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

DEPARTMENT: TEXTILES

CURRICULUM
B. Tech. Textile Plant Engineering Program

Final Year
With Effect From
2019 - 2020

Promoting Excellence in Teaching
Learning & Research

Final Year B. Tech Textile Plant Engineering

Semester-I

Sr. No.	Course Code	Name of the Course	Group	Teaching Scheme				Credits
				Theory Hrs/ Week	Tutorial /Project Hrs/ Week	Practical Hrs/ Week	Total	
1	TPL401	TEXTILE MILL PLANNING AND ORGANISATION	C	3			3	3
2	TPL402	THEORY OF TEXTILE MACHINES-II	D	3			3	3
3	TPL403	DESIGN OF TEXTILE MACHINES-II	D	3			3	3
4	TPLEL1	ELECTIVE - I	C	3			3	3
5	TPLEL2	ELECTIVE -II	D	3			3	3
6	TPP410	TEXTILE MILL PLANNING AND ORGANISATION	C		1		1	1
6	TPP411	THEORY OF TEXTILE MACHINES-II LAB	D			2	2	1
7	TPP412	DESIGN OF TEXTILE MACHINES-II LAB	D			2	2	1
8	TPD413	PROJECT PHASE - I	F		4		4	4
Total				**15**	**5**	**4**	**24**	**22**

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

List of Elective-I

TPL404 Textile Mill Management

TPL405. Condition Based Monitoring Techniques

TPL406 Entrepreneurship Development

List of Elective-II

TPL407 Textile Air Engineering

TPL408 Process Control in Spinning

TPL409 Nonwoven Technology

Final Year B. Tech. Semester – VII
TPL401: TEXTILE MILL PLANNING AND ORGANISATION

Teaching Scheme	
Lectures	3 Hrs. / Week
Total Credits	3

Evaluation Scheme	
SE	25
TA	15
SEE	60
Total	100

Course Objectives

1. To Explain Project Planning, Formulation of a Project Report for Spinning, Weaving, Knitting Units, Techno economics
2. To explain Plant & Machinery Layout, Machinery Specification Selection & Civil/Building Construction approach
3. To calculate number of Machines essential in each textile process for targeted production quantity.
4. To explain Materials Handling concept and method ,Labour Complement

Course Outcomes

At the end of the course students will be able to

1. Understand the project report preparation for textile activity.
2. Understand layout preparation process, machine specifications and construction concept
3. Calculate spin plan and weave plan
4. Understand material handling equipments used in textile industry and labour complement details

	Course Contents	Hrs.
Unit 1.	Project Planning - Introduction, Capital investment required for project, Phases of Capital Budgeting, Difficulties in Capital expenditure, Phases involved. Formulation of a Project Report for Spinning, Weaving, Knitting Units - Assumptions, Machinery Organizations, Requirement of Miscellaneous Fixed Assets. Machinery Stores, Spares and in process inventories. Machinery erection, commissioning. Need of modernization and automation in Textile plants. Factors related to safety in Textile Plants.	6
Unit 2.	Techno-economic Viability - Calculations of cost of project – Means of	6

Finance – Estimates of sales & production – cost of production – working capital requirement – Profitability Projection – Break even point – Projected cash flow statements.

Unit 3. Site Selection - Selection of site for textile mills, General location, Actual selection of specific site, Calculation of spatial requirements, factors influencing site selection, Humidification considerations. Civil/Building Construction - Consideration in building design, size, shape and configuration of building. Architectural & structural aspects of textile mill building. Building morphology, General principles of building construction & building functions, Types of factory buildings, Types of building construction. Material for construction with special reference to walls, roofs, floors, false ceilings, fire resistance, sound proof, etc. Colour schemes for buildings, interior & machinery in textile mills. Cost considerations in building construction. Amenities required as per standards. 6

Unit 4. Plant & Machinery Layout - Significance of the concept, objectives and principles of layouts, kinds of layouts and their comparisons, flow pattern, work station design, tools and devices of making layouts, use of Auto-Cad for layouts, storage space requirements, plant layout procedure, factors influencing layouts, selection of layout, effect of automation on plant layout, symptoms of bad layout. Layout aspects of spinning, weaving, knitting and composite mills. Spatial requirements of spinning / weaving / knitting machines .Modern trends material handling. 6

Unit 5. Machinery Specification, Selection & Calculation for No. of Machines -Selection of machines & machinery specifications required for the product in spinning, weaving, knitting etc. 6

Calculation for number of machines in spinning /spin plan - Preparation of organization for ring spinning mill and preparatory, departments based on ring spindle capacity and production of ring spun yarn. (Carded, Combed, Blended, Folded). Assumptions for draft, waste, efficiency etc.

