4: TECHNICAL TEXTILES

SL. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	TC3017	Recycling in Textiles	PEC	3	0	0	3	3
2.	CTT349	Technical Textiles	PEC	3	0	0	3	3
3.	CTT339	Home Textiles	PEC	3	0	0	3	3
4.	TC3018	Bonded Fabrics	PEC	3	0	0	3	3
5.	CTT340	Medical Textiles	PEC	3	0	0	3	3
6.	TC3019	Protective Textile	PEC	3	0	0	3	3

OPEN ELECTIVES

Students shall choose the open elective courses, such that the course contents are not similar to any other course contents/title under other course categories.

OPEN ELECTIVE I AND II
(EMERGING TECHNOLOGIES)

To be offered other than Faculty of Information and Communication Engineering

SL. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	OCS351	Artificial Intelligence and Machine Learning Fundamentals	OEC	2	0	2	4	3
2.	OCS352	IoT Concepts and Applications	OEC	2	0	2	4	3
3.	OCS353	Data Science Fundamentals	OEC	2	0	2	4	3
4.	OCS354	Augmented and Virtual Reality	OEC	2	0	2	4	3

OPEN ELECTIVES – III

SL. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	OHS351	English for Competitive Examinations	OEC	3	0	0	3	3
2.	OCE353	Lean Concepts, Tools And Practices	OEC	3	0	0	3	3
3.	OMG352	NGOs and Sustainable Development	OEC	3	0	0	3	3
4.	OMG353	Democracy and Good Governance	OEC	3	0	0	3	3
5.	OME353	Renewable Energy Technologies	OEC	3	0	0	3	3
6.	OME354	Applied Design Thinking	OEC	2	0	2	4	3
7.	OMF351	Reverse Engineering	OEC	3	0	0	3	3
8.	OMF353	Sustainable Manufacturing	OEC	3	0	0	3	3
9.	OAU351	Electric and Hybrid Vehicle	OEC	3	0	0	3	3
10.	OAS352	Space Engineering	OEC	3	0	0	3	3
11.	OIM351	Industrial Management	OEC	3	0	0	3	3
12.	OIE354	Quality Engineering	OEC	3	0	0	3	3
13.	OSF351	Fire Safety	OEC	3	0	0	3	3

		Engineering						
14.	OML351	Introduction to non-destructive testing	OEC	3	0	0	3	3
15.	OMR351	Mechatronics	OEC	3	0	0	3	3
16.	ORA351	Foundation of Robotics	OEC	3	0	0	3	3
17.	OAE352	Fundamentals of Aeronautical engineering	OEC	3	0	0	3	3
18.	OGI351	Remote Sensing Concepts	OEC	3	0	0	3	3
19.	OAI351	Urban Agriculture	OEC	3	0	0	3	3
20.	OEN351	Drinking Water Supply and Treatment	OEC	3	0	0	3	3
21.	OEE352	Electric Vehicle technology	OEC	3	0	0	3	3
22.	OEI353	Introduction to PLC Programming	OEC	3	0	0	3	3
23.	OBT352	Biomedical Instrumentation	OEC	3	0	0	3	3
24.	OFD352	Traditional Indian Foods	OEC	3	0	0	3	3
25.	OFD353	Introduction to food processing	OEC	3	0	0	3	3
26.	OPY352	IPR for Pharma Industry	OEC	3	0	0	3	3
27.	OCH351	Nano Technology	OEC	3	0	0	3	3
28.	OCH352	Functional Materials	OEC	3	0	0	3	3
29.	OPE351	Introduction to Petroleum Refining and Petrochemicals	OEC	3	0	0	3	3
30.	OPE352	Energy Conservation and Management	OEC	3	0	0	3	3
31.	OPT351	Basics of Plastics Processing	OEC	3	0	0	3	3
32.	OEC351	Signals and Systems	OEC	3	0	0	3	3
33.	OEC352	Fundamentals of Electronic Devices and Circuits	OEC	3	0	0	3	3
34.	OBM351	Foundation Skills in integrated product Development	OEC	3	0	0	3	3
35.	OBM352	Assistive Technology	OEC	3	0	0	3	3
36.	OMA352	Operations Research	OEC	3	0	0	3	3
37.	OMA353	Algebra and Number Theory	OEC	3	0	0	3	3
38.	OMA354	Linear Algebra	OEC	3	0	0	3	3

OPEN ELECTIVES – IV

SL. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	OHS352	Project Report Writing	OEC	3	0	0	3	3
2.	OCE354	Basics of Integrated Water Resources Management	OEC	3	0	0	3	3
3.	OMA355	Advanced Numerical Methods	OEC	3	0	0	3	3
4.	OMA356	Random Processes	OEC	3	0	0	3	3
5.	OMA357	Queuing and Reliability Modelling	OEC	3	0	0	3	3
6.	OMG354	Production and Operations Management for Entrepreneurs	OEC	3	0	0	3	3
7.	OMG355	Multivariate Data Analysis	OEC	3	0	0	3	3
8.	OME352	Additive Manufacturing	OEC	3	0	0	3	3
9.	OME353	New Product Development	OEC	3	0	0	3	3
10.	OME355	Industrial Design & Rapid Prototyping Techniques	OEC	2	0	2	4	3
11.	OMF352	Micro and Precision Engineering	OEC	3	0	0	3	3
12.	OMF354	Cost Management of Engineering Projects	OEC	3	0	0	3	3
13.	OAU352	Batteries and Management system	OEC	3	0	0	3	3
14.	OAU353	Sensors and Actuators	OEC	3	0	0	3	3
15.	OAS353	Space Vehicles	OEC	3	0	0	3	3
16.	OIM352	Management Science	OEC	3	0	0	3	3
17.	OIM353	Production Planning and Control	OEC	3	0	0	3	3
18.	OIE353	Operations Management	OEC	3	0	0	3	3
19.	OSF352	Industrial Hygiene	OEC	3	0	0	3	3
20.	OSF353	Chemical Process Safety	OEC	3	0	0	3	3
21.	OML352	Electrical, Electronic and Magnetic materials	OEC	3	0	0	3	3
22.	OML353	Nanomaterials and applications	OEC	3	0	0	3	3
23.	OMR352	Hydraulics and	OEC	3	0	0	3	3

		Pneumatics						
24.	OMR353	Sensors	OEC	3	0	0	3	3
25.	ORA352	Foundation of Automation	OEC	3	0	0	3	3
26.	ORA353	Concepts in Mobile Robotics	OEC	3	0	0	3	3
27.	OMV351	Marine Propulsion	OEC	3	0	0	3	3
28.	OMV352	Marine Merchant Vehicles	OEC	3	0	0	3	3
29.	OMV353	Elements of Marine Engineering	OEC	3	0	0	3	3
30.	OAE353	Drone Technologies	OEC	3	0	0	3	3
31.	OGI352	Geographical Information System	OEC	3	0	0	3	3
32.	OAI352	Agriculture Entrepreneurship Development	OEC	3	0	0	3	3
33.	OEN352	Biodiversity Conservation	OEC	3	0	0	3	3
34.	OEE353	Introduction to control systems	OEC	3	0	0	3	3
35.	OEI354	Introduction to Industrial Automation Systems	OEC	3	0	0	3	3
36.	OBT353	Environment and Agriculture	OEC	3	0	0	3	3
37.	OFD354	Fundamentals of Food Engineering	OEC	3	0	0	3	3
38.	OFD355	Food safety and Quality Regulations	OEC	3	0	0	3	3
39.	OPY353	Nutraceuticals	OEC	3	0	0	3	3
40.	OCH353	Energy Technology	OEC	3	0	0	3	3
41.	OCH354	Surface Science	OEC	3	0	0	3	3
42.	OPE353	Industrial safety	OEC	3	0	0	3	3
43.	OPE354	Unit Operations in Petro Chemical Industries	OEC	3	0	0	3	3
44.	OPT352	Plastic Materials for Engineers	OEC	3	0	0	3	3
45.	OPT353	Properties and Testing of Plastics	OEC	3	0	0	3	3
46.	OEC353	VLSI Design	OEC	3	0	0	3	3
47.	OEC354	Industrial IoT and Industry 4.0	OEC	2	0	2	4	3
48.	OBM353	Wearable devices	OEC	3	0	0	3	3
49.	OBM354	Medical Informatics	OEC	3	0	0	3	3

SUMMARY

Name of the Programme										
S.No	Subject Area	Credits per Semester								Total Credits
		I	II	III	IV	V	VI	VII/VIII	VIII/VII	
1	HSMC	4	3	4				5		16
2	BSC	12	10		2					24
3	ESC	5	11	3						19
4	PCC			14.5	19.5	6	12	6		58
5	PEC					12	6			18
6	OEC						3	9		12
7	EEC	1	2	1		2		2	10	18
8	Non-Credit /(Mandatory)					√	√			
Total		22	26	22.5	21.5	20	21	22	10	165

Enrollment for B.E. / B. Tech. (Honours) / Minor degree (Optional)

A student can also optionally register for additional courses (18 credits) and become eligible for the award of B.E./B.Tech. (Honours) Minor degree.

