

**DKTE Society's
TEXTILE & ENGINEERING INSTITUTE
Rajwada, Ichalkaranji 416115
(An Autonomous Institute)**

DEPARTMENT: TEXTILES

**CURRICULUM
B. Tech. Textile Technology Program**

Second Year
With Effect From
2017 - 2018



Second Year B. Tech Textile Technology

Semester-I

Sr. No.	Course Code	Name of the Course	Group	Teaching Scheme				Credits
				Theory Hrs/Week	Drawing Hrs/Week	Practical Hrs/Week	Total	
1	TTL201	THERMAL ENGINEERING	B	3			3	3
2	TTL202	TEXTILE MATHEMATICS-III	A	3			3	3
3	TTL203	TECHNOLOGY OF FIBRES	D	3			3	3
4	TTL204	TEXTILE TESTING-I	D	3			3	3
5	TTL205	YARN FORMING TECHNOLOGY-III	D	3			3	3
6	TTL206	FABRIC FORMING TECHNOLOGY-III	D	3			3	3
7	TTP207	TEXTILE TESTING-I LAB	D			2	2	1
8	TTP208	YARN FORMING TECHNOLOGY-III LAB	D			2	2	1
9	TTP209	FABRIC FORMING TECHNOLOGY-III LAB	D			2	2	1
10	TTP210	TEXTILE DESIGN AND COLOUR LAB	D		2		2	2
11	TTL211	ENVIRONMENTAL STUDIES - I (Mandatory Audit)	C	2			2	2 Units
Total				20	2	6	28	23

Group Details

- A: Basic Science
- B: Engineering Science
- C: Humanities, Social Science & Management
- D: Professional Core Courses & Professional Elective
- E: Free Elective
- F: Seminar/Training/ Project

Second Year B. Tech.
TTL201: THERMAL ENGINEERING

Teaching Scheme	
Lectures	3 Hrs. /Week
Total Credits	3

Evaluation Scheme	
SE-I	25
SE-II	25
SEE	50
Total	100

Course Objectives

1. To understand basics of Thermodynamics, Thermodynamics processes and Air standard cycles. To get familiar with the procedure for solving numerical based on the same.
2. To understand the properties of steam, its types and applications in textile. Different types of steam boilers, its construction, accessories and mountings. To get familiar with the procedure for finding performance of boiler.
3. To understand basics of Refrigeration, Air Conditioning and Thermic fluid heating system, concerned parameters, psychometric processes, application of the same in textile industry.
4. To get acquainted with various types of compressors, pumps and pneumatic symbols, application of the same in textile industry.

Course Outcomes

At the end of the course students will be able to

1. Explain basics of Thermodynamics, thermodynamic processes and air standard cycles by drawing concerned diagrams, derive the necessary expressions and solve numerical based on the same.
2. Explain the properties of steam, its types and applications in textile. To describe construction and working of different types of steam boilers, its accessories and mountings with the help of diagrams. To solve the numerical based on performance of boiler.
3. Explain basics of refrigeration, air conditioning and thermic fluid heating system and its application in textile industry. To read and interpret psychometric chart. To describe psychometric processes with the help of diagrams and derive necessary expressions for the same.
4. Describe construction and working of various types of compressors, pumps and their applications in textile industry. To draw symbols for pneumatic systems.

	Course Contents	Hrs.
Unit 1.	<p>Introduction to Thermodynamics and Air standard cycle.</p> <p>a) Introduction to Thermodynamics: Laws of thermodynamics – zeroth law, first Law, second law of thermodynamics. Thermodynamic Processes – constant volume, constant pressure, constant temperature, adiabatic, polytropic & throttling process with P-V & T-S diagrams, numerical based on the same.</p> <p>b) Air standard cycle: Introduction, assumptions in thermodynamic cycles, terms used in thermodynamic cycles, efficiency of a cycle, representation of Carnot cycle, Otto cycle, Diesel cycle on P-V and T-S</p>	10

- diagram and numerical based on the same.
- Unit 2. Properties of Steam:**
Formation of steam at constant pressure, temperature vs. total heat graph during steam formation, enthalpy, enthalpy of water, enthalpy of evaporation, enthalpy of dry saturated steam, wet steam, superheated steam, specific volume of steam, steam table, external work done during evaporation, internal energy of steam, difference between gas & vapour, types of calorimeter, numerical based on the same. Applications of steam in textiles. 6
- Unit 3. Steam boilers, mountings & accessories:**
a) Steam boiler: Introduction, classification of boilers, Important terms for steam boilers, essentials of good steam boiler, selection of a steam boiler, construction & working of fire tube boilers such as Cochran boiler, Locomotive boiler, construction & working of water tube boiler such as Babcock & Wilcox boiler, equivalent evaporation, efficiency of boiler & numerical based on the same. 8
b) Boiler mountings & accessories: Mountings - safety valve – dead weight safety valve, lever safety valve, spring loaded safety valve, water level indicator, fusible plug, steam pressure gauge, feed check valve, stop valve, blow off cock. Accessories – feed water pump, injector, economizer, super heater.
- Unit 4. Thermic Fluid Heating System:**
Introduction, thermic heating system, expansion & deaeration tank, their selection, requirements of fluids, deterioration of fluid, consequences, cleaning of the system, application in textile industry. 2
- Unit 5. Refrigeration and Air Conditioning**
a) Refrigeration: Introduction, unit of refrigeration, coefficient of performance (COP), difference between heat engine, refrigerator & heat pump. Air refrigerator working on reversed Carnot cycle with P-V & T-S diagram, derivation for expression of COP.
b) Air Conditioning: Introduction, psychrometric terms, Dalton's law of partial pressure, psychrometric chart, psychrometric processes - sensible heating & cooling, bypass factor of heating & cooling coil, humidification & dehumidification, sensible heat factor, cooling with dehumidification, cooling with adiabatic humidification of air, adiabatic chemical dehumidification, humidification by steam injection, mixing of air streams, objectives, methods & features of modern humidification plant in textile mills, effect of moisture on textile fibres, sling psychrometer, hair type humidistat. 7
- Unit 6. Pumps, Compressors and Introduction to Pneumatics:**
a) Pumps & Compressors: Pumps – reciprocating, centrifugal (construction and working principle). Compressors - classification, reciprocating, rotary - vane & screw compressor, centrifugal compressor,

axial flow compressor.

6

b) Introduction to Pneumatics:

Pneumatic Circuits – symbols of cylinder, control valves, check valves.

Air treatment – symbols for air filter, refrigerated dryer, lubricators,

Control valves – symbols for poppet valve, pilot operated check valve and spool valve. Application of Pneumatic circuits in Textile machines.

Reference Books

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

Second Year B. Tech.
TTL202: TEXTILE MATHEMATICS-III

Teaching Scheme	
Lectures	3 Hrs./Week
Total Credits	3

Evaluation Scheme	
SE-I	25
SE-II	25
SEE	50
Total	100

Course Objectives

1. To explain ordinary differential equation and solve problems. To apply ordinary differential equations for solving simple mechanical and electrical problems.
2. To explain linear differential equation and solve problems. To apply linear differential equations for solving simple mechanical and electrical problems.
3. To explain theory of large sample tests (Z-tests) with application in textiles. To explain theory of small sample tests (χ^2 , t and F-tests) with application in textiles.
4. To explain theory of estimation and theory of statistical quality control for process control and for lot control.

Course Outcomes

At the end of the course students will be able to

1. Solve problems related to ordinary differential equations and its applications
2. Solve linear differential equations and its applications.
3. Identify textile data for testing, test the hypothesis. Calculate and interpret large sample Z-tests. Calculate and interpret small sample t-tests. Calculate and interpret Chi-square and F-tests.
4. Apply estimation for unknown parameters. Evaluate and interpret process and lot control methods.

