

## S.Y.B.TEXT.REVISED SYLLABUS W.E.F.01ST JULY, 2011

### S.Y.B.TEXT. (TT) SEMESTER-I

SR. NO.	COMMTTON TO COURSES	SUBJECTS	TEACHING SCHEME				EXAMINATION SCHEME				
			L	T	DR	PR	TP	TW	OE	PE	SUB.
			<b>TOTAL</b>								
3.1	TT/MMTT/TPE/TC/FT	ADVANCED COMPUTER PROGRAMMING	3	---	---	2	100	25	---	50	175
3.2	TT/MMTT/TPE/TC/FT	TEXTILE MATHEMATICS-III	3	---	---	---	100	---	---	---	100
3.3	TT	TECHNOLOGY OF FIBRES OTHER THAN COTTON	3	---	---	---	100	---	---	---	100
3.4	TT	PHYSICAL PROPERTIES OF TEXTILE FIBRES	4	---	---	3	100	25	---	50	175
3.5	TT	YARN FORMING TECHNOLOGY-II	4	---	---	2	100	25	---	---	125
3.6	TT	FABRIC FORMING TECHNOLOGY-II	4	---	---	2	100	25	---	---	125
			<b>21</b>	---	---	<b>9</b>	<b>600</b>	<b>100</b>	---	<b>100</b>	<b>800</b>

L =LECTURES  
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DR=DRAWING  
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**S.Y.B.TEXT. (TT) SEMESTER-II**

SR. NO.	COMMTTON TO COURSES	SUBJECTS	TEACHING SCHEME				EXAMINATION SCHEME				
			L	T	DR	PR	TP	TW	OE	PE	SUB.
			TOTAL								
4.1	TT/MMTT/TPE/TC	THERMAL AND AIR ENGINEERING	3	---	---	---	100	---	---	---	100
4.2	TT/MMTT/TPE/TC/FT	TEXTILE MATHEMATICS-IV	3	---	---	---	100	---	---	---	100
4.3	TT	PHYSICAL PROPERTIES OF YARNS & FABRICS	3	---	---	2	100	25	---	50	175
4.4	TT/MMTT	CHEMICAL PROCESSING OF TEXTILES-I	3	---	---	2	100	25	---	---	125
4.5	TT	YARN FORMING TECHNOLOGY-III	4	---	---	2	100	25	---	50	175
4.6	TT	FABRIC FORMING TECHNOLOGY-III	4	---	---	2	100	25	---	50	175
4.7	TT/MMTT/FT	TEXTILE DESIGN & COLOUR	---	---	2	---	---	50	---	---	50
			<b>20</b>	<b>---</b>	<b>2</b>	<b>8</b>	<b>600</b>	<b>150</b>	<b>---</b>	<b>150</b>	<b>900</b>
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**S.Y.B.TEXT. (MMTT) SEMESTER-I**

SR. NO.	COMMTTON TO COURSES	SUBJECTS	TEACHING SCHEME				EXAMINATION SCHEME				
			L	T	DR	PR	TP	TW	OE	PE	SUB.
											TOTAL
3.1	TT/MMTT/TPE/TC/FT	ADVANCED COMPUTER PROGRAMMING	3	---	---	2	100	25	---	50	175
3.2	TT/MMTT/TPE/TC/FT	TEXTILE MATHEMATICS-III	3	---	---	---	100	---	---	---	100
3.3	MMTT/TC	POLYMER SCIENCE	3	---	---	---	100	---	---	---	100
3.4	MMTT	MANMADE FIBRE MANUFACTURE-I	4	---	---	3	100	25	---	50	175
3.5	MMTT	MANMADE STAPLE YARN MANUFACTURE-II	4	---	---	2	100	25	---	---	125
3.6	MMTT	MANMADE FABRIC MANUFACTURE-II	4	---	---	2	100	25	---	---	125
			<b>21</b>	<b>---</b>	<b>---</b>	<b>9</b>	<b>600</b>	<b>100</b>	<b>---</b>	<b>100</b>	<b>800</b>

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## S.Y.B.TEXT. (MMTT) SEMESTER-II

SR. NO.	COMMTTON TO COURSES	SUBJECTS	TEACHING SCHEME				EXAMINATION SCHEME				
			L	T	DR	PR	TP	TW	OE	PE	SUB.
			<b>TOTAL</b>								
4.1	TT/MMTT/TPE/TC	THERMAL AND AIR ENGINEERING	3	---	---	---	100	---	---	---	100
4.2	TT/MMTT/TPE/TC	TEXTILE MATHEMATICS-IV	3	---	---	---	100	---	---	---	100
4.3	MMTT	MANMADE FIBRE MANUFACTURE-II	3	---	---	2	100	25	---	50	175
4.4	TT/MMTT	CHEMICAL PROCESSING OF TEXTILES-I	3	---	---	2	100	25	---	---	125
4.5	MMTT	MANMADE STAPLE YARN MANUFACTURE-III	4	---	---	2	100	25	---	50	175
4.6	MMTT	MANMADE FABRIC MANUFACTURE-III	4	---	---	2	100	25	---	50	175
4.7	TT/MMTT/FT	TEXTILE DESIGN & COLOUR	---	---	2	---	---	50	---	---	50
			<b>20</b>	<b>---</b>	<b>2</b>	<b>8</b>	<b>600</b>	<b>150</b>	<b>---</b>	<b>150</b>	<b>900</b>

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## S.Y.B.TEXT. (TPE) SEMESTER-I

SR. NO.	COMMITTON TO COURSES	SUBJECTS	TEACHING SCHEME				EXAMINATION SCHEME				
			L	T	DR	PR	TP	TW	OE	PE	SUB.
											TOTAL
3.1	TT/MMTT/TPE/TC/FT	ADVANCED COMPUTER PROGRAMMING	3	---	---	2	100	25	---	50	175
3.2	TT/MMTT/TPE/TC/FT	TEXTILE MATHEMATICS-III	3	---	---	---	100	---	---	---	100
3.3	TPE	MATERIAL ENGINEERING	3	---	---	---	100	---	---	---	100
3.4	TPE	MANUFACTURING PROCESSES	4	---	---	3	100	25	---	50	175
3.5	TPE	YARN MANUFACTURING MACHINERY-II	4	---	---	2	100	25	---	---	125
3.6	TPE	FABRIC MANUFACTURING MACHINERY-II	4	---	---	2	100	25	---	---	125
			<b>21</b>	---	---	<b>9</b>	<b>600</b>	<b>100</b>	---	<b>100</b>	<b>800</b>
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REVISED SYLLABUS W.E.F.01ST JULY, 2011

**S.Y.B.TEXT. (TPE) SEMESTER-II**

SR.	COMMITTON TO	TEACHING SCHEME	EXAMINATION SCHEME
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NO.	COURSES	SUBJECTS	L	T	DR	PR	TP	TW	OE	PE	SUB.
											TOTAL
4.1	TT/MMTT/TPE/TC	THERMAL AND AIR ENGINEERING	3	---	---	---	100	---	---	---	100
4.2	TT/MMTT/TPE/TC	TEXTILE MATHEMATICS-IV	3	---	---	---	100	---	---	---	100
4.3	TPE	ELECTRICAL TECHNOLOGY	3	---	---	2	100	25	---	25	150
4.4	TPE	PHYSICAL PROPERTIES OF TEXTILES	3	---	---	2	100	25	---	25	150
4.5	TPE	YARN MANUFACTURING MACHINERY-III	4	---	---	2	100	25	---	50	175
4.6	TPE	FABRIC MANUFACTURING MACHINERY-III	4	---	---	2	100	25	---	50	175
4.7	TPE	TEXTILE MACHINE DRAWING	---	---	2	---	---	50	---	---	50
			<b>20</b>	---	<b>2</b>	<b>8</b>	<b>600</b>	<b>150</b>	---	<b>150</b>	<b>900</b>

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### S.Y.B.TEXT. (TC) SEMESTER-I

SR. NO.	COMMTTON TO COURSES	SUBJECTS	TEACHING SCHEME				EXAMINATION SCHEME				
			L	T	DR	PR	TP	TW	OE	PE	SUB.

												TOTAL
3.1	TT/MMTT/TPE/TC/FT	ADVANCED COMPUTER PROGRAMMING	3	---	---	2	100	25	---	50	175	
3.2	TT/MMTT/TPE/TC/FT	TEXTILE MATHEMATICS-III	3	---	---	---	100	---	---	---	100	
3.3	MMTT/TC	POLYMER SCIENCE	3	---	---	---	100	---	---	---	100	
3.4	TC	CHEMISTRY OF TEXTILE FIBRES-II	4	---	---	3	100	---	---	50	150	
3.5	TC	SPINNING TECHNOLOGY	3	---	---	2	100	25	---	---	125	
3.6	TC	TECHNOLOGY OF BLEACHING & MERCERISING	4	---	---	3	100	---	---	50	150	
			<b>20</b>	---	---	<b>10</b>	<b>600</b>	<b>50</b>	---	<b>150</b>	<b>800</b>	

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### S.Y.B.TEXT. (TC) SEMESTER-II

SR. NO.	COMMTTON TO COURSES	SUBJECTS	TEACHING SCHEME				EXAMINATION SCHEME				
			L	T	DR	PR	TP	TW	OE	PE	SUB.
			TOTAL								
4.1	TT/MMTT/TPE/TC	THERMAL AND AIR ENGINEERING	3	---	---	---	100	---	---	---	100

4.2	TT/MMTT/TPE/TC	TEXTILE MATHEMATICS-IV	3	---	---	---	100	---	---	---	100
4.3	TC	CHEMISTRY OF TEXTILE FIBRES-III	3	---	---	---	100	---	---	---	100
4.4	TC	CHEMISTRY OF DYES & PIGMENTS	4	---	---	3	100	50	---	50	200
4.5	TC	WEAVING TECHNOLOGY	4	---	---	2	100	25	---	50	175
4.6	TC	FLUID FLOW & HEAT TRANSMISSION	3	---	---	3	100	50	25	---	175
4.7	TC	PRINTED TEXTILE DESIGN & COLOUR	---	---	2	---	---	50	---	---	50
			<b>20</b>	---	<b>2</b>	<b>8</b>	<b>600</b>	<b>175</b>	<b>25</b>	<b>100</b>	<b>900</b>

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### S.Y.B.TEXT. (FT) SEMESTER-I

SR. NO.	COMMTTON TO COURSES	SUBJECTS	TEACHING SCHEME				EXAMINATION SCHEME				
			L	T	DR	PR	TP	TW	OE	PE	SUB.
			TOTAL								
3.1	TT/MMTT/TPE/TC/FT	ADVANCED COMPUTER PROGRAMMING	3	---	---	2	100	25	---	50	175
3.2	TT/MMTT/TPE/TC/FT	TEXTILE MATHEMATICS-III	3	---	---	---	100	---	---	---	100



3.3	FT	FABRIC STRUCTURE & DESIGN	4	---	---	2	100	50	---	---	150
3.4	FT	BASICS OF APPARAL PRODUCTION PROCESSES	4	---	---	---	100	---	---	---	100
3.5	FT	YARN MANUFACTURE	4	---	---	2	100	25	---	---	125
3.6	FT	FABRIC MANUFACTURE	4	---	---	2	100	50	---	---	150
			<b>22</b>	---	---	<b>8</b>	<b>600</b>	<b>150</b>	---	<b>50</b>	<b>800</b>

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### S.Y.B.TEXT. (FT) SEMESTER-II

SR. NO.	COMMTTON TO COURSES	SUBJECTS	TEACHING SCHEME				EXAMINATION SCHEME				
			L	T	DR	PR	TP	TW	OE	PE	SUB.
			TOTAL								
4.1	FT	YARNS & FABRICS FOR FASHION APPLICATIONS	4	---	---	2	100	---	---	50	150
4.2	TT/MMTT/TPE/TC/FT	TEXTILE MATHEMATICS-IV	3	---	---	---	100	---	---	---	100
4.3	FT	CHEMICAL PROCESSING OF TEXTILES	3	---	---	2	100	25	---	---	125
4.4	FT	PATTERN MAKING & GARMENT CONSTRUCTION-I	3	---	---	2	100	25	---	50	175

4.5	FT	TESTING OF TEXTILES & APPARELS	3	---	---	2	100	25	---	50	175
4.6	FT	FASHION ILLUSTRATION	2	---	---	2	100	25	---	---	125
4.7	TT/MMTT/FT	TEXTILE DESIGN & COLOUR	---	---	2	---	---	50	---	---	50
			<b>18</b>	---	<b>2</b>	<b>10</b>	<b>600</b>	<b>150</b>	---	<b>150</b>	<b>900</b>
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## **SECOND YEAR B. TEXT. – SEMESTER – I**

### **3.1 ADVANCED COMPUTER PROGRAMMING (TT/MMTT/TPE/TC/FT)**

Lectures	:	3 Hours / Week
Practical	:	2 Hours / Week
Theory Paper	:	100 Marks
Practical Exam	:	50 Marks
Term Work	:	25 Marks
Subject Total	:	175 Marks

#### **1. Networking Concepts:**

Introduction to network, use of computer networks, Network Topologies, Network types - LAN, MAN, WAN, Network hardware Components - cables, connectors, NIC, Hub, Switch etc. Network Operating system, Client / Server Architecture, Internet and its applications. Switching and routing in network, The X.25 network & supporting protocols, TCP/IP

#### **2. Database Management**

Introduction to database, Records, Relational database management systems, structural query languages (SQL), SQL table creation integrity constraints, insertion of records, select statement, alter command, drop table partitioned table, SQL operator, transaction processing, where clause, like operator, between operator, order by clause, group by clause, having clause, SQL function , commands - Select, Insert, update, delete, joins - inner join, outer join, equijoin.

#### **3. Analysis of Information System:**

Types of information, information processing for store- overview, overview of design of an information system, role &

attribute system analyst, tool for system analyst

#### **4. Visual Basic Fundamentals:**

Introduction, projects in visual basic, project explorer, setting project. Options, Visual Basic code - understanding procedures, subroutines, Functions, comments, code window & its features, controlling program flow, conditional branching, loops.

### **5. Visual Basic Data Types:**

Data types in visual basic, - byte, integer, long, single, double, currency, Boolean, data, string, object, variant, declaring variables, variable scope & life time, data conversion, arrays, constants, user defined data types.

### **6. Designing User Interface:**

Forms, form properties, form events, loading, unloading, showing & hiding Forms controls in visual Basic - label, buttons, text box, list, dropdown Selection list, checkbox, option button, timer control, setting tab order, Menus in visual basic. Message box, input box, common dialog. Data report.

### **7. Programming Database Access:**

Introduction, Record set object - definition, properties, methods & events, Records, working with record set in code, visual basic data control, Introduction to ADO.

### **8. Introduction To .Net**

Need of vb.net, .Net framework, features of and architectures of vb. net, introduction to visual studio, .Net IDE interface and event driven programming. Creating application building projects using simple components running VB.NET application.

### **9. Introduction of ERP**

Evolution of ERP, growth of ERP, Need for system interaction and interface, early ERP packages, various models of ERP, advantages of ERP, Overview of enterprise, integrated management, business modeling ERP for small business,

business process for ERP module design, opportunities and problems in ERP selection and implementation, hardware Environment.

**List of Experiments:-**

1. Study of basic concept of computer network.
2. Study of network System with commands from Novell Network.
3. Creating databases, tables using Ms-access.
4. Creating & manipulating Database using Oracle.
5. Working with SQL Commands like Select, Insert, Update, Delete, etc.
6. Creating simple form in Visual Basic.
7. Writing applications in Visual Basic using multiple forms, various controls (like radio button, list etc.) and database application using data control for Finding mean, SD, CV% of yarn strength testing machine  
Finding twist & its SD, mean & CV%  
To calculate production of winding m/c, warping m/c, sizing m/c, looms, (Weaving Machine.), blow room, card, speed frame, ring frame etc (Spinning Machine).
8. Finding % exhaustion of dye bath.
9. Application program using VB ADODC- 2 Programs
10. Application program using VB.Net- 2 Programs

**Reference Book:-**

1. Computer Network - by Andrew Tanenbaum
2. Database System - by Korth

3. Black Book VB 6.0 - by Holzner
4. Analysis & Design of information System- by Rajaraman

**SECOND YEAR B. TEXT. – SEMESTER – I**

**3.2 TEXTILE MATHEMATICS-III (TT/MMTT/TPE/TC/FT)**

Lectures	:	3 Hours / Week
Theory Paper	:	100 Marks
Subject Total	:	100 Marks

**1) Differential equations of first order & first degree:**

Method of solving Exact, Non exact, Linear and Non-linear differential equations.

Numerical solution of o.d. equations by Euler,s method and Runge Kutta method of fourth order.

(6)

**2) Applications of ordinary differential equations:**

Applications for solving simple electrical circuit problems and mechanical problems

(4)

**3) Linear differential equations of  $n^{\text{th}}$  order with constant coefficients:-**

Methods of finding Solution of L.D. equations in the form  $y = C.F. + P.I$  Cauchy,s homogeneous linear differential equations with constant coefficients and there solution.

(7)

**4) Applications L. D. equations of  $n^{\text{th}}$  order with constant coefficients:**



Applications for solving simple electrical circuit problems and mechanical problems

(4)

**5) Testing of hypothesis:-**

Introduction, Hypothesis, Statistic, Critical Region, Errors in testing, Level of Significance.

(2)

**6) Large sample tests:-**

Test for population mean, equality of population means population proportion & equality of population proportions.

(4)

**7) Small sample tests:-**

Test for population mean, equality of population means, population variance, equality of population variance. Test for goodness of fit and independence of attributes. Test for significance of population correlation coefficient.

(7)

**8) Estimation:-**

Point Estimation, types, unbiased estimators of population mean and variance. Interval Estimation, Confidence Interval for population mean based on normal and 't' and  $X^2$  distributions,

(3)

**9) Statistical quality Control:-**

Process Control: Control\_charts, X-chart, R-chart, C-chart, np-chart, P-chart.

Lot Control: AQL, LTPD, AOQ, AOQL, O.C. Curve, Single and Double sampling plans.

(4)

**Reference Books:-**

1. A Text Book of Applied Mathematics: by J.N. & P.N. Watarikar.
2. Higher Engineering Mathematics by B. S. Grewal.
3. A Text Book on Engineering Mathematics by Bali, Saxena & Iyengar.
4. Mathematical Statistics by J.Fruend.
5. Applied Statistics & Probability of Engineers by Montgomeri & Runger
6. Probability & Statistics for Engineers by Johnson.



**SECOND YEAR B. TEXT. – SEMESTER – I**

**3.3 TECHNOLOGY OF FIBRES OTHER THAN COTTON (TT)**

Lectures	:	3 Hours / Week
Theory Paper	:	100 Marks
Subject Total	:	100 Marks

**1) Wool:**

- Historical and economical background of wool industries.
- Breeds of sheep and Indian wool
- Morphology and properties of wool fibre
- Washing, shearing, classification / sorting and grading of wool
- Scouring, teasing and carbonizing.

**Woolen yarn manufacturing:**

- Willowing, blending, oiling, teasing, carding and spinning.

**Worsted yarn manufacturing:**

- Preparing, backwashing, combing and spinning.

**Weaving of woolen / worsted yarns:**

- Preparatory, weaving, Knitting and felling of wool.

**2) Jute:**

- Cultivation and Extraction of Jute fibres.
- Properties of Jute fibre.
- Manufacture of Jute yarn
- Blending of Jute fibre.
- Weaving of Jute yarns and applications.

**3) Flax:**

- Cultivation and Extraction of Flax fibres.
- Properties of Flax fibre.
- Conversion of Flax fibres into yarn
- Weaving of Flax yarns and applications.

**4) Silk:**

- Historical and economical background of silk.
- Silk worm host plants.
- Silk fibre properties
- Mulberry cultivation and cocoon production and Rearing of silk worms.

**5) Raw Silk Manufacturing –**

- Cocoon storing, cooking, brushing
- Charka reeling
- Cottage basin and Filature reeling
- Properties of raw silk, Testing of raw silk

**Spun silk Yarn manufacturing:**

- Degumming, circular dressing, drawing and spinning, Blending opportunities in silk

**Weaving of silk yarns:**

- Value addition in silk industry silk project study.

**Study of wild silks:**

**6) Glass:**

- Glass fibre characteristics,
- Manufacture of glass fibre / filament.

- Type of Textile grade glass and weaving of glass.
- Application of glass fibres / filament / fabrics.

**7) Long Vegetables fibres:**

- Sisal, Pineapple leaf, Banana, Hemp, Bamboo.
- Study of properties, extraction methods.
- Blending opportunities and applications.

**Reference Books:-**

- 1) Wool Hand Book vol. I & II by, Warner Von Besgen.
- 2) Woolen Yarn Manufacturing Textile Progress Vol.15 No.12
- 3) Hand Book of Practical Sericulture by S.R. Ullal and M.N. Narsimayya.
- 4) Hand Book of Silk Technology by T.N. Sonwalkar.
- 5) Fibre Glass by J.Giltest Mahr & William P. R
- 6) Inorganic Fibres by C.Z. Cenol.
- 7) Hand book of worsted and wool blended suiting process by R. S. Tomar.
- 8) Pineapple Leaf Fibres Textile Progress Vol.24.
- 9) Long Vegetable Fibres Textile Progress Vol.4 No.4
- 10) Hand Book of Jute Vol.I, II & IV by T.C. Ranjan.
- 11) Silk Exports and Developments by T.D. Koshi.
- 12) Wool Printings and Dyeing Textile Progress Vol 12 No.3

- 13) Chemical Processing of Silk by M.L. Gulrajani.
- 14) Production, Processing and Marketing of Silk by Mahesh Nanawati.
- 15) Encyclopedia of Textiles.
- 16) Textile fibres by Gordon Cook
- 17) Textiles fibres to Fabric by Bernard Corbman
- 18) Woolen and Worsted Spinning by V Collins Miles
- 19) [www.swicofil.com/bamboo.pdf](http://www.swicofil.com/bamboo.pdf)
- 20) [www.bambos.rwth-aachen.de](http://www.bambos.rwth-aachen.de)



**SECOND YEAR B. TEXT. – SEMESTER – I**

**3.4 PHYSICAL PROPERTIES OF TEXTILE FIBRES (TT)**

Lectures	:	4 Hours / Week
Practical	:	3 Hours / Week
Theory Paper	:	100 Marks
Practical Exam	:	50 Marks
Term Work	:	25 Marks
Subject Total	:	175 Marks

1. Introduction to Testing: Objectives of testing
2. Sampling for determination of fibre properties -  
Importance, general requirements – random sample, biased sample, numerical and length biased samples, - extent bias, avoidance of extent bias, sampling technique – Squaring method – cut square method, zoning techniques, dye sampling for wool, tong sampling method, core sampling of raw wool.
3. Longitudinal dimensions (Fibre length) -  
Concept, Technical Significance of fibre length, frequency, weight and length distributions, length distribution and fibre diagrams: P(l), Q(l), T(l), staple length of cotton, Fibre length measurement - - oil plate method – comb sorter method, scanning method- Fibrograph.

4. Transverse dimensions (Fineness & Maturity) -

Concept, Terms and definitions, fibre dimension relationship, - The technical significance of fibre fineness – Variation in fineness, measures of fineness, measurement of fineness - gravimetric method, Airflow method, vibroscope method.

Concept, The maturity of cotton, - Technical significance – measures of fibre maturity – methods measurement of fibre maturity – NaOH Swelling method, polarized light method, differential dyeing method,.

5. Fibre Density -  
Introduction, definition, problems in measurement of fibre density, measurement of fibre density – density gradient column, Importance of fibre density.
6. Fibre strength - Introduction, terminologies, stress-strain curve, Importance of fibre strength, factors influencing fibre strength, measurement of fibre strength. Single fibre strength – Instron, Bundle strength –Pressley Tester, Stelometer , Single fibre strength Vs Bundle strength
7. Moisture relations and testing –  
Regain and moisture content – Measurement of atmospheric conditions, Regain – humidity relationships, Effects of regain on fibre properties.  
The measurement of regain – correct invoice weight ,moisture testing ovens – rapid drying oven ,Drying by means of chemical ovens ,Drying by hot air-currents , Drying by radio frequency wave , Regain measurement by methods based on resistance and capacitance principles.
8. Testing of Trash Content in fibres -  
Classification of trash, Technical significance of trash, estimation of trash content in cotton by Trash analyser
9. Testing of colour and honey dew in cotton fibre.
10. Fibre Quality Index and its significance

11. Study of modern fibre testing instruments: - High Volume Instruments , AFIS.
12. Identification of fibres (Cotton, wool, silk, viscose, rayon, nylon, polyester & acrylic fibres) : solubility test, burning test, cross sectional & longitudinal views of fibres.
13. Neps – Concept, Classification of Neps, importance – testing of neps in card web – nepping potential – Nep testing in fibrous materials

**List of Experiments:-**

1. Identification of Textile Fibres by Microscopy Method.
2. Study of Different sampling techniques for selection of fibre sample
3. Comb Sorter method for estimation of fibre length parameters
4. Fibre Length by using Grease Plate Method.
5. Fibre Fineness by Cut-Weight Method.
6. Fibre Maturity Measurement by Caustic Soda Method.
7. Measurement of fineness and maturity by airflow instrument.
8. Determination of components of trash in cotton using Trash Analyser.
9. Study of fibre parameters on AFIS.
10. Study of fibre parameters on HVI.
11. Determination of Neps in Card web by Shirley Template
12. Mill Visit.

**Reference Books:-**

1. Physical Testing of Textiles by J.E. Booth.
2. Physical Properties of Fibres, Morton and Hearle
3. Manuals of HVI, AFIS
4. Manual of Spinning by P. Lord.
5. Textile Testing by Skinkle.
6. Handbook of Indian Standards.
7. Textile Testing by Angappan & Gopalkrishnan.