For B.E. / B. Tech. (Honours), a student shall register for the additional courses (18 credits) from semester V onwards. These courses shall be from the same vertical or a combination of different verticals of the same programme of study only.

For minor degree, a student shall register for the additional courses (18 credits) from semester V onwards. All these courses have to be in a particular vertical from any one of the other programmes, Moreover, for minor degree the student can register for courses from any one of the following verticals also.
Complete details are available in clause 4.10 of Regulations 2021.

VERTICALS FOR MINOR DEGREE (In additions to all the verticals of other programmes)

Vertical I Fintech and Block Chain	Vertical II Entrepreneurship	Vertical III Public Administration	Vertical IV Business Data Analytics	Vertical V Environment and Sustainability
nancial Management	Foundations of Entrepreneurship	nciples of Public Administration	Statistics For Management	Sustainable infrastructure Development
ndamentals of Investment	Team Building & Leadership Management for Business	nstitution of India	Datamining For Business Intelligence	Sustainable Agriculture and Environmental Management
nking, Financial Services and Insurance	Creativity & Innovation in Entrepreneurship	blic Personnel Administration	man Resource Analytics	Sustainable Bio Materials
roduction to Blockchain and its Applications	Principles of Marketing Management For Business	ministrative Theories	arketing And Social Media Web Analytics	Materials for Energy Sustainability
ntech Personal Finance and Payments	Human Resource Management for Entrepreneurs	Indian Administrative System	peration And Supply Chain Analytics	Green Technology
roduction to Fintech	Financing New Business Ventures	blic Policy Administration	nancial Analytics	Environmental Quality Monitoring and Analysis
-	-	-	-	Integrated Energy Planning for Sustainable Development

-	-	-	-	Energy Efficiency for Sustainable Development

(Choice of courses for Minor degree is to be made from any one vertical of other programmes or from anyone of the following verticals)

VERTICAL 1: FINTECH AND BLOCK CHAIN

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	CMG331	nancial Management	PEC	3	0	0	3	3
2.	CMG332	ndamentals of Investment	PEC	3	0	0	3	3
3.	CMG333	Banking, Financial Services and Insurance	PEC	3	0	0	3	3
4.	CMG334	Introduction to Blockchain and its Applications	PEC	3	0	0	3	3
5.	CMG335	ntech Personal Finance and Payments	PEC	3	0	0	3	3
6.	CMG336	roduction to Fintech	PEC	3	0	0	3	3

VERTICAL 2: ENTREPRENEURSHIP

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	CMG337	Foundations of Entrepreneruship	PEC	3	0	0	3	3
2.	CMG338	Team Building & Leadership Management for Business	PEC	3	0	0	3	3
3.	CMG339	Creativity & Innovation in Entrepreneurship	PEC	3	0	0	3	3
4.	CMG340	Principles of Marketing Management For Business	PEC	3	0	0	3	3
5.	CMG341	Human Resource Management for Entrepreneurs	PEC	3	0	0	3	3
6.	CMG342	Financing New Business Ventures	PEC	3	0	0	3	3

VERTICAL 3: PUBLIC ADMINISTRATION

SL. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	CMG343	Principles of Public Administration	PEC	3	0	0	3	3
2.	CMG344	Constitution of India	PEC	3	0	0	3	3
3.	CMG345	blic Personnel Administration	PEC	3	0	0	3	3
4.	CMG346	ministrative Theories	PEC	3	0	0	3	3
5.	CMG347	Indian Administrative System	PEC	3	0	0	3	3
6.	CMG348	blic Policy Administration	PEC	3	0	0	3	3

VERTICAL 4: BUSINESS DATA ANALYTICS

SL. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	CMG349	Statistics For Management	PEC	3	0	0	3	3
2.	CMG350	Datamining For Business Intelligence	PEC	3	0	0	3	3
3.	CMG351	man Resource Analytics	PEC	3	0	0	3	3
4.	CMG352	rketing And Social Media Web Analytics	PEC	3	0	0	3	3
5.	CMG353	eration And Supply Chain Analytics	PEC	3	0	0	3	3
6.	CMG354	ancial Analytics	PEC	3	0	0	3	3

VERTICAL 5: ENVIRONMENT AND SUSTAINABILITY

SL. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	CES331	Sustainable infrastructure Development	PEC	3	0	0	3	3
2.	CES332	Sustainable Agriculture and Environmental Management	PEC	3	0	0	3	3
3.	CES333	Sustainable Bio Materials	PEC	3	0	0	3	3
4.	CES334	Materials for Energy Sustainability	PEC	3	0	0	3	3
5.	CES335	Green Technology	PEC	3	0	0	3	3
6.	CES336	Environmental Quality Monitoring and Analysis	PEC	3	0	0	3	3
7.	CES337	Integrated Energy Planning for Sustainable Development	PEC	3	0	0	3	3
8.	CES338	Energy Efficiency for Sustainable Development	PEC	3	0	0	3	3

PROGRESS THROUGH KNOWLEDGE

MA3357 PROBABILITY AND STATISTICAL METHODS L T P C
3 1 0 4

OBJECTIVE:

- To develop Probability techniques in manufacturing and quality evaluation process.
- To familiarize the students with two dimensional random variables.
- To familiarize the student with Differential Equations.
- To make the students to understand various techniques of Correlation and Time series Analysis.
- To acquaint the student with mathematical tools needed in evaluating Statistical quality control and to apply in the textile manufacturing industry.

UNIT I PROBABILITY AND RANDOM VARIABLES 9+3

Probability – axioms of probability – Conditional probability – Baye's theorem – Discrete and continuous random variables – Moments – Moment Generating functions – Binomial , Poisson , Geometric , Uniform , Exponential , Gamma and Normal distributions.

UNIT II TWO DIMENSIONAL RANDOM VARIABLES 9+3

Join distributions – Marginal distributions and conditional distributions –Moments – Covariance – Transforms of random variables – Central limit theorem.

UNIT III DIFFERENTIAL EQUATIONS 9+3

Higher order linear differential equations with constant coefficients – Method of variation of parameters – Homogenous equation of Euler's and Legendre's type – System of simultaneous linear differential equations with constant coefficients – Method of undermined coefficients.

UNIT IV CORRELATION, REGRESSION, INDEX NUMBERS AND TIMES SERIES ANALYSIS 9+3

Correlation analysis, estimation of regression line. Time series analysis: Variations in time series , trend analysis , cyclical variations , seasonal variations and irregular variations. Index Numbers – Lasperyre's, Paasche's and Fisher's Ideal Index.

UNIT V STATISTICAL QUALITY CONTROL 9+3

Control charts for measurements (X and R chart) – Control charts for attributes (p ,C and np) charts – Tolerance limits – acceptance Sampling.

TOTAL: 60 PERIODS

.**OUTCOMES:**

At the end of the course the students will be able to

CO1: Use the Probability techniques for solving practical problems.

CO2: Apply two dimensional random variable tools in solving various problems.

CO3: Able to solve differential Equations by applying various techniques.

CO4: Apply different methods of Correlation, Regression, Index Numbers and Times series Analysis in solving practical problems.

CO5: Apply statistical techniques in solving manufacturing and management related problems

TEXT BOOKS:

1. Johnson, R.A., Miller, I and Freund J., "Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 8th Edition, 2015.
2. Milton. J. S. and Arnold. J.C., "Introduction to Probability and Statistics", Tata McGraw Hill, 4th Edition, 2007.

3. Kreyszig.E, “Advanced Engineering Mathematics”, John Wiley and Sons, 10 th Edition, New Delhi, 2016.
4. Grewal.B.S., “Higher Engineering Mathematics”, Khanna Publishers, New Delhi, 44 th Edition , 2018.
5. Richard I. Levin, David S. Rubin, Sanjay Rastogi Masood Husain Siddiqui, Statistics for Management, Pearson Education, 7th Edition, 2016.

REFERENCES:

1. Devore. J.L., “Probability and Statistics for Engineering and the Sciences”, Cengage Learning, New Delhi, 8th Edition, 2014.
2. Papoulis, A. and Unnikrishnapillai, S., “Probability, Random Variables and Stochastic Processes”, McGraw Hill Education India, 4th Edition, New Delhi, 2010.
3. Jain . R.K. and Iyengar. S.R.K., “ Advanced Engineering Mathematics ”, Narosa Publications, New Delhi, 5 th Edition, 2016.
4. Ramana. B.V., “ Higher Engineering Mathematics “, McGraw Hill Education Pvt. Ltd, New Delhi, 2016.
5. Prem.S.Mann, “Introductory Statistics” 7th Edition, Wiley India, 2016.
6. Gareth James, Daniela Witten, Trevor Hastie, Robert Tibshirani, “An Introduction to Statistical Learning with Applications in R”, Springer, 2016.
7. Aczel A.D. and Sounderpandian J., “Complete Business Statistics”, 6th edition, Tata McGraw Hill Publishing Company Ltd., New Delhi, 2012.