Course Contents

Unit 1.	Differential equations of first order & first degree: Method of solving Exact, Non exact, Linear and Non-linear differential equations. Numerical solution of O.D. equations by Euler's method and Runge-Kutta method of fourth order.	8 Hrs.
Unit 2.	Linear differential equations of nth order with constant coefficients: - Methods of finding Solution of L.D. equations in the form $y = C.F. + P.I$ Cauchy's homogeneous linear differential equations with constant coefficients and their solution.	7 Hrs.
Unit 3.	Applications of ordinary and linear differential equations: Applications for solving simple electrical circuit problems and mechanical problems	4 Hrs.
Unit 4.	Testing of hypothesis and Large sample tests Introduction, Hypothesis, Statistic, Critical Region, Errors in testing, Level of Significance. Test for population mean, equality of population means. Population proportion & equality of population proportions.	7 Hrs.

Unit 5.	Small sample tests and estimation Test for population mean, equality of population means, population variance, equality of population variance. Test for goodness of fit and independence of attributes. Point Estimation, unbiased estimators of population mean and variance. Interval Estimation, Confidence Interval for population mean based on normal and 't' distributions.	8 Hrs.
Unit 6.	Statistical quality Control Process Control: Control charts, X-chart, R-chart, C-chart, np-chart, P-chart. Lot Control: AQL, LTPD, AOQ, AOQL, O.C. Curve, Single and Double sampling plans.	5 Hrs.

Reference Books

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

Second Year B. Tech.**TTL203: TECHNOLOGY OF FIBRES**

Teaching Scheme	
Lectures	3 Hrs. /Week
Total Credits	3

Evaluation Scheme	
SE-I	25
SE-II	25
SEE	50
Total	100

Course Objectives

1. To explain cultivation, retting and manufacturing of textiles from wool, Jute, Flax, PALF, Banana, Sisal, Bamboo fibres
2. To describe the properties and applications of above mentioned fibres
3. To illustrate the flow chart of raw and spun silk and describe their properties and applications
4. To explain glass fibre manufacturing, properties and end uses

Course Outcomes

At the end of the course students will be able to

1. Describe the significance of cultivation, retting types and manufacturing methods of textiles
2. Compare the different fibres based on their properties and end use
3. Apply the knowledge of fibre data to the product development
4. Study the techno economic of fibres and its feasibility to commercialize in the market

Course Contents

Unit 1.	Wool:	14
	<ul style="list-style-type: none"> • Breeds of sheep and Indian wool • Morphology and properties of wool fibre • Washing, shearing, classification / sorting and grading of wool • Scouring and carbonizing 	
	Woolen yarn manufacturing:	
	<ul style="list-style-type: none"> • Blending, oiling, carding and spinning. 	
	Worsted yarn manufacturing:	
	<ul style="list-style-type: none"> • Preparing, backwashing, combing and spinning. 	
Unit 2.	Jute & Flax	6
	<ul style="list-style-type: none"> • Cultivation and Extraction of Jute & Flax fibres. • Properties of Jute & Flax fibres. • Manufacture of Jute & Flax yarns • Blending of Jute & Flax fibres • Weaving of Jute & Flax Yarns and applications. 	

Unit 3.	Silk:	6
	<ul style="list-style-type: none"> • Silk fibre properties • Mulberry cultivation and cocoon production and Rearing of silk worms. 	
Unit 4.	Raw Silk Manufacturing	6
	<ul style="list-style-type: none"> • Cocoon storing, cooking, brushing • Charka reeling • Cottage basin and Filature reeling • Properties of raw silk, Testing of raw silk 	
	Spun silk Yarn manufacturing:	
	<ul style="list-style-type: none"> • Degumming, circular dressing, drawing and spinning, Blending opportunities in silk 	
	Weaving of silk yarns:	
	<ul style="list-style-type: none"> • Value addition in silk industry silk project study. 	
Unit 5.	Glass:	4
	<ul style="list-style-type: none"> • Glass fibre characteristics, • Manufacture of glass fibre / filament. • Type of Textile grade glass and weaving of glass. • Application of glass fibres / filament / fabrics. 	
Unit 6.	Long Vegetables fibres:	3
	<ul style="list-style-type: none"> • Sisal, Pineapple leaf, Banana, Bamboo. • Study of properties, extraction methods. • Blending opportunities and applications. 	

Reference Books

1. Wool Hand Book vol. I & II by, Warner Von Besgen.
2. Woolen Yarn Manufacturing Textile Progress Vol.15 No.12
3. Hand Book of Practical Sericulture by S.R. Ullal and M.N. Narsimayya.
4. Hand Book of Silk Technology by T.N. Sonwalkar.
5. Fibre Glass by J.Giltest Mahr & William P. R
6. Inorganic Fibres by C.Z. Cenol.
7. Hand book of worsted and wool blended suiting process by R. S. Tomar.
8. Pineapple Leaf Fibres Textile Progress Vol.24.
9. Long Vegetable Fibres Textile Progress Vol.4 No.4
10. Hand Book of Jute Vol.I, II & IV by T.C. Ranjan.
11. Silk Exports and Developments by T.D. Koshi.
12. Production, Processing and Marketing of Silk by Mahesh Nanawati.
13. Textile fibres by Gordon Cook
14. Textiles fibres to Fabric by Bernard Corbman
15. Woolen and Worsted Spinning by V Collins Miles
16. www.swicofil.com/bamboo.pdf
17. www.bambos.rwth-aachen.de

Second Year B. Tech.
TTL204: TEXTILE TESTING – I

Teaching Scheme	
Lectures	3 Hrs. /Week
Total Credits	3

Evaluation Scheme	
SE-I	25
SE-II	25
SEE	50
Total	100

Course Objectives

1. To explain significance and selection of sample
2. To discuss technical significance of fibre properties.
3. To describe testing methodologies for evaluation of fibre properties.
4. To explain significance of moisture in textiles and its measurement.

Course Outcomes

At the end of the course students will be able to

1. To select representative sample.
2. To understand technical significance of fibre properties.
3. To test and interpret results of fibre properties.
4. To understand moisture fibre relations.

Course Contents

Unit 1.	Sampling for determination of fibre properties	4 Hrs.
	Necessity of sampling, Terms: Population, Sample, Random sample, biased sample, Factors governing sampling, Sampling methods - Zoning method, Squaring method, Cut squaring method, Core sampling method.	
Unit 2.	Longitudinal dimensions (Fibre length)	8 Hrs.
	Concept, Technical Significance of fibre length, Staple length of cotton, Length- frequency diagrams, Fibre length measurement - Oil plate method, Comb sorter method, Scanning method - Digital Fibrograph.	
Unit 3.	Transverse dimensions (Fineness & Maturity)	10 Hrs.
	Fibre Fineness: Concept, Measures of fineness, Technical significance of fineness, Measurement of fineness - Microscopic method, Gravimetric method, Airflow method - Sheffield Micronaire.	
	Fibre Maturity: Concept, Measures of maturity, Technical significance of maturity, Measurement of maturity - Caustic soda method, Polarized light method, Differential dyeing method.	

Unit 4.	Fibre strength	6 Hrs.
	Terms and definitions, Stress-strain curve, Importance of Tensile properties, Factors influencing fibre strength, Types of loading, Measurement of fibre strength- Single fibre strength– Strain gauge transducer principle, Bundle fibre strength– Pendulum lever principle , Comparison of Single fibre strength and Bundle fibre strength.	
Unit 5.	Moisture relations and testing	5 Hrs.
	Terms and definitions, Effect of moisture on textiles, Regain–humidity relationships, factors affecting moisture regain, Measurement of atmospheric conditions- dry and wet bulb hygrometer, hair hygrometer, electrolytic hygrometer, measurement of regain –oven dry method, methods based on resistance and capacitance principles.	
Unit 6.	Miscellaneous testing and modern fibre testing-	6 Hrs.
	Trash: Classification of trash, Technical significance of trash, estimation of trash content in cotton by Trash analyser.	
	Neps – Concept, Classification of Neps, importance, Neps in card web – Shirley template method, nepping potential.	
	Honey dew Content – Concept, Significance and estimation of honey dew content	
	Fibre Density – Concept, Measurement of fibre density	
	Fibre Quality Index and its significance.	
	Modern fibre testing instruments: -	
	High Volume Instrument (HVI), Advanced Fibre Information System (AFIS).	

