

REVISED SYLLABUS W.E.F.01ST JULY, 2005

T.Y.B.TEXT. (TT) SEMESTER-I

SR. NO.	COMMITTON TO COURSES	SUBJECTS	TEACHING SCHEME				EXAMINATION SCHEME				
			L	T	DR	PR	TP	TW	OE	PE	SUB. TOTAL
5.1	TT/MMTT/TPE/TC	TEXTILE ELECTRONICS-II	3	---	---	2	100	---	---	50	150
5.2	TT	YARN FORMING TECHNOLOGY-III	4	---	---	2	100	50	---	---	150
5.3	TT	FABRIC FORMING TECHNOLOGY-III	4	---	---	2	100	50	---	---	150
5.4	TT/MMTT	CHEMICAL PROCESSING OF TEXTILES-II	3	---	---	2	100	25	---	50	175
<b>5.5</b>	<b>TT</b>	<b>* 'STRUCTURE AND PROPERTIES OF TEXTILE FIBRES</b>	<b>3</b>	<b>---</b>	<b>---</b>	<b>2</b>	<b>100</b>	<b>25</b>	<b>---</b>	<b>---</b>	<b>125</b>
5.6	TT/MMTT	MECHANICS OF TEXTILE MACHINES	3	---	---	---	100	---	---	---	100
5.7	TT/MMTT/TPE/TC	INPLANT TRAINING-I	---	---	---	---	---	50	---	---	50
			20	---	---	10	600	200	---	100	900
L =LECTURES T =TUTORIALS DR=DRAWING PR=PRACTICALS			TP=THEORY PAPER TW=TERM WORK OE=ORAL EXAMINATION PE=PRACTICAL XAMINATION								

## THIRD YEAR B.TEXT. - SEMESTER - I

### 5.1 TEXTILE ELECTRONICS-II (TT/MMTT/TPE/TC)

Lectures	-	3 hrs/week.
Practicals	-	2 hrs/week.
Theory Paper	-	100 marks.
Practical Exam.	-	50 marks.
Subject Total	-	150 marks.

1) **Digital Electronics and Number System :-**

Difference between digital and analog, digital gates, working, truth table & Boolean equation, with examples from TTL family.

Digital Circuits :- Introduction to multiplexers, Demultiplexers, Encoders, decoders, Flip Flop – R-S, D & J – K, Registers Latches, binary counter, buffers, Tri state devices, memories – RAM, ROM, EPROM.

Introduction to Number systems :- Decimal, Binary, hexadecimal, conversion of numbers from one system to other. Binary arithmetic – addition, subtraction, two's complement representation.

2) **8085 Microprocessor :-**

Introduction to microprocessor, features of 8085, Architecture of 8085 – Register section, ALU, Timing & Control etc. Demultiplexing of address data bus. Generation of control signals, Example of microprocessor based system, 8085 machine cycles and bus timing. Memory interfacing to 8085.

3) **Programming of 8085 :-**

Instruction classification, instruction and data formats, addressing modes, complete instruction set, assembly language programming, Execution of programs, programming with looping, counting & indexing techniques. Time delay's & counters.

4) **Stacks and Subroutine :-**

Stack, subroutine, call & Return instructions advanced subroutine concepts.

5) **Interfacing Input / output devices :-**

Basic interfacing concept, interfacing output displays, interfacing input devices, difference between peripheral Input/output memory mapped Input/out.

**6) Interrupts :-**

Concept of interrupts, software & hardware interrupts, Description of interrupt process, vectored interrupts, programming using interrupts.

**7) Interfacing of peripherals & other I/O devices :-**

8255 PPI interfacing & programming, interfacing of keyboard (matrix) & display, interfacing of thumbwheel switches, stepper motor, D/A & A/D converters, Relays etc.

**8) Introduction to Microcontroller:-**

Introduction to microcontroller, Block diagram of microcontroller, Difference between microprocessor and microcontroller, Features of 8051 microcontroller, Introduction to PLC & its applications.

**9) Applications of Microprocessor in Textiles :-**

Use of Microprocessor / Microcontroller in Sizing Machine, Jet dyeing machine, advanced looms, Spinning machines, Ring data System, Auto levelers, On-line monitoring systems, Evenness tester.

**LIST OF EXPERIMENTS**

- 1) Study of basic gates.
- 2) Study of flip flops
- 3) Assembly language programmes ( 6 to 8)
- 4) Interfacing of 8255 in simple I / O & BSR mode.
- 5) Interfacing of Seven segment display.
- 6) Interfacing of keyboard.
- 7) Interfacing of stepper motor.
- 8) Interfacing of D/A converter.
- 9) Interfacing of A/D converter.
- 10) Interfacing of thumbwheel.

## **REFERENCE BOOKS**

- 1) Digital Principles and applications by Malvino & leach.
- 2) Microprocessor Architecture, Programming and applications with 8085 by Ramesh Gaonkar.
- 3) Microprocessor & Digital system by Douglas Hall.
- 4) Fundamentals of microprocessors & microcomputers by B. Ram.
- 5) The 8051 Microcontroller Architecture, Programming and Applications by Kenneth J, Ayala.
- 6) Machine manuals of USTER, LOPHE, PREMIER

### **THIRD YEAR B. TEXT - SEMESTER-I**

#### **5.2 YARN FORMING TECHNOLOGY-III (TT)**

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

#### **Ring Spinning:-**

1. Revision of basic principle of working of a ring frame, passage of cotton, calculations regarding draft, twist and production.
2. Drafting: - Evolution of design of drafting systems at ring frame. Study of design and working of modern top weighting system with respect to arrangement of rollers, roller weighting system, fibre control, process and cradles. Concept of e-drafting.
3. Ring and Traveller: - Basic principle, design developments in ring and traveller, ring and traveller specifications and their application for different count ranges, traveller burning and its reasons, maintenance of rings and travellers. Ring traveller interaction and spinning performance.
4. Spindles and Bobbins: - Design developments in ring frame spindles and bolsters. Study of types of bobbins used in ring spinning. Design specifications of spindles and rings and their suitability for counts being spun. Maintenance of spindles and bolsters. Optimum package size for ring spinning.
5. Drives: - Types of drives used for ring frame. Design developments in variable speed drive. Developments in drive to spindles.
6. Selection of ring frame specifications depending on count being spun. Procedure for running in of ring frames. Defective production at ring frame and remedies. Schedule of routine maintenance. Roller lapping in ring spinning. Humidity in ring spinning.

