

**DKTE Society's  
TEXTILE & ENGINEERING INSTITUTE**

**Rajwada, Ichalkaranji 416115**

**(An Autonomous Institute)**

**DEPARTMENT: TEXTILE**

**CURRICULUM**

**B.Tech. Textile Plant Engineering Program**

**Second Year**

With Effect From

2017- 2018



Promoting Excellence in Teaching  
Learning & Research

**Second Year UG Program in B.Tech.Textile Plant Engineering  
Semester-III**

Sr. No.	Course Code	Name of the Course	Group	Teaching Scheme				Credits
				Theory Hrs/ Week	Tutorial/ Drawing Hrs/ Week	Practical Hrs/ Week	Total	
1	TPL201	THERMAL ENGINEERING	B	3			3	3
2	TPL202	TEXTILE MATHEMATICS-III	A	3			3	3
3	TPL203	MATERIAL SCIENCE	A	3			3	3
4	TPL204	MANUFACTURING PROCESSES-II	D	3			3	3
5	TPL205	YARN MANUFACTURING MACHINERY-III	D	3			3	3
6	TPL206	FABRIC MANUFACTURING MACHINERY-III	D	3			3	3
7	TPP207	MANUFACTURING PROCESSES-II LAB	D			2	2	1
8	TPP208	YARN MANUFACTURING MACHINERY-III LAB	D			2	2	1
9	TPP209	FABRIC MANUFACTURING MACHINERY-III LAB	D			2	2	1
10	TPP210	TEXTILE MACHINE DRAWING LAB	B		2		2	2
11	TPL211	ENVIRONMENTAL STUDIES - I	C	2			2	2 Units
		Total		<b>20</b>	<b>2</b>	<b>6</b>	<b>28</b>	<b>23</b>

**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.**  
**TPL201: THERMAL ENGINEERING**

<b>Teaching Scheme</b>	
Lectures	3 Hrs. /Week
Total Credits	3

<b>Evaluation Scheme</b>	
SE-I	25
SE-II	25
SEE	50
<b>Total</b>	<b>100</b>

**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 numericals 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 numericals 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.

	<b>Course Contents</b>	<b>Hrs.</b>
<b>Unit 1.</b>	<p><b>Introduction to Thermodynamics and Air standard cycle.</b></p> <p><b>a) Introduction to Thermodynamics:</b> Laws of thermodynamics – zeroth law, first Law, second law of thermodynamics. Thermodynamic Processes – constant volume, constant pressure, constant temperature, adiabatic, polytropic &amp; throttling process with P-V &amp; T-S diagrams, numericals based on the same.</p> <p><b>b) Air standard cycle:</b> 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>	<b>10</b>

- diagram and numericals 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, numericals 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 & numericals 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, 6

axial flow compressor.

**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.**  
**TPL202: TEXTILE MATHEMATICS-III**

<b>Teaching Scheme</b>	
Lectures	3 Hrs./Week
Total Credits	3

<b>Evaluation Scheme</b>	
SE-I	25
SE-II	25
SEE	50
<b>Total</b>	<b>100</b>

**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 ( $\chi^2$ , 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**

<b>Unit 1.</b>	<b>Differential equations of first order &amp; first degree:</b> Method of solving Exact, Non exact, Linear and Non-linear differential equations. Numerical solution of O.D. equations by Euler's method and Runge-Kuttamethod of fourth order.	<b>8 Hrs.</b>
<b>Unit 2.</b>	<b>Linear differential equations of n<sup>th</sup> order with constant coefficients:</b> - 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.	<b>7 Hrs.</b>
<b>Unit 3.</b>	<b>Applications of ordinary and linear differential equations:</b> Applications for solving simple electrical circuit problems and	<b>4 Hrs.</b>

	mechanical problems	
<b>Unit 4.</b>	<b>Testing of hypothesis and Large sample tests</b>	<b>7 Hrs.</b>
	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.	
<b>Unit 5.</b>	<b>Small sample tests and estimation</b>	<b>8 Hrs.</b>
	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.	
<b>Unit 6.</b>	<b>Statistical quality Control</b>	<b>5 Hrs.</b>
	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.	

**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.**  
**TPL203: MATERIAL SCIENCE**

<b>Teaching Scheme</b>	
Lectures	3 Hrs/ Week
Total Credits	3

<b>Evaluation Scheme</b>	
SE-I	25
SE-II	25
SEE	50
<b>Total</b>	<b>100</b>

**Course Objectives**

1. To understand engineering materials and textile materials.
2. To get familiar with ceramic, organic and composite materials.
3. To get familiar with nanotechnology, green chemistry, corrosion and its preventions.
4. To understand properties of engineering materials, their types, applications, alloying, heat treatments etc. To get conversant with the electrical & magnetic materials.

**Course Outcomes**

At the end of the course students will be able

1. To describe engineering materials and select proper material for textile applications.
2. To explain properties and applications of various types of ceramic, organic and composite materials.
3. To explain the process of corrosion and various methods of its prevention. To apply knowledge of nanotechnology and green chemistry.
4. To explain mechanical & thermal properties of engineering materials, their types, applications, alloying, heat treatments etc. To describe various electrical & magnetic materials.