Reference Books

1. Principles of Textile Testing, J.E.Booth, CBS Publishers & Distributors, 1996.
2. Physical Properties of Fibres, Morton and Hearle
3. Manuals of HVI, AFIS
4. Manual of Spinning, P. Lord.
5. Physical Testing of textiles, B. P. Saville.
6. Handbook of Indian Standards.
7. Textile Measuring Technology and Quality Control by Richard Furter

Second Year B. Tech.**TTL205: YARN FORMING TECHNOLOGY-III**

Teaching Scheme	
Lectures	3 Hrs. /Week
Total Credits	3

Evaluation Scheme	
SE-I	25
SE-II	25
SEE	50
Total	100

Course Objectives

1. To explain working principles and process parameters of combing preparatory, comber and ringframe.
2. To describe constructional details and design aspects of machine parts and mechanisms involved in combing preparatory, comber and ringframe.
3. Explanation to enumerate parameters influencing combing preparatory, comber and ringframe.
4. Describe utilities, maintenance needs, methods to evaluate the processes. Enumerate features of modern combing preparatory, comber and ringframe and acquaint the students with industrial working by organizing industrial visits.

Course Outcomes

At the end of the course students will be able to

1. Understand the working principles and process parameters of combing preparatory, comber and ringframe.
2. Understand the constructional details and design aspects of machine parts and mechanisms involved in combing preparatory, comber and ringframe.
3. Estimate parameters related to combing preparatory, comber and ringframe.
4. Understand maintenance needs, methods to evaluate the processes. Enumerate features of modern combing preparatory, comber and ringframe.

Course Contents

- Unit 1. Comber Preparatory: 4 Hrs.**
Requirements of good lap – importance of number of passages, importance of good lap, linear density of lap, etc. Methods of comber lap preparation – Different sequences of comber lap preparation, study of sliver lap machine, ribbon lap machine, unilap machine. Developments in combing preparatory machines. Maintenance & Assessment of combing preparatory machines.
- Unit 2. Combing Process and Constructional Details of Comber: 12Hrs.**
Objects of combing process. Study of combing cycle. Constructional details of Comber- feeding, nipper assembly, cylinder and detaching rollers, cylinder needles, web and sliver transport, drafting and coiling at comber. Semi combing, normal combing, super combing and double combing. Forward and backward feed in combing. Maintenance of

	comber. Index Cycle, Comber Settings.	
Unit 3.	Assessment of Comber Performance – Norms for production, speed. Combing efficiency, Fractionating efficiency of comber. Influence of combing operation on quality Automation in Comber: Automatic and centralized noil collection. Automatic material handling. Stop motions in comber. Technical specifications of modern combers, available in the world market.	3Hrs.
Unit 4.	Ring Spinning Process and Constructional Details of Ring Frame: Objects and principle of operation, Creel, Drafting System, Top arm roller weighting, Spindle and driving arrangement, The thread guide devices, The balloon control ring and the separator and their functions, important design features and settings, Ring and Traveller, Study of building mechanism. Spinning Geometry: Importance, effect of spinning angle, Drafting angle, spinning triangle. Introduction to spinning tension	13 Hrs.
Unit 5.	Developments in Ring Frame On line Monitoring of Ring frame Operation, Pneumafil and overhead cleaners, Autodoffing, Basics of Compact Spinning.	4 Hrs.
Unit 6.	Selection of Specification, Defects and Remedies, Performance assessment: Selection of specifications depending on count and material being processed. Defective production of ring frame and remedies. Routine maintenance schedule of ring frames Relative Humidification requirement and its importance. Performance assessment of ring frame.	3 Hrs.

Reference Books

1. The Textile Institute Publication –Manual of Textile Technology-Short Staple Spinning Series Vol I to IV by W. Klein .
2. Practical guide to combing by W.Klein, Textile Institute publication Vol.3
3. Technology of cotton spinning by J.Janakiram.
4. Drawing, Combing and speed frame by Zoltan, S.Szaloky, The Institute of Textile Technology, Verginia
5. Draw frame, combing and speed frame by J.H.Black; The Textile Institute publication, Manual of cotton spinning Vol-IV part II.
6. Spun Yarn Technology by Eric Oxtoby.
7. Elements of combing by A.R.Khare.
8. Combing by G.R.Merril.

Second Year B. Tech.

TTL206: FABRIC FORMING TECHNOLOGY-III

Teaching Scheme	
Lectures	3 Hrs / Week
Total Credits	3

Evaluation Scheme	
SE-I	25
SE-II	25
SEE	50
Total	100

Course Objectives

1. To explain design features, construction, working of different mechanisms of automatic shuttle looms
2. To explain various weaves like Stripe and check weave, Backed fabrics, Bed ford cords, Welt, Pique and Double cloth with their characteristics, weaving requirements and applications
3. To explain construction of pile, carpets and extra thread figuring
4. To explain construction & development of Jacquard Designs, Gauze and Leno.

Course Outcomes

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

1. Design features, construction, working of different mechanisms of automatic shuttle looms
2. Various weaves like Stripe and check weave, Backed fabrics, Bed ford cords, Welt, Pique and Double cloth with their characteristics, weaving requirements and applications
3. Construction of pile, carpets and extra thread figuring
4. Construction & development of Jacquard Designs, Gauze and Leno.

	Course Contents	Hrs.
Unit 1.	Automatic Weaving Limitations of ordinary looms, Design features of automatic looms, basic concept of - Weft feelers, Transfer mechanism, Automatic let-off motion, Warp stop motion, Centre weft fork, Operator assisting motions.	8
Unit 2.	Fabric Structure-1 Study of Stripe and check weave combination, Color and weave effect, characteristics and weaving requirements.	4
Unit 3.	Fabric Structure-2 Backed fabrics - Warp, weft and wadding backed fabrics, Bed ford cords - Plain, twill, wadded Welt and Pique Plain, wadded, Double cloth, Selection of face and back weaves type of stitching points and their selection, wadded double cloth.	13
Unit 4.	Fabric Structure-3	07

Study of following weaves with their characteristics and loom requirements.

Warp pile, Introduction to tufted carpets, Weft pile and extra warp & weft figuring

Unit 5. Construction & Development of Jacquard Designs: 04

1. Development of Jacquard Designs - Construction of square paper designs, Process of drafting a sketch design, drafting designs from woven fabrics.
2. Development of figures - Prevention of long floats, bold & flat development, Development of large figures, use of warp & weft float, figure shading.
3. Insertion of ground weavers.

Unit 6. Gauze and Leno : 03

Principles, basic sheds, leno with flat steel doups and slotted doups, point draft or counter leno, simultaneous top and bottom douping, applications of slotted doups and double slotted doups, easing and shaker motion concept, working, construction and applications.

Reference Books

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

Second Year B. Tech.
TTP207: TEXTILE TESTING-I LAB

Teaching Scheme	
Practical	2 Hrs. /Week
Total Credits	1

Evaluation Scheme	
CIE	50
SEE	50
Total	100

List of Experiments

1. Study of Zoning technique for selection of fibre sample.
2. Fibre Length by using Grease Plate Method.
3. Comb Sorter method for estimation of fibre length parameters.
4. Fibre Fineness by Cut-Weight Method.
5. Measurement of fibre fineness by airflow principle.
6. Fibre Maturity Measurement by Caustic Soda Method
7. Determination of trash content in cotton using Trash Analyzer.
8. Study of fibre parameters on AFIS.
9. Study of fibre parameters on HVI.
10. Determination of Neps in Card web by Shirley Template.
11. Determination of moisture content and regain by oven dry method.
12. Determination of moisture content by Shirley Moisture meter

Submission

1. Completed Journal

Second Year B. Tech.**TTP208: YARN FORMING TECHNOLOGY-III LAB**

Teaching Scheme		Evaluation Scheme	
Practical	2 Hrs. /Week	CIE	50
Total Credits	1	Total	50

Any twelve experiments in a term are to be conducted.