TC3301 POLYMER AND ORGANIC CHEMISTRY

L	T	P	C
3	0	0	3

OBJECTIVE:

- To describe individual operation used in pre-treatment and physical – chemical changes brought int to textile material.
- To explain chemical formulations and process parameters used in unit operations of pre-treatment and properties of chemicals used.
- To explain machinery used in pre-treatments operations.
- To discuss quality parameters and environmental impact of pre-treatment operations.
- To facilitate the students to learn about the pre-treatments of various kinds of textile materials involved in textile wet processing industries.

UNIT I POLYMERIZATION 9

Polymers – Classifications – Polymerization – Mechanisms – Chain Polymerization (Free radical, ionic and Ziegler Natta). Polymerization Techniques – Bulk, Solution, Suspension, Emulsion, Solid and Liquid Phase. Poly condenzation Techniques – Melt, Solution and Interfacial.

UNIT II IMPORTANT POLYMERS 9

Synthesis, properties and Applications : Polyethylene (LDPE & HDPE), Polyacrylonitrile, Polymethyl methacrylate, Polyesters (PET), Polyamides – Nylon 6, Nylon 6,6 , Polyurethane, Polyvinylchloride, Polypropylene, Polytetrafluoroethylene.

UNIT III CHARACTERIZATION OF POLYMERS 9

Degree of Polymerization – Glass Transition Temperature – Factors affecting T_g - Determination of T_g – Dilatometer and Thermo mechanical methods. Determination molecular weights – Weight

average – Light scattering, Number average – End group analysis, Viscosity average – Ubbelholde viscometer. Thermal characterization – TGA and DSC.

UNIT IV AROMATIC HYDROCARBON, AMINE AND DIAZONIUM SALT 9

Benzene – Aromaticity – Huckel rule – General methods of preparation of benzene – Electrophilic substitution reactions – Directive effects of substituents – Aromatic amino compounds – General methods of preparation – Physical and chemical properties – Carbylamines reaction – Aryldiazonium salts – Preparation and synthetic applications.

UNIT V ALDEHYDES, KETONES AND ACIDS 9

General methods of preparation – Physical and chemical properties – Aldol condensation – Clemmensen reduction – Wolf-Kishner reduction – Haloform reaction – Cannizzaro reaction – Reformatsky reaction – Wittig reaction – Saturated monocarbozylic acids – Methods of preparation– Physical and chemical properties – Hell-Volhard-Zelinsky reaction – Amino acids – Methods of preparation – Physical and chemical properties.

TOTAL: 45 PERIODS.

OUTCOMES:

At the end of the course the students will be able to understand

CO1: Polymerization.
CO2: Important Polymers.
CO3: Characterization Of Polymers.
CO4: Aromatic Hydrocarbon, Amine And Diazonium Salt.
CO5: Aldehydes, Ketones And Acids

TEXT BOOKS:

1. Paul.C, polymer chemistry, NCUTE Publications, Hiemenz , 2007
2. Shenai V.A.,Advanced Organic Chemistry, Sevak Publications, Wadala, Chennai, 1991.

REFERENCES:

1. Nalankilli.G, Edwin Sundar.A, Chemical Preparatory Processes for Textiles, NCUTE Publications, New Delhi, 2002
2. Karmakar, S.R., Chemical Technology in the Pre-Treatment Processes of Textiles. Elsevier Science, 1999
3. Chakraborty, J.N, Fundamentals and Practices in colouration of textiles, Woodhead Publishing India, 2009, ISBN – 13: 978-81-908001-4-3.
4. Bleaching & Mercerizing – BTRA Silver Jubilee Monograph series
5. Technology of Mercerizing by J.T. Marsh

CO's	PO's												PSO's			
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**
1	2	-	1	-	-	1	2	1	-	1	1	1	2	1	2	2
2	2	1	-	1	-	1	1	-	-	1	-	1	1	1	2	1
3	1	2	-	-	2	1	-	-	1	-	-	-	2	1	1	2
4	1	-	1	1	1	2	1	1	1	1	-	1	3	2	2	2
5	1	-	1	1	1	2	1	1	1	1	-	1	3	1	2	1
AVg	1.4	1.5	1	1	1.3	1.4	1.2	1	1	1	0.5	1	2.2	1.2	1.8	1.6

TC3302 PREPARATION OF TEXTILES FOR COLORATION

L	T	P	C
3	0	0	3

OBJECTIVE:

- To describe individual operation used in pre-treatment and physical – chemical changes brought int to textile material.
- To explain chemical formulations and process parameters used in unit operations of pre-treatment and properties of chemicals used.
- To explain machinery used in pre-treatments operations.
- To discuss quality parameters and environmental impact of pre-treatment operations.
- To facilitate the students to learn about the pre-treatments of various kinds of textile materials involved in textile wet processing industries.

UNIT I SINGEING & DESIZING 9

Impurities present in different fibres, Inspection of grey goods and lot preparation. Shearing and Cropping Singeing of cotton and blended fabrics. Yarn singeing – Singeing of tubular knitted fabrics. Tightrope, Slack rope washing. Acid desizing and its limitations, enzyme desizing – Typical recipe for desizing of different materials – different desizing methods. Open width washing machine. Degumming of silks using soap, soap and soda ash, acids, amines and enzymes.

UNIT II SCOURING 9

Principles of Scouring: jumbo/JT-10, Vapourlac and soft flow machine, Chemical and auxiliaries for Scouring – Scouring of coloured goods – Degumming of Silk, Scouring of wool, silk P/C, P/V blends – Scouring of Jute, Souring of synthetic textiles, Solvent Scouring, Bio Scouring. Auxiliaries required for scouring of different materials and with respect to different materials.

UNIT III BLEACHING 9

Principles of Bleaching: Importance of whiteness and whiteness retention – Bleaching mechanism of Hydrogen Peroxide, Hypo chlorites and Sodium chlorite – Parameters involved in bleaching action – Merits and Demerits of each bleaching agent – bleaching in rope form bleaching in Kier, Jumbo Jigger – Continuous \scouring and Bleaching of cotton goods in open width and rope form using H2O2 – Yarn Scouring and Bleaching using Cabinet hank dyeing machine. Bleaching of p/c blend in open width form by Pad roll and continuous methods using Hydrogen Peroxide and Sodium chlorite, bleaching of Jute – Knitted fabric bleaching on winches, soft flow – The concept of full bleaching –Mechanism of Whitening effect. Blueing agents and its use. Combined Bleaching & whitening. Typical recipe for bleaching of different fibres.

UNIT IV MERCERISATION 9

Mercerizing – conditions. Physical and Chemical changes – Mercerizing of coloured goods P/C blends and tubular knits. Effects of Time, Tension, Caustic Concentration, Temp on mercerizing effects. Stack mercerizing, Hot mercerizing, mercerizing of blending fabrics.

UNITV DEVELOPMENTS 9

Developments in grey preparation – combined processing enzymatic scouring & bleaching, cold bleaching; prograde process (liquid ammonia mercerization) Developments in desizing, Scouring, Bleaching and mercerizing, plasma based preparation, ozone bleaching. Milling, Grabbing and potting

TOTAL: 45 PERIODS

OUTCOMES:

CO1: Illustrate individual operation used in pre-treatment and physical – chemical changes brought in to textile material.

CO2: Demonstrate chemical formulations and process parameters used in unit operations of pre-treatment and properties of chemicals used.

CO3: Explain machinery used in pre-treatments operations.

CO4: Explain quality parameters and environmental impact of pre-treatment operations.

CO5: Design wet processing techniques such as singeing, desizing, mercerizing, scouring and bleaching of different textile materials at desired levels.

TEXT BOOKS:

1. Trotman, E.R., Textile Scouring and Bleaching, Charless Griffins, Com. Ltd., London 1990.
2. Shenai V.A., Technology of Bleaching and Mercerizing, Sevak Publications, Wadala, Chennai, 1991.

REFERENCES:

1. Nalankilli.G, Edwin Sundar.A, Chemical Preparatory Processes for Textiles, NCUTE Publications, New Delhi, 2002
2. Karmakar, S.R., Chemical Technology in the Pre-Treatment Processes of Textiles. Elsevier Science, 1999
3. Chakraborty, J.N, Fundamentals and Practices in colouration of textiles, Woodhead Publishing India, 2009, ISBN – 13: 978-81-908001-4-3.
4. Bleaching & Mercerizing – BTRA Silver Jubilee Monograph series
5. Technology of Mercerizing by J.T. Marsh

CO's	PO's												PSO's			
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**
1	2	-	1	1	-	2	2	2	-	1	-	2	2	2	2	1
2	2	-	2	2	1	2	3	1	2	2	1	1	2	1	2	1
3	1	-	2	-	2	1	1	-	-	2	-	2	1	1	3	2
4	1	-	1	3	1	2	3	2	2	1	-	1	2	1	2	1
5	2	2	3	-	1	-	2	2	-	-	-	2	3	2	1	2
Avg	1.5	2	1.8	2	1.2	1.7	2.2	1.7	2	1.5	0.5	1.6	2	1.4	2	1.4

TC3303 STRUCTURE AND PROPERTIES OF FIBRES

L	T	P	C
3	0	0	3

OBJECTIVES:

To enable the students to

- Enhance their knowledge related to the structure and morphology of textile fibres.
- Understand the mechanical, physical characteristics of each fiber in detail.

