



अनुसंधान प्रबंधन और राष्ट्रीय प्रौद्योगिकी संस्थान  
**RESEARCH MANAGEMENT AND NATIONAL INSTITUTE OF TECHNOLOGY**  
(An Autonomous institution under Ministry of HRD, Govt. of india)  
(A 9001-2008 ISO CERTIFIED INTERNATIONAL B-SCHOOL)

**TEXTILE TECHNOLOGY**

**On**

**UGC Model Curriculum**

# TEXTILE TECHNOLOGY SYLLABUS

## COURSE STRUCTURE FOR TEXTILE TECHNOLOGY

### SECOND YEAR FIRST SEMESTER

<b>A. THEORY</b>							
SL.NO	CODE	THEORY	CONTACTS (PERIODS/WEEK)				CREDIT S
			L	T	P	TOT AL	
1.	TT 301	Textile Fibre I	3	0		3	3
2.	TT 302	Yarn Formation I	3	0		3	3
3.	TT303	Fabric Formation I	3	0		3	3
4.	TT304	Chemical processing of Textile I	3	0		3	3
5.	TT305	Textile Testing and instruments I	3	0		3	3
6.	TT306	Applied Mechanics	3	0		3	3
7.	TT307	Statistics	3	1		4	4
<b>Total of Theory</b>			21	1		22	22
<b>B. PRACTICALS</b>							
8.	TT 391	Yarn Formation Lab I			3	3	2
9.	TT392	Fabric Formation Lab I			3	3	2
10.	TT393	Chemical Processing of Textiles Lab I			3	3	2
11.	TT394	Textile Testing & Instruments I			3	3	2
<b>Total of Practical</b>					12	12	8
<b>Total of Semester</b>			34			30	

# TEXTILE TECHNOLOGY SYLLABUS

## TEXTILE TECHNOLOGY SECOND YEAR SECOND SEMESTER

<b>A. THEORY</b>							
SL.NO	CODE	THEORY	CONTACTS (PERIODS/WEEK)				CREDITS
			L	T	P	TOTAL	
1.	TT401	Textile fibre II	3	0		3	3
2.	TT402	Yarn Formation II	3	0		3	3
3.	TT403	Fabric Formation II	3	0		3	3
4.	TT404	Chemical processing of Textile II	3	0		3	3
5.	TT405	Computer Application in Textiles	3	0		3	3
6.	TT406	Design and Structure of Fabric-I	3	0		3	3
<b>Total of Theory</b>			18	0		18	18
<b>B. PRACTICALS</b>							
7.	TT 491	Yarn Formation Lab II			3	3	2
8.	TT492	Fabric Formation LabII			3	3	2
9.	TT493	Chemical Processing of Textiles Lab II			3	3	2
10.	TT494	Computer Application in Textiles lab			3	3	2
11.							
<b>Total of Practical</b>					12	12	8

### **C. SESSIONAL:**

HU 481	Technical Report writing & / Language Practice Lab	0	0	0	3	2
	<b>TOTAL OF SESSIONAL</b>				3	2
<b>TOTAL :</b>					<b>33</b>	<b>28</b>

# TEXTILE TECHNOLOGY SYLLABUS

## COURSE STRUCTURE FOR TEXTILE TECHNOLOGY

### THIRD YEAR FIRST SEMESTER

<b>A. THEORY</b>							
SL.NO.	CODE	THEORY	CONTACTS (PERIODS/WEEK)				CREDIT S
			L	T	P	TOTAL	
1.	TT501	Yarn Formation III	3	0		3	3
2.	TT502	Fabric Formation III	3	0		3	3
3.	TT503	Chemical Processing of Textile III	3	0		3	3
4.	TT504	Textile Testing & Instrument II	3	0		3	3
5.	TT505	Design and Structure of Fabric-II	3	0		3	3
6.	TT506	Instrumentation & Control	3	0		3	3
<b>Total of Theory</b>			18	0		18	18
<b>B. PRACTICALS</b>							
7.	TT 591	Yarn Formation Lab III			3	3	2
8.	TT592	Fabric Formation Lab III			3	3	2
9.	TT593	Chemical Processing of Textiles Lab III			3	3	2
10.	TT594	Textile Testing & Instrument Lab II			3	3	2
11.	TT595	Industrial Training					2
<b>Total of Practical</b>					12	12	10
<b>Total of Semester</b>			30				28

# TEXTILE TECHNOLOGY SYLLABUS

## TEXTILE TECHNOLOGY

### THIRD YEAR SECOND SEMISTER

<b>A. THEORY</b>							
SL.NO	CODE	THEORY	CONTACTS (PERIODS/WEEK)				CREDIT S
			L	T	P	TOTAL	
1.	TT601	Yarn Formation IV	3	0		3	3
2.	TT602	Fabric Formation IV	3	0		3	3
3.	TT603	Chemical Processing of Textile IV	3	0		3	3
4.	TT604	Quality Management	3	0		3	3
5.	TT605	Elective-I (Theory and Design of Textile Machines OR Textile Mechanics)	3	0		3	3
6.	TT606	Elective-II (Technical Textiles OR New Generation Fibres)	3	0		3	3
7.	TT607	Textile Mill Management I	3	0		3	3
<b>Total of Theory</b>			21	0		21	21
<b>B. PRACTICALS</b>							
8.	TT691	Yarn Formation lab			3	3	2
9.	TT692	Fabric Formation lab			3	3	2
10.	TT693	Seminar			3	3	2
<b>Total of Practical</b>					9	9	6
<b>Total of Semester</b>			30			27	

# TEXTILE TECHNOLOGY SYLLABUS

## FOURTH YEAR FIRST SEMISTER

<b>A. THEORY</b>							
SL.N O.	CODE	THEORY	CONTACTS (PERIODS/WEEK)				CREDIT S
			L	T	P	TOTAL	
1.	TT701	Information Technology in Textile	3	0		3	3
2.	TT702	Industrial Eng.	3	0		3	3
3.	TT703	Theory of Textile Structure	3	0		3	3
4.	TT704	Textile Mill Management II	3	0		3	3
5.	TT705	Elective III ( Wool Technology / Silk Technology / Jute Technology )	3	0		3	3
6.	TT706	Elective-IV (Garment Technology OR Specialty Yarn & Sewing Thread	3	0		3	3
<b>Total of Theory</b>			18	0		18	18
<b>B. PRACTICALS</b>							
7.	TT 791	Industrial Training					2
8.	TT792	Seminar on Industrial Training					3
9.	TT793	Minor Project			9	9	6
10.	TT794	Information Technology in Textile Lab			3	3	2
<b>Total of Practical</b>					12	12	13
<b>Total of Semester</b>			30				31

# TEXTILE TECHNOLOGY SYLLABUS

## FOURTH YEAR SECOND SEMISTER

<b>A. THEORY</b>							
SL.NO.	CODE	THEORY	CONTACTS (PERIODS/WEEK)				CREDIT S
			L	T	P	TOTAL	
1. 1	HU801	Values and Ethics in Profession	3	0		3	3
2. 2	TT801	Energy Science	3	0		3	3
3. 3	TT802	Elective -V (Entrepreneurship development / Robotics and Control Engg./ Computer Simulation for Textile Mechanics)	3	0		3	3
<b>Total of Theory</b>						9	9
<b>B. PRACTICALS</b>							
4.	TT891	Assigned Project			12	12	8
5.	TT881	Personality development			3	3	2
6.	TT894	Comprehensive Viva-Voce					4
<b>Total of Practical</b>						15	14
<b>Total of Semester</b>			24				23

# **TEXTILE TECHNOLOGY SYLLABUS**

## **SEMESTER-III**

# TEXTILE TECHNOLOGY SYLLABUS

## Textile Fibres I (TT301)

L	T	P	C
3	0	0	3

- 1. Introduction:** a) Classification of textile fibres according to their nature and origin, b) essential and desirable properties of textile fibres, c) staple fibre and continuous filaments, d) comparison of natural and man made fibres.
- 2. Natural fibres:** a) Vegetable (bast, leaf and seed fibres), b) animals (wool and silk) and c) mineral (glass, asbestos and metallic fibres). d) cotton: concept of varieties; definition of grading, distinctive properties and end uses, e) jute:- varieties, distinctive properties and end uses, f) flax and pineapple fibres:- brief introduction and uses, g) protein fibres:- wool:- classification, distinctive properties and end uses, silk:- classification, distinctive properties and end uses.
- 3. Man-made fibres:** a) Classification, b) regenerated fibres-acetate, viscose & diverse forms of viscose, cuprammonium, alginate. - general properties, end uses, c) synthetic fibres:- principles of polycondensation with reference to polyesters, polyamides and polyurethanes, principles of poly addition with reference to acrylics, polyolefins, polyvinyl chlorides and co-polymers, d) chemical properties & end uses of polyester, polyamide and poly acrylonitrile fibres, e) introduction to the production of manmade fibres: f) principles of melt spinning, details of melt spinning process with special reference to polyester-parameters near spinneret, LOY, MOY & POY, g) dry spinning and h) wet spinning; i) viscosity of melts and solutions, j) equipments of manmade fibre production, k) main features of the production of some important manmade fibres-viz., viscose, cellulose-acetate, polyamides, polyesters, polypropylene and poly acrylic fibres, l) concept of quenching operation and finish application, m) concept of micro denier fibre and aramid fibers.
- 4. Texturing:** Introduction, purpose, bulked and textured yarns, methods of texturing thermoplastic and non-thermoplastic yarns, basic principles, feed material characteristics-study of twist-set-detwist, false twist, edge crimp, stuffer box crimp; knit de-knit techniques of texturing and the techniques of modified stretch yarn;, properties and uses of textured and bulked yarns.

### Reference Subjects:

1.Chemistry I (TCH104), 2 Chemistry II (TCH203), 3.Yarn Formation I (TT302), 4 Textile Testing and Instruments I (TT305)

### Text Books and Articles:

1. Manmade Fibres by R.W. Moncrieff, 2. Textile Chemistry, Vol. I, by R.H. Peters, 3. Dyeing and Chemical Technology of Textile Fibres by E.R. Trotman, 4. Handbook of Fiber Science and Technology, Vol. IV, Fiber Chemistry by M. Lewin and E.M. Peare, 5. Man-made Fibres Science and Technology, Vol. 1,2,3, by H.F. Mark, S.M. Atlas and E. Cernia, 6. Polyester Fibres Chemistry and Technology by H. Ludwig, Textbook of Polymer Science by F.W. Billmeyer.

# TEXTILE TECHNOLOGY SYLLABUS

## Yarn Formation I (TT302)

L	T	P	C
3	0	3	5

**1. Staple fibre Spinning** (brief idea): Introduction, raw material, ginning, opening, cleaning, blending, equalizing, drafting, yarn formation, different systems of spinning.

**2. Introductory concept of Ginning:** Cotton ginning and bailing-object of ginning, different methods and their limitations, description of modern ginning machine, ginning performance on yarn quality, impurities

**3. Opening and Cleaning:** Opening and cleaning: Introduction, the need for opening and cleaning, type of opening and degree of opening, impurities to be eliminated.

**4. Blending:** The purpose of blending, selection of blend constituents, measures of blending, blending procedures- merits and demerits.

**5. Blow Room:** a) Introduction, basic operations in the blow room, opening, cleaning, dust removal, even feed of material to card, blow room line as a sequence of machines-need for various types of machines; b) Components of blow room machines: feed apparatus- feed with two clamping cylinders, feed with a roller and pedals; opening methods and devices- introduction to the actions of opposing spikes, action of air currents, action of beaters and regulating action; classification of opening devices and opening variants; grid- grid as an opening device, elements of grid, waste collection under the grid, grid adjustment; interaction of feed assembly, opening element and grid; c) General factors influencing opening and cleaning; d) Detailed study of modern blow room line & individual machines; e) Idea of accessories and associated equipment (dust removing and disposing devices; material transport devices, material flow control devices, metal extractors, fire eliminator); f) Draft and production calculations; g) Performance assessment of blow room line: cleaning efficiency, degree of opening, waste, nep generation, lap weight variation and rejection, lap build, norms for blow room operations.

**6. Carding:** a) Introduction, object of carding, operating principle, various actions in carding; different types of design (cotton card, woolen card, worsted card, jute card).

b) Operating regions of the card, feed of material, requirements, material or flock feeding, single chute and double chute flock feeding; feed device- conventional and unconventional systems, taker-in zone; taker-in and its operation, elimination of waste, transfer to the main cylinder; main cylinder and cylinder under casing, flats- function, construction, movement; carding plates; cleaning positions in the region of the flats; doffing- the doffer, doffing operation, Detaching- web detaching apparatus, crushing rollers; coiling in cans; c) Card clothing: choice of clothing, classification (flexible, semi-rigid, metallic), geometry of metallic clothing, important operating parameters of clothing-point density, base width, height, tooth pitch, carding angle; tooth point, base of tooth, tooth hardness; d) Handling sliver: laying down in cans, coiler mechanisms., can changing; e) Auto levelling equipment: basic, classification, principles of short-term auto levelling regulation at the delivery, auto levelling in the feed; principle of medium term auto levelling, principles of long-term auto levelling, measuring devices-pneumatic and mechanical systems; f) Carding maintenance: stripping the clothing, burnishing the clothing, grinding of clothing-intervals between grinding, depth of grind, grinding of the flats, grinding tools-full width grinding roller, traversing grinding disc; settings- basics,

# **TEXTILE TECHNOLOGY SYLLABUS**

auxiliary equipment; g) Drives and gearing: single motor drive or multi-motor drive; gearing diagram, calculations of draft and production; h) New developments: Introduction to the trend, developments at different zones of carding; i) Performance assessment: cleaning efficiency, wastes, nep formation, card sliver unevenness etc.

**5. Processing of manmade fibres in the short staple mill: Blow room, carding** (material preparation, processing guidelines, problems, settings, modifications required, processing environment)

**Reference subjects:**

1.Yarn Formation II (TT402), 2.Yarn Formation III (TT502), 3.Yarn Formation IV (TT601), 4.Elective III (TT702), 5.Elective IV, Specialty Yarn and Sewing Thread Formation (TT705)

**Text Books and Articles:** 1. The Technology of Short Staple Spinning by W. Klein 2. A Practical Guide to Opening & Carding, W. Klein 3. Manual of Cotton Spinning (Opening & Cleaning) by C. Shrigley, 4. Manual of Cotton Spinning (Carding) by W. G. Byerley et. al., 5. Spun Yarn Technology by Eric Oxtoby, 6. Spun Yarn Technology (Vol-1 & Vol-2) by A Venkatasubramani

# **TEXTILE TECHNOLOGY SYLLABUS**

## **Yarn Formation I (TT391)**

### **Practical**

(Any six selecting two from each category)

The following list is in no way exhaustive. Additional laboratory work or experiments can be planned to consolidate the theoretical work and to emphasize the activities for doing rather than the knowing.

#### **Category A**

1. To study and sketch the working mechanism of bale opener /breaker
2. To study and sketch the working mechanism of hopper feeder.
3. To study and sketch the working mechanism of step cleaner or similar
4. To study and sketch the working mechanism of scutcher and lap preparation
5. Determination of openness of tufts.
6. Determination of trash content in cotton.

#### **Category B**

1. To study and sketch the working mechanism of a card with respect to flow of material
2. To study and sketch the working mechanism of feed systems
3. To study and sketch the working mechanism of flats
4. To study and sketch the working mechanism of delivery and web collection
5. To study and sketch the working mechanism of coiler and sliver packing
6. To study different settings of the card

#### **Category C**

1. To study the gearing plan, marking of various change wheels and gears of card
2. Calculation of rotational speeds and surface speeds of various organs of Card
3. Calculation of draft at various regions, total draft and draft constant.
4. Calculation of actual production and production constant of card.
5. Determination of transfer coefficient of a card.
6. Determination of cleaning efficiency of a card.

# TEXTILE TECHNOLOGY SYLLABUS

## Fabric Formation I (TT303)

L	T	P	C
3	0	3	5

### Key Concepts

*Introduction to fabric formation and preparatory processes, warp winding, weft winding, warping and sizing*

- 1. Introduction:** a) The fabric, b) methods of fabric formation, c) phases in the formation of fabric by weaving, d) a technical introduction to weaving: basic motions, principal mechanisms of a loom, path of warp through a loom, motion of the healds, sley and shuttle, idea of other loom mechanisms.
- 2. Preparatory processes:** Introduction, sequence of processes. Single and multi-end winding.

Single –end Warp Winding-a) Introduction, b) need for winding, c) cleaning, clearing, d) different types of packages and package build-parallel, near parallel wind & cross wound packages, standard package formats (cop, cone, cheese, pineapple etc.) e) winding techniques-random, precision and combined, f) winding parameters: winding rate, wind and traverse ratio, gain, winding angle, g) winding faults; pattern formation, principles of pattern breaking. h) winding operation, i) unwinding- side and over end withdrawal, j) winding machines-basic function, classification of winding machines, spindle and drum driven machines- driving the package e.g., constant surface speed, constant angular speed, varying angular speed. k) yarn traversing- reciprocating mechanisms, rotating mechanisms, l) stop motions, m) auxiliary functions (creeling, piecing, knotting, splicing, doffing etc.), n) tensioning devices, o) yarn clearing-mechanical and electronic types, p)commercial machines, classification, automatic and non-automatic: non-auto machines-introductory idea: automatic machines-concept of travelling spindle machines and small group non-travelling spindle machines, large group machines, brief description of two most popular commercial machines

Single –end Weft winding- a) Introduction b) need, c) shape and build of the pirn, c) basic requirements, d) elements of the pirn winding machines, e) concept of basic terms-pirn density, cohesion, consistency of pirn diameter, bunch building, chase, winding and binding coils, yarn tails and back wind, spindle speed, direction of rotation, f) degree of automation, g) description of features of a pirn winding machine with respect to a latest commercially available machine.

**Multi-end Winding/Warping:** a) Introduction, b) principal methods of warping, c) warping process, d) warping creels- continuous chain creel, truck creel, magazine creel, automatic creel, unrolling creel e) yarn tension in warping, f) stop motions and measuring motions, g) leasing and beaming, h) beam warping or direct warping- process, machines, i) section warping- process, machines, section building and relating drum storage capacity to beam flange diameter.

**Sizing:** a) Introduction, b) sizing process, c) size ingredients, d) factors which affect the properties of sized yarns, f) preparation of the size paste- formulation and equipments, g) techniques of sizing, h) types of sizing, i) concept of factors governing the pick up of size, j) principal machine elements- creel, size box, drying arrangements, head stock,

# **TEXTILE TECHNOLOGY SYLLABUS**

tension control mechanisms, measuring and marking mechanisms etc., k) modern trends in sizing.

**Reaching in and Drawing in :** a) Introduction, b) need, c) process, d) modernization, e) related calculations.

**Reference Subjects:**

1.Fabric Formation II (TT403), 2.Fabric Formation III (TT503), 3.Fabric Formation IV (TT602), 4.Elective I-TT607,Textile Mechanics.

**Text Books and Articles:**

1. Principles of Weaving by Marks & Robinson, 2. Textiles (The Motivate Series) by A. Wynne, 3. Weaving Conversion of Yarn to Fabric by Lord & Mohammed, 4. Textile Maths Volume III by Booth, 5. Cotton Weaving by Gordeev, Volkov, Blinov & Svyantenko, 6. Handbook of Weaving Preparation by D.S. Verma, 7. Winding – Silver Jubilee Monograph by BTRA, 8. Sizing – Materials, Methods, Machinery by Ajgoankar, Talukdar & Wadekar, 9. Weaving – Machinery, Mechanisms, management by Talukdar, Sriramalu & Ajgoankar..

# **TEXTILE TECHNOLOGY SYLLABUS**

## **Fabric Formation I (TT392)**

### **Practical**

(Any six selecting two from each category)

The following list is in no way exhaustive. Additional laboratory work or experiments can be planned to consolidate the theoretical work and to emphasize the activities for doing rather than the knowing.