7. Design features of ring frame and their importance – spinning angle, winding angle, lead angle,
8. Factors affecting tension and its variation in yarn in ring spinning frame, Studies on end breaks.
9. Balloon Theory – Importance of balloon of yarn for motion of balloon. The limiting balloon size, the effect of control rings on tension, the ratio of balloon tension to winding on tension in ring spinning.
10. Automation in ring frames – Auto doffing systems – importance, advantages, study of different types, techno economics - Study of link coning system.

### **Doubling, Folding, Fancy & Special Yarns :-**

1. Object of ply twisting - Scope of ply twisting - Methods of ply twisting, concept of balance of twist.
2. Study of conventional Ring doubling machines. Dry and Wet doubling - calculation relating to production, efficiency and twist – Limitation of ring doubling system
3. Study of two for one twisters – evolution of TFO, basic concepts, study of design and construction of two for one twisting machine. Machine design aspects, drives used, power requirement, calculations relating to efficiency, production and twist. Advantages over ring doubling. Techno economics. Modern developments in TFO machines.
4. Fancy yarn production – classification of fancy yarns - basic principle - study of productions methods - spinning techniques for the production of fancy yarns – Design and construction of the basic profiles such as Spiral, Gimp, Loop, Snarl, Knop, Cover, Slub, Chenille, Marl, Grandrelle, Nepp. Combination of profiles – analysis of fancy yarns.
5. Compact yarns :- Definition, basic concept of producing compact yarns, types of compact yarns and their production, machine & process parameters, application of compact yarns.

6. Production & preparation of Melange yarn, Lycra, Elastane yarns, Singed yarn etc.

### **LIST OF EXPERIMENTS**

1. Ring frame settings – Spindle gauging, lappet guide centering, spindle centering, etc.
2. Study of building mechanism of ring frame.
3. Study of TFO – passage, gearing, calculations related to twist, speed, production.
4. Study of Ring doubler – passage, gearing, calculation related to twist, speed and production.
5. Measurement of various parameters related to spinning geometry of different ring frames.
6. Comparative study of variator drives used on ring frame.
7. Application of tools & gauges used in spinning.
8. To study the Pneumatic circuits used in spinning.
9. Manufacture of package on soft/parallel winding machine at various process parameters.
10. Production of slub yarns and other fancy yarns by using Fancy yarn making device.
11. Manufacture of multi-twist and multi-count yarn.
12. Production of compact yarn and comparison of the same with ring spun yarn.
13. Mill visit–Study of Modern Ringframes, Yarn conditioning /Packaging, TFO, etc.

### **REFERENCE BOOKS**

- 1) Fundamentals of Spinning – P. Lord / C. A. Lawarance
- 2) Technology of Cotton Spinning – J. Janakiram
- 3) Trade Literature & Bulletins of Rieter LMW, Marzoli
- 4) NCUTE Pilot programmers in spinning.
- 5) SITRA Focus series.

- 6) Elements of ring frame & doublings by A. R. Kahre.
- 7) Manual of Textile Technology – Short Staple Series.
- 8) Vol IV A Practical Guide to Ring Spinning – W. Klein
- 9) Advances in Spinning – S. M. Ishtiaque
- 10) Two for one Twister technology & Technique for spun yarns by H. S. Kulkarni & HVS Murty.

### THIRD YEAR B. TEXT - SEMESTER-I

#### 5.3 FABRIC FORMING TECHNOLOGY-III (TT)

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

1. **Air Jet weft Insertion:** - Introduction, History of Air jet weft insertion, overview of weft insertion elements, insertion main nozzles designs, relay nozzle designs, configurations, Loom settings, Air supply & energy consumption, Air flow in nozzles & guide channel, performance of yarns in air jet insertion, Influence of yarn characteristics on weft insertion, Optimisation of settings, Weft stops & breaks, application of air jet weaving, functional characteristics & features of modern air jet weaving machines, (Dornier, Smit, Picanol, Sulzer) Quality of Air.
2. **Water Jet Weft Insertion:-** Introduction, Design, Requirements, Picking mechanism, weft insertion elements, loom settings, influence of yarn characteristics, features of water jet looms, applications of water jet weft insertion system. Comparison with air jet.
3. **Multiphase Weaving:-** Introduction, Classification, Methods to form warp wise and weft wise sheds, methods of picking, methods of beat up, limitations of multiphase weaving, applications, features of modern multiphase weaving machines e.g. M 8300.
4. **Circular Weaving:-** Introduction, Classification as per number of shuttles, shedding, picking, beating, cloth collection, supply of warp yarn, stop motions for warp & weft, productivity, applications of circular weaving.
5. **Triaxial Weaving:** - Introduction, Properties of triaxial woven fabrics, applications, weaving equipment for triaxial weaving.
6. **Narrow Fabric Weaving:-**

- a. Preparation – Machines & processes for assembling warps, various warping processes used weft preparation.
  - b. Technology of narrow fabric weaving – Machine construction, Shuttle looms, needle looms, warp feed systems from beams, creel, for elastomeric yarns, shedding, weft insertion systems, take up.
  - c. Micro electronics in Narrow Fabric Weaving – Fundamentals computer aided patterning systems, Acquisition of production data & monitoring equipment.
  - d. Application of weaves in narrow fabric weaving.
7. **Manufacture of Labels:** - Introduction, labels with woven selvedge & cut selvedge.
8. **Braiding:** - Introduction classification (rounds & flat braids), applications, raw material used for braids, machines used for braiding (drive, yarn supply, Braiding technology, take up.)

## **EXPERIMENTS**

1. Overhauling of Sulzer picking motion.
2. Study of style change process on projectile (Sulzer) Machine.
3. Study of let-off motions of all shuttle less weaving machines & operations of looms.
4. Study of control panel of Dornier weaving machine and fabric production with changed parameters.
5. Study of control panel of SMIT Air Jet weaving machine and fabric production with changed parameters.
6. Study of Dobby CAD software
7. CAD software application – Creation of weaves
8. CAD software application – Creation of weaves.
9. Study of style change on Dornier
10. Study of style change on Airjet Smit
11. Study of sample weaving equipment
12. Visit to rapier weaving unit.