UNIT I STRUCTURE OF FIBRES 9

Fibres - Classification of fibres,Study of structures of natural and man-made fibers – physical, chemical and Morphological structures . Molecular conformations – planar zig-zag, helical and lamellar conformations.

UNIT II STRUCTURE INVESTIGATION TECHNIQUES 9

Transmission and Scanning electron microscopes-principle construction and working; X-ray diffraction techniques – X-ray analysis-estimation of crystallinity; Infrared radiation and dichroism. techniques – chemical element and group identification by transmittance and optical density methods. Molecular orientation estimation, Typical molecular structures of commercially important fibers.

UNIT III MOISTURE ABSORPTION CHARACTERISTICS OF FIBRES 9

Moisture absorption behaviour of natural and man-made fibres; influence of fibre structure, humidity and temperature on the moisture absorption; conditioning of fibres –mechanism of conditioning and factors influencing conditioning. Moisture diffusion in fibres. Heat of sorption – integral and differential, their relation; factors influencing heat of sorption - measurement of heat of sorption.

UNIT IV TENSILE CHARACTERISTICS OF FIBRES 9

Tensile characteristics –Study of strength, elongation, work of rupture, initial modulus, work factor and yield point – determination of yield point. Stress-strain relations of natural and manmade fibres - influence of humidity and temperature on tensile characteristics .Time effects- Study of creep phenomena.

UNIT V ELASTIC RECOVERY- OPTICAL AND FRICTIONAL BEHAVIOUR OF FIBRES 9

Mechanical conditioning of fibres and its influence on elastic recovery. Elastic recovery and its relation to stress and strain of fibres. mechanical conditioning of fibres and its influence on elastic recovery. Refractive index -Refractive Index measuring techniques, directional friction in wool – friction.

TOTAL: 45 PERIODS

OUTCOMES:

CO1: Structure and properties of fibres.
CO2: Method of investigation of structure of fibres.
CO3: Moisture properties of fibres.
CO4: Tensile and elongation properties of fibres.
CO5: Optical, thermal and frictional characteristics of fibres.

TEXT BOOKS:

1. Morton W. E. and Hearle J. W. S., “Physical Properties of Textile Fibres”, The Textile Institute,
2. Washington D.C., 2008.
3. Meredith R. and Hearle J. W. S., “Physical Methods of Investigation of Textiles”, Wiley Publication,New York, 1989
4. Mukhopadhyay S. K., “Advances in Fibre Science”, The Textile Institute,1992

REFERENCES:

1. Meredith R., “Mechanical Properties of Textile Fibres”, North Holland, Amsterdam, 1986.
2. Hearle J. W. S. Lomas B. and Cooke W. D., “Atlas of Fibre Fracture and Damage to Textiles”, The
   Textile Institute, 2nd Edition, 1998.
3. Raheel M. (ed.), “Modern Textile Characterization Methods”, Marcel Dekker, 1995.
4. Mukhopadhyay S. K., “The Structure and Properties of Typical Melt Spun Fibres” Textile Progress

CO’s	PO’s												PSO’s			
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**
1	2	-	1	2	1	-	-	-	1	2	-	2	2	1	1	2
2	1	2	-	2	1	-	1	-	-	1	-	1	2	2	1	1
3	2	2	-	1	-	2	1	1	-	2	1	2	1	1	2	1
4	2	-	1	2	1	-	-	-	1	2	-	2	2	1	1	1
5	1	2	-	2	2	-	1	-	-	1	-	1	2	1	2	2
AVg	1.6	2	1	1.8	1	2	1.5	0.5	1	1.6	0.5	1.6	1.8	1.2	1.4	1.4

TC3304 TECHNOLOGY OF YARN AND FABRIC MANUFACTURING **L T P C**
3 0 0 3

OBJECTIVE:

- To enable the students to understand various processes involved in conversion of fibre to yarn by ring spinning system and other modern spinning systems.
- To teach weaving and non-woven technologies of fabric manufacturing and the machinery used.

UNIT I GINNING, BLOW ROOM, CARDING AND DRAWING 9

Ginning – objectives, types, working principle and ginning performance on yarn quality; opening and cleaning – objectives of blow room machines, principle of opening, cleaning and blending machines, principles of carding, working of carding machine; drawing machine– objectives, drafting system – types and applications, principles of auto levelers

UNIT II COMBER, ROVING 9

Comber preparation – objectives, principles of sliver lap ribbon lap and super lap formers; comber - principle of combing, sequence of combing operation; Roving machine – objectives, working principle and operation

UNIT III SPINNING 9

Ring spinning machine – objectives, working principle and operation; Principles of yarn formation and material flow – rotor, friction, air-jet and air vortex spinning

UNIT IV WINDING,SIZING 9

Purpose and types of cone winding machines- Yarn clearers -Mechanical, Electrical Pirn winding machine – Types – yarn faults. Warping & Sectional warping machines. Sizing – size ingredients.

UNIT V WEAVING 9

Basic Principles of Tappet looms, Dobby looms, Drop box Looms, Jacquard looms. Basic concepts of Shuttle less looms – Rapier, projectile and Air jet looms. Salient features. Analysis of fabric defects.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of this course, the student shall be able to

CO1: Understand the Principle and operations of Ginning, Blow Room, Carding and Drawing.

CO2: Understand the Principle and operations of Comber preparation, comber, Roving.

CO3: Understand the Principle and operations of Ring spinning, rotor, friction, air-jet and air-vortex Spinning.

CO4: Understand the Principle and operations of cone winding, Pirn winding, Warping, Sizing.

CO5: Understand the Principle and operations of Tappet looms, Dobby looms, Drop box Looms, Jacquard looms, Shuttle less looms.

TEXT BOOKS:

1. Klein W., “The Technology of Short-staple Spinning “, The Textile Institute, Manchester, 1998.
2. Talukdar M.K., Sriramulu P.K. and Ajgaonkar D.B., “Weaving: Machines, Mechanisms, Management
3. Oxtoby E., “Spun Yarn Technology “, Butterworth, London, 1987, ISBN: 0408014644 /ISBN- 13: 9780408014649.

REFERENCES:

1. Chattopadhyay R., Technology of Carding, NCUTE, IIT Delhi,2003.
2. Chattopadhyay R. & Rengasamy R., “Spinning, Drawing, Combing & Roving, NCUTE Pilot Programme.
3. Salhotra K. R. & Chattopadhyay R., Book of papers on “Blowroom and Carding”, IIT Delhi1998.
4. Ormerod A., Modern Preparation and Weaving, Merrow Publication Co. U.K.1988.
5. Talukdar M.K., “An Introduction to Winding and Warping” Testing Trade Press,Mumbai.
6. Talavasek O. & Svaty V., Shuttleless Weaving Machines, Elsevier Scientific Pub. Co., New York1981.
7. Adanur S., Handbook of Weaving, Technomic Publishing Co., Inc.,2001.

CO's	PO's												PSO's			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
1	3	3	3	3	2	2	2	3	3	3	3	3	3	2	3	3
2	3	3	2	3	2	1	1	2	2	2	2	2	3	2	3	3
3	2	2	2	2	1	1	1	2	2	2	2	2	3	2	3	2
4	2	2	2	2	1	2	2	2	3	2	2	2	3	2	3	2
5	2	2	2	2	1	1	1	2	2	2	2	2	3	2	3	2
AVg	2.4	2.4	2.2	2.4	1.4	1.4	1.4	2.2	2.4	2.2	2.2	2.2	3	2	3	2.4

TC3305 CHEMISTRY OF TEXTILE AUXILIARIES L T P C
3 0 0 3

OBJECTIVE:

- To provide the knowledge on classification and types of textile auxiliaries.
- To provide the knowledge on importance and basic functions of auxiliaries.
- To enable the students to know about the chemistry of textile auxilires.
-

UNIT I MODIFICATION OF SURFACE TENSION 9

Auxiliaries: Importance and functions; Surfactants: Mode of action and classification of surfactants – cationic, anionic, nonionic surfactants.

UNIT II PREPARATORY PROCESS 9

Auxiliaries associated with De-sizing, scouring, Bleaching of cellulosic fibres, Protein fibres and synthetic fibres.

UNIT III DYEING PROCESS 9

Auxiliaries associated with Dyeing with Direct Dyes, Reactive, Vat, Azoic colors, Sulphur dyes, Acid dyes, Metal complex dyes, Basic and Disperse dyes.

UNIT IV PRINTING PROCESS 9

Auxiliaries associated with printing: Direct Style of Printing, Discharge style of Printing, Resist style of printing.