	<b>Course Contents</b>	<b>Hrs.</b>
<b>Unit 1.</b>	<b>Introduction to Material Engineering: -</b> Definition of engineering materials, classification, scope of the subject, structural studies of materials – 1) Types of bonds - a) Primary- ionic, covalent, co-ordinate and metallic b) Secondary- Hydrogen bond and Van der Waal forces 2) Crystal structures – simple cubic, BCC, FCC.	6
<b>Unit 2.</b>	<b>Properties of Engineering Materials: -</b> Mechanical – Hardness, Strength (compression, tension), Ductility, Malleability, Machinability, Weldability, Fatigue and Creep. Thermal – Specific heat, Thermal conductivity, Thermal expansion and Thermoelectric effect.	6
<b>Unit 3.</b>	<b>A) Metallic Materials: -</b> Pig Iron, Wrought iron, Steel & Cast iron, classification, alloying of steel - effect of addition of elements such as C, Si, P, Mn, Ni, Mo, V, Co to steel, Stainless steel, Heat treatment of steels, Non-ferrous metals – Copper, Aluminium & their alloys such as Brass, Bronze, Duralumin,	



Alnico, Nichrome, Solder material. 7

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

Factors affecting the resistivity of conductors, properties of materials used as electrical contact materials, electrical conductors, resistors, insulating materials. Types of insulating materials such as PVC, Mica Fibre glass, Mineral oil and Asbestos. Magnetisation, soft and hard magnetic materials such as iron silicon alloys, Alnico type alloys and Ferrites.

**Unit 4. A) Organic Materials: -**

Polymers – Introduction, classification, properties and applications of Bakelite, urea - formaldehyde resin, Nylon-66, Rubber, Plastics - properties and applications. Paints.

**B) Ceramic Materials: -**

Introduction and types of ceramic materials, Abrasives - Introduction and properties. Refractory material - refractory's such as Chromate bricks, Zircon bricks, High alumina, Porcelain. Cement - types, manufacturing process, setting & hardening, applications. 7

**C) Composite Materials: -**

Introduction, constituents of composites, types of composites, FRP and GRP, processing of fibre reinforced composites, failure of fibre reinforced composites.

**Unit 5. Corrosion and Its Prevention:-**

Definition, types, mechanism, factors affecting rate of corrosion. Prevention of corrosion – alloying, electroplating, cementation, cladding, proper selection of material and designing. Passivity. 6

**Unit 6. A) Textile materials:-**

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

**B) Introduction to Nanotechnology and Green Chemistry:-** 7

Introduction, methods of synthesis of nanoparticles - chemical bath deposition method, electrodeposition method, advantage and disadvantage of nanomaterials, applications in textiles. Green chemistry – definition, goals and principles of green chemistry.

**Reference Books:**

1. Material Science by R.B. Gupta.
2. A Text book of Material Science by V.K. Manchanda.
3. Material Science and Engineering by V. Raghavan.
4. Material Science and Processes by S. K. HajraChoudhary.
5. Material Science and Metallurgy by V.D.Kodgire.
6. The Nanoscope by Dr. ParagDiwan& Ashish Bharadwaj.
7. Green Chemistry; A textbook by V. K. Ahluwalia.
8. Green Chemistry by Desai K. R.

**Second Year B. Tech.****TPL204: MANUFACTURING PROCESSES – II**

<b>Teaching Scheme</b>	
Lectures	3 Hrs. /Week
Total Credits	3

<b>Evaluation Scheme</b>	
SE-I	25
SE-II	25
SEE	50
<b>Total</b>	<b>100</b>

**Course Objectives**

1. To understand need of automation & stages involved in it. To get familiar with numerical control of machine tools & its concerned features.
2. To know the concept of Non-traditional machining methods. To know various methods of protection of machined surfaces.
3. To get familiar with hot working, cold working & forging of metals.
4. To get acquainted with various metal joining processes.

**Course Outcomes**

At the end of the course students will be able,

1. To describe need of automation, NC machines & their concerned features with the help of diagrams.
2. To explain the principle, working, applications advantages & dis-advantages of Non-traditional machining methods with the help of diagrams. To describe various methods of protection of machined surfaces.
3. To describe hot working, cold working & forging of metals and its applications with the help of diagrams.
4. To explain various methods of metal joining processes with the help of diagrams.

	<b>Course Contents</b>	<b>Hrs.</b>
<b>Unit 1.</b>	<b>Automation of manufacturing processes:</b> Objectives of automation, stages of advancement in machinery, concept of general purpose machines & special purpose machines, In-line transfer machines, Rotary type transfer machines etc.	<b>3</b>
<b>Unit 2.</b>	<b>Numerical control of machine tools:</b> Introduction to NC machine, CNC machine – additional features, advantages, dis-advantages, application areas, parts suitable for CNC machines, DNC machines, Classification of CNC machines – according	<b>8</b>

to feedback control, according to control system features, axis identification in CNC machines, ATC & Tool magazine.