**SECOND YEAR B. TEXT. – SEMESTER – I**

**3.5 YARN FORMING TECHNOLOGY-II (TT)**

Lectures	:	4 Hours / Week
Practical	:	2 Hours / Week
Theory Paper	:	100 Marks
Term Work	:	25 Marks
Subject Total	:	125 Marks

**CARDING :**

- a) Feed to Card – Principle and concept of chute feed to card. Advantages and limitations. Study of design details of different types of chute feeding systems available in the market.
- b) Revolving Flat Card – Detailed study of design developments in Take in zone, Cylinder Flat Carding Zone – Doffer Zone – Sliver formation – Study of cards used in the industry – General construction – Driving arrangement, production calculations, draft calculations, stop motions – on line monitoring – Tandem Cards.
- c) Carding Theory – Opening of fibre mass – Carding actions – Web formation and fibre configuration – Blending – Levelling action – Fibre breakage.
- d) Transfer efficiency of card – importance, concept, methods of finding transfer efficiency.
- e) Autolevellers at Card – Basic principles and concept – Types of autolevellers – Principle of working of autolevellers at Card – Setting of autolevellers.
- f) Card Clothing – History and Development – Metallic wire – Tooth geometry – Maintenance of Card Clothing – Card wire mounting.

- g) Assessment of performance of card – Cleaning efficiency, Nep removal efficiency, fibre breakage.
- h) . Centralised Waste collection System : Design features, operating principles.
- i) Air engineering for carding and utilities required

**DRAWFRAME :-**

- a) Functions of drawframe, principles of drafting and doubling. Study of constructional details and design considerations of a drawframe. Calculations relating to speeds, drafts, production etc.
- b) Principles of roller drafting, design details of drafting system, evolution of drafting systems at drawframe (Shirley 4/4 draftings, plats, pressure bar, whitin accu drafting. Rieter polar drafting systems etc. Developments in drawframe drafting.
- c) Suction at drawframe. Automatic can handling. Auto leveling at drawframe. On-line quality monitoring and control.
- d) Study of drawframes available in the market. Blending at drawframe.
- e) Study of maintenance aspects and design developments such as rollers, roller, roller weightings, drafting systems etc.
- f) Assessment of performance of drawframe. Defective production at drawframe, Causes and remedies for the same. Norms for production, sliver quality, waste etc.
- g) Role of air on modern draw frame and utilities required

**List of Experiments:-**

- 1. Study of chute feed system
- 2. Study of constructional details of a card.
- 3. Driving arrangement and calculations of carding machine.
- 4. Settings of various parts of feed zone of carding.
- 5. Settings of various parts of carding zone in carding.
- 6. Demonstration of stripping, Grinding, wire mounting, etc. – Mill visit.
- 7. Study of utilities on card & Draw frame.



8. Processing of Material on card and evaluating card performance.
9. Study of constructional details of draw frame.
10. Driving arrangement and calculation of D/F.
11. Evaluation of Draw frame performance.
12. Study of autolevellers used on card and Draw frame.

**Reference Books:-**

- 1) The Textile Institute Publication –Manual of Textile Technology-Short Staple Spinning Series Vol I to V by W. Klein
- 2) The characteristics of Raw Cotton by P. Lord.The Textile Institute Publication, Manual of Cotton Spinning Vol II, Part-I.
- 3) Opening and cleaning by Shirley. The Textile Institute Publication, Manual of Cotton Spinning Vol II, Part II.
- 4) Opening cleaning and picking by Dr. Zoltan, S. Szaloki, Institute of Textile Technology, Verginia.
- 5) Fundamentals of Spun Yarn Technology, By Carl Lawrence.
- 6) Blow room and carding –Training program conducted by NCUTE, IIT Delhi.
- 7) Carding by F. Charanlay .The Textile Institute publication, Manual of cotton spinning series Vol - III.
- 8) Essential calculations of practical cotton spinning by T. K. Pattabhiraman.
- 9) Blow room, Carding, Draw frame-by Prof. A. R. Khare
- 10) Technology of cotton spinning by J. Janakiram.

**SECOND YEAR B. TEXT. – SEMESTER – I**

**3.6 FABRIC FORMING TECHNOLOGY-II (TT)**

Lectures	:	4 Hours / Week
Practical	:	2 Hours / Week
Theory Paper	:	100 Marks
Term Work	:	25 Marks
Subject Total	:	125 Marks

**1) AUTOMATIC WEAVING:-**

- a) Limitations of ordinary looms: - Production, efficiency, quality & allocation, objectives for developing automatic looms, scope for automation.
- b) Design features of automatic looms: - Drives, loom motions, accessories & other critical features of automatic looms.
- c) Weft feelers: - Construction working of side sweep (Cimmco & Ruti-B Type), electrical (Ruti-C Type) & electronic weft feelers, their merits, demerits & applications.
- d) Transfer mechanism: - Cimmco & Ruti-C transfer motion's working & construction, shuttle protector, temple & shuttle eye cutter. Requirement for successful transfer of pirn, reasons of stripping, bottoms & remedies. Shuttle changing mechanism & safety motion, its applications.
- e) Automatic let-off motion: - Principles and requirements of automatic let-off mechanism, types, construction & working of Cimmco, Ruti-B, Ruti-C type let-off motions.
- f) Warp stop motion: - Types, Construction and working of mechanical and electrical warp stop motion, Types of drop pins, specifications & applications.

- g) Centre weft fork: - Construction & working of Ruti-C type center weft fork motion & its advantages.
- h) Operator assisting motions: - Pick finding, heald leveling, light indicators; pick counters need, functions & use.
- i) Auto loom fabric defects, causes and remedies, Calculations.

**2) FABRIC STRUCTURE:-**

Study of following weaves (Design, draft & peg plan) & weave characteristics & weaving requirements.

- i) Stripe & check weave combination - selection of weaves, joining of weaves, firmness, classification & construction of designs.
- ii) Colour & weave effect.
- iii) Simple spot designs.
- iv) Backed fabrics - Warp, weft and wadding backed fabrics.
- v) Bed ford words - Plain, twill, wadded, Crepon cords,
- vi) Welt & Pique: - Plain, wadded & waved pique.
- vii) Figuring with extra threads: - Principles, extra warp, extra weft figuring, combination, limitation, extra thread effect & weaving.
- viii) Gauze & Leno :- Principles, basic sheds, Leno with flat steel doups & slotted doups, point draft or counter leno, simultaneous top & bottom douping, application of slotted doups & double slotted doups, easing & shaker motion concept, working & construction.
- ix) Double cloth: - Object, classification, self stitched double cloth; center stitched double cloths, interchanging double cloth, multiplayer fabrics. Selection of face & back weaves type of stitching points & their selection, wadded double cloth.

**3) AUTOMATIC WINDING:-**

- a) Classification of automatic winding machine P & Q winding, their application.
- b) Technical requirements of winding process :
  - i) Yarn unwinding
  - ii) Yarn take-up
  - iii) Yarn tensioning
  - iv) Wound package requirements for warping, knitting & weaving.
- c) Construction of automatic winding machines
  - i) Design features, i.e. yarn path (Creel, link presenter, booster, unwinding accelerator, pre cleaner, tensioners, waxing cradle etc.)
  - ii) Drive to drums, scroll details, super drums, braking etc. (Autoconer -

238,338,338 0, Savio Espero & Orion, Murata - 21 C, 7 -V.)

iii) Special features of all models, blowers, air consumption & power etc.

- d) Yarn Clearing :-
  - i) Technical back ground
  - ii) Optimum clearing.
  - iii) Uster Classimat as an aid for yarn clearing.
- e) Electronic yarn clearers
  - i) Optical & capacitance, Loeffe, TK 930F, TK 950H, Quantum-II etc.
  - ii) The capabilities of different yarn clearers.
  - iii) Detailed method of setting of optical & capacitance type clearer (for carded & combed yarns) w.r.t. N,DS, DL,LL,-D,-L,C, Cluster setting, splicer setting, extended splicer setting for various yarn counts and materials.
  - iv) Siro cuts.
    - v) Knot factor & clearing efficiency & its use as an aid to assess the performance of winding machines.
- f) Splicing :-
  - i). Types - mechanical & pneumatic, details of construction, parameters, their applications.
  - ii). Electronic checking of spliced joint.
  - iii). Splice quality assessment (strength, appearance, hairiness)
  - iv). Maintenance of splicers.
- g) Study of various delivery packages.
- h) Package Quality:-
  - i). Details of package faults observed on automatic winding machines causes & remedies.
  - ii). Mechanism for anti patterning, maximum diameter of package, all to doffing & restarting.
- i) Calculations: - Efficiency, production & allocation.

#### 4) **MODERN WARPING:-**

- a) Constructional details & features of modern warping machines. Such as Benninger, West Point, Sucker-Muller, Tsudakoma & Karl Mayer with reference to design of creel, pre-tensioners, automatic adjustment of central control of tensioners.

- b) Types of re creeling - magazine, truck, chain creels, semi - auto & auto creels, creel - master, and auto plan for colour patterns.
- c) Head Stock - i) Beam warping - Auto leasing, drive, brakes and automatic doffing & donning.
  - ii) Sectional warping - Auto leasing, drum traverse & cone angle adjustment, beam traverse & its adjustment.
  - iii) MIS systems & its use.

**List of Experiments:-**

- 1) Dismantling and resetting of under pick motion.
- 2) Dismantling and resetting of Cimmco & Ruti-C weft feeler motion.
- 3) Dismantling and resetting of Cimmco auto let-off motion.
- 4) Dismantling and resetting of pirn change motion.
- 5) Dismantling and resetting of clutch motion.
- 6) Study of Ruti-C loom -drive, centre weft fork, pick finding, take-up drive, back rest, multi pawl drive, shuttle construction, picking, loose reed etc.
- 7) Study of sectional warping drive - warping speed, beaming speed, reed & beam traverse speed, production and efficiency.
- 8) Study of Laxmi and Senmet pirn winding machine. - Spindle speed, traverse speed, coils per double traverse, diameter control, production and efficiency.
- 9) Visit to Auto loom unit.
- 10) Fabric analysis - Extra warp, weft, Bedford, cord, pique, leno, double cloth, pile fabric.
- 11) Fabric analysis - Extra warp, weft, Bedford cord, pique, leno, double cloth, pile fabric.
- 12) Fabric analysis - Extra warp, weft, Bedford, cord, pique, leno, double cloth, pile fabric.
- 13) Visit to Autoconer unit.
- 14) Visit to Automatic loom unit.

**Reference Books:-**

- 1. Principles of Weaving by Marks A.T.C. & Robinson.
- 2. Textile Colour & Design by Watson.
- 3. Weaving Machines, Materials & Methods by Prof. M.K. Talukdar, Prof.D.B.

Ajgaonkar etc.

4. Textile Mathematics - Vol.-I & II by J.E. Booth.
5. Advanced Textile Design by Watson
6. Modern Preparation & Weaving Machines by A. Ormerod.

### **SECOND YEAR B. TEXT. – SEMESTER – I**

#### **3.3 POLYMER SCIENCE (MMTT/TC)**

Lectures	:	3 Hours / Week
Theory Paper	:	100 Marks
Subject Total	:	100 Marks

#### **Chapter –I : Basic Determinants of Fibre Forming Polymers :-**

Importance of polymer science. Various applications of polymers. Classification of polymers. Definition of monomer, oligomer, high polymer, mesomer, cohesive energy density, solubility parameter, glass transition temperature, functionality and degree of polymerization. Concept of basic determinants of fibre forming polymer. Effect of molecular weight, Symmetry, rigidity and chemical reactivity of polymeric chain on the properties of polymer. Concept of rubber, plastic and fibre. Essential requirements of suitability of a polymer for apparel wear and industrial applications.

#### **Chapter –II : Condensation Polymerization :-**

Mechanism, types, feasibility, essential requirements and importance of condensation polymerization. Carother's equation. Significance of Carother's equation. Concept of gelation & cyclic polymer formation. Effect of functionality on gelation. Factors affecting cyclization. Kinetics of condensation polymerisation. Stoichiometry of reactants and degree of polymerization.

**Chapter-III : Addition polymerization –** Mechanism, types, features and essential requirements of addition polymerization. Types of initiation, chemistry of initiators, retarders and inhibitors. Effect of catalyst, temperature, pressure, solvents, modifiers, emulsifying and suspending agents on addition polymerisation. Kinetics of addition polymerisation. Industrial applications of addition polymerisation.

#### **Chapter-IV: Co-polymerization :-**

Concept of graft and block co-polymerization and their importance. Various techniques of grafting. Various factors such as temperature, time, dose-rate,

concentration of monomers, diffusion, scavengers, initiators & physical state on co-polymerization. Concept of ideal, alternating and azeotropic co-polymerisation. Reactivity ratios of monomers and its significance. Concept of Q-e scheme. Kinetics of co-polymerisation.



**Chapter-V: Techniques of polymerization:–**

Study of various techniques of polymerisation such as bulk, solution, suspension, emulsion, solid state, plasma polymerization.

**Chapter-VI: Molecular Weight :-** Concept of  $M_n$ ,  $M_w$  and poly-dispersibility & their significance. Effects molecular weight distribution of polymer on spinnability & drawability. Light scattering and ultra centrifuge techniques to determine  $M_w$ . Endgroup analysis, osmotic pressure, cryoscopic methods & viscosity methods to determine  $M_n$  &  $M_v$ . Characteristics of polymer using DSC, TGA, DTA, DMA and GPC.

**Chapter-VII : Polymer Degradation –**

Concept of chain end and random polymer degradation. Study of polymer degradation by thermal, mechanical, chemical and other agencies.

**Reference Books:-**

1. Polymer sciences and technology by Joel R. Fried.
2. Text book of polymer science by Fred W. Billmeyer, Jr.
3. Polymers and their properties by J.W.S. Hearle.
4. Organic chemistry of high polymers by Lenz.
5. Applied Polymer science by Flory.
6. Fundamentals of polymers by Anilkumar and Rakesh K. Gupta.
7. Principles of Polymerisation by George Odian.
8. Polymer science by Steven.
9. Introduction to polymer chemistry by G.S. Mishra.
10. Polymer science and technology of plastics & rubbers by Dr. Premamoy Ghosh.
11. Polymer Science by V.R. Gowarikar, N.V. Viswanathan & Jaydev Shreedhar.

**SECOND YEAR B. TEXT. – SEMESTER – I****3.4 MAN MADE FIBRE MANUFACTURE-I (MMTT)**

Lectures	:	4 Hours / Week
Practical	:	3 Hours / Week
Theory Paper	:	100 Marks
Practical Exam	:	50 Marks
Term Work	:	25 Marks
Subject Total	:	175 Marks

**Structural Principles of Textile Fibres:-**

Structural principles of fibre forming polymers: Fibre forming processes, molecular size & its interaction, molecular orientation and crystallinity in fibres, polymers as fibres, plastics and rubbers.

**Physical Fundamentals of the Fibre Spinning Process:-**

General principles of the spinning process, principles of solidification in spinning process, spinnability of liquids, Flow instabilities, Rheology of spinning, shear flow and elongational flow, Formation of fibre structure: molecular orientation & crystallinity.

**Principles of Melt Spinning:-**

General features of the melt spinning process, Melt spinning devices such as extruders, static mixer, pre-filtration, manifold, spinpack, cooling devices, T-up winders. Melt spinning variables and calculations related to production, spinning pump speed and polymer output rate. Conditions for continuous spinning, Role of some critical parameters and their variation along spinning line. Structure formation during spinning, profile of polymer jet and velocity distribution. Effect of orientation and crystallinity on the behaviour of undrawn fibres, Non-steady state spinning conditions and non-uniform fibers. Direct melt spinning, High speed spinning, staple fibre production process, spin draw process, some special spinning methods.

**Spin finish:** Composition of spin finish, Requirements of good spin finish, Methods of application of spin finish.



**Principles of Solution Spinning Process:-**

Fundamental aspects of wet spinning process, post spinning operations, fibre formation and coagulation variables.

Fundamental aspects of dry spinning process, preparation of spinning solution, extrusion, spinning, theory of filament formation, stretching , dry-jet wet spinning process.

**Drawing of Melt Spun Fibres:-**

Drawing unit, drawing behaviour of thermoplastic fibres, Influence of drawing on structure and properties of filament yarns, orientation stretching for high strength, draw warping.

**Heat Setting of Thermoplastic Fibres:** - Nature of set, Heat setting behavior of different yarns, settability and measurement of degree of set.

**List of Experiments:-**

1. Demonstrations of laboratory melt spinning unit and production of filament yarn.
2. Demonstration of laboratory filament yarn drawing machine and drawing & heat setting of polyester POY.
3. Measurement of MFI of given polymer using KAYJAY MFI testing apparatus.
4. Effect of temperature and thermal treatment on MFI and Melt Index Spread of polyolefins.
5. Effect of melt spinning process variables on characteristics of filament yarn- Part-I
6. Effect of melt spinning process variables on the characteristics of filament yarn- Part-II.
7. Comparison of cold drawn and hot drawn filament yarns.
8. Comparison of properties of single and multi stage drawn polyesters filament yarns.
9. The effect of draw ratio and drawing temperature on properties of filament yarns.
10. Maintenance of spin pack.
11. Industrial visit.
12. Industrial visit

**Reference Books:-**

1. Fundamentals of fibre formation – Andrej Ziabicki
2. High speed spinning - Ziabicki and Kawai
3. Man Made fibre science and technology - Marks and Allas.
4. Manufactured fibre technology - V.B. Gupta, and V.K. Kothari.
5. Production of synthetic fibres – A.A. Vaidya.
6. Book of papers of NCUTE Programmes on Man Made fibres.
7. Setting of fibres and fabrics – Hearle J.W.S. & Miles L.W.C.

**SECOND YEAR B. TEXT. – SEMESTER – I****3.5 MAN MADE STAPLE YARN MANUFACTURE-II (MMTT)**

Lectures	:	4 Hours / Week
Practical	:	2 Hours / Week
Theory Paper	:	100 Marks
Term Work	:	25 Marks
Subject Total	:	125 Marks

**CARDING:**

- a) Feed to Card – Principle and concept of chute feed to card. Advantages and limitations. Study of design details of different types of chute feeding systems available in the market.
- b) Revolving Flat Card – Detailed study of design developments in Take in zone, Cylinder Flat Carding Zone – Doffer Zone – Sliver formation – Study of cards used in the industry – General construction – Driving arrangement, production calculations, draft calculations, stop motions – on line monitoring – Tandem Cards.
- c) Carding Theory – Opening of fibre mass – Carding actions – Web formation and fibre configuration – Blending – Levelling action – Fibre breakage.
- d) Transfer efficiency of card – importance, concept, methods of finding transfer efficiency.
- e) Autolevellers at Card – Basic principles and concept – Types of autolevellers – Principle of working of autolevellers at Card – Setting of autolevellers.
- f) Card Clothing – History and Development – Metallic wire – Tooth geometry – Maintenance of Card Clothing – Card wire mounting.
- g) Assessment of performance of card – Cleaning efficiency, Nep removal efficiency, fibre breakage.
- h) Concept of Air engineering w.r.t. carding.
- i) Utilities required for carding machine.

**DRAWFRAME:-**

- a) Functions of drawframe, principles of drafting and doubling. Study of constructional details and design considerations of a drawframe. Calculations relating to speeds, drafts, production etc.
- b) Principles of roller drafting, design details of drafting system, evolution of drafting systems at drawframe (Shirley 4/4 draftings, plats, pressure bar, whitin accu drafting. Rieter polar drafting systems etc. Developments in drawframe drafting.
- c) Suction at drawframe. Automatic can handling. Auto leveling at drawframe. On-line quality monitoring and control.
- d) Study of drawframes available in the market. Blending at drawframe.
- e) Study of maintenance aspects and design developments such as rollers, roller, roller weightings, drafting systems etc.
- f) Assessment of performance of drawframe. Defective production at drawframe, Causes and remedies for the same. Norms for production, sliver quality, waste etc.
- g) Role played by air on Drawframe and utilities required.

**List of Experiments:-**

- 1) Study of chute feed system
- 2) Study of constructional details of a card.
- 3) Driving arrangement and calculations of carding machine.
- 4) Settings of various parts of feed zone of carding.
- 5) Settings of various parts of carding zone in carding.
- 6) Demonstration of stripping, Grinding, wire mounting, etc. – Mill visit.
- 7) Study of utilities on card & Draw frame.
- 8) Processing of Material on card and evaluating card performance.
- 9) Study of constructional details of draw frame.
- 10) Driving arrangement and calculation of D/F.
- 11) Evaluation of Draw frame performance.
- 12) Study of autolevellers used on card and Draw frame.

**Reference Books:-**

1. The Textile Institute Publication –Manual of Textile Technology-Short Staple Spinning Series Vol I to V by W. Klein

2. The characteristics of Raw Cotton by P. Lord. The Textile Institute Publication, Manual of Cotton Spinning Vol II, Part-I.
3. Opening and cleaning by Shirley. The Textile Institute Publication, Manual of Cotton Spinning Vol II, Part II.
4. Opening cleaning and picking by Dr. Zoltan, S. Szaloki, Institute of Textile Technology, Verginia.
5. Fundamentals of Spun Yarn Technology, By Carl Lawrence.
6. Blow room and carding –Training program conducted by NCUTE, IIT Delhi.
7. Carding by F. Charanlay .The Textile Institute publication, Manual of cotton spinning series Vol - III.
8. Essential calculations of practical cotton spinning by T. K. Pattabhiraman.
9. Blow room, Carding, Draw frame-by Prof. A. R. Khare
10. Technology of cotton spinning by J. Janakiram.



**SECOND YEAR B. TEXT. – SEMESTER – I****3.6 MAN MADE FABRIC MANUFACTURE-II (MMTT)**

Lectures	:	4 Hours / Week
Practical	:	2 Hours / Week
Theory Paper	:	100 Marks
Term Work	:	25 Marks
Subject Total	:	125 Marks

**1) AUTOMATIC WEAVING:-**

- i) Limitations of ordinary looms: - Production, efficiency, quality & allocation, objectives for developing automatic looms, scope for automation.
- ii) Design features of automatic looms: - Drives, loom motions, accessories & other critical features of automatic looms.
- iii) Weft feelers: - Construction working of side sweep (Cimmco & Ruti-B Type), electrical (Ruti-C Type) & electronic weft feelers, their merits, demerits & applications.
- iv) Transfer mechanism: - Cimmco & Ruti-C transfer motion's working & construction, shuttle protector, temple & shuttle eye cutter. Requirement for successful transfer of pirn, reasons of stripping, bottoms & remedies. Shuttle changing mechanism & safety motion, its applications.
- v) Automatic let-off motion: - Principles and requirements of automatic let-off mechanism, types, construction & working of Cimmco, Ruti-B, Ruti-C type let-off motions.
- vi) Warp stop motion: - Types, Construction and working of mechanical and electrical warp stop motion, Types of drop pins, specifications & applications.
- vii) Centre weft fork: - Construction & working of Ruti-C type center weft fork motion & its advantages.
- viii) Operator assisting motions: - Pick finding, heald leveling, light indicators, pick counters need, functions & use.
- ix) Auto loom fabric defects, causes and remedies, Calculations.

**2) FABRIC STRUCTURE:-**

Study of following weaves (Design, draft & peg plan) & weave characteristics &

weaving requirements.

- i) Stripe & check weave combination - selection of weaves, joining of weaves, firmness, classification & construction of designs.
- ii) Colour & weave effect.
- iii) Simple spot designs.
- iv) Backed fabrics - Warp, weft and wadding backed fabrics.
- v) Bedford words - Plain, twill, wadded, Crepon cords,
- vi) Welt & Pique: - Plain, wadded & waved pique.
- vii) Figuring with extra threads: - Principles, extra warp, extra weft figuring, combination, limitation, extra thread effect & weaving.
- viii) Gauze & Leno :- Principles, basic sheds, Leno with flat steel doups & slotted doups, point draft or counter leno, simultaneous top & bottom douping, application of slotted doups & double slotted doups, easing & shaker motion concept, working & construction.
- ix) Double cloth: - Object, classification, self stitched double cloth; center stitched double cloths, interchanging double cloth, multiplayer fabrics. Selection of face & back weaves type of stitching points & their selection, wadded double cloth.

### 3) **AUTOMATIC WINDING:-**

- a) Classification of automatic winding machine P & Q winding, their application.
- b) Technical requirements of winding process :
  - i) Yarn unwinding
  - ii) Yarn take-up
  - iii) Yarn tensioning
  - iv) Wound package requirements for warping, knitting & weaving.
- c) Construction of automatic winding machines
  - i) Design features, i.e. yarn path (Creel, link presenter, booster, unwinding accelerator, pre cleaner, tensioners, waxing cradle etc.)
  - ii) Drive to drums, scroll details, super drums, braking etc. (Autoconer - 238,338,338 0, Savio Espero & Orion, Murata - 21 C, 7 -V.)
  - iii) Special features of all models, blowers, air consumption & power etc.
- d) Yarn Clearing :-
  - i) Technical back ground

- ii) Optimum clearing.
  - iii) Uster Classimat as an aid for yarn clearing.
  - e) Electronic yarn clearers
    - i) Optical & capacitance, Lofe, TK 930F, TK 950H, Quantum-II etc.
    - ii) The capabilities of different yarn clearers.
    - iii) Detailed method of setting of optical & capacitance type clearer (for carded & combed yarns) w.r.t. N,DS, DL,LL,-D,-L,C, Cluster setting, splicer setting, extended splicer setting for various yarn counts and materials.
    - iv) Siro cuts.
    - v) Knot factor & clearing efficiency & its use as an aid to assess the performance of winding machines.
  - f) Splicing :-
    - ii). Types - mechanical & pneumatic, details of construction, parameters, their applications.
    - iii). Electronic checking of spliced joint.
    - iv). Splice quality assessment (strength, appearance, hairiness)
    - v). Maintenance of splicers.
  - g) Study of various delivery packages.
  - h) Package Quality :-
    - i). Details of package faults observed on automatic winding machines causes & remedies.
    - ii). Mechanism for anti patterning, maximum diameter of package, all to doffing & restarting.
  - i) Calculations: - Efficiency, production & allocation.
- 4) MODERN WARPING:-**
- a) Constructional details & features of modern warping machines. Such as Benninger, West Point, Sucker-Muller, Tsudakoma & Karl Mayer with reference to design of creel, pre-tensioners, automatic adjustment of central control of tensioners.
  - b) Types of re creeling - magazine, truck, chain creels, semi - auto & auto creels, creel - master, and auto plan for colour patterns.
  - c) Head Stock - i) Beam warping - Auto leasing, drive, brakes and automatic doffing & donning.