## **REFERENCE BOOKS**

1. Handbook of weaving – Sabit Adanur.
2. Modern preparation and weaving machinery – A Ormerod
3. Shuttleless weaving machine – Svaty.
4. Shuttleless Looms – J. J. Vincent
5. Shuttleless weaving machine – O. Talavasele, V. Svaty
6. Narrow Fabric Weaving - Sauer Lander Verlag
7. Narrow Fabric Group Conference – Textile Institute
8. Braiding and Braiding Machinery – W. A. Douglass

### **THIRD YEAR B.TEXT. - SEMESTER - I**

#### **5.4 CHEMICAL PROCESSING OF TEXTILES-II (TT/MMTT)**

Lectures	-	3 hrs/week.
Practicals	-	2 hrs/week.
Theory Paper	-	100 marks.
Term Work	-	25 marks
Practical Exam.	-	50 marks
Subject Total	-	175 marks.

1. Elements of Dyeing – Principles of dyeing, Classification of dyes based on application methods, dye fibre interactions and concepts like exhaustion, expression, percentage shade and affinity.
1. Dyeing of cellulosic fibres with direct, vat, reactive, sulphur dyes and azoic colours.
2. Dyeing of Polyester & its blends like polyester-cotton, polyester-viscose, polyester-wool.
3. Dyeing of silk, wool, acrylic, & nylon.
4. Evaluation of fastness properties like wash fastness, rubbing fastness and light fastness
5. Introduction to Loose fibre dyeing machines, package dyeing machine. Jigger dyeing machine, winch dyeing machine, padding mangle, jet dyeing & soft flow dyeing machine.
6. Concept of printing. Various ingredients used in preparation of printing paste.
8. Various styles of printing such as direct, resist and discharge by using direct, reactive and disperse dyes.
9. Printing with pigments.
10. Introduction to various methods of printing such as table, flat bed & rotary.
11. Concept of inkjet / digital printing.
12. Objects of finishing, classification of finishes. Resin finishing, mechanism of resin finishing. Concept of anti crease, wash-n-wear & durable press.

13. Heat setting and weight reduction of polyester material.
14. Concept of speciality finishes like soil release, water repellent and flame retardant finishes
15. Various finishing machinery such as stenter, calendars, sanforising and drying machine.

### **LIST OF EXPERIMENTS**

1. Dyeing of cotton with various classes of dyes such as direct, vat, reactive, and sulphur on OBBD Machine.
2. Dyeing of wool and silk with acid & metal complex dyes on OBBD Machine.
3. Dyeing of 100% polyester with disperse dye by using HTHP beaker dyeing machine.
4. Dyeing of polyester-cotton by using beaker dyeing machine.
5. Demonstration of dyeing of cotton on Jigger, winch, Padding mangle, Package dyeing, soft flow dyeing machine and garment dyeing machine.
6. Printing of cotton with pigments.
7. Printing of cotton with reactive dyes for direct and discharge style.
8. Chemical identification of fibres.
9. Chemical identification of dyes on fibres.
10. Evaluation of light, wash, rubbing and fastness.
11. Demonstration of computer colour matching system

### **REFERENCE BOOKS**

- 1) Dyeing Of Polyester & Its Blends by M.L. Gulrajani.
- 2) Dyeing Of Chemical Technology Of Textile Fibres by E.R. Trotman.
- 3) Technology Of Dyeing by V.A. Shenai.
- 4) Textile Printing by L.W.C. Miles.
- 5) Technology Of Printing by V.A. Shenai.
- 6) An Introduction To Textile Printing by W. Clarke.
- 7) Textile Finishing by A.J. Hall.

- 8) Introduction To Textile Finishing by J.T. Marsh
- 9) Technology of Finishing by V.A. Shenai.

### THIRD YEAR B. TEXT - SEMESTER-I

#### 5.5 STRUCTURE AND PROPERTIES OF TEXTILE FIBRES (TT)

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

1. Fibre structure-Requirements of fibre formation - Molecular weight - Molecular weight distribution, Determination of molecular weight, Molecular weight distribution curves, Degree of polymerisation-useful limits of polymerization- crystalline and amorphous regions-molecular structure of fibres-morphological models-one phase, two phase, three phase models,-morphology of various fibres.
2. Techniques for investigation of fiber structure
  - a. Optical properties of textile fibres- Refractive Index- Double refraction, Birefringence. Optical heterogeneity in fibres-The factors influencing the birefringence of a fibre, Measurement of birefringence -the beckeline method-compensator method-interference microscopy- refractometer method-Significance of birefringence, Optical dichroism and its importance
  - b. X-ray Diffraction Investigations-Introduction, Production and origin of X-rays-Bragg's law of x-ray diffraction-crystal structure-miller indices-determination of fibre structural parameters by x-ray diffractometer and fibre diagram techniques-small angle scattering
  - c. Electron Microscopy –Principle of electron microscope- Transmission and scanning electron microscopes and their principle, working and applications
  - d. Infrared Spectroscopy –Spectroscopy, Beer-Lambert law, Principles of IR-Spectroscopy, Principle and working of IR spectrophotometer, Applications, IR-Dichroism and its importance

3. Mechanical Properties of Textile fibres
  - a. Tensile properties\_Terminology, the factors influencing the tensile properties of fibres
  - b. Effects of variability- variability –weak link effect, Pierces formula-derivation- Spencer Smith theory, Composite specimen effects-variability in practice
  - c. Elastic recovery-Definitions-Effects of test conditions on elastic recovery of fibres- Mechanical conditioning of fibres-swelling recovery
  - d. Forces in various directions-bending and twisting of fibres, derivation of flexular and torsional rigidity, shear modulus-shear strength-general elastic deformation-compression
  - e. Theories of Mechanical Properties-approaches-structural effects in fibres-theories of time dependence-thermodynamic effects-creep stress relaxation, stress-strain curve, dynamic mechanical properties, their measurement and importance, factors influencing them.
4. Model theory of viscoelasticity-linear viscoelasticity, viscoelastic models-Features of Eyring model
5. Fibre Friction- Consequence of friction in textiles, measurement of friction-empirical results-the nature of friction
6. Thermal properties-Introduction-Specific heat capacity, thermal conductivity, structural changes in fibres on heating and setting, Transition in fibres-primary and secondary transitions and their significance, factors influencing them, degradation and decomposition, Thermal expansion of fibres.
7. Electrical properties: Static electricity-its generation and consequence-measurement of static electricity, Dielectric properties-permittivity, dielectric constant, dissipation factor, power factor, factors influencing the dielectric properties, measurement of dielectric behavior of fibres, Electric resistance-

Specific resistance- Measurement of resistance-Factors influencing the electrical resistance of fibres.