#### **Category A;**

1. To study the working of an Automatic winding machine and prepare a bobbin.
2. To study the working of a Beam warping.
3. To study the working of a Sectional warping.
4. To study the passage of yarn on a sizing machine and the features of various parts/mechanisms of the sizing machine.

#### **Category B:**

1. To perform simple Reaching in, Drawing in and warp tying.
2. To prepare a bobbin on a pirn winding machine with standard settings
3. To convert some ring bobbins to cone/cheese by adjusting the tension and slub catcher.
4. To prepare a size paste for a given sort.

#### **Category C**

1. To study the principal mechanisms of a precision winder.
2. To study the working of a automatic knotter on a winding machine,
3. To study the working of a splicer on a winding machine.
4. To have practice of synchronising body movements for shedding, picking and beat-up on the handloom by producing a metre of fabric with least fabric faults.

# TEXTILE TECHNOLOGY SYLLABUS

## Chemical Processing of Textile I (TT304)

L	T	P	C
3	0	3	5

- 1. Introduction:** Overview of colouration and finishing or chemical processing of textile materials, overview of different stages, preparation of cotton/cellulosic materials, prelims of preparation: grey testing-stamping-mending-stitching
- 2. Chemical processing equipment:** Principles of functions of different machines used in preparatory processing including padder, J-box, washing machine, kiers, different mercerising machines, equipments for water removal – contact and non-contact type of dryer, hydroextractor, construction, schematic diagram, function, speed, capacity etc.
- 3. Singeing:** Objectives, materials suitable, singeing methods-mentioning of plate and roller singeing machine, details of gas singeing machine, merits, demerits, precautions, advancement, bio-singeing.
- 4. Desizing:** Objective, ingredients of size, brief chemical nature and process of removal-chemistry of starch and its hydrolytic and oxidative decomposition, methods of desizing-hydrolytic & oxidative, brief glimpse of rot steep and acid steep; enzymatic desizing, classification of amylases used in desizing-according to hydrolytic action & according to origin, factors of enzymatic desizing, methods of enzymatic desizing, some commercial names of enzymes, merits and demerits over other desizing processes, precautions, bromite desizing, factors, methods of bromite desizing, advancement, if any; method of evaluation of desizing efficiency.
- 5. Scouring:** Objective, impurities of cotton fiber-their chemical nature and possible methods of removal, merits and demerits of each process, importance of alkali scouring, surfactants, concept of micelle, critical micelle concentration, HLB value, cloud point, their classification –according to chemical nature, action, mechanisms of wetting, detergency and emulsification, factors of scouring, methods of scouring, different scouring equipment e.g., High pressure kier, combi-steamer, their construction, working principle, capacity, solvent scouring, method of evaluation of scouring efficiency, enzymatic scouring.
- 6. Bleaching:** Objective, classification of bleaching methods, different bleaching agents, their relative merits and demerits, hypochlorite, chlorite, peroxide bleaching, their mechanisms, bleaching parameters, methods of bleaching, role of chemicals used in bleaching, method of evaluation of bleaching efficiency including objective, principle/mechanism, properties, and method of application of optical whitening agents.
- 7. Mercerisation:** Objective, action of alkali on the morphological/fine structure of cellulose, methods- cold and hot, relative merits and demerits, evaluation
- 8. Treatment with liquid ammonia:** Objective, methods, relative merits and demerits, evaluation
- 9. Preparation of coloured materials:** Nature of problems associated with the preparation of coloured goods, causes and remedies
- 10. Preparation of silk and wool:** Impurities present, degumming/scouring, bleaching, optical whitening of wool and silk.
- 11. Preparation of jute:** Impurities present, scouring, bleaching, optical whitening
- 12. Preparation of synthetic fibres, blends:** Impurities present, heat-setting, singeing of man made fibres, their blends; scouring, bleaching, optical whitening: objectives, methods, merits and demerits of different methods, wherever applicable.

# **TEXTILE TECHNOLOGY SYLLABUS**

## **Reference Subjects:**

1. Engg.Chemistry (Ch201), 2.Textile Fibres I & II (TT301 & TT401), 3. Chemical Processing of Textiles II,III & IV (TT404 ,TT503 & TT603).

## **Text Books:**

1.Textile Chemistry, Vol. II by R.H. Peters, 2. Textile Scouring and Bleaching by E.R. Trotman 3. Technology of Bleaching and Mercerising by V.A. Shenai, 4. Engineering in Textile Colouration by C. Duckworth, 5. Dyeing and Chemical Technology of Textile Fibres by E.R. Trotman, 6. Handbook of Fiber Science and Technology, Vol. I, Fundamentals and Preparation, Part A and B by M. Lewin and S.B. Sello, 7. Chemical Technology of Fibrous Materials by F. Sadov, M. Korchagin and A. Matetsky, 8. Mercerisation by J.T. Marsh, 9. Surfactants in Textile Processing by A. Datyner, 10. The Preparation and Dyeing of Synthetic Fibres by H.U. Schmidlin.

# **TEXTILE TECHNOLOGY SYLLABUS**

## **Chemical Processing of Textiles I (TT393)**

### **Practical**

(All)

The following list is in no way exhaustive. Additional laboratory work or experiments can be planned to consolidate the theoretical work and to emphasize the activities for doing rather than the knowing.

1. Desizing of cotton material.
2. Scouring of cotton material.
3. Bleaching of cotton material:
  - a) hypochlorite bleaching
  - b) chlorite bleaching
  - c) peroxide bleaching
4. Blueing/optical whitening of cotton material.
5. Degumming of silk material.
6. Bleaching of silk material.
7. Optical whitening of silk material.
8. Mercerisation of cotton material.

# TEXTILE TECHNOLOGY SYLLABUS

## Textile Testing & Instruments I (TT305)

L	T	P	C
3	0	3	5

- 1 Introduction to textile testing:** Properties of fibres, yarns and fabrics and their relevance in assessing the performance of textiles during and after manufacture, selection of samples for testing, random and biased samples, review of statistical techniques (estimation of population characteristics from samples and the use of confidence intervals, determination of number of tests to be carried out to give chosen degree of accuracy, significant testing of means, quality control charts and their interpretation.).
- 2 Fibre Testing:** Measurement of fibre length: length and its variability measurement, cumulative frequency diagram, fibre length distribution, wt. distribution curve, methods of measurement and associated parameters: fibre fineness: technical significance, various parameters of measurement, gravimetric, optical, air flow and vibroscopic method; determination of maturity of cotton: significance, maturity ratio, maturity coefficient, degree of thickening, methods of measurement- air flow, dye method, polarising light method and NaOH method; tensile testing of fibres: comparative stress-strain diagrams of different fibres, tensile testing of single fibre, bundle strength testing. principles of operation of CRL, CRT, CRE and accelerated rate of loading type of tensile testers; moisture in fibres: relative and absolute humidity, standard atmosphere and testing atmosphere, effect of moisture on fibres, moisture content and regain, moisture estimation methods; crimp: significance, methods of determination; foreign matter content of fibres: significance, methods of determination.
- 3 Yarn testing:** Yarn dimensions and numbering: linear density, yarn numbering systems, determination of yarn count, conversion from one system to another, measurement of yarn diameter, measurement of twist: twist, diameter and count relation, twist factor, optimum twist, effect of twist on fabric properties, methods of twist measurement, yarn strength: the concept of yarn rupture, types of tests- single thread, lea and ballistic test, types of testers and their principles of working (pendulum, spring, inclined plane, strain gauge etc.), types of testing (CRT, CRL, CRE and ARL), the effect of gauge length (the weak link theory etc.), automation in tensile testers, evenness testing: idea of the theory of random assemblies of fibres, theoretical best evenness possible, the V(l) and B(l) curves, periodic variations (drafting wave, machine imperfections), evenness testing of laps, slivers, rovings and yarns, analysis of periodic variations in mass per unit length. yarn appearance and grading, Uster Classimat, hairiness of yarn: methods of testing and implications for further processing, grading of yarn, special testing of interlaced and textured yarns.

### Reference Subjects:

1. Yarn Formation I (TT302), 2. Yarn Formation II (TT402), 3. Yarn Formation III (TT502), 4. Yarn Formation IV (TT601), 5. Textile Fibres I (TT301), 6. Textile Fibres II (TT401)

### Text Books:

1. Principles of Textile Testing by J. E. Booth, 2. Textile Testing by Skinkle, 3. Physical Properties of Textile Fibres by W.E. Morton and J.W.S. Hearle, 4. Testing and Quality Management by V.K. Kothari

# TEXTILE TECHNOLOGY SYLLABUS

## Textile Testing and Instruments I (TT394)

### Practical

(Any six experiments)

The following list is in no way exhaustive. Additional laboratory work or experiments can be planned to consolidate the theoretical work and to emphasize the activities for doing rather than the knowing.

#### **A. Fibre**

1. To prepare a Baer sorter diagram and determine the following:
  - a) Effective Length
  - b) Mean Length
  - c) Dispersion percentage
  - d) Short fibre percentage
2. To determine 2.5% span length, 50% span length and uniformity ratio of a given cotton using fibrograph. Construct a fibrogram by re-setting the counters for various S.L. between 5% to 90%. Compare the fibrogram of manmade fibre with cotton.
3. To determine micronaire value of given cotton sample by Airflow method. Convert the result into SI unit and give a suitable rating to the fibre sample.
4. To determine maturity coefficient and maturity ratio of given cotton sample by caustic soda method. Give appropriate rating to the sample.
5. To determine the bundle strength and elongation at break of a cotton fibre using Stelometer instrument. Study the effect of rate of loading on tensile properties of the fibre.
6. To determine moisture content/regain of a fibre sample by desiccator/hot air method.
7. To determine crimp (arcs/cm and crimp%) of a given manmade fibre sample.
8. To determine fibre fineness of manmade fibres/filaments by:  
Whole fibre method, Vibroscope

#### **B. Yarn**

1. To determine yarn count by Knowle's, Beesley, Quadrant and electronic balance.
2. To determine the lea strength, lea strength CV% and count strength product (CSP) of carded and combed yarns.
3. To determine the yarn strength, breaking elongation, tenacity and initial modulus of spun yarn using a modern tensile tester (strain gauge principle). Determine the relationship between the tenacity and count strength product (CSP) of spun yarn.
4. To study the effect of gauge length and rate of extension on the tensile properties of spun yarns.
5. To determine the stress-relaxation and creep characteristics of filament yarns and spun yarns.
6. To study the evenness and imperfections in the given yarn using capacitance type tester and compare the results with Uster statistics. Study the spectrogram and variance-length curves to determine the type of irregularity present (periodic and non-periodic type).
7. To determine the hairiness of spun yarn using the hairiness tester and compare the hairiness results with the ASTM grades.

# TEXTILE TECHNOLOGY SYLLABUS

## APPLIED MECHANICS (TT 306)

L	T	P	C
3	0	0	3

1. **Introduction to Engineering Materials:** Engineering materials, requirements, classification, levels of structure, structure –property relationships in materials.
2. **Crystal geometry and Structure of solids:** Introduction, crystalline and non-crystalline states, inorganic solids, covalent solids, metals and alloys, ionic solids, structure of silica and silicates, idea of phase diagrams and transformations.
3. **Elastic, Anelastic and Viscoelastic behavior:** Elastic behavior- idea of atomic model, idea of modulus as a parameter of design, rubber like elasticity, Anelastic behavior-relaxation process, visco-elastic behavior- introduction to spring dashpot model.
4. **Plastic Deformation and Creep in crystalline materials:** Plastic deformation-review of stress-strain curves, plastic deformation by slip, idea of shear strength of perfect and real crystals, idea of stress to move a dislocation.
5. **Fractures:** Ductile fracture, brittle fracture, idea of ductile-brittle transition, methods of protection against fracture, fatigue fracture.
6. **Heat treatment:** Annealing, normalising, critical cooling rate, hardenability, factors of hardenability, quench test and determination of hardenability,

### 7. Mechanics of Machines:

Introduction: Revision of general concepts of mechanics. Revision of basic concepts for translation, introduction to three-dimensional dynamics of rigid bodies:

#### Mechanisms:

- a) Cams: cam with straight flank-roller ended follower, cam with curved flanks – flat ended follower, circular cam – flat and roller ended follower, spring force, reaction torques, and equivalent mechanisms.
- b) Crank effort diagrams: crank effort diagram, fluctuation of speed and energy.
- c) Hooke's joint: Velocity and acceleration, double Hooke's joint.
- d) Belt drives and shoe brakes: Centrifugal forces and driving tensions, modification of V-grooved pulley, initial tension, belt creep, external and internal shoe brake.
- e) Toothed gearing: spur gears, condition for transmission of constant velocity ratio, velocity of sliding, path of contact, arc of contact, and contact ratio, interference, methods of avoiding interference, rack and pinion, internal teeth, helical gears, forces on bearing, equivalent spur wheel, spiral gears, gear ratio and centre distance, worm and worm wheel, epicyclic gears.
- f) Friction clutches: plate clutch, cone clutch and centrifugal clutch.
- g) Balancing: Introduction, basic ideas.
- h) Gyroscope: Introduction, gyroscopic couples, effect of gyroscopic couples, general case.

**Reference Subjects :**1) Mechanical Sciences (ME 101), 2) Theory and Design of Textile Machines/Textile Mechanics TT605, 3) Computer simulation for Textile Mechanics TT802

**Text books :**1.)Theory of Machines by Rattan, 2) Theory of Machines by Khurmi & Gupta, 3) Material Science and Engineering by V. Raghavan, 4)Engineering Mechanics by S.S. Bhavikatti and K.G. Rajashekerappa

# TEXTILE TECHNOLOGY SYLLABUS

## Statistics (TT307)

L	T	P	C
3	1	0	4

1. **Introduction:** What is statistics, definition of Varieties and random variable – discrete and continuous variables.
2. **Patterns in data:** Frequency distributions, cumulative frequency, ogive, histogram and frequency polygon.
3. **Measure of central tendency and dispersion:** Mean, median, mode, quartiles, range, mean deviation, standard deviation, co-efficient of variation, calculation involving the use of frequency distribution.
4. **Probability:** Definition of probability, compound event, addition of two or more than two events, exhaustive event, mutually exclusive event, independent event, conditional probability, Boy's theorem, Weak law of large numbers and central limit theorem (without proof ).
5. **Some standard probability distributions:** Expected value of a random variable, Bernoulli's trial, distribution function, calculation of mean and variance of binomial distribution, Poisson distribution, its mean and variance, density function, normal distribution, normal approximation to binomial, standard normal distribution, tables of normal distribution, curve fitting
6. **Sampling distributions:** Definition of population and sample, sampling distribution of mean and variance.
7. **Inference concerning mean:** Point estimation, interval estimation, Bayesian estimation, test of hypothesis, null hypothesis, hypothesis concerning one mean and two means.
8. **Influence concerning variances:** The estimation of variances, hypothesis concerning one and two variances.
9. **Concept of analysis of variance:** Only introductory idea.
10. **Simple nonparametric tests.**
11. **Curve fitting:** Concept of two variables and their relation, regression, line of regression, the correlation coefficient – interpretation and significance, method of least square, normal equation.

### Reference Subjects:

1. Textile Testing & Instruments I (TT305), 2. Textile Testing & Instruments II (TT405)

### Text Books:

1. Statistics by N.G. Das, 2. Probability & Statistics for Engineers by Miller & Freuntz, 3. Practical Statistics in Textile Industry Part I and II by G.A.V. Leaf

# **TEXTILE TECHNOLOGY SYLLABUS**

## **SEMESTER-IV**

# TEXTILE TECHNOLOGY SYLLABUS

## TEXTILE FIBRES II (TT401)

L	T	P	C
3	0	0	3

### 1. FIBRE FUNDAMENTALS:

- (a) **Chemical structure of fibres:** General introduction, nature of matter, nature of fibres, requirements for fibre formation, chemical structure of synthetic fibres, chemical structure of natural fibres-vegetable or cellulosic, animal or polypeptide fibres, recapitulation of bonding in polymer fibres – primary bonding, secondary bonding, methods of investigating structure-idea of infrared spectroscopy, x-ray, microscopy, NMR etc;
- (b) **Microstructure and macrostructure of fibres:** Recapitulation of crystalline and non-crystalline materials –structure of crystals, polymer crystals, X-ray diffraction and crystallinity, thermal analysis of polymers by DTA, TGA and DSC.
- (c) **Microstructure and macrostructure of natural fibres:** cotton and other vegetable fibres; silk, wool and other animal fibres.
- (d) **Microstructure and macrostructure of synthetic fibres:** polymer crystallisation from the melt or concentrated solution, fibre formation, microstructure of manmade fibres; idea of simple models of fibre structure.
- (e) **Fibre length:** (Brief treatment without testing procedure) fibre length variation, technical significance of fibre length, introduction to length distributions, Baer diagram, staple length of cotton, crimp.
- (f) **Fibre cross-section and linear density:** (Brief treatment without testing procedure) Fibre linear density, fibre cross-sectional shape and surface area, variability in fibre denier; technical significance of fibre fineness; maturity of cotton.
- (g) **Environmental effects:** (Brief treatment without testing procedure): Solvents, moisture and radiation, solubility parameters, interaction of fibres with moisture-moisture regain and content, heat of moisture sorption, physical property changes with moisture uptake; idea of the effects of radiation on fibre structure and properties.

### 2. MECHANICAL PROPERTIES (Brief treatment without testing procedure)

- (a) **Tensile properties:** Basic definition: true stress, specific stress, tenacity and breaking length, recapitulation of elastic and plastic deformation, Hook's law and Poisson's ratio; stress-strain curves;
- (b) **Elastic recovery, strain recovery, work recovery:** Shear, bending, torsion and compression;

### 3. PHYSICAL PROPERTIES:

- a) Optical Properties, b) Thermal properties, c) Fiber friction and d) Dielectric properties.

### Reference subjects:

1. Textile Fibres I (TT301), 2. Textile Testing & Instruments I (TT305), 3. Textile Testing & Instruments II (TT405).

### Text Books and Articles:

1. Fiber Science by Steven B. Warner, 2. Physical Properties of Textile Fibres by W.E. Morton and J.W.S. Hearle, 3. Mechanical Properties of Solid Polymers by I. M. Ward, 4. Fundamentals of Fibre Formation by A. Ziabicki., 5. Textile- Motivate Series by A. Wynne, Macmillan.