List of Experiments

1. Driving arrangement & calculations of Sliver lap machine.
2. Driving arrangement & calculations of Ribbon lap machine.
3. Study of roller settings in sliver lap and ribbon lap machines.
4. Study of constructional aspects, combing cycle & index chart of modern comber.
5. Driving arrangement & calculations comber.
6. Study of Comber setting.
7. Driving arrangement & calculations related to production, constants, draft twist etc. of Ring frame.
8. Study of ring frame settings and spinning geometry.
9. Study of building mechanism of Ring frame.
10. Mill visit to study modern Comber, Ring frame.
11. Study of working principle, roller setting and lap forming mechanism on in sliver lap
12. Study of working principle, roller setting and lap forming mechanism on ribbon lap machine.
13. Study of utilities on comber and ring frame.
14. Study of variable drives on ring frame.
15. Calculation of noil% on comber
16. Analysis of comber noil

Submission

1. Completed Journal

Second Year B. Tech.**TTP209: FABRIC FORMING TECHNOLOGY- III LAB**

Teaching Scheme	
Practical	2 Hrs / Week
Total Credits	1

Evaluation Scheme	
CIE	50
SEE	50
Total	100

List of Experiments

1. Study, dismantling and resetting of side lever under pick mechanism.
2. Dismantling and resetting of side sweep weft feeler mechanism
3. Dismantling and resetting of clutch drive.
4. Dismantling and resetting of pirn change mechanism
5. Dismantling and resetting of semi positive let-off mechanism.
6. Dismantling and resetting of warp stop mechanism.
7. Fabric analysis- stripe, checks or colour and weave effect fabric
8. Fabric analysis- backed fabrics
9. Fabric analysis- bed ford cords
10. Fabric analysis- pile , leno fabrics
11. Visit to Automatic loom unit.
12. Visit to jacquard loom unit.

Submission

1. Completed Journal

Second Year B. Tech.**TTP210: TEXTILE DESIGN AND COLOUR LAB**

Teaching Scheme	
Tutorial/Drawing	2 Hrs / Week
Total Credits	2

Evaluation Scheme	
CIE	50
SEE	--
Total	50

Course Objectives

1. To apply various elements of art, color modification and color theories for textile design development.
2. To develop textile design with the help of designing principles.
3. To compose textile design with different bases.
4. To create doobby and jacquard designs on point paper.

Course Outcomes

At the end of the course students will be able to

1. Understand various elements of art, color modification and color theory charts for textile design development.
2. Develop textile design with the help of designing principles.
3. Compose textile design with different bases.
4. Create doobby and jacquard designs on point paper.

List of Experiments

1. Elements of art- Line, Direction, Size, Shape, Colour, Value, Texture.
2. Colour modification chart- Primary, Secondary and Tertiary colour modification.
3. Colour theory chart - Pigment theory of colour (Subtractive)and light theory of colour (Additive).
4. Textile design development with the help of designing principles -Principle of Repetitions.
5. Principle of Alteration - Change in colour, Change in size, Change in direction, Permutation and combination. (Any one of list.)
6. Principle of Grade, Harmony, Balance, Contrast.(Any one of list.)
7. Principle of Dominance.
8. Composition of textile design by - Rectangle base.
9. Drop base – half drop or full drop.
10. Diamond base, Ogee base, Sateen base.(Any one of list)
11. Development of point paper design for doobby weaving.

12. Development of point paper design for jacquard- Extra warp.

Submission

1. Completed Journal.

Reference Books

1. “Textile design and colour- Elementary weaves and figured fabrics”, William Watson.
2. “Fabric structure and design”- N. Gokarneshan.
3. “Woven Structures and Design “-Doris Goerner.
4. “Handbook of textile design- principles, processes and practice” - Jacquie Wilson, The Textile Institute, Woodhead Publishing Limited.

Second Year B. Tech.
TTL211: ENVIRONMENTAL STUDIES- I

Teaching Scheme		Evaluation Scheme (Annual evaluation in Sem. IV)	
Lectures	2 Hrs. /Week	SEE	70
Audit Points	2	CIE (Project)	30
		Total	100

*Evaluation of the course will be in Sem. IV based on syllabus of Sem. III and Sem. IV

Course Objectives

1. Introduce students to multi-disciplinary nature of Environment sciences and its importance
2. To create awareness about present Environmental problems and their root causes
3. Understand action needed for environment conservation for present and future
4. Introduction to sustainability and resource conservation

Course Outcomes

At the end of the course students will be able to

1. Explain various concepts in Environmental sciences
2. Describe collective responsibility towards conservatory approach
3. Explain importance of mass awareness and individual role in pollution prevention
4. Analyze social issues and local environmental problems and suggest solutions

	Course Contents	Hrs.
Unit 1.	Nature of Environmental Studies Definition, scope and importance, Multidisciplinary nature of environmental studies. Need for public awareness	06
Unit 2.	Natural Resources and Associated Problems: Forest resources: Use and over-exploitation, deforestation. Timber extraction, mining, dams and their effects on forests and tribal people. Mineral resources: Usage and exploitation, environmental effects of extracting and using mineral resources. Food resources: World food problem, changes caused by agriculture effects of modern agriculture, fertilizer-pesticide problems. Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources. Land resources: Land as a resource, land degradation, man induced landslides soil erosion and desertification. Role of an individual in conservation of natural resources	10
Unit 3.	Ecosystems: Concept of an ecosystem, Structure and function of an ecosystem. Producers, consumers and decomposers. Energy flow in the ecosystem, Ecological succession. Food chains, food webs and ecological pyramids. Introduction, types, characteristics features, structure and function of the following ecosystem - Forest ecosystem. Grassland ecosystem. Desert ecosystem. Aquatic ecosystems (Ponds, Lakes). Aquatic	10

ecosystems (Lakes, Rivers). Aquatic ecosystems (Streams, Oceans, Estuaries).

Reference Books

1. Environmental Studies, Publisher Shivaji University Kolhapur
2. Environmental Studies, by Tiwari *et al* publisher IK International New Dehli
3. Environmental Studies by Dr. A Kaushik New Age International publisher New Dehli
4. Environmental Biology by KC Agarwal Nidi Pub. Ltd Bikaner
5. Ecology and Environment by PD Sharma Rastogi Publication Meerut
6. Essentials of Ecology, Townsend C., Harper, J. and Michael Begon, Blackwell Science (TB)

**Second Year B. Tech Textile Technology
Semester-II**

Sr. No.	Course Code	Name of the Course	Group	Teaching Scheme				Credits
				Theory Hrs/Week	Tutorial Hrs/Week	Practical Hrs/Week	Total	
1	TTL212	TEXTILE ELECTRONICS	B	4			4	4
2	TTL213	TEXTILE MATHEMATICS-IV	A	3			3	3
3	TTL214	TEXTILE TESTING-II	D	3			3	3
4	TTL215	CHEMICAL PROCESSING OF TEXTILES-I	D	3			3	3
5	TTL216	YARN FORMING TECHNOLOGY-IV	D	3			3	3
6	TTL217	FABRIC FORMING TECHNOLOGY-IV	D	3			3	3
7	TTP218	TEXTILE ELECTRONICS LAB	B			2	2	1
8	TTP219	TEXTILE TESTING-II LAB	D			2	2	1
9	TTP220	CHEMICAL PROCESSING OF TEXTILES-I LAB	D			2	2	1
10	TTP221	YARN FORMING TECHNOLOGY-IV LAB	D			2	2	1
11	TTP222	FABRIC FORMING TECHNOLOGY-IV LAB	D			2	2	1
12	TTP223	ENVIRONMENTAL STUDIES - II (Mandatory Audit) LAB	C		2		2	1 Units
Total				19	2	10	31	24

Group Details

- A: Basic Science
- B: Engineering Science
- C: Humanities Social Science & Management
- D: Professional Core Courses & Professional Elective
- E: Free Elective
- F: Seminar/Training/ Project

Second Year B. Tech.
TTL212: TEXTILE ELECTRONICS

Teaching Scheme	
Lectures	4 Hrs. /Week
Total Credits	4

Evaluation Scheme	
SE-I	25
SE-II	25
SEE	50
Total	100

Course Objectives

1. To explain the operation and applications of semiconductor devices, power semiconductor devices and electromechanical devices.
2. To describe working principle of different types of sensors and transducers.
3. To explain working of digital circuits, microprocessor, microcontroller and PLC
4. To demonstrate applications of electronics in textiles.