Calculation for number of machines in weaving / weave plan - Preparation of organization for shuttle & shuttleless weaving mill and preparatory departments based on number of weaving machines & production of different cloths. Calculation regarding efficiency, waste, crimp, production rates, raw material and number of machinery required at different processes.

Unit 6. Materials Handling - Definition and importance of materials handling, functions and principles of materials handling, material handling methods, engineering and economic factors, relationship to plant layout, selection and type of material handling equipments, study of different types of equipments used for materials handling in spinning, weaving, knitting mills. Latest trends in materials handling. 6

Labour Complement - Types of labour required, labour complement, labour and staff required for spinning and weaving based on workload consideration. Job evaluation and merit rating.

Reference Books

1 Management of Textile Industry – Dr. V. Dudeja
2 Textile Project Management by A. Ormerod, The Textile Institute Publication.
3 Industrial Organisation & Engg. Economics T.R. Banga & S.C. Sharma, Khanna Publishers, Delhi.
4 Norms for Process Parameters, Productivity etc. ATIRA, BTRA, SITRA, NITRA
5 USTER Statistics
6 Management of Textile Production, A. Ormorod. Newnes – Butter Wortrs Publication.

FINAL YEAR B. TECH. Semester- VII
TPL402: THEORY OF TEXTILE MACHINES- II

Teaching Scheme	
Lectures	3 Hrs. /Week
Total Credits	3

Evaluation Scheme	
SE	25
TA	15
SEE	60
Total	**100**

Course Objectives

1. To apply the theory, design, analysis and use of different types of gears and epicycle gears
2. To describe theory, design and calculations based on the clutch and brakes.
3. To apply the concept of Static and Dynamic Balancing, Balancing of textile machine components, its uses. To describe about vibrations, its adverse and beneficial effects and applications from industry point of view.
4. To classify, explain construction, mounting, maintenance & applications of Antifriction and sliding bearings.To teach different types of drives used and its applications and power required for different textile machines

Course Outcomes

At the end of the course students will be able,

1. To understand theory, design, analyse and use of different types of gears or epicycle gears.
2. To describe design and analysis process & decide applications of clutch and brakes.
3. To understand and explain static and dynamic balancing. Balancing of different machine components. To know machine vibration and its analysis & applications for textile industry.
4. To understand construction, classification, mounting, selection, maintenance & applications of drives, antifriction and sliding bearings. To know and control power consumption pattern required for different textile machines.

	Course Contents	**Hrs.**
Unit 1.	**Balancing** - Static and Dynamic Balancing of rotary masses. Balancing machines. Balancing of textile machine components – carding cylinder, flyers and spindles of Ring frame.	**7**
	Toothed and epicyclic gearing **a) Toothed Gearing** Gear tooth terminology and geometry, Condition for constant velocity ratio, velocity of sliding of teeth, form of teeth. Effect of change in	

	central distance on velocity ratio. Length of path of contact, arc of contact for in volute teeth. Interference, minimum number of teeth on pinion for in volute rack to avoid interference. Minimum number of teeth on gear to avoid interference.	**11**
	b) Epicyclic gearing	
Unit 2.	Gear trains, determination of velocity ratio and torque in epicyclic gear trains. Study of epicyclic gear trains used in speed frame, carding and comber.	
	Brakes and Clutches	
Unit 3.	Simple band brake, Band & block brake, shoe brake. Different types of clutches – plate & cone clutches. Application to textile machines.	**6**
	Vibrations	
Unit 4.	Longitudinal, torsional vibrations, free and forced vibrations, natural frequency. Whirling of shaft, critical speed.	**5**
	Antifriction and sliding bearings:	
Unit 5.	Construction, classification, mounting, maintenance & application to textile machines. Mathematical estimation of static and dynamic load, life of bearing, Selection of antifriction bearing.	**5**
	Drives and power consumption pattern:	
	Drives: Different types of drives used in spinning. PIV, VPS, frequency controlled drive and applications.	
Unit 6.	**Power consumption pattern:** Power required for textile machines. Ring frame, speedframe, carding and looms.	**5**