- ii) Sectional warping - Auto leasing, drum traverse & cone angle adjustment, beam traverse & its adjustment.
- iii) MIS systems & its use.

**List of Experiments:-**

- 1) Dismantling and resetting of under pick motion.
- 2) Dismantling and resetting of Cimmco & Ruti-C weft feeler motion.
- 3) Dismantling and resetting of Cimmco auto let-off motion.
- 4) Dismantling and resetting of pirn change motion.
- 5) Dismantling and resetting of clutch motion.
- 6) Study of Ruti-C loom -drive, centre weft fork, pick finding, take-up drive, back rest, multi pawl drive, shuttle construction, picking, loose reed etc.
- 7) Study of sectional warping drive - warping speed, beaming speed, reed & beam traverse speed, production and efficiency.
- 8) Study of Laxmi and Senmet pirn winding machine. - Spindle speed, traverse speed, coils per double traverse, diameter control, production and efficiency.
- 9) Visit to Auto loom unit.
- 10) Fabric analysis - Extra warp, weft, Bedford, cord, pique, leno, double cloth, pile fabric.
- 11) Fabric analysis - Extra warp, weft, Bedford cord, pique, leno, double cloth, pile fabric.
- 12) Fabric analysis - Extra warp, weft, Bedford, cord, pique, leno, double cloth, pile fabric.
- 13) Visit to Autoconer unit.
- 14) Visit to Automatic loom unit.

**Reference Books:-**

1. Principles of Weaving by Marks A.T.C. & Robinson.
2. Textile Colour & Design by Watson.
3. Weaving Machines, Materials & Methods by Prof. M.K. Talukdar, Prof.D.B. Ajgaonkar etc.
4. Textile Mathematics - Vol.-I & II by J.E. Booth.
5. Advanced Textile Design by Watson
6. Modern Preparation & Weaving Machines by A. Ormerod.

**SECOND YEAR B. TEXT. – SEMESTER – I****3.3 MATERIAL ENGINEERING (TPE)**

Lectures	:	3 Hours / Week
Theory Paper	:	100 Marks
Subject Total	:	100 Marks

**1) Introduction to Material Engineering:-**

Definition of engineering materials, classification scope of the subject, structural studies of materials – Types of bonds, atomic and ionic radius, interatomic distances, vander waals forces, formation of engineering materials, Crystal structures, molecular structures, amorphous phases.

**2) Properties of Engineering Materials:-**

Mechanical – Hardness, Strength (compression, tension), Ductility, Malleability, Machinability, Weldability, Fatigue and Creep.

Thermal – Specific heat, Thermal conductivity, Thermal expansion and Thermoelectric effect.

Chemical – Ionization and Electrolysis.

**3) Metallic Materials -**

Pig Iron, Wrought iron, Steel & Cast iron, classification, alloying of steel - effect of addition of elements such as Si, C, P, Mn, Ni, Mo, V, Co to steel, Stainless steel, Heat treatment of steels, Non-ferrous metals such as Brass, Bronze, Duralumin, Alnic Nichrome, Solder material.

**4) Ceramic Materials :-**

Introduction, types, polymorphism, manufacture & types of glass. Properties of refractory material, refractories such as a) Chromates b) Zircon c) High alumina refractories d) Porcelain.e) bricks. Cement, its types, manufacturing process, setting & hardening, uses.

**5) Organic Materials :-**

Polymers , Polymerisation, types, mechanisms, plastics, types, properties and applications, crystallinity in polymer & its structure, properties and applications of bakelite, Nylon 66, rubber –classification, vulcanisation, protective coatings such as paints, polishes and varnishes.

**6) Electrical and Magnetic Materials :-**

Factors affecting the resistivity of conductors, properties of materials such as Ag, Cu, Al, Nichrome and Ca as dielectric characteristics, insulating materials such as mineral oil, PVC, Mica fibres, glass and asbestos, Magnetisation, soft and hard magnetic materials such as a silicon iron, Alnico types alloys and ferrites.

**7) Corrosion :-**

Definition, types, mechanism, factors affecting rate of corrosion. Prevention of corrosion – proper selection of material and proper designing, alloying, metallic coatings – hot dip process, spraying, electroplating, cementation, cladding.

**8) Textile materials :-**

Various textile materials, their properties and applications. Glass wool, Polyester film, insulation fleets, filters etc. Materials used for textiles – bobbins, picker, leather, wood for shuttles, ring travellers etc.

**9) Composite Materials -**

Introduction, constituents of composites, types of composites, processing of fibre reinforced composites, failure of fibre reinforced composites.

**10) Introduction to Nanotechnology :-**

Introduction, methods of synthesis of Nanopartilcles, chemical bath deposition method, electrodeposition method, advantage & disadvantage of nanomaterials, applications.

**Reference Books:-**

1. Material Science by R.B. Gupta.
2. A Text book of Material Science by V.K. Manchanda.
3. Material Science and Engineering by V. Raghavan.
4. Material Science and Processes by S. K. Hajra Choudhary.
5. Material Science and Metallurgy by V.D.Kodgire.
6. The Nanoscope by Dr. Parag Diwan & Ashish Bharadwaj.

**SECOND YEAR B. TEXT. – SEMESTER – I****3.4 MANUFACTURING PROCESSES (TPE)**

Lectures	:	4 Hours / Week
Practical	:	3 Hours / Week
Theory Paper	:	100 Marks
Practical Exam	:	50 Marks
Term Work	:	25 Marks
Subject Total	:	175 Marks

**1) Traditional Metal Cutting Processes :-**

Principles of Traditional Metal Cutting Processes like Turning, milling, drilling, reaming, boring. Concept of general purpose machine & special purpose machine.

**2) Advancement in Machines :-**

Requirement of advancement in machinery, Introduction to NC machine, CNC machine – additional features, advantages, dis-advantages, application areas & parts suitable for CNC machines. DNC machine. Classification of CNC machine – according to feedback control, according to control system features, axis identification in CNC machines, ATC & Tool magazine.

**3) Non-Traditional Machining Methods (NTMM) :-**

Introduction, classification, Information about the processes EDM, ECM, AJM, LBM, Plasma arc cutting – principle, working, advantages, disadvantages & applications of each process.

**4) Protection of Machined Surfaces:-**

Requirement of protection & information about Electroplating, Galvanizing, Metal Spraying, Tinning, Painting,

**5) Mechanical Working of Metals:-**

Hot working of metals, Cold working of metals & concept about the processes like Rolling, Extrusion, Drawing, Metal Spinning.

**6) Forging :-**

Introduction, various tools used, Basic forging operations, Hand forging, machine forging, open-die forging, close-die forging, forging defects & causes.

**7) Press Work :-**

Press machine and its parts, various press working operations like various cutting operations & forming operations.

**8) Welding :-**

Principle, equipment & procedure of Gas & Arc welding, Brazing.

**Practicals (Mechanical Workshop) : -**

1. Fitting Job : Male Female Fitting - 1 Jobs
1. Turning Job : Assembly job containing following operations –  
Facing, Step turning, Taper turning, Knurling, Threading, etc. -1 Job
3. Identification of manufacturing processes of textile machine components .

**Practical Examination:-**

2 Jobs from Fitting & Turning (one each) – Time duration 4 hrs. each  
Total - 2 Jobs, 8 hrs.

**Reference Books:-**

1. Elements of Workshop Practices (Vol. I) by Hazra Choudhary.
2. Production Technology by R. K. Jain.
3. A Course in Workshop Technology by B. S. Raghuwanshi.
4. CNC Machines by Pabla & Adithan.
5. CAD/CAM Principles & Operations by P. N. Rao.



**SECOND YEAR B. TEXT. – SEMESTER – I****3.5 YARN MANUFACTURING MACHINERY-II (TPE)**

Lectures	:	4 Hours / Week
Practical	:	2 Hours / Week
Theory Paper	:	100 Marks
Term Work	:	25 Marks
Subject Total	:	125 Marks

**CARDING :**

- a) Feed to Card – Principle and concept of chute feed to card. Advantages and limitations. Study of design details of different types of chute feeding systems available in the market.
- b) Carding Machine – Engg. Study and mechanics of design developments in Take in zone, Cylinder Flats Carding Zone – Doffer Zone – Sliver formation.
- c) Study of cards used in the industry – General construction – Driving arrangement, production calculations, draft calculations, stop motions – on line monitoring – Tandem Cards.
- d) Carding Theory – Opening of fiber mass – Carding actions – Web formation and fibre configuration – Blending – Leveling action – Fiber breakage.
- e) Transfer efficiency of card – importance, concept, methods of finding transfer efficiency.
- f) Autolevellers at Card – Basic principles and concept – Types of autolevellers – Principle of working of autolevellers at Card – Setting of autolevellers , sensors used.
- g) Card Clothing – History and Development – Metallic wire – Tooth geometry , material used for wires - Maintenance of Card Clothing – Card wire mounting.
- h) Assessment of performance of card – Cleaning efficiency, Nep removal efficiency, fibre breakage.
- i) . Centralised Waste collection System : Design features, operating principles.

**DRAWFRAME :-**

- a) Functions of drawframe, principles of drafting and doubling. Study of constructional details and design considerations of a drawframe. Calculations related to speeds, drafts, production etc.
- b) Principles of roller drafting, design details of drafting system, evolution of drafting systems at drawframe (Shirley 4/4 draftings, plats, pressure bar, whitin accu drafting, Rieter polar drafting systems etc. Developments in drawframe drafting.
- c) Suction at drawframe. Automatic can handling. Auto leveling at drawframe ,on-line quality monitoring and control.
- d) Study of drawframes available in the market. Blending at drawframe.
- e) Study of maintenance aspects and design developments such as rollers, roller, roller weightings, drafting systems etc.
- f) Assessment of performance of drawframe. Defective production at drawframe, causes and remedies for the same. Norms for production, sliver quality, waste etc.

**List of Experiments:-**

- 1) Study of chute feed system
- 2) Study of constructional details of a card.
- 3) Driving arrangement and calculations of carding machine.
- 4) Settings of various parts of feed zone of carding.
- 5) Settings of various parts of carding zone in carding.
- 6) Demonstration of stripping, Grinding, wire mounting, etc. – Mill visit.
- 7) Study of utilities on card & Draw frame.
- 8) Processing of Material on card and evaluating card performance.
- 9) Study of constructional details of draw frame.
- 10) Driving arrangement and calculation of D/F.
- 11) Evaluation of Draw frame performance.
- 12) Study of autolevellers used on card and Draw frame.

**Reference Books:-**

1. The Textile Institute Publication –Manual of Textile Technology-Short Staple Spinning Series Vol I to v by W. Klein

2. The characteristics of Raw Cotton by P. Lord. The Textile Institute Publication, Manual of Cotton Spinning Vol II, Part-I.
3. Opening and cleaning by Shirley. The Textile Institute Publication, Manual of Cotton Spinning Vol II, Part II.
4. Opening cleaning and picking by Dr. Zoltan, S. Szaloki, Institute of Textile Technology, Verginia.
5. Fundamentals of Spun Yarn Technology, By Carl Lawrence.
6. Blow room and carding –Training program conducted by NCUTE, IIT Delhi.
7. Carding by F. Charanlay .The Textile Institute publication, Manual of cotton spinning series Vol - III.
8. Essential calculations of practical cotton spinning by T. K. Pattabhiraman.
9. Blow room, Carding, Draw frame-by Prof. A. R. Khare
10. Technology of cotton spinning by J. Janakiram.

**SECOND YEAR B. TEXT. – SEMESTER – I****3.6 FABRIC MANUFACTURING MACHINERY-II (TPE)**

Lectures	:	4 Hours / Week
Practical	:	2 Hours / Week
Theory Paper	:	100 Marks
Term Work	:	25 Marks
Subject Total	:	125 Marks

**1) AUTOMATIC WEAVING:-**

- a) Limitations of ordinary looms: - Production, efficiency, quality & allocation, objectives for developing automatic looms, scope for automation.
- b) Design features of automatic looms: - Drives, loom motions, accessories & other critical features of automatic looms.
- c) Weft feelers: - Construction working of side sweep (Cimmco & Ruti-B Type), electrical (Ruti-C Type) & electronic weft feelers, their merits, demerits & applications.
- d) Transfer mechanism: - Cimmco & Ruti-C transfer motion's working & construction, shuttle protector, temple & shuttle eye cutter. Requirement for successful transfer of pirn, reasons of stripping, bottoms & remedies. Shuttle changing mechanism & safety motion, its applications.
- e) Automatic let-off motion: - Principles and requirements of automatic let-off mechanism, types, construction & working of Cimmco, Ruti-B, Ruti-C type let-off motions.
- f) Warp stop motion: - Types, Construction and working of mechanical and electrical warp stop motion, Types of drop pins, specifications & applications.
- g) Centre weft fork: - Construction & working of Ruti-C type center weft fork motion & its advantages.
- h) Operator assisting motions: - Pick finding, heald leveling, light indicators, pick counters need, functions & use.
- i) Auto loom fabric defects, causes and remedies, Calculations.

**2) FABRIC STRUCTURE:-**

Study of following weaves (Design, draft & peg plan) & weave characteristics &

weaving requirements.

- i) Stripe & check weave combination - selection of weaves, joining of weaves, firmness, classification & construction of designs.
- ii) Colour & weave effect.
- iii) Simple spot designs.
- iv) Backed fabrics - Warp, weft and wadding backed fabrics.
- v) Bedford words - Plain, twill, wadded, Crepon cords,
- vi) Welt & Pique: - Plain, wadded & waved pique.
- vii) Figuring with extra threads: - Principles, extra warp, extra weft figuring, combination, limitation, extra thread effect & weaving.
- viii) Gauze & Leno :- Principles, basic sheds, Leno with flat steel doups & slotted doups, point draft or counter leno, simultaneous top & bottom doubling, application of slotted doups & double slotted doups, easing & shaker motion concept, working & construction.
- ix) Double cloth: - Object, classification, self stitched double cloth; center stitched double cloths, interchanging double cloth, multiplayer fabrics. Selection of face & back weaves type of stitching points & their selection, wadded double cloth.

### 3) **AUTOMATIC WINDING:-**

- a) Classification of automatic winding machine P & Q winding, their application.
- b) Technical requirements of winding process :
  - i) Yarn unwinding
  - ii) Yarn take-up
  - iii) Yarn tensioning
  - iv) Wound package requirements for warping, knitting & weaving.
- c) Construction of automatic winding machines
  - i) Design features, i.e. yarn path (Creel, link presenter, booster, unwinding accelerator, pre cleaner, tensioners, waxing cradle etc.)
  - ii) Drive to drums, scroll details, super drums, braking etc. (Autoconer - 238,338,338 0, Savio Espero & Orion, Murata - 21 C, 7 -V.)
  - iii) Special features of all models, blowers, air consumption & power etc.
- d) Yarn Clearing :-
  - i) Technical back ground

- ii) Optimum clearing.
  - iii) Uster Classimat as an aid for yarn clearing.
  - e) Electronic yarn clearers
    - i) Optical & capacitance, Loefe, TK 930F, TK 950H, Quantum-II etc.
    - ii) The capabilities of different yarn clearers.
    - iii) Detailed method of setting of optical & capacitance type clearer (for carded & combed yarns) w.r.t. N,DS, DL,LL,-D,-L,C, Cluster setting, splicer setting, extended splicer setting for various yarn counts and materials.
    - iv) Siro cuts.
    - v) Knot factor & clearing efficiency & its use as an aid to assess the performance of winding machines.
  - f) Splicing :-
    - ii). Types - mechanical & pneumatic, details of construction, parameters, their applications.
    - iii). Electronic checking of spliced joint.
    - iv). Splice quality assessment (strength, appearance, hairiness)
    - v). Maintenance of splicers.
  - g) Study of various delivery packages.
  - h) Package Quality :-
    - i). Details of package faults observed on automatic winding machines causes & remedies.
    - ii). Mechanism for anti patterning, maximum diameter of package, all to doffing & restarting.
  - i) Calculations: - Efficiency, production & allocation.
- 4) MODERN WARPING:-**
- a) Constructional details & features of modern warping machines. Such as Benninger, West Point, Sucker-Muller, Tsudakoma & Karl Mayer with reference to design of creel, pre-tensioners, automatic adjustment of central control of tensioners.
  - b) Types of re creeling - magazine, truck, chain creels, semi - auto & auto creels, creel - master, and auto plan for colour patterns.
  - c) Head Stock - i) Beam warping - Auto leasing, drive, brakes and automatic doffing & donning.

- ii) Sectional warping - Auto leasing, drum traverse & cone angle adjustment, beam traverse & its adjustment.
- iii) MIS systems & its use.

**List of Experiments:-**

- 1) Dismantling and resetting of under pick motion.
- 2) Dismantling and resetting of Cimmco & Ruti-C weft feeler motion.
- 3) Dismantling and resetting of Cimmco auto let-off motion.
- 4) Dismantling and resetting of pirn change motion.
- 5) Dismantling and resetting of clutch motion.
- 6) Study of Ruti-C loom -drive, centre weft fork, pick finding, take-up drive, back rest, multi pawl drive, shuttle construction, picking, loose reed etc.
- 7) Study of sectional warping drive - warping speed, beaming speed, reed & beam traverse speed, production and efficiency.
- 8) Study of Laxmi and Senmet pirn winding machine. - Spindle speed, traverse speed, coils per double traverse, diameter control, production and efficiency.
- 9) Visit to Auto loom unit.
- 10) Fabric analysis - Extra warp, weft, Bedford, cord, pique, leno, double cloth, pile fabric.
- 11) Fabric analysis - Extra warp, weft, Bedford cord, pique, leno, double cloth, pile fabric.
- 12) Fabric analysis - Extra warp, weft, Bedford, cord, pique, leno, double cloth, pile fabric.
- 13) Visit to Autoconer unit.
- 14) Visit to Automatic loom unit.

**Reference Books:-**

1. Principles of Weaving by Marks A.T.C. & Robinson.
2. Textile Colour & Design by Watson.
3. Weaving Machines, Materials & Methods by Prof. M.K. Talukdar, Prof.D.B. Ajgaonkar etc.
4. Textile Mathematics - Vol.-I & II by J.E. Booth.
5. Advanced Textile Design by Watson
6. Modern Preparation & Weaving Machines by A. Ormerod.

**SECOND YEAR B. TEXT. – SEMESTER – I****3.4 CHEMISTRY OF TEXTILE FIBRES-II (TC)**

Lectures	:	4 Hours / Week
Practical	:	3 Hours / Week
Theory Paper	:	100 Marks
Practical Exam	:	50 Marks
Subject Total	:	150 Marks

**CHAPTER – I: Fundamentals of Fibre Spinning:-**

General principles of the spinning process, Theory of solidification of polymer in various spinning techniques. Rheology of spinning, Spinnability of fluid, Flow instabilities, Concept of melt spinning, General features and essential requirements of melt spinning. Total sequence of polymer flow in melt spinning, Melt spinning equipments such as melting devices, static device, filters, manifold, spin pack, quenching. Take-up winders. Variables in melt spinning, Formation of fibre structure during spinning, Concept of high speed spinning. Concept of LOY, MOY, POY, HOY, FOY yarns, Spin draw process, Concept of Direct melt spinning, Manufacturing process, properties and application of micro fibres, concept of nano fibers.

**CHAPTER-II: Polyester Fibres:-**

Synthesis of Raw materials, manufacturing process, physical and chemical properties and end uses of polyester. Modified polyester fibres - hollow fibre, hydrophilic fibre, low pilling, flame retardant fibre, CDPET, biodegradable polyester, bicomponent polyester, polyester fibres other than polyethylene terephthalate {Polypropylene terephthalate (PPT), Polybutylene terephthalate (PBT) etc.}

**CHAPTER-III: Polyamide Fibres:-**

Synthesis of Raw materials, manufacturing process, physical and chemical properties and end uses of Nylon-6 & Nylon-66. Modified nylon fibres - hydrophilic, antistatic, low pilling, flame retardant, differentially dyeable nylon, bicomponent fibres.



#### **CHAPTER-IV: Acrylic Fibres –**

Synthesis of Raw materials, manufacturing process, physical and chemical properties and end uses of acrylic and modacrylics. Modified acrylic fibres hydrophilic fibre, low pilling, flame retardant, Bicomponent, differentially dyeable, high shrinkage fibre, fibres with modified cross-sections.

#### **CHAPTER-IV: Unconventional Fibres –**

Extraction, physical & chemical properties and uses of pineapple fibre, banana fibre, coir fibre, sisal fiber, hemp fiber, soyabean fiber

#### **List of Experiments:-**

1. Identification of fibres by microscopic method.
2. Determination of density of fibre.
3. Identification of fibres from binary by chemical method - I.
4. Identification of fibres from binary by chemical method - II.
5. Identification of fibres from tertiary blends by chemical methods.
6. Demonstration of laboratory melt spinning unit and production of filament yarn.
7. Demonstration of laboratory filament yarn drawing machine and drawing & heat setting of polyester POY.
8. Determination of accessible region of cotton.
9. Determination of accessible region of polyester by Iodine absorption method.
10. Quantitative analysis of given known blend – I.
11. Quantitative analysis of given known blend – II.
12. Quantitative analysis of given known blend – III.
13. Detection of oxycellulose & Hydrocellulose.
14. Determination of  $M_n$  Nylon by End Group Analysis.
15. Determination of  $M_n$  of PET by End Group Analysis.

#### **Reference Books:-**

1. Manufactured Fibre Technology by Dr.V.C. Gupta & Dr.V.K. Kothari.
2. Science and technology of Man Made Fibres by Dr. S. P. Mishra
3. Advanced Fibre Spinning Technology by Prof.T. Nakagima
4. Advances in Fibre Science by Dr.S.K. Mukhopadhyay.

5. Manmade fibres by R.W. Moncrieff.
6. Production of Synthetic fibres by Dr. A. A. Vaidya.
7. Fibre Technology by Hans A. Krassig Jurgen Lenz and Herman F. Mark.
8. Handbook of Fibre Science and Technology – Vol.I, II & III by Menachem Lewin & Stephen B. Sello.
9. High Tech Fibrous Materials by Tyrone L. Vigo and Albin F. Turbak.
10. Modified Polyester Fibres by Jiri Militky, Jiri vanicok, Jiri Krydufek & Vaclav Hartych.
11. Man-made fibres: Their Origin and Development by The Late Raymond B. Seymonic and Roger S. Porter.
12. New Fibres by Phillips and Hongu. 2<sup>nd</sup> edition
13. Synthetic Fibres by Jordon Cook.
14. Fundamentals of high speed spinning by A. Ziabicki

**SECOND YEAR B. TEXT. – SEMESTER – I**

**3.5 SPINNING TECHNOLOGY (TC)**

Lectures	:	3 Hours / Week
Practical	:	2 Hours / Week
Theory Paper	:	100 Marks
Term Work	:	25 Marks
Subject Total	:	125 Marks

**General:-**

- Definition of fibre
- Definition of yarns (Filament, Textured yarn, Spun Staple), Classification of yarn.
- Fibre characteristics required for spun yarn production.
- Process flow charts for conversion of staple fibres into yarns Carded yarn, Combed yarn, Openend / airjet yarn.

**Yarns Numbering System:-**

- Introduction to Direct system, indirect system.
- Study of Tex, Denier, English, Metric, Worsted, Woolen etc. systems.
- Conversions between different systems of yarn numbering.
- Study of folded yarn, resultant yarn count calculations.

**Cotton Fibre Cultivation & Ginning:-**

- Introduction to cotton cultivation.
- Definition of picking and types of picking, their effect on cotton quality
- Definition of Ginning and types of Ginning, their effect on cotton quality
- Bailing of cotton

**Spinning Preparatory & Spinning:-**

- a. **Mixing & Blowroom** – Objects of mixing and blow-room. Importance of opening & cleaning. Sequence of blowroom machines used. Material transportation system (Conventional and modern).

- b. **Carding** – Objects of carding, Feeding arrangement of the carding and its effect on quality. Introduction to carding and stripping action. Passage of material through carding. Working of carding. Calculations
- c. **Draw frame** – Concept of drafting, requirement of doubling, objectives of draw frame. Working of Draw frame. Auto leveler system. Calculations.
- d. **Comber Preparatory** – Requirements of comber preparatory. Machine sequences used for comber preparatory. Introduction to Sliver lap and Ribbon lap machines. Object of comber, working of comber and passage of material through comber. Index and combing cycle of comber. Forward and backward feed of comber. Calculations.
- e. **Speed frame** – Object of speed frame. Working of speed frame machine. Passage of material through speed frame. Different zones of speed frame. Calculations
- f. **Ring Frame** – Objectives of ring frame, working of ring frame machine. Passage of material through ring frame. Calculations.

#### **New Spinning Systems :-**

Introduction of spinning technique, working and technical specification of following spinning systems.

- a. Compact spinning system.
- b. Rotor spinning system.
- c. Dref spinning system
- d. Air Jet spinning system.
- e. Siro spinning
- f. Twistles spinning system

#### **List of Experiments:-**

1. To draw process flow chart for carded yarn, combed yarn & rotor yarn.(Mill Visit)
2. Sequence of machines in blowroom and their introduction.
3. Study of passage of material through blowroom machines, bale opener, mild cleaner& intensive opener.
4. Study of Lap formation system (scutcher) & Chute feed system(Mill Visit).
5. Study of passage of material through carding machine.
6. Study of passage of material through draw frame machines.