- Unit 3. Non-traditional machining methods (NTMM):**  
Introduction, classification, processes such as EDM, ECM, AJM, LBM, Plasma are cutting – principle, working, advantages, disadvantages & applications of each process. 7
- Unit 4. Protection of machined surfaces:**  
Requirement of protection/coating, coating methods such as hot dipping, electroplating, galvanizing, metal spraying, tinning, painting. 5
- Unit 5. Mechanical working of metals :-**
- A) Hot working of metals, cold working of metals, rolling, extrusion, drawing, metal spinning. 5
- B) Forging -Introduction, various tools used, basic forging operations-hand forging, machine forging, open-die forging, close-die forging, forging defects & causes. 6
- Unit 6. Joining processes:**  
Welding & its types – arc welding, gas welding, resistance welding, TIG welding, MIG welding, welding defects etc. brazing, soldering. 5

**Reference Books:**

- 1 Elements of Workshop Practices (Vol. I & II) by HazraChoudhary.
- 2 Production Technology by R. K. Jain.
- 3 A Course in Workshop Technology Vol. I & II by B. S. Raghuwanshi.
- 4 CNC Machines by Pabla&Adithan.
- 5 CAD/CAM Principles & Operations by P. N. Rao.
- 6 Manufacturing Engineering & Technology by SeropeKalpakjian& Steven R. Schmid.

**Second Year B. Tech.****TPL205: YARN MANUFACTURING MACHINERY III**

<b>Teaching Scheme</b>	
Lectures	3 Hrs./Week
Total Credits	3

<b>Evaluation Scheme</b>	
SE-I	25
SE-II	25
SEE	50
<b>Total</b>	<b>100</b>

**Course Objectives**

1. To explain working principles and process parameters of combing preparatory, comber and ring frame.
2. To describe constructional details and design aspects of machine parts and mechanisms involved in combing preparatory, comber and ring frame.
3. Explanation to enumerate parameters influencing combing preparatory, comber and ring frame.
4. Describe utilities, maintenance needs, methods to evaluate the processes. Enumerate features of modern combing preparatory, comber and ring frame 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. Students should be able to understand the working principles and process parameters of combing preparatory, comber and ring frame.
2. Understand the constructional details and design aspects of machine parts and mechanisms involved in combing preparatory, comber and ring frame.
3. Students should estimate parameters related to combing preparatory, comber and ring frame.
4. Students should understand maintenance needs, methods to evaluate the processes. Enumerate features of modern combing preparatory, comber and ring frame.

**Course Contents****Hrs.****Unit 1. Comber Preparatory:**

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.

**4 Hrs.****Unit 2. Combing Process And Constructional Details Of Comber:**

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.

**12 Hrs.**

<b>Unit 3. A) Assessment Of Performance Of Comber –</b>	
Norms for production, speed. Combing efficiency, Fractionating efficiency of comber. Influence of combing operation on quality.	
<b>B) Automation Of Comber:</b>	<b>3 Hrs.</b>
Automatic and centralized noil collection. Automatic material handling. Stop motions in comber. Technical specifications of modern combers, available in the world market. Role of utilities in modern comber.	
<b>Unit 4. Ring Spinning Process And Constructional Details Of Ring Frame:</b>	
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.	<b>13 Hrs.</b>
<b>Spinning Geometry:</b>	
Importance, effect of spinning angle, Drafting angle, spinning triangle. Introduction to spinning tension	
<b>Unit 5. Developments in Ring Frame</b>	<b>04 Hrs.</b>
On line Monitoring of Ring frame Operation, Pneumafil and overhead cleaners, Autodoffing, Basics of Compact Spinning.	
<b>Unit 6. Selection of Specification, Defects and Remedies, Performance assessment:</b>	
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.	<b>03 Hrs.</b>

#### 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.****TPL206: FABRIC MANUFACTURING MACHINERY-III**

<b>Teaching Scheme</b>	
Lectures	3 Hrs. / Week
Total Credits	3

<b>Evaluation Scheme</b>	
SE-I	25
SE-II	25
SEE	50
<b>Total</b>	<b>100</b>

**Course Objectives**

1. To understand design features of automatic winding machine
2. To understand developments in warping process
3. To understand developments in sizing process
4. To understand design features of automatic weaving machine

**Course Outcomes**

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

1. Understand design features of automatic winding machine
2. Understand developments in warping process
3. Understand developments in sizing process
4. Understand design features of automatic weaving machine

