

**DR. A.P.J. ABDUL KALAM TECHNICAL UNIVERSITY  
LUCKNOW**



**Evaluation Scheme & Syllabus**

**For**

**B.Tech. Second Year**

**Textile Chemistry**

**On**

**AICTE B.Tech Model Curriculum**

**(Effective from the Session: 2019-20)**

## Textile Chemistry

### SEMESTER- III

Sl. No.	Subject Codes	Subject	Periods			Evaluation Scheme				End Semester		Total	Credit
			L	T	P	CT	TA	Total	PS	TE	PE		
1	KOE031-38/ KAS302	Engg. Science Course/Maths IV	3	1	0	30	20	50		100		150	4
2	KAS301/ KVE301	Technical Communication/Universal Human values	2	1	0	30	20	50		100		150	3
			3	0	0								
3	KTT303	Textile Fibre-I	3	1	0	30	20	50		100		150	4
4	KTC301	Principle of Yarn Manufacture	3	1	0	30	20	50		100		150	4
5	KTC302	Preparatory to Processing of Textiles	3	0	0	30	20	50		100		150	3
6	KTT353	Textile Fibre-I Lab	0	0	2				25		25	50	1
7	KTC351	Principle of Yarn Manufacture Lab	0	0	2				25		25	50	1
8	KTC352	Preparatory to Processing of Textiles Lab	0	0	2				25		25	50	1
9	KTC354	Mini Project or Internship Assessment*	0	0	2			50				50	1
10	KNC301/ KNC302	Computer System Security/Python Programming	2	0	0	15	10	25		50			0
11		MOOCs (Essential for Hons. Degree)											
		<b>Total</b>										<b>950</b>	<b>22</b>

\*The Mini Project or internship (3-4 weeks) conducted during summer break after II semester and will be assessed during III semester.

### SEMESTER- IV

Sl. No.	Subject Codes	Subject	Periods			Evaluation Scheme				End Semester		Total	Credit
			L	T	P	CT	TA	Total	PS	TE	PE		
1	KAS402/ KOE041-48	Maths IV/Engg. Science Course	3	1	0	30	20	50		100		150	4
2	KVE401/ KAS401	Universal Human Values/ Technical Communication	3	0	0	30	20	50		100		150	3
			2	1	0								
3	KTT403	Textile Fibre-II	3	0	0	30	20	50		100		150	3
4	KTC401	Principle of Fabric Manufacture	3	1	0	30	20	50		100		150	4
5	KTC402	Technology of Dyeing -I	3	1	0	30	20	50		100		150	4
6	KTT453	Textile Fibre-II Lab	0	0	2				25		25	50	1
7	KTC451	Principle of Fabric Manufacture Lab	0	0	2				25		25	50	1
8	KTC452	Technology of Dyeing -I Lab	0	0	2				25		25	50	1
9	KNC402/ KNC401	Python Programming/Computer System Security	2	0	0	15	10	25		50			0
10		MOOCs (Essential for Hons. Degree)											
		<b>Total</b>										<b>900</b>	<b>21</b>

## **TEXTILE FIBRE-I**

### **UNIT I**

Introduction: various definitions related to textile fibres, classification of textile fibres, difference between staple & filament, essential & desirable properties of textile fibres, advantages & disadvantages of natural and man made fibres.

### **UNIT II**

Cotton cultivation and harvesting, development of cotton fibres in seed, cotton varieties and grading, morphological structure, physical and chemical properties of cotton fibre and its applications.

### **UNIT III**

Jute cultivation, retting and extraction process, structure of jute fibre, physical and chemical properties of jute fibre and its applications, Introduction to other natural bast fibres like flax, hemp, ramie, banana, bamboo fibre etc. and their applications.

### **UNIT IV**

Types of wool and its grading, Morphological structure, chemical composition, physical & chemical properties, varieties of wool fibres and their applications, introduction to other animal fibres like angora fibres, camel hair fibre, goat fibre etc. and their applications.

### **UNIT V**

Types of silk and its production, chemical composition and morphological structure of silk, physical & chemical properties of silk and its applications.