# TEXTILE TECHNOLOGY SYLLABUS

## Yarn Formation II (TT402)

L	T	P	C
3	0	3	5

**1. Draw frame:** a) Introduction, objective of draw frame, operating principle; b) Attenuation (draft): the draft, the drafting operation, drafting force; behaviour of the fibres in the drafting zone, friction fields, distribution of draft, additional effects of draft; perfect and real drafting; nature of drafting irregularities; c) Equalizing: unevenness of fibre strands, basic possibilities of equalizing, doubling, levelling; d) Draw frame operating devices: creel, drafting arrangement- requirements, influences on the draft; elements of drafting arrangements in short staple spinning- bottom rollers, top rollers, top roll pressure; forms of drafting arrangements- 3 over 4 roller drafting arrangement, 3 over 3 roller drafting, 4 over 3 roller drafting, 5 over 4 roller drafting, pressure bar system, and other commercially successful combinations; coiling- delivery, condensing, sliver coiling, can changing; e) Monitoring and autoleveling: classification of monitoring systems, monitoring devices with self compensation and autoleveling, classification of auto levelling systems, evener draw frame with open loop, closed loop and combined control; correction length, evening operation; f) Integrated monitoring system (process control technique): structure of computerised data collection and monitoring systems; g) Blending at the draw frames: conventional & unconventional operations; h) Gearing and production calculations; i) Performance assessment

**2. Combing:** a) Introduction, tasks of comber, types of comber, sequence of operation in a rectilinear comber; b) Preparation for combing: outline, operating principles of sliver lap machine, ribbon lap machine and sliver doubling machine; comparative assessment of web doubling and sliver doubling processes; c) Technology of combing: parameters influencing combing operation- raw material, material preparation, factors associated with machine setting, ambient conditions, influence of feed stock on combing, parallelisation of fibres in the sheet, sheet thickness (wt.), evenness of the lap sheet, disposition of hooks, number of draw frame passages, degree of combing, noil theory, noil elimination with forward feed and backward feed, influence of machine components and settings on combing, feed distance moved per cycle, type of feed, detachment setting, points on the combs, depth of penetration of the top comb, piecing; d) Combing machines: outline, classification, description of functions- feed, feed of lap sheet, feed device, nipper assembly, cylinder comb, top comb, take-off & the material, piecing, withdrawal of the web and formation of sliver, sliver take-off, drafting arrangement, coiling of sliver, waste removal (stripping), timing diagram of comber motions, automation in comber; e) Performance assessment

**3. Roving frame:** a) Introduction, necessity, functions -operating sequence, description of frame; b) Operating regions: the creel, drafting arrangement, rollers, aprons, top arm, condenser, top roll pressure, spacing of aprons, spindle & flyer imparting twist, various designs of flyer, flyer top, pressure arm, arrangement of spindle in two rows, winding of the bobbin package build, speed relationship, winding principle, concept of bobbin drive, cone drum transmission; c) Builder motion: shifting of the belt, reversing of bobbin rail, shortening of the lift, differential motion, gear train & accessories; monitoring devices-need for such devices, sliver stop motions, roving stop motions, blower apparatus; d) Novel features of a modern roving frame and automation possibilities; e) Calculation of draft, twist, coil density and production; f) Performance assessment.

# **TEXTILE TECHNOLOGY SYLLABUS**

**4.Processing of manmade fibres in the short staple mill: Draw frame Combing, Speed frame** (material preparation, processing guidelines, problems, settings, modifications required, processing environment)

**Reference Subjects:**

1. Elective I-TT605, Textile Mechanics, 2.Elective III (TT704), 3. Yarn Formation I (TT302)

**Text Books and Articles:**

1.A Practical Guide to Combing & Drawing by W. Klein, 2. Manual of Cotton Spinning (Draw frames, Combers) by F. Charnley 3. The Principle of Roller Drafting & The Irregularity of Drafted Materials by G. A. R. Foster, 4. Spun Yarn Technology, Eric Oxtoby 5. A Practical Guide to Speed frame by W. Klein.

# TEXTILE TECHNOLOGY SYLLABUS

## Yarn Formation II (TT491)

### Practical

(Any six selecting two from each category)

The following list is in no way exhaustive. Additional laboratory work or experiments can be planned to consolidate the theoretical work and to emphasize the activities for doing rather than the knowing.

#### Category A

1. To study and sketch the working mechanism of draw frame with respect to flow of material
2. To study and sketch the working mechanism of drafting zone
3. To study the Ratch setting of draw frame drafting system
4. To study and understand the generation of drafting wave
5. To study and sketch the working mechanism of delivery zone
6. Calculation of draft at different regions of drawframe.

#### Category B

1. General study of comber machine.
2. Study of the gearing diagram and calculation of mechanical draft and draft constant of comber.
3. Determination of operating speed and production from the gearing plan of a comber.
4. An estimation of noil extraction (between head and overall) in a comber machine.

#### Category C

1. Study of various components of speed frame and their functions.
2. Study of gearing diagram of speed frame and calculation of speeds of various components.
3. Calculation of mechanical draft and draft constant of speed frame.
4. Calculation of mechanical twists and twist constant of speed frame.
5. Study the working of building motion and differential drive of speed frame

# TEXTILE TECHNOLOGY SYLLABUS

## Fabric Formation II (TT403)

L	T	P	C
3	0	3	5

1. **Introduction:** a) Classification of looms, b) methods of indicating loom timing, k) shedding- early and late shedding, i) history of loom development.

2. **Shedding:** a) Introduction b) Forms and Types of shed- shed geometry, clear and unclear shed, complete and incomplete shed, symmetric and asymmetric shed, close shed, open shed and their variations, c) shedding mechanisms- idea of tappet, dobbie and jacquard shedding and their scope, d) cam or tappet shedding- idea of different types of cam used in shedding, positive and negative tappet, e) shedding with negative cams, a simplified idea of arrangement of cams and other elements on the loom, derivation of an expression of lift of the tappet, idea of designing a simple cam f) purpose of counter shaft of tappet shaft, movement ratio of counter shaft, g) setting of tappet on a loom., h)reversing mechanism-simple acting mechanisms , roller and simple spring reversing mechanism, constant tension spring motion, i) shedding with positive tappets, grooved and matched cam shedding arrangements j) limitations of tappet shedding, k) split shedding or heald staggering - definition, purpose, causes of an end break, principles of staggering -fixed heald staggering, variable heald staggering m) geometry of the shed and other consideration- depth of the shed, bending factor, determination of dwell of shed from shed depth curve, n) shed troughing o) different types of healds.

3. **Picking:** a) Introduction, b) classification of picking methods, c) shuttle picking, the shuttle types etc. shuttle projection, shuttle acceleration, principal types of mechanism for imparting motion to the shuttle (macro and micro), shuttle traverse with crank shaft rotation, motion of shuttle during acceleration- nominal and actual displacement, catapult action, profile of picking cams (linear, parabolic, sinusoidal etc.), factors tending towards uniform acceleration, d) loom speed and timing- relation between shuttle velocity and loom speed, e) loom width and rate of weft insertion, logical basis for the timing of the shuttle flight and indication of the limits of possible variation ( $P=k\theta v$ ), f) conventional picking mechanisms. introduction, classification, function of the picking mechanism. brief description of cone over pick, cone under pick, side shaft & side-lever mechanism- advantages & disadvantages of each., brief description of Rütli-C & Shirley picking mechanisms.

4. **Shuttle checking:** a) General consideration of checking, b) an idea of a commonly used checking mechanism, functions of the swell, swell easing motions, c) idea of inertia effect in checking, e) shuttle checking devices,-conventional mechanisms: idea of mechanisms used in shuttle looms.

5. **Beat-up:** a) Introduction, b) construction of crank based & cam based sley mechanism, c) eccentricity of sleys motion in crank based mechanisms, d) expressions for sley eccentricity in terms of crank arm and crank radius (with out derivation), e) cloth fell position in the loom, relation between weaving resistance and fell displacement, bumping conditions, f) multiple beat up mechanisms- double beat up, g) terry beat up mechanism - principle of operation- swing reed mechanism & Sulzer mechanism.

# TEXTILE TECHNOLOGY SYLLABUS

6. **Warp and cloth control:** a) Introduction to pick spacing and pick density, b) causes of variations in pick spacing, c) The Take-up motions, negative and positive take-up, Intermittent and continuous, 5 and 7 wheel take up and other take-up motions in shuttleless looms, d) Let-off motions:- negative friction let-off; e) temples- introduction, brief description of different types- ring, roller and full width.

7. **Stop motions:** a) Warp protection, fast reed, loose reed, electromagnetic warp protecting mechanisms, b) warp stop motions- introduction , principle of operation, classification, brief description of commercially popular mechanical, electrical and electronic stop motion(one each) c) weft stop motions- side weft fork, centre weft fork and an idea of electronic ones (piezo electric for shuttleless loom ).

## **Reference Subjects:**

1.Fabric Formation I (TT303), 2.Fabric Formation III (TT503), 3.Fabric Formation IV (TT602), 4.Elective I- TT605, Textile Mechanics

## **Text Books:**

1..Principles of weaving by R. Marks and A. T. C. Robinson, 2..Shuttleless Looms by Talavasek and Svaty 3. Textiles- Motivate Series by A. Wynnes, 4.Preparatory to weaving and Weaving Machinery by Ormerod, 5. Weaving- Machines, Mechanisms, management by Talukdar, Sriramalu and Ajgoankar, 6.Weaving – conversion of yarn to fabric by Lord and Mohammed, 7. Weaving Mechanisms- Banerjee

## **Fabric Formation II (TT492)**

### **Practical**

(Any six selecting two from each category)

The following list is in no way exhaustive. Additional laboratory work or experiments can be planned to consolidate the theoretical work and to emphasize the activities for doing rather than the knowing.

#### **Category A**

1. To study and sketch the shedding mechanism with negative and positive tappets and to have practice of adjusting the shed height, shed opening, alignment and shed timing.
2. To study the beat up mechanism and eccentricity of the sleys motion,
3. To study the working of over pick mechanisms
4. To study the working of underpick mechanism

#### **Category B**

1. To have practice of adjusting the pick strength, pick timing, picker replacement and reed adjustment etc.
2. To study and sketch the shuttle checking mechanism.
3. To study and sketch the 5-wheel and 7-wheel take up motions,
4. To study the working of a negative let-off motion,

#### **Category C**

1. To study the working of side weft fork motion,
2. To study the working of centre weft fork motion,
3. To study the working of loose reed motion.
4. To study the working of fast reed motion.

# TEXTILE TECHNOLOGY SYLLABUS

## Chemical Processing of Textiles II (TT404)

L	T	P	C
3	0	3	5

1. **Introduction to Dyeing:** Classification of dyes according to chemical constitution; application, concept and utility of Colour Index
2. **Dyeing Equipments:** General principles of functions of different machines used in dyeing including package dyeing machine, jigger, winch, stenter, jet dyeing machine, thermosoling unit -construction, schematic diagram, function, speed, capacity etc.
3. **Direct Colours:** General properties, classification, dyeing mechanism, technological process parameters, general method of application, after-treatment, reasons, a few brand names, role of bath additives
4. **Cationic/basic colours:** General properties, classification, dyeing mechanism, general method of application, brief idea about application on cellulosic materials including necessity of mordanting, different types of mordants, method of application, after-treatment, a few brand names, role of bath additives
5. **Azoic colours:** General properties, dyeing mechanism, general properties of naphthols and bases, their classification, stabilisation of bases, objective, methods, brand name of different stabilised bases, general method of application-preparation of naphthol and base, application by batchwise, semi-continuous and continuous process, after-treatment, reasons, a few brand names, role of bath additives.
6. **Vat colours:** General properties, classification, dyeing mechanism, general method of application-preparation of stock solution, application by batchwise, semi-continuous and continuous process, after-treatment, reasons, a few brand names, special problems associated with vat dyes, reasons, prevention/correction, role of bath additives.
7. **Solubilised vat colours:** General properties, classification, dyeing mechanism, general method of application-preparation of stock solution, application by batchwise, semi-continuous and continuous process, after-treatment, reasons, a few brand names, role of bath additives
8. **Sulphur colours:** General properties, classification, dyeing mechanism, general method of application-preparation of stock solution, application by batchwise, semi-continuous and continuous process, after-treatment, reasons, a few brand names, special problems associated with vat dyes, reasons, prevention/correction, role of bath additives.
9. **Reactive colours:** General properties, classification-according to chemical nature and application, dyeing mechanism, general method of application-preparation of stock solution, application by batchwise, semi-continuous and continuous process, after-treatment, reasons, a few brand names, role of bath additives
10. **Phthalogen blue colours:** General properties, classification, dyeing mechanism, general method of application, after-treatment, reasons, a few brand names, role of bath additives
11. **Disperse colours:** General properties, classification, dyeing mechanism, oligomers, their chemical nature, troubles and their removal, general method of application, after-treatment, reasons, a few brand names, role of bath additives, concept of rapid dyeing.

### Reference Subjects:

1. Chemistry I (TCH104), 2. Chemistry II (TCH 203), 3. Textile Fibres I (TT301), 4. Textile Fibres II (TT401), 5. Chemical Processing of Textiles I (TT304), 6. Chemical Processing

# **TEXTILE TECHNOLOGY SYLLABUS**

of Textiles III (TT503) 7. Chemical Processing of Textiles IV (TT603)

## **Text Books and Articles:**

1. Textile chemistry, R.H. Peters, 2. The Dyeing Of Textile Materials by J. Cegarra, P. Puente, J. Valldeperas, 3. Technology of Textile processing, Vol. II, Chemistry of Dyes and Principles of Dyeing by V.A. Shenai, 4. Technology of Textile processing, Vol. VI, Technology of Dyeing by V.A. Shenai, 5. Engineering in Textile Colouration by C. Duckworth, 6. The Dyeing of Cellulosic Fibres by C. Preston, 7. Chemical Technology of Fibrous Materials by F. Sadov, M. Korchagin and A. Matetsky, 8. Dyeing and Chemical Technology of Textile Fibres by E.R. Trotman, 9. Surfactants in Textile Processing by A. Datyner, 10. The Preparation and Dyeing of Synthetic Fibres by H.U. Schmidlin, 11. The Dyeing of Synthetic Polymer and Acetate Fibres by D.N. Nunn, 12. Chemical Processing of Synthetic Fibres and Blends by K.V. Datye and A. A. Vaidya.

## **Chemical Processing of Textiles II (TT493)**

### **Practical**

(All)

The following list is in no way exhaustive. Additional laboratory work or experiments can be planned to consolidate the theoretical work and to emphasize the activities for doing rather than the knowing.

1. Dyeing of cotton with
  - a) direct colour
  - b) azoic colour
  - c) vat colour
  - d) sulphur colour
  - e) reactive colour
2. Dyeing of silk fibre with
  - a) direct colour
  - b) acid colour
3. Dyeing of wool fibre with
  - a) acid colour
  - b) metal complex colour
4. Dyeing of polyester fibre with disperse dyes using
  - a) carrier
  - b) HT-HP
5. Dyeing of polyacrylonitrile fibre with cationic dyes
6. Identification of dyestuff on different substrates
7. Dyeing of nylon with acid colour

# TEXTILE TECHNOLOGY SYLLABUS

## Computer Application in Textiles (TT405)

L	T	P	C
3	0	3	5

1. **Introduction to Visual Basic:** How Visual Basic works, using the Visual Basic User Interface, Writing BASIC Code
2. **Creating User Interfaces:** User Interface Design, forms and buttons, boxes and buttons for making choices, Text boxes for typing and showing words, scroll bars and labels, pretty pictures and objects from geometry.
3. **Making Menus:** Creating and editing Pull-Down Menus, Submenus, Growing Menus, and Pop-up Menus, Dialog Boxes.
4. **The Basics of Writing Code:** Event procedures, using variables, responding to the user, Math: arithmetic, logical and comparison operators, strings and things, defining constants and using comments, killing bugs.
5. **Making Decisions:** The If-Then and If-Then-Else Statements, Select case and Nested Control structures.
6. **Getting Loops:** The Do While and Do-Loop While Loops, The Do Until and Do-Loop Until Loops, For Next Loops that can count, Nested Loops and Quick Exits.
7. **Writing Subprograms:** General Procedures, Passing Arguments, Functions, Idea of class with Object-oriented Programming, Managing Files.
8. **Database Files and Printing:** Creating Database Files, Using Files from Database Programs, Making Program for Printing
9. **Add on Programs :** Introduction , Idea of ActiveX controls, some useful Visual Basic Add-on Programs, , Working with wizards and Form Templates,. Visual Basic resources.
10. **Textile Applications:** Idea of machine or equipment Data acquisition through serial and parallel ports, preparation of a industrial norms data book with searching facility, idea of simple macro programming in excel for spinning and weaving calculations, calculation of Interest on borrowed capital.

**Text Books and Articles:** 1. Visual Basic 6 for Windows for Dummies by Wallace Wang. 2. Visual Basic –Programming explorer P. G. Aitken, Comdex. 3. Foundations of Visual Basic Programming, D. Hergert, Comdex. 4. Type and learn Visual basic today- T. Swan, Comdex, 50 Home Automation Basics-Practical Applications using visual Basic 6 by T.E. Leonik, SAMs technical publishing, 6. Automating Science and Engineering Laboratories with Visual Basic M.F. Russo and M.M.Echols.

# TEXTILE TECHNOLOGY SYLLABUS

## DESIGN AND STRUCTURE OF FABRICS-I (TT406)

L	T	P	C
3	0	0	3

### **1. Elements of woven design:**

Idea of cloth formation on loom; classification of fabrics; idea of fabric structure; methods of fabric representation; repeat of weave; drafts; requirements of drawing in; weaving plan; lifting plan; relationship between weave; draft and lifting plan; construction of weaving plan from a given weave; construction of weave from a given draft and lifting plan; construction of draft from a given lifting plan and weave. (7 hrs)

### **2. Construction of elementary weaves:**

General characteristics; plain weave; twill weaves; satin and sateen weaves; irregular sateen and satins. (5hrs)

### **3. Calculations for fabric feeding:**

Standard procedure of fabric calculation; fabric characteristics; dimension of fabric; density of warp and threads in grey fabrics; warp and weft characteristics; take up and crimp of yarn in fabrics; calculation of number of warp and weft threads in fabrics; selecting the selvages; type of weave and weaving plan; calculation of reed; calculation of harness and healds; calculation of yarn mass per unit area of fabric. (3 hrs)

### **4. Development of weave from elementary basis:**

Weaves constructed on plain base; warp and weft ribs; hopsack, mat or basket weaves;

Weaves constructed on twill basis; waved herring bone; curved; broken transposed twill; angel of twill; firmness of twill; elongated twills; combination of twill weaves.

Weaves constructed on satin or sateen bases: - simple developments; extension of sateen weaves;

Fancy twills; diamonds; and diaper designs; large diagonals; shaded twills; diagonal on satin bases; figured twills; construction of diamond design (even no & odd no); construction of diaper designs. (12 hrs)

### **5. Miscellaneous elementary weaves:**

Further extension of hopsack weave; barley corn; stitched hopsack; crepe; honey comb (ordinary & brighton); sponge; huck-a-back; mockleno; distorted thread effects; simple spot designs. (4 hrs)

### **6. Stripe and check weave combination:**

Elements of colour; simple colour and weave effects; construction of line effects; Hound's tooth pattern; Bird's eye & spot effects; Hairline effects; step pattern; idea of compound color and weave effects. (3 hrs)

### **7. Special rib and cord structure:**

Construction of cork screw weaves; bed ford cords-plain, face, wadded, crepon, twill faced bedford cords and Bedford cords arranged with alternate picks. (3 hrs)

# TEXTILE TECHNOLOGY SYLLABUS

## 8. Spot figures:

Methods of drafting spot figures, spot distribution; several irregular sateen base-calculations relating to spot figure designing; point paper designing of jacquard fabrics; arrangement and compositions of half-drop and reverse design; completion of designs from incomplete repeats. (3 hrs)

## 9. Backed cloth:

Warp backed cloth; weft backed cloth; backed cloth with wadding threads; warp and weft wadded cloths; reversible backed cloths. (3 hrs)

## 10. Construction and development of jacquard designs:

Size of jacquard and cards, etc; harness tying; drawing in; card cutting and lacing; harness and design calculations; sett and harness. (2 hrs)

## Text book reference:

1. Grammer of textile design – Nisbet.
2. Fabric design – Blinov.
3. Textile design and color – Watson.
4. Advanced textile design and color – Watson.

## **TECHNICAL REPORT WRITING & / LANGUAGE PRACTICE LABORATORY HU 481**

L	T	P	C
0	0	3	2

Topics to be covered and number of hours required for it

1. **Introduction:** Introductory lecture is to be given to the students so that they get a clear idea of the syllabus and understand the need for having such a practice lab in the first place (3 hours)
2. **Conversion practice:** This is to be done on given situation topics. The students are also made to listen to pre-recorded cassettes produced by British Council and also by the Universities of Oxford and Cambridge (6 hours)
3. **Group Discussions:-** The students are made to understand the difference between the language of conversion and group discussion. Strategies of such discussions are to teach to them. It is also helpful to use videocassettes produced by the U.G.C. on topics like group-discussion. After wards the class is divided into groups and the students have to discuss on given topics on current socio-economic-political-educational importance (12 hours)
4. **Interview sessions-**students are taught the do's and don'ts of facing a successful interview. They then have to face rigorous practices of mock-interviews. There simulations of real life interview sessions where students have to face an interview panel (12 hours)
5. **Presentations:** The secrets of an effective presentation are taught to the students. Then each and every student has to make lab presentations with the help of the Overhead projector/ using power point presentation and other audio-visual aids in the laboratory. They also have to face the question answer sessions at the end of their presentation (12 hours)

# TEXTILE TECHNOLOGY SYLLABUS

6. **Testing sessions:** Classes are also allotted to prepare the students for competitive examinations like the T.O.E.F.L. by making the students listen to specially produced C.D. cassettes of such examinations (3 hours)

The overall aim of this course is to inculcate a sense of confidence in the students and help them to become good communicators in their social as well as professional lives.