Reference Books

1. Theory of Machines by Rattan S.S.
2. Mechanical Vibrations by V.P. Singh,
3. Theory of Machines by V.P.Singh,
4. Theory of Machines by Ballaney,
5. Theory of Machines by R.S. Khurmi & J.K.Gupta
6. Mechanics of Spinning Machines by R. Rengaswamy.
7. Mechanics of Textile M/c. Part-I & II by Huntan & Slatter

Final Year B. Tech. Semester- VII
TPL403: DESIGN OF TEXTILE MACHINES- II

Teaching Scheme	
Lectures	3 Hrs. / Week
Total Credits	3

Evaluation Scheme	
SE	25
TA	15
SEE	60
Total	100

Course Objectives

1. To get familiar with methods of design of mechanical components for various conditions of fluctuating loads.
2. To get familiar with design procedure of sliding & rolling contact bearings.
3. To know design procedure of Thin & Thick cylinders. To know design considerations of machine frames, concept of optimum design & various parameters for economical design. To get familiar with CAD & CAE.
4. To get familiar with design procedures of various types of gears.

Course Outcomes

At the end of the course students will be able to

1. To design mechanical components subjected to various conditions of fluctuating loads by constructing S-N diagram, Soderberg & Modified Goodman diagram.
2. To explain construction, working, advantages & disadvantages of sliding & rolling contact bearings, designing the same. Select rolling bearing from manufacturer's catalogue for a given application.
3. To design Thin & Thick cylinders. Plot/draw the stress pattern for the compound cylinder. Explain with sketches various types of end closures used for cylindrical pressure vessels & compare them. To explain design considerations of machine frames. To describe parameters for economical design, concept of optimum design & applications of solid modeling & analysis package.
4. To design various types of gears according to the applications.

	Course Contents	Hrs.
Unit 1.	**Design against fluctuating load** – Stress concentration, fluctuating stresses, fatigue failure, endurance limit, Notch sensitivity, Reversed stresses - design for finite and infinite life, Cumulative damage in fatigue, Soderberg & Goodman diagrams, Modified Goodman diagrams, fatigue design under combined stresses.	6
Unit 2.	**A) Design of Rolling contact bearings -** Introduction, classification, basic terminology, selection from manufacturer's catalogue, design for cyclic loads & speeds, bearing with a probability of survival other than 90%, mounting of bearing.	5
	B) Design of Sliding contact bearings – Hydrodynamic and Hydrostatic lubrication, Viscosity, Hydrostatic step bearing & energy losses in it, Raimondi & Boyd method, temperature rise, bearing design – selection of parameters, constructional details & materials etc.	5
Unit 3.	**Design of pressure vessels** – Classification, design of thin & thick cylinders, spherical vessels, Autofrettage, Compound cylinder, end closures.	5
Unit 4.	**A) Design of Spur gears** – force analysis in spur gears, gear tooth failures, material selection, beam strength & wear strength of gear tooth, gear design for maximum power transmitting capacity.	6
	B) Design of Helical gears – terminology, virtual number of teeth, force analysis, beam strength & wear strength.	3
Unit 5.	**A) Design of Bevel gears** – terminology, force analysis, beam strength & wear strength.	2
	B) Design of Worm & worm wheel – terminology and proportions of worm gears, force analysis, friction in worm gears, material selection, strength rating & wear rating of worm gears, Thermal considerations.	3
Unit 6.	**A) Design considerations of machine frames** – Design consideration of machine frames, bed, covers and bodies, design consideration for casting, forging & fabricated parts.	2
	B) Standardization, cost consideration in design from manufacturing requirement & from customer's requirement.	1

C) Introduction to CAD & CAE – Introduction to solid modeling package & analysis package, concept of optimum design. 1

Reference Books

1 Design of Machine Elements by V.B. Bhandari.

2 A Textbook of Machine Design by R.S. Khurmi & J. K. Gupta.

3 Design of Machine Elements by T. Krishna Rao Vol. I & II.

4 Machine Design by P. Kannaiah.

5 Design of Machine Elements by Spotts

6 Mechanical System Design by R. B. Patil.

7 Machine Tool Design & Numerical Control by N. K. Mehta.

8 Machine Tool Design by Basu & Pal.

9 Mechanics of Spinning Machines – R. Rengaswamy.

Final Year B. Tech. Semester – VIII

TPLEL1- TPL404: TEXTILE MILL MANAGEMENT (ELECTIVE-I)

Teaching Scheme	
Lectures	3 Hrs. / Week
Total Credits	3

Evaluation Scheme	
SE	25
TA	15
SEE	60
Total	100

Course Objectives

1. To understand the functions and Principles of Management.
2. To explain the term planning, organizing, staffing.
3. To understand the term leadership, Communication & Controlling.
4. To explain basic concepts of financial management and marketing.