**Course Contents****Unit 1. Modern Winding****Hrs.  
12**

- 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.	
<b>Unit 2.</b>	<b>Modern Warping</b>	<b>05</b>
	<ul style="list-style-type: none"> <li>• Constructional details &amp; features of modern warping machines with reference to design of creel, pre-tensioners, automatic adjustment of central control of tensioners.</li> <li>• Types of Recreeling - magazine, truck, chain creels, semi - auto &amp; auto creels, creel - master, and auto plan for colour patterns.</li> <li>• Head Stock - i) Beam warping - Auto leasing, drive, brakes and automatic doffing &amp; donning. ii) Sectional warping - Auto leasing, drum traverse &amp; cone angle adjustment, beam traverse &amp; its adjustment.</li> </ul>	
<b>Unit 3.</b>	<b>Modern Sizing – I</b>	<b>06</b>
	<ul style="list-style-type: none"> <li>• Creel - construction, braking arrangement &amp; positive drive.</li> <li>• Size Box - Modern size box construction</li> <li>• Drying Cylinders - Heating arrangement, coating, temperature &amp; its control, pressure of steam, thermal performance of drying cylinders, steam trap and its types &amp; importance.</li> <li>• Head Stock - Dry splitting, measuring motion, drag roller, comb &amp; drive to weavers beam, pressuring device.</li> </ul>	
<b>Unit 4.</b>	<b>Modern Sizing – II</b>	<b>06</b>
	<ul style="list-style-type: none"> <li>• Control Systems- Importance, consequences of moisture, temperature, size level, on line size percentage, Stretch control systems.</li> <li>• Factors affecting size pick up &amp; size add-on, migration.</li> <li>• Assessment of sizing performance - laboratory &amp; practical methods.</li> <li>• Concept of single end sizing &amp; various methods.</li> <li>• Concept of dyeing cum sizing.</li> <li>• MIS on modern machines.</li> <li>• Calculations - Related to size concentration, size pick up, stretch, size mixture.</li> </ul>	
<b>Unit 5.</b>	<b>Automatic Weaving – I</b>	<b>04</b>
	<ul style="list-style-type: none"> <li>• Limitations of ordinary looms: - Production, efficiency, quality &amp; allocation, objectives for developing automatic looms.</li> <li>• Design features of automatic looms: - Drives, loom motions, accessories &amp; other critical features of automatic looms.</li> <li>• Weft feelers: - Construction working of side sweep, electrical &amp; photoelectric weft feelers, their merits, demerits &amp; applications.</li> </ul>	
<b>Unit 6.</b>	<b>Automatic Weaving – II</b>	<b>06</b>
	<ul style="list-style-type: none"> <li>• Transfer mechanism: - Transfer motion's working &amp; construction, shuttle protector, temple &amp; shuttle eye cutter. Requirement for</li> </ul>	

successful transfer of pirn, Shuttle changing mechanism and its applications.

- Automatic let-off motion: - Principles and requirements of automatic let-off mechanism, types, construction & working of automatic let-off motion.
- Warp stop motion: - Types, Construction and working of mechanical and electrical warp stop motion, Types of drop pins, specifications & applications.
- Centre weft fork: - Construction & working of Ruti-C type center weft fork motion & its advantages.

### **Reference Books**

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



**Second Year B. Tech.**  
**TPP207: MANUFACTURING PROCESSES – II LAB**

<b>Teaching Scheme</b>		<b>Evaluation Scheme</b>	
Practical	2 Hrs. /Week	CIE	50
Total Credits	1	SEE	50
		Total	100

**Term work (Mechanical Workshop):**

1. One assembly Job In fitting section.
2. One assembly job in turning section containing following operations – facing, step turning, taper turning, knurling, threading etc.

**Practical Examination:**

1. One assembly Job on fitting (Time duration 4 Hrs).
2. One assembly job on turning (Time duration 4 Hrs).

Total - 2 Jobs for 8 Hrs. duration

**Second Year B. Tech.****TPP208: YARN MANUFACTURING MACHINERY-III LAB**

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

**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.****TPP209: FABRIC MANUFACTURING MACHINERY-III LAB**

<b>Teaching Scheme</b>	
Practical	2 Hrs. / Week
Total Credits	1

<b>Evaluation Scheme</b>	
CIE	50
SEE	50
<b>Total</b>	<b>50</b>

**List of Experiments**

1. Study of features of Automatic winding machine.
2. Study of sectional warping machine drive for warping speed, beaming speed, reed & beam traverse speed, production and efficiency.
3. Dismantling and resetting of Under pick motion.
4. Dismantling and resetting of Cimmco&Ruti-C weft feeler motion.
5. Dismantling and resetting of Cimmco auto let-off motion.
6. Dismantling and resetting of Pirn change motion.
7. Dismantling and resetting of Clutch motion.
8. Study of shuttle change motion and silk loom features.
9. Study and setting of warp stop motion.
10. Visit to Automatic winding machine unit.
11. Visit to Modern warping and sizing machine unit.
12. Visit to Automatic loom unit.

**Submission**

1. Completed Journal

**Second Year B. Tech.****TPP210: TEXTILE MACHINE DRAWING LAB**

<b>Teaching Scheme</b>	
Drawing	2 Hrs / Week
Total Credits	2

<b>Evaluation Scheme</b>	
CIE	50
SEE	--
<b>Total</b>	<b>50</b>

**Course Objectives**

1. To draw IS conventions for machine drawing and symbols used in various branches of Engineering.
2. To describe method to prepare free hand sketches, details and assembly drawings of machines.
3. To illustrate free hand sketches, assembly and details drawings of textile machines.
4. To explain use of CAD for machine drawing.

**Course Outcomes**

At the end of the course students will be able to

1. Know and draw IS conventions for machine drawing and symbols used in Electrical, Electronics Engg. And hydraulics, pneumatics.
2. Prepare free hand sketches of machine parts and assemblies of textile machines.
3. Make assembly and details drawings of textile machines and machines in mechanical engineering.
4. Use of CAD for machine drawing and layout.