## **Text Books and Articles:**

1. Sharma—Business Correspondence & Report Writing, TMH,
2. Prasad—Group Discussion & Interview (With Audio Cassette) , TMH,
3. Sashi Kumar—Spoken English (with Cassette) , TMH

# **TEXTILE TECHNOLOGY SYLLABUS**

## **SEMESTER-V**

# TEXTILE TECHNOLOGY SYLLABUS

## Yarn Formation III (TT501)

L	T	P	C
3	0	3	5

**1) Ring spinning:** a) Functions and mode of operation, task of ring frame, principle of operation, design features of the machine- basic frame work, creel, drafting arrangement- design concepts in the structure of the drafting arrangement- top rollers, top roller weighting, methods of applying pressure (weight, spring, pneumatic, magnetic); fiber guiding device- types of guidance, various apron arrangements; spindle- thread path, structure of the spindle, spindle mounting, spindle drive, classification, tape drives, tangential belt drive, direct drives; yarn guiding device, lappets, balloon control rings, separators, the ring- significance of ring and traveller, form of the ring, basic forms (lubricated, un-lubricated- single, double sided, anti-edge, low crown, su ring, rotating ring etc.); materials for the ring, mounting of the ring, traveller task and function, classification, form of the traveller wire, profile of the traveller, material of the traveller, traveller mass, traveller clearer; b) the machine drive: problems, types of motors used, dual motor drive and variable speed drive; c) the package: structure of the cop, cop form winding process, builder motion, building the base, formation of conical base, preparation for doff, manual doffing, automatic doffing, classification of doffing installations, component parts of the installation, steps in auto doffing, preparation for doff, the doff, doffing tubes, completion of the doff; d) automation and ancillary equipment: need for automation, possibilities for automation, end break aspirators, piecing devices, roving stop motions, traveling clearers, monitoring- the purpose, computer based data collection system, automatic cop transport; e) supplementary spinning theory: spinning geometry, spinning triangle, inclination of drafting arrangement, roller overhung, wrap of the yarn on the thread guide, formation of spinning balloon, balloon height and other dimensions, winding principle, variation in the speed of the traveller, variation in yarn twist, forces and tension relationship during winding using travellers; f) problems and prospects: optimum spinning conditions, limitations on spindle speed, factors influencing end breaks in ring spinning and remedial measures, future prospects.

**2.Waste Spinning-** Brief idea about m/cs and process.

**3.Conversion of filaments to fibres:** Principles of stretch breaking and cutting, tow to top and tow to yarn converters, crimping, twisting of continuous filaments, up twisters and two for one twisters.

**4.Spin finish:** Introduction, purpose of applying spin finishes, requirements to be fulfilled by a spin finish, components of spin finishes, problems in spinning.

**5.Processing of manmade fibres in the short staple mill: Ring frame** (material preparation, processing guidelines, problems, settings, modifications required, processing environment), steaming and stabilization of yarns.

**6.Study of Doubling and Twisting m/cs including Two for One Twister,production,speeds,calculations.**

### Reference subjects:

1.Yarn Formation I (TT302), 2.Yarn Formation II (TT402), 3.Yarn Formation IV (TT601), 4.Elective I (TT605), Textile Mechanics, 5.Elective III (TT704), 6.Elective IV, (TT705)

# **TEXTILE TECHNOLOGY SYLLABUS**

**Text Books and Articles:** 1. A Practical Guide to Ring Spinning by W. Klein, 2. The Principles & Theory of Ring Spinning by A. E. D. Barr & H. Catling, 3. Spun Yarn Technology by Eric Oxtoby

## **Yarn Formation III (TT591) Practical**

(Any six selecting two from each category)

The following list is in no way exhaustive. Additional laboratory work or experiments can be planned to consolidate the theoretical work and to emphasize the activities for doing rather than the knowing.

### **Category A**

1. Study of gearing diagram of a Ring frame and calculation of speeds of various components.
2. Calculation of mechanical draft and draft constant of Ring frame.
3. Calculation of mechanical twist and twist constant of Ring frame.
4. To study the working of building motion of Ring frame

### **Category B**

1. Determination of coils per inch and coils per inch constant from the gearing plan of a Ring frame.
2. To study the effect of twist on the yarn strength.
3. To study the effect of Ring frame draft on the yarn quality.

### **Category C**

1. To study the influence of assembly winding on quality of ply yarn.
2. To study the working principle of Two-for-one twister/Doubling m/c. by producing samples

# TEXTILE TECHNOLOGY SYLLABUS

## Fabric Formation III (TT502)

L	T	P	C
3	0	3	5

### GROUP - A

- 1. Selection mechanisms:** a) Introduction, b) warp selection and weft selection, warp selection mechanisms: a) dobby selection mechanisms: introduction, scope of dobby, use of dobby, classification, principle of single lift and double lift dobbies: negative dobby- introduction, climax dobby; – working principle, timing diagram, idea of pegging the lags, modern negative dobby with minimal pivot points, positive dobby:- introduction, gear dobby – working principle, paper dobby— working principle, timing diagram, rotary dobby- working principle, b) jacquard selection mechanisms: introduction, scope and use, classification, sizes , pitch and figuring capacities of jacquard, concept of single lift single cylinder, double lift single cylinder and double lift double cylinder jacquards; fine pitch jacquard- working principle of a modern Verdol jacquard, electronic jacquard –working principle, jacquard harness -- introduction to systems of harness mounting and harness ties.  
weft selection for patterning:- a)systems available, drop box, weft mixing etc, b)eccentric based weft mixing motion, double eccentric based 4x1 box motion, c)concept of pick at will and pick and pick motions;
- 2. Automatic looms:** a) Automatic weaving systems, b) essential features of the automatic loom, c) work of the operative and weft replenishment, d) weft feelers- weft reserve (base bunch, tip bunch), feeler position, types of feeler, principles of working of mechanical, electrical, mechatronic feelers etc.; e) shuttle changing looms (concept only, f) single shuttle automatic bobbin change looms- principle of operation, bobbin change mechanism and accessories, advantages and disadvantages; g) bobbin loaders- principle of operation; h)loom winders- principle of operation; i) comparison among the three systems of bobbin changing; j)concept of multi shuttle weft replenishment,
- 3. Warp Let-off:** a) semi positive and positive let-off, b) warp tension control, c) warp tension variations, d) effect of beam diameter, e) effect of back rail, f) effect of pivots etc. g) brief description and principle of operation of Rütli-C let- off, Saurer let-off, hunts let-off and one electronics let-off, let-off mechanism of Sulzer projectile loom.

### GROUP - B

- 1. Knitting technology:** General terms and principles of knitting technology: hand knitting and machine knitting, classification of knitting machines, knitted loop structure, a course, a wale, stitch density, technically upright, design, appearance, requirement, main feature of knitting machine,; the needle , fabric draw off, basic knitting action of a needle, main parts of bearded needle, knitting action of bearded needle , latch needle, knitting action of latch needle, compound needle, machine gauge, basic mechanical principles of knitting technology: idea of the sinker, the jack, cam arrangement, methods of yarn feeding, methods of forming yarn into needle loops, comparison of warp and weft knitting: yarn feeding and loop formation, field of application and industry, idea of productivity, idea of machine design, primary base structures: introduction , single jersey, rib and interlock structures; production of single jersey fabric on a circular latch needle machine, knitting action of a circular

# **TEXTILE TECHNOLOGY SYLLABUS**

rib machine, production of interlock fabric on circular machines, basic warp knitting principles, warp knitting machines and their knitting actions( brief idea), comparison of properties of woven and knitted goods,

## **Reference Subjects:**

1.Fabric Formation I (TT303), 2.Fabric Formation II (TT403), 3.Fabric Formation IV (TT602)

## **Text Books and Articles:**

1.Principles of Weaving by R. Marks and A.T.C. Robinson, 2. Shuttleless Looms, Talavasek and Svaty, 3. Textiles- Motivate Series by A. Wynnes 4. Modern Preparation and Weaving Machinery by A. Ormerod, 5. Shuttleless Looms by J.J. Vincent., 6. Weaving- Machines, Mechanisms, Management by Talukdar, Sriramalu and Ajoankar. 7. Knitting Technology by D.J. Spencer, 8. Knitting Technology by D. B. Ajoankar.

# **TEXTILE TECHNOLOGY SYLLABUS**

## **Fabric Formation III (TT592)**

### **Practical**

(Any six selecting two from each category)

The following list is in no way exhaustive. Additional laboratory work or experiments can be planned to consolidate the theoretical work and to emphasize the activities for doing rather than the knowing.

#### **Category A:**

1. To study and sketch the working of ordinary climax dobby,
2. To study and sketch the working of ordinary paper dobby.
3. To study pegging the lattice for the desired peg plan.
4. To study and sketch working of a double lift jacquard along with its types of needles, cylinders and their mounting.
5. To study the Jacquard mounting and harness ties & practice of casting out.

#### **Category B:**

1. Practice of card cutting and lacing of jacquard designs.
2. To study and sketch the working of a Four box motion.
3. To prepare chain for any weft pattern involving movement of one, two, three boxes and run it on loom.
4. To study the working of a semi-positive let-off motion.
5. To study and sketch needles and sinkers of weft knitting machines.
6. To study and sketch knitting cycle of single jersey weft knitting machine.

#### **Category C:**

1. To study the working of different mechanical and electrical weft feelers in the laboratory.
2. To study the working of weft replenishment motion of the automatic loom.
3. To have practice in adjusting the transfer hammer throw, shuttle eye thread cutter, shuttle protector etc.
4. To study and sketch knitting cycle of double jersey weft knitting machine.
5. To study the take-down mechanism of a weft knitting machine.

# TEXTILE TECHNOLOGY SYLLABUS

## Chemical Processing of Textiles III (TT503)

L	T	P	C
3	0	3	5

### Key Concepts:

*Acid colours, acid mordant dyes, metal complex colours, pigment colours, colouration of blends, mass colouration, defects and remedies of dyed materials, introduction to printing, printing machine, styles and methods of printing, printing procedure of different fibres.*

1. **Acid colours:** General properties, classification criteria, i.e., according to state in solution and according to method of dyeing, dyeing mechanism, general method of application, after-treatment, reasons, a few brand names, role of bath additives
2. **Acid mordant dyes:** General properties, classification criteria, i.e., according to method of dyeing, dyeing mechanism, general method of application, after-treatment, reasons, a few brand names, role of bath additives
3. **Metal complex colours:** General properties, classification, dyeing mechanism, general method of application, after-treatment, reasons, a few brand names, role of bath additives
4. **Pigment colours:** General properties, classification, dyeing mechanism, general method of application, after-treatment, reasons, a few brand names, role of bath additives
5. **Colouration of blends:** Dyeing of polyester/cellulose, polyester/wool, wool/polyamide, wool/acrylic blends by batchwise, semi-continuous and continuous methods
6. **Mass colouration:** Objective, principle, methods, advantages and disadvantages
7. **Defects and remedies of dyed materials**
8. **Introduction to printing:** Definition of printing, difference between dyeing and printing, different steps involved in printing-viz., preparation of materials, preparation of printing paste, ingredients of printing paste, different thickeners, their chemical and rheological behaviour, drying of print, fixation of print, washing and drying of printed materials
9. **Printing machine:** Principles of functions of different machines used in printing including roller, screen (flat bed & rotary), inkjet printer, curing machine, steamer, water removal by hydro-extraction, vacuum slot, i.r. dryer, r.f. dryer, -construction, schematic diagram, function, speed, capacity etc.,
10. **Styles and methods of printing:** Styles of printing-viz., direct, resist, discharge, flock printing, methods of printing-brief concept of hand block printing, roller printing and screen printing (flat bed and rotary) method, non-conventional methods of printing, e.g., transfer printing, dry, wet, melt transfer, possibilities, making of screens for flat bed and rotary screen printing machines, storage and care of screens, faults and defects of screen & limitations, foam printing, ink jet printing
11. **Printing procedure of different fibres:** Printing of cellulosic, wool, silk, polyester, polyamide, polyacrylic and their blends with various classes of dyes like direct, acid, basic, mordant, azoic, vat, solubilised vat, sulphur, reactive, disperse pigment colours with relevant after-treatments, faults of printing and their prevention.

### Reference Subjects:

1. Chemistry I (TCH104), 2. Chemistry II (TCH 203), 3. Textile Fibres I (TT301), 4. Textile Fibres II (TT401), 5. Chemical Processing of Textiles I (TT304), 6. Chemical Processing of Textiles II (TT404), 7. Chemical Processing of Textiles IV (TT704)

# TEXTILE TECHNOLOGY SYLLABUS

## **Text Books and Articles:**

1. Textile Chemistry Vol. III by R.H. Peters, 2 The Dyeing Of Textile Materials by J. Cegarra, P. Puente, J. Valdeperas, 3. Technology of textile processing, Vol. IV, Technology of Printing by V.A. Shenai 4. Engineering in Textile Colouration by C. Duckworth, 5. Textile Printing by L.W.C. Miles, 6. The Dyeing of Cellulosic Fibres by C. Preston, 7. Chemical Technology of Fibrous materials by F. Sadov, M. Korchagin and A. Matetsky, 8. Dyeing and Chemical Technology of Textile Fibres by E.R. Trotman, 9. Chemical Processing of Synthetic Fibres and Blends by K.V. Datye and A. A. Vaidya.

# **TEXTILE TECHNOLOGY SYLLABUS**

## **Chemical Processing of Textiles III (TT593) Practical**

The following list is in no way exhaustive. Additional laboratory work or experiments can be planned to consolidate the theoretical work and to emphasize the activities for doing rather than the knowing.

1. Quantitative estimation of dyestuff
2. Direct style printing of cotton fabric using
  - a) Reactive colour
  - b) Pigment colour
  - c) solubilised vat
  - d) Vat colour
3. Discharge style printing of cotton fabric using REACTIVE COLOUR
4. Batik resist printing
3. Application of functional finishes on cotton using
  - a) crease recovery finish
  - b) flame retardant finish
  - c) water repellent finish

# TEXTILE TECHNOLOGY SYLLABUS

## Textile Testing & Instruments II (TT504)

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
3	0	3	5

1. **Fabric testing:** Fabric parameters and dimensions: analysis of cloth- design, ends spacing, picks spacing, count of warp and weft, warp and weft crimp, fabric weight, fabric thickness; fabric strength: influence of fabric structure on strength, types of tests (raveled strip, grab, weakened strip etc.) types of testers and their principles of working (pendulum, spring, inclined plane, strain gauge etc.), types of testing (CRT, CRL, CRE and ARL), the effect of gauge length, two dimensional tests( bursting strength etc.), tear strength, automation in tensile testers; comfort properties: fabric handle and drape, bending, shear and compressional properties of fabrics, stiffness, crease recovery and wrinkle behaviour; air, water and vapour transmission through fabrics, thermal resistance of fabrics, abrasion resistance of fabrics and durability: abrasion resistance, pilling resistance of fabrics, seam slippage, water repellency and shrinkage, special tests for carpets and nonwoven fabrics.
2. **Textile chemical analysis:** Chemical methods of identification of fibres, analysis of blends, estimation of damage to fibre materials, determination of amount of size and filling material in fabrics, analysis of oil soaps and softners, identification of dyes in substances and on fibres, colour fastness tests.
3. **Analysis of test results:** Concept of statistical techniques, designing of tests, interpretation of results, preparation of reports and presentation.

### Reference Subjects:

- 1.Yarn Formation I (TT302), 2.Yarn Formation II (TT402), 3.Yarn Formation III (TT502), 4.Yarn Formation IV (TT601), 5.Textile Fibres I (TT301), 5.Textile Fibres II (TT401)

### Text Books:

1. Principles of Textile Testing by J. E. Booth, 2. Textile Testing by Skinkle, 3. Physical Properties of Textile Fibres by W.E. Morton and J.W.S. Hearle, 4. Testing and Quality Management by V.K. Kothari

# TEXTILE TECHNOLOGY SYLLABUS

## Textile Testing and Instruments II (TT594)

### Practical

(Any six experiments)

The following list is in no way exhaustive. Additional laboratory work or experiments can be planned to consolidate the theoretical work and to emphasize the activities for doing rather than the knowing.

#### **Fabric**

1. To characterise a woven fabric with respect to its dimensional properties: thread density , yarn number, yarn crimp, weave, cover factor, areal density, skewness, thickness
2. To determine the tensile strength of a woven fabric by strip test method. Draw load-elongation curve of a woven fabric and compare it with that of a knitted or nonwoven fabric.
3. To determine the fabric assistance of a woven fabric.
4. To determine the tear strength of a fabric using Elmendorf tear tester or ballistic tester.
5. To determine the bursting strength of a fabric using hydraulic bursting tester.
6. To determine the abrasion resistance of a fabric.
7. To determine the bending length and flexural rigidity of a woven fabric using the Shirley tester.
8. To determine the crease recovery of fabric and observe the effect of loading time and recovery time on crease recovery.
9. To determine the drape coefficient of woven and knitted fabric using the drape meter.
10. To determine the thickness of a fabric under standard loading.
11. To determine the air permeability of a fabric.

# TEXTILE TECHNOLOGY SYLLABUS

## DESIGN AND STRUCTURE OF FABRICS-II(TT505)

L	T	P	C
3	0	0	3

### **1. Figuring with extra threads:**

Principles of figuring with extra materials; extra warp figuring-concept of simple techniques; extra weft figuring-concepts of simple techniques; idea of continuous figuring in one extra warp and extra weft; figuring with two extra warps; extra warp planting; clipped spots effect; intermittent extra weft figuring.(8 hrs)

### **2. Welts and piques:**

Ordinary ,wadded, fast back welts; piques; idea of loose back, half fast back and fast back fabrics.(3 hrs)

### **3. Double and multilayer cloths:**

Classifications of double cloth construction; concept of self stitched; stitched by thread interchange; stitch by cloth interchange; centre stitched; alternate single-ply and double ply construction; idea of wadded double cloths; idea of treble cloth and multiply belting structure.(7 hrs)

### **4. Gauze and Leno structure:**

Principles of leno structures; methods of producing leno and idea of simple constructions ; counter leno; net leno; bottom and top douping; idea of Gauge with reference to Madras Muslin structures.(5 hrs)

### **5. Damask and compound process:**

Idea of simple structures. (3 hrs)

### **6. Pile structures:**

weft-pile introduction; concept of simple constructions; Terry pile introduction; formation of pile; simple terry weaves; idea of a terry pile forming mechanism ; idea of ornamentation; with the aid of wires; face to face principles; relveteens; all over or plain west plushes; corded and figured relveteens; velvets;

### **7. Tapestry structures:**

Introduction; idea of simple weft faced structures; carpet structures; spool and gripper Axminster carpets (4hrs)

### **8. Uncommon and special woven structures:**

Idea of lappet and swivel structures ;( 2hrs)

### **9. Different types of selvages and their weaves:**

different types of selvages; advantages and disadvantages; applications ;( 2hrs)

### **10. Multi-axial fabrics:**

Introduction; weave; (2hrs)

### **TEXTBOOKS REFERENCE:**

1. Grammer of Textile Design: Nisbet
2. Fabric Design: Blinov
3. Textile Design and Colour: Watson
4. Advanced Textile Design & colour: Watson

# TEXTILE TECHNOLOGY SYLLABUS

## Instrumentation & Control (TT506)

L	T	P	C
3	0	0	3

**1. Basic concepts of measurements:** Introduction, idea of a generalized measurement system, basic characteristics of measuring devices - accuracy, precision error, hysteresis, resolution, threshold, repeatability, reliability, span, dynamic accuracy; calibration.