7. Study of passage of material through comber preparatory machine.
8. Study of passage of material through comber.
9. Study of passage of material through speed frame machine.
10. Study of passage of material through ring frame machine.
11. Study of passage of material through ring doubler and TFO.
12. Study of rotor spinning system.
13. Study of hank and count calculation by wrapping method.

**Reference Books:-**

1. Natural Fibres by Mathews.
2. Introduction to Textile Fibres by Dr. H.V.S. Murthy.
3. The technology of short staple spinning by W. Klein, The Textile Institute publication – short staple spinning series Vol. I
4. Opening, Cleaning and Picking by Dr. Zoltan S. Staloki, The Institute of Textile Technology, Virginia.
5. Cotton Ginning, Textile Progress, The Textile Institute Publication.
6. Carding and Drawing by Prof. A. R. Khare.
7. Cotton Carding by G.R. Merrill.
8. A Practical Guide to Combing & Drawing by W. Klein. The Textile Institute Publication, short staple spinning series Vol.3.
9. Draw frame, Combing and Speed frame by J.H. Black. TTI publication manual of Cotton Spinning Vol.IV part-II.
10. A practical guide to ring spinning by W.Klein , TTI publication.
11. Two-for-One Technology and Technique for Spun Yarn by Dr. H. S. Kulkarni and Dr. H. V. S. Murthy.
12. Unconventional Spinning Systems by W. Klein, TTI publication.
13. Cotton Spinning By Ganesh and Garde
14. Textile Science by Halls
15. Textile – Fibre to Fabric by Bernard Corbman
16. Spun Yarn Technology by Oxtoby

**SECOND YEAR B. TEXT. – SEMESTER – I**

**3.6 TECHNOLOGY OF BLEACHING AND MERCERISING (TC)**

Lectures	:	4 Hours / Week
Practical	:	3 Hours / Week
Theory Paper	:	100 Marks
Practical Exam	:	50 Marks
Subject Total	:	150 Marks

**CHAPTER – 1 SIZING**

- Objects of sizing and its relevance in desizing
- Sizing ingredients & their functions.
- General size paste formulations for cotton (20<sup>s</sup>, 40<sup>s</sup>, 60<sup>s</sup>, 100<sup>s</sup>), P/C, P/V yarn.
- Size identification

**CHAPTER – 2 INTRODUCTIONS**

- Introduction & importance of pretreatments.
- Classification of impurities.
- Various pretreatment sequences for yarn, woven, Knits, cotton, synthetics & their blends, wool and silk.

**CHAPTER – 3 GREY INSPECTION**

- Point system
- Tag system
- Types of stitching
- Segregation and rejection
- Inspection machines for woven and knit goods..

**CHAPTER –4 MECHANICAL PRECESSING SHEARING & CROPPING.**

- Objects
- Working principle
- Types of Shearing,
- Evaluation of the efficiency of shearing & cropping.

## **SINGEING**

- Object of singeing.
- Methods of singeing.
- Various types of gas singeing m/cs and developments in singeing m/cs like direct and indirect singeing.
- Singeing of yarn, woven, knit, synthetic & blended fabrics.
- Evaluation of the efficiency of singeing.

## **CHAPTER – 5: CHEMICAL PROCESSING DESIZING**

- Objects of desizing.
- Chemistry of desizing by acid, enzyme and oxidizing agents.
- Various practical methods of desizing.
- Evaluation of the efficiency of desizing like Tegewa test etc.

### **SCOURING**

- Objects of scouring.
- Various processes occurring during scouring for removal of impurities.
- Recipe and functions of scouring bath ingredients.
- Solvent and solvent assisted scouring.
- Evaluation of the efficiency of scouring.
- Bio-scouring.

### **BLEACHING**

- Chemistry of natural colouring matter and their removal.
- Concept of A.O.X
- Chemistry of bleaching agents like Hydrogen Peroxide, Per-acetic acid.
- Bleaching of Cotton, Polyester, Nylon, Acrylic and their blended woven fabrics.
- Bleaching of knit goods and terry towels.
- Bleaching of coloured woven goods.
- Enzyme bleaching
- Evaluation of the efficiency of bleaching.

## **CHAPTER –6: PROCESSES & METHODS**

- Chemistry of single step preparatory processes.
- Batch wise, semi-continuous & continuous method of bleaching machines like JT-10, Hydraulic jiggers, soft flow, pad batch and continuous bleaching range.

## **CHAPTER – 7: MERCERIZATION**

- Objects of Mercerization.
- Various changes brought by mercerization.
- Concept of Hydrate formation & various types of cellulose conversions.
- Various factors affecting the process of mercerization.
- Various stages of mercerization & their comparison.
- Mercerization of P/C blends.

## **CHAPTER-8 UNCONVENTIONAL MERCERIZING**

- Concept of hot mercerization.
- Concept of liquid ammonia mercerization and machines.
- Evaluation to test efficiency of mercerization

## **CHAPTER-9 MERCERIZING MACHINES**

- Yarn mercerization m/c/s.
- Various types of fabric mercerization m/cs for woven fabrics.
- Knit goods mercerization m/c in tubular and open width form.

## **CHAPTER – 10 PREPARATION OF WOOL**

- Preparatory process sequence for woolen goods.

## **CHAPTER – 11 PREPARATION OF SILK**

- Preparatory process sequence for silk goods.
- Various methods of Degumming of silk.



**List of Experiments:-**

- 1) Identification of Size, Desizing of Cotton, their blends by batch & padding method & evaluation of desizing efficiency by TEGEWA method.
- 2) Scouring of Cotton fabric on Jigger & using Pad- Steam method.
- 3) Causticisation of Cotton yarn for terry towels.
- 4) Bleaching of Cotton using Hydrogen Peroxide by batch & Pad – Steam method.
- 5) Peroxide bleaching of cotton jute & cotton linen blends by batch method.
- 6) Combined Scouring & Bleaching of Cotton yarn in Package form.
- 7) Scouring & Bleaching of Wool, Degumming & bleaching of Silk.
- 8) Determination of Absorbency & Ash-Content.
- 9) Determination of Copper number.
- 10) Determination of Carboxyl group content.
- 11) Determination of Barium Activity Number.
- 12) Mini project on preparatory processes for various fabrics.
- 13) Visit to a modern process house.  
(Study of machinery, process sequences & consumption of various utilities.)

**Reference Books:-**

1. Sizing by Prof. D. B. Ajgaonkar, Dr. M. K. Talukdar & V.R. Wadekar.
2. Chemical technology of fibrous materials by F. Sadov.
3. Chemical Processing of Polyester / Cellulosic blends by R.M.Mittal & S.S. Trivedi.
4. Chemical processing of synthetic & blends by Dr.K.V. Datye & A.A. Vaidya.
5. Mercerizing by J.T. Marsh.
6. Introduction to Textile bleaching by J.T. Marsh.
7. Bleaching, Dyeing & Chemical Technology of Textile Fibres by S.R. Trotman.
8. Technology of Bleaching by Dr. V.A. Shenai.
9. Warp Sizing by Paul V. Seydel.
10. Warping and Sizing – BTRA Silver Jubilee Monograph series.
11. Bleaching & Mercerizing – BTRA Silver Jubilee Monograph series.
12. Series of articles in COLOURAGE in processing machinery.

**SECOND YEAR B. TEXT. – SEMESTER – I**

**3.3 FABRIC STRUCTURE AND DESIGN (FT)**

Lectures	:	4 Hours / Week
Practical	:	2 Hours / Week
Theory Paper	:	100 Marks
Term Work	:	50 Marks
Subject Total	:	150 Marks

1) Bedford cords: plain faced - twill faced. Wadded - modifications. Welt piques: wadded piques - Loose back and fast back welts and piques, waved pique. Simple spot designs, Spot figuring - arrangement of figuring for dobby and jacquard.

2) Color theory: light and pigment theory - modification of color - color combination - application of colors - color and weave effects. Stripe & check weave combination.

3) Extra warp and extra weft figuring. Extra warp and extra weft figuring with two colors.

4) Backed Fabrics: Warp and Weft back, wadded backed fabric.

5) Warp pile produced by - terry weaves, Face to face weaving, wire insertion methods, carpet structure. Weft pile: plain back - twill back velveteen, corduroy, Weft plush, Length, density and fastness of pile.

6) Double cloth: Object, Classification: - self stitched - face to back - back to face - Combination face to back and back to face stitched double cloth. Wadded double cloth - weft and warp Wadded double cloth - Center Warp & Weft Stitched double cloth. Interchanging double cloths, multilayer fabrics, open to double & triple width & tubular fabrics.

7) Gauze & Leno: Principles, basic sheds, leno with flat steel doups And slotted doups, point draft or counter leno, simultaneous top & bottom douping, application of slotted doups, easing and shaker motion concept, working and construction.

8) Fabric engineering: fabric classification as per structure pierces formula for yarn diameter, cloth cover, cloth geometry of plain & twill fabrics, practical application of

cloth geometry and cover factor.

9) Construction and development of jacquard design.

Elements of jacquard shedding-double lift jacquard with single and double cylinder working, jacquard sizes, harness ties ,card cutting and card lacing, harness and design calculation ,casting out ,size of repeat ,count of design paper. Development of jacquard design -construction of square paper designs, process of drafting a sketch design, drafting designs from woven fabrics,

10) Application of CAD in developing fabric structure and design.

### **List of Experiments:**

- 1) Fabric analysis: Bedford cords pique.
- 2) Fabric analysis: Extra warp and extra weft
- 3) Fabric analysis: color and weave effects. Stripe & check weave.
- 4) Fabric analysis: Warp and weft back
- 5) Fabric analysis: Pile fabrics
- 6) Fabric analysis: double cloth
- 7) Fabric analysis: Leno fabric.
- 8) Sample weaving of Bedford cloth
- 9) Sample weaving of extra weft
- 10) Sample weaving of double cloth
- 11) Sample weaving of terry pile fabric
- 12) Sample weaving of stripe & check fabric.

### **Reference Books:-**

1. Grosicki Z., "Watson's Textile Design & Color: Elementary weaves & Figure", Blackwell Science, Commerce place.
2. Grosicki Z., "Advanced Textile Design & Colour:", Blackwell Science, Commerce place.
3. H.Nisbet, "Grammar of textile Design", Tarporevala sons & Co. Pvt. Ltd.,
4. W.S. Murphy, "Textile weaving & Design", Abhishek Publications.
5. Marks & robinson, " woven cloth construction"
6. J.E. Booth, " Textile mathematics- vol-I & II"

**SECOND YEAR B. TEXT. – SEMESTER – I**

**3.4 BASICS OF APPARAL PRODUCTION PROCESSES (FT)**

Lectures	:	4 Hours / Week
Theory Paper	:	100 Marks
Subject Total	:	100 Marks

1. Introduction to clothing industry, classification as per the size, labour etc. fabric inspection and grading system used in the industry.
2. Cutting: Importance of cutting, requirements of cutting, production processes in cutting room, planning, spreading, cutting, preparation for sewing.
3. Fusing: purpose of fusing, the process of fusing, requirement of fusing as per fabric, fusing machinery for garment parts, methods of fusing and quality control in fusing.
4. Sewing: Classification of stitches & seams, seam defects and stitching defects, feed systems, sewing threads, sewing needles, machinery and equipments.
5. Pressing & finishing: object, classifications, means, components, machinery and equipments, garment finishing and inspection, Quality Standards of some giant retailers, TUV, SGS and ASTM testing standards.
6. Production technology: Manual systems, make through systems, straight line systems, modular production systems, unit production systems, quick response systems
7. Ware housing: Handling equipments, storage equipments, packing equipments.
8. Application of CAD/CAM in garment manufacturing

**Reference Books:-**

- 1) Garment technology for fashion designers by Gerry Cooklin.
- 2) Introduction to clothing manufacturing by Gerry Cooklin.
- 3) Clothing construction and wardrobe planning by Dora S. Lewin, Mabel Goode Bowers, Manetta Knttunen- The Macmillan Co New York
- 4) Garment technology by Dr. V. Subramanian – winter school booklets 1990
- 5) BIS publications 1989.

- 6) The Technology of clothing manufacture, Carr & Latham, Blackwell Publications, 2000.

### **SECOND YEAR B. TEXT. – SEMESTER – I**

#### **3.5 YARN MANUFACTURE (FT)**

Lectures	:	4 Hours / Week
Practical	:	2 Hours / Week
Theory Paper	:	100 Marks
Term Work	:	25 Marks
Subject Total	:	125 Marks

- 1) **Cotton Ginning:** - Introduction, Objects of ginning. Cotton cultivation. Cotton picking methods. Study of various types of gins. Pre and post ginning equipments. Factors influencing ginning performance. Influence of ginning on fibre, yarn and fabric quality. Pressing and bailing of cotton, Characteristics of bales of various countries Grading of cotton
- 2) **Blowroom:** Types and composition of trash in cotton, their origin and their effect on processing performance & yarn quality. Objects of mixing and blowroom Elements of blow room machines. Machines used for opening & cleaning Chute feed system, calculation of production, waste.
- 3) **Carding:** Objects, basic actions in carding, constructional details, calculation of production, draft and waste.
- 4) **Drawing:** Objects, Concepts of drafting & doubling, principles of roller drafting systems. Drafting roller setting. Calculations of drafts & production.
- 5) **Combing:** Objects, Characteristics of good lap, Machines sequences used for comber preparatory, Type of combing. Study of principles & operation. Constructional details Calculation of drafts, production & noils.
- 6) **Speed Frame:** Objects, principles of working of speed frame, drafting, twisting & winding, constructional details, driving arrangement, calculation of draft, twist & production.
- 7) **Ring Frame:** Objects, description of machine, drafting, twisting & winding, brief study of spindles, ring & travelers, driving arrangements, calculation of draft, twist & production.

**List of Experiments:-**

- 1) Study of passage of material through blow room machines - bale openers, mild opener,
- 2) Study of passage of material through blow room machines intensive opener, cute Feed system.
- 3) Driving arrangement & calculation of Carding machine.
- 4) Driving arrangement & calculation of Draw Frame
- 5) Driving arrangement & calculation of Sliver lap machine.
- 6) Driving arrangement & calculation of Ribbon lap machine.
- 7) Driving arrangement & calculation of Comber machine.
- 8) Driving arrangement & calculation of Speed frame.
- 9) Driving arrangement & calculation of Ring frame.
- 10) Spinning of carded yarn
- 11) Spinning of combed yarn. Comparison with carded yarn.
- 12) Mill visit.

**Reference Books:-**

1. 'The Technology of Short Staple Spinning' by W.Klein. The Textile Institute Publication - Short Staple Spinning Series Vo1.1.
2. 'A Practical Guide to Opening and Carding' by W. Klein. The Textile Institute Publication - Short Staple Spinning Series Vo1.2.
3. 'The Characteristics of Raw Cotton' by E. Lord. The Textile Institute Publication Manual of Cotton Spinning Vol.II, Part-I.
4. 'Opening Cleaning and Picking' by Dr.Zoltan S. Szaloki, Institute of Textile Technology, Virginia.
5. 'Cotton Opening and Picking' by G.R. Merrill.
6. 'Blowroom' by BTRA, Sliver Jubilee Monograph series.
7. 'Cotton Ginning' Textile Progress, The Textile Institute Publication.
8. CIRCOT Annual Issue on Cotton Varieties.
9. The technology of short staple spinning - The Textile Institute publication short staple spinning series Vol-I - W. Klein.
10. The practical guide to opening & Carding. The Textile Institute publication short staple spinning series Vol-II - W. Klein.

11. The Practical guide to combing & drafting The Textile Institute publication short staple spinning series Vol-III - W. Klein.
12. Carding by F. Charanlay. The Textile Institute publication Manual of cotton spinning series Vol-III.
13. Drawing, Combing and Roving by Zoltan. S. Szalola The Institute of Textile Technology Virginia.
14. Cotton Drawing & Roving by GR. Merrill.
15. Elements of cotton spinning calculations by Dr. HV.S. Murthy.
16. A Practical guide to Ring Spinning by Vol.-IV by W.Klein, The Textile Institute, Manual of Textile Technology - Short Staple Spinning Series.
17. Carding, draw frame by Prof. A. R. Khare.
18. Ring frame & doubling by Prof. A. R. Khare.

**SECOND YEAR B. TEXT. – SEMESTER – I**

**3.6 FABRIC MANUFACTURE (FT)**

Lectures	:	4 Hours / Week
Practical	:	2 Hours / Week
Theory Paper	:	100 Marks
Term Work	:	50 Marks
Subject Total	:	150 Marks

**1) Winding:**

Constructional details and features of modern winding machines.

**2) Warping:**

Classification, Working of beam and sectional warping machine, Calculations for production and efficiency, Features of modern warping machines.

**3) Sizing-**

Need, size ingredients, Passage of warp through the sizing machine, Calculations for production & efficiency, Features of modern sizing machine.

**4)** Basic concepts and working principles of Dobby looms, Drop box Looms, Jacquard looms - dobby pegging and Card cutting.

**5) Automatic weaving**

Limitations of ordinary looms, Importance of shuttle and cop changing loom, Working and objects of various motions for the same, autoloom fabric defects, causes and remedies.

**6) Non-Woven fabrics** - Types- different methods of production of non woven - needle punched, chemical & thermal bonded - application of non woven fabrics.

**7) Shuttleless Weaving:-**

- 1) Classification of shuttleless weaving machines.
- 2) Projectile weaving machine -Projectile picking motion , picking phases, torsion rod details, Projectile preparation for picking, selvedge motion, Receiving unit , Selvedge weaves, specifications of projectiles & grippers for various



- applications, Sley drive, Multi colour weft insertion, Fabric defects & remedies.
- 3) Principle of rapier weft insertion through various mechanisms such as single rapier, double rapier, rigid and flexible, biphasic & twin rapiers. Rapier heads, weft transfer system rapier drive, Positive and negative rapiers, Sley Reed drive, selvage formation, Multicolour feeding mechanism, Field of application & commercial viability.
  - 4) Study of secondary and auxiliary motions of shuttleless technology

**List of Experiments:-**

- 1) To study the working of modern automatic winding machine.
- 2) To study & operate the sectional warping machines to make the beam.
- 3) To study the working of various dobby looms.
- 4) To study the working of jacquard loom.
- 5) To study the working of drop box loom.
- 6) To study the working of cop and shuttle changing automatic loom.
- 7) General study of projectile machine.
- 8) General study of flexible & rigid Rapier machine. 9) Study of fabric inspection system.
- 9) Visit to auto loom and jacquard unit.
- 10) Visit to projectile unit.
- 11) Visit to Rapier unit.

**Reference Books:-**

1. Principles of Weaving By Marks A.T.C. & Robinson.
2. Weaving machines, Materials & methods By Prof. M.K. Talukdar Prof. D.B. Ajgaonkar and Sriramlu.
3. Modern Preparation & weaving Machines by A. Ormerod.
4. Weaving mechanism by N. N. Bannerjee.
5. Sizing by Prof. D. B. Ajgaonkar, Dr. M. K. Talukdar & V.R. Wadekar
6. Warp Sizing by Paul V. Seydel.
7. Warping and Sizing - BTRA Silver Jubilee Monograph series.
8. Winding & Warping by Dr. M. K. Talukdar.
9. Non-wovens by N. N. Bannerjee.
10. Manual of non Wovens by Dr. Radko Krma.

## 11. Non Woven Bonded Fabric by Lunenscholoss

**SECOND YEAR B. TEXT. – SEMESTER – II****4.1 THERMAL AND AIR ENGINEERING (TT/MMTT/TPE/TC)**

Lectures	:	3 Hours / Week
Theory Paper	:	100 Marks
Subject Total	:	100 Marks

1. Introduction – Laws of Thermodynamics – Zeroth Law, First Law, Second law of Thermodynamics. Thermodynamic Processes – constant volume, constant pressure, constant temperature, adiabatic, polytropic & throttling process with P-V & T-S diagrams and numericals..
2. Air Standard Cycle – Introduction, Assumptions in thermodynamic cycles, Important terms used in thermodynamic cycles, efficiency of a cycle, representation of Carnot cycle, Otto cycle, Diesel cycle, on P-V and T-S diagram and numericals.
3. Properties of Steam – Formation of steam at constant pressure – Enthalpy, Enthalpy of water, Enthalpy of evaporation, Enthalpy of dry saturated steam, Wet steam, Superheated steam, Specific volume of steam, Steam table, External work done during evaporation, Internal energy of steam, difference between Gas & Vapour.  
Use of steam in textiles – Sizing, Wet processing and numericals based on properties of steam.
4. Steam Boilers – Introduction, Classification of boilers, Study & construction of fire tube boilers such as Cochran boiler, Lancashire boiler, Study & construction of water tube boiler such as Babcock & Wilcox boiler, equivalent evaporation, efficiency of boiler & numericals.
5. Study of boiler mountings & accessories – Safety valve – Dead weight safety valve, Lever safety valve, Spring loaded safety valve, Combined high pressure steam & low water safety valves, Water level indicator, Fusible plug,

- Steam pressure gauge, Feed check valve, Stop valve, Blow off cock, Accessories – Feed water pump, Injector, Economizer, Superheater.
6. Thermic Fluid Heating System – Introduction, Thermic heating system, Expansion & Deviation, Selection of Tanks, Requirements of Fluids, Deterioration of fluid, Consequences, Cleaning of the system, Application in Textile industry.
  7. Refrigeration – Units of refrigeration, C.O.P., Difference between heat engine, Refrigerator, heat pump. Air refrigerator working on reversed Carnot cycle on P-V & T-S diagram, expression for C.O.P.
  8. Air Conditioning – Introduction to air conditioning, psychrometric terms, Dalton's law of partial pressure, Psychrometric relations, Enthalpy of moist air, Thermodynamic wet bulb temperature, Psychrometric chart, Psychrometric processes, - Sensible heating & cooling, bypass factor of heating & cooling coil, Humidification & dehumidification, methods of humidification in textile industry, methods of dehumidification, sensible heat factor, cooling & dehumidification, cooling with adiabatic humidification by steam injection, Adiabatic chemical dehumidification, Adiabatic mixing of two air streams, Object of a/c & proper humidification in textile mills, Effect of moisture on textile fibres, Sling psychrometer, Humidistat.
  9. Compressor – Classification, Reciprocating, Rotary vane compressor, Screw compressor, Centrifugal compressor, Axial flow compressor. Pumps – Reciprocating, Centrifugal (working and principle only).
  10. Introduction to Pneumatics –
    - (a) Pneumatic Circuits – Symbols of cylinder, control valves, check valves.
    - (b) Air treatment – Symbols for Air filter, Refrigerated dryer, Lubricators.
    - (c) Control valves – Symbols for Poppet valve, Pilot operated check valve and spool valve.
    - (d) Application of Pneumatic circuits in Textile machines.



**Reference Books:-**

1. A Textbook of Engineering Thermodynamics by R.K. Rajput.
2. Thermal Engineering by R.S.Khurmi & Gupta.
3. Elements of Heat Engines (Vol. I & II) by Patel, Karamchandani.
4. A course in Refrigeration & Air conditioning by Arora & Domkundwar.
5. Pneumatic Systems by Majumdar.
6. Hydraulics & Pneumatics by Andrew & Parr.
7. Humidification & Air conditioning by S. P. Patel.
8. Textile Humidification by K. G. Vaze.

**SECOND YEAR B. TEXT. – SEMESTER – II****4.2 TEXTILE MATHEMATICS-IV (TT/MMTT/TPE/TC/FT)**

Lectures	:	3 Hours / Week
Theory Paper	:	100 Marks
Subject Total	:	100 Marks

**1. Laplace Transforms: -**

Definition, transforms of standard functions, transforms of derivatives, and integrals. Inverse Laplace transforms by partial fraction and convolution method. (6)

**2. Applications of Laplace Transforms for solving L.D. equations:-**

Method of solving L. D. equations with initial conditions (Boundary Values) with the help of Laplace Transforms. (3)

**3. Vector differentiation:-**

Differentiation of vector valued function of scalar 't', gradient, divergence, curl, directional derivative. Solenoidal and irrotational vector fields. (5)

**4. Fourier Series:-**

Definition, Euler,s formulae, Conditions for fourier expansions. Full range fourier series and half range expansions and their examples. (6)

**5. Analysis of Multivariate Data:-**

Multiple and Partial correlation coefficients. Plane of regressions. (4)

**6. Analysis of Variances:-**

Introduction, One-way Classification, Two-way Classification with and without repetition. (5)

**7. Design of Experiments:-**

Introduction, Basic principles, Basic Designs (CRD, RBD & LSD). (7)

**8. Factorial Experiments:-**

Introduction & types,  $2^n$  factorial experiments,  $2^2$  &  $2^3$  factorial experiments. (4)

**Reference Books:-**

1. A Text Book of Applied Mathematics : by J.N. & P.N. Wattikar.
2. Higher Engineering Mathematics : by B.S. Grewal.
3. A Text Book on Engineering Mathematics :by Bali, Saxena & Iyengar.
4. Mathematical Statistics : by J.Fruend.
5. Applied Statistics & Probability of Engineers : by Montgomeri & Runger
6. Probability & Statistics for Engineers : by Johnson.
7. Design and Analysis of Experiments : by Montgomeri.
8. A Text Book of Engineering Mechanics : by R.S. Kurmi.

**SECOND YEAR B. TEXT. – SEMESTER – II****4.3 PHYSICAL PROPERTIES OF YARNS AND FABRICS (TT)**

Lectures	:	3 Hours / Week
Practical	:	2 Hours / Week
Theory Paper	:	100 Marks
Practical Exam	:	50 Marks
Term Work	:	25 Marks
Subject Total	:	175 Marks

**1. Yarn Number -**

Concept, Direct and indirect systems of yarn numbering, Measurement of yarn number: Knowles Balance, Stubbs Balance, Beesley Balance, Quadrant Balance, Analytical Balance, Yarn count and yarn diameter.