Course Outcomes

At the end of the course students will be able to

1. Understand significance of functions of management
2. Understand and Apply the leadership, controlling and costing system in organization
3. Understand thoroughly concept of organizing and staffing.
4. Know the marketing techniques for selling the product and services of organization

	Course Contents	Hrs.
Unit 1.	Management Nature, Importance, Elements, Levels of Management, Fundamental Managerial Skills, Functions of Management – Henry Fayol's Principles of Management - Social responsibilities a Manager.	6
Unit 2.	Planning & Organizing The Nature, Characteristics & Process of Planning – Forms of Planning, The Nature, Importance& Steps involved in the process of organizing	6
Unit 3.	Staffing & Leadership	7

	Meaning, definition, importance and process of staffing. Types of organization structure, Human resource management & selection - Performance appraisal, Meaning & Importance of leadership, Motivation: Theory X and Y	
Unit 4.	Communication & Controlling Meaning, communication process, effective communication. Meaning, Concept, Definitions, Steps in control process, Techniques and Types of control, Requirements of an effective control system.	6
Unit 5.	Financial Management Balance sheet – Profit loss statement – Financial ratios. Cost Accounting, Meaning of Budget, Objectives, Advantages & Limitations of Budget, and Types of Budget and Budgetary control, Introduction to Costs, Types of cost, Depreciation, Breakeven analysis.	7
Unit 6.	Marketing Evolution of marketing, Nature of Marketing, Core concepts of marketing – Marketing Mix, Product Life Cycle, Meaning, Scope, Limitations of Marketing Research - Marketing Research Procedure – Types & Techniques.	7

Reference Books

1 Essential of Management – by Harold Koontz & Heinz, Weihrich – Tata McGraw-Hill Publishing Company Ltd., New Delhi.

2 Advanced Cost & Management Accounting by P.K. Sikdar – Viva Books Pvt. Ltd., New Delhi.

3 Industrial Engineering & Management by O.P. Khanna & A. Sarup, Dhanapat Rai Publications (P) Ltd., Delhi.

4 Dynamics of Entrepreneurial Development & Management by Vasant Desai – Himalaya Publishing House – Delhi.

5 How to Read a Balance Sheet – An ILO Programmed Book – Oxford & IBH Publishing Co. Pvt. Ltd., Delhi.

6 Entrepreneurial Development by S.S. Khanta , S. chand & Company Ltd., Delhi 110 055.

7 Fundamentals of Marketing by W.J. Stanton, M.J. Etzel B.J. Walker –

McGrawHill, Inc – New York, St. Laouis etc.

8 Industrial Organisation & Engineering Economics by S.C. Sharma & T.R. Banga Khanna Publishers – 2-B, Nath Market, Nai Sorak, Delhi – 110 006.

9 Marketing Management By Philip Kotler – Prentice – Hall of India Pvt. Ltd., New Delhi – 110 001.

10 Managing Human Resource by Luis R. Gomer Mejia, D.B. Balkin & R. L. Cardy. Pearson Education (Singapore) Pvt. Ltd., Indian Branch, 482 FIE Delhi, India.

11 Cost Accounting by M.E. Thukaram Rao, New Age Internation (P) Ltd., Publishers New Delhi.

12 Project Management by K. Nagaraja, New Age Internation (P) Ltd., Publishers – New Delhi, Bangalore etc.

Final Year B.Tech. Semester-VIII
TPLEL1-TPL405:CONDITION BASED MONITORING TECHNIQUES
(ELECTIVE-I)

Teaching Scheme	
Lectures	3 Hrs. / Week
Total Credits	3

Evaluation Scheme	
SE	25
TA	15
SEE	60
Total	**100**

Course Objectives

1. To explain working principles, types and usefulness of condition based monitoring, its comparison with conventional planned maintenance.
2. To describe details of NDT, Contaminant examination techniques used for monitoring and their applications.
3. Explanation to learn Dynamic Analysis, parameters related tomachine vibrations. Methods of vibration measurement, its isolation, materials used to control machine vibration and noise.
4. Describe performance monitoring techniques used for mechanical conditions as well as such techniques in textile on line monitoring.