Experiments based on following topics

	<b>Course Contents</b>	<b>Hrs.</b>
<b>Unit 1.</b>	Study of IS conventions essential for machine drawing.	
<b>Unit 2.</b>	Study of electrical, electronic, hydraulic and pneumatic symbols used.	
<b>Unit 3.</b>	Drawing sketches of couplings, cotter joint, knuckle joint, pipe joint, bearings, springs, pulleys, gears and gear drives.	
<b>Unit 4.</b>	Free hand sketches of <ol style="list-style-type: none"> <li>a) Primary loom motions</li> <li>b) Gearing plan of spinning machines</li> <li>c) Differential gearing</li> <li>d) Comber index chart</li> <li>e) Detaching roller mechanism</li> </ol>	

f) Drafting system of draw frame

g) Coiler drive

**Unit 5.** Details and assembly drawings of machines / mechanisms assemblies containing 6-8 components.

**Unit 6.** Computer aided drafting used for layout of industrial units.

### **Reference Books**

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

### **List of Experiments**

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

### **Submission**

1. Completed Journal containing 5 to 8 submission sheets from above list.

**Second Year B. Tech.**  
**TPL211: ENVIRONMENTAL STUDIES- I**

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

\*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

<b>Course Contents</b>		<b>Hrs.</b>
<b>Unit 1.</b>	<b>Nature of Environmental Studies</b> Definition, scope and importance, Multidisciplinary nature of environmental studies. Need for public awareness	<b>06</b>
<b>Unit 2.</b>	<b>Natural Resources and Associated Problems:</b> <b>Forest resources:</b> Use and over-exploitation, deforestation. Timber extraction, mining, dams and their effects on forests and tribal people. <b>Mineral resources:</b> Usage and exploitation, environmental effects of extracting and using mineral resources. <b>Food resources:</b> World food problem, changes caused by agriculture effects of modern agriculture, fertilizer-pesticide problems. <b>Energy resources:</b> Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources. <b>Land resources:</b> Land as a resource, land degradation, man induced landslides soil erosion and desertification. Role of an individual in conservation of natural resources	<b>10</b>
<b>Unit 3.</b>	<b>Ecosystems:</b>  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	<b>10</b>

following ecosystem - Forest ecosystem. Grassland ecosystem.  
Desert ecosystem. Aquatic ecosystems (Ponds, Lakes). Aquatic  
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 UG Program in B.Tech.Textile Plant Engineering  
Semester-IV**

Sr. No.	Course Code	Name of the Course	Group	Teaching Scheme				Credits
				Theory Hrs/ Week	Tutorial Hrs/ Week	Practical Hrs/ Week	Total	
1	TPL212	TEXTILE ELECTRONICS	B	4			4	4
2	TPL213	TEXTILE MATHEMATICS-IV	A	3			3	3
3	TPL214	ADVANCED ELECTRICAL TECHNOLOGY	B	3			3	3
4	TPL215	TEXTILE TESTING - I	D	3			3	3
5	TPL216	YARN MANUFACTURING MACHINERY-IV	D	3			3	3
6	TPL217	FABRIC MANUFACTURING MACHINERY-IV	D	3			3	3
7	TPP218	TEXTILE ELECTRONICS LAB	B			2	2	1
8	TPP219	ADVANCED ELECTRICAL TECHNOLOGY LAB	B			2	2	1
9	TPP220	TEXTILE TESTING – I LAB	D			2	2	1
10	TPP221	YARN MANUFACTURING MACHINERY-IV LAB	D			2	2	1
11	TPP222	FABRIC MANUFACTURING MACHINERY-IV LAB	D			2	2	1
12	TPP223	ENVIRONMENTAL STUDIES - II LAB	C		2		2	1 Unit
		<b>Total</b>		<b>19</b>	<b>2</b>	<b>10</b>	<b>31</b>	<b>24</b>

**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.**  
**TPL212: TEXTILE ELECTRONICS**

<b>Teaching Scheme</b>	
Lectures	4 Hrs. /Week
Total Credits	4

<b>Evaluation Scheme</b>	
SE-I	25
SE-II	25
SEE	50
<b>Total</b>	<b>100</b>

**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** **12 Hrs.**  
 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 Valve
- Unit 4. Digital Electronics** **8 Hrs.**  
 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
- Unit 5. Microprocessor, Microcontroller and PLC** **5 Hrs.**  
 8085 microprocessor features, pin diagram and architecture;  
 8051 microcontroller features, block diagram; PLC block diagram
- Unit 6. Automation in Textiles** **5 Hrs.**  
 Automatic textile control systems- feedback, feed forward and combined; applications of electronics in spinning, weaving, testing and finishing

#### 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, DhanpatRia and Sons Pub.
5. Instrumentation Devices & Systems by C.S. Rangan, G.R. Sharma, TMH Pub
6. Op-amp and Linear Integrated Circuits by RamakantGaykwad
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.**  
**TPL213: TEXTILE MATHEMATICS-IV**

<b>Teaching Scheme</b>	
Lectures	3 Hrs./week
Total Credits	3

<b>Evaluation Scheme</b>	
SE-I	25
SE-II	25
SEE	50
<b>Total</b>	<b>100</b>

**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**

<b>Unit 1.</b>	<b>Laplace Transforms and its application to L.D Equations</b> 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).	<b>8 Hrs.</b>
<b>Unit 2.</b>	<b>Vector differentiation</b> Differentiation of vector valued function of scalar 't', gradient, divergence, curl, directional derivative. 'Solenoidal' and 'Irrotational' vector fields.	<b>5 Hrs.</b>
<b>Unit 3.</b>	<b>Fourier Series</b> Definition, Euler's formulae, Conditions for Fourier expansions. Full range fourier series and half range expansions and their examples.	<b>6Hrs.</b>