**2. Twist and Twist Measurement -**

Concept, Twist direction, Amount of twist, Twist multiplier/Factor, Function of twist in yarn structure, Twist and yarn strength, Effect of twist in yarn on fabric properties, Measurement of twist in single and double yarns – Straightened fibre method, Twist contraction method, twist to break test, Twist measurement by optical method.

**3. Evenness of Yarn** – Classification of variation, Expression of irregularity, Basic irregularity, index of irregularity. Addition of irregularities, Measurement of yarn irregularities, visual examination, cutting & weighing method, electronic capacitance principle, variation of thickness under compression, photoelectric testers, Analysis of irregularity –  $V_L$  –  $B_L$  curves, spectrogram analysis, correlogram, causes of irregularity, interpretation of results of irregularity tests, effect of irregularity on the fabric behaviour. Imperfections & classimat faults, principle & working of uster classimat, Analysis of classimat faults.

**4. Hairiness in spun yarn** - Concept, causes, reduction & measurement of Hairiness.



**5. Yarn Strength –**

Introduction, terminologies

a) Single thread strength - The effect of fibre properties on the yarn strength, factors affecting the tensile properties of textiles. Different principles of tensile testing of yarns – The pendulum lever principle, the inclined plane principle, and the strain gauge transducer principle

b) Lea Strength - The lea CSP or Break factor & its significance – Description of lea strength tester, comparison of lea & single thread test results, ballistic test & its importance.

**6. Sampling of Fabrics.**

**7. Dimensional characteristics** - Length, width & thickness and their measurement, importance of thickness.

**8. Threads/Unit length** – EPI and PPI, count warp count, weft count, weight of fabric – weight per unit length, weight per unit area, warp & weft crimp, effect of crimp on the fabric properties, Measurement of crimp, fabric cover – cover factor.

**9. Fabric Strength** – Importance of fabric strength testing, Tensile strength testing – cut strip method, Grab test method, comparison between strip test & grab test, Tear strength test, Ballistic test, Bursting test

**10. Fabric abrasion & Handle of fabric** – Concept : - Serviceability, wear, abrasion, Factors affecting abrasion resistance, assessment of abrasion damage, the BFT abrasion testing machine, Martindale abrasion tester.

**11. Pilling of fabrics**

Concept, mechanism of pilling, factors responsible for pilling, effect of pilling, remedies ICI Pill Box Tester.

**12. Fabric Stiffness & Drape**

Concept, Importance of stiffness and Drape, measurement of stiffness: Shirley stiffness tester (cantilever test), Heart loop test, measurement of drape by Drape meter, Factors affecting stiffness and drape

13. **Crease resistance & crease recovery:** Concept, measurement of crease recovery, Factors affecting crease recovery
14. **Air permeability**– Concept, Importance, air permeability, air resistance, air porosity, SHIRLEY air permeability tester, Factors affecting air permeability
15. **Water fabric relations:** Concept, Importance, water proofing & water repellency, mechanics of wetting, wetting time test, spray test, Drop penetration test, Bundesmann test, Water head test.

**List of Experiments:-**

1. Determination of linear density
2. Twist in single and double yarn
3. Single yarn strength measurement
4. Determination of tenacity strength of yarn
5. Yarn evenness testing on evenness tester
6. Determination ravelled strip strength test
7. Tearing strength of fabric
8. Abrasion resistance of fabric
9. Stiffness of fabrics
10. Crease recovery angle
11. Drape of fabric
12. Fabric pilling (demo)

**Reference Books:-**

1. Principles of Textile Testing by J. E. Booth..
2. Physical properties of Textile Fibre by J. W. S. Hearle & Morton.
3. Textile Testing by Skinkle.
4. Handbook of Indian Standards.
5. Quality control and Testing by V. K. Kothari
6. Textile Testing Vol.I & II by Anagappan & Gopalkrishnan



**SECOND YEAR B. TEXT. – SEMESTER – II**

**4.4 CHEMICAL PROCESSING OF TEXTILES-I (TT/MMTT)**

Lectures	:	3 Hours / Week
Practical	:	2 Hours / Week
Theory Paper	:	100 Marks
Term Work	:	25 Marks
Subject Total	:	125 Marks

**CHAPTER – 1 SIZING**

- Objects of sizing.
- Size paste ingredients & their functions.
- Adhesives and its classification.
- Study of Maize starch, Potato, Thin boiling starches, Starch ethers and Starch esters.
- TKP, LTKP,
- Carboxy methyl cellulose.
- Synthetic adhesive like Polyvinyl alcohol.
- Viscosity, keeping and congealing properties of starch.
- Testing of adhesives.
- Functions of Softeners & Lubricants.
- Testing of softeners.
- Functions of antiseptics, some organic and inorganic antiseptics used in sizing.
- Functions of weighting agents, study of weighting agents like china clay gypsum salt, French chalk & Barium salt.
- Size paste formulation for cotton ( 20<sup>S</sup>, 40<sup>S</sup>,60<sup>S</sup>,100<sup>S</sup>), viscose, P/C, P/V

**CHAPTER – 2 GREY INSPECTION**

- Importance of grey inspection, defect analysis - flow based & point based.
- Four point & ten point system & numerical for acceptance & rejection of fabric.
- Use of different colour tags for different processes & defects.
- Inspection machines for woven & knit goods.

### **CHAPTER – 3 PRETREATMENTS**

- Introduction of pretreatments in wet processing.
- Introduction to shearing and cropping machines. Objects, working principle, types of shearing.
- Objects of singeing.
- Methods of singeing - gas singeing for woven & knitted fabrics
- Introduction to efficiency of singeing
- Evaluation & efficiency of singeing

### **CHAPTER – 4 DESIZING**

- Objects of desizing.
- Mechanism of desizing.
- Inter-relation of desizing with singeing and sizing
- Various methods of desizing: Hydrolytic & oxidative method of desizing.
- Evaluation of efficiency of desizing.

### **CHAPTER – 5 SCOURING**

- Object of scouring.
- Scouring with alkali & solvent assisted desizing.
- Inter-relation between desizing and scouring.
- Study of batch-wise & continuous methods of scouring
- Concept of bio-scouring
- Evaluation of efficiency of scouring

### **CHAPTER – 6 BLEACHING**

- Objects of bleaching.
- Introduction to bleaching agents like sodium hypochlorite ,hydrogen peroxide & per-acetic acid.
- Bleaching of cotton, polyester & its blends.
- Batch-wise & continuous machinery for bleaching
- Bleaching of wool ,silk
- Concept of AOX
- Evaluation of efficiency of bleaching.



## CHAPTER – 7 MERCERIZATION

- Introduction & objects of mercerization
- Effect of mercerization on structure of cellulose.
- Machinery used for yarn, woven and knit fabrics.
- Concept of hot mercerization & liquid ammonia mercerization.
- Testing methods to evaluate efficiency of mercerization like Barium Activity Number, Axial Ratio & Luster index.

### List of Experiments:-

- 1) Identification of adhesives by microscopic method.
- 2) Testing & analysis of adhesive.
- 3) Testing & analysis of purity of softener.
- 4) Estimation of size % in grey fabric.
- 5) Acid and enzymatic desizing of cotton & *PIC* blends.
- 6) Scouring of cotton and *PIC* blend.
- 7) Bleaching of woven & knitted cotton fabrics.
- 8) Determination of mercerization efficiency by BAN method.
- 9) Degumming of silk.
- 10) Scouring & bleaching of wool.
- 11) Determination of whiteness, yellowness of bleached fabric by CCM .
- 12) Formulation of size recipe & testing the performance using single end sizing machines.
- 13) Visit to sizing unit and process house.

### Reference Books:-

1. Sizing by Prof. D. B. Ajgaonkar, Dr. M. K. Talukdar & V. R. Wadekar
2. Chemical technology of fibrous materials by F. Sadov.
3. Chemical processing of polyester / cellulosic blends by R. M. Mittal & S. S. Trivedi.
4. Chemical processing of synthetic blends by K. V. Datye & A. A. Vaidya .
5. Mercerization by J.T. Marsh.
6. Introduction to Textile Bleaching by J. T. Marsh.
7. Bleaching, Dyeing & Chemical technology of textiles fibres by S. R. Trotman.

8. Technology of Bleaching by V. A. Shenai.
9. Wrap Sizing by Paul V. Seydel.
10. Warping & sizing by BTRA Silver Jubilee Monograph Series.
11. Bleaching & mercerizing by BTRA Silver Jubilee Monograph Series.
12. Chemical Technology in the pretreatments of textiles by S. R. Karmarkar
13. Textile sizing by Bhuvanesh C.Goswami.



**SECOND YEAR B. TEXT. – SEMESTER – II**

**4.5 YARN FORMING TECHNOLOGY-III (TT)**

Lectures	:	4 Hours / Week
Practical	:	2 Hours / Week
Theory Paper	:	100 Marks
Practical Exam	:	50 Marks
Term Work	:	25 Marks
Subject Total	:	175 Marks

**1 . COMBER:-**

**COMBER PREPARATORY:**

- A. Requirements of good lap – importance of number of passages, importance of good lap, linear density of lap, etc.
- B. Methods of comber lap preparation – Different sequences of comber lap preparation, study of sliver lap machine, ribbon lap machine, unilap machine. Developments in combing preparatory machines.
- C. Maintenance & Assessment of combing preparatory machines.

**COMBING :**

- A. Objects of combing process. Study of combing cycle.
- B. Constructional details of Comber- feeding, nipper assembly, cylinder and detaching rollers, cylinder needles, web and sliver transport, drafting and coiling at comber.
- C. Semi combing, normal combing, super combing and double combing. Forward and backward combing.
- D. Maintenance of comber. Index Cycle, Comber Settings.
- E. Assessment of performance of comber – Norms for production, speed. Combing efficiency, Fractionating efficiency of comber. Influence of combing operation on quality.
- F. Automatic and centralized noil extraction. Automatic materials handling. Stop motions in comber.
- G. Technical specifications of modern combers available in the world market.
- H. Role of utilities on modern comber



## **2 . SPEEDFRAME :-**

- A. Objects of speed frame. Concept of drafting, twisting and winding process.
- B. Constructional aspects of Speedframe – Creel, Top arm apron drafting system, Spindle & Flyer assembly, Bobbin building at speed frame, stop motions.
- C. Study of mechanisms like – differential motion, swing motion, building mechanism, semi-automatic and automatic doffing, etc.
- D. Assessment of performance of Speedframe - Productivity and Quality norms of speed frame, Zero break concept, block creeling.
- E. Materials handling. Transport of bobbins to ring spinning machines.
- F. Maintenance of speed frame.
- G. Features of modern speed-frame machines available in the market.
- H. Role of utilities on modern speed frame

### **List of Experiments:-**

- 1. Driving arrangement & calculations of Sliver lap machine. Roller settings in Sliver lap machine.
- 2. Driving arrangement & calculations of Ribbon lap machine. Roller settings in Ribbon lap machine.
- 3. Study of constructional aspects, combing cycle & index chart of modern comber.
- 4. Driving arrangement & calculations in modern comber.
- 5. Comber setting.
- 6. Driving arrangement & calculations related to production, constants, draft twist etc. of modern speed frame.
- 7. Study of coils per inch of speed frame & differential gearing.
- 8. Study of building mechanism of speed frame.
- 9. Mill visit to study modern Comber, Speed frame.
- 10. To study the utilities required for Comber preparatory, Comber, Speed frame

**Reference Books:-**

1. The Textile Institute Publication –Manual of Textile Technology-Short Staple Spinning Series Vol I to V by W. Klein Vol III-A Practical training guide to Combing & Drawing by W.Klein
2. Practical guide to combing by W.Klein, Textile Institute publication Vol.3
3. Fundamentals of Spun Yarn Technology, By Carl Lawrence.
4. Essential calculations of practical cotton spinning by T.K.Pattabhiraman
5. Technology of cotton spinning by J.Janakiram.
6. Drawing, Combing and roving and speed frame by Zoltan, S.Szaloky, The Institute of Textile Technology, Virginia
7. Draw frame, combing and speed frame by J.H.Black; The Textile Institute publication, Manual of cotton spinning Vol-Iv part II.
8. Combing by Moor.
9. Spun Yarn Technology by Eric Oxtoby.
10. Elements of combing by A.R.Khare.
11. Cotton Drawing and Roving by G.R.Merril.
12. Manual of cotton spinning series, vol3, part 2 by J.Black et al Textile Institute Publication.

**SECOND YEAR B. TEXT. – SEMESTER – II**

**4.6 FABRIC FORMING TECHNOLOGY-III (TT)**

Lectures	:	4 Hours / Week
Practical	:	2 Hours / Week
Theory Paper	:	100 Marks
Practical Exam	:	50 Marks
Term Work	:	25 Marks
Subject Total	:	175 Marks

- 1) SIZING:-** Study of modern sizing machine element.
1. Creel - construction, braking arrangement & positive drive.
  2. Size Box - various size boxes, 1 nip 1 dip, 2 nip 2 dip, dressing rollers, Zell, Sucker, West point, Benninger, Tsudakoma size box constructions various roller constructional details.
  3. Drying Cylinders - Heating arrangement, coating ,temperature & its control, pressure of steam, thermal performance of drying cylinders, steam traps & its types & importance.
  4. Head Stock - Dry splitting, measuring motion, drag roller, comb & drive to weavers beam, pressuring device.
  5. Control Systems- Importance, consequences of moisture, temperature, size level, on line size percentage, Stretch control systems.
  6. Factors affecting size pick up & size add-on, migration.
  7. Assessment of sizing performance - laboratory & practical methods.
  8. Concept of single end sizing & various methods.
  9. Concept of dyeing cum sizing.
  10. Automation and MIS on modern machines.
  11. Concept of recycling of sizes.
  12. Calculations - Related to size concentration, size pick up, stretch, drying, count of warp production etc.
- 2) FABRIC STRUCTURE:-**
- a) Study of following weave on weave characteristics & weaving requirements.
    - 1) Warp pile - wire method, face to face weaving & terry pile.

- 2) Introduction to tufted carpets.
  - 3) Weft pile - velveteens & velours
  - b) Fabric Engineering:-
    1. Peirce's yarn diameter formula & its limitations.
    2. Fabrics cover & crimp factors.
    3. Cloth geometric of plain, twill and combination weave.
    4. Concept of Tightness factor.
    5. Practical application of cloth geometry & cover factor.
  - c) Construction & Development of Jacquard Designs:-
    1. Elements of Jacquards shedding - Double lift, Jacquard with single & double cylinder working, Jacquard sizes, Harness tie, Harness drawing - in, card cutting & card lacing.
    2. Harness & design calculation - Setting of harness, number of harness cords to each hook, casting out, size of repeat, count of design paper.
    3. Development of Jacquard Designs - Construction of square paper designs, Process of drafting a sketch design, drafting designs from woven fabrics.
    4. Development of figures - Prevention of long floats, bold & flat development, Development of large figures, use of warp & weft float, figure shading.
    5. Insertion of ground weavers.
    6. Factors influence woven designs.
- 3) SHUTTLELESS WEAVING:-**
- a) Limitations of shuttle loom with respect to weaving process, engineering aspects & environmental aspects.
  - b) Classification of shuttle less weaving machines.
  - c) Projectile weaving machine - History of shuttle less weaving machine; Projectile machine models TW-II To P7300 ; Machine drive, various motions timing, shedding Cam motion, Beat-up motion, limitations of shuttle loom picking motion; Projectile picking concept, picking motion, picking phases, Projectile acceleration & retardation, torsion rod details, Projectile preparation for picking, selvedge motion, Receiving unit, Selvedge weaves, Let-off motion (Mechanical & power), Take-up motion,

their advantages in relation to shuttle loom motions, specifications of projectiles & grippers for various applications, Machine speed, timings, power specifications for various widths, all auxiliary motions such as brake, clutch, oiling, cleaning, MIS, General electronic circuit, pick finding, Multi colour weft insertion, weft stop, warp stop, whip roller, weft brake etc. Fabric defects & remedies

d) Ravier Weaving Machine -

Various ravier weaving machines such as Picanol, Smit, Somet, Vamatex, Dornier, Sulzer, Panther etc. Various machine models available of above make & their brief history.

Study of weft velocity curves for looms with different methods of weft insertion. Concept of Dewas & Gabler ravier systems, their comparison with other weft insertion systems from weft acceleration & retardation point. Study of effect of reed width on loom speed Principles of different single & double ravier weft insertion systems (Drive), their comparison. Study of ravier heads.

Smit ravier machine models, machine drive, Timings of various motions, cam shedding & beat up motion, Ravier motion drive details, Details of ravier tape, head, sely construction , guiding elements, Gripper openers, cutters, stroke adjustment. Selvedge forming elements & adjustments.

Let-off & take up motion (Mechanical & power), their adjustments for various pick density range, specifications of ravier & head for various applications. Specifications speed, power & machine timing for various widths.

All auxiliary motions such as brake, clutch oiling, cleaning, MIS, General electronic circuit, pick finding, multi colour weft insertion, weft-stop, warp stop, whip roller, weft brake etc.

Fabric defects & remedies, weft waste during selvedge formation.

Detailed study of Dornier ravier weaving machine on above line.

**List of Experiments:-**

- 1) Dismantling and resetting of warp stop motion.
- 2) Study of shuttle change motion and silk loom features.
- 3) Loom operating - starting, stopping, knotting, & drawing -in & study of fabric

defects.

- 4) General study of projectile machine and drive arrangements for various motions.
- 5) General study of flexible Rapier machine & drive arrangements for various motions.
- 6) General study of rigid Rapier machine & drive arrangements for various motions.
- 7) Study of positive cam motions of Sulzer & Ruti-C machine.
- 8) Study of Rotary mechanical & electronic doobby.
- 9) Study of electronic jacquard motion.
- 10) Fabric analysis of advanced structures.
- 11) Fabric analysis of advanced structures.
- 12) Fabric analysis of advanced structures.
- 13) Visit to Jacquard unit.

**Reference Books:-**

- 1) The Technology of Warp Sizing by J.B. Smith.
- 2) Modern Preparation & Weaving by A. Ormerod.
- 3) Textile Maths Vol.III by J.E. Booth
- 4) Principles of weaving by Marks & Robbinson.
- 5) Weaving machines & methods by Dr. Talukdar, Prof. D.B. Ajgaonkar.
- 6) Sizing by Sydel.
- 7) Shuttleless weaving by Svaty.
- 8) Modern Methods of Weaving by Duxburng.
- 9) Hand Book of Weaving - Sulzer Publication.



**SECOND YEAR B. TEXT. – SEMESTER – II**

**4.7 TEXTILE DESIGN AND COLOUR (TT/MMTT/FT)**

Drawing	:	2 Hours / Week
Practical Exam	:	50 Marks
Subject Total	:	50 Marks

**List of Experiments:-**

1. Units developments for textile design.
2. Colour modification chart.
3. Colour theory chart.
4. Textile design development with the help of designing principles.
5. Composition of all over textile design by following bases – (Any two assignments)
  - a. Sq. or Rectangle base
  - b. Drop base – half drop, full drop, 1/3 or 2/3 drop
  - c. Diamond base.
  - d. Ogee base
  - e. Satin base.
6. Development of point paper design for dobby weaving (Any two).
  - a. Extra warp
  - b. Extra weft
  - c. Backed cloth
  - d. Double cloth
7. Development of point paper design for jacquard.
8. Basics of computer aided designing software for dobby.
9. Use of dobby software for designing (Designing different colour patterns, motifs for dobby weaving).
11. Basics of computer aided designing software for jacquard.
12. Use of jacquard software for designing.
13. Designing different motifs, colour pattern for jacquard weaving.

**Reference Books:**

1. Willian Watson “Textile design and colour”: Elementary weaves and figured fabrics.
2. N. Gokarneshan “Fabric structure and design”.

## 3. Doris Goerner “Woven Structures and Design “

**SECOND YEAR B. TEXT. – SEMESTER – II****4.3 MAN MADE FIBRE MANUFACTURE-II (MMTT)**

Lectures	:	3 Hours / Week
Practical	:	2 Hours / Week
Theory Paper	:	100 Marks
Practical Exam	:	50 Marks
Term Work	:	25 Marks
Subject Total	:	175 Marks

**Polyester Fibre:-**

Ploy (ethylene terephthalate fibre) – Overview of the processes to produce polyester staple/ filament yarns. Polymer production, fibre production, structure and properties of polyester fibre. Developments in polyester fibres, polyester fibres other than PET, Polyester micro fibre/ filament yarns, their production, properties and applications. Polyester 3GT fibre-Production, Properties and applications

**Polyamide Fibres:-**

Nylon 6, nylon 6,6 polymer production, production of nylon 6, & 6,6 fibres, structure and properties of nylon 6 and nylon 6,6 fibres. Developments in nylon fibres, Studies of other nylon fibres.

**Polypropylene Fibres:-**

Tacticity of polypropylene, production of polypropylene polymer, production of polypropylene fibres, Effect of pigments on fibre characteristics, problems in the fibre production and possible causes, structure and properties of polypropylene fibres, application areas.

**Acrylic Fibre:-**

Production of PAN polymer for acrylic and modacrylic fibres. Spinning of PAN fibres, structure and properties of PAN fibres, application areas, Developments in acrylic fibres.

**Viscose Fibres:-**

Production of viscose fibres – preparation of spinning solution, spinning of fibres, HWM & LWM fibres, structure and properties of viscose fibres, Developments in viscose fibres.

**Tencel Fibres:-**

Production of Tencel fibre, properties and application of Tencel fibre.

**Acetate Fibres:-**

Production, properties and application of acetate and triacetate fibres.

**Regenerated Protein fibres:-**

Principle of manufacture, casein fibre, vicara fibre, Aradil fibres, General properties of these fibres, application areas.

**Tape yarns:-**

Production, Properties and application areas.

**Elastomeric Fibres:-**

Extensibility and recovery mechanism, fibre production. Properties of elastomeric fibres and application areas.

**List of Experiments:-**

1. Demonstration of high speed draw winder and production of FDY.
2. Production of intermingled yarns using draw winder and study of their characteristics.
3. To determine the density of fibre by using Density Gradient Column.
4. To determine the spin finish of the given sample by cold extraction method.
5. To determine the draw force, and shrinkage force of POY using Dynafil Tester.
6. To determine the crimp contraction force, and shrinkage force of textured yarns using Dynafil tester.
7. Demonstration of air-covering machine and manufacturing of air covered yarns.
8. Effect of process variables of air-covering machine on yarn characteristics

9. Effect of heat-setting temperature on the dimensional stability of filament yarns.
10. Effect of heat setting time on the dimensional stability of filament yarns.
11. Industrial Visit.
12. Industrial Visit

**List of References:-**

1. Manufactured fibre technology – V.B. Gupta and V.K. Kothari.
2. Synthetic fibre production – A.A. Vaidya.
3. Fibre science and technology – S.P. Mishra.
4. Book of papers of NCUTE training programmes on man made fibres.
5. Man-Made fibres – Moncriff.
6. Hand book of fibres – Gorden & Cook.
7. Production and application of poly propylene fibres – O. pagjart B. Reichstadts
8. Textile Fibres-I – V.A. Shenai.

**SECOND YEAR B. TEXT. – SEMESTER – II**

**4.5 MAN MADE STAPLE YARN MANUFACTURE-III (MMTT)**

Lectures	:	4 Hours / Week
Practical	:	2 Hours / Week
Theory Paper	:	100 Marks
Practical Exam	:	50 Marks
Term Work	:	25 Marks
Subject Total	:	175 Marks

**1 . COMBER :-**

**COMBER PREPARATORY:**

- A. Requirements of good lap – importance of number of passages, importance of good lap, linear density of lap, etc.
- B. Methods of comber lap preparation – Different sequences of comber lap preparation, study of sliver lap machine, ribbon lap machine, unilap machine. Developments in combing preparatory machines.
- C. Maintenance & Assessment of combing preparatory machines.

**COMBING :**

- A. Objects of combing process. Study of combing cycle.
- B. Constructional details of Comber- feeding, nipper assembly, cylinder and detaching rollers, cylinder needles, web and sliver transport, drafting and coiling at comber.
- C. Semi combing, normal combing, super combing and double combing. Forward and backward combing.
- D. Maintenance of comber. Index Cycle, Comber Settings.
- E. Assessment of performance of comber – Norms for production, speed. Combing efficiency, Fractionating efficiency of comber. Influence of combing operation on quality.
- F. Automatic and centralized noil extraction. Automatic materials handling. Stop motions in comber.
- G. Technical specifications of modern combers available in the world market.
- H. Utilities for Modern comber

## **2 . SPEEDFRAME:-**

- A. Objects of speed frame. Concept of drafting, twisting and winding process.
- B. Constructional aspects of Speedframe – Creel, Top arm apron drafting system, Spindle & Flyer assembly, Bobbin building at speed frame, stop motions.
- C. Study of mechanisms like – differential motion, swing motion, building mechanism, semi-automatic and automatic doffing, etc.
- D. Assessment of performance of Speedframe - Productivity and Quality norms of speed frame, Zero break concept, block creeling.
- E. Materials handling. Transport of bobbins to ring spinning machines.
- F. Maintenance of speed frame.
- G. Features of modern speed-frame machines available in the market.
- H Utilities for Modern speed frame

### **List of Experiments:-**

- 1) Driving arrangement & calculations of Sliver lap machine. Roller settings in Sliver lap machine.
- 2) Driving arrangement & calculations of Ribbon lap machine. Roller settings in Ribbon lap machine.
- 3) Study of constructional aspects, combing cycle & index chart of modern comber.
- 4) Driving arrangement & calculations in modern comber.
- 5) Driving arrangement & calculations related to production, constants, draft twist etc. of modern speed frame.
- 6) Comber setting.
- 7) Study of coils per inch of speed frame & differential gearing.
- 8) Study of building mechanism of speed frame.
- 9) Mill visit to study modern Comber, Speed frame.
- 10) To study the utilities required for Comber preparatory, Comber, Speed frame
- 11) Assessment of performance of comber preparatory
- 12) Assessment of performance of comber .
- 13) Assessment of performance of Speed frame.