Course Outcomes

At the end of the course students will be able to

1. Able to understand and explain principles, types and usefulness of condition based monitoring, its advantages over conventional planned maintenance.
2. To describe and select NDT, Contaminant examination techniques used for monitoring and their applications.
3. Describe Dynamic Analysis, parameters, related to machine vibrations. Methods of vibration monitoring, its isolation and materials used to control machine vibration and noise.
4. Enumerate performance monitoring techniques used for mechanical conditions as well as such techniques in textile on line monitoring.

	Course Contents	Hrs.
Unit 1.	**Introduction to Condition Monitoring** - Subjective & objective assessment, advantages of condition based maintenance over preventive maintenance. Types of inspections in condition based maintenance.	**3**
Unit 2.	**Non Destructive Testings** - Ultrasonic testing, Radiography, Thermography, eddy current testing, Magnetic particle test, Acoustic, emission testing, Temperature measurement, stroboscope, optical inspection techniques.	6
	Special Purpose Inspection Methods - Crack detection, leak detection, corrosion monitoring, Contaminant examination – magnetic plug test, SOAP, Particle count method.	5
Unit 3.	**Performance Monitoring** - Concept, On line monitoring techniques in Textile machine – Ring data system, Varioset, Classimat, Autolevellers at carding and drawframe, Uster spectrogram.	**4**
	Lubrication Monitoring - Objects, Methods, Laboratory tests & spot tests for oils & greases.	**3**
Unit 4.	**Dynamic Analysis** - Fundamentals of vibration & noise. Concept of Dynamic analysis, vibration measurement methods, applications. Case study of shock pulse monitoring of antifriction bearing, Machinery noise & analysis.	8
Unit 5.	**Study of transducers used for vibration and noise measurement** – LVDT - Peizo crystal – inductive - condenser mic - peizo mic - electrets microphone, etc.	6
Unit 6.	**Methods of vibration and noise isolation** - Fundamentals related to vibration and noise, their solation, free damped vibrations, vibrations with 6 degrees of freedom. Transmissibility, damping factor. Materials and methods used for isolation of noise.	7

Reference Books

1. Maintenance Management Vol. 12, IMME Pub.
2. Summer School on Maintenance Engineering – S.J.C.E. Mysore.
3. Measurement System – E.O. Doeblin, McGrawhill International Pub.
4. Theory & application of Digital Signal Processing – Ranbiner L.R. & Gold B.
5. Mechanical Measurements – Beckwith T.G. and Lewis Buck N.
6. Machinery Noise Measurement – S.J. Yang and A.J. Ellison, Oxford New York.

Final Year B. Tech. Semester – VII
TPLEL1- TPL406: ENTREPRENEURSHIP DEVELOPMENT (ELECTIVE-I)

Teaching Scheme	
Lectures	3 Hrs. / Week
Total Credits	3

Evaluation Scheme	
SE	25
TA	15
SEE	60
Total	100

Course Objectives

1. To know and understand important concepts related to entrepreneurship.
2. To identify environmental factors affecting entrepreneur and project appraisal techniques.
3. To make students understand the policy framework in India for entrepreneurship development.
4. To know and understand the social entrepreneurship concept.

Course Outcomes

At the end of the course students will be able to

1. Understand the significance of entrepreneurship in any economy with business opportunity identification.
2. Understand the environmental factors affecting entrepreneur and project appraisal techniques.
3. Understand various schemes and institutions promoting entrepreneurship in India.
4. Understand the social entrepreneurship concept.

	Course Contents	Hrs.
Unit 1.	Entrepreneurship Perspectives Concepts of entrepreneur, entrepreneurship and start-ups. Importance and Characteristics of entrepreneurs, Types of entrepreneurs, Entrepreneur Vs Manager, Entrepreneur Vs. Intrapreneur. Benefits and potential risks of entrepreneurship, Factors affecting growth of Entrepreneurship in India, Role of Entrepreneurship in Economic Development.	7
Unit 2.	Business Opportunity Identification Business ideas, methods of generating ideas, and opportunity	7

	recognition, Meaning and significance of a business plan, components of a business plan, and feasibility study.	
Unit 3.	Environment and Entrepreneurship Environment factors affecting entrepreneurship, institutional finance and Entrepreneurship. Local mobility of entrepreneurs Unit	6
Unit 4.	Project Appraisal Project Appraisal techniques, economic, Steps Analysis, Financial Analysis; Market Analysis, Technical Feasibility.	6
Unit 5.	Institutions Supporting Entrepreneurs Central level Institutions: NABARD; SIDBI, NIC, KVIC; SIDIO; NSIC Ltd; etc. – state level Institutions –DICs- SFC- SSIDC- Other financial assistance.	6
Unit 6.	Social Entrepreneurship Need, Types, characteristics and benefits of social enterprises/social entrepreneurship. Rural entrepreneurship: Need and problems of rural entrepreneurship, challenges and opportunities. Women entrepreneurship: Role of government.	7

Reference Books

1 Vasant Desai (2010), “The Dynamics of Entrepreneurship Development and Management”, Sixth edition, Himalaya Publishing House.