Course Outcomes

At the end of the course students will be able to

1. Describe operation and application of semiconductor devices, power semiconductor devices and electromechanical devices.
2. Explain working principle of different types of sensors and transducers.
3. Explain working of digital circuits, microprocessor, microcontroller and PLC
4. Demonstrate applications of electronics in textiles.

Course Contents

- Unit 1. Basic Electronics and Semiconductor devices** **12 Hrs.**
- Electronics components, passive components, resistors, capacitors and inductors
 Classification of materials- metals, insulators and semiconductors, intrinsic semiconductor, extrinsic semiconductors, p-n junction diode, junction theory, VI characteristics of p-n junction diode, use of diode in rectifiers, half wave rectifier, full wave rectifiers, performance of rectifiers, filters-shunt capacitor filter, series inductor filter, zener diode, zener regulator, diode specification.
 Construction, working of transistor, transistor configurations, common emitter characteristics, transistor amplifying action, Basic CE amplifier
- Unit 2. Op-amp and power semiconductor devices** **10 Hrs.**
- Op-amp- Introduction, block diagram, symbol, ideal op-amp, open loop op-amp configuration, Concept of feedback in amplifier, +ve and -ve feedback, op-amp with negative feedback, IC741-pinout and specifications
 SCR construction, operation, turning ON and OFF of SCR, SCR characteristics, Triac- Construction, working and characteristics, diac-

	Construction, working and characteristics, SCR in DC Motor speed control, AC power control using triac, power MOSFET, IGBT, power modules	
Unit 3.	Transducers and electromechanical devices Introduction, transducer classification – Primary and secondary transducers, active and passive transducers, analog and digital transducers, basic requirements of transducers Classification of optoelectronic devices- emitters, sensors, optocouplers; photodiode, phototransistor, LDR, photo voltaic cell, LED, optocouplers, optical shaft encoders Pressure measurement –bourdon tubes, bellows and diaphragms; Temperature Transducers – RTD, Thermocouple, Thermistors; Strain gauge- working principle, types; Linear variable differential transformers (LVDT), Capacitive transducers, Piezo electric transducers, proximity sensors Electromechanical Devices- Relay, Solenoid Volve	12 Hrs.
Unit 4.	Digital Electronics Difference between analog and digital electronics, digital gates, 4:1 multiplexer, 1:4 demultiplexer, 3:8 decoder, 8:3 encoder, level triggered RS flip flop, edge triggered D and JK flip flop, asynchronous up and down counter, 4-bit register, memory & its types	8 Hrs.
Unit 5.	Microprocessor, Microcontroller and PLC 8085 microprocessor features, pin diagram and architecture; 8051 microcontroller features, block diagram; PLC block diagram	5 Hrs.
Unit 6.	Automation in Textiles Automatic textile control systems- feedback, feed forward and combined; applications of electronics in spinning, weaving, testing and finishing	5 Hrs.

Reference Books

1. Electronics Components and Materials by Madhuri Joshi
2. A Textbook of Applied Electronics by R. S. Sedha
3. Basic Electronics by B. L. Therja
4. Electrical and Electronics Measurements and Instrumentation by A.K.Sawhey, Dhanpat Ria and Sons Pub.
5. Instrumentation Devices & Systems by C.S. Rangan, G.R. Sharma, TMH Pub
6. Op-amp and Linear Integrated Circuits by Ramakant Gaykwad
7. Digital Principles and applications by Malvino and leach
8. Microprocessor Architecture, Programming and applications with 8085 by Ramesh Gaonkar.
9. The 8051 Microcontroller Architecture, Programming and Applications by Kenneth J, Ayala.
10. Electronic Controls for Textile Machine – Hiren Joshi and Gouri Joshi, NCUTE
11. 8085 Microprocessor by Vibhute & Borole

Second Year B. Tech.
TTL213: TEXTILE MATHEMATICS-IV

Teaching Scheme	
Lectures	3 Hrs./week
Total Credits	3

Evaluation Scheme	
SE-I	25
SE-II	25
SEE	50
Total	100

Course Objectives

1. To explain Laplace transform & inverse of it with examples. To apply Laplace transform for solving L.D. equations
2. To teach vector differentiation with examples. To define Fourier series and explain formulae and solve examples
3. To demonstrate one way / two way analysis of variance with application in textiles
4. To study design of experiment of various types with examples. To teach analysis of factorial experiment and draw conclusions

Course Outcomes

At the end of the course students will be able to

1. Solve problems related to Laplace and inverse Laplace transforms. Solve problems of applications of Laplace transforms for L.D. equations.
2. Solve problems of applications of Fourier series. Solve problems of applications of vector differentiation.
3. Solve and interpret problems of one-way and two-way ANOVA. Solve and interpret problems of CRD, RBD and LSD
4. Solve and interpret problems of two and three factor factorial experiments. Solve problems related to Laplace and inverse Laplace transforms.

Course Contents

Unit 1.	Laplace Transforms and its application to L.D Equations Definition, transforms of standard functions, transforms of derivatives, and integrals. Inverse Laplace transforms by partial fraction and convolution method. Application for L.D. equations, Method of solving L.D. equations with initial conditions (Boundary Values).	8 Hrs.
Unit 2.	Vector differentiation Differentiation of vector valued function of scalar 't', gradient, divergence, curl, directional derivative. 'Solenoidal' and 'Irrotational' vector fields.	5 Hrs.
Unit 3.	Fourier Series Definition, Euler's formulae, Conditions for Fourier expansions. Full range fourier series and half range expansions and their examples.	6Hrs.
Unit 4.	Analysis of Multivariate Data Multiple correlation coefficients. Partial correlation coefficients. Planes of regression.	4 Hrs.
Unit 5.	Analysis of Variances:	8 Hrs.

Introduction, One-way analysis of variance, Two-way analysis of variance with and without repetition.

Unit 6. Basic designs and factorial experiments

8 Hrs.

Introduction, Basic principles, Basic Designs (CRD, RBD & LSD).
Introduction and types of factorial experiments, 2^n factorial experiments, 2^2 & 2^3 factorial experiments.

Reference Books

1. A textbook of applied mathematics Vol.-I & II by P.N. & J.N. Wartikar.
2. Higher engineering mathematics by B.S. Grewal.
3. A textbook of applied mathematics by Bali, Saxena & Iyengar.
4. Mathematical Statistics by J.E. Freund.
5. Probability & Statistics for engineers by Johnson.
6. Statistical methods by Kumbhojkar

**Second Year B. Tech.
TTL214: TEXTILE TESTING-II**

Teaching Scheme	
Lectures	3 Hrs. /Week
Total Credits	3

Evaluation Scheme	
SE-I	10
SE-II	10
SEE	70
Total	100

Course Objectives

1. To discuss significance of yarn and fabric properties.
2. To discuss the factors affecting yarn and fabric properties.
3. To explain principle and testing methodology of yarn properties.
4. To explain principle and testing methodology of fabric properties.

Course Outcomes

At the end of the course students will be able to

1. Understand significance of yarn and fabric properties.
2. Discuss the factors affecting yarn and fabric properties.
3. Test yarn properties and interpret the results.
4. Test fabric properties and interpret the results.

Course Contents**Unit 1. Count and Twist in Yarn****8 Hrs.****Yarn Number:**

Concept, Direct and indirect systems, Measurement of yarn number: Knowles balance, Stubbs balance, Beesley balance, Quadrant balance, Relation between yarn count and yarn diameter.

Yarn Twist:

Terms and definitions, Function of twist in yarn structure, Effect of twist on yarn and fabric properties, Measurement of twist in single and double yarns: Straightened fibre method, Twist contraction method, Twist to break method, Optical method and Twist take up method.

Unit 2. Mechanical Properties of Yarns and Fabric:**13 Hrs.****Yarn Strength**

Terms and Definitions, Effect of fibre properties on the yarn strength, Factors affecting the tensile properties of textiles

a) **Single yarn strength:** The pendulum lever principle, Strain gauge transducer principle, Machines working on these principles, interpretation of test results.

b) **Lea Strength:** The lea CSP or Break factor & its significance: Description of lea strength tester, comparison of lea & single yarn test results, Ballistic test & its importance.