**Reference Books:-**

1. The Textile Institute Publication –Manual of Textile Technology-Short Staple Spinning Series Vol I to V by W. Klein Vol III-A Practical training guide to Combing & Drawing by W. Klein
2. Practical guide to combing by W. Klein, Textile Institute publication Vol.3
3. Fundamentals of Spun Yarn Technology, By Carl Lawrence.
4. Essential calculations of practical cotton spinning by T. K. Pattabhiraman
5. Technology of cotton spinning by J. Janakiram.
6. Drawing, Combing and roving and speed frame by Zoltan, S. Szaloky, The
7. Institute of Textile Technology, Verginia
8. Draw frame, combing and speed frame by J. H. Black; The Textile Institute publication, Manual of cotton spinning Vol-IV part II.
9. Combing by Moor.
10. Spun Yarn Technology by Eric Oxtoby.
11. Elements of combing by A. R. Khare.
12. Cotton Drawing and Roving by G. R. Merril.
13. Manual of cotton spinning series, vol3, part 2 by J. Black et al Textile Institute Publication.

**SECOND YEAR B. TEXT. – SEMESTER – II****4.6 MAN MADE FABRIC MANUFACTURE-III (MMTT)**

Lectures	:	4 Hours / Week
Practical	:	2 Hours / Week
Theory Paper	:	100 Marks
Practical Exam	:	50 Marks
Term Work	:	25 Marks
Subject Total	:	175 Marks

- 1) SIZING:-** Study of modern sizing machine element.
1. Creel - construction, braking arrangement & positive drive.
  2. Size Box - various size boxes, 1 nip 1 dip, 2 nip 2 dip, dressing rollers, Zell, Sucker, West point, Benninger, Tsudakoma size box constructions various roller constructional details.
  3. Drying Cylinders - Heating arrangement, coating ,temperature & its control, pressure of steam, thermal performance of drying cylinders, steam traps & its types & importance.
  4. Head Stock - Dry splitting, measuring motion, drag roller, comb & drive to weavers beam, pressuring device.
  5. Control Systems- Importance, consequences of moisture, temperature, size level, on line size percentage, Stretch control systems.
  6. Factors affecting size pick up & size add-on, migration.
  7. Assessment of sizing performance - laboratory & practical methods.
  8. Concept of single end sizing & various methods.
  9. Concept of dyeing cum sizing.
  10. Automation and MIS on modern machines.
  11. Concept of recycling of sizes.
  12. Calculations - Related to size concentration, size pick up, stretch, drying, count of warp production etc.
- 2) FABRIC STRUCTURE:-**
- a) Study of following weave on weave characteristics & weaving requirements.
    - 1) Warp pile - wire method, face to face weaving & terry pile.



- 2) Introduction to tufted carpets.
  - 3) Weft pile - velveteens & velours
  - b) Fabric Engineering:-
    - 1) Peirce's yarn diameter formula & its limitations.
    - 2) Fabrics cover & crimp factors.
    - 3) Cloth geometric of plain, twill and combination weave.
    - 4) Concept of Tightness factor.
    - 5) Practical application of cloth geometry & cover factor.
  - c) Construction & Development of Jacquard Designs:-
    - 1) Elements of Jacquards shedding - Double lift, Jacquard with single & double cylinder working, Jacquard sizes, Harness tie, Harness drawing - in, card cutting & card lacing.
    - 2) Harness & design calculation - Setting of harness, number of harness cords to each hook, casting out, size of repeat, count of design paper.
    - 3) Development of Jacquard Designs - Construction of square paper designs, Process of drafting a sketch design, drafting designs from woven fabrics.
    - 4) Development of figures - Prevention of long floats, bold & flat development, Development of large figures, use of warp & weft float, figure shading.
    - 5) Insertion of ground weavers.
    - 6) Factors influence woven designs.
- 3) SHUTTLELESS WEAVING:-**
- a) Limitations of shuttle loom with respect to weaving process, engineering aspects & environmental aspects.
  - b) Classification of shuttle less weaving machines.
  - c) Projectile weaving machine - History of shuttle less weaving machine; Projectile machine models TW-II To P7300 ; Machine drive, various motions timing, shedding Cam motion, Beat-up motion, limitations of shuttle loom picking motion; Projectile picking concept, picking motion, picking phases, Projectile acceleration & retardation, torsion rod details, Projectile preparation for picking, selvedge motion, Receiving unit, Selvedge weaves, Let-off motion (Mechanical & power), Take-up

motion, their advantages in relation to shuttle loom motions, specifications of projectiles & grippers for various applications, Machine speed, timings, power specifications for various widths, all auxiliary motions such as brake, clutch, oiling, cleaning, MIS, General electronic circuit, pick finding, Multi colour weft insertion, weft stop, warp stop, whip roller, weft brake etc. Fabric defects & remedies

e) Ravier Weaving Machine -

Various ravier weaving machines such as Picanol, Smit, Somet, Vamatex, Dornier, Sulzer, Panther etc. Various machine models available of above make & their brief history.

Study of weft velocity curves for looms with different methods of weft insertion. Concept of Dewas & Gabler ravier systems, their comparison with other weft insertion systems from weft acceleration & retardation point. Study of effect of reed width on loom speed Principles of different single & double ravier weft insertion systems (Drive), their comparison. Study of ravier heads.

Smit ravier machine models, machine drive, Timings of various motions, cam shedding & beat up motion, Ravier motion drive details, Details of ravier tape, head, sely construction, guiding elements, Gripper openers, cutters, stroke adjustment. Selvedge forming elements & adjustments.

Let-off & take up motion (Mechanical & power), their adjustments for various pick density range, specifications of ravier & head for various applications. Specifications speed, power & machine timing for various widths.

All auxiliary motions such as brake, clutch oiling, cleaning, MIS, General electronic circuit, pick finding, multi colour weft insertion, weft-stop, warp stop, whip roller, weft brake etc.

Fabric defects & remedies, weft waste during selvedge formation.

Detailed study of Dornier ravier weaving machine on above line.

**List of Experiments:-**

1. Dismantling and resetting of warp stop motion.
2. Study of shuttle change motion and silk loom features.
3. Loom operating - starting, stopping, knotting, & drawing -in & study of fabric

- defects.
4. General study of projectile machine and drive arrangements for various motions.
  5. General study of flexible Rapier machine & drive arrangements for various motions.
  6. General study of rigid Rapier machine & drive arrangements for various motions.
  7. Study of positive cam motions of Sulzer & Ruti-C machine.
  8. Study of Rotary mechanical & electronic doobby.
  9. Study of electronic jacquard motion.
  10. Fabric analysis of advanced structures.
  11. Fabric analysis of advanced structures.
  12. Fabric analysis of advanced structures.
  13. Visit to Jacquard unit.

**Reference Books:-**

1. The Technology of Warp Sizing by J.B. Smith.
2. Modern Preparation & Weaving by A. Ormerod.
3. Textile Maths Vol.III by J.E. Booth
4. Principles of weaving by Marks & Robbinson.
5. Weaving machines & methods by Dr. Talukdar, Prof. D.B. Ajgaonkar.
6. Sizing by Sydel.
7. Shuttleless weaving by Svaty.
8. Modern Methods of Weaving by Duxburng.

**SECOND YEAR B. TEXT. – SEMESTER – II****4.3 ELECTRICAL TECHNOLOGY (TPE)**

Lectures	:	3 Hours / Week
Practical	:	2 Hours / Week
Theory Paper	:	100 Marks
Practical Exam	:	25 Marks
Term Work	:	25 Marks
Subject Total	:	150 Marks

**1. D.C. MOTORS:**

Principle, working, types, performance, characteristics and applications, speed control methods. Starters. Modern methods of speed control using thyristor, [Torque calculation and simple numerical based on speed control methods].

**2. A.C MOTORS:**

Three induction motors, principle, working , types, performance, characteristics, efficiency, modern methods of speed control using Electronics devices like thyristor invertors. Modern methods of starting of A.C. motors.

Selection & study of motors for various textile machineries like let off motor, take off motor, accumulator motor, main motor. Motors in humidification plant. Energy efficient motors (EEM) and ISI standards for motors used in Textile industries, possible faults in Textile motors and remedies.

**3. SERVO MOTORS:**

Construction, principle, working, types, applications of A.C. /D.C. servo motors, stepper motors.

**4. POWER QUALITY & POWER FACTOR IMPROVEMENT:**

Concept of power quality, harmonics & methods of harmonics elimination, Concept of power triangle, active power, apparent and reactive power, various modern methods of improving power factor and its importance in industries,

APFC panel (mathematical treatment is necessary for power factor improvement), disadvantages & advantages of P.F. improvement.

#### **5. TARIFF & ENERGY AUDITING:**

Different types of tariffs, load Management, concept of Energy Auditing in textile industry, Measurement of active power using two wattmeter method. Simple problems based on two wattmeter method, calculation of electricity bill of different textile mills and industries. [Simple problems on two-part tariff.]

#### **6. SUBSTATION & ITS COMPONENTS:**

Fuses, Relays, Circuit breakers, ratings of circuit breaker, Substation & different components of substation.

#### **7. Renewable Energy Sources:**

Concept of renewable energy sources, types of energy resources like solar energy & solar cell, wind energy, tidal energy, ocean thermal energy, geothermal energy, photovoltaic, biomass. Concept of co-generation plant.

#### **List of Experiments: (Any eight)**

- 1) Speed control of D.C. Shunt motor by flux control method.
- 2) Speed control of D.C. Shunt motor by Armature voltage control method.
- 3) Load test on D.C. Shunt motor.
- 4) Reversal of D.C. Shunt motors
- 5) Study of starter for D.C. motors.
- 6) Reversal of three phase A.C. induction motors
- 7) Speed control of three phase of induction motors by voltage control method.
- 8) Speed control of three phase of induction motors by pole changing method.
- 9) Measurement of three-phase power by two-watt meter method.
- 10) Load test on three phase induction motors
- 11) Study of stepper motors.
- 12) Study of starter for three phase induction motors.

#### **Reference Books:-**

1. Electrical Technology- by Prof. B.L. Theraja.
2. Electrical Technology- by Prof.H. Cotton

3. A.C Machines – by Prof. M.G. Say
4. Electrical Measurement and Instrumentation by Prof. A.K, Sawhny
5. Electrical Power Systems by Prof. S.L Uppal.
6. Switch Gear and Protection by Prof. S.Rao.
7. Modern Electric Traction System by Prof. H. Pratap.
8. A first course in Electrical drive –by- Prof.F.K.Pillai
9. Modern Industrial Electronics by Prof T.J. Maloney
- 10 Utility Engineering in Textile -(UET)Research Paper
- 11 Electrical Technology by Prof,U.A Bakshi.---- Text Book

**SECOND YEAR B. TEXT. – SEMESTER – II**

**4.4 PHYSICAL PROPERTIES OF TEXTILES (TPE)**

Lectures	:	3 Hours / Week
Practical	:	2 Hours / Week
Theory Paper	:	100 Marks
Practical Exam	:	25 Marks
Term Work	:	25 Marks
Subject Total	:	150 Marks

**INTRODUCTION TO TESTING: Objectives of testing**

**A) FIBRE TESTING:-**

**1) Fibre Length**

Technical significance, fibre length measurement - comb sorter, fibro graph.

**2) Fibre Fineness**

Terms & definitions, technical significance of fibre fineness, measurement of fineness, - Gravimetric method, Airflow method – Micronaire Instrument .

**3) Maturity of Cotton**

Technical significance, measurement of maturity – Microscopic method, polarized light method

**4) Study of Modern Fibre Testing Instruments like HVI & AFIS.**

**B) YARN TESTING:-**

**1) Twist & Twist Measurement**

Definition, Twist direction, amount of twist, TM / TF, twist & yarn strength, measurement of twist in single & double yarn – Twist contraction method, Take Up Twist Tester.

**2) Yarn Evenness**

Importance, classification of variation, causes of irregularity, Measurement of yarn irregularities – cutting & weighting method, Evenness tester – Uster

Tester, Analysis of spectrogram, Comparison between imperfection and classimat faults.

**C) FABRIC TESTING:-**

- 1) Air permeability: – Concept, measurement & factors affecting air permeability.
- 2) Water permeability: – Concept, terms measurement:- wetting time test, spray test, drop penetration test, bundesmann tester, static head test.
- 3) Fabric stiffness & Drape: – Concept, Shirley stiffness tester, Drapemeter.
- 4) Crease resistance & Crease recovery: -measurement of crease recovery.
- 5) Serviceability, wear & abrasion resistance :- Concept - Serviceability, wear & abrasion, testing of Abrasion Resistance - Martindale Abrasion tester.
- 6) Pilling of fabric – Importance, testing of pilling properties of fabric.

**D) TENSILE STRENGTH TESTING OF TEXTILE MATERIALS**

**1) Tensile Strength**

Introduction, terminology, stress strain curve, factors affecting tensile properties.

**2) Measurement of Fibre Strength**

Single fibre strength - Instron, Bundle Strength-Stelometer

**3) Measurement of Yarn Strength**

Pendulum lever principle: single thread strength tester, lea strength tester, strain gauze transducer principle : Instron Tester, Ballistic Tester.

**4) Measurement of Fabric strength**

Cut strip test, Raveled strip test, Grab test, tearing strength testing, Ballistic strength testing, bursting strength testing.

**List of Experiments:-**

1. Comb Sorter method for estimation of fibre length parameters
2. Determination of fibre fineness by air flow method
3. Determination Fibre Length & Nep On AFIS



4. Study of fibre parameters on HFT-9000
5. Determination of twist in single & double Yarn.
6. Study of yarn evenness.
7. Mill Visit : Yarn Evenness and analysis of Spectrogram Testing
8. Determination of Single yarn strength
9. Determination of Lea strength
10. Fabric strip Strength Test
11. Fabric Tearing Strength
12. Fabric Abrasion
13. Fabric Stiffness

**Reference Books:-**

1. Physical Testing of Textiles by J.E. Booth.
2. Manuals of HVI, AFIS
3. Textile Testing by Skinkle.
4. Handbook of Indian Standards.
5. Physical properties of Textile Fibre by J.W.S. Hearle & Morton.
6. Quality control and Testing by V.K.Kothari
7. Textile Testing by Angappan & Gopalkrishnan.

**SECOND YEAR B. TEXT. – SEMESTER – II**

**4.5 YARN MANUFACTURING MACHINERY-III (TPE)**

Lectures	:	4 Hours / Week
Practical	:	2 Hours / Week
Theory Paper	:	100 Marks
Practical Exam	:	50 Marks
Term Work	:	25 Marks
Subject Total	:	175 Marks

**1 . COMBER :-**

**COMBER PREPARATORY:**

- A. Requirements of good lap – importance of number of passages, importance of good lap, linear density of lap, etc.
- B. Methods of comber lap preparation – Different sequences of comber lap preparation, study of sliver lap machine, ribbon lap machine, unilap machine. Developments in combing preparatory machines.
- C. Maintenance & Assessment of combing preparatory machines.

**COMBING:**

- A. Objects of combing process. Study of combing cycle.
- B. Constructional details of Comber- feeding, nipper assembly, cylinder and detaching rollers, cylinder needles, web and sliver transport, drafting and coiling at comber.
- C. Semi combing, normal combing, super combing and double combing. Forward and backward combing.
- D. Maintenance of comber. Index Cycle, Comber Settings.
- E. Assessment of performance of comber – Norms for production, speed. Combing efficiency, Fractionating efficiency of comber. Influence of combing operation on quality.
- F. Automatic and centralized noil extraction. Automatic materials handling. Stop motions in comber.
- G. Technical specifications of modern combers available in the world market.



## **2 . SPEEDFRAME :-**

- A. Objects of speed frame. Concept of drafting, twisting and winding process.
- B. Constructional aspects of Speedframe – Creel, Top arm apron drafting system, Spindle & Flyer assembly, Bobbin building at speed frame, stop motions.
- C. Study of mechanisms like – differential motion, swing motion, building mechanism, semi-automatic and automatic doffing, etc.
- D. Assessment of performance of Speedframe - Productivity and Quality norms of speed frame, Zero break concept, block creeling.
- E. Materials handling. Transport of bobbins to ring spinning machines.
- F. Maintenance of speed frame.
- G. Features of modern speed-frame machines available in the market.

### **List of Experiments:-**

- 1. Driving arrangement & calculations of Sliver lap machine. Roller settings in Sliver lap machine.
- 2. Driving arrangement & calculations of Ribbon lap machine. Roller settings in Ribbon lap machine.
- 3. Study of constructional aspects, combing cycle & index chart of modern comber.
- 4. Driving arrangement & calculations in modern comber.
- 5. Comber setting.
- 6. Driving arrangement & calculations related to production, constants, draft twist etc. of modern speed frame.
- 7. Study of coils per inch of speed frame & differential gearing.
- 8. Study of building mechanism of speed frame.
- 9. Mill visit to study modern Comber, Speed frame.
- 10. To study the utilities required for Comber preparatory, Comber, Speed frame

### **Reference Books:-**

- 1. The Textile Institute Publication –Manual of Textile Technology-Short Staple Spinning Series Vol I to V by W. Klein Vol III-A Practical training guide to Combing & Drawing by W.Klein

2. Practical guide to combing by W.Klein, Textile Institute publication  
Vol.3
3. Fundamentals of Spun Yarn Technology, By Carl Lawrence.
4. Essential calculations of practical cotton spinning by  
T.K.Pattabhiraman
5. Technology of cotton spinning by J.Janakiram.
6. Drawing, Combing and roving and speed frame by Zoltan, S.Szaloky,  
The Institute of Textile Technology, Virginia
7. Draw frame, combing and speed frame by J.H.Black; The Textile  
Institute publication, Manual of cotton spinning Vol-Iv part II.
8. Combing by Moor.
9. Spun Yarn Technology by Eric Oxtoby.
10. Elements of combing by A.R.Khare.
11. Cotton Drawing and Roving by G.R.Merril.
12. Manual of cotton spinning series, vol3, part 2 by J.Black et al Textile  
Institute Publication.

**SECOND YEAR B. TEXT. – SEMESTER – II****4.6 FABRIC MANUFACTURING MACHINERY-III (TPE)**

Lectures	:	4 Hours / Week
Practical	:	2 Hours / Week
Theory Paper	:	100 Marks
Practical Exam	:	50 Marks
Term Work	:	25 Marks
Subject Total	:	175 Marks

- 1) **SIZING:-** Study of modern sizing machine element.
  - 1) Creel - construction, braking arrangement & positive drive.
  - 2) Size Box - various size boxes, 1 nip 1 dip, 2 nip 2 dip, dressing rollers, Zell, Sucker, West point, Benninger, Tsudakoma size box constructions various roller constructional details.
  - 3) Drying Cylinders - Heating arrangement, coating, temperature & its control, pressure of steam, thermal performance of drying cylinders, steam traps & its types & importance.
  - 4) Head Stock - Dry splitting, measuring motion, drag roller, comb & drive to weavers beam, pressuring device.
  - 5) Control Systems- Importance, consequences of moisture, temperature, size level, on line size percentage, Stretch control systems.
  - 6) Factors affecting size pick up & size add-on, migration.
  - 7) Assessment of sizing performance - laboratory & practical methods.
  - 8) Concept of single end sizing & various methods.
  - 9) Concept of dyeing cum sizing.
  - 10) Automation and MIS on modern machines.
  - 11) Concept of recycling of sizes.
  - 12) Calculations - Related to size concentration, size pick up, stretch, drying, count of warp production etc.
  
- 2) **FABRIC STRUCTURE:-**
  - a) Study of following weave on weave characteristics & weaving requirements.
    - 1) Warp pile - wire method, face to face weaving & terry pile.

- 2) Introduction to tufted carpets.
- 3) Weft pile - velveteens & velours
- b) Fabric Engineering:-
  - 1) Peirce's yarn diameter formula & its limitations.
  - 2) Fabrics cover & crimp factors.
  - 3) Cloth geometric of plain, twill and combination weave.
  - 4) Concept of Tightness factor.
  - 5) Practical application of cloth geometry & cover factor.
- c) Construction & Development of Jacquard Designs:-
  - 1) Elements of Jacquards shedding - Double lift, Jacquard with single & double cylinder working, Jacquard sizes, Harness tie, Harness drawing - in, card cutting & card lacing.
  - 2) Harness & design calculation - Setting of harness, number of harness cords to each hook, casting out, size of repeat, count of design paper.
  - 3) Development of Jacquard Designs - Construction of square paper designs, Process of drafting a sketch design, drafting designs from woven fabrics.
  - 4) Development of figures - Prevention of long floats, bold & flat development, Development of large figures, use of warp & weft float, figure shading.
  - 5) Insertion of ground weavers.
  - 6) Factors influence woven designs.

### 3) **SHUTTLELESS WEAVING:-**

- a) Limitations of shuttle loom with respect to weaving process, engineering aspects & environmental aspects.
- b) Classification of shuttle less weaving machines.
- c) Projectile weaving machine - History of shuttle less weaving machine; Projectile machine models TW-II To P7300 ; Machine drive, various motions timing, shedding Cam motion, Beat-up motion, limitations of shuttle loom picking motion; Projectile picking concept, picking motion, picking phases, Projectile acceleration & retardation, torsion rod details, Projectile preparation for picking, selvedge motion, Receiving unit, Selvedge weaves, Let-off motion (Mechanical & power), Take-up

motion, their advantages in relation to shuttle loom motions, specifications of projectiles & grippers for various applications, Machine speed, timings, power specifications for various widths, all auxiliary motions such as brake, clutch, oiling, cleaning, MIS, General electronic circuit, pick finding, Multi colour weft insertion, weft stop, warp stop, whip roller, weft brake etc. Fabric defects & remedies

d) Ravier Weaving Machine -

Various ravier weaving machines such as Picanol, Smit, Somet, Vamatex, Dornier, Sulzer, Panther etc. Various machine models available of above make & their brief history.

Study of weft velocity curves for looms with different methods of weft insertion. Concept of Dewas & Gabler ravier systems, their comparison with other weft insertion systems from weft acceleration & retardation point. Study of effect of reed width on loom speed Principles of different single & double ravier weft insertion systems (Drive), their comparison. Study of ravier heads.

Smit ravier machine models, machine drive, Timings of various motions, cam shedding & beat up motion, Ravier motion drive details, Details of ravier tape, head, sely construction , guiding elements, Gripper openers, cutters, stroke adjustment. Selvedge forming elements & adjustments.

Let-off & take up motion (Mechanical & power), their adjustments for various pick density range, specifications of ravier & head for various applications. Specifications speed, power & machine timing for various widths.

All auxiliary motions such as brake, clutch oiling, cleaning, MIS, General electronic circuit, pick finding, multi colour weft insertion, weft-stop, warp stop, whip roller, weft brake etc.

Fabric defects & remedies, weft waste during selvedge formation.

Detailed study of Dornier ravier weaving machine on above line.

**List of Experiments:-**

1. Dismantling and resetting of warp stop motion.
2. Study of shuttle change motion and silk loom features.
3. Loom operating - starting, stopping, knotting, & drawing -in & study of fabric



- defects.
4. General study of projectile machine and drive arrangements for various motions.
  5. General study of flexible Rapier machine & drive arrangements for various motions.
  6. General study of rigid Rapier machine & drive arrangements for various motions.
  7. Study of positive cam motions of Sulzer & Ruti-C machine.
  8. Study of Rotary mechanical & electronic dobbie.
  9. Study of electronic jacquard motion.
  10. Fabric analysis of advanced structures.
  11. Fabric analysis of advanced structures.
  12. Fabric analysis of advanced structures.
  13. Visit to Jacquard unit.

**Reference Books:-**

1. The Technology of Warp Sizing by J.B. Smith.
2. Modern Preparation & Weaving by A. Ormerod.
3. Textile Maths Vol.III by J.E. Booth
4. Principles of weaving by Marks & Robinson.
5. Weaving machines & methods by Dr. Talukdar, Prof. D.B. Ajgaonkar.
6. Sizing by Sydel.
7. Shuttleless weaving by Svaty.
8. Modern Methods of Weaving by Duxburng.
9. Hand Book of Weaving - Sulzer Publication.

**SECOND YEAR B. TEXT. – SEMESTER – II**

**4.7 TEXTILE MACHINE DRAWING (TPE)**

Drawing	:	2 Hours / Week
Term Work	:	50 Marks
Subject Total	:	50 Marks

- 1) Study of IS conventions essential for machine drawing.
- 2) Study of electrical, electronic , hydraulic and pneumatic symbols used.
- 3) Drawing sketches of couplings, cotter joint, knuckle joint, pipe joint, bearings, springs, pulleys, gears and gear drives.
- 4) Free hand sketches of
  - a) Primary loom motions
  - b) Gearing plan of spinning machines
  - c) Differential gearing
  - d) Comber index chart
  - e) Detaching roller mechanism
  - f) Drafting system of draw frame
  - g) Coiler drive
- 5) Details and assembly drawings of machines / mechanisms assemblies containing 6-8 components.
- 6) Computer aided drafting used for layout of industrial units.

**TERM WORK**

Eight submission sheets are to be drawn based on above syllabus . Every year two different drawings may be given to students to avoid repeatability.

- 1) One sheet on IS convensions.
- 2) One sheet on free hand sketches of textile mechanism.
- 3) one sheet based on weaving cam design.
- 4) Assembly & details drawing of flanged coupling,bearings, joints( knuckle or cotter joints), pulleys, springs, or gears consisting of 6-8 components.
- 5) Assembly and details drawing of following  
Single plate clutch, tailstock, feed chuck valve, etc.
- 6) Assembly and details of textile mechanism  
Picking shaft assembly , feed roller of carding machine, lap roller drive at comber.
- 7) Sheet representing hydraulic, pneumatic, Electrical , Electronic symbols and

circuits, pipe joints.

- 8) Sheet on machinery and plant layout with help of computer drafting.