### **References:**

1. WE Morton & JWS Hearle, Physical properties of textile fibres, Textile Institute, U.K.
2. Progress in textiles: Science and technology Vol.-2 by Dr. VK Kothari, IIT Delhi.
3. Hand book of textile fibres by J. Gordon Cook
4. Fibre Science and Technology, SP Mishra

# **PRINCIPLES OF YARN MANUFACTURE**

## **UNIT I**

Cotton ginning, Name of ginning machines, different types of mixing. Different machines of blow room department with the basic idea of each machines along with their opening and cleaning principle. Lap formation and chute feed system.

## **UNIT II**

Objectives of carding process. Description of carding machine parts with passage of materials, Carding and doffing actions. Flexible and metallic Card clothing. Carding, striping and grinding actions. Different carding engine setting and speed of different parts. Drafts (actual & mechanical) and draft constant, Quality of web and neps etc.

## **UNIT III**

Objectives of Draw frame. Different types of drafting systems. Stop motion and their importance, weighting system used in draw frame, passage of material on modern draw frame machine, Concept of draft.

## **UNIT IV**

Objectives of Comber, Passage of material of modern comber along with functions of various parts of comber machine, Fibre presentation and its effects on combing. Preparatory machines for comber and its working.

## **UNIT V**

Objectives of speed frame, drafting, twisting & winding mechanism of speed frame. Package building on speed frame, ring frame, drafting twisting and winding on ring frame, double apron drafting system on ring frame.

### **References:**

1. Essential elements of practical cotton spinning by TK Pattabhiram
2. Cotton blow room, carding, ring frame by Gilbert R. Merrill
3. Cotton spinning by W. Taggart
4. Spun yarn technology by Eric Oxtoby

## **PREPARATORY TO PROCESSING OF TEXTILES**

### **UNIT I**

Natural and added impurities in grey fabric, Singeing-its object and various types of singeing. Introduction to various preparatory processes for cotton, wool, silk, nylon polyester, acrylic and their blends. Preparatory Process for wool: scouring, decatizing.

### **UNIT II**

Desizing- its objects, various desizing methods with its advantages, disadvantages and comparative study (hydrolytic, oxidative methods), Scouring of cotton and fabric: conventional and bio-scouring, Kiers –various types of kiers and their working.

### **UNIT III**

Objectives of Bleaching, various types of bleaching agent such as NaOCl, CaOCl<sub>2</sub> and H<sub>2</sub>O<sub>2</sub>, NaClO<sub>2</sub>. Bleaching chemistry and mechanism of above mentioned bleaching agents, batch wise, semi continuous and continuous bleaching processes: J-box, Continuous bleaching range (CBR).

### **UNIT IV**

Methods used for determination of degradation of cotton during scouring and bleaching such as copper no., methylene blue absorption method, cuprammonium fluidity etc. optical whitening agent and their applications.

### **UNIT V**

Objectives of mercerization, physical and chemical changes in cotton due to mercerization. Methods and equipment for yarn and fabric mercerization . various methods of determination of efficiency of mercerization.

#### **References:**

1. Technology of bleaching Vol. 3 by VA Shenai
2. Textile Scouring & Bleaching by ER Trotman
3. Bleaching & mercerization by JT Marsh
4. Bleaching & mercerization by BTRA

## **TEXTILE FIBRE-I LAB**

Principle of microscopy, microscopic identification of natural fibres, preparation and mounting of specimen for longitudinal view, standard scheme of analysis of homogeneous fibre and blend by physical and chemical methods, preparation of reagents used for chemical analysis.

## **PRINCIPLE OF YARN MANUFACTURE LAB**

Practice in handling and operation of blow room, study of constructional details of machinery in blow room, card, draw frame, speed frame & ring frame, calculating speed of different machine parts, Study of constructional details of card, change places and speed calculation of a carding machine, finding out individual draft and total draft in carding machine, draf frame, rinf frame and roving frame.