Mechanical Properties of Fabric

a) **Fabric Strength:** Importance of fabric strength test, Sampling of fabric, Tensile strength testing : Cut strip test, Grab test, comparison of strip test & grab test, Tear strength test, Bursting test.

b) **Abrasion Resistance of fabric:** Serviceability, wear, abrasion, Factors affecting abrasion resistance, assessment of abrasion damage, BFT abrasion testing machine, Martindale abrasion tester.

c) **Pilling:** Concept, mechanism of pilling, factors affecting fabric pilling, ICI Pill Box Tester.

Unit 3. Evenness of Yarn

10 Hrs.

Concept, Classification of irregularity, causes of irregularity, Measures of irregularity, Basic irregularity, Index of irregularity. Addition of irregularity, Measurement of yarn irregularity: Visual examination, Cutting & weighing method, Electronic capacitance principle, Variation of thickness under compression, Analysis of irregularity: Variance length curves, spectrogram, Importance of yarn uniformity.

Imperfections: Concept, Causes and importance.

Classimat faults: Classification of faults and its causes. Principle & working of Classimat tester.

Hairiness in spun yarn:

Concept, Causes, Reduction and measurement of hairiness: Photoelectric method.

Unit 4. Structural Properties of Fabric:

4 Hrs.

a) **Thickness:** Definition, Significance, Shirley method of measurement of fabric thickness.

b) **Crimp of Yarn In Fabric:** Definition, Measurement, Effect on Fabric Properties.

- c) **Cover factor:** Definition, Derivation of cover factor, Significance
- Unit 5. Aesthetic Properties of Fabric** **2 Hrs.**
- a) **Fabric Stiffness:** Concept, Importance of stiffness and Drape, measurement of stiffness: Shirley stiffness tester (cantilever principle), Heart loop test.
- b) **Drape:** Concept, Measurement of drape by Drape meter, Factors affecting stiffness and drape.
- c) **Crease resistance & crease recovery:** Concept, Measurement of crease recovery, Factors affecting crease recovery.
- Unit 6. Transport Properties of Fabric** **2 Hrs.**
- a) **Air permeability:** Concept, Importance, air permeability, air resistance, air porosity, Shirley air permeability tester, Factors affecting air permeability.
- b) **Water fabric relations:** Concept, Importance, Water proofing & water repellency, Mechanics of wetting, Wetting time test, Spray test, Drop penetration test, Bundesmann test, Water head test.

Reference Books

1. Principles of Textile Testing, J.E.Booth, CBS Publishers & Distributors, 1996.
2. Physical properties of Textile Fibres, J. W. S. Morton & Hearle.
3. Physical Testing of textiles, B. P. Saville.
4. Handbook of Indian Standards.
5. Quality control and Testing, V. K. Kothari.
6. Textile testing Fibre, Yarn and Fabric, Arindam Basu, Published by SITRA, Coimbatore.
7. Textile Measuring Technology and Quality Control by Richard Furter

Second Year B. Tech.

TTL215: CHEMICAL PROCESSING OF TEXTILES I

Teaching Scheme		Evaluation Scheme	
Lectures	3 Hrs. /Week	SE-I	25
Total Credits	3	SE-II	25
		SEE	50
		Total	100

Course Objectives

1. To describe the objects of sizing and preparatory processes
2. To describe the process sequence in pre-treatment of various types of textiles.
3. To explain the role of various chemicals used in pre-treatment of textiles with their objectives.
4. To explain the importance and evaluation methods of mercerization.

Course Outcomes

At the end of the course students will be able to

1. Illustrate the importance of sizing and pretreatments
2. Describe process sequence in pre-treatment of various types of textiles.
3. Understand objectives various chemicals used in pre-treatment of textiles.
4. Illustrate the importance and evaluation of mercerization.

Course Contents

Unit 1. Sizing: Sizing: Process, Purpose, Ingredients: Types, functions , Adhesives: Classification, Starches- Properties, testing, Softeners: Types, properties, testing methods, Size paste formulation: Cotton, P/C, P/V blended yarn.	6 Hrs.
Unit 2. Grey Fabric Inspection and Mechanical Preparatory Processes: Grey fabric inspection: Purpose, Faults in grey fabric- four point & ten point system of inspection, Criteria for rejection. Mechanical Pretreatments: Importance, application, types , Shearing & cropping machine: 2 cutter and 4 cutter, Singeing: Importance, Construction & working principle of gas singeing machines for woven and knitted fabric.	6 Hrs.
Unit 3. Desizing: Size on grey fabric: Identification, Desizing process: Purpose, Methods, Factors affecting process, Desizing machines: Batch wise & continuous, Desizing efficiency: Tegewa, weight loss percentage evaluation methods	4 Hrs.
Unit 4. Scouring: Scouring: Importance, Mechanism and Reactions, Methods: Alkaline scouring, solvent scouring, bio-scouring, Scouring process: cotton, polyester (PET) and their blends, knit goods, Scouring machine: Batch-wise, semi continuous & continuous, Wool: Scouring, Crabbing, carbonization, and milling,	8 Hrs.

Degumming of silk: Purpose, Methods - Soap, alkali, and enzyme,
Evaluation of scouring by absorbency, copper number, weight loss and strength loss.

Unit 5. Bleaching:	8 Hrs.
Sodium hypochlorite bleaching: Purpose, mechanism, Procedure for cotton, factors affecting to hypochlorite bleaching.	
Hydrogen peroxide bleaching: Purpose, mechanism, factors affecting, Role of stabilizer, activator, Process for cotton, Polyester and their blends Comparison between H ₂ O ₂ & NaOCl bleaching,	
Sodium chlorite bleaching: Mechanism, Procedure for polyester.	
Wool, silk, knits and colored woven goods: Precautions, procedure of bleaching.	
Machines: Batch wise, semi continuous & continuous methods of bleaching.	
Efficiency of bleaching: Whiteness index.	
Unit 6. Mercerization:	7 Hrs.
Mercerization: Importance, changes occurred in fibre,	
Causticization: Purpose, process,	
Factors affecting the mercerization process,	
Machines: Yarn mercerization, pad-chain, padless-chainless, hot mercerization, liquid ammonia mercerization,	
Efficiency: BAN, Axial ratio, De-convolution count and absorbency method.	

Reference Books

1. Textile Sizing by Goswami, B. C.; Anandjiwala, R. D.; Hall, D., CRC Press, 2004, ISBN: 9780203913543
2. Sizing by Ajgaonkar, D.B., Talukdar, M. K., Wadekar, V. R., Textile Trade Press, Ahmedabad, 1st Edition, 1982
3. Warp Sizing by Paul V. Seydel.
4. Chemical Technology in the Pretreatment Processes of Textile by Karmakar, S. R., Elsevier Science Publication, Netherlands, 1999.
5. Textile Chemical Processing Vol- 1; Author : Jitendra Kumar; Publisher : Pankaj Publication International; ISBN : BK 0202435
6. Textile Scouring and Bleaching by Trotman, E.R., Hodder Arnold, 1968
ISBN: 9780852640678
7. Textile Scouring and Bleaching by Choudhary, A. K. R. Science Publishers, Enfield, NH, USA, 2006, ISBN: 9781578084043
8. Technology of Bleaching and Mercerizing by Shenai, V. A., Sevak Publication, Mumbai, 2003.
9. Introduction to Textile Bleaching by J. T. Marsh.
Chemical Processing of Synthetic Fibres and Blends by Datye, K. V.; Vaidya, A. A., Wiley-Blackwell, New York, 1984, ISBN: 9780471876540
10. Chemical Processing of Polyester/ Cellulosic Blends by Mittal, R.M., Trivedi, S. S., ATIRA, Ahmedabad, 1983.
11. Chemical processing of textiles, NCUTE publication.
12. Technology of Textiles- Spinning & Weaving, Dyeing, Drying, Printing & Bleaching by EIRI Board, Engineers India Research Institute, ISBN:

9788186732489.