### **LIST OF EXPERIMENTS**

- 1) Cutting combing ratio of carded and combed sliver.
- 2) Moisture absorption of sliver, roving and yarns.
- 3) Torsional rigidity of natural fibre/man made fibre.
- 4) Evaluation of fibre parameters by HVI.
- 5) Study of fibre parameters by AFIS.
- 6) Fibre bundle tenacity by Stelometer & HVI.
- 7) Determination of neps & length by Aquara.
- 8) Hot air and Hot water shrinkage testing of cotton, blended filament fabrics
- 9) Determination of fibre density.
- 10) Effect of type of loading (CRE & CRL) on tensile strength of fibre.
- 11) Study of creep & stress relaxation of spun yarn.

### **REFERENCE BOOKS**

1. Fibre Science- Edited by J.M. Preston, Published by the textile institute, Manchester
2. Physical Methods of Investigation of Textiles, Edited by Meredith R. and Hearle J.W.S.-Published by Textile Book published Inc. New York
3. Physics of fibres- An Introductory Survey-Woods H. J. Published by the Institute of Physics-London, 1955
4. Applied Fibre Science- Vol I-Edited by F. Happey published by Academic Press, London
5. Physical Properties of Textile Fibres-Morton W. E. and Hearle J.W.S. published by the Textile Institute Manchester
6. Fibre Microscopy-Stores J. L. published by London National Trade Pr
7. Structure/Property relationship in Textile Fibres-Textile Progress Vol. 20 No. 4 The Textile Institute Manchester
8. Textile Fibres Yarns and Fabrics – Kaswell E. R. published by Reinhold Publishing Corporation- New York, 1954

## THIRD YEAR B.TEXT. - SEMESTER - I

### 5.6 MECHANICS OF TEXTILE MACHINES (TT/MMTT)

Lectures	-	3 hrs/week.
Theory Paper	-	100 marks.
Sub. Total	-	100 marks

1. Frictional Drives :-

Introduction, Drum drive – Belt drives – Conditions of critical slippage of belts – belt drive plus frictional disc drive (texturising machine), the timing belt drive, cone drum belt drives.

2. Positive Drives :-

Chain & sprocket drum - Gear drives – types of gears – terms used in study of gears – pitch measurement, ratio of gear trains – selection of gears for change wheels, Epicyclic gear trains – velocity ratio – differential gearing in comber & Speedframe. Planetary mechanisms in Coiling – Rack and Pinion – Screw traversing mechanism.

**3. Intermittent Rotary Motion :-**

Introduction – Ratchet and pawl, Mechanisms – Let off & take up motions in weaving machines – variation in pick spacing – Geneva wheel.

4. Cams & Eccentric: -

Introduction – Basic types of cams – Motion of cam follower – linear cam – parabolic cam – Use of positive cams – SHM – Determination of Acceleration in SHM – Cylindrical Cam. The crank and connecting rod – the loom sley movement

5. Linkage Mechanisms :-

Introduction – The four bar linkage – SHM calculation of dwell clearance on a loom – modified SHM – Multiple – Bar Linkage – Double Beat up mechanism – Combined ratchet and linkage. Mechanisms – complex combined mechanisms – driving detaching rollers of comber.

6. Balancing of Machines :-

Vibration of machine, Balancing of machinery – Unbalance, Production balancing, Field balancing, Concepts of definitions – Theoretical considerations

in balancing – Balancing of rotors / Cards cylinder Practical aspects of balancing. Measurement & control unbalance.

#### 7. Clutches & Brakes :-

Introduction – Clutches – Jaw / toothed clutches, Friction clutches, Materials for friction lining, Cone Clutches.

Brakes - Mechanical brakes, Block brake with short shoe, Pivotal double block brake, Internal expanding brake, Band brakes.

#### 8. Selection Mechanisms :-

Introduction – methods of storing information – the grouping of machine parts for selection – converting information into movement – some mechanical switching mechanisms – Dobby selection mechanisms – high speed mechanical switching mechanisms – additional complex mechanical switches – the movement of the information store.

#### 9. Control Mechanisms :-

Introduction – the elements of control mechanisms – a comparison of open loop & closed loop system – the detecting element – the detailed of broken ends – the control of yarn / cloth tension – control of sliver thickness – detection of full and empty packages.

#### **10. Mechanics of Spinning & Weaving Machines :-**

C and M factors in Blow room, Design of Beater & Chamber, Transfer efficiency of card, Inertia of Carding, Coiling of sliver, Card Wires, Drafting force and friction field in roller drafting, coils spacing in speed frame, Centrifugal force of flyers, Arrangement in two rows, Yarn tension in ring spinning, Balloon theory, Package density, Traveller friction.

Study of mechanisms in winding, Build of various packages. Design of grooved drums for various packages. Design changes in Beam warping drive for high speed. Sectional warping drum design. Mechanism of squeezing, sow box design. Mechanical design changes of shedding mechanism. Picking

mechanism theories for different shuttleless weaving techniques. Kinematics of different sley drives.

### **REFERENCE BOOKS**

- 1) Textile Mathematics, Vol-I By J.E. Booth, The Textile Institute, Publication.
- 2) Textile Mathematics, Vol-II By J.E. Booth, The Textile Institute, Publication.
- 3) Textile Mathematics, Vol-III By J.E. Booth, The Textile Institute, Publication.
- 4) Control Methodology in Textile Engineering & Economics By John W.s. Hearle, Journal of the Textile Inst. Vol.83, No.3, 1992, The Textile Institute Publication
- 5) Mechanics for Textile Students, By W.A. Hanton, The Textile Inst. Publication.
- 6) Mechanics of Spinning Machines By R.S. Rengasamy, NCUTE Publication
- 7) Textile Mechanics Vol.I, By K. Slater, The Textile Inst. Publication.
- 8) Textile Mechanics, Vol.-II, By K. Slater, The Textile Inst. Publication.
- 9) An Introduction to Textile Mechanisms By P. Grosberg, The General Publishing Company.