**2. Transducer:** Introduction, classification, basic requirements.

**3. Displacement measurement:** Idea of servo potentiometers, differential inductors and transformers, capacitives, shaft encoders, hall effect devices, proximity devices and digital transducers.

**4. Velocity measurement:** D.C. Tachogenerators, A.C. drag-cup tachogenerators, digital velocity transducers.

**5. Temperature measurement:** Introduction, concept of transmitters, liquid in glass thermometers, liquid filled systems, Resistance type temperature sensors, thermistors, thermocouples, solid state sensors, quartz thermometers, temperature measurement by radiation method, optical pyrometers.

**6. Force and torque:** Introduction, strain gauges and load cells, concept of different configurations, digital force transducers, concept of electronic weighing systems, concept of torque measurement

**7. Pressure measurement:** Introduction, diaphragms, capsule, Bourdon tube, potentiometric devices, strain gauges devices, LVDT & capacitive devices, solid state devices (piezo-junction & piezo-resistance).

**8. Special measurements:** Idea of transducers for measurement of .pH, humidity, density and thickness

**9. Measurement accessories:** Brief concept of instrumentation amplifiers, signal generation and processing, data acquisition and conversion, input-output devices and displays.

**10. General test equipments:** Brief review of general-purpose electronic test equipments - CRO, digital multimeters, counters, signal generators, regulated power supplies.

**11. Control systems and engineering:** Introduction, open and closed loop systems, idea of mathematical modeling of simple physical systems, concept of transfer functions, types of control action - ON-OFF, proportional, derivative, integral and PID, concept of time response analysis with respect to instrumentation systems - zero order systems, first order systems and its step, ramp frequency response, second order systems and its step, ramp response.

### Reference Subjects:

1. Basic Electronics Engg. (EC201), 2. Basic Electrical Engineering (EE 101)

### Text Books and Articles:

1. Instrumentation & Control by Rangan, Mani & Sharma, 2. Transducers & Instrumentation by Murty. 3. Control Systems Engineering by Nagrath and Gopal

# **TEXTILE TECHNOLOGY SYLLABUS**

## **Industrial Training I (TT595)**

### **Practical/Field work**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
0	0		2

1. Orientation of the mill, name and address, area and site details of the mill, nature of the construction of the mill, product range of the mill, rules and regulations of the mill
2. Manufacturing process followed by the mill, significance of the plant layout with respect to the manufacturing process, technical details of the manufacturing department,
3. Organizational setup, categorise the number of workers, employed department-wise, number of supervisory staff and general staff, yearly turnover.

# **TEXTILE TECHNOLOGY SYLLABUS**

## **SEMESTER-VI**

# TEXTILE TECHNOLOGY SYLLABUS

## Yarn Formation IV (TT601)

L	T	P	C
3	0	2	5

**1. New spinning processes:** a) Introduction, summary of new spinning processes, possibilities of use of various spinning processes; b) open-end spinning processes: the basic principle of yarn formation, operating principles of rotor, electrostatic, air vortex, and friction spinning; comparison; c) twist spinning: concept of rubbing (self twist) techniques- concept of Repco spinning, concept of wrap spinning; false twist process-principle of jet spinning, principle of PLYfil spinning' adhesive process -concept of Twilo and Bobtex process, comparison; d) commercially popular systems: rotor spinning: i) overview: the developments, tasks of the rotor spinning machine, principle of operation, speed relationships, ii) raw material requirements and preparation: raw materials used, requirements for the raw material (fibre lengths, fineness, strength, dirt & dust, foreign matter), iii), iv) opening unit: sliver infeed, opening, opening by means of an opening roller, clothing of the opening roller, trash removal, fibre guide passage, (feed tube); v) yarn formation: fibre flow into the rotor, formation of a coherent fibre strand, back doubling, formation of the yarn, the false twist effect, wrapping fibers, the rotor, influence of the rotor, form and raw material, rotor groove, rotor diameter, combination of rotor diameter and rotor groove, rotor bearing, rotor revolutions, cleaning the rotor, yarn withdrawal and winding, direction of withdrawal, navel, formation of the navel, withdrawal tube, vi) package: requirements for the package, the winding process, vii) automation: the extent of realisation, usual degree of automation, package handling, length measurement, monitoring of quality at the spinning position, logging of operation data, technical and technological data, technical data of rotor spinning machine, viii) yarn characteristics -structural difference between rotor spun and ring spun yarns, the differences in the yarns, important differences in further processing, differences in the end product, ix) techno-economic aspects of rotor spinning; x)friction spinning: operating principles, classification, raw material, technological interrelationships, yarn structure and characteristics, techno-economic aspect, trends in the development;XI) jet spinning: operating principles, classification, raw material, technological interrelationships, yarn structure and characteristics, techno-economics, trends in the development.,XII)Other Un-conventional spinning: operating principles, classification, raw material, technological interrelationships, yarn structure and characteristics, techno-economic aspect, trends in the development

### Reference Subjects:

1.Elective I (TT605), 2.Elective III (TT704), 3. Elective IV (TT705).

### Text Books and Articles:

1.New Spinning Systems by W. Klein, 2. Open End Spinning by Rohlena, 3. Spinning in the 70's by P R Lord, 4. Open End Spinning by Nield, 4. Textile Yarns by Martinedale, Goswami & Scardino, 5. Textured Yarn Technology by Gandhi.

# TEXTILE TECHNOLOGY SYLLABUS

## Yarn Formation IV (TT691)

L	T	P	C
	0	2	2

3. To study the effect of shore hardness on yarn quality,
4. To study the effect of roller eccentricity on yarn quality
5. To study the top roller pressure by pressure gauge.
6. Study of various components of Rotor spinning machine and their functions.
7. Calculation of speeds of various components of Rotor spinning machine
8. Estimation of minimum twist required to spin yarn continuously in ring and rotor spinning
9. Estimation of twist loss in rotor spinning
10. Studies on twist-strength relationship of ring and rotor spun yarn
11. Effect of opening roller speed on rotor spun yarn characteristics.
12. Estimation of fibre breakage by the opening roller of rotor spinning m/cs.
13. Study of Dref-III m/cs or Air-jet and produce samples.

# TEXTILE TECHNOLOGY SYLLABUS

## Fabric Formation IV (TT602)

L	T	P	C
3	0	3	5

### GROUP – A

1. **Unconventional looms:** a) Introduction, b) perspective of development (technological, engineering and environmental), c) classification, d) principles of operation, e) scientific nomenclature, f) comparative factors and selection of looms– from the view point of versatility, flexibility, quality, productivity and environmental aspects;
- a) **Micro-shuttle/projectile looms:** a) introduction, b) principles of mono and multi projectile looms, c) picking mechanisms- concept of torsion bar system ,helical spring and pneumatic mechanisms , d) the torsion bar system of projectile loom (Sulzer)- the size and shape of the projectile, basic elements of torsion bar system- principle of operation, e) phases of weft insertion, projectile gripper lifting , opening; weft presenting and clamping, Idea of weft braking and tensioning mechanisms, projectile guide in the shed, picking and projectile flight through the warp., projectile checking, projectile shifting after picking, weft tucking-in, f) conjugate cam beat-up of Sulzer, g) flow sheet of projectile and weft monitoring on Sulzer projectile loom, h) path of warp on Sulzer projectile loom with respect to cloth supports, i) basic cyclogram of timing on Sulzer projectile loom, j) idea of centralised lubrication on Sulzer projectile loom, mechanics of torsion bar., performance of Sulzer projectile loom;
- b) **Rapier looms:** a) introduction, b) detailed classification of rapier looms with respect to insertion and withdrawal of rapier in the shed, c) the gripper heads- basic types , commercially available heads, general principle of operation, principal elements, d) rapier drives- basic types, commercially popular mechanisms, general principles of operation., e) phases of weft insertion on a divided rigid rapier tip transfer loom , f) rapier guides in the warp shed.
- c) **Fluid jet looms:** a) introduction, types, idea of the tractive force with respect to yarn characteristics and viscosity of the projecting medium; i) **air jet looms:** essential requirements, principal elements of the air jet picking system and general description, principle of operation, character of air velocity during picking and weft motion, systems for maintaining the jet integrity, concept of main nozzle and relay nozzle, classification of air jet looms, main operations jet picking – measuring and accumulation of the weft, picking, weft tensioning, beating up, weft location and gripping, weft cutting, weft stop motions, phases of weft insertion in a multi nozzle loom, types of loom configuration, timing diagram, the weft untwisting, the range of application of air jet picking system, compressed air requirements; ii) **water jet looms:** essential requirements, principal elements of the water jet picking system and general description, principle of operation, character of the water jet during picking and weft motion, concept of the nozzle and its operation, main operations of water jet picking– picking, weft tensioning, ,beating up, weft location and gripping, weft cutting, weft stop motions, fabric de-watering system, final drying of the woven fabric, phases of weft insertion, types of loom configuration, timing diagram, water and water pump requirements, the range of application of water jet picking system, fundamental problems of water jet loom, prospect of water jet looms, comparison with air jet looms.
- d) Weft patterning and selection on shuttleless looms.
- e) Selvage formation on shuttleless looms.

# **TEXTILE TECHNOLOGY SYLLABUS**

- f) Direct weft insertion: Introduction, principal elements and general description, principle of operation, weft motion, method of retarded delivery, different techniques of insertion, fundamental problems, prospects.
- g) Continuous weft insertion: Introduction, types; l) circular weaving: main features and general description, principle of operation, main operations- shedding, picking, beating up, take up and let off, fundamental problems, range of application, prospects; i) flat multiphase weaving: classification, principles of operation, commercially tested shedding mechanisms of weft way and warp way shed looms, commercially tested weft carrier drives, commercially tested weft beat up mechanisms, supply systems for weft, fundamental problems, prospects.

## **GROUP - B**

- 1. Non woven technology:** a) Introduction, the importance of non- woven fabrics and of individual processes, b) Web preparation-introduction, fibre consideration, carding systems, aerodynamic web formation, web uniformity, c) Needle punching-introduction , fibres, machinery and techniques, advanced techniques, needles-design and action; range of application, d) Adhesive bonded fabrics: Introduction , fabrics from dry laid webs- fibres and processes, binders, solvent bonding; Fabrics from wet laid webs- fibres, machinery and methods, binders and bonding, finishing; modified webs and discontinuous bonding- introduction, concept of apertured, spunlaced and print bonded fabrics; fabrics for special purposes- concept of medical and other technical fabrics. e) Spun laid fabrics: introduction, processes and products, civil engineering applications, melt blown webs, f) thermobonded fabrics: Introduction, techniques used, binder fibres and powders, calender bonding. g) application of non-wovens in different fields.

### **Reference Subjects:**

1.Design and structure of fabrics, (TT406)

### **Text Books and Articles:**

1.Principles of Weaving by R. Marks and A.T.C. Robinson, 2. Shuttleless Looms, Talavasek and Svaty, 3.Modern Preparation and Weaving Machinery by A. Ormerod, 4. Shuttleless Looms by J.J. Vincent., 5. Weaving- Machines, Mechanisms, Management by Talukdar, Sriramalu and Ajoankar. 6. Textiles- Motivate Series by A. Wynnes, 7. Developments in Non-woven Fabrics by A.T. Purdy , 8. Nonwoven Textiles by NDC, 9. International Conference on Nonwoven by M.L. Gulrajani & Textile Institute, 10. Nonwoven Fabric Technology by Krcma.

# **TEXTILE TECHNOLOGY SYLLABUS**

## **Fabric Formation III (TT692)**

### **Practical**

(Any six selecting three from each category)

The following list is in no way exhaustive. Additional laboratory work or experiments can be planned to consolidate the theoretical work and to emphasize the activities for doing rather than the knowing.

#### **Category A :**

1. To study the shedding mechanism of shuttleless loom.
2. To study the picking mechanism of projectile loom.
3. To study the beat-up mechanism of the shuttleless loom.
4. To study the take- up mechanism of a shuttleless loom.
5. To study the leno/ twisted selvedge formation on a loom.

#### **Category B:**

1. To study a Rapier drive system.
2. To study the weft transfer mechanism of a rapier loom.
3. To study the let-off mechanism of a shuttleless loom.
4. To study the air jet weft insertion on an air jet loom,
5. To study the water jet weft insertion on a water jet loom.

# TEXTILE TECHNOLOGY SYLLABUS

## Chemical Processing of Textiles IV (TT603)

L	T	P	C
3	0	0	3

1. **Introduction to finishing:** Objective of finishing, classification, temporary, semi-permanent and permanent finishing, their significance
2. **Finishing equipments:** Principles of functions of different machines used in finishing including padding units, calendering units, sanfosing machine, foam applicator
3. **Different finishing processes:** Objective, classification of different finishing processes, principle, methods, advantages and disadvantages of different finishing processes including cross linking agents used for different substrates to impart crease recovery/easy care finish, anti shrink finishing, flame retarding/proofing, water repelling, rot and mildew proofing of wool, carbonisation of polyester/cellulosic materials, application of softeners, enzymatic softening, organdie finish, milling of wool, moth proofing of wool, anti static finish, soil release finish, finishing of blends.
4. **Foam Application Technology:** Concept objective, range of application, principle, ingredients of a foam system, half life of foam, blow ratio, foam generator, foam applicator, merits and demerits.
5. **Colour and Chemical constitution and its estimation:** Concept of colour and brief idea about the relation between colour and chemical constitution, factors governing transmission, Beer's law, Lambert's law, absorption, scattering of light, concept and definition of source, illuminant, detector, description of colour, colour co-ordinates, colour rendition, colour adaptation, hue, chroma, value, standard observer, tristimulus value, colour and colour difference measurement, Kubelka Munk's equation, methods of colour estimation, -manual, their limitations, -instrumental, pass-fail criteria, concept of colour temperature, metamerism, standard illumination, absorption and reflectance spectra of a coloured material, extinction coefficient, measurement whiteness, evaluation of optical whitening, brief idea of computer colour matching and formulation
6. **Evaluation of different fastness properties:** Objectives of fastness measurement, different methods of fastness namely, wash, light, rubbing, perspiration, other allied fastness properties, their estimation methods

### Reference Subjects:

1. Chemistry I (TT104), 2. Chemistry II (TT 203), 3. Textile Fibres I (TT301), 4. Textile Fibres II (TT401), 5. Chemical Processing of Textiles I (TT304), 6. Chemical Processing of Textiles II (TT404), 7. Chemical Processing of Textiles III (TT503)

### Text Books and Articles:

1. Handbook of Fiber Science and Technology, Vol. II, Chemical Processing of Fibers and Fabrics, Part A and B by M. Lewin and S.B. Sello, 2. Principles of Colour Technology, F.W. Billmeyer, 3. Dyeing and Chemical Technology of Textile Fibres by E.R. Trotman, 4. An Introduction to Textile Finishing by J.T. Marsh, 5. Methods of Test for Colour Fastness of Textiles and Leather by The Society of Dyers and Colourists, 6. ISI Handbook of Textile Testing by Bureau of Indian Standards, 7. Textile Finishing by A.J. Hall, 8. Colour Physics for Industry by R. McDonald, 9. Chemical After-Treatment of Textiles by H. Mark, N.S. Wooding and S.M. Atlas, 10. Instrumental Colour Measurement and Computer Aided Colour Matching for Textiles by H.S. Shah and R.S. Gandhi, 11. BS Handbook, Methods of Test for Textiles by British Standards Institution.

# TEXTILE TECHNOLOGY SYLLABUS

## Quality Management (TT604)

L	T	P	C
3	0	0	3

**1. Introduction:** The importance of quality, definitions of quality, basic concepts:- quality control, quality assurance and total quality control in textile industry.

**2. Quality control:** Inspection, quality and productivity, historical importance:-inspection, statistical quality control, quality circles, quality assurance, strategic quality management(with special reference to Textile Industry).

**3. Cost of quality:** Prevention, appraisal and failure aspects of quality, planning for investment, return of investment, quality cost data acquisition, consolidation and analysis, performance indices (with special reference to Textile Industry).

**4. Management of quality:** Quality data collection, analysis of data, design of quality control systems, reporting, organizing for quality improvement, approach to quality cost minimization (with special reference to Textile Industry)..

**5. Motivational programmes:** Concepts of zero defects, right first time, guide for launching, just in time etc. (with special reference to Textile Industry).

**6. Training for quality:** Training of workers, supervisors for managing quality, methods and approaches, training and motivational role of quality circle, small group approach etc.

**7. Quality circles:** Back ground to quality circle, essential preconditions for successful quality circles, organizing and training for quality control (with special reference to Textile Industry).

**8. Quality assurance:** National and international standardization, quality assurance systems, implementation of mandatory quality assurance systems (with special reference to Textile Industry).

**9. Quality design and quality of conformance:-** Design vs. conformance, basic requirements of quality of design and conformance to design.

**10. ISO 9000 and Similar:-**Concept, methods, applications, interpretation, etc.

### Reference Subjects:

1. Textile testing and instruments I & II (TT305 and TT405), 2. Textile Mill Management I & II (TT607 and TT703).

### Text Books and Articles:

1. Textile testing by J.E. Booth, 2 Total Quality by Wakhlu, 3. Quality control Handbook by Juran, 4. Total Quality Management- selected papers by Juran, 5. Management and Control of Quality by Evans and Lindsay. 6. Total Quality Management- Baidya. 7. Quality Management- Turan 8. ISO-9000 for Quality Management, 9. Practical Handbook of Textile Testing & Quality Control- Hamby & Groover.

# TEXTILE TECHNOLOGY SYLLABUS

## Elective I, TT605

### Theory & Design of Textile Machines

L	T	P	C
3	0	0	3

- 1. Simple Machines and Mechanisms:** (Revision of concepts)- Introduction, Link , kinematic pair, degrees of freedom, kinematic chain, linkage mechanism and structure, Classification of mechanisms, Four link(bar) mechanism, inversion of slider crank chain; introduction to Motion analysis:, motion of four link mechanism- loom crank and sley , displacement , velocity and acceleration curves.
- 2. Lower pair:** Introduction, straight line mechanism- rapier movement in loom, Hooke's joint- movement of bobbin drive in speed frame, idea of double hook joint, ratchet and pawl mechanism- loom take-up and let –off, ring frame builder etc., special oscillatory mechanism: detaching roller drive in combing.
- 3. Cams:** Introduction, types of cams, types of follower, follower displacement programming, motions of the follower, cams with specified contours- tappets, winding cams, ring frame builder cams, picking cam knitting cam, etc.
- 4. Restraints, friction and lubrication:** introduction, the nature of friction, lubrication by means of chemical films, lubrication by thick films of fluid, the use rolling instead of sliding contact, journal and roller bearing, the design of sliding pairs, classification of bearings used in textile machines, special lubrication techniques in textile machines, friction in textile materials, friction spinning, friction twister in texturing, friction clutches and brakes in textile machines, friction drives, cone drum drives in speed frame, indirect loom beam drive, friction tensioners in winding etc.
- 5. Belt and chain Drives:** Introduction to belt drives, open and closed belt drives, velocity ratio, slip, type of pulleys, variable speed drives with special reference to textile machines. Introduction to chain drives, chain length, angular speed ratio, classification of chain drives with respect of textile machines.
- 6. Gears:** Introduction, basic concepts, helical gears and spiral gears – draw frames, ring frames, looms etc., worm and worm gears in looms and ring frames, Bevel gears in carding , speed frames etc., gear trains in drafting ( spg. M/c) and take up(loom), epicyclic and differential gear trains in speed frames and in double drive of looms.
- 7. Static and Dynamic force analysis:** introduction, basic concepts, static equilibrium;concept of dynamic analysis , D'Alemberts principle, dynamic analysis of crank sley mechanism, turning moment of ring frame main shaft, crank shaft of loom etc., fly wheels on looms etc., moment of inertia, centripetal and centrifugal forces, baloon formation in ring frame and winding, roller movement in drafting, design of modern draftin systems in spinning, rotor design in OE winding, motion of winding traverse, motion of beams and drums, analysis of beat-up mechanism. Dynamics of conventional and unconventional shedding ,dynamics of projectile and rapier picking mechanisms..
- 8. Balancing of Machine parts:** Introduction, basic concepts of with reference to balancing of bobbin rail of speed frame, flyer balancing, crank shaft balancing etc.