<b>Unit 4.</b>	<b>Analysis of Multivariate Data</b> Multiple correlation coefficients. Partial correlation coefficients. Planes of regression.	<b>4 Hrs.</b>
<b>Unit 5.</b>	<b>Analysis of Variances:</b> Introduction, One-way analysis of variance, Two-way analysis of variance with and without repetition.	<b>8 Hrs.</b>
<b>Unit 6.</b>	<b>Basic designs and factorial experiments</b> Introduction, Basic principles, Basic Designs (CRD, RBD & LSD). Introduction and types of factorial experiments, $2^n$ factorial experiments, $2^2$ & $2^3$ factorial experiments.	<b>8 Hrs.</b>

**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.**  
**TPL214: ADVANCED ELECTRICAL TECHNOLOGY**

<b>Teaching Scheme</b>	
Lectures	3 Hrs. /Week
Total Credits	3

<b>Evaluation Scheme</b>	
SE-I	25
SE-II	25
SEE	50
<b>Total</b>	<b>100</b>

**Course Objectives**

1. To understand DC motor operation, characteristics and to understand induction motor operation, characteristics and application in textile industry, concept of BLDC motor and advantages
2. To understand servo motor operation, characteristics and application in textile industry, to understand concept of power quality and causes and benefits and bad effects
3. To understand economics of power generations and different tariffs and their calculations. Acquire knowledge of energy auditing and its implementation in textile engineering.
4. To understand necessity of substation its basics components and their functions. To understand energy scenario and its distribution and stock limitations and new methods for conversion.

**Course Outcomes**

At the end of the course students will be able to

1. To understand select, operate, control DC motor. To understand select, operate, control induction Motor
2. To understand select, operate, control servo motor. To understand significance of power quality, its criteria and advantages and bad effects and cause of power quality
3. To understand and calculate m.d., size of substation, distribution factor, load factor, tariff, energy and bill. To understand energy auditing and its implementation in indu
4. To understand new methods of energy conversions and its use in textile industry

**Course Contents**

- Unit 1. D.C. MOTORS: 7 Hrs.**  
Principle, working, types, performance, characteristics and applications, speed control methods. Starters. Modern methods of speed control using thyristor, [Torque calculation and simple numerical based on speed control methods].
- Unit 2. A.C MOTORS: 8 Hrs.**  
Three induction motors, principle, working, types, performance, characteristics, efficiency, modern methods of speed control using Electronics devices like thyristor invertors. Modern methods of starting of A.C. motors.

	Selection & study of motors for various textile machineries like let off motor, take off motor, accumulator motor, main motor. Motors in humidification plant. Energy efficient motors (EEM) and ISI standards for motors used in Textile industries, possible faults in Textile motors and remedies	
<b>Unit 3.</b>	<b>SERVO MOTORS:</b> Construction, principle, working, types, applications of A.C. /D.C. servo motors, stepper motors.	<b>7 Hrs.</b>
<b>Unit 4.</b>	<b>POWER QUALITY &amp; POWER FACTOR IMPROVEMENT:</b> Concept of power quality, harmonics & methods of harmonics elimination, Concept of power triangle, active power, apparent and reactive power, various modern methods of improving power factor and its importance in industries	<b>8 Hrs.</b>
<b>Unit 5.</b>	<b>TARIFF &amp; ENERGY AUDITING:</b> Different types of tariffs, load Management, concept of Energy Auditing in textile industry, Measurement of active power using two wattmeter method. Simple problems based on two wattmeter method, calculation of electricity bill of different textile mills and industries. [Simple problems on two-part tariff.]	<b>7 Hrs.</b>
<b>Unit 6.</b>	<b>SUBSTATION &amp; ITS COMPONENTS:</b> Fuses, Relays, Circuit breakers, ratings of circuit breaker, Substation & different components of substation. <b>Renewable Energy Sources:</b> Concept of renewable energy sources, types of energy resources like solar energy & solar cell, wind energy, tidal energy, ocean thermal energy, geo-thermal energy, photovoltaic, biomass. Concept of co-generation plant	<b>2 Hrs.</b>

**Reference Books**

1. Electrical Technology, U.A.Bakshi
2. First Course in Electrical Drive By S. K. Paile
3. A Text Book In Electrical Technology By B. L. Thareja
4. Electrical Power By S. L. Uppal

**Second Year B. Tech.**  
**TPL215: TEXTILE TESTING – I**

<b>Teaching Scheme</b>	
Lectures	3 Hrs. /Week
Total Credits	3

<b>Evaluation Scheme</b>	
SE-I	25
SE-II	25
SEE	50
<b>Total</b>	<b>100</b>

**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**

<b>Unit 1.</b>	<b>Sampling for determination of fibre properties</b>	<b>4 Hrs.</b>
	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.	
<b>Unit 2.</b>	<b>Longitudinal dimensions (Fibre length)</b>	<b>8 Hrs.</b>
	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.	
<b>Unit 3.</b>	<b>Transverse dimensions (Fineness &amp; Maturity)</b>	<b>10 Hrs.</b>
	<b>Fibre Fineness:</b> Concept, Measures of fineness, Technical significance of fineness, Measurement of fineness - Microscopic method, Gravimetric method, Airflow method - Sheffield Micronaire.	
	<b>Fibre Maturity:</b> Concept, Measures of maturity, Technical significance of maturity, Measurement of maturity - Caustic soda method, Polarized light method, Differential dyeing method.	