### **THIRD YEAR B. TEXT - SEMESTER-I**

#### **5.7 INPLANT TRAINING - I (TT/MMTT/TPE/TC)**

Duration	:	4 Weeks
Term Work	:	50 Marks

- 1) As a part of curriculum, students are required to undergo an Inplant training for the period of Four Weeks, after the completion of second semester of Second Year B. Text.
- 2) During this period, students are required to study the machinery, industrial practices & the other relevant data, information as per the guidelines given by the Institute.
- 3) The students are required to submit a Inplant Training Report on the basis of above training.
- 4) Term work marks are assigned on the basis of students performance in the viva – voce, conducted by Internal Examiner immediately after inplant training. A viva-voce will be conducted in the first semester of Third Year B. Text.
- 5) If the performance of the student is found to be unsatisfactory, his terms will not be granted.

**T.Y.B.TEXT. (TT) SEMESTER-II**

SR. NO.	COMMITTON TO COURSES	SUBJECTS	TEACHING SCHEME				EXAMINATION SCHEME				
			L	T	DR	PR	TP	TW	OE	PE	SUB. TOTAL
6.1	TT/MMTT/TPE/TC	ADVANCED COMPUTER PROGRAMMING	3	---	---	2	100	50	---	50	200
6.2	TT	MANMADE FIBRES & YARNS	3	---	---	---	100	---	---	---	100
6.3	TT/MMTT	UTILITY ENGINEERING IN TEXTILES	3	---	---	---	100	---	---	---	100
6.4	TT	STRUCTURE & PROPERTIES OF YARNS	3	---	---	2	100	50	---	50	200
6.5	TT	YARN FORMING TECHNOLOGY -IV	4	---	---	3	100	50	---	---	150
6.6	TT	FABRIC FORMING TECHNOLOGY -IV	4	---	---	3	100	50	---	---	150
			20	---	---	10	600	200	---	100	900
L =LECTURES T =TUTORIALS DR=DRAWING PR=PRACTICALS			TP=THEORY PAPER TW=TERM WORK OE=ORAL EXAMINATION PE=PRACTICAL XAMINATION								

## THIRD YEAR B.TEXT. SYLLABUS - SEMESTER - II

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

Lectures	-	3 hrs/week.
Practicals	-	2 hrs/week.
Theory Paper	-	100 marks.
Term Work	-	50 Marks
Practical Exam.	-	50 marks.
Subject Total	-	200 marks.

#### **1. Introduction to Windows:**

Managing windows, working with disks, folders and files, finding lost files, creating backups, shortcut keys, installing and removing programmes, printing in windows, printer setting, fonts, installing fonts.

#### **2. 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.

#### **3. Database Management:**

Introduction to database, records, Relational database management systems, structural query languages (SQL), SQL commands – Select, Insert, update, delete, joins – inner join, outer join, equijoin.

#### **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, manus in visual basic.

**7. Dialogs:**

Introduction, message box, input box, common dialog.

**8. 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.

**LIST OF EXPERIMENTS**

1. Study of Windows 98 operating system.
2. Working with Start Button, Desktop, Explorer, Control Panel.
3. Study of network System with commands from Novell Network.
4. Creating databases, tables using Ms-access.
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).
  - ◆ Finding % exhaustion of dye bath.

- ◆ Finding correlation between whiteness & strength.
- ◆ Finding at add on of finish.

## **REFERENCE BOOKS**

1. Windows 95 for busy people – Ron Mansfield (Tata McGraw-Hill Edition)
2. Computer Guide to Networking – Peter Norton (Techmedia publication)
3. Computer Networks (Third Edition)
4. SQL for professional – Swapna Kishore, Rajesh Naik (Tata McGraw-Hill editon)
5. Guide to Visual Basic 6 – Peter Norton (Techmedia Publication)
6. Beginning Visual Basic 6 – Peter Wright (WROX Publication)

## THIRD YEAR B. TEXT - SEMESTER-II

### 6.2 MAN MADE FIBRES & YARNS (TT)

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

#### 1) SYNTHETIC FIBRES:-

**Viscose Rayon** :- Process of manufacturing viscose fibre / filament yarns, physical and chemical properties of viscose rayon, applications of viscose fibres.

**Tencel Fibre**: - Manufacturing process, properties and applications.

**Cellulose Acetate Fibres**:- Production process of both cellulose acetate and triacetate fibres, properties and applications.

#### **Polyester Fibres**:-

Raw materials, manufacturing details of PET fibre / yarns. Properties and applications of PET fibres.

#### **Polyamide Fibres**:-

Raw materials for Nylon 6 and Nylon 6,6, Study of the manufacturing process of Nylon 6 and Nylon 6,6, fibres and filament yarns. Physical and chemical properties of nylon fibres. Applications of nylon fibres.

#### **Polypropylene Fibres**:-

Manufacturing process of polypropylene fibres and filament yarns. Dope dyed PP fibres. Properties and applications of polypropylene fibres.

#### **Acrylic Fibres**:-

Comparison of acrylic and modacrylic fibres. Manufacturing process, properties and applications of acrylic fibres.

#### **Elastane Fibres**:-

Production, properties and applications.

## **2) TEXTURISING:-**

Draw backs of flat filament yarn, scientific principle in twist texturising, Classification and characteristics of textured yarns.

**False Twist Process:-** Introduction, Methods of production of stretched and modified stretched yarns by conventional methods.

**Draw Texturising:** - Draw Texturising, sequential (False twist process) and simultaneous draw texturising, Study of simultaneous draw texturising process.

**Draw Texturising Machine:-** Machine profiles, Twisting devices – Various friction twisting units, heaters, cooling devices, coning oil application, process variables, Quality of draw textured yarns. Technological developments in draw – texturising technology.

**Air Jet Texturising:-** Principle, Air-jet texturising machine, air jets, wetting systems, stabilizing devices, process variables in air texturising, Quality of air textured yarns, blending of filaments yarn in air texturising.

**Other Texturising Methods:-** Stuffer box crimping, Edge Crimping, Knit-de-knit, Gear crimping, Chemical texturising.

## **3) BLENDS SPINNING:-**

Fibre characteristics and spinnability, fibre properties and end uses, objectives of blending, measures of blending, migration, timing, selection of blend constituents, mechanics of blending, blending techniques, modification of cotton spinning machineries for processing man made fibres.

Common faults in blended and 100% man made spun yarn. Blending of man made fibres with wool. Processing of man made fibres and its blends on Rotor Spinning Machines.