# **TEXTILE TECHNOLOGY SYLLABUS**

9. **Vibration:** introduction, basic concepts, vibration in looms, ring frame, speed frame etc.

10. **Selection mechanisms:** Introduction, methods of storing information, grouping of machine parts for selection, converting information into movement, mechanical, electromagnetic and electronics switching mechanisms, dobby and jacquard selection mechanisms, new concepts.

11. **Control mechanisms:** introduction, open loop and closed loop systems, the detecting elements, detection of broken yarns and slivers, control of yarn and cloth tension, stretch control in sizing, let off and take up mechanisms, the control of sliver thickness in carding and draw frame, auto doffing in winding and ring frame, control of temperature and liquor ratio in textile processing, pick finding devices on loom, control of size preparation,

## **Reference Subjects:**

1. Applied Mechanics, (TT306), 2.Engineering Graphics, (TEG106), 3. Computer Simulation for Textile Mechanics, Elective V, (TT803)., 4. Textile Mechanics TT605

## **Text Books:**

1. Textile Mechanics by Slater, vol. I & II, 2. Mechanics For Textile Students by W. A. Hanton, 3. Introduction to Textile Mechanisms by P. Grosberg., 4.. Theory of Machines by Rattan. 5.. Theory of Machines by Bevan

# TEXTILE TECHNOLOGY SYLLABUS

## Elective I, TT605 Textile Mechanics

L	T	P	C
3	0	0	3

### 1.The Laws of Motion

Basic Principles, Derivation of Equations, Uniform Velocity, Uniform Acceleration, The Distance-Acceleration Relation, The Velocity-Distance Relation, Uniform Circular Acceleration, Gravity, Origins, Gravitational Acceleration. The Measurement of Velocity, the Measurement of Acceleration, Limitations in Textile Applications.( Tentative list of textile items that may be considered: Beater motions,carding motions, spindle speed, shuttle , projectile and rapier movements, sley motions, shedding motions etc.)

### 2.Force, Momentum, Work, Energy, and Power

Mass, Force, Momentum,Principle of conservation of momentum,Work, Power, Energy, Interrelationships, Mass and Force, Force, Time, and Momentum, Work and Force, Work and Energy, Work, Power, and Energy, Other Forces, Electrostatic Force, Electromotive Force, Electromagnetic Force, Gravitational Force, Frictional Force. (Tentative list of textile items that may be considered: Beater forces, power requirement in ring spinning, shuttle picking forces, power of picking, energy sotred in torsion bar, gravitational forces on shuttle and pendulum testing machines etc)

### 3.Friction and Lubrication

The Origins of Friction, The Surfaces of Materials, Extraneous Matter, Molecular Features, Contact between Surfaces, The Effects of Friction, Useful Friction, Inconvenient Friction, Friction and Static Electricity, Types of Friction, Linear Friction, Coil Friction. The Measurement of Friction in textiles, Changes in Frictional Behaviour, Inherent Methods, Change in Mechanical Conditions.

Lubrication, Lubricant Action, Molecular Structure of Lubricants, Effectiveness of Lubrication(Tentative list of textile items that may be considered: shaft bearings in spinning weaving and other machines, spindle bearing in ring frame & lubrication, bearing for OE rotor, spray lubrication of projectile, friction in yarn movements over guides, friction in shuttle checking etc)

### 4.The Mechanics of Simple Machines

Equations of Circular Motion, Maintaining Uniform Circular Motion, Requirements for Maintaining Motion, Forces Acting during Circular Motion, Practical Applications, The Conical Pendulum, Tension in a Rotating Ring, Belt, or Thread

#### Non-Circular Movement Brief review of concepts with respect to textiles:

Types of Non-circular Movement, Linear Simple Harmonic Motion (S. H. M.),Angular S. H. M, Damped and Forced Vibrations, Linear S.H.M, Origins of S.H.M, Oscillation in a Spring, Equations of Linear S.H.M, Linear S. H. M. in Circular Motion, Angular S.H.M, Comparison with Linear S.H.M, Exact and Approximate Angular S. H. M, Damped and Forced Vibrations, Damping Factors, Degrees of Damping, Forced Vibrations, Types of Forced Oscillation, Non-harmonic' Periodic Vibrations, Definition

Resolution of Non-harmonic Vibrations, Equations for Periodic Vibrations

(Tentative list of textile items that may be considered: angular velocity of card cylinder, angular velocity in hydro extractor, centripetal and centrifugal forces in ring spinning, oscillation of doffer comb, comb movement in comber traverse movment in winding, SHM and other movement of sley, vibrations in loom, vibration in ring frame and speed frame etc)

### 5.Transmission of Motion

Simple Drives, Belt Drives, Chain Drives, Meshing Drives, Gears, Worms, Ratchets, Hunting-cog Motions, Geneva Mechanisms, Mangle Wheels, Auxiliary Components,

# TEXTILE TECHNOLOGY SYLLABUS

Shafts and Bearings, Cams, Cranks and Eccentrics, Idler Wheels (Tentative list of textile items that may be considered: drives in carding, drawframe, ring frame, warping and loom, gear drives in drafting and loom take up, ratchet wheel and worm gear drive in let-off and take up, hunting cog stop motion in blow room, chain drive in carding flat etc.)

**6. Impulsive Forces:** Impulsive Force, Impact, Coefficient of Restitution, Impulses and Impacts in Textiles, Powered Impacts, Gravitational Impacts, Textile Impacts (Tentative list of textile items that may be considered: shuttle and projectile picking, beating action in blow room etc.)

**7. Machines:** The Application of Drives, Definitions, Practical Factors, Theoretical Factors, Types of Machine, Levers, Inclined Planes, Comparison of Levers and Inclined Planes, The Law of the Machine, The Effects of a Load Increase, Practical Use of the Law of a Machine, Textile-machine Efficiency (Tentative list of textile items that may be considered: levers in picking mechanism, weight levers in let off, etc.)

**8. The Mechanics of Complex Systems** The Principle Of Moments: Definitions, Equilibrium, Moment of a Force, Centre of Gravity, Couples, Sign Conventions, Principle of Moments, Equilibrium, Stability, Equilibrium under Two Forces, Equilibrium under Three Forces, General Conditions of Equilibrium, Centre of Gravity, Stability, Location by Calculation, Location by Measurement, Practical Applications, General Applications, Applications in Textiles (Tentative list of textile items that may be considered: motion of crank handle in ring frame and loom, weighting of drafting rollers, centre of gravity of ring and speed frame spindles, weighting of calender rollers, band brake in warping, let off motions etc.)

**9. Moment of Inertia** Brief review of concepts with respect to textiles: Basic Principles, Moment of Inertia of Standard Geometric Objects., Angular Momentum, Properties of Rotating Bodies, Kinetic Energy, Radius of Gyration, The Compound Pendulum, Centre of Oscillation, Measurement of Moment of Inertia, The Compound Pendulum, A Revolving Mass, Referral of Moment of Inertia (Tentative list of textile items that may be considered: moment of inertia carding cylinder, flywheel in loom, moment of inertia of warpers beam, radius of gyration of upright picking shaft, etc.)

**10. Elastic Behaviour.** Review of concepts with respect to textiles: Definitions, Stress, Strain, Elasticity, Elastic Limit, Elastic and Non-elastic Behaviour, Modulus of Elasticity, Hooke's Law, Yield Point and Breaking Stress, Types of Stress, Tensile and Compressive Stress, Bending Stress, Shear Stress, Torsional Stress, Stress in Textile Materials, Specific Stress., Breaking Length, Graphical Representation, Conditions in Strained Bodies, Work and Energy, Effects of Time, Practical situations (Tentative list of textile items that may be considered: elastic behaviour in fibre, yarn and fabric etc.)

**11. Fluids** Review of concepts with respect to textiles: Fluids, Liquids, Gases, Plastics, Viscosity, Origins of Viscosity, Coefficient of Viscosity, Laminar Flow, Viscosity and Textiles, Surface Tension, Origins of Surface Tension, Surface Energy, Angle of Contact, Changes in Surface Tension, Viscoelastic Behaviour, Origins of Viscoelasticity, Types of Viscoelastic Behaviour, Spring-and-dashpot Models (Tentative list of textile items that may be considered: surface tension in textile colouration, viscosity in fibre spinning, fibre and yarn models etc)

**12. Molecular Theories Of Behaviour** Review of concepts with respect to textiles: Chemical Bonding, State of Matter, Solids, Liquids, Gases, Change of State, Polymers, Movement, Mass and Acceleration, Inertia, Friction and Lubrication, Force and Stress, Mechanical Forces, Electromechanical Forces, Forces and Fluids, Pressure, Viscosity, Surface Tension.

**Reference Subjects:** 1. Applied Mechanics, (TT306), 2. Engineering Graphics, (TEG106), 3. Computer Simulation for Textile Mechanics, Elective V, (TT803), 4. Theory and Design of Textile Machines TT605

# TEXTILE TECHNOLOGY SYLLABUS

## **Text Books:**

1. Textile Mechanics by Slater, vol. I & II, 2. Mechanics For Textile Students by W. A. Hanton, 3. Theory of Machines by Bevan, 4. Theory of Machines by Rattan, 5. . Introduction to Textile Mechanisms by P. Grosberg

# TEXTILE TECHNOLOGY SYLLABUS

## Elective II, TT606 Technical Textiles

L	T	P	C
3	0	0	3

1. **Introduction:** Basic concepts, growth of industrial textiles, engineering textile structures for industrial purposes. Difference with non-industrial textiles; Classification;
2. **Production of common fabrics:** Revisiting production and properties of adhesive bonded, needle punched, stitch bonded and spun bonded fabrics, woven fabrics.
3. **Textile composites:** Production, Properties and use of textile composites like tyres, hoses and belts, ; uses of textiles in rigid composites, properties and applications.
4. **Coated fabrics:** Design, production, properties and application
5. **Medical Textiles :** Material used in bio-textiles; classification of medical textiles; Textiles for implantations; Non-implantations textiles; textiles for extra-corporeal devices; Healthcare and hygiene textiles;Surgical Textile, Suture threads, Vascular textiles, Knitted cardiac biological valves, Dialyze textiles, hollow fibres as dialysis membrane, hospital textile, Sanitary applications.
6. **Textiles in filtration:** Introduction, general filtration and filtration by osmosis, Textiles in dry filtrations; Textiles in liquid filtrations; filtration for medical purposes
7. **Agricultural application of textiles:** Introduction, erosion control of soil, loss prevention of seeds and seedlings, sun and wind control etc.,application for drainage.
8. **Textiles in civil engineering applications:** Introduction, erosion control of river banks, road construction, sewerage control etc. Fabrics for architechural and constructions; Awnings and canopies; Roofing material; Storage vessels; Fibre reinforced concrete and cement; Acoustic and heat insulation textiles;
9. **Textiles in protective clothing:** introduction, protection against heat, impact and others for safety. Fabrics in defence system and weapons; other applications;
10. **Sports and recreation textiles :**
11. General; Sports uniforms; Base ball; Tennis; Football; Golf and hockey equipments; Skates; Bikas; Marine products; Textiles in sports surfaces; Fabrics for children fun and play.
12. **Textiles in miscellaneous industrial applications:** introduction, paper makers felt, bearing and sealing materials, sound insulation, battery separators, electrical insulation, automotive application, structural applications Textiles in electronics; Banners and flags; textiles re-inforced products; Transports bags and sheets; Fabrics to control oil spills; Canvas cover and tarpaulins; Rope and nets etc.;

# **TEXTILE TECHNOLOGY SYLLABUS**

## **Reference Subjects:**

1.Fabric formation I,II,III,IV (TT303, TT 403, TT 502, TT 602), 2.Textile fibres, (TTF301), 3.New Generation Fibres, TT606 .

## **Text Books and Articles:**

1.Wellington Sears Handbook of Industrial Textiles by S. Adanur, 2.Performance of Textiles by Lyle.

2.Medical Textiles-International Conference on Medical Textiles,Bolton,Woodhed Publication,Cambridge,1997

3.John,N.W.M"Geotextile"Blackie publication,Glasgow,1987

4.Gulrajani, North India Textile Institute,New York1992

5. Industrial Textiles – Horrocks

# TEXTILE TECHNOLOGY SYLLABUS

## Elective II TT606 New Generation Fibres

L	T	P	C
3	0	0	3

- 1 .New generation fibers:** Introduction, Background, Transition to new fibers
- 2. The super-fiber with new performance:** Introduction, basic classes of super-fiber, the need for a strong fiber, concept of "gel-spinning, The aramid fiber race , Polyacetal fiber, Strong Vinyon RM, New liquid crystalline polymers: engineering plastics, Vectran: a fully aromatic polyester fibre, Developing polyallylate fiber, Final stage of pitch-based carbon fiber development, use of super fibres, The future of super-fibers
- 3. High-tech fibers:** A silk-like fiber that surpasses natural silk, ultra-fine fibers, skin-like fabrics, Chameleonic fabrics, Photochromism-controlled clothing material, Perfumed fibers, Power fibers that store solar energy, Iridescent textiles, Protein plastics with the feel of human skin.
- 4.Biomimetic chemistry and fibres:** Application of Morphology / structure, Hybridisation technology.
- 5.Bio-polymer frontiers:** Mimicking the functions of enzymes and co-enzymes, Polysaccharides in semiconductors and medicine, fibres from biomass of crab and shrimp shells, New applications of silk, Fibers produced by bacteria, New functions for cellulose.
- 6 Progression of high-tech fibers:** Introduction, Biotechnology and fibers ,Electronics and fibers , Cars and fibers, Fibers in space, Fibers and nuclear power, Fibers in sport, Fibers for geotextiles, Fibers in the ocean.
- 7 New high-tech fibers:** Various categories of high-tech fibers, Development of *Shingosen*, Design of specialist fibers, Fabrics for relaxation using  $1/f$  fluctuations, new arrivals.
- 8 Cellulosic fibers:** New solvent systems, New cellulosic fiber derivatives, New environmental and cost saving developments, Life-cycle assessment, Cellulose: the renewable resource.
- 9.Fibers for the next generation:** High-tenacity and high-modulus fibers, microdenier (ultra-fine) fibers and biomimetics, the next stage: technological improvements, new frontier fibers (super-function fiber materials, etc.), super-biomimetic fiber materials, super-natural materials, resources recycling, fibers for health.
10. Carbon Fibres.

### Reference Subjects:

1. Textile Fibres I (TT301), 2. Textile Fibres II (TT401),

### Text books:

1. New Fibres by Hongu and Phillips, 2. Polymers for Engineering Applications by R. B. Seymour, 3. High technology Fibres: Handbook of Fibre Science and Technology, Vol. III, Ed. by Lewin and Preston.

# TEXTILE TECHNOLOGY SYLLABUS

## Textile Mill Management I (TT 607)

L	T	P	C
3	0	0	3

**1. BUSINESS:** Industry ,trade, commerce, common features of business enterprise, ownership type etc.

**2. INDUSTRIAL OWNERSHIP:** Introduction, type of ownership, single ownership, partnership, Joint Stock Company, cooperative society, public sector, private sector.

**3. MANAGEMENT CONCEPTS:** Nature of management and purpose, integrating men and methods, activities in the organisation, relation among management , administration and organisation, scientific approach to management, principles of management, functions of management, evolution of management thought and the pattern of management analysis, idea of major contribution to management, scientific management, operational management theory, behavioural sciences, system theory, modern management thoughts, management in the future.

### **4. FUNCTIONS OF MANAGEMENT:**

a) **Planning:** purpose and nature of planning, types of plans(mission, goal, strategies, policies, procedures, programs, budgets etc.) steps in planning objectives, evolving concepts in Management by Objectives(MBO), the process of MBO, benefits and weaknesses of MBO, strategy and policy, strategic planning process, major kinds of strategies and policies,, planning premises-values and areas of forecasting, idea of Delphi technique In fore casting, sales forecast , nature and use of sales forecast, methods of sales forecasting, decision making-managerial functions and decision making, types of decisions, nature of decision making,, steps in decision making, fears in decision making, Decision support system and management information systems, idea of creativity and innovation, system approach to decision making.

b) **Organising:** Introduction, formal and informal organisation, organisational decision, organisation levels and span of management, factors determining the effective span, structure and process of organising, Organisational structure- departmentation by simple numbers, by time, by enterprise function, by territory,, by customer, by process or equipment, by product. idea of strategic business unit, Line/Staff authority and decentralisation- idea of authority and power line, line and staff concept, functional organisation,, benefits and limitations, decentralisation of authority, delegation of authority, advantages and limitations of decentralisation. Matrix -organisation.

c) **Staffing:** Introduction , system approach to human resource management, an overview of factors affecting staffing, an overview of system approach to selection, training and development, performance appraisal and carrier strategy, managing change through manager, group dynamics and organization development.

d) **Leading:** Human factors and motivation, Leadership, supervision, committee and group decision making.

e) **Communication:** Communication functions in organization, communication process, effective communication, and electronic media in communication.

f) **Controlling:** Control process , control as a feed back system, real time information and control, requirements for effective con troll, control techniques and information technology,, budget and non budgetary control devices, time event network analysis, program budgeting, procedures planning and control in information technology, idea of productivity and operations management, profit and loss control, preventive control, management audit.

**5.TYPES OF MANAGEMENT:** Concept of Development management, Distribution management, financial management, Maintenance management, purchase

# **TEXTILE TECHNOLOGY SYLLABUS**

management, Production management, Transport management, personnel management, office management.

## **Reference Subject**

1. Textile Mill Management II (TT 703), 2 Entrepreneurship Management

## **Text Books and Articles:**

1. Textile Mill Management by Ormerod, 2. Essentials of Engineering Economics by Kasner, 3. Management in a Global Perspective by K'oonze & Wehrich., 4. Quantitative Approach to Management by Levin, Rubin, et. al., 5. Industrial Engineering and Management by O. P. Khanna, 6. Engineering Economics by Kleinfeld, 7. Managerial Economics by M.V. Palyee, K.C. Sankaranarayan & J.T. Payyappilly,

# TEXTILE TECHNOLOGY SYLLABUS

## Seminar -TT693)

L	T	P	C
0	0	3	2

Each student will deliver a lecture on a topic of his/her own choice. He/she must submit a synopsis of the said topic at least one week before the scheduled date to the coordinator. He/she has to submit at least two seminars during the semester and one seminar at the end of semester.