UNIT V FINISHING PROCESS 9

Auxiliaries used in Resin Finishing, Stiff finishing, soft finishing,Water repellent, Water Proof, Flame retardant, Soil release.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to know about role of auxiliaries in

CO1: Modification of surface tension

CO2: Preparatory Process
CO3: Dyeing Process
CO4: Printing Process
CO5: Finishing

TEXT BOOKS:

1. Shennai.V.A, "Organic Textile Chemicals", Sevak Publication, Bombay,1995
2. Vaidya.A.A, "Chemistry of Textile auxiliaries", Wheeler Publishing, NewDelhi,1999

REFERENCES:

1. John Shore, "Colourants& Auxiliaries" Wiley and Sons Ltd, New York, Volume I & II,1999.
2. Chakraborty, J.N, "Fundamentals and Practices in colouration of Textiles", Woodhead Publishing India, 2009, ISBN-13:978-81-908001-4-3
3. Shennai.V.A, "Organic Textile Chemicals", Sevak Publication, Bombay,1995
4. Vaidya.A.A, "Chemistry of Textile auxiliaries", Wheeler Publishing, NewDelhi,1999
5. W D Schindler P J Hauser., "Chemical Finishing of Textiles", Woodhead publishing Ltd, 2004.
6. Mathews Kolanjikombil.,"Dyeing of Textile substrates III –Fibres, Yarns and Knitted fabrics", Woodhead publishing India , 2021
7. Trotman E. R., "Dyeing and Chemical Technology of Textile Fibres", Charles Griffin & Co. Ltd., U.K., 1984, ISBN : 0 85264 165 6.
8. Dr. N N Mahapatra., "Textile dyeing", Woodhead publishing India, 2018

CO's	PO's												PSO's			
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**
1	2	2	1	-	1	2	3	2	1	2	1	3	2	1	2	3
2	2	1	2	1	2	1	2	1	-	1	1	1	1	2	1	2
3	3	2	1	-	2	3	1	2	2	1	-	2	2	1	1	2
4	2	2	1	1	1	2	1	1	1	-	1	2	3	2	1	2
5	3	2	1	1	1	2	1	2	-	1	1	2	1	1	2	1
AVg	2.4	1.8	1.2	1	1.4	2	1.6	1.6	1.3	1.2	1	2	1.8	1.4	1.4	2

TC3311 YARN AND FABRIC MANUFACTURING LABORATORY

L	T	P	C
0	0	3	1.5

OBJECTIVE:

To enable the students to

- Make the students identify a problem/process relevant to their field ofinterest that can be carried out
- Make them equipped to search databases and journals to collect relevantdata and identify a solution
- Plan, learn and perform experiments to verify the solution

LIST OF EXPERIENTS

1. Material passage and production calculation in
    a. Blow room scutcher
    b. Carding machine
    c. Comber
    d. Draw frame
    e. Speed frame
2. Material passage, draft, twist and production calculation in ring frame
3. Material passage and production calculation in winding machine
4. Timing diagram of weaving machine
5. Shedding mechanisms - Tappet, dobby
6. Jacquard mechanism
7. Picking mechanism and calculation of shuttle speed
8. Beat-up mechanism
9. Let-off and take-up mechanism
10. Auxiliary mechanisms

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of this practical course, the students shall be able to

CO1 : Understand the material passage in the machine
CO2 : Draw gearing diagram
CO3 : Identify the components of spinning and weaving machines
CO4 : Calculate draft, twist and production rate of spinning machines
CO5 : Understand the mechanism of weaving machine

LAB EQUIPMENTS

LIST OF EQUIPMENT FOR BATCH OF 30 STUDENTS

1. Blow room Line – 1 No.
2. Carding machine – 1 No.
3. Drawing machine – 1 No.
4. combing machines – 1 No.
5. Roving machine – 1 No.
6. Ring Frame – 1 No.
7. Cone / Cheese winding machine – 1 No.
8. Pirn winding machine – 1 No.
9. Loom with tappet shedding – 1 No.
10. Loom with dobby shedding – 1 No.
11. Loom with jacquard – 1 No.
12. Loom with drop box – 1 No.

CO's	PO's												PSO's			
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**
1	2	1	2	2	1	1	3	1	2	2	1	2	2	1	2	2
2	3	2	1	1	-	2	1	-	2	1	2	2	2	1	1	2
3	2	1	2	2	1	2	1	2	1	1	1	3	3	2	1	3
4	3	2	1	2	2	1	2	1	3	2	1	2	2	1	2	2
5	2	2	1	1	2	2	1	1	2	2	1	2	3	1	2	2

AVg	2.4	1.6	1.4	1.6	1.5	1.6	1.6	1.2	2	1.6	1.2	2.2	2.4	1.2	1.6	2.2

TC3312 **FIBRE SCIENCE LABORATORY** **L T P C**
0 0 2 1

OBJECTIVE:

To enable the students to understand the

- Identification of fibres by different methods
- Method of characterization of fibres

LIST OF EXPERIENTS

1. Identification of natural, regenerated and synthetic fibres
2. Preparation of density gradient column and determination of density of various fibres
3. Determination of denier of synthetic fibres
4. Determination of moisture regain and moisture content of fibres
5. Determination of wax content and spin finish of natural and synthetic fibres
6. Identification of fibres and determination of the blend proportion of
    a. Cotton/ regenerated cellulose
    b. Polyester/ protein fibres
    c. Cellulose/polyester fibres
    d. Cotton/ viscose/polyester
7. Viscosity and molecular weight determination
8. Analysis of Thermograms of fibers
9. Analysis of FTIR spectrograms of fibers
10. Coagulation of polymers in wet spinning
    a. Viscose
    b. Acrylic
11. Analysis of XRD patterns of various fibre

TOTAL: 30 PERIODS

OUTCOMES:

Upon completion of this practical course, the students shall be able to

CO1: Identify the fibres using solubility test
CO2: Identify the fibres using burning test
CO3: Identify the fibres using microscopic characterization
CO4: Determination of linear density, density and moisture properties of fibres
CO5: Analyze the results of TGA, FTIR spectrometer and X-ray diffractometer

LAB EQUIPMENTS

LIST OF EQUIPMENT FOR BATCH OF 30 STUDENTS

1. Microscope – 1 No.
2. Weighing balance – 1 No.
3. Conditioning Chamber – 1 No.

CO's	**PO's**												**PSO's**			
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**
1	3	2	3	1	1	1	2	2	1	2	1	1	3	3	2	3

2	2	2	2	1	1	1	2	2	1	2	1	1	3	3	2	2
3	2	2	1	1	1	1	2	1	1	2	1	1	2	2	1	1
4	3	2	2	2	1	1	2	1	1	2	1	1	3	2	2	2
5	3	3	2	2	2	1	2	1	1	2	1	1	3	1	3	2
AVg	2.6	2.2	2	1.4	1.2	1	2	1.4	1	2	1	1	2.8	2.2	2	2

TC3401 CHEMISTRY AND TECHNOLOGY OF INTERMEDIATES AND DYES **L T P C**
3 0 0 3

OBJECTIVE:

- To enable the students to learn about the raw materials & purification of intermediates for dyes preparation
- To explain the students about the basic chemistry & mechanism in dye & dye intermediates preparation

UNIT I INTRODUCTION TO DYES 9

Coal tar – fractional distillation and their products. Aromatic hydrocarbons from petroleum. Introduction to primary and intermediate chemicals for dyes. Relation between Colour and Chemical Constitution.CI Name and Number.

UNIT II UNIT PROCESSES 9

Unit processes in organic synthesis such as halogenation, nitration, Sulphonation, esterification, alkylation ,acetylation, hydroxylation, and diazotisation with suitable examples.

UNIT III AROMATIC INTERMEDIATES 9

Systematic study of important intermediates from benzene, chlorobenzene, toluene, nitrobenzene, aniline, phenol, salicylic acid, naphthalene and anthraquinone.

UNIT IV DYE INTERMEDIATES 9

Classification of dyes and intermediates. Introduction to azines, oxazines, thiazines, xanthine, acridine, Diphenyl and triphenyl methane dyes.

UNIT V DYES 9

Introduction to their chemistry and preparation of – Anthraquinone vat dyes, indigoid, solubilised vat dyes, reactive dyes, disperse dyes, Blueing and Fluorescent brightening agents.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to

CO:1 Understand about the Colour and Chemical Constitution
CO:2 Understand about Unit processes in organic synthesis
CO:3 Understand about Aromatic Intermediates
CO:4 Understand about dyes and their intermediates
CO: 5 Understand about chemistry and preparation of Dyes.