## **REFERENCE BOOKS**

- 1) Manufactured Fibre Technology, Edited by V. B. Gupta & V. K. Kothari (1997) Chapman and Hall, London.
- 2) Production of Synthetic Fibres – A. A. Vaidya.
- 3) Production and Applications of Polypropylene Textiles – O. P. Rajgrat & F. Sevicik.
- 4) Man Made Fibres – R. W. Moncrieff.
- 5) Artificial Silks – S. R. Trotman & E. R. Trotman
- 6) The Structure and Properties of Textile Fibres – R. Meredith
- 7) Textile Fibres Vol – I, V. A. Shenai
- 8) Physical Properties of Textile Fibres – W. E. Morton and J. W. S. Hearle
- 9) NCUTE – Training Programme Book of Papers on Man Made Fibres.
- 10) Yarn Texturising Technology – J. W. S. Hearle, Wilson, Woodhead Publishing Ltd., England.
- 11) Texturising Methods other than False Twisting – Textile Progress.
- 12) Yarn Texturising Technology – Hess & Ursney.
- 13) Spinning of Man made fibres on cotton system – K. R. Salhotra.
- 14) Trade Literature of ICI, PCL etc.

## THIRD YEAR B. TEXT - SEMESTER-II

### 6.3 UTILITY ENGINEERING IN TEXTILE (TT/MMTT)

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

#### 1) Humidification in Textile Mills:-

Need for humidification in Textile Mills, Ambient conditions required in various departments of a textile mill. Psychrometry - definition, use of psychrometric charts, various psychrometric processes like cooling, heating, humidification, de-humidification, etc. Aspects of evaporating cooling method & refrigerative cooling method. Study of arrangements & layout of standard humidification methods for spinning, weaving & knitting processes – Return air ducts, Return Air Plenum, Filters, Return Air fans, Dampers, Supply Air Fans, Washers, Eliminators, Supply Air Plenum, Supply Air Duct, Diffusers etc. Study of the construction of each component.

Design considerations for a humidification plant & air circulation systems, Calculations related to the heat load in the department, air circulation & the design features of the plant such as fan capacity, Sizes of Dampers, Washers, Ducts, Return Air & Supply Air openings in the department. Automatic controls in humidification plants. Study of recent developments in humidification plant used in spinning, weaving, knitting departments.

#### 2) Pumps, Compressors & Fans used in Textile Mill:-

Classification & characteristics of various types of pumps. Study of types of pumps used in textile mills

Compressors: - Compression methods, intermittent, continuous. Classification of compressors & brief study of construction, working, advantages, limitations of each type. Compressed air requirement in Textile mills, Calculation of compressor capacity. Compressor accessories such as reservoir, dryer, lubrication system, filters, cooling towers, etc.

Fans: - Classification, construction & working of different classes of fans. Centrifugal, Axial flow & Radial flow. Fan capacity, power & efficiency. Fan selection. Pneumatic conveying of materials in textile mills.

**3) Requirement of quality & quantity of water for spinning & weaving mills.**

**4) Selection of Drives :-**

Selection of drives, AC and DC motors, starters, losses, efficiency, speed control, of AC and DC motors, vector control, soft starters, inverters for speed control, design features of energy efficient motors, motor capacity calculation for Air compressors, blowers, pumps, hydraulic systems. Motors used in textile industry, Pneumatic systems: Basic components, functions, operation of Pneumatic circuit.

**5) Illumination:-**

Definitions :- Flux, intensity, solid angle, illumination, utilisation, factor, maintenance factor, laws of illumination, numerical problems on illumination, energy efficient systems, energy efficient lamps, standard values of illumination (LUX) for different departments in textile industry. Study of different lamps. Discharge Lamps, Flu. Tube, Sodium Vap Lamp, Mercury Vapor Lamp, Metal halid Lamp, C.F.L. LED.

**6) Energy Management:-**

Electrical power required in Textile mills. Maximum demand, Average demand, Power factor, Load factor, Calculation related to energy requirement. Methods of power measurement & tariff. Control of maximum demand for saving. Power factor control for saving. Load factor and saving.

Receiving & Distribution of Power in Textiles – High Tension substation – Transformers, Capacitors, Switch yard, Panels, etc. Types of cables – sizes &

calculations. Methods of Power distribution in the department. Methods of procuring H.T. supply and policies and charges and deposits based on connected load and maximum demand.

Methods of captive generation – Brief introduction to D.G set & furnace oil, calculation of techno-economic viability.

Energy Audit - Principle, energy measurement & energy conservation. Recent developments in energy efficient equipments. Harmonics in supply. Concept of power quality. Concept of payback and investment in the corrective action taken after auditing.

### **REFERENCE BOOKS**

- 1) Air Conditioning & Refrigeration by Arora & Domkundwar.
- 2) Air Conditioning & Refrigeration by Khurmi & Gupta.
- 3) Manual of Humidification – Batliboi Ltd.,
- 4) Air Conditioning in Textiles by S.P. Patel.
- 5) Compressors by Royce N Brown.
- 6) Refrigeration & Air Conditioning by P.L. Ballaney.
- 7) Refrigeration & Air Conditioning by P. Arora.
- 8) Utilisation and traction by S.L. Uppal.
- 9) Power system by V.K. Mehta.
- 10) Electrical power system by dr. H.P. Inamdar.
- 11) Utilisation of electrical power and electric traction by J.B. Gupta.
- 12) Mill Engineering by Prof. Pudbidri.
- 13) Electrification in Textile Industry by Willum Style.
- 14) Planning for Demand side management in electricity sector. Tat Mcgraw Hill, New Delhi.
- 15) Industrial load management – Theory and practice and simulation by Bjork C.O. – Elsevier the Netharland
- 16) Electrical Energy Management in Textiel Mills by Nitra, Ghazibad.
- 17) Energy Management by Ocallaghan Paul (Mcgraw Hill books co.England)

- 18) Textile Eng. Progress by Nissan
- 19) Energy Conservation – TI – Tex Progress.
- 20) Electrical Energy Management in Textile Mills – Training Programme.