# **TEXTILE TECHNOLOGY SYLLABUS**

## **SEMESTER-VII**

# TEXTILE TECHNOLOGY SYLLABUS

## Information Technology in Textile(TT701)

L	T	P	C
3	0	3	5

1. **Introduction:** Meaning of Information technology, historical perspective, IT revolution.
2. **Goals of IT Deployment:** Development of IT applications in business, Potential of IT in Textile Manufacturing, need and framework of IT use in textile. Vision and Important areas, data versus information, information resources, Basic elements of IT in Textile mills, past and present IT in textile mills, elements of non-integrated computer environment in manufacturing., strategic planning, information resources management concept.
3. **Enterprise IT Infrastructure:** Broad vision, Idea of architecture and standards, Inter and intra- enterprise integration, general areas of IT application- integrated product and process design, shop floor production, business practices, New areas of IT applications- virtual factory, programmable and reconfigurable factory, net worked factory, microfactory etc, Non manufacturing areas- knowledge and information management,.Planning the enterprise IT infrastructure.
4. **Getting Connected for IT:** Introduction, Telecommunications, LANs,WANs and Intrnets, information Super Highway and the Internet, World Wide Web, Idea of Client server architecture.
5. **Computer Based Information Systems:** Information management, manager and systems, , computer-based information systems, information services organization, justifying the CBIS, achieving the CBIS.;
  - a) Management information systems- concept of information subsystems,systems model of textile firms, system approach, modeling and simulation, perspective of MIS, problem solving;
  - b) Manufacturing information systems- model of manufacturing information system in textile. shop floor information systems and control of individual activities.;
  - c) Financial information systems- model of financial information systems, accounting information systems, fund management and forecasting subsystems, control subsystems.
  - d) Human resource information systems-model of human resource s information systems, human resource management subsystems.
  - e) Marketing information systems, model of marketing information systems, Electronic Commerce- strategy and methodology, EDI, E-commerce technology, use of internet.
  - f) Knowledge-based Systems:Decision support systems, artificial intelligence, expert system, knowledge base, fuzzy logic and Neural Networks.
  - g) Virtual Office: Office automation, virtual office, virtual office in textile arena.
6. **IT Enabled organizational change:**Approaches towards It implementation, types of changes related to IT implementation, other issues.
7. **Security and social Issues:** Ethics and information systems, information crimes, legislation, right to privacy.

# TEXTILE TECHNOLOGY SYLLABUS

**Reference Subjects:** 1)Computer applications in Textile

**Text books and Articles:** 1)Information Technology for Manufacturing-A research Agenda, National Academy Press, Washinton DC, 1995; 2)Industrial Automation Systems and Integration-product data representation and exchange, Part I- overview and fundamental principles, ISO-10303-1, International Organisation for Standardisation(ISO), Geneva; 3)Introduction to Information Systems by James A. O'Brien, McGrawhill, USA 1997, 4) Computer Systems Today by S.K. Basandra, Wheeler Publishing, New Delhi,1999, 5) Principles of Management Information Systems by G.M. Scott, McGrahill, USA, 1986; 6) Study of Application of Computer Systems in a Textile Mill, B.Sc(Tech) Project report, supervised by A. Biswas, CTT Berhampore, W.B.1998; 7)Information Technology for Textile Manufacturing ( an unpublished note for short course) by A. Biswas, CTT, Berhampore, W.B.

# **TEXTILE TECHNOLOGY SYLLABUS**

## **InformationTechnology in Textile(TT794) Practical**

The following list is in no way exhaustive. Additional laboratory work or experiments can be planned to consolidate the theoretical work and to emphasize the activities for doing rather than the knowing.

- 1.To study the networking of computers in star structure,
- 2.To study the working of servers,
- 3.To study the Windows Linux and Unix operating systems for net work management,
- 4.To study the protocols for information exchange(TCP/IP),
5. To study the network security and firewalls,
- 6.To study the video conferencing on the net,
- 7.To study the chat on internet
- 8.to study the file transfer on internet,
- 9.To prepare a survey report on the state of the art of a particular textile machine by browsing and searching the internet.
- 10.To study the simple data acquisition from a textile machine or instrument.
11. Practice of Coreldraw, Adobe Photoshop, Tool Book II

# TEXTILE TECHNOLOGY SYLLABUS

## Industrial Engineering(TT 702)

L	T	P	C
3	0	0	3

1. **Introduction:** Definition, purpose, available techniques, Aspects, physical facilities & operating facilities ,scientific management, resources productivity, etc.

2. **Work Study:** Definition ,objectives, Techniques, method study, work measurement, Purpose of work study, steps, different phases,

3. **Method Study :**

Definition , Steps, Selection of problems, Collection of facts and consideration about objectives, Recording techniques ,Elements of a process analysis , Operation process chart ,Different process charts, Critical examination ,

4. **Work Measurement :**

Definition ,Uses, Techniques, Time Study, Measuring Instruments, Elements in time study, factors, alignment chart, Performance rating methods, observed time & normal time , allowances, Standard time, Work sampling Predetermined Motion Time study, Motion time data for assembly operations, Work factor system, method time measurement,

5. **Job Evaluation :**

definition, Aspects, Uses, definition of job ,different methods of job evaluation ,Ranking system, Grade description system, point method, Factor comparison method

6. **Wage Incentive Plans:**

Unit of measurement, Various methods, Characteristics of wage, Incentive schemes, relationship between productivity, wages & cost different wage incentive plans , relationship between indirect labour , direct labour & total plant productivity .

7. **Plant Maintenance :**

Introduction, Systems of maintenance, break down, Planned, Corrective and Preventive maintenance, maintenance schedule

8. **Operations Resarch:**

Introduction, concept of optimization, methods of operations research, linear programming , distribution methods, Assignment models, queuing theory, Sequencing problems, Network Analysis, Game theory, Replacement analysis, depreciation

**Reference Subjects:**

1. Textile Mill Management I (TT 607), 2. Textile Mill Management II (TT 704)

**Text Books and Articles:**

1. Industrial Engineering and Management by O. P. Khanna, 2. Textile Mill Management by Ormerod , 3. Engineering Economics by Kleinfeld, 4. Managerial Economics by M.V. Palyee, K.C. Sankaranarayan & J.T. Payyappilly, 5. Essentials of Engineering Economics by Kasner, 6. Management in a Global Perspective by K'oonze & Weihrich., 7. Quantitative Approach to Management by Levin, Rubin, et. al.,

# TEXTILE TECHNOLOGY SYLLABUS

## Theory of Textile Structures (TT703)

L	T	P	C
3	0	0	3

- 1. Introduction:** Basic concepts of yarn and fabric structure.
- 2. Yarn structure:** Types of yarn, the idealized helical yarn structure, yarn count and twist factors, twist contraction and retraction, packing of fibres in yarn, effect of fibre properties on the diameter and density of yarn, measurement of yarn diameter, density and specific volume, empirical formulas for the determination of yarn diameter.
- 3. Morphology of single yarn:** The arrangement of fibres in a unitary yarn, ideal migration, characterization of migration behaviour, techniques of determining the position of fibre in a yarn, migration in blended yarns, mechanisms of migration, effect of various parameters on migration behaviour.
- 4. Continuous filament yarns:** Analysis of tensile behaviour, effect of traverse force and lateral components of continuous filament yarns, analysis of large extension, extension & breakage of spun yarn.
- 5. Staple fibre yarns:** Introduction, fibre obliquity and slippage, influence of fibre length and friction.
- 6. Blended yarns:** composition of fibres in cross section of blended yarns, blend irregularity, distribution of blend components, strength of blended yarns, introduction of Hamburger's model.
- 7. Woven structure:** Elements of fabric geometry, cloth setting, cloth setting theories, study of Peirce's model and introduction to the later modifications, jamming of threads, cover and crimp interchange in woven fabrics with respect to simple geometry.

### Reference Subjects:

1.Design and structure of fabric (TT304), 2.Textile instruments & Testing I & II (TT305 & TT405)

### Text Books and Articles:

1.Structural Mechanics for Textiles by Hearle, Grosberg and Becker. 2. Textile Yarns by Martindale, Goswami & Scardino 3. Woven Cloth Construction by Robinson, 4. Cloth Geometry by F.T. Pierce.

# TEXTILE TECHNOLOGY SYLLABUS

## Textile Mill Management II (TT 704)

L	T	P	C
3	0	0	3

### 1. MONEY MATTERS IN MANAGEMENT

- a) **Introduction,**
- b) **Financial management:** concept and definition, purpose of investment, types of capital, working capital, sources of finance, reserve surplus, financial accounting, book keeping, assets, liabilities, journal and ledger, trial balance, trading account, financial statement, financial ratios.
- c) **Cost Accounting and Control:** Introduction, Costing and cost accounting, utility of costing, purposes of cost accounting, considerations in introduction of costing, methods of costing and types of cost (job, process and farm costing), techniques of costing (definitions and concept of historical costing, predetermined cost-estimated costing, standard costing; marginal costing, uniform costing, opportunity costing, differential cost, out of pocket cost, imputed cost), analysis and classification of cost, Elements of cost- (material procurement, inventory control, material requirements planning), labour ( types, time keeping, remuneration etc.) and overhead( classification, distribution etc.), prime cost- factory cost-total cost-selling price, function-wise classification of cost,- production cost, administration cost, selling and distribution cost, behaviour wise classification of cost- variable cost, fixed cost and semi-variable cost., concept of textile costing system, cost control.
- d) **Budgets and budgetary control:** Revisiting earlier concepts, objectives of budgets, budgeting and budgetary control, advantages of budget, limitations of budget, types of budgets, preparation of budgets, budget as a means of planning , control and co-ordination, working of budgetary control.
- e) **Banks and Banking** ( brief concept): types of banks, money market, credit concept, stock exchange, free trade and protection, foreign exchange.
- f) **Evaluating Investments:** Revisiting earlier concepts only (Concept of pay-back time, Return on Investment, benefit/cost analysis, break even analysis to investment alternatives, evaluating investments, using time value of money,-- concept of interest, , maximum pay- back time, discounted cash flow analysis.)

### 2. HUMAN ASPECTS IN MANAGEMENT

- a) **Organisation:** Introduction, organisational structure for textile industry— organisational patterns, the specialist department, communications, interaction between organisational structure and technology.
- b) **Personnel Management:** Introduction, objectives and functions of management, recruitment and selection of employees, education and training, safety and security, housekeeping, labour welfare, communication in industry., trade unions, industrial disputes, workers participation in management, industrial labour legislation.
- c) **Industrial psychology and Human Motivation:** introduction, objectives, morale, motivation, working conditions, industrial fatigue.

### 3. Materials or Product in Management:

- a) **Materials procurement:** Introduction, Fibres, Yarns, Fabrics, purchasing or procurement, stores and material control,
- b) **Material Handling:** Introduction, functions and principles of material handling, types of material handling equipment, selection of equipment.
- c) **Material sales and marketing management:** Introduction , sales management, sales organisation, functions of sales department, the selling concept vs.

# **TEXTILE TECHNOLOGY SYLLABUS**

marketing concept, marketing principles and functions, marketing management and its functions, marketing research, sales forecasting, the marketing mix, advertising and sales promotion, channels of distribution, product packaging, concept of pricing.

## **4. METHODS IN MANAGEMENT:**

- a) **Introduction**, Revisiting concepts of Operations research, Techniques of labour remuneration, Work Study etc.
- b) **Inventory Control and Management:** Introduction, inventory control, inventory classification, inventory management, objectives of inventory control, economic order quantity, inventory models, ABC analysis, material requirements planning, manufacturing resource planning, operating cycle.
- c) **Statistical methods:** Introduction, revisiting SQC and other quality control procedures, interpretation of data and design of experiments.
- d) **Decision making:** Revisiting earlier concepts with respect to Textile Mill, managerial functions and decision making, types of decision, theories of decision making, techniques of decision making, nature of decision making, steps in decision making, quantitative methods in decision making, decision making under certainty, uncertainty and risk, decision support systems, fuzzy logic and neural net work, creativity and innovation.

## **5. Plant and Production aspects in Management:**

- a) **Plant Location and Layout:** Introduction, factors governing plant location, location economics, rural versus urban plant sites, plant layout, process layout, product layout, combination layout, flow pattern, plant layout procedure. Factory building—consideration in building design, effect of process and material flow, types of factory building,
- b) **Engineering services**, lighting, heating, ventilation, Air conditioning, noise reduction,
- c) **Production Planning and first projection:** Introduction, forecasting, technological forecasting, planning to meet demands, process planning, scheduling and control of production, dispatching, routing, progress control, supply chain management, line balancing.

### **Reference Subjects:**

1. Textile Mill Management I (TT 607)

### **Text Books and Articles:**

1. Textile Mill Management by Ormerod , 2. Engineering Economics by Kleinfeld, 3. Managerial Economics by M.V. Palyee, K.C. Sankaranarayan & J.T. Payyappilly, 4. Essentials of Engineering Economics by Kasner, 5. Management in a Global Perspective by K'oonze & Weihrich., 6. Quantitative Approach to Management by Levin, Rubin, et. al., 7. Industrial Engineering and Management by O. P. Khanna

# TEXTILE TECHNOLOGY SYLLABUS

## Elective III, Wool Technology (TT705)

L	T	P	C
3	0	0	3

### Key Concepts

*Fibre and its properties, woollen spinning systems, worsted/semi worsted spinning systems.*

- Fibre properties and its testing:** Sheep breeds and shearing, grading of wool; morphological, chemical, and fine structure of wool fibres, physical properties of wool such as length, micron, strength, crimp, total fatty matter (tfm) etc. and their testing processes; physical properties of fibres suitable to be blended with wool and concept of hair fibres.
- Chemical processing of wool fibre/top:** Impurities in raw wool and their removal, different methods of scouring, carbonisation of wool and back washing, theory of dyeing of wool and blends with special reference to dyeing of wool tops.
- Yarn manufacturing system:** Classification and brief outline of spinning systems like woollen, semi-worsted and worsted.
- Woollen spinning system:** Secondary wool, rag pulling and garnetting (shoddy and mungo), wool blends for woollen yarns and oiling of wool; woollen carding - mechanism and card settings, woollen spinning- basic concepts of wool spinning, concept of carpet yarn manufacture.
- Worsted/semi worsted spinning system:** Top preparation, worsted carding, semi worsted card (only concept), gilling, intersecting gillbox, combing, topmaking and top finishing for wool; tow to top conversion of filament for multilength staple fibre for blending with wool top, blending technique, type of product blend, concept of process sequence, count range, worsted drawing, roving frame, rubbing frame and ring spinning-detailed mechanism, setting, speed drafting system, draft etc. of the machines with special reference to modern machines, concept of yarn twisting with reference to two for one twister, norms for worsted and woollen yarn quality, on-line control of productivity and quality in all stages of yarn manufacture, humidification control.
- Introduction to woollen/worsted weaving:** Weaving preparatory for woollen and worsted with settings, controls and package particulars. Selection & study of weaving machines for woollen and worsted blended fabrics.  
Carpets: Structures, cutting, manufacturing techniques and designing of carpets, required essential properties of carpets.  
Blankets: Manufacturing technique and machinery line-up. On-line control of productivity and quality.

### Reference Subjects:

1.Yarn formation I,II,III & IV(TT302,TT402, TT502, TT601), 2.Chemical Processing of Textiles I (TT404), 3.Fabric formation I,II,III & IV (TT303, TFF403,TFF502,TFF602).

### Text Books and Articles:

1. The Microscopy of Animal Textile Fibres by A.D. Wildman, 2. Textile Fibre to Fabric

## **TEXTILE TECHNOLOGY SYLLABUS**

by B.P. Corbman, 3. Wool Hand Book, 4. An Introduction to the Study of Spinning by W.E. Morton, 5. Textile Scouring by E.R. Trotman, 6. Theory and Practice of Wool Dyeing by C.L. Bird, 7. Production of Quality Woollen Yarn by WIRA, 8. Practical Worsted Carding by T.F. Griffin, 9. Wool Spinning, Vol. I & II by Y. Lipenkov, 10. Spun Yarn Technology by Eric Oxtoby.

## Elective III, Silk Technology (TT705)

L	T	P	C
3	0	0	3

### Key Concepts

*Silk fibre–Introduction, cocoons, silk reeling, silk testing, spun silk industry, silk throwing and weaving, wet processing.*

**1. Silk fibre:** Introduction, physical properties of silk, chemical properties of silk, washing and drying properties of silk, physical characteristics of cocoons.

**2. Cocoons:** Mulberry cocoons, formula for ascertaining the renditta and price fixation of cocoons, relationship between shell percentage and renditta/raw silk percentage, research work, process flow chart of mulberry silk reeling, cocoon testing, cocoon testing and grading, method adopted in Japan, stifling/drying, storage of cocoons, sorting of cocoons, cocoon cooking, brushing/deflossing, idea of reeling, re-reeling, skeinling, mulberry vs. non-mulberry silk, process flow chart of *tasar* and *muga* cocoons, non-mulberry cocoons.

**3. Silk reeling:** Introduction, mulberry silk reeling, *charkha*, cottage basin, multiend reeling basin, automatic reeling machine, doupion silk reeling, new experimental studies, typical raw silk yield, non-mulberry, recent research studies.

**4. Silk testing:** Importance of raw silk testing and grading, international system, twin tests, doupion, silk testing.

**5. Spun silk industry:** Introduction, existing utilisation capacity, classification of silk waste, economics, waste from non-mulberry cocoons, spun silk industry, noil yarn, typical yield of mulberry and *Eri* in spun silk mills, hand spinning, recent research studies.

**6. Silk throwing and weaving:** Preparatory processes, silk weaving in India, features of silk loom, shuttleless loom, quality criteria in silk weaving, weaving defects.

**7. Wet processing:** Introduction, flow chart of silk processing, degumming of silk, bleaching of silk, dyeing of silk, printing of silk, finishing of silk.

### Reference Subjects:

1.Yarn formation I, II,III,IV(TYF302,TYF402 ,TYF502, TYF601,), 2..Fabric formation I,II,III & IV (TFF303, TFF403,TFF503,TFF602), 3.Textile Fibres I & II (TTF301 & TTF401), 4.Chemical Processing of Textiles I,II,III & IV (TCP404,TCP 504,TCP603,TCP704)

### Text Books:

1.Handbook of Silk Technology by Tammanna N. Sonwalkar.

# TEXTILE TECHNOLOGY SYLLABUS

## Elective III (TT705) Jute Technology

L	T	P	C
3	0	0	3

### *Key concepts*

*Jute fibre, batching, drawing and doubling, roving frames, spinning frame, reeling and bundling, twisting, winding, modern developments, weaving and processing.*

1. **Jute Fibre:** Introduction, Raw jute, different qualities and gradation, jute used in different quality of yarn viz. Carpet backing, hessian sacking; main defects in raw jute and their reasons.
2. **Batching:** Introduction, hand and machine batching, batching emulsion, hackling, root cutting, softener, spreader, teaser card, dust shaker, breaker cards for hessian and sacking warp, finisher cards for hessian and sacking warp, breaker and finisher cards for sacking weft, roll formers.
3. **Drawing and Doubling:** Introduction, open link chain, double crank, push bar, spiral and rotary, frames, modern drawing, frames for hessian first drawing, second drawing and finisher drawing, sacking, weft mackhigh drawing and sacking, weft finisher drawing frames.
4. **Roving Frame:** Introduction, study of roving frames for draft twist, winding on and builder motion mechanisms.
5. **Spinning Frames:** Introduction, Revolving Spindle and Flyer type rove spinning, high speed auto doffing static spindle type, controlled draft, slip draft, inclined gill spinning.
6. **Reeling and Bundling:** Introduction, purpose, equipment.
7. **Twisting:** Introduction, different types of frames, arrangement of drawing rollers for medium and heavy twist.
8. **Winding:** Introduction, spool and cop winding.
9. **Modern Developments:** trends on jute softening, batching, drawing , spinning and winding machinery.
10. **Weaving and Processing:** Introduction, requirements, system and process parameters.