<b>Unit 4.</b>	<b>Fibre strength</b>	<b>6 Hrs.</b>
	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.	
<b>Unit 5.</b>	<b>Moisture relations and testing</b>	<b>5 Hrs.</b>
	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.	
<b>Unit 6.</b>	<b>Miscellaneous testing and modern fibre testing-</b>	<b>6 Hrs.</b>
	<b>Trash:</b> Classification of trash, Technical significance of trash, estimation of trash content in cotton by Trash analyser.	
	<b>Neps</b> – Concept, Classification of Neps, importance, Neps in card web – Shirley template method, nepping potential.	
	<b>Honey dew Content</b> – Concept, Significance and estimation of honey dew content	
	<b>Fibre Density</b> – Concept, Measurement of fibre density	
	<b>Fibre Quality Index and its significance.</b>	
	<b>Modern fibre testing instruments: -</b>	
	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.



**Second Year B. Tech.****TPL216: YARN MANUFACTURING MACHINERY-IV**

<b>Teaching Scheme</b>	
Lectures	3 Hrs/Week
Total Credits	3

<b>Evaluation Scheme</b>	
SE-I	25
SE-II	25
SEE	50
<b>Total</b>	<b>100</b>

**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.

<b>Course Contents</b>		<b>Hrs.</b>
<b>Unit 1.</b>	<b>A) Yarn Folding and Doubling:-</b> 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>B) Study of Two for One Twisters –</b> 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.	<b>10</b>
<b>Unit 2.</b>	<b>A) Fancy Yarn Production –</b>	<b>6</b>

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.

<b>Unit 3.</b>	<b>Principle of Rotor Spinning:</b> 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	<b>7</b>
<b>Unit 4.</b>	<b>Study of Constructional Details of Rotor Elements:</b> Fibre separation and transportation, Fibre deposition and twist insertion and winding, developments of twisting elements of open-end spinning	<b>6</b>
<b>Unit 5.</b>	<b>A) Design Aspects of Rotor Spinning Elements:</b> Developments in Fibre separation and transportation, Fibre deposition and twist insertion and winding, rotor drives, Yarns monitoring in rotor spinning. <b>B) Automation in Rotor Spinning Machine:</b> 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.	<b>8</b>
<b>Unit 6.</b>	<b>Yarn Conditioning :-</b> Principle and scope of yarn conditioning, conditioning procedure, design and operational details of yarn conditioning systems.	<b>2</b>

**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.****TPL217: FABRIC MANUFACTURING MACHINERY-IV**

<b>Teaching Scheme</b>	
Lectures	3 Hrs / Week
Total Credits	3

<b>Evaluation Scheme</b>	
SE-I	25
SE-II	25
SEE	50
<b>Total</b>	<b>100</b>

**Course Objectives**

1. To explain the construction and working of Projectile weaving machine
2. To explain the construction and working of Rapier weaving machine
3. To explain the construction and working of air jet and water jet weaving machine
4. To explain the construction and working of high speed shedding mechanisms

**Course Outcomes**

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

1. The construction and working of Projectile weaving machines
2. The construction and working of Rapier weaving machines
3. The construction and working of Air jet and Water jet weaving machines
4. The construction and working of high speed shedding mechanisms

**Course Contents****Hrs.****Unit 1. Projectile Weaving Machine****7**

Limitations of shuttle loom. Classification of shuttle less weaving machines. Study of weft velocity curves for looms with different methods of weft insertion.

History of shuttle less weaving machine; Machine drive, various motions timing, Beat-up motion, Projectile picking, motion, picking phases, selvedge motion, Receiving unit, Let-off motion (Mechanical & power), Take-up motion, specifications of projectiles & grippers for various applications, Multi colour weft insertion, weft stop, warp stop, whip roller, weft brake etc.

**Unit 2. Rapier Weaving Machine****7**

Various models of rapier weaving machines and brief history. Classification of rapier weaving machine and their weft insertion principles. Concept of Dewas&Gabler rapier systems, their comparison. Study of effect of reed width on loom speed, their comparison. Study of rapier heads.

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

<b>Unit 3.</b>	<b>Air Jet Weft Insertion</b>	<b>10</b>
	Introduction, overview of weft insertion elements, main nozzle designs, relay nozzle designs, stretch nozzle design. Configurations, loom timing of picking elements and settings, constructional details of profile reed. Air supply and energy consumption, Air flow in nozzles and guide channel, performance of yarns in air jet insertion, Optimization of settings, Weft stops and breaks, application of air jet weaving. Drive and Pneumatic circuit for air supply. Technical features of modern air jet weaving machines, (Popular machine models) Quality of Air, Maintenance of machines.	
<b>Unit 4.</b>	<b>Water Jet Weft Insertion</b>	<b>4</b>
	Introduction, Design requirements, Picking mechanism, weft insertion elements, features of water jet looms, applications of water jet weft insertion system. Comparison with air jet, maintenance. Technical features of modern water jet weaving machines, (Popular models) Comparison of various shuttle less weaving technologies with respect to reed width, loom speed, WIR and capital cost.	
<b>Unit 5.</b>	<b>High Speed Cam Shedding Mechanism</b>	<b>4</b>
	<ul style="list-style-type: none"> <li>• Limitations of Tappet shedding motion, positive cam shedding concept and need, Positive cam shedding motions, details of construction and working, Adjustments essential during weave change and timing. Mounting possibilities, pitch of heald frames</li> </ul>	
<b>Unit 6.</b>	<b>High Speed Dobby &amp; Jacquard Shedding Mechanism</b>	<b>7</b>
	<ul style="list-style-type: none"> <li>• Limitation of lever and cam negative doobby, positive lever doobby, positive rotary cam concept, Rotary mechanical and electronically controlled doobby, mounting possibilities, pitch of heald frames, capacity, data transfer, adjustments during weave change, various models available in the markets.</li> <li>• Limitations of mechanical Jacquard, concept of electronic Jacquard, details of construction and working of electronic Jacquard, comparison between various Jacquard (Bonas, Staubli, Grosse) working principles, adjustment for various weaves, Jacquard capacity, mounting, suitability for various end uses, data transfer and management, Networking with looms.</li> </ul>	