**THIRD YEAR B. TEXT. - SEMESTER-II**

**6.4 STRUCTURE & PROPERTIES OF YARNS (TT)**

Lectures	:	3 Hrs / Week
Practicals	:	2 Hrs / Week
Theory Paper	:	100 Marks
Practical Exam	:	50 Marks
Term Work	:	50 Marks
Subject Total	:	200 Marks

1. Classification and Structure of Yarn: Classification of yarns, Yarn structures- fundamental structural features of yarns. Structurally related performance of yarn, effect of mechanical and chemical treatment
- 2) Twist in yarns: Geometry of twisted yarns. Idealized helical geometry, twist contraction, twist and packing of fibres in yarns, idealized packing and packing in actual yarn. Influence of twist in man made fibres on other yarn properties
- 3) Form and fibre arrangement in twisted yarns- Fibre migration-Ideal migration, Geometrical approach, Tracer fibre technique for estimation of migration, Characterisation of migration behavior, Migration in spun and filament yarn, Tension variation mechanism of migration, frequency and period of migration,
- 4) Theory of the extension of continuous filament yarns: Simplest analysis of tensile behavior, analysis with transverse forces and lateral contraction, analysis for large extension, prediction of breakage, prediction of load-extension curve. Observed extension and breakage of continuous filament yarn. Terminology and definitions of the same, breakage effect of twisting method on tensile properties
- 5) Mechanical Properties of Yarn: Mechanics of yarn structures, Tensile behavior of continuous filament yarns. Influence of processing factors on tensile properties. Observed extension and breakage of spun yarns, experimental studies
- 6) Yarn Irregularity:

Introduction, Characteristics of yarn evenness, Causes of unevenness, concept of limiting irregularity. Instrumental evaluation of yarn irregularity Analysis of Irregularity -V(L) and B(L) Curves-their explanation and significance-Types of irregularities-Random, Quasi-Periodic and Periodic-Short term, Medium Term and Long Term Irregularities-Measurement of wave length of periodic variation-Study of Uster spectrogram-Analysis and Interpretation of spectrograms-Effect of yarn evenness on Yarn Properties and on Further Processing and the Fabric Appearance.

Yarn imperfections-Definitions, causes of imperfection, measurement of imperfections and its importance, Seldom occurring faults-Classification, causes and its measurements

7. Yarn Structure in Relation to the Aesthetic and tactile qualities of apparel fabrics Role of Structure in visual aesthetics, tactile aesthetics, Role of yarn structure in fabric compression

### **LIST OF EXPERIMENTS**

- 1) Study of yarn evenness.
- 2) Comparison of dry & wet tenacity of yarn.
- 3) Comparative study of strength on Tensomaxx & Tensolab.
- 4) Study of yarn friction.
- 5) Study of yarn hairiness.
- 6) Study of yarn abrasion.
- 7) Study of fibre migration in twisted yarn.
- 8) Yarn diameter.
- 9) Effect of change in speed on yarn strength.
- 10) Study of classimat faults.
- 11) Twist measurement by optical & twist upto break method.
- 12) Analysis of variance – length curves & spectrogram.

## REFERENCE BOOKS

1. Structural mechanics of fibres, yarns and fabrics by Hearle, Grosberg and Backer
2. Textile Yarn by Marindale and Goswami
3. Properties of fibres, yarns and fabrics by Kaswell
4. Physical Testing and quality control textile progress, Vol. 23, No.1/2/3 by K.Slater
5. Principle of textile testing by J. E. Booth
6. Mario Bona-Textile Quality (Eurotex series)
7. Cotton Testing by Steadman
8. Physical Testing of Textiles, B. P. Saville
9. Textile Testing-Fibre, Yarn and Fabric by Dr. Arindam Basu (ATIRA)
10. Testing & Quality Management by Dr. V. K. Kothari (IIT Delhi)

## **THIRD YEAR B.TEXT. - SEMESTER - II**

### **6.5 YARN FORMING TECHNOLOGY - IV (TT)**

Lectures	-	4 hrs/week
Practicals	-	3hrs/week
Theory Papers	-	100 marks
Term Work	-	50 Marks
Subject Total	-	150 Marks

#### **A. Rotor Spinning Technology:-**

1. Limitation of ring spinning system. drafting & stages involved in opened spinning – developments of twisting elements in opened spinning.
2. Study of design developments in Shivery Delivery section, Fibre separation and transportation, Fibre deposition and twist insertion, Design aspects of rotor.
3. Developments in rotor drives.
4. Yarns monitoring in rotor spinning.
5. Automation in Rotor Spinning Machine.
6. Structure and properties and applications of rotor yarns.
7. Technological developments in spinning and processing of rotor spun yarns, effect of trash in sliver, improved cleaning at rotor, production of fine rotor yarns, rotor spinning of man made and blends, speciality yarns on rotor spinning machines, post spinning processing.

#### **B. Air Jet Spinning:-**

- i) Basic concept, evaluation of air jet spinning.
- ii) Raw material requirement, stages involved, operating principle & air jet spinning.
- iii) Principles of MJS, MTS & MVS.
- iv) Specifications & working of different air jet spinning systems.
- v) Yarn properties, process variables, limitations.

**C. Friction Spinning:-**

- i) Operating principle & raw material requirements, stages involved in friction spinning.
- ii) Working principle of different friction spinning systems..
- iii) Development in various stages of friction spinning.
- iv) Yarn properties, application, process variables.

**D. Other Unconventional Spinning Techniques:-**

- i) Introduction to cover spinning, Spinning Bobtex, SIRO spinning, self- twist spinning, twistless spinning .
- ii) Raw material requirements, operating principles & yarn properties produced from these spinning systems.
- iii) Advantages & limitations of these spinning systems.

**E. Yarn Condition :-**

- i) Principle & scope of yarn conditioning.
- ii) Conditioning procedure, design & operational details of various yarn conditioning systems.

**LIST OF EXPERIMENTS**

1. Study of Rotor spinning machine – Passage, Gearing & calculations related to Speeds of various organs, Twist, Production, etc.
2. To analyze the effect of various process parameters on quality of rotor spun yarn.
3. Study of Air Jet spinning – Constructional details, Passage, Driving arrangement and calculations.
4. To analyze the effect of various process parameters on quality of air jet spun yarns.
5. Study of display and monitoring devices used on spinning machines/- spinning accessories.
6. Production of Fasciated yarn on Air Covering Machine & to study the characteristics of air-covered yarn.

7. Manufacture of Siro yarn on ring frame and comparison of the same with ring spun yarn.
8. Manufacture of doubled yarn on TFO & Ring doubling & comparison of yarn properties.
9. To study the effect of process parameters in Draw-Texturising machine on textured yarn quality.
10. To study the effect of process parameters in Air-jet Texturising machine on textured yarn quality.
11. Study of Hollow yarn Doubling – Constructional details, passage of materials, driving arrangement and calculation.
12. Effect of various process parameters in yarn conditioning on yarn properties.
13. Mill visit to study the various process parameters in blend spinning.