### **Reference Subjects:**

1.Yarn Formation I, II, III, IV (TYF302, TYF402, TYF502& TYF601), 2.Textile fibres I & II (TTF301,401)

### **Text Books:**

1.Jute Fibre to Yarn by Atkinson, 2.Handbook on Jute Vol. I & II by T. C. Ranjan, 3.Production Process and Cost Control on Jute Industry by S. N..Bindal

# TEXTILE TECHNOLOGY SYLLABUS

## Elective IV, TT706 Garment Technology

L	T	P	C
3	0	0	3

**1. INTRODUCTION:** Factors involved in the study of clothing, general functional descriptions of clothing.

**2. GARMENT INDUSTRY:** General background, origin, location, and growth, structure of apparel industry in India.

**3. STUDY IN ANTHROPOLOGY :** Basic understanding of 3-dimensional body form, fit and silhouettes, Study about anthropology in relation to size charts, ranges, and grading., Understanding of fit and balance of a garment. Draft basic blocks from measurements of body and dress form;

**4. PROPERTIES FOR COMFORT AND FIT:** General functional description of clothing, Heat and moisture relations in clothing, physical properties of clothing and clothing materials in relation to comfort, thermal transmission or resistance, water and air-permeability or resistance, radiation exchange with clothing materials, influence of environmental conditions on the protective performance of garments, thermal protection of clothing, stiffness and bending properties, clothing fit and fabric shear, fabric friction, static electricity; aesthetic aspects of clothing, e.g., drape and wrinkle recovery, abrasion resistance, pilling resistance of fabrics, Tailor ability and sewability, water repellency and shrinkage.

**5. FIBRES AND THEIR INFLUENCES:** Introduction, special for unusual stress environments, trends in fibre usage, influence of fibre yarn characteristic and fabric construction parameters on clothing comfort.

**6. STUDY OF CLOTHING:** Current trends and new developments, new fibres ,materials and finishes, new techniques, new concepts, garment finishing.

### **7. GARMENT MANUFACTURE:**

- a) **Introduction:** Garment manufacture terms and definitions;
- b) **Grading-** system of grading, grading of bodice, sleeve, collar etc. and size charts, computer aided pattern making and grading;
- c) **Garment construction-** understanding of basic sewing machinery, cut, sew, construct and finish of high quality garments;
- d) **Pattern making-** Terminologies lay planning & marker planning, Spreading technology and quality control in pattern making, Application of computer in pattern construction and lay planning's
- e) **Cutting Process:** Marking and cutting Process, Reprographics, drilling and notching ,Methods of cutting and automatic cutting
- f) **Sewing and stitching:** Stitch classification and seam types, Basic principles and machinery for a variety of sewing operations e.g. chain/ lock/ blind/ multi-needles/ over-lock linking etc stitching machines,
- g) **Trimming Operations:** Trims, Operations, thread cutting, labeling, QC- check, etc.

# **TEXTILE TECHNOLOGY SYLLABUS**

- h) **Finishing operations**: Garment finishing and packing processes,
- i) **Production Systems**: Conventional and advanced garment production systems, Automation and CIM in garment manufacturing.

## **Reference subjects:**

1. Textile Testing & Instruments I & II (TT305 & TT405)

## **Text books and articles:**

1. Principles of Textile Testing by J E Booth.,
2. Performance of Textiles by Lyle,
3. The Technology of Clothing Manufacture by Carr, Harold & Lotham,
4. Apparel Production Management by Solinger,
5. An Introduction to Quality Control for Textile Industry by P. V. Mehta,
6. Introduction to Clothing Production Management- A.J.Chuter,
7. The Technology of Clothing Manufacture-Carr Harold & Latham Barbara,
8. Garment Technology for fashion designers-Garry Covkem,
9. Knitted Clothing Technology- Terry Breakenbury

# TEXTILE TECHNOLOGY SYLLABUS

## Elective IV TT706

### Speciality Yarns and Sewing Thread Formation

L	T	P	C
3	0	0	3

1. **Classification of yarns:** Introduction-Staple yarns, Continuous filament yarns, novelty/specialty yarns, high bulk (staple and continuous filament), stretch yarns.
2. **Speciality yarns:** Condenser spun, drawn and spun, fancy yarns produced on conventional folding/cabbling machinery-spiral, diamond, multifold, gimp, mock chenille; fancy yarns produced on specialized folding/cabbling machinery-cloud, knop, loop, snarl, spiral, stripe, slub, eccentric, folded chenille; coloured yarn manufacture: Solid shades, mixture shades- gill mixing, recombining, colour mixing in drawing; core yarns: Classification and concept; Vigoureux printing (melange): imitation Vigoureux effects.Speciality Coloured yarns: Twist shades (Grandrelle); single marl, marl, Half marl, double marl, single mottle, tie-n-dye.
3. **Sewing Threads:** Introduction, classification and end uses; basic properties of sewing threads: sewability, seam security, colour matchability, tenacity, evenness and hairiness; raw materials: cotton, manmades and blends; manufacturing techniques: classification of different processes including modern techniques; detailed study of manufacture of cotton sewing thread: raw stock through opening and cleaning, carding, combing preparation and combing, drawing, roving, ring spinning, ring yarn winding and clearing, assembly winding, doubling, plying and/or cabbling, winding for finishing; flowchart for sewing thread finishing operation with objectives: singing and mercerising, quilling, bleaching, dyeing. thread finishing: objectives, types, sewing finishes; packaging: spooling of thread, coning and tubing, ticketing and labelling.
4. **Textured Yarns:** Introduction, purpose, bulked and textured yarns, methods of texturing thermoplastic and non-thermoplastic yarns, basic principles, feed material characteristics-study of twist-set-detwist, false twist, edge crimp, stuffer box crimp; knit de-knit techniques of texturing and the techniques of modified stretch yarn; theory of bulking, study of air jet bulking process, properties and uses of textured and bulked yarns; texturing of non thermoplastic yarns.

#### Reference Subjects:

- 1.Yarn formation I (TT302), 2.Yarn formation II (TT402), 3.Yarn formation III (TYF501), 4.Yarn formation IV (TYF601).

#### Text Books & Articles:

1. Textile Yarns by Goswami, Martindale and Scardino, 2 Spun Yarn Technology by E. Oxtoby, 3. American Cotton Handbook, Vol. I. 4.Textile Yarns by Martinedale, Goswami & Scardino, 5. Textured Yarn Technology by Gandhi. 6. Modern Yarn Production by G.R.Wray. 7. Textured Yarn Technology by Monsanto.

# **TEXTILE TECHNOLOGY SYLLABUS**

## **Industrial Training II (TT791)**

### **Practical/Fieldwork**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
0	0		3

1. Maintenance schedule followed machine-wise/department-wise, preventive maintenance program for different departments, organisational details of maintenance department.
2. Details of ancillary equipment and system required to control the relative humidity and temperature, machinery audit in different sections, knowledge of the working principle, production rates and efficiencies of the machine available in the department.
3. Details of quality control/quality assurance program followed in the mill, instrument available in the quality control section and/or process control instruments used in the mill, on-line quality control system.
4. Pollution control measure/environmental engineering practices adopted by the mill, equipment/devices used by the mill to control the noise, safety measures taken by the mill to prevent accidents and hazards.
5. Preparation of mill report for day-to-day work, authenticated by a responsible person (not below the level of shift-in-charge).

# **TEXTILE TECHNOLOGY SYLLABUS**

## **Seminar on Industrial Training (TT792)**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
0	0		3

Each student will deliver a lecture on his/her training only.. He/she must submit a synopsis of the training at least one week before the scheduled date to the coordinator. He/she has to submit one seminar at the end of semester.

# TEXTILE TECHNOLOGY SYLLABUS

## Minor Project I (TT793)

L	T	P	C
0	0	9	6

In this semester, students are required to define the problem, analyse potential causes, identify possible solutions, select the best solution, develop an action plan, submit a written report and present the initial progress of the work in a seminar for assessment as per university norms.

# **TEXTILE TECHNOLOGY SYLLABUS**

## **SEMESTER-VIII**

# **TEXTILE TECHNOLOGY SYLLABUS**

## **VALUES AND ETHICS OF PROFESSION-HU 801**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
3	0	0	3

### **1) Science, Technology and Engineering as Knowledge and as Social and Professional Activities**

- Effects of Technological Growth: ( 2 lectures)
- Rapid Technological growth and depletion of resources. Reports of the Club of Rome.
- Limits of growth; sustainable development ( 2 lectures)
- Energy Crisis; Renewable Energy Resources ( 2 lectures)
- Environmental degradation and pollution. Eco-friendly Technologies. Environmental Regulations. Environmental Ethics ( 4 lectures)
- Appropriate Technology Movement of Schumacher: later developments ( 2 lectures)
- Technology and developing nations. Problems of Technology transfer. Technology assessment, impact analysis ( 4 lectures)
- Human Operator in Engineering projects and industries. Problems of man machine interaction. Impact of assembly line and automation. Human centered Technology ( 4 lectures)

### **2) Ethics of Profession**

- Engineering profession: Ethical issues in Engineering practice. Conflicts between business demands and professional ideals . Social and ethical responsibilities of Technologists. Codes of professional ethics. Whistle blowing and beyond. Case studies. ( 8 lectures)

### **3) Profession and Human Values**

- Value Crisis in contemporary society ( 2 lectures)
- Nature of values: Value Spectrum of a 'good' life ( 2 lectures)
- Psychological values: Integrated personality; mental health ( 2 lectures)
- Societal values: The modern search for a 'good' society , justice, democracy, secularism, rule of law; values in Indian Constitution ( 4 lectures)
- Aesthetic values : Perception and enjoyment of beauty, simplicity, clarity ( 2 lectures)
- Moral and ethical values: Nature of moral judgments; canons of ethics; ethics of virtue; ethics of duty; ethics of responsibility ( 8 lectures)

### **References / Books:**

1. Stephen H.Unger, *Controlling Technology : Ethics and the Responsible Engineers*, John Wiley & Sons, New York, 1994 ( 2 nd Ed)

## **TEXTILE TECHNOLOGY SYLLABUS**

2. Deborah G. Johnson, *Ethical Issues in Engineering* , Prentice Hall, Englewood Cliffs, New Jersey, 1991.
3. A.N.Tripathi, *Human Values in the Engineering Profession*, Monograph published by IIM, Calcutta, 1996.

# TEXTILE TECHNOLOGY SYLLABUS

## Energy Science (TT801)

L	T	P	C
3	0	0	3

**1.Introduction** – sources of energy, classification of energy sources, quality and concentration of an energy source, characteristics temperature

**2.Conventional energy sources:** coal, oil, gas

**3.Non-conventional sources of energy:** biogas, geothermal, solar, nuclear, wind, hydel

**4.Energy conservation:** basic principles, thermal insulation in conservation, conservation through control, electric energy conservation in building-heating and lighting, energy efficient motors, tariff and power factor improvement in power system

**5. Energy conservation in industry (textile and similar):** different gadgets, machines, equipments, transportation, material handling

**6.Energy auditing:** basic principles, utility, and case studies,

### Reference subjects:

1. Physics, 2. Mechanical Engineering, 3.Electrical Engineering.

### Text books and Articles:

1.Decentralised Energy-options and Technology edited by N.K. Bansal,2. RAS, Sectoral energy demand in India, regional energy Development Programme, Planning Commission, Govt.of India, New Delhi. 3.Advances in solar energy technology,H.P. Garg, D. Riedel Publishing Company, Netherlands,1987.

# TEXTILE TECHNOLOGY SYLLABUS

## ELECTIVE-V. Entrepreneurship Development(TT802 )

L	T	P	TOTAL
3	0	0	3

- 1. Creativity and innovation and their Commercialization (Lecture: 1 hour)**  
What is creativity? What is innovation? Example of creativity that leads to innovation. The commercialization of creative and innovative ideas. Trends in technology development.
- 2. Entrepreneurship: An Overview (Lecture: 3 hour)**  
Definition of an entrepreneur Entrepreneurship Management And Ownership, Contrast entrepreneurship with management, Entrepreneur: Their Characteristics, Role of an entrepreneur in Industrial development, . Starting A New Business, Business Planning/ Strategic Planning And Strategic Management, Site Selection And Layout
- 3. Establishing New Venture (Lecture:8 hour)**  
Opportunities for Entrepreneurship, Meaning and Definition of SSI, Ancillary industry, Importance of SSI, Government policies for SSI. Basic criteria for final selection of a business opportunity, Amount of investment, Nature of technology. Input requirement for setting up SSI , Institutional support to SSI at State & National level. Products Identification in various fields, Causes of industrial disputes , Machinery for settlement of disputes, Idea of risk management.
- 4. The Business Plan Development (Lecture: 4 hours)**  
What is a Business Plan? The Need for a Business Plan, Define the structure of a business plan, Discuss the critical elements of an effective business plan, Preparing a Business Plan: a) Forecasting Developments and Charting an Action Plan b) Identifying the Product/Service c) Evaluating the Business Venture d) Market Research and Feasibility Study; Differentiate the feasibility study and the business plan, Identify requirements for venture feasibility.
- 5. Enterprise Management: (Lecture: 5 hour)**  
Identify mechanisms of and requirements for growth of a venture, Describe effective organizational structures, Discuss the operational challenges for entrepreneurs, Review alternative operations strategies for adapting an organization to changes in the marketplace, Differentiate entrepreneurial and traditional corporate career paths, Organizational structure relevant to small organization, Procedures involved in the management of man, machine, material and methods of production and operation.
- 6. Financing Business (Lecture: 4 hours)**  
Type of capital, importance of financial management in context to small scale industry, Sources of Debt Financing, Sources of Equity Financing ,Financial Controls
- 7. Marketing Products (Lecture: 2 hours)**  
Creating the Marketing Plan, Pricing for Profit, Creative Advertising and Promotion.
- 8. Indian Entrepreneurship and Case Studies (Lecture: 4 hours)**  
Overview and analysis of successful entrepreneurs (such as Jamshedji Tata,G.D.

# **TEXTILE TECHNOLOGY SYLLABUS**

Birla, Aditya Birla, Dirubhai Ambani, Azim Premji etc.) ,Discussion of Indian business environment

**References Subjects:** 1)Textile mill Management I TT607 and II TT704, 2) Industrial Engineering TT702, 3)Personality Development

## **Text Book and Articles:**

1.Peggy A. Lambing (1999), Entrepreneurship, 2/e. Prentice Hall., 2.David Carson, Stanley Cromie & Pauric McGowan (1996), Marketing and Entrepreneurship in SME's: An Innovative Approach, 1/e. Prentice Hall. 3.Donald E. Vaughn (1997), Financial Planning for the Entrepreneur, 1/e. Prentice Hall.4.William L. Megginson, Mary Jane Byrd & Leon C. Megginson (1999), Small Business Management: An Entrepreneur's Guidebook, 3/e. McGraw Hill. 5.Cengiz Haksever et al (1999), Service Management and Operations, 2/e. Prentice Hall. 6.Sally Jones (1999), Principles of Taxation for Business and Investment Planning, 3/e. McGraw Hill. 7.Barjoyai Bardai (1996), Indian Tax Policy. Pelanduk Publication. 8.V. Anantaraman, Indian Industrial Relations:: Law & Practice. UPM Press, 1997, Serdang. 9.Success (Magazine) 10.Fortune 500 (Magazine) 11.Business Today(Magazine) 12.Businessworld (Magazine) 13.Merrill Lynch, "How to Read a Financial Report" 14.Stancill, "How Much Money Does Your New Venture Need?" HBR May-June 1986 15.Siegel, "Financial Plan," Business Plan Guide Chp 13 16.Sahlman, "How to write a great business plan," Harvard Business Review 17.Rich & Gumpert, "How to write a winning business Plan," The Entrepreneurial Venture Chp 10 18.WebCafe: Ernst & Young, "Guide to Producing a Business Plan" 19.Merrill Lynch, "How to Read a Financial Report" 20.Stancill, "How Much Money Does Your New Venture Need?" HBR May-June 1986 21.Siegel, "Financial Plan," Business Plan Guide Chp 13 22."Alternative Sources of Financing," HBS (9-384-187) 23.Internet: Background on Wharton Entrepreneurial Programs: ([www.wep.wharton.upenn.edu](http://www.wep.wharton.upenn.edu)) 24.WebCafe: Ernst & Young, "Guide to Producing a Business Plan" 25.WebCafe: Steve Jurvetson and Tim Draper, "Viral Marketing"

# TEXTILE TECHNOLOGY SYLLABUS

## **Elective V, TT802** **Robotics and Control Engineering**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
3	0	0	3

- 1) **Introduction:** Historical development of robots, Types of robots and their basic feature
- 2) **Robot arm kinematics** - direct kinematics problem , inverse kinematics problem,\Classification of manipulators
- 3) **Jacobians** - Velocities and static forces
- 4) **Robot arm dynamics** - Newton -Euler formulation. Lagrangian formulation
- 5) **Manipulator trajectory generation** - general concept , joint inter polated trajectories , Cartesian path trajectory
- 6) **Control of robot manipulators** - Control of robot arm , Computation of torque and steady state error for positional control of joints ,stability performance criteria and compensation technique ,Controller of multi joints robot , Resolved motion control, Sensing- Range sensor, Proximity sensor, Touch sensor Force and torque sensor
- 7) **Robot vision** - Image acquisition ,Illumination techniques, Image geometry ,Camera models ,Stereoscopy, Preprocessing of image data in spatial domain and frequency domain - Smoothing ,Enhancement ;Edge detection ,Thresholding ,Image analysis -Segmentation ,Description ,Recognition and Interpretation for 2D and 3D objects
- 8) **Robot programming languages** -An introduction
- 9) **Robot intelligence and task planning** - All techniques, Recent advancement in robotics.

**Reference Subjects:** 1. Applied Mechanics (TT306).

**Text Books and Articles:**1.Robotics- control, sensing, vision & intelligence by K.S. Fu, R.C. Gonzalez and C.S. G. Lee. 2. Robotics Motion- planning and Control by MIT Press, 3. Robotics by N.R. Deb

# TEXTILE TECHNOLOGY SYLLABUS

## Elective-V, TT802

### Computer Simulation for Textile Mechanics

L	T	P	C
3	0	0	3

1. **Introduction:** Textile Mechanics, mathematical modeling and simulation, computer modeling and simulation, two dimensional and three dimensional modeling, standard software packages for modeling and simulation.
2. **Software:** Introduction, basic features, operating concept, requirements, installation and starting. Menus, tools and controls, Coordinate System, Manipulating views, Workspace, Bodies, Assembling bodies, Constraints reference, Running Simulations, Controlling Simulation Properties, Measuring Simulation Data, Import and export.
3. **Force systems:** simulation of forces on body, verification of equilibrium of forces
4. **Structural Mechanics:** simulation of simple structural models to verify shear and bending forces of beams.
5. **Friction:** Simulation of friction brakes, verification of rolling resistance.
6. **Moment of Inertia:** verification of moment of inertia for simple bodies.
7. **Simple mechanisms:** Simulation of slider crank, hooke's joint, sley mechanism.
8. **Gear Drives:** Simulation of simple gear trains, simulation of draft gearing, take –up and let –off gearing.
9. **Cams:** Simulation of shedding cams, ring frame builder cams etc.
10. **Collision of bodies:** simulations of simple bodies in collision.
11. **Elastic mechanisms:** simulation of spring mass system and spring amss and dashpot systems.

**Reference Subjects:** 1. Elective I, Textile Mechanics,(TT605), 2.Engineering Graphics, (TT107), 3.Applied Mechanics, (TT206),.

**Text Books:**1.Mathematical Modeling, by Kapur, 2.Working Model 2D /3D/4D Manual and Tutorials, 3.Mechanical Desktop Manual, 4.Textile Mechanics by Slater, vol., I & II. 5.Manual of Sim Mechanical- Mat Lab tool box. 6. manual of Mechanical Systems- Mathematica Application Library.

# **TEXTILE TECHNOLOGY SYLLABUS**

# **TEXTILE TECHNOLOGY SYLLABUS**

## **Assigned Project II (TT891)**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
0	0	12	8

In this semester, students are required to present a dissertation reporting all the aspects of the work and defend the reports in a seminar arranged for the purpose of final assessment as per university norms.

## **Personality Development-TT881**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
0	0	3	2

Communication effectiveness, formal and informal communication ability, inter personal skills and rapport, the art of listening, role expectation, role ambiguity and conflict, written communication, presentations capability, general personality test. etc.

## **Comprehensive Viva-voce-TT894**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
0	0		4

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Sd/-A.BANERJEE, CTTB

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