### Reference Books

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

8. Handbook of weaving – SabitAdanur.
9. Shuttleless Looms – J. J. Vincent
10. Shuttleless weaving machine – O. Talavasele, V. Svaty

**Second Year B. Tech.**  
**TPP218: TEXTILE ELECTRONICS LAB**

<b>Teaching Scheme</b>	
Practical	2 Hrs. /Week
Total Credits	1

<b>Evaluation Scheme</b>	
CIE	50
SEE	50
<b>Total</b>	<b>100</b>

**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.**  
**TPP219: ADVANCED ELECTRICAL TECHNOLOGY LAB**

<b>Teaching Scheme</b>	
Practical	2 Hrs. /Week
Total Credits	1

<b>Evaluation Scheme</b>	
CIE	50
<b>Total</b>	<b>50</b>

**List of Experiments**

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

**Submission**

1. Completed Journal

**Second Year B. Tech.**  
**TPP220: TEXTILE TESTING – I LAB**

<b>Teaching Scheme</b>	
Practical	2 Hrs. /Week
Total Credits	1

<b>Evaluation Scheme</b>	
CIE	50
<b>Total</b>	<b>50</b>

**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.****TPP221: YARN MANUFACTURING MACHINERY-IV LAB**

Teaching Scheme	
Practical	2Hrs/Week
Total Credits	1

Evaluation Scheme	
CIE	50
SEE	50
<b>Total</b>	<b>100</b>

**Any twelve experiments in a term are to be conducted.**

**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. Manufacture of multi-twist and multi-count yarn.
6. Study of Rotor spinning machine and constructional details of rotor
7. To study of yarn conditioning and its effect on yarn quality.
8. Production of yarn on Air Covering Machine and to study the characteristics of air-covered yarn.
9. Mill visit–Study of Two for One twister, Rotor spinning machine, Yarn conditioning.
10. Comparative study of OE yarn and ring yarn.
11. Production of lycra core yarn on ring frame
12. Comparative study of TFO and ring double yarns.
13. Production of fancy yarn on ring doubler and TFO
14. Production of SIRO yarn and testing of it's properties
15. Production of compact yarn using different technologies and testing of it's properties
16. Study and estimation of package parameters for ring cop and cone

**Submission**

1. Completed Journal

**Second Year B. Tech.****TPP222: FABRIC MANUFACTURING MACHINERY-IV LAB**

<b>Teaching Scheme</b>	
Practical	2 Hrs / Week
Total Credits	1

<b>Evaluation Scheme</b>	
CIE	50
SEE	--
<b>Total</b>	<b>50</b>

**List of Experiments**

1. General study of projectile machine and drive arrangements for various motions.
2. Study of Sulzer picking motion and positive cam motions of Sulzer machine.
3. General study of flexible Rapier machine, it's drive and control panel.
4. General study of Air jet weaving machine, it's drive and control panel.
5. General study of rigid Rapier machine, it's drive and control panel.
6. Study of Rotary mechanical & electronic dobby.
7. Study of electronic jacquard mechanism.
8. Overhauling of Sulzer picking motion.
9. Study of style change process on projectile, air jet and rapier weaving machines.
10. Study of sample weaving equipments.
11. Visit to Air jet weaving unit.
12. Visit to Projectile / Rapier weaving unit.

**Submission**

1. Completed Journal

**Second Year B. Tech.**  
**TPP223: ENVIRONMENTAL STUDIES- II LAB**

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

<b>Evaluation Scheme</b> <b>Based on syllabus of Sem. III &amp; Sem. IV</b>	
SEE	70
CIE (Project)	30
<b>Total</b>	<b>100</b>

**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

<b>Course Contents</b>		<b>Hrs.</b>
<b>Unit 1.</b>	<b>Biodiversity and its Conservation:</b> 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. 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.	<b>06</b>
<b>Unit 2.</b>	<b>Environmental Pollution:</b> Definition: Causes, effects and control measures of Air pollution. Water pollution. Soil pollution, Marine pollution. Noise pollution. Thermal pollution & Nuclear hazards. Solid Waste Management: Causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution.	<b>10</b>
<b>Unit 3.</b>	<b>Social Issues and the Environment:</b> 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,	<b>10</b>

nuclear accidents and holocaust. Wasteland reclamation. Consumerism and waste products. Environmental Protection and Projectwork 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