#### **REFERENCE BOOKS**

- 1) The Textile Institute Manual of Textile Technology – Short staple spinning Series Vol.V – New Spinning System by W. Klein.
- 2) Trade Literature of Trutzschler, Rieter, Marzoli, cheery Hara, Toyoda, Holligsworth etc.
- 3) Textile Progress Vol.3, No.2 – A Critical Appreciation of Recent Developments – Yarn Production and Properties by W. Nuttler.
- 4) The Economics of Science and Technology of yarn production – Vol.-I & II
- 5) Spinning in 70s by P.R. Lord.
- 6) Textile progress vol. 10 No.2 – The Production and properties of staple fibre, Yarns made by Recently developed Techniques by L. Hunter.
- 7) Air jet spinning – Textile Progress, Textile Institute Publication.
- 8) Hand Book of Yarn Production by P. R. Lord
- 9) Spun Yarn Technology by [Carl A. Lawrence](#)
- 10) Vol V New Spinning Systems – H. Staldar
- 11) Open end Spinning – R. Nield

- 12) Textile Progress Vol 10 No. 2 – Production & properties of Staple fibre yarns made by recently developed techniques O L. Hunt.
- 13) Textile Progress on open end spinning – C. A. Lawrance

## **THIRD YEAR B.TEXT. - SEMESTER - II**

### **6.6 FABRIC FORMING TECHNOLOGY-IV (TT)**

Lectures	-	4 hrs/week.
Practicals	-	3 hrs/week.
Theory Paper	-	100 marks.
Term Work	-	50 marks
Subject Total	-	150 marks.

#### **WEFT KNITTING:-**

1. Basic structure of warp & weft knitted fabric. Comparison with woven fabric with respect to production and properties.
2. Passage of yarn through circular weft knitting machine. Study of elements of knitting machines such as :
  - a) Creel – Construction, types, capacity and their suitability.
  - b) Yarn feeding – Need, construction, drive, types of positive and negative feeders, stop motions, indicators, tensioners etc.
  - c) Loop forming mechanism – Knitting cycle, types of needles and their comparison. Study of essential elements of loop forming such as cylinder, sinker, cam, dial, yarn guide.
  - d) Take down motion – Spreader, Nip roller, cloth roller, Drive mechanism and its types, capacity. Machine and material monitoring systems.
3. Study of weft knitted structures :-

Principle stitches such as knit, Tuck, miss and their representation types. Types of knitted fabrics such as single jersey, double jersey and their derivatives like interlock, Rib and purl etc. manufacturing process of above fabrics. Conditions for the use of delayed & synchronized timing. Pattern analysis method, Needle order, Cam order. Pattern structures with one, two, three & four needle types(S/J-crossmiss, lapique, longitudinal tuck stripes,plain pique .Rib – milano, half milano, cardian, half cardian, double cardian, swiss and French pique. Interlock- pique, texi pique, pintuck, interlock super roma, bourrelet ). Concept of colour Jacquards structures.
4. Relative Technology (Relanit) on circular knitting machines.

5. Needle Controls – Cams, Control sinkers, machine memory.
6. Patterning Equipments – For fleecy fabrics, plush fabrics, stripers, Loop transfer.
7. Study of weft knitted fabric defects and their remedies, yarn quality requirements.
8. Circular weft knitting machine production calculations, fabric weight and Tightness factor. Knitted fabric relaxation concept.

### **FLAT KNITTING :-**

1. Basic elements & their functions of flat knitting machine. Hand and machine operated flat knitting machines & their knitting actions.
2. Machine operation for various stitches such as Miss, Tuck, Transfer, drop stitch.
3. Design with and without needle selection, bed racking, new formed and transfer loop for hand and machine operated machines. Concept of seamless knitting.

### **Sox, Hand Gloves Knitting :-**

Basic machines for above items, working principles and types.

### **Warp Knitting :-**

1. Passage of yarn through warp knitting machine. Essential elements of warp knitting machine. Knitting cycle of Tricot and Raschel warp knitting machine. Study and representation of single and two guide bars structures.
2. Multi guide bar Tricot & Raschel machines. Weft insertion techniques, Terry technique, Sinker pile fabrics, full plate, cut press & miss press techniques.
3. Crochet machines – General principles old and new patterning devices.
4. Straight bar frame – Knitting elements and their operation through one complete cycle.

5. Methods for calculating runner ratios for each bar for different structures.

### **Non-wovens :-**

Definition, classification according to raw material and method of production. Comparison of productivity with other technologies. Raw material used, process flow for manufacturing various non-woven techniques, introduction to web forming and bonding methods.

### **Geo Textiles :-**

Definition, classification, Raw materials, functions and area of application.

## **LIST OF EXPERIMENTS**

1. Study of single jersey circular weft knitting machine – yarn supply arrangements, loop forming mechanism, takedown motion, Production calculation.
2. Study of double jersey circular weft knitting machine – yarn supply arrangements, loop forming mechanism, takedown motion, Production calculation.
3. Study of warp knitting machine – yarn supply arrangements, loop forming mechanism, takedown motion, Production calculation.
4. Study of flat knitting machine – yarn supply arrangements, loop forming mechanism, takedown motion, Production calculation.
5. Design setting on single jersey circular weft knitting machine- Machine operation, cam & needle arrangements, yarn feeding and take down setting.
6. Design setting on Double jersey circular weft knitting machine- Machine operation, cam & needle arrangements, yarn feeding and take down setting.
7. Design setting on warp knitting machine- Machine operation, pattern chain & guide arrangements, yarn feeding and take down setting.
8. Knitted fabric analysis.
9. Knitted fabric analysis.
10. Visit to knitting unit.

11. Study of needle loom technology and production of tape.
12. Study of Braiding machine technology and production of lace
13. Visit to circular loom unit.

#### **REFERENCE BOOKS**

1. Knitting Technology by Prof.D.B. Ajgaonkar.
2. Circular Knitting by Dr. Chandrashekhar Iyer.
3. Knitting Technology by Mr. D. Spenser.
4. Warp Knitting by Dr. S. Raz.
5. Flat Knitting by Dr. S. Raz.
6. Manual of Nonwoven by Dr. Radko Kríma.
7. Geo-textiles by N.W.M. John.