13. The Complete Technology Book on Textile Processing With Effluents Treatment by NIIR Board, NIIR Board, 2004, ISBN: 8178330504
14. Mercerization by J.T. Marsh.

Second Year B. Tech.**TTL216: YARN FORMING TECHNOLOGY-IV**

Teaching Scheme		Evaluation Scheme	
Lectures	3 Hrs/Week	SE-I	25
Total Credits	3	SE-II	25
		SEE	50
		Total	100

Course Objectives

1. To explain basic principles, raw material preparation, processes and parameters of yarn doubling, open end spinning and yarn conditioning.
2. To describe constructional details and design aspects of machine parts and mechanisms involved in yarn doubling, open end spinning and yarn conditioning.
3. Explanation to enumerate productivity, efficiency related calculations and selection of process parameters of yarn doubling, open end spinning and yarn conditioning.
4. Describe utilities, maintenance needs and features of modern yarn doubling, open end spinning and yarn conditioning machines and acquaint the students with industrial working by organizing industrial visits.

Course Outcomes

At the end of the course students will be able to

1. To explain basic principles, raw material preparation, processes and parameters of yarn doubling, open end spinning and yarn conditioning.
2. To describe constructional details and design aspects of machine parts and mechanisms involved in yarn doubling, open end spinning and yarn conditioning.
3. Explanation to enumerate productivity, efficiency related calculations and selection of process parameters of yarn doubling, open end spinning and yarn conditioning.
4. Describe utilities, maintenance needs and features of modern yarn doubling, open end spinning and yarn conditioning machines.

Course Contents**Hrs.****Unit 1. A) Yarn Folding and Doubling:-****10**

Object of ply twisting - Scope of ply twisting - Methods of ply twisting, concept of balance of twist. Study of conventional ring doubling machines. Calculation relating to production, efficiency and twist – Limitation of ring doubling system

B) Study of Two for One Twisters –

Evolution of TFO, Basic concepts, study of design and construction of two for one twisting machine. Machine design aspects, drives used, power requirement, calculations relating to efficiency, production and twist. Advantages over ring doubling. Techno- economics. Modern developments in TFO machines.

Unit 2. A) Fancy Yarn Production –**6**

Classification of fancy yarns - basic principle - study of productions methods - spinning techniques for the production of fancy yarns – Design and construction of the basic profiles such as Spiral, Gimp, Loop, Snarl, Knop, Cover, Slub, Nepy.

B) Production of Elastomeric and Air Covering:

Production and preparation of Mélange yarn, Lycra, Elastane yarns, Singed yarn etc.

- | | |
|--|---|
| Unit 3. Principle of Rotor Spinning: | 7 |
| Classification of spinning system based on twisting, classification of yarns by structure, Limitation of ring spinning system. Drafting and stages involved in open end spinning | |
| Unit 4. Study of Constructional Details of Rotor Elements: | 6 |
| Fibre separation and transportation, Fibre deposition and twist insertion and winding, developments of twisting elements of open-end spinning | |
| Unit 5. A) Design Aspects of Rotor Spinning Elements: | 8 |
| Developments in Fibre separation and transportation, Fibre deposition and twist insertion and winding, rotor drives, Yarns monitoring in rotor spinning. | |
| B) Automation in Rotor Spinning Machine: | |
| Structure and properties and applications of rotor yarns, Technological developments in spinning and processing of rotor spun yarns, effect of trash in sliver, cleaning at rotor, production of fine rotor yarns, processing of man-made staple and their blends, specialty yarns on rotor spinning machines. | |
| Unit 6. Yarn Conditioning :- | 2 |
| Principle and scope of yarn conditioning, conditioning procedure, design and operational details of yarn conditioning systems. | |

Reference Books

1. Fundamentals of Spinning – P. Lord / C. A. Lawarance
2. Technology of Cotton Spinning – J. Janakiram
3. Trade Literature and Bulletins of Rieter LMW, Marzoli
4. NCUTE Pilot programmes in spinning.
5. SITRA Focus series.
6. Elements of ring frame and doublings by A. R. Kahre.
7. Manual of Textile Technology – Short Staple Series. Vol V Modern spinning systems – W. Klein
8. Advances in Spinning – S. M. Ishtiaque
9. Two for one Twister technology and Technique for spun yarns by H. S. Kulkarni and HVS Murty.

Second Year B. Tech.

TTL217: FABRIC FORMING TECHNOLOGY- IV

Teaching Scheme	
Lectures	3 Hrs / Week
Total Credits	3

Evaluation Scheme	
SE-I	25
SE-II	25
SEE	50
Total	100

Course Objectives

1. To explain the construction and working of modern winding machine.
2. To explain the construction and working of modern warping & sizing machine.
3. To explain automatic drawing in & warp tying equipments.
4. To explain the construction and working of projectile weaving machines.

Course Outcomes

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

1. Mechanisms on modern winding machines and their working and functions.
2. Mechanisms on modern warping & sizing machines and their working and functions.
3. Demonstrate the method of drawing in & warp tying.
4. The construction and working of projectile weaving machine.

Course Contents**Hrs.
11****Unit 1. Automatic Winding:**

- Concept of P and Q winding, their applications.
- Technical requirement of winding process.
- Construction of automatic winding machines.
- Drive to drums, scroll details, super drum details and advantages, braking etc.
- Special features of all models, blowers, air consumption and power requirements etc.
- Yarn Clearing :-i) Technical back ground, ii) Optimum clearing, iii) Uster Classimat as an aid for yarn clearing and fault classification in latest models.
- Electronic yarn clearers:i) Optical and capacitance, ii) capabilities with respect to fault and contamination removal etc., iii) Detailed method of setting of optical and capacitance type clearer (for carded and combed yarns) w.r.t. N, DS, DL, LL,-D,-L, C, Cluster setting, splicer setting, extended splicer setting for various yarn counts and materials. iv) Siro cuts: concept, classification.
- Splicing : i). Types – mechanical, pneumatic, aqua and thermal, construction, parameters, their applications and comparison. ii) Splice quality assessment (strength, appearance, hairiness)
- Package Quality: i) Details of package faults observed on automatic

	winding machines causes and remedies, ii) Mechanism for anti patterning, maximum diameter of package, automatic doffing and restarting of winding head.	
Unit 2.	Modern Warping:	4
	<ul style="list-style-type: none"> • Constructional details and features of modern warping machines. with reference to design of creel, pre-tensioner, automatic adjustment of central control of tensioner. • Types of creels – pitch and its importance, magazine, truck, chain creels, semi-automatic and fully automatic creels, creel - master, and auto plan for colour patterns. • Head Stock - i) Beam warping - Auto leasing, drive, brakes and automatic doffing and donning, • Sectional warping - Auto leasing, drum traverse and cone angle adjustment, beam traverse and its adjustment, iii) MIS systems and its use. 	
Unit 3.	Modern Sizing :	12
	<ul style="list-style-type: none"> • Study of modern sizing machine elements like Creel, Size Box, Drying Cylinders, temperature & its control, pressure of steam, thermal performance of drying cylinders and steam traps. • Study of Head Stock, Control Systems, Factors affecting size pick up & size add-on, migration, Assessment of sizing performance - laboratory & practical methods. • Concept of single end sizing & various methods, Concept of dyeing cum sizing, Automation and MIS on modern machines. • Calculations - Related to size concentration, size pick up, stretch, drying, count of warp, production etc. 	
Unit 4.	Drawing in & warp tying equipments:	3
	Study of drawing in & warp tying equipments for warp and style change along with quick style change on weaving machines.	
Unit 5.	Introduction to Shuttleless weaving machines:	2
	Classification of shuttles technology, Need for better weft insertion methods, requisites for successful installation of shuttleless weaving machines.	
Unit 6.	Projectile weaving machine:	7
	History of Projectile weaving machine; Machine drive, various motions timing, Beat-up motion, Projectile picking, motion, picking phases, Projectile acceleration & retardation, torsion rod details, Projectile preparation for picking, selvedge motion, Receiving unit, Let-off motion (Mechanical & power), Take-up motion, their advantages in relation to shuttle loom motions, specifications of projectiles & grippers for various applications, all auxiliary motions such as brake, clutch, oiling, cleaning, MIS, pick finding, Multi colour weft insertion, weft stop, warp stop, whip roller, weft brake etc.	