2 S.Anil Kumar, S.C. Poornima, Mini.K.Abraham and K.Jayashree (2003), “Entrepreneurship Development”, First Edition, New Age International Publishers.

3 Dr. S.S. Khanka (2013), “Entrepreneurial Development”, Revised Edition, S. Chand and Company Ltd.

4 Ashish Gupta (2010), “Indian Entrepreneurial Culture”, First Edition, New Age International Publishers.

5 Peter F. Drucker, Innovation and Entrepreneurship.

6 A.Sahay, M. S. Chhikara, New Vistas of Entrepreneurship: Challenges & Opportunities.

7 Poornima M.CH., Entrepreneurship Development –Small Business Enterprises, Pearson, Delhi,2009.

Final Year B. Tech. Semester – VII
TPLEL2- TPL407: TEXTILE AIR ENGINEERING (ELECTIVE-II)

Teaching Scheme	
Lectures	3 Hrs. / Week
Total Credits	3

Evaluation Scheme	
SE	25
TA	15
SEE	60
Total	100

Course Objectives

1. To understand basic terminology of air conditioning, psychrometric processes & application of the same in textile industry & interpret psychometric chart. To get familiar with the procedure for solving the numerical based on psychrometric processes. To understand the function of refrigerants, its desirable properties and applications.
2. To get familiar with types of air refrigeration and simple vapour compression refrigeration system and factors affecting the same. To understand different equipment's used in refrigeration system.
3. To know principle and types of different air conditioning systems for human comfort & to provide ambient conditions in industry for facilitating production activities.
4. To understand principle, types and design of air distribution systems. To get familiar with ventilation and air changes required for various departments of textile mill, calculations of heat load, cooling coil capacity, humidifier capacity and heating coil capacity. To get acquainted with developments in humidification plants of textile industry.

Course Outcomes

At the end of the course students will be able

1. To explain the function of refrigerants and describe its desirable properties and applications. To describe psychrometric processes & solve the numericals based on it analytically as well as with the help of psychrometric chart.

2. To describe on air refrigeration system and simple vapour compression refrigeration system. To explain different equipment's used in refrigeration system.
3. To describe principle and types of different air conditioning systems which gives comfort to human body and provide ambient conditions in industry for facilitating production activities.
4. To design, analyze heat load, capacity of air distribution systems required for textile mill. To explain developments in humidification plants of textile industry.

	Course Contents	**Hrs.**
Unit 1.	**Thermodynamics -** Laws of thermodynamics applied to refrigeration. Introduction to basic terms – specific volume, density, specific weight, energy, internal energy, flow energy work, specific heat, sensible heat, latent heat, entropy, enthalpy, difference between gas and vapour, CoP, ton of refrigeration.	5
Unit 2.	**A) Refrigeration -** Air refrigeration system – Reversed Carnot cycle, Bell Coleman cycle, advantages, disadvantages of air refrigeration, simple vapour compression refrigeration system – T.S, H.S. and P-H diagrams, comparison with air compression system, coefficient of performance.	5
	B) Refrigerants - Introduction, classification, properties of an ideal refrigerant, secondary refrigerants, comparison of refrigerants – Air, NH3, R-11, R-12, selection of refrigerant, environment friendly refrigerants.	5
Unit 3.	**A) RAC Equipments -** working principle and applications of hermetically sealed compressor, condenser, evaporator, fans, blowers, air washers, filters, heaters, heat pumps, grills, registers, humidifiers and dehumidifiers used in textile A/C plant.	5
	B) Comfort - Factors affecting comfort, thermal exchange of human body with environment, heat disorders, comfort chart.	3
Unit 4.	**Psychrometry -** Psychrometric terms, Dalton's law of partial pressure, psychrometric relations, psychrometric chart, psychrometric processes – sensible heating and cooling, humidification & dehumidification cooling with dehumidification, heating with humidification, humidification by steam	