**Reference Books:-**

1. M/c Drawing : N.D. Bhatt
2. M/c Drawing : N. Sidheshwar
3. M/c Drawing : V.V. Shastri & P.P. Kanhaiya
4. M/c Drawing : M.B. Shah
5. Hand Book : IS 696, IS 969.
6. Elements of w/s Technology : Hazra Choudhary
7. Machine manuals of textile machines.

**SECOND YEAR B. TEXT. – SEMESTER – II****4.3 CHEMISTRY OF TEXTILE FIBRES-III (TC)**

Lectures	:	3 Hours / Week
Theory Paper	:	100 Marks
Subject Total	:	100 Marks

**CHAPTER-I : Carbon Fibre:-**

Precursors for carbon fibres. Preparation of carbon fibres from polyacrylonitrile. Preparation of carbon fibres from rayon and pitch. Carbon fibres from phenolic precursors. Structure of carbon fibres. Surface properties, mechanical properties and chemical properties of carbon fibre. Various applications of carbon fibres.

**CHAPTER-II : Polyolefin Fibres:-**

Raw materials, manufacturing process, physical and chemical properties of polypropylene and polyethylene. Applications as carpets, slit tape, nonwoven fabrics, apparel, cordage, knitting, biaxially oriented film, unoriented film, injection molded consumer products like appliances, general consumers products, medical applications, rigid packaging, transportation (interior use & exterior use).

**CHAPTER-III : Polybenzimidazol :-**

Introduction, polymer structures, fibre processing, physical and chemical properties. Various applications of polybenzimidazol fibres.

**CHAPTER-IV : High Performance Polyimide Fibre :-**

Introduction, synthesis of aromatic polyimides, manufacture of polyimide fibre. Physical and chemical properties of polyimides. Various applications of polyimide fibres.

**CHAPTER-V : Poly Urethane Fibre :-**

Introduction, raw materials, manufacture, physical and chemical properties, various applications of polyurethane fibres.

**CHAPTER-VI : Fibres from Polybenzoxazoles and Polybenzothiazoles :-**

Introduction, manufacture, morphology and structure, physical and chemical properties. End uses of rigid-rod polymer fibres.

**CHAPTER-VII : Bicomponent Fibre :-**

Introduction, methods of production, composition (sheath/core fibres, Islands-in theera, eitrus, side-by-side microfibrres). Properties and uses.

**CHAPTER-VIII : Kevlar Fibres :-**

Introduction, raw materials, manufacture, structure and morphology. Physical and chemical properties of Kevlar. Various applications of Kevlar fibres.

**CHAPTER-IX : Nomex Fibre :-**

Introduction, polymer preparation, fibre preparation of staple and continuous filament. Typical properties like colour, density, tensile properties, thermal properties, light stability, chemical resistance, flex and abrasion resistance, moisture region. Dimensional stability, Dyeability. Various end uses.

**CHAPTER-X : Bio Fibre :-**

Introduction, raw material, manufacture, physical and chemical properties and end uses. Biodegradability of polylactic acid fibre and bamboo fibre.

**CHAPTER-XI : Optical Fibre :-**

Introduction, raw materials, manufacture, physical and chemical properties and end uses.

**Reference Books:-**

1. High Technology Fibres Vol.-III Part-C, by Menachen Levsin & Jack Preston.
2. High Technology Fibres Vol.-III Part-D, by Menachen Levsin & Jack Preston.
3. High Technology Fibres Vol.-III Part-A, by Menachen Levsin & Jack Preston.
4. Advances in Fibre Science by Dr. S.K. Mukhopadhyay.
5. Carbon Fibres by Jean Baptiste Donnet & Roop Cahnd Bansal.
6. Polypropylene Hand Book By Edward P. Morre, Jr.
7. New Fibres by Philips & Hongu.
8. Carbon Fibres: Formulation, Structure and Properties by Leighton H. Peebles.

9. High Technology Fibres Vol.-III. Part B by Mechan Lewin & Jack Preston.
10. Textile Fibres Vol.-II : Developments & Innovations by Dr.V.K. Kothari.
11. Kevlar Aramid Fibre by H.H. Yang.
12. Manufactured Fibre Technology by Dr.V.B. Gupta & Dr.V.K. Kothari.
13. Handbook of Fiber Chemistry – by Menachem Lewin & M. Pearce.

**SECOND YEAR B. TEXT. – SEMESTER – II**

**4.4 CHEMISTRY OF DYES AND PIGMENTS (TC)**

Lectures	:	4 Hours / Week
Practical	:	3 Hours / Week
Theory Paper	:	100 Marks
Practical Exam	:	50 Marks
Term Work	:	50 Marks
Subject Total	:	200 Marks

**CHAPTER - 1 INTRODUCTION OF DYE**

- Introduction to synthetic dye industry.
- Destructive distillation of coal tar & its products and use of these products in dyestuff manufacturing.
- Importance of intermediates industry in dyestuff manufacturing.

**CHAPTER – 2 CLASSIFICATION OF DYE**

- Definition of dye & pigment.
- Classification of dyes according to the method of application.
- Classification of dyes according to the chemical structure.
- Colour index & its significance.
- Nomenclature of dyestuffs.

**CHAPTER – 3 PIGMENTS**

- Pigments & their classifications based on colour.
- Pigments & their classifications based on chemical structure.

**CHAPTER – 4 ASPECTS OF CHEMICAL STRUCTURE OF DYESTUFF**

- Factors governing absorption of light.
- Relationship between colour & chemical constitution.
- Relationship between chemical structure & substantivity.
- Relationship between chemical structure & fastness properties.

## **CHAPTER – 5: PREPARATION OF DYES BASED ON CHROMOPHORI GROUP**

- Nitro dyes
- Azo dyes
- Stilbene dyes
- DPM and TPM dyes
- Anthraquinone dyes

## **CHAPTER – 6: DEVELOPMENTS IN DYES**

Reactive dyes-

- Chlorine based homofunctional and bifunctional dyes
- Fluorine based dyes

Concept of-

- Fluorescent dyes,
- Thermochromic dyes,
- Photochromic dyes,
- Antimicrobial dyes.
- Antimicrobial pigments,
- Air dyes.

## **CHAPTER – 6: ELEMENTS OF DYEING**

**Concept of-**

% Shade, Affinity and substantivity of dyes, Liquor ratio, pH, Solubility, Dissolution of dyes, Exhausting agents, Retarding agents, Aggregates of dyes, Equilibrium factor, Time of dyeing, Temp. of dyeing, Compatability of dyes in combination shades, % Exhaustion, % Expression.

## **DIRECT DYE**

- Classification & general method of dyeing.
- Fastness properties of direct dyed goods.

## **CHAPTER – 6 : REACTIVE DYE -**

- Classification of dyes and general methods of dyeing.
- Fastness properties of reactive dyed goods.



### **CHAPTER – 7 : VAT DYES**

- Classification vat dyes.
- Various steps involved in vat dyeing.
- Fastness properties of vat dyed goods.

### **CHAPTER – 8: SULPHUR DYE.**

- Classification of sulphur dyes.
- General Method of dyeing.
- Fastness properties

### **CHAPTER – 9: ACID DYE -**

- Classification & mechanism of dyeing of Nylon with acid dye.
- Fastness properties of acid dyed material.

### **CHAPTER –10 : BASIC DYES -**

- General method of Dyeing of acrylics, nylon & cotton with basic dye.
- Fastness properties of basic dyed goods.

### **CHAPTER – 10 : AZOIC COLOURS**

- Mechanism of dyeing wrt preparation of naphthol & base solution & coupling.
- Problems associated wrt fastness properties.

### **CHAPTER – 11 :- MORDANT & METAL COMPLEX DYES**

- Brief introduction about the dyes with respect to their structures.
- Classification based on method of application of mordant dyes.
- Classification based on metal content of metal complex dyes.
- General mechanism of dyeing of nylon, wool, silk.
- Fastness properties of dyed goods.

### **CHAPTER- 12 : DISPERSE DYE –**

- General methods of Dyeing with disperse dye.
- Fastness properties of disperse dyed goods.

**List of Experiments:-**

1. Estimation of aniline by diazotitration method
2. Estimation of aniline by diazotitration method
3. Preparation of Direct dye
4. Preparation of Pigments
5. Identification of dyes
6. Identification of dyes
7. Identification of dyes on fibres
8. Identification of dyes on fibres
9. Comparative estimation of strength of the given dye by dyeing technique
10. Comparative estimation of strength of the given dye by dyeing technique
11. Compatability of dyes in compound shades
12. Compatability of dyes in compound shades

**Reference Books:-**

1. Synthetic organic chemistry by G.R. Chatwal.
2. Synthetic dyes by K. Venkatraman.
3. Chemistry of dyes and principles of dyeing by Dr. V.A. Shenai.
4. Principles of dye chemistry by Paul Vittum.
5. Synthetics Dyes by K.M. Shah.
6. Dyeing & chemical technology of textile fibres by E.R. Trotman.
7. The dyeing of cellulose fibres by Clifford Preston.
8. Chemical technology of fibrous material by F.Sadov.
9. Technology of dyeing by Dr. V.A. Shenai
10. Chemical processing of synthetic fibres by Dr. K.V. Datye & A.A. Vaidya

**SECOND YEAR B. TEXT. – SEMESTER – II**

**4.5 WEAVING TECHNOLOGY (TC)**

Lectures	:	4 Hours / Week
Practical	:	2 Hours / Week
Theory Paper	:	100 Marks
Practical Exam	:	50 Marks
Term Work	:	25 Marks
Subject Total	:	175 Marks

1. General: Methods of fabric forming such on weaving, knitting and non-wovens. Brief general discussion about processes involved in these methods. Basic terminologies like Warp, Weft, End, Pick, Selvedges

2. Flow chart for grey, stripped and checks fabrics

3. Warp Preparation –

Object and passage of yarn through Winding machine, Functions of various important parts like creel, tensioner, clearer, winding drum. Features of automatic winding machine. Objects and passage of yarn through Beam Warping Machine. Objects and need of Sectional Warping Machine. Process of sectional warping and Beaming. Objects and need of Sizing, Passage of warp through Sizing machine, Functions of various important parts like creel, sow box, drying system, and head stock. Objects of drawing in and denting process.

4. Weft Preparation

Objects of Pirn winding machine and passage of yarn through machine

5. Fabric Forming –

i) Weaving – Classification of looms. Concept of weaving.

Passage of warp through the plain loom. Driving arrangement of plain loom and speed relation of crankshaft, bottom shaft and picks introduced. Various motions used on loom.

Shedding – Different types of shedding mechanisms like tappet, dobby and jacquard. Concept of negative and positive shedding, working of tappet shedding mechanism. Limitations of tappet shedding

Picking – Objects, types and working of Overpick & Underpick mechanism.

Beat Up – Objects, construction and working of beat up motion. Eccentricity of sley. Functions of reed, Reed count.

Secondary Motions - Objects, construction and working of Negative Let off , Seven Wheel Take Up motion

Auxiliary Motions - Objects, construction and working of Weft Stop Motion, Warp protecting motion, Temple, Brake

Functions and applications of Climax Dobby, 4x1 Drop box and principle of Jacquard.

Limitations of Shuttle Loom. Features of Automatic Loom, Principles of picking of Projectile, Rapier, Air Jet and Water Jet.

ii) Knitting – Comparison of Knitting with Weaving. Structure of single jersey, Rib & Interlock fabrics. Representation of structure on point paper. Types of stitches and their functions. Knitting cycle for weft knitting. Structure of Warp Knitted fabric and it's applications.

6. Fabric Structure – Introduction to interlacement of threads, methods of representation of warp weft interlacement on graph paper. Design, draft, peg plan and denting order of plain, twill and satin weaves. Derivatives of plain weave, Towel weaves like Honey comb, Huck a back & Mock leno. Quality particulars of Saree, Dhoti, Poplin, Cambric, Denim, Suiting and Shirting fabrics.

7. Calculations –

i) Production calculation for winding, warping, loom and circular weft knitting machine

ii) Fabric weight of woven and knitted fabrics

**List of Experiments:-**

- 1) General study of Ordinary, Automatic and Pirn winding m/cs.
- 2) General study of warping & sizing m/cs ( Visit )
- 3) Passage of Yarn through the ordinary & automatic looms.

- 4) General study of the primary motions.
- 5) General study of secondary & auxiliary motions.
- 6) General study of various types of dobbies (cam & climax).
- 7) General study of various types of dobbies (cam & climax).
- 8) Study of Jacquard & Drop box.
- 9) General study of Automatic looms (Cimmco & Ruti).
- 10) General study of projectile & airjet looms.
- 11) General study of knitting machine Study of Knitting Cycle
- 12) Fabric Analysis: - Woven fabrics 8 samples (plain, twill, satin, derivatives of plain, honey comb, huck a back, mock leno)

**Reference Books:-**

1. Plain loom motions by K.T. Aswani
2. Weaving Mechanism by N.N. Banerjee.
3. Winding & Warping by Dr. M.K. Talukdar.
4. Fancy Weaving by K.T. Aswani.
5. Textile Design & Colour by Watson.
6. Circular knitting by Ambumani.
7. Woven Fabric production – I, and II, NCUTE publicatiopn.
8. Knitting by Prof. D.B. Ajgaonkar.
9. Weaving Calculations by Sengupta.
10. Woven Cloth Construction by Dorries Garner.

**SECOND YEAR B. TEXT. – SEMESTER – II****4.6 FLUID FLOW AND HEAT TRANSMISSION (TC)**

Lectures	:	3 Hours / Week
Practical	:	3 Hours / Week
Theory Paper	:	100 Marks
Term Work	:	50 Marks
Oral Exam	:	25 Marks
Subject Total	:	175 Marks

**1) Scope :-**

Scope of fluid flow studies in textile processing areas like design & installation of process equipments, piping & instrumentation, material balances, scope of heat transfer studies in chemical processing sector of textiles from the point of view of energy balances, audit & analysis of plant failure, cost control. Units & dimensions, numericals based on the conversion factors of various units.

**2) Introduction to Fluid Flow :-** Definition, nature & classification of fluids. Study of fluid properties like density, viscosity, surface tension, vapour pressure. Principles of fluid statics. Applications of fluid statics. Newtons law of viscosity Newtonian & non Newtonian fluids. Numericals based on above topics.

**3) Fluid Dynamics :-**

Study of flow patterns, Reynolds experiment. Rheological behaviour of fluids, Equation of continuity, Bernoulli's equation, pump-work calculations based on above equations. Applications of equations of fluid flow for discharge through pipe, a small orifice & pumps.

**4) Fluid Flow Through Pipes & Open Channels :-**

Flow resistance in pipes. Concept of friction factor & calculations of energy losses based on friction factor formulae. Energy losses in straight pipes, changing cross sections, fittings. Concept of equivalent diameters. Study of pipes, pipe fitting & tubing & valves suitable in textile process.

**5) Fluid Pressure & Flow Measurements :-**

Manometers, mechanical gauges. Numericals based on fluid pressure measurement. Fluid flow measuring devices (classification). Study of

venturimeter. Orifice meter, rotameter, pitot tubes & weirs. Numericals based on above.

**6) Pumping of Liquids / Gases :-**

Suction, discharge, net-positive suction heads, centrifugal & reciprocating pumps. Pumps used in textile wet processing industry. Pumping of gases – Fans, blowers & compressors.

**7) Energy & Textile Industry :-**

Thermal energy & textile wet processing sector. Global circuit of thermal energy in textile chemical processing sector. Need of understanding the fundamentals of heat transfer. Brief idea of various energy consuming machines like boiler, pressurized vessel, open vessel for dyeing, agitated vessels, heat exchangers, stenters etc. in a typical textile process house.

**8) Introduction to Heat Transfer :-**

Modes of heat transfer like conduction, convection & radiation. Fourier's law of heat conduction, heat flow through infinitely long hollow cylinder, a plane wall & a sphere & their respective composites. Applications of conduction heat transfer to industry e.g. thermal insulation over steam pipes, insulation over drying chamber, cabinet etc. Numericals based on above.

**9) Heat Transfer by Convection :-**

Definition, concept of dimensional analysis, dimensionless numbers. Heat transfer coefficients, free & forced convection. Heat transfer with change of phases like boiling & condensation. Numericals based on above.

**10) Heat Transfer by Radiation :-**

Definition, Terminologies, pertaining to radiation. Stefan-Boltzmann's Law of Radiation, Kirchoff's law of radiation, Wein's law of radiation. Numericals based on above.

Application of radiation heat transfer to industry in general & textiles in particular.

**11) Heat Exchangers :-**

Definition and classification of heat exchangers. Study of heat exchangers suitable in a textile process house, Fouling factor, Log-mean temperature difference, effectiveness of heat exchangers.

Numericals based on above topics.

**List of Experiments:-**

- A) Calibration of Flow meters using :
  - i) Venturimeter.
  - ii) Orificemeter.
  - iii) Triangular, Trapezoidal notches.
- B) Bernoulli's Experiment.
- C) Reynolds Experiment.
- D) Study of fluid friction through pipe.
- E) Study of centrifugal pump.
- F) Study of Heat Transfer by conduction:
  - i) Metal Rod apparatus.
  - ii) Sphere in sphere method for the determination of thermal conductivity of insulation material.
  - iii) Composite wall apparatus.
- G) Study of heat transfer by natural convection.
- H) Measurement of Emissivity
- I) Verification of Stefan Boltzmann's Law.
- J) Study of Critical Heat Flux Apparatus.
- K) Visit to a Chemical Industry:

**Reference Books:-**

1. "Introduction to Chemical Engineering" by Walter L.,Badger & J.T. Banchemo, McGraw-Hill, (1955).
2. "Unit Operations of Chemical Engineering" by W.L. McCabe, J.C.Smith, Peter Harriott, McGraw-Hill, Inc., New York.
3. Fluid Mechanics and Hydraulics, by Giles, McGraw-Hill (1971).
4. Engineering in Textile Colouration by C. Duckworth.
5. Chapman Heat Transfer by Collier, Mac Millan, (1969).
6. "Convective Boiling & Condensation" by Collier, McGraw-Hill, (1972).
7. 'Process Heat Transfer' by Kern, McGraw-Hill, (1954).



**SECOND YEAR B. TEXT. – SEMESTER – II**

**4.7 PRINTED TEXTILE DESIGN AND COLOUR (TC)**

Drawing	:	2 Hours / Week
Term Work	:	50 Marks
Subject Total	:	50 Marks

**List of Experiments:**

1. Units developments for textile design.
2. Colour modification chart.
3. Colour theory chart.
4. Textile design development with the help of designing principles.
5. Composition of all over textile design by following bases – (Any two assignments).
  - a. Sq. or Rectangle base
  - b. Drop base – half drop, full drop, 1/3 or 2/3 drop
  - c. Diamond base.
  - d. Ogce bse
  - e. Satin base.
6. Development of textile design for flat bed screen printing.
7. Basics of computer aided design for textile printing.
9. Use of different tools for design development in printing.
10. Image development and colour processing for textile printing.
11. Development of computer aided textile design for flat bed printing machine.
13. Development of computer aided textile design for rotary screen printing machine.

**Reference Books:-**

1. Willian Watson “textile design and colour”: Elementary weaves and figured fabrics.
2. N. Gokarneshan “Fabric structure and design”.
3. Doris Goerner “Woven Structures and Design “

**SECOND YEAR B. TEXT. – SEMESTER – II****4.1 YARNS AND FABRICS FOR FASHION APPLICATIONS (FT)**

Lectures	:	4 Hours / Week
Practical	:	2 Hours / Week
Theory Paper	:	100 Marks
Practical Exam	:	50 Marks
Subject Total	:	150 Marks

**1. Fancy yarns**

Concept of blend spinning. Properties & application of blended yarns. Introduction to various types of fancy yarns - Siub yarn, multi twist multi count yarn, Crep yarn, multi component fancy yarn, Rotor and Ring frame slub yarn, Blended Fancy yarns, SIRO, Bobtex etc.

Manufacturing techniques, end uses, yarn properties & structure of fancy yarns.

**2. Hosiery Yarns**

Requirement of hosiery yarn. Raw material for hosiery yarn, Process sequence & Process parameters to make hosiery yarn from Cotton, Polyester, viscose & their blends. Properties and end use applications of hosiery yarns.

**3. Elastane Yarns**

Introduction to elastane textile material like polyurethane, production of core / cover lycra yarns on ring spinning & air covering machine. Necessary modification on machine, process parameters, production, yarn properties & end uses.

**4. Embroidery Yarn:**

Introduction of thread construction, Raw material used, Characteristics of embroidery yarn, Thread production methods, Types of thread package

**5. Sewing Threads**

Introduction of Thread construction, Characteristics of sewing threads, Thread productional methods, Types of thread package, Thread storage & degradation.

**6. Principle of Air jet weft insertion.**

Constructional details of single nozzle, confusor, multinozzle air jet weaving machines. Study of- Relay nozzle weaving machines, Profile reed, Reed beat up, Take up - let *off* motions, Auxiliary motions, Field of application & commercial viability.

7. Water jet weft insertion system, nozzle, picking, water consumption, water requirement, and field of application.
8. Principle of multiphase weaving, passage of yarn, ripple shed or wavy shed formation, Beatup, carrier drive, take up, field of application, study of sulzer M 8300 multiphase weaving machines.
9. Circular weaving principle, passage of yarn, fabric production, speeds, classification and field of application. Types of yarns used and their specifications.
10. Triaxial Weaving: Principles of weaving, shed formation, heddles, beat up, take up of fabric, properties and applications of triaxial fabrics, yarns used and their specifications, field of applications.
11. Techno economical rating of different shuttleless technologies.
12. Weaving of different material on shuttleless weaving like polyester, silk, Acrylic, polypropylene, Nylon and Blends. Sample weaving concept from hand loom to Suzuki sample loom.
13. Fabric inspection and its importance

**List of Experiments: -**

1. Manufacturing of Hosiery yarn and warp yarn on the ring spinning machine.
2. Manufacturing of elastic core cover yarn on ring frame and manufacturing of air covered fancy yarn on air covering machine.
3. Manufacturing of dye package by using precision winding machine.

4. Manufacturing of fancy yarns on hallow spindle winder by changing machine parameters.
5. Manufacturing slub yarn, multi count yarn & multi twist yarn for garment application.
6. Manufacturing of fancy yarn using SIRO spinning.
7. Mill visit to the fancy yarn manufacturing unit.
8. General study of air-jet machine.
9. Weaving on air jet loom by changing parameters.
10. Sample warping & weaving for blend yarns.
11. Fabric inspection procedures.
12. Style change on shuttle less looms.
13. Visit to circular weaving unit.
14. Visit to air jet weaving unit.

**Reference Books:-**

1. 'Sewing Threads' Textile progress vol.30 no.3/4, by J.O. Ukponmwan, The Textile Inst. Publisher.
2. 'Modern Yarns for Modern Fabrics Seminar' Conference proceddings. By TTI, The Textile Inst. Publisher.
3. Yarns & Fabric Classification Main Items in wool and blends, Italtex Editor.
4. Textile guide synthesis to create yarns & fabrics, Italtex Editor.
5. Fancy yarns by Wood head publications.
6. Modern Preparation & Weaving by A. Ormerod.
7. Principles of weaving by Marks & Robinson.
8. Weaving machines & methods by Dr. Talukdar, Prof. D.B. Ajgaonkar.
9. Shuttleless weaving by Svaty.
10. Modern Methods of Weaving by Duxbury

11. Shuttleless Weaving by J.J. Vincent.
12. Shuttleless weaving NCUTE programme by IIT Delhi.
13. Brochures and machine pamphlets of various machine manufacturers

**SECOND YEAR B. TEXT. – SEMESTER – II****4.3 CHEMICAL PROCESSING OF TEXTILES (FT)**

Lectures	:	3 Hours / Week
Practical	:	2 Hours / Week
Theory Paper	:	100 Marks
Term Work	:	25 Marks
Subject Total	:	125 Marks

**1. SIZING:**

Objects of sizing, Sizing ingredients & their functions, Types of Sizing, Size paste formulations for cotton (20<sup>s</sup>, 40<sup>s</sup>, 60s, 100s), P/C, P/V yarn

**2. INTRODUCTION TO TEXTILE WET PROCESSING:**

Importance of pretreatments, various pretreatment sequences for yarn, woven, Knits, synthetics & their blends, Importance of grey inspection, Point system, Types of stitches, Inspection machines for woven and knit goods

**3. MECHANICAL PREPARATORY PROCESSES:**

- Objects of shearing and cropping, working principle of shearing and cropping
- Object of singeing, various types of singeing machines for yarn, woven and knitted fabrics

**4. CHEMICAL PREPARATORY PROCESSES:**

**A. DESIZING**

- Objects of desizing, Chemistry of desizing, Various hydrolytic and oxydative methods of desizing, Evaluation of efficiency of desizing - Tegawa system

**B. SCOURING**

- Objects of scouring, various processes occurring during scouring, solvent assisted scouring, Batch wise, Semi- Continuous & continuous methods of scouring, Concept of Bio-scouring.

**C. BLEACHING**

- Objects of bleaching, Chemistry of bleaching agents like Hydrogen Peroxide, Bleaching of Cotton, Polyester, Wool Silk, Nylon, Acrylic & its blended woven fabrics, bleaching of coloured woven goods. Evaluation of bleaching efficiency

**D. MERCERIZATION**

- Object of mercerization, Changes brought about by Mercerization, Mercerization machines used for yarn, woven and knit fabrics, Concept of hot mercerization and liquid ammonia treatment.