Reference Books

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

**Second Year B. Tech.
TTP218: TEXTILE ELECTRONICS LAB**

Teaching Scheme	
Practical	2 Hrs. /Week
Total Credits	1

Evaluation Scheme	
CIE	50
SEE	50
Total	100

List of Experiments

1. Forward and reverse bias characteristics of diode.
2. Half wave rectifier (with and without filter).
3. Full wave rectifier (with and without filter).
4. Reverse characteristics of zener diode.
5. Op-amp inverting and non-inverting amplifier.
6. AC power control using triac.
7. LDR characteristics.
8. Speed measurement using optical and magnetic pickups.
9. RTD characteristics
10. Weight measurement using strain gauge.
11. Realization of digital gates
12. 8085 assembly language program

Submission

1. Completed Journal

Second Year B. Tech.
TTP219: TEXTILE TESTING-II LAB

Teaching Scheme		Evaluation Scheme	
Practical	2 Hrs. /Week	CIE	50
Total Credits	1	Total	50

List of Experiments

1. Determination of yarn Linear Density.
2. Determination of twist in single yarn.
3. Determination of twist in double yarn.
4. Determination of single yarn strength.
5. Determination of yarn lea strength.
6. Evaluation of yarn unevenness by cut weight principle.
7. Estimation of crease recovery angle
8. Evaluation of stiffness of fabric.
9. Determination of fabric strip strength.
10. Determination of tearing strength of fabric.
11. Assessment of abrasion resistance of fabric.
12. Estimation of drapability of fabric.

Submission

1. Completed Journal

Second Year B. Tech.**TTP220: CHEMICAL PROCESSING OF TEXTILES I LAB**

Teaching Scheme	
Practical	2 Hrs. /Week
Total Credits	1

Evaluation Scheme	
CIE	50
Total	50

List of Experiments

1. To find moisture content, ash content and total dissolved solids in the given starch sample
2. To identify pilling tendency of the given fabric before and after singeing using pilling tester.
3. To remove size on the given textile by using acid desizing method
4. To remove size on the given textile by using enzyme desizing method
5. Use open bath scouring method to improve the absorbency of the given cotton fabric
6. Use pressure boil scouring method to improve the absorbency of the given cotton fabric
7. Bio scouring of Cotton knitted fabrics.
8. Use relevant degumming method to remove Serecin from the given silk.
9. Use hypochlorite bleaching method to improve whiteness of the given cotton fabric
10. Use hydrogen peroxide bleaching method to improve whiteness of the given cotton fabric.
11. Use combined scouring and bleaching method to improve absorbency and whiteness of the given cotton fabric
12. Use open bath scouring and bleaching method for the given wool fabric
13. Use open bath bleaching method for the given silk fabric.
14. Determination of whiteness index, yellowness index of bleached & OBA treated fabrics by using CCM.
15. Use hank mercerization method for the given cotton hank
16. Determine Barium Activity Number (BAN) of the given mercerized goods
17. Visit to sizing unit and process house.

Submission

1. Completed Journal

Second Year B. Tech.**TTP221: YARN FORMING TECHNOLOGY-IV LAB**

Teaching Scheme	
Practical	2 Hrs / Week
Total Credits	1

Evaluation Scheme	
CIE	50
SEE	50
Total	100

Sr. No.**List of Experiments**

1. Study of TFO – passage, gearing, calculations related to twist, speed, production.
2. Study of Ring-doublers – passage, gearing, calculation related to twist, speed and production.
3. Manufacture of package on soft/parallel winding machine at various process parameters.
4. Production of slub yarns using Fancy yarn making device.
5. Study of Rotor spinning machine and constructional details of rotor
6. To study of yarn conditioning and its effect on yarn quality.
7. Production of yarn on Air Covering Machine and to study the characteristics of air-covered yarn.
8. Mill visit–Study of Two for One twister, Rotor spinning machine, Yarn conditioning.
9. Production of lycra core yarn on ring frame
10. Comparative study of TFO and ring double yarns.
11. Production of SIRO yarn and testing of it's properties
12. Production of compact yarn using different technologies and testing of it's properties

Submission

1. Completed Journal

Second Year B. Tech.**TTP222: FABRIC FORMING TECHNOLOGY-IV LAB**

Teaching Scheme	
Practical	2 Hrs / Week
Total Credits	1

Evaluation Scheme	
CIE	50
SEE	--
Total	50

List of Experiments

1. General study of projectile machine and drive arrangements for various motions.
2. Study of Sulzer picking motion.
3. Study of style change process on projectile (Sulzer) Machine.
4. Study of sample warping & sizing equipment.
5. Study of sample weaving loom.
6. Study of modern winding machine.
7. Study of splicing parameters on splice quality and appearance.
8. Study of sectional warping machine- drive, warping speed, beaming speed, reed and beam traverse speed, production and efficiency.
9. Fabric analysis.
10. Fabric analysis.
11. Visit to Automatic winding unit.
12. Visit to modern warping & sizing unit.

Submission

1. Completed Journal

Second Year B. Tech.
TTP223: ENVIRONMENTAL STUDIES- II LAB

Teaching Scheme	
Lect/ Tut/ Proj	2 Hrs. /Week
Audit Points	1

Evaluation Scheme	
Based on syllabus of Sem. III & Sem. IV	
SEE	70
CIE (Project)	30
Total	100

Course Objectives

1. Introduce students to multi-disciplinary nature of Environment sciences and its importance
2. To create awareness about present Environmental problems and their root causes
3. Understand action needed for environment conservation for present and future
4. Introduction to sustainability and resource conservation

Course Outcomes

At the end of the course students will be able to

1. Explain various concepts in Environmental sciences
2. Describe collective responsibility towards conservatory approach
3. Explain importance of mass awareness and individual role in pollution prevention
4. Analyze social issues and local environmental problems and suggest solutions

	Course Contents	Hrs.
Unit 1.	<p>Biodiversity and its Conservation:</p> <p>Introduction - Definition: genetic, species and ecosystem diversity, Bio-geographical classification of India. Value of biodiversity: Consumptive use, productive use, social, ethical, aesthetic and option values. India as a mega-diversity nation. Western Ghat as a bio-diversity region.</p> <p>Hot-spots of biodiversity. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. Endangered and endemic species of India. Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.</p>	06
Unit 2.	<p>Environmental Pollution:</p> <p>Definition: Causes, effects and control measures of Air pollution. Water pollution. Soil pollution, Marine pollution.</p> <p>Noise pollution. Thermal pollution & Nuclear hazards.</p> <p>Solid Waste Management: Causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution.</p>	10
Unit 3.	<p>Social Issues and the Environment:</p> <p>Disaster Management: Floods, earthquake, cyclone and landslides. Tsunami. Urban problems related to energy. Water conservation, rain water harvesting, watershed management. Resettlement and rehabilitation of people; its problems and concerns. Environmental Ethics: Issue and possible solutions. Global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Wasteland reclamation. Consumerism</p>	10

and waste products. Environmental Protection and Project work
From Unsustainable to sustainable development. Environment Protection
Act. Air (Prevention and Control of Pollution) Act. Water (Prevention and
Control of Pollution) Act. Wildlife Protection Act. Forest Conservation
Act. Population Growth.

Reference Books

1. Environmental Studies, Publisher Shivaji University Kolhapur
2. Environmental Studies, by Tiwari *et al* publisher IK International New Dehli
3. Environmental Studies by Dr. A Kaushik New Age International publisher New Dehli
4. Environmental Biology by KC Agarwal Nidi Pub. Ltd Bikaner
5. Ecology and Environment by PD Sharma Rastogi Publication Meerut
6. Environmental management, Wagner K.D., 1998, W.B. Saunders Co. Philadelphia, USA 499p.
7. Essentials of Ecology, Townsend C., Harper, J. and Michael Begon, Blackwell Science (TB)
8. Environmental Chemistry by SC Santra, *Published by* New Central Book Agency Kolkata