	injection, adiabatic chemical dehumidification, adiabatic mixing of air streams, bypass factor of heating and cooling coil, efficiency of heating and cooling coil, efficiency of humidifier, sensible heat factor, numericals based on above topics.	7
Unit 5.	**A) Air conditioning systems -** Summer air conditioning, winter air conditioning, modern year round air conditioning, ambient conditions required in various departments of textile mill and controlling ambient conditions.	3
	B) Air distribution systems - Re-circulated air, conditioned air, duct work, use of friction loss chart, rectangular equivalent of round duct, Duct systems, principle of duct sizing, different air distribution systems.	3
Unit 6.	**A) Design of Air conditioning system -** Design hints for practical design of air conditioning and humidification plant, ventilation and air changes required for various departments of textile mill, calculations of heat load, cooling coil capacity, humidifier capacity, heating coil capacity.	2
	B) Developments in Air conditioning system – Modern developments in humidification plants of textile industry.	1

Reference Books

1 Refrigeration and Air conditioning by R. K. Rajput.

2 A Course in Refrigeration and Air-conditioning by Arora & Domkundwar.

3 Refrigeration and Air conditioning by R.S. Khurmi.

4 Refrigeration and Air conditioning by C.P. Arora.

5 Principles of Refrigeration by Roy J. Dossat.

6 Air conditioning in Textile mills by S.P. Patel (ATIRA).

Final Year B. Tech. Semester – VII
TPLEL2- TPL408: PROCESS CONTROL IN SPINNING (ELECTIVE-II)

Teaching Scheme	
Lectures	3Hrs. / Week
Total Credits	3

Evaluation Scheme	
SE	25
TA	15
SEE	60
Total	100

Course Objectives

1. Explain the principals of process management, concepts of total quality management and ISO 9000 the wastage and its effect on cost of production.
2. Explain the process of choosing process parameters and application of the chosen parameters at preparatory and ring spinning stages.
3. Illustrate the methodology of process and product performance evaluation and role of norms.
4. Describe the role of machine parameters and machine technology on process and product quality and cost

Course Outcomes

At the end of the course students will be able to

1. Understand the role of machine technology and parameters on product quality.
2. Understand the principles of process management and quality management.
3. Understand the process of choosing process parameters at preparatory and ring spinning stages.
4. Apply the chosen process parameters and assess the influence of parameters at different ring spinning process stages. Test the product properties and compare with norms of the industry.

	Course Contents	Hrs.
Unit 1.	a) Introduction to process management –	2
	Meaning of process management, various phases of process management like planning, organizing, linking of customer feedback and process management, cycle of process management.	2
	b) The Cost of Quality –	
	Definition, three views of quality costs, measuring quality costs, use of quality cost, information, accounting systems, and activity based	2

costing.

c) Concepts of ISO –

Concepts of ISO 9000 series, other quality systems, implementation, documentation, post certification, ISO / QS 9000 elements, internal auditing.

Unit 2. a) Total Quality Management (TQM) – Fundamental concepts of TQM, Basic approach, quality & business performance service quality versus product quality, obstacles. 3

b) Customer focus & satisfaction – 2
Customer perception of quality, process versus customer, feedback, service quality customer relation & profitability, buyer supplier relationship, supplier partnership, continuous process improvement 1

c) Production Costing and Parameters influencing the production cost

Unit 3.

a) Raw material management –
Importance, need of instrumental evaluation, traditional methods of cotton selection, importance of cost in raw material, use of linear programming for mixing, bale management, yarn engineering. 2

b) Yarn Realization – 2
Importance, estimation process, norms for various yarns like cotton, blended etc., analysis of yarn realization from mills. 3

c) Process management in blow room & card –
Blow room & card as integrated system, control of waste, cleaning efficiency, neps& fibre rupture, contamination control, selection of proper sequence process and its parameters.

Unit 4.

a) Process management at Comber preparatory & combing –
Significance & importance of good lap for comber, evaluation of comber performance, fractionating efficiency of comber, comber waste analysis, influence of various factors on combing performance. 3

b) Process management at Draw frame 3
Drafting wave & its significance, roller nip movement, roller speed variation, roller vibration, influence of parameters like speed, setting, Role of auto leveler, role of material channelizing in spinning. 1

c) Process management at Speed frame –
Influence of process parameters like flyer speed, twist, break draft and settings on roving quality. Reasons for stretch in roving and its control at speed frame.