## **PREPARATORY TO PROCESSING OF TEXTILE LAB**

Bleaching and mercerization of cotton fabric and to evaluate the effectiveness of each process using various test such as Tewega test, drop absorption test, whiteness index, barium activity number test, measure wax content, ash content and scouring loss of cotton fabric.

## **SEMESTER IV**

### **PRINCIPLES OF FABRIC MANUFACTURE**

#### **UNIT I**

Objects of winding process, working principles of automatic cone and cheese winders. Precision and drum winding machine, pirn winding, winding faults and remedies.

#### **UNIT II**

Objectives warping process, working principles of Beam warping m/c. Sectional warping m/c, beaming, warper beam defects: cause and remedies.

#### **UNIT III**

Objectives sizing process, Slasher Sizing machine, Brief description of modern sizing machine with proper function of each essential part, multicylinderdrying, hot air drying and unconventional drying of sized yarns, . Sizing ingredients used for cotton and synthetic yarns.

#### **UNIT IV**

Drawing-in process, Passage of material on handloom and power loom, Study and working principles of Handloom, Powerloom and Automatic Loom Primary, secondary and auxiliary motions of a power loom.

#### **UNIT V**

Comparison between shuttle and shuttleless looms, Basic concepts of shuttleless looms, Brief description of various shuttleless weft insertion principles, Fabric faults and remedies.

#### **References:**

1. Tablets (ATIRA) a. Winding b. Warping c. Sizing
2. Process control in warping, winding and sizing (ATIRA,BTRA)
3. Yarn preparation Vol. I & II R. Sengupta
4. Warp sizing by Rame Bottom
5. Yarn calculation by R. Sengupta

# TECHNOLOGY OF DYEING-I

## UNIT I

Classification of dyes according to the methods of application, general theory of dyeing, various method of dyeing- Batch, Semi continuous, Continuous dyeing. Dyeing of cellulosic fibres with direct dyes Reactive Dyes.

## UNIT II

Dyeing of cellulosic fibres with Vat dyes-vatting, dyeing, oxidation, Solublised vat dyes. Sulphur dye dissolution ,application ,faults and remedies .Azoic-diazotization, naphtholation, coupling, Oxidation colour-aniline black, mineral colours-mineral khaki.

## UNIT III

Dyeing of protein fibres – silk and wool with different types of acid dyes –its advantages and limitations, Metal Complex dyes- 1:1, 1:2, metal complex, Chrome dyes-pre, post & simultaneous mordanting, Basic Dyes.

## UNIT IV

Dyeing of synthetic fibres: polyester-carrier ,HTHP& thermosol method, Acrylic dyeing with basic dye, dyeing of Nylon and their blends .Problems associated with dyeing, Common fault and their remedies.

## UNIT V

Mechanism of dyeing, role of fibre structure in dyeing .dyeing equilibria, adsorption isotherms, chemical potential – activity of dyes in solution and fibre, heat of dyeing, entropy of dyeing. Kinetics of dyeing –diffusion coefficient, diffusion in steady state and non steady state, rate of dyeing.

### References:

1. Chemical processing of cotton and p/c blends – ATIRA
2. A glimpse on the chemical technology and textile fibres by RR Chackrawartty
3. Technology of Dyeing by VA Shenai
4. Chemical technology of fibrous material by F. Shadov
5. Physical chemistry of dyeing –Vickerstaff



## **PRINCIPLES OF FABRIC MANUFACTURE LAB**

Study of cone winding, cheese winding, pirn winding and auto coner, constructional details of machine, types of packages produced by them and package faults, Calculations pertaining to cone winding, cheese winding, pirn winding

Study of beam warping & sectional warping machine, stop motion and tensioners in warping, Calculations pertaining to warping machines.

Study of different types of looms, their constructional details, working of doobby & jacquards.

## **TECHNOLOGY OF DYEING-I LAB**

Dye cotton with direct, reactive, vat and sulphur dye, dyeing polyester, wool, silk, acrylic and nylon using, appropriate disperse, acid and basic dyes, Print cotton fabric using various styles of printing, namely, direct, resist and discharge, Evaluate colour fastness to washing, light, perspiration and rubbing properties