TEXT BOOKS:

1. Shenai,.V.A., “Introduction to the Chemistry of Dyestuffs”, Sevak Publications,Mumbai 1995

2. Shore,J. (Ed)., “Colorants and auxiliaries, Volume 1,:Colorants”, SDC, Blackwells, Leeds, 1990,

REFERENCES:

1. Venkatraman.K., “The Chemistry of Synthetic Dyes” – Vol. I & II, Academic press, London, 1990
2. David.R.Waring, Geoffrey Hallas, The Chemisry and Application of Dyes, SDC,1990.
3. John Shore, "Colourants& Auxiliaries" Wiley and Sons Ltd, New York, Volume I & II,1999.
4. Chakraborty, J.N, "Fundamentals and Practices in colouration of Textiles", Woodhead Publishing India, 2009, ISBN-13:978-81-908001-4-3

CO’s	PO’s												PSO’s			
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**
1	2	2	2	-	1	2	3	2	1	2	1	1	2	1	2	3
2	3	2	1	1	2	3	2	1	1	1	1	3	2	2	1	2
3	2	2	1	1	2	1	1	2	1	1	-	2	2	1	2	2
4	2	2	1	1	1	2	1	1	1	-	1	2	3	2	1	1
5	3	1	1	1	1	2	1	2	1	1	1	2	2	1	2	2
AVg	2.4	1.8	1.2	1	1.4	2	1.6	1.6	1	1.2	1	2	2.2	1.4	1.6	2

TT3591 TESTING OF TEXTILE MATERIALS L T P C
3 0 0 3

OBJECTIVES:

- To make the students understand the principle and method of working of equipment’s used for testing of textile materials

UNIT I SAMPLING AND FIBRE TESTING 9

Sampling: Sampling of fibres, yarns and fabrics. Standard test atmosphere, measurement of relative humidity. Moisture content and regain of textile materials: Measurement methods. Fibre Length Measurement; Fibre Fineness Measurement. Measurement of cotton fibre maturity, trash and micro dust. High Volume instruments, Advanced fibre information system. standards and norms

UNIT II YARN TESTING 9

Yarn testing - yarn numbering, twist in single and ply yarns, single yarn strength, lea strength, yarn mass evenness, yarn hairiness; yarn friction– static and dynamic; standards and norms

UNIT III TESTING OF FABRIC MECHANICAL PROPERTIES - 9

Fabric testing - tensile, tear, bursting strength, ballistic impact, Low stress mechanical properties - Kawabata Evaluation System; FAST; standards and norms

UNIT IV TESTING OF SERVICEABILITY 9

Test procedure - abrasion resistance, pilling resistance, stiffness, drape ability, crease recovery, wrinkle recovery, air permeability; standards and norms

UNIT V FABRIC INSPECTION AND GARMENT QUALITY 9

Fabric defects – inspection and grading, acceptable quality level; quality assessment of garments - cutting, sewing, pressing, finishing and packaging defects; standards

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of this course, the student will be able to

CO1: Explain the importance and test procedure for various fibres and its properties

CO2: Discuss the testing of various yarn properties

CO3: Describe various test procedure for fabric mechanical and aesthetic related properties

CO4: Explain the test procedure for determining low stress mechanical properties of fabric

CO5: Discuss the fabric inspection and quality assessments of garment

TEXTBOOKS

1. Booth J.E., "Principle of Textile Testing", Butterworth Publications, London, 1989, ISBN: 0592063259 | ISBN-13: 9780592063256.
2. Kothari V. K., "Progress in Textiles: Science & Technology Vol 1 Testing & Quality Management", IAFL Publications, New Delhi, 1999, ISBN: 819010330X | ISBN-13: 9788190103305

REFERENCS

1. Seville B.P., "Physical Testing of Textiles", Textile Institute, Manchester, 1999, ISBN: 1855733676 | ISBN-13: 9781855733671.
2. Ruth E.Glock., and Grace I. Kunz., "Apparel Manufacturing – Sewn Product Analysis FourthEdition", Pearson/Prentice Hall, 2005, ISBN: 0131119826 / ISBN: 978-0131119826
3. Pradip V. Mehta P.E., and Satish K. Bhardwaj., "Managing Quality in the Apparel Industry", National Institute of Fashion Technology, India 1998, ISBN: 8122411665 | ISBN-13: 9788122411669
4. Sara J. Kadolph., "Quality Assurance for Textiles and Apparels", Fair child Publications, New York, 2007, ISBN: 1563675544 | ISBN-13: 9781563675546.
5. Slater K., "Physical Testing and Quality Control", The Textile Institute, Vol.23, No.1/2/3 Manchester, 1993, ISBN: 187081245X | ISBN-13: 9781870812450.

PROGRESS THROUGH KNOWLEDGE

Course Articulation Matrix:

Course Outcomes	Statement	Program Outcome														
		PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO3
CO1	Explain the importance and test procedure for various fibres and its properties	3	3	2	3	2	-	-	-	-	-	-	1	3	1	2
CO2	Discuss the testing of various yarn properties	3	3	2	3	2	-	-	-	-	-	-	1	3	1	2
CO3	Describe various test procedure for fabric mechanical and aesthetic related properties	3	3	2	3	2	-	-	-	-	-	-	1	3	1	2
CO4	Explain the test procedure for determining low stress mechanical properties of fabric	3	3	2	3	2	-	-	-	-	-	-	1	3	1	2
CO5	Discuss the fabric inspection and quality assessments of garment	3	3	2	3	2	-	-	2	-	-	-	1	3	1	2
Overall CO		3	3	2	3	2	-	-	2	-	-	-	1	3	1	2

1, 2 and 3 are correlation levels with weightings as Slight (Low), Moderate (Medium) and Substantial (High) respectively

PROGRESS THROUGH KNOWLEDGE

TC3402 PRINCIPLES AND THEORY OF DYEING

L	T	P	C
3	0	0	3

OBJECTIVE:

- To expose the students about the mechanics of dyeing
- To enable the students to learn about colour, combinations of colours, their source and measurement
- To expose the students to the factors influencing the dyeing

UNIT I CHEMICAL KINETICS 9

Kinetics, characteristics of second order reaction – concept of activation energy – Arrhenius equation – Theory of absolute reaction rates – Kinetics of Enzyme Catalyzed reactions. Kinetic of dyeing. Factors affecting the kinetics of dyeing.

UNIT II ADSORPTION AND CATALYSIS 9

Physical and Chemical adsorption – Important isotherms – Freundlich and Langmuir adsorption isotherms. Homogeneous catalysis – Heterogeneous catalysis, acid – base catalysis, Enzyme catalysis – Applications of catalysis in industries.

UNIT III ELECTROCHEMISTRY 9

Electrical Conductance – Specific conductance – Equivalent conductance – variation with dilution - Kohlrausch's law – Galvanic cells –Reference electrode– Standard Hydrogen electrode – Nernst equation Electrochemical series – Applications of EMF measurements.

UNIT IV FIBER PROPERTIES AND ITS EFFECT ON DYEING 9

Influence of Fibre structure, – Dyeing behaviour of drawn, heat set and texturizing of textile materials. Interpretation between dye molecules and fibre polymeric chains –Substantivity and affinity of dyes with textile materials.

UNIT V FACTORS INFLUENCING DYEING 9

Glass transition temperature and its effect on dye stability and dye diffusion temperature. Diffusion of dyes – Fick's first and second law of diffusion. Derivation of William Landed Ferry (WLF) equation and its significances on textile dyeing.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to

CO1: Understand the Chemical Kinetics

CO2: Understand the Adsorption And Catalysis

CO3: Understand the Electrochemistry

CO4: Understand the Fiber Properties And Its Effect On Dyeing

CO5: Understand the Factors Influencing Dyeing

TEXT BOOKS:

1. Puri B.H. and Sharma L.R. Principles of Physical Chemistry, S. Nagin Chand and Company, Delhi, 1994
2. Gordon M. Barrow, Physical Chemistry, Sixth edition, Tata McGraw-Hill, 1998

REFERENCES:

1. Peters.A.T and Freeman,H.S "Physico – Chemical Principles of Colour Chemistry", Blackie, ISBN:0751402109.1995
2. Johnson A, "The Theory of Colouration of Textiles", SDC 2nd Edition,1998.

CO's	PO's												PSO's			
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**
1	2	2	1	2	1	2	2	1	2	2	1	2	2	2	3	2
2	3	2	2	1	2	2	2	2	1	1	1	2	3	1	2	2
3	3	3	2	2	1	1	2	3	2	2	2	3	2	2	3	2
4	2	2	1	2	2	1	2	2	3	2	1	2	3	1	2	3
5	3	2	2	1	1	2	1	1	2	1	1	2	2	2	2	3
AVg	2.6	2.2	1.6	1.6	1.4	1.6	1.8	1.8	2	1.6	1.2	2.2	2.4	1.6	2.4	2.4

TC3403 DYEING OF CELLULOSIC AND PROTEIN MATERIALS **L T P C**
3 0 0 3

OBJECTIVE:

- To provide the knowledge on theory of dyeing fibrous material
- To provide the knowledge on classification, principle, shop floor practice & problems in the application of various dyes on textiles
- To enable the students to understand machinery used for dyeing of textile materials through class room discussion and field visits.