**5. DYEING**

- Elements of Dyeing, Principles of dyeing, Classification of dyes based on application methods, concepts of exhaustion, expression, percentage shade and affinity
- Dyeing of cellulosic fibres with direct, vat, reactive and sulphur dyes. Dyeing of Polyester & its blends like polyester/cotton, polyester/viscose, polyester/wool. Dyeing of silk, wool, acrylic, & nylon
- Evaluation of fastness properties like Wash Fastness, Rubbing Fastness, Light Fastness and Perspiration fastness
- Package dyeing machine, Jigger, winch machine, Padding mangle, Soft airflow jet dyeing

**List of Experiments:-**

1. Desizing of 100% cotton fabric.
2. Scouring of 100% cotton fabric.
3. Bleaching of 100% cotton fabric by using Hydrogen Peroxide.
4. Dyeing of cotton with direct dyes
5. Dyeing of cotton with I<sub>N</sub> class of vat dyes.
6. Dyeing of cotton with HE reactive dyes by exhaust method.
7. Dyeing of cotton with HE reactive dyes by pad –steam method.
8. Dyeing of cotton with sulphur dyes.
9. Dyeing of 100% polyester with disperse dyes by HTHP method.
10. Dyeing of 100% polyester with disperse dyes by thermosol method.
11. Dyeing of Polyester/cotton blended fabric by exhaust method.
12. Dyeing of 100% wool
13. Dyeing of 100% silk
14. Visit to process house.

**Reference Books:-**

1. Sizing by Prof.D.B. Ajgaonkar, M.K. Talukdar & V.R. Wadekar.
2. Textile Wet Processing, by Nodal Centre for Up gradation of Textile Education
3. Chemical technology of fibrous materials by F. Sadov.
4. Chemical Processing of Polyester/Cellulosic blends by R.M.Mittal & S.S. Trivedi.
5. Chemical processing of synthetic & blends by K.V. Datye & A.A. Vaidya.
6. Mercerizing by J.T. Marsh.



7. Textile Finishing by Heywood
8. Introduction to Textile bleaching by J.T. Marsh.
9. Bleaching, Dyeing & Chemical Technology of textile fibres by S.R. Trotman.
10. Technology of Bleaching by V.A. Shenai.
11. Dyeing of Polyester & Its Blends by M.L. Gulrajani.
12. Dyeing of Chemical Technology Of Textile Fibres by E.R. Trotman.
13. Technology of Dyeing by V.A. Shenai.
14. Chemistry and technology of fabric preparation and finishing by Dr. C. Tomasino, NCSU, USA.

**SECOND YEAR B. TEXT. – SEMESTER – II****4.4 PATTERN MAKING AND GARMENT CONSTRUCTION-I (FT)**

Lectures	:	3 Hours / Week
Practical	:	2 Hours / Week
Theory Paper	:	100 Marks
Practical Exam	:	50 Marks
Term Work	:	25 Marks
Subject Total	:	175 Marks

**1) BASIC PATTERN MAKING:**

Function of Pattern Making Tools, Pattern Making Terms, Model form and measurements, Measurement Taking – Size chart and Measuring of Sizes.

**2) DRAFTING OF BASIC PATTERN SET:**

Basic dress foundation, front and back bodice block, front and back skirt and sleeve, testing of fitting of basic blocks & correction.

**3) DART MANIPULATION:**

Introduction to darts, Techniques of dart manipulation, Pivotal method & Slash & Spread method, Dart terminology, Creating styles through dart manipulation.

**4) DESIGNING WITH DARTS:**

Introduction, Tuck darts, pleats, flares, gathers, fullness, Dart clusters & dart equivalents, multiple darts. Importance of drill hole marks in the darts.

**5) DRAFTING OF SLEEVE & COLLAR:**

**SLEEVES:** Introduction, Cap sleeves, Puff Sleeve, Leg-o-mutton Sleeve, Cowl Sleeves, Wedding Sleeves, Sleeve Cuffs.

**COLLARS:** Introduction, Straight collar, Peter Pan collar, Mandarin collar, collar with stand, shawl collar, sailor collar.

## 6) DRAFTING OF YOKES & PLACKETS:

**YOKES:** Yokes for bodice, gathers, yokes design variations, gathers, flanges, pleat tucks & pin tucks.

**PLACKETS:** Pointed placket with facing-in-one, wing collar placket, slit opening with placket.

## 7) POCKETS:

Pocket classification, outside pockets, seam pocket, jeans pocket, accordion pockets, stylized outside pockets, pocket with hidden side seam.

## 8) Introduction and construction techniques of garment closures:

Application of zippers-fly, kissing lap, button & button holes, hooks, and eye snaps. Velcro, eyelets, cords. Cuffs – Contoured cuffs, Roll-up Cuffs.

## List of Experiments:-

1.     - Taking measurements directly from body  
       - Locating land marks and taking anthropometrics measurements  
       - Taking measurements from the garments
2. Practice on use of:  
       - L-scales and grading scales  
       - French curve – for armhole, necklines etc.  
       - Practice on use of other equipment
3. Drafting of:  
       - Basic block  
       - Sleeve

4. Dart Manipulation
  - i. Relocation of darts
  - ii. Designing with darts
5. Developing patterns for Children's wear
  - i. Skirt Block
  - ii. Rompers
6. Developing patterns and samples for darts & pleats:
  - i. Graduated & Radiating darts
  - ii. Box, knife & sunburst pleats
7. Developing Patterns and sample for collars:
  - i. Stand Collar
  - ii. Peter Pan Collar
8. Developing patterns and samples for plackets:
  - i. Sleeve plackets
  - ii. Front Plackets
9. Developing patterns and samples for pockets:
  - i. Welt Pocket
  - ii. Patch Pocket
10. Developing patterns and samples for sleeves:
  - i. Puff Sleeve
  - ii. Raglan Sleeve
11. Preparing samples for Necklines
  - i. Bias facing,

ii. Bias Binding & Fitted facing.

12. Visit to garment industry for preparation of industrial patterns.

**Reference Books:-**

1. Gerry Cooklin "Introduction to Clothing Manufacture", Blackwell Scientific Publications SP
2. Gerry Cooklin "Master Patterns & Grading for Women's Outsize", Blackwell Scientific Publications (1995) ISBN: 0 – 632- 03915 – 9.
3. Gerry Cooklin "Master Patterns & Grading for Men's Outsize", Blackwell Scientific Publications 1992.
4. Gillian Holman - Pattern Cutting Made Easy, Blackwell Scientific Publications 1997. ISBN: 0- 7134 – 8093- 9.
5. Natalie Bray "More Dress Pattern Designing" Blackwell Scientific Publications 1986 ISBN: 0- 632-01883- 6.
6. Cooklin Gerry, "Garment Technology for Fashion Designers", Blackwell Science Ltd., 1997.
7. Claire Shaeffer, "Sewing for apparel Industry", Prentice Hall, 2000.
8. Leila Aitken, "Step by step dress making course", BBC Books, 1992.

**SECOND YEAR B. TEXT. – SEMESTER – II****4.5 TESTING OF TEXTILES AND APPARELS (FT)**

Lectures	:	3 Hours / Week
Practical	:	2 Hours / Week
Theory Paper	:	100 Marks
Practical Exam	:	50 Marks
Term Work	:	25 Marks
Subject Total	:	175 Marks

**I) Objectives Of Testing****II) Classification of fabric Properties, Sampling of Fabrics****III) Dimensional characteristics**

Length, Width & Thickness and their measurement, Importance of thickness.

**IV) Threads/Unit length**

EPI and PPI, Thread count, Fabric weight - Weight per unit length, Weight per unit area, Warp & Weft crimp, Effect of crimp on the fabric properties, Measurement of crimp, fractional cover factor, Cloth cover factor

**V) Fabric Strength**

Terminology and definitions related to tensile testing.

Tensile strength testing – Ravelled strip method, cut strip method, Grab method, Comparison between strip test & grab test,  
Tear strength testing – Measurement of tear strength - Elemendorf tearing strength tester, Impact principle-Ballistic test,  
Bursting strength test.

**VI) Fabric Abrasion resistance & Handle of fabric**

Serviceability, wear, abrasion, testing of abrasion resistance, assessment of abrasion damage, BFT abrasion testing machine, Martindale abrasion tester.

**VII) Pilling of fabrics**

Definition, mechanism of pilling, factors responsible for pilling, Effects of pilling, Remedies, ICI Pill Box Tester.



**VIII) Fabric Stiffness, Handle & Drape**

Concept- Handle,Drape. Measurement of drape-Drapeometer, Measurement of Stiffness - Cantilever test (Shirley stiffness tester), Heart-loop test.

**IX) Crease resistance & crease recovery**

Definitions: Crease,Wrinkle. Measurement of crease recovery - Recovery angle, TBL method.

**X) Air permeability**

Definitions - Air permeability, Air resistance, Air porosity, Shirley air permeability tester,

**XI) Water proofing & water repellency**

Water permeability and Water repellency, Basic concepts of Wetting and water repellency, Methods of measuring water repellency in fabrics - Wetting time test, spray test, Drop penetration test, Hydrostatic head test.

**XII) Fabric Hand**

Concept - fabric hand, Objective & subjective evaluation of textiles, Measurement of fabric hand- KAWABATA & FAST techniques.

**XIII) Luster**

Concept of luster, Subjective aspects of luster, measurement of luster, Effect of fabric construction on luster.

**XIV) Apparel Testing**

Introduction, Strength properties of Apparel Fabrics – Fabric strength, Seam Strength, Resistance to Yarn Slippage, Fabric Stretch Properties, Dimensional Stability in Apparel, Durable Press Evaluation, Needle cutting/Yarn Severance, Sewability of Fabrics, Soil/Stain Release Testing, Snagging, Colorfastness to – Washing, Dry Cleaning, Light, Crocking, Perspiration, Frosting, Heat, Burnt Gas fumes, Ozone Testing of Fusible interlinings, Testing of Zippers, Testing of Elastic Waistband.



**list of experiments:-**

1. Determination of Fabric Tensile strength and Elongation
2. Determination of crimp in Yarn.
3. Determination of Abrasion Resistance.
4. Determination of Fabric bursting strength
5. Determination of fabric washing fastness.
6. Determination of Shrinkage of knitted and woven fabrics.
7. Determination of color fastness to rubbing - Crock meter
8. Analyzing of Woven and knitted fabric EPI, PPI, Wales and courses per inch, loop length, GSM,
9. Determination of fabric stiffness and crease recovery angle.
10. Determination of fabric Drape
11. Seam strength testing
12. Dimensional Stability

**Reference Books:-**

1. J.E.Booth- "Principles of Textile Testing", CBS Publishers & Distributors, 1996.
2. Sundaram V, "Hand book of Textile Testing", CTRL Publication, Bombay.
3. Textile Testing Vol.I & II by Anagappan & Gopalkrishnan
4. An Introduction to Quality Control for Apparel Industry , Pradip Mehta
5. Managing Quality in the Apparel Industry, Pradip Mehta & Satish Bhardwaj
6. Quality control and testing by V.K.Kothari.

**SECOND YEAR B. TEXT. – SEMESTER – II****4.6 FASHION ILLUSTRATION (FT)**

Lectures	:	2 Hours / Week
Practical	:	2 Hours / Week
Theory Paper	:	100 Marks
Term Work	:	25 Marks
Subject Total	:	125 Marks

**1. Figure Proportions**

Real Figure versus fashion figure, Understanding basic proportions of 8 head theory and 10 Head Theory, Figure mapping with geometrical shapes, Fleshing out, Freehand quick sketching, Profile figure, Three-quarter turned figure, lay figure.

**2. Basic Figure Forms**

Full front head, profile head, three-quarter turned head, Diamond technique, Hairstyles, Facial features: eyes, nose, mouth and ears. Drawing legs, Legs in motion, Foreshortening legs, Drawing feet, Drawing Arms, Foreshortening arms, Rotating arms and legs, Drawing hands.

**3. Turning Reality to Fashion Fantasy**

Drawing from photographs, Gesture components, balance line, movement and balance, importance of center front, angles. Matching poses to garments, wide silhouettes, attitude in poses, attitude contradictions, illustrator versus designer, stylization

**4. Drawing Men**

Proportions of male figure, male versus female figure, drawing male figures, Drawing head, legs, arms and hands, hairstyle, comparing male and female gestures, Gesture sketching.

## **5. Drawing Children**

Children's age groups, Infants, Toddlers, Child, Tween, Head, Hairstyles, Arms and Hands, Legs and Feet, styling kids.

## **6. Rendering Techniques**

Art kit used for rendering, Rendering skin flesh tone, Patterns, Print, shading, Rendering materials like denim, chiffon, satin, taffeta, gouache, gauze, net, velvet, knits, fur, silk, wool, etc. rendering black garments, rendering hairs, Rendering accessories like hats, shoes, scarves, bags, belts, gloves, sunglasses, etc.

## **7. Drawing Flats**

Ways to layout flats, sketching flats freehand, proportions for flats, flats and specs, flats for men, flats for children, sketching techniques for flats, croquis mixed with flats.

## **8. Layout**

Composition for layout, figures and accessories, space and shapes in layout, grouping figures, layout choices.

### **List of Experiments:-**

1. Study of human body proportions and drawing of 8 head figure.
2. Drawing of 10 head fashion figure.
3. Drawing of side view and 3/4<sup>th</sup> turned view of fashion figure.
4. Enlargement and reduction of basic figures.
5. Drawing fashion figures from photographs.

6. Dressing fashion figures.
7. Drawing of male figure.
8. Drawing of children figure.
9. Study of fabric and garment rendering.
10. Study of rendering accessories.
11. Study of drawing flats.
12. Study of composition for layout.

**Reference Books:-**

1. Fashion Sketchbook by Bina Abling
2. Figure Drawing for Fashion Figure by Elisabetta Drudi
3. Fabric Texture and Patterns by Elisabetta Drudi
4. Illustrating Fashion by Kathryn McKelvey
5. Fashion Drawing: The basic principles by Anne Allen and Julian Seaman
6. Illustrating Fashion: Concept to Creation by Steven Stipelman
7. Fashion Artist: Drawing Techniques to Portfolio Presentation by Sandra Burke
8. Fashion Design Drawing and Presentation by Patrick John
9. Fashion Design Illustration (Women) by Patrick John
10. Fashion Design Illustration (Men) by Patrick John
11. Fashion Design Illustration (Children) by Patrick John

**D.K.T.E.SOCIETY'S TEXTILE & ENGINEERING INSTITUTE, ICHALKARANJI.****Equivalence of subject at Second Year B.Text. to Revised Textile Courses.****SECOND YEAR B.TEXT.- T.T. (TEXTILE TECHNOLOGY) Sem – I**

<b>SR. NO.</b>	<b>COMMON TO COURSE</b>	<b>PRE-REVISED SUBJECTS</b>	<b>SEM-ISTER</b>	<b>COMMON TO COURSE</b>	<b>REVISED SUBJECTS</b>	<b>SEM-ISTER</b>
1	TT/MM/TP/TC/FT	Textile Electronics – I	I	TT/MM/TP/TC/FT	Advanced Computer Programming	I
2	TT/MM/TP/TC/FT	Textile Mathematics– III	I	TT/MM/TP/TC/FT	Textile Mathematics–III	I
3	TT	Technology of Fibres Other Than Cotton	I	TT	Technology of Fibres other than Cotton	I
4	TT	Textile Fibre Testing	I	TT	Physical Properties of Textile Fibres	I
5	TT	Yarn Forming Technology – I	I	TT	Yarn Forming Technology-II	I
6	TT	Fabric Forming Technology–I	I	TT	Fabric Forming Technology-II	I

**D.K.T.E.SOCIETY'S TEXTILE & ENGINEERING INSTITUTE, ICHALKARANJI.****Equivalence of subject at Second Year B.Text. to Revised Textile Courses.****SECOND YEAR B.TEXT.- T.T. (TEXTILE TECHNOLOGY) Sem – II**

<b>SR. NO.</b>	<b>COMMON TO COURSE</b>	<b>PRE-REVISED SUBJECTS</b>	<b>SEM-ISTER</b>	<b>COMMON TO COURSE</b>	<b>REVISED SUBJECTS</b>	<b>SEM-ISTER</b>
1	TT/MM/TP/TC	Thermal & Air Engineering	II	TT/MM/TP/TC	Thermal & Air Engineering	II
2	TT/MM/TP/TC/FT	Textile Mathematics–IV	II	TT/MM/TP/TC/FT	Textile Mathematics-IV	II
3	TT	Testing of Yarns & Fabrics	II	TT	Physical Properties of Yarns & Fabrics	II
4	TT/MM	Chemical Processing of Textiles – I	II	TT/MM	Chemical Processing of Textiles-I	II
5	TT	Yarn Forming Technology – II	II	TT	Yarn Forming Technology-III	II
6	TT	Fabric Forming Technology – II	II	TT	Fabric Forming Technology-III	II
7	TT/MM	Textile Design & Colour	II	TT/MM/FT	Textile Design & Colour	II



**D.K.T.E.SOCIETY'S TEXTILE & ENGINEERING INSTITUTE, ICHALKARANJI.****Equivalence of subject at Second Year B.Text. to Revised Textile Courses.****SECOND YEAR B.TEXT.- M.M.T.T. (MAN MADE TEXTILE TECHNOLOGY) Sem – I**

<b>SR. NO.</b>	<b>COMMON TO COURSE</b>	<b>PRE-REVISED SUBJECTS</b>	<b>SEM-ISTER</b>	<b>COMMON TO COURSE</b>	<b>REVISED SUBJECTS</b>	<b>SEM-ISTER</b>
1	TT/MM/TP/TC/FT	Textile Electronics– I	I	TT/MM/TP/TC/FT	Advanced Computer Programming	I
2	TT/MM/TP/TC/FT	Textile Mathematics – III	I	TT/MM/TP/TC/FT	Textile Mathematics-III	I
3	MMTT/TC	Polymer Science	I	MMTT/TC	Polymer Science	I
4	MMTT	Manmade Fibre Manufacture-I	I	MMTT	Manmade Fibre Manufacture-I	I
5	MMTT	Manmade Staple Yarn Manufacture-I	I	MMTT	Manmade Staple Yarn Manufacture-II	I
6	MMTT	Manmade Fabric Manufacture-I	I	MMTT	Manmade Fabric Manufacture-II	I

**D.K.T.E.SOCIETY'S TEXTILE & ENGINEERING INSTITUTE, ICHALKARANJI.****Equivalence of subject at Second Year B.Text. to Revised Textile Courses.****SECOND YEAR B.TEXT.- M.M.T.T. (MAN MADE TEXTILE TECHNOLOGY) Sem – II**

<b>SR. NO.</b>	<b>COMMON TO COURSE</b>	<b>PRE-REVISED SUBJECTS</b>	<b>SEM-ISTER</b>	<b>COMMON TO COURSE</b>	<b>REVISED SUBJECTS</b>	<b>SEM-ISTER</b>
1	TT/MM/TP/TC/FT	Thermal & Air Engineering	II	TT/MM/TP/TC	Thermal & Air Engineering	II
2	TT/MM/TP/TC/FT	Textile Mathematics – IV	II	TT/MM/TP/TC/FT	Textile Mathematics-IV	II
3	MMTT	Manmade Fibre Manufacture-II	II	MMTT	Manmade Fibre Manufacture-II	II
4	TT/MM	Chemical Processing of Textiles – I	II	TT/MMTT	Chemical Processing of Textiles-I	II
5	MMTT	Manmade Staple Yarn Manufacture-II	II	MMTT	Manmade Staple Yarn Manufacture-III	II
6	MMTT	Manmade Fabric Manufacture-II	II	MMTT	Manmade Fabric Manufacture-III	II
7	TT/MM	Textile Design & Colour	II	TT/MMTT/FT	Textile Design & Colour	II

**D.K.T.E.SOCIETY'S TEXTILE & ENGINEERING INSTITUTE, ICHALKARANJI.****Equivalence of subject at Second Year B.Text. to Revised Textile Courses.****SECOND YEAR B.TEXT.- T.P.E. (TEXTILE PLANT ENGINEERING) Sem – I**

<b>SR. NO.</b>	<b>COMMON TO COURSE</b>	<b>PRE-REVISED SUBJECTS</b>	<b>SEM-ISTER</b>	<b>COMMON TO COURSE</b>	<b>REVISED SUBJECTS</b>	<b>SEM-ISTER</b>
1	TT/MM/TP/TC/FT	Textile Electronics – I	I	TT/MM/TP/TC/FT	Advanced Computer Programming	I
2	TT/MM/TP/TC/FT	Textile Mathematics – III	I	TT/MM/TP/TC/FT	Textile Mathematics – III	I
3	TPE	Material Engineering	I	TPE	Material Engineering	I
4	TPE	Manufacturing Processes	I	TPE	Manufacturing Processes	I
5	TPE	Yarn Manufacturing Machinery – I	I	TPE	Yarn Manufacturing Machinery-III	I
6	TPE	Fabric Manufacturing Machinery–I	I	TPE	Fabric Manufacturing Machinery-III	I

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<b>SR. NO.</b>	<b>COMMON TO COURSE</b>	<b>PRE-REVISED SUBJECTS</b>	<b>SEM-ISTER</b>	<b>COMMON TO COURSE</b>	<b>REVISED SUBJECTS</b>	<b>SEM-ISTER</b>
1	TT/MM/TP/TC/FT	Thermal & Air Engineering	II	TT/MM/TP/TC	Thermal & Air Engineering	II
2	TT/MM/TP/TC/FT	Textile Mathematics – IV	II	TT/MM/TP/TC/FT	Textile Mathematics – IV	II
3	TPE	Electrical Technology	II	TPE	Electrical Technology	II
4	TPE	Analysis of Mechanical Elements	II	TPE	<b>Physical Properties of Textiles</b>	II
5	TPE	Yarn Manufacturing Machinery – II	II	TPE	Yarn Manufacturing Machinery-III	II
6	TPE	Fabric Manufacturing Machinery – II	II	TPE	Fabric Manufacturing Machinery-III	II
7	TPE	Textile Machine Drawing	II	TPE	Textile Machine Drawing	II

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<b>SR. NO.</b>	<b>COMMON TO COURSE</b>	<b>PRE-REVISED SUBJECTS</b>	<b>SEM-ISTER</b>	<b>COMMON TO COURSE</b>	<b>REVISED SUBJECTS</b>	<b>SEM-ISTER</b>
1	TT/MM/TP/TC/FT	Textile Electronics – I	I	TT/MM/TP/TC/FT	Advanced Computer Programming	I
2	TT/MM/TP/TC/FT	Textile Mathematics – III	I	TT/MM/TP/TC/FT	Textile Mathematics-III	I
3	MMTT/TC	Polymer Science	I	MMTT/TC	Polymer Science	I
4	TC	Chemistry of Textile Fibres –II	I	TC	Chemistry of Textile Fibres-II	I
5	TC	Spinning Technology	I	TC	Spinning Technology	I
6	TC	Technology of Bleaching & Mercerising	I	TC	Technology of Bleaching & Mercerising	I

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<b>SR. NO.</b>	<b>COMMON TO COURSE</b>	<b>PRE-REVISED SUBJECTS</b>	<b>SEM-ISTER</b>	<b>COMMON TO COURSE</b>	<b>REVISED SUBJECTS</b>	<b>SEM-ISTER</b>
1	TT/MM/TP/TC/FT	Thermal & Air Engineering	II	TT/MM/TP/TC	Thermal & Air Engineering	II
2	TT/MM/TP/TC/FT	Textile Mathematics – IV	II	TT/MM/TP/TC/FT	Textile Mathematics – IV	II
3	TC	Chemistry of Textile Fibres-III	II	TC	Chemistry of Textile Fibres-III	II
4	TC	Chemistry of Dyes & Pigments	II	TC	Chemistry of Dyes & Pigments	II
5	TC	Weaving Technology	II	TC	Weaving Technology	II
6	TC	Fluid Flow & Heat Transmission	II	TC	Fluid Flow & Heat Transmission	II
7	TC	Printed Textile Design & Colour	II	TC	Printed Textile Design & Colour	II

**D.K.T.E.SOCIETY'S TEXTILE & ENGINEERING INSTITUTE, ICHALKARANJI.****Equivalence of subject at Second Year B.Text. to Revised Textile Courses.****SECOND YEAR B.TEXT.- F.T. (FASHION TECHNOLOGY) Sem – I**

<b>SR. NO.</b>	<b>COMMON TO COURSE</b>	<b>PRE-REVISED SUBJECTS</b>	<b>SEM-ISTER</b>	<b>COMMON TO COURSE</b>	<b>REVISED SUBJECTS</b>	<b>SEM-ISTER</b>
1	TT/MM/TP/TC/FT	Textile Electronics – I	I	TT/MM/TP/TC/FT	Advanced Computer Programming	I
2	TT/MM/TP/TC/FT	Textile Mathematics – III	I	TT/MM/TP/TC/FT	Textile Mathematics-III	I
3	FT	Fabric Structure & Design	I	FT	Fabric Structure & Design	I
4	FT	Basics of Apparal Production Processes	I	FT	Basics of Apparal Production Processes	I
5	FT	Yarn Manufacture	I	FT	Yarn Manufacture	I
6	FT	Fabric Manufacture	I	FT	Fabric Manufacture	I

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<b>SR. NO.</b>	<b>COMMON TO COURSE</b>	<b>PRE-REVISED SUBJECTS</b>	<b>SEM-ISTER</b>	<b>COMMON TO COURSE</b>	<b>REVISED SUBJECTS</b>	<b>SEM-ISTER</b>
1	TT/MM/TP/TC/FT	Thermal & Air Engineering	II	FT	<b>Yarns &amp; Fabrics for Fashion Applications</b>	II
2	TT/MM/TP/TC/FT	Textile Mathematics – IV	II	TT/MM/TP/TC/FT	Textile Mathematics – IV	II
3	FT	Textile Wet Processing	II	FT	Chemical Processing of Textiles	II
4	FT	Pattern Making & Garment Construction	II	FT	Pattern Making & Garment Construction-I	II
5	FT	Yarns for Fashion Applications	II	FT	<b>Testing of Textiles &amp; Apparels</b>	II
6	FT	Fabrics for Fashion Applications	II	FT	<b>Fashion Illustration</b>	II
7	FT	Textile Design & Colour Ornamentation	II	TT/MMTT/FT	Textile Design & Colour	II