UNIT I INTRODUCTION 9

Basic concept of dye and pigment, Definition of affinity, substantivity, reactivity, exhaustion, depth of dyeing, percentage shade. Concepts of exhaust and padding techniques of dyeing. Basic mechanisms of dyeing techniques such as mechanical deposition, chemical fixation. Classification of dyes according to methods of application. Influence of pretreatment on dyeing properties.

UNIT II DIRECT AND REACTIVE DYES 9

Direct dyes: General properties, principles and method of application on cellulosic materials. Classification dyeing of cellulosic materials. Various after treatments to improve the wash fastness and light fastness. Practical problems and their remedies. Reactive dyes – Chemistry, concept of hot brand, cold brand, HE and vinyl sulphone reactive dyes, bifunctional and low salt reactive dyes, principle steps involved in dyeing of cellulosic materials. Practical problems remedy

UNIT III VAT DYES, OXIDATION COLOURS AND PIGMENTS 9

Vat dyes: Chemistry and general properties classification. Principle steps involved in dyeing. Various methods of application of on cellulosic yarn and fabric with vat dyes. Stripping practical problems – dyeing and remedies. Solubilised vat dyes: Chemistry and general properties – Principles steps involved in dyeing of cellulosic materials. Dyeing of oxidation colours and pigments

UNIT IV ACID DYES 9

Acid Dyes: Types based on application – Properties - Effect of electrolyte, temperature, time, pH and other dye bath assistants on dyeing of protein fibres. Mechanism of dyeing protein fibres. Application procedure for dyeing of wool, silk, stripping and re-dyeing.

UNIT V BASIC AND METAL COMPLEX DYES 9

Basic Dyes: Dyeing mechanism with protein fibres – application procedure of silk and wool mechanism of dyeing silk and wool with metal complex dyes – properties of chrome dyes – application procedure – chrome mordant, meta chrome and after chrome methods. Dyeing of wool with solubilised vat dyes.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to

CO1: Understand the theory of dyeing

CO2: Understand the dyeing of cellulosic textiles with Direct and reactive dyes

CO3: Understand the dyeing of cellulosic textiles with vat dyes, oxidation colours and Pigments

CO4: Understand the dyeing of synthetic textiles with Acid dyes

CO5: Understand the dyeing of synthetic textiles with Basic and Metal complex dyes

TEXT BOOKS:

1. Shenai V.A. “Technology of Dyeing” l995, Sevak Publications, Mumbai.
2. Shore,J. “Blend Dyeing”, SDC, London, 1998 ISBN: 0901956740.

REFERENCES:

1. Madaras, G.W., Parish, G.J., and Shore,J, “Batchwise dyeing of woven cellulosic fabrics”, SDC, London, 1993, ISBN: 0901956554.
2. Shore,J. “Cellulosic Dyeing”, SDC Publication, London, 1995 ISBN:0901956686.
3. Chakraborty, J.N, "Fundamentals and Practices in colouration of Textiles", Woodhead Publishing India, 2009, ISBN-13:978-81-908001-4-3.

CO’s	PO’s												PSO’s			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
1	2	2	1	2	2	1	2	1	1	1	2	2	3	2	1	2
2	3	2	2	2	2	1	1	2	1	2	1	2	2	3	1	2
3	2	3	1	2	1	2	2	1	1	2	2	3	3	2	2	2
4	3	2	1	1	2	2	1	2	1	1	2	2	2	2	1	3
5	3	2	2	2	1	1	2	2	2	2	1	2	3	2	1	2
AVg	2.6	2.2	1.4	1.8	1.6	1.4	1.6	1.6	1.2	1.6	1.6	2.2	2.6	2.2	1.2	2.2

TC3404 TECHNOLOGY OF PRINTING L T P C
3 0 0 3

OBJECTIVE:

- To enable the students to understand the fundamental concepts of printing of various kinds of fabrics using different colourants

UNIT I CONCEPTS OF PRINTING 9

Definition of printing – Difference between printing and dying – Pretreatment and Fabric requirements for printing – Design details of printing like repeat of design, squeegees, bolting cloth, Preparation of Screen – Table and Rotary machine – Ingredients in printing with functions and their concentration of usage.

UNIT II THICKENERS 9

Classification thickeners – Requirements to be a good thickener – Brief study on thickeners like CMC, Sodium Alginate, Indalca, Guar gum and Kerosene emulsion paste – Synthetics thickeners. Printing with Pigments, Classification of pigments, Synthetic binders, Catalyst, Cross Linking agents. Selection criteria for binders.

UNIT III DIRECT STYLE 9

Printing with reactive dyes by steaming method, curing and silicate padding method – Advantages and Disadvantages of above methods– Printing with Rapid fast and Rapidogen colours, Printing with solubilised Vat dyes. IKAT Printing

UNIT IV DISCHARGE, RESIST STYLES 9

Colour and White Discharge of cotton and viscose dyed materials – Problems associated with Discharge style printing. Brief study on Discharging agents and their usage and limitations of usage, Different styles of Resist printing of cellulose materials.

UNIT V PRINTING MACHINERYS 9

Roller printing machinery. Screen printing: flat bed screen - Rotary screen. Thermo transfer printing machinery. Garment printing machines. Printing paste formulations, printing of silk and woolen materials.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to

CO:1 Understand the concepts of printing of fabrics
CO:2 Understand about thickeners
CO:3 Understand the concepts of Direct Style of printing
CO:4 Understand the concepts Discharge and Resist of printing.
CO:5 Understand the Printing machinery and Printing of synthetic fabrics

TEXT BOOKS:

1. Shenai V.A. “Technology of Textile Processing Vol. IV” 1998, Sevak Publications, Mumbai.
2. Mills I.W.C. "Textile Printing" SDC Perkin House, 82, Grattom Rd, Yorkshire, England.1994, ISBN 0901956570.
3. Storey, J. “Manual of Textile Printing”, Thames & Hudson, 1992, ISBN: 0500680280.

REFERENCES:

1. Kale D.G. “Principles of Cotton Printing edition – 2”, Mahajan Books, Ahemedabad. 1979
2. Chakraborty, J.N, "Fundamentals and Practices in colouration of Textiles", Woodhead

Publishing India, 2009, ISBN-13:978-81-908001-4-3.

CO's	PO's												PSO's			
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**
1	3	2	2	1	2	2	1	2	1	2	1	3	3	1	2	3
2	2	2	1	2	2	2	2	1	1	2	2	2	2	2	2	2
3	3	2	2	1	2	2	1	2	1	1	2	2	2	1	2	3
4	2	3	2	1	2	1	2	1	1	2	2	2	3	2	2	2
5	2	2	1	1	2	1	1	2	1	2	1	2	2	2	3	2
AVg	2.4	2.2	1.6	1.2	2	1.6	1.4	1.6	1	1.8	1.6	2.2	2.4	1.6	2.2	2.4

GE3451 ENVIRONMENTAL SCIENCES AND SUSTAINABILITY **L T P C**
2 0 0 2

UNIT I ENVIRONMENT AND BIODIVERSITY 6

Definition, scope and importance of environment – need for public awareness. Eco-system and Energy flow– ecological succession. Types of biodiversity: genetic, species and ecosystem diversity– values of biodiversity, India as a mega-diversity nation – hot-spots of biodiversity – threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ.

UNIT II ENVIRONMENTAL POLLUTION 6

Causes, Effects and Preventive measures of Water, Soil, Air and Noise Pollutions. Solid, Hazardous and E-Waste management. Case studies on Occupational Health and Safety Management system (OHASMS). Environmental protection, Environmental protection acts .

UNIT III RENEWABLE SOURCES OF ENERGY 6

Energy management and conservation, New Energy Sources: Need of new sources. Different types new energy sources. Applications of- Hydrogen energy, Ocean energy resources, Tidal energy conversion. Concept, origin and power plants of geothermal energy.

UNIT IV SUSTAINABILITY AND MANAGEMENT 6

Development , GDP ,Sustainability- concept, needs and challenges-economic, social and aspects of sustainability-from unsustainability to sustainability-millennium development goals,and protocols-Sustainable Development Goals-targets, indicators and intervention areas Climate change- Global, Regional and local environmental issues and possible solutions-case studies. Concept of Carbon Credit, Carbon Footprint. Environmental management in industry-A case study.

UNIT V SUSTAINABILITY PRACTICES 6

Zero waste and R concept, Circular economy, ISO 14000 Series, Material Life cycle assessment, Environmental Impact Assessment. Sustainable habitat: Green buildings, Green materials, Energy efficiency, Sustainable transports. Sustainable energy: Non-conventional Sources, Energy

Cycles-carbon cycle, emission and sequestration, Green Engineering: Sustainable urbanization-Socio-economical and technological change.

TOTAL: 30 PERIODS

TEXT BOOKS:

1. Anubha Kaushik and C. P. Kaushik's "Perspectives in Environmental Studies", 6th Edition, New Age International Publishers ,2018.
2. Benny Joseph, 'Environmental Science and Engineering', Tata McGraw-Hill, New Delhi, 2016.
3. Gilbert M.Masters, 'Introduction to Environmental Engineering and Science', 2nd edition, Pearson Education, 2004.
4. Allen, D. T. and Shonnard, D. R., Sustainability Engineering: Concepts, Design and Case Studies, Prentice Hall.
5. Bradley. A.S; Adebayo, A.O., Maria, P. Engineering applications in sustainable design and development, Cengage learning.
6. Environment Impact Assessment Guidelines, Notification of Government of India, 2006.
7. Mackenthun, K.M., Basic Concepts in Environmental Management, Lewis Publication, London, 1998.

TT3581 TESTING OF TEXTILE MATERIALS LABORATORY

L	T	P	C
0	0	3	1.5

OBJECTIVE:

- To make the students practically learn various fibre, yarn and fabric evaluation procedures to determine characteristics of fibres, yarn and fabric

LIST OF EXPERIMENTS

Determination of

1. Fibre fineness, length and maturity
2. Fibre trash content, Bundle fibre strength
3. Sliver/roving/ yarn linear density
4. Single yarn strength and Yarn Lea strength
5. Yarn single and ply yarn twist
6. Unevenness of yarn and assessment of yarn appearance
7. Fabric tensile strength,
8. Fabric tear and bursting strength
9. Fabric flexural rigidity, bending modulus and crease recovery
10. Drapeability of fabrics
11. Fabric abrasion and pilling resistance
12. Fabric air permeability
13. Fabric weight, thickness and dimensional stability
14. Seam strength and seam slippage

TOTAL: 45 PERIODS

OUTCOMES:

Upon the completion of this course the student will be able to

CO 1: Measure important characteristics of fibre and yarn

CO2: Determine the important characteristics of fabrics

CO3: Measure the seam strength and slippage of garment

LAB EQUIPMENTS

LIST OF EQUIPMENT FOR BATCH OF 30 STUDENTS

Baer Sorter - 1 No.
Fibre Bundle strength tester - 1 No.
Fibre Fineness tester - 1 No.
Trash Analyzer - 1 No.
Projection Microscope - 1 No.
Wrap Reel - 1 No.
Wrap Block - 1 No.
Yarn Twist Tester - 1 No.
Single Yarn Strength Tester - 1 No.
Bundle yarn strength tester - 1 No.
Ballistic Tester - 1 No.
Yarn Unevenness tester - 1 No.
Weighing balance - 1 No.
Yarn appearance Board Winder - 1 No.
Yarn appearance Board (Standards) - 1 No.
Fabric tensile strength tester -1 No.
Fabric tearing strength tester -1 No.
Fabric Thickness Tester -1 No.
Fabric Stiffness Tester -1 No.
Fabric Crease Recovery Tester -1 No.
Fabric Bursting Strength Tester -1 No.
Fabric Abrasion Resistance Tester -1 No.
Fabric Pilling resistance tester -1 No.
Fabric air permeability tester -1 No.
Fabric Drape meter -1 No.
GSM cutter and weighing balance – 1 No.
Lander-o-meter - 1 No
Crock meter - 1 No

ANNA UNIVERSITY
PROGRESS THROUGH KNOWLEDGE

Course Articulation Matrix:

Course Outcomes	Statement	Program Outcome														
		PO1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO1 0**	**PO1 1**	**PO1 2**	**PSO 1**	**PSO 2**	**PSO3**
CO1	Measure important characteristics of fibre and yarn	3	3	3	3	2	-	-	-	2	2	2	1	3	2	3
CO2	Determine the important characteristics of fabrics	3	3	3	3	2	-	-	-	2	2	2	1	3	2	3
CO3	Measure the seam strength and slippage of garment	3	3	3	3	2	-	-	-	2	2	2	1	3	2	3
Overall CO		3	3	3	3	2	-	-	-	2	2	2	1	3	2	3

1, 2 and 3 are correlation levels with weightings as Slight (Low), Moderate (Medium) and Substantial (High) respectively

PROGRESS THROUGH KNOWLEDGE

REFERENCES:

1. R.K. Trivedi, 'Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards', Vol. I and II, Enviro Media. 38 .
2. Cunningham, W.P. Cooper, T.H. Gorhani, 'Environmental Encyclopedia', Jaico Publ., House, Mumbai, 2001.
3. Dharmendra S. Sengar, 'Environmental law', Prentice hall of India PVT. LTD, New Delhi, 2007.
4. Rajagopalan, R, 'Environmental Studies-From Crisis to Cure', Oxford University Press, 2005.
5. Erach Bharucha "Textbook of Environmental Studies for Undergraduate Courses" Orient Blackswan Pvt. Ltd. 2013.

TC3411 WET PROCESSING PREPARATION LABORATORY

L	T	P	C
0	0	3	1.5

OBJECTIVE:

- To practice the students in the tests carried out at preparatory section of the wet processing of textile materials

LIST OF EXPERIENTS

1. Determination of starch content in Enzyme desizing.
2. Determination of residual starch in acid desizing
3. Determination of scouring loss.
4. Bleaching of scoured fabric with hydrogen peroxide.
5. Comparison between bleached and bleached & optical brightened treated sample for whiteness and reflectance value.
6. Determination of the yellowing of hypochlorite bleached (soured/not soured, but washed) fabrics.
7. Effect of time/ temperature in bleaching with hypochlorite (whiteness and strength loss).
8. Effect of pH/ available chlorine in bleaching with hypochlorite (whiteness and strength loss)
9. Scouring &Bleaching of knitted cotton fabrics in winch
10. Scouring &Bleaching of woven blend fabrics in jigger.
11. Bleaching of knitted fabrics in jigger.
12. Degumming of silk.
13. Scouring and Bleaching of wool using hydrogen peroxide.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of this practical course, the students would be able to

CO1: Understand the Desizing process and Efficiency of fabric
CO2: Understand the Scouring process and Efficiency of Scoured fabric
CO3: Understand the Bleaching Process and Efficiency of Bleached fabric
CO4: Understand the combined scouring and Bleaching
CO5: Understand the scouring and Bleaching of synthetic fabrics

LAB EQUIPMENTS

LIST OF EQUIPMENT FOR BATCH OF 30 STUDENTS

1. Jigger – 1 No.
2. Winch – 1 No.
3. Water Bath – 1 No.
4. Tensile Strength Tester – 1 No.
5. Computer colour Matching system – 1 No.
6. PH Meter – 2 Nos.
7. Weighing balance – 1 No.

CO's	PO's												PSO's			
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**
1	2	2	3	2	1	2	1	2	2	2	2	1	3	2	2	2
2	2	2	3	2	1	2	1	2	2	2	2	1	3	2	2	1
3	2	2	3	2	1	2	2	2	2	2	2	1	3	2	2	2
4	2	1	2	1	1	1	1	2	1	2	2	1	3	2	2	1
5	2	2	2	1	1	1	1	2	1	2	2	1	3	2	2	2
AVg	2	1.8	2.6	1.6	1	1.6	1.2	2	1.6	2	2	1	3	2	2	1.6

TC3412 TEXTILE CHEMICAL ANALYSIS LABORATORY

L	T	P	C
0	0	3	1.5

OBJECTIVE:

- To practice the students in evaluation of chemicals and dyes used in textile wet processing industry

LIST OF EXPERIENTS

1. Estimation of the Efficiency of the wetting agent.
2. Estimation of strength of oxidizing agent.
3. Estimation of strength of reducing agent.
4. Estimation of strength of dispersing agent.
5. Estimation of strength of Optical Brightening agent.
6. Demonstration of UV-VIS spectrophotometer and instruments of working principles.
7. Evaluation of the inorganic substances in Textile processing.
8. Identification of dye powder.
9. Identification of the dye in the dyed fabric
10. Determination of Viscosity of liquid samples by using viscometer.
11. Evaluation of the finishing chemicals

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of this practical course, the students would be able to

CO1: Estimate different types of chemicals used for wet processing of textile materials.

CO2: Understand the UV-VIS spectrophotometer process
CO3: Evaluate the inorganic substances
CO4: Identify the dyes
CO5: Estimate purity of dye solution.

LAB EQUIPMENTS

LIST OF EQUIPMENT FOR BATCH OF 30 STUDENTS

1. Beaker Dyeing machine – 1 No.
2. Dye Bath – 1 No.
3. Weighing Balance – 1 No.
4. Stop Watch – 1 No.
5. Soxhlet Apparatus – 1 No.
6. Viscometer – 1 No
7. UV-Vis spectrophotometer – 1 No.

CO's	PO's												PSO's			
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**
1	2	1	1	2	1	2	2	1	2	1	1	2	2	2	1	2
2	2	2	1	2	1	2	2	1	1	2	1	2	3	2	1	2
3	2	1	2	1	2	1	2	1	2	2	1	2	2	1	1	2
4	2	2	1	2	1	2	1	2	1	2	1	2	3	2	1	2
5	2	1	1	2	1	2	1	2	1	1	2	2	2	2	1	2
AVg	2	1.4	1.2	1.8	1.2	1.8	1.6	1.4	1.4	1.6	1.2	2	2.4	1.8	1	2

PROGRESS THROUGH KNOWLEDGE