Unit 5. Process management in Ring Spinning –

a) Influence of various machine and material parameters on yarn quality. 1

b) Control of yarn count and strength, within and between bobbin variation, Control of yarn evenness and imperfections, Types of yarn irregularities, measurement causes and assessment. Control of yarn Hairiness- measurement, role played by fibre properties and process parameters. 3 1

d) End breaks in spinning –Importance, assessment and controls 2

e) Control of Yarn and package faults –

Influence of fibre properties, machine parameters on classimat faults, control of faults. Study and control of faults like slubs, crackers, spinners double bad piecing, double gaiting, slough off, hard/soft packages etc.

Unit 6. a) Role of maintenance in product quality – 2

Specific maintenance activities from blow room to ring spinning which directly reflect on yarn quality. Total productive maintenance.

b) Role of On & off line monitoring and centralized data collection systems in spinning process. 1

c) Productivity – 2

Importance, definition of indices of productivity, analysis & shortfall in productivity, productivity indices, standards, means to improve productivity, productivity of different sections in spinning, comparison & reasons for losses.

Reference Books

1 Textile Quality Physical method of Product & Process Control by Mairio Bona COMMETT program of EEC.
2 Process Control in Spinning by A. R. Garde& T. R. Subramaniam, ATIRA Publication.SITRA publication.
3 Total Quality Management – A How to program for high performance business by John M. Kelly, Published by Aleycuder, Hamitton Institute Inc.
4 Process Control in Spinning – Dr. K. R. Salhotr, ATIRA Publications.
5 Process Management in Spinning by R.Senthil Kumar
6 ISO 9000 – Meeting the new international standards by Perry L. Johnson McGraw Hill Inc.Uster Statistics

Final Year B. Tech. Semester – VII
TPLEL2- TPL409: NONWOVEN TECHNOLOGY (ELECTIVE-II)

Teaching Scheme	
Lectures	3 Hrs. / Week
Total Credits	3

Evaluation Scheme	
SE	25
TA	15
SEE	60
Total	100

Course Objectives

1. To understand the concept of Nonwoven Textiles
2. To define Nonwovens and Understand Basics
3. To classify Nonwovens
4. To analyze and identify the Nonwoven products and to apply knowledge of Nonwovens in testing and product development.

Course Outcomes

At the end of the course students will be able to

1. Describe the logic and processes involved in Nonwovens.
2. Classify the Nonwovens.
3. Prepare technical data sheet of each sector of Nonwovens and Compile the fibres used, technology applied in manufacturing of Nonwovens.
4. Evaluate the performance of Nonwovens with different Indian and International standards.

	Course Contents	**Hrs.**
Unit 1.	Historical background of nonwovens, non woven definition, stages in Non-woven manufacturing. Web Forming Techniques: carding, air laid, wet process, polymer extrusion.	4
Unit 2.	**Classification of nonwoven** – On the basis of use, on the basis of manufacturing process, on the basis of web formation, on the basis of bonding.	4
Unit 3.	**Dry laid webs** – fibre selection, fibre preparation, web formation, layering, **Wet laid nonwoven** – Raw materials, production process, special features of the wet laid process and its product. Spun laced webs.	8
Unit 4.	**Mechanically bonded webs** – needle punched nonwovens,	8

Application of needle punching, stitch bonded nonwovens, applications.

Hydro entangled nonwovens – Bonding process, water system, filtration system, web drying, properties of spun laced webs, applications.

Unit 5. **Thermally bonded nonwovens** – binder, binding fibres, binding powder, binding webs, methods of thermal bonding – Hot calendaring, belt calendaring, oven bonding, ultrasonic bonding, radiant heat bonding. Melt blown nonwovens 8

Unit 6. **Chemically bonded nonwoven** – Latex binder, other types of nonwoven binders, formulation, order of formulation, bonding technology. Application of chemical bonded nonwovens. 4

Reference Books

1 Handbook of Nonwovens
1st Edition By: S Russell, Woodhead Publishing 2007
2 Nonwoven Process Performance & Testing – Turbak
3 Nonwovens Technology Market & Product Potential, Proceedings of the Seminar IIT New Delhi,2007
4 NPTEL on Nonwoven Technology
5 Nonwovens: Monogram by BTRA
6 Nonwovens BY DR.P.K. Bannerjee

Final Year B. Tech. Semester – VII
TPP410: Textile Mill Planning and Organisation

Teaching Scheme	
Tutorial	1 Hrs. / Week
Total Credits	1

Evaluation Scheme	
CIE	50
Total	50

THEME: The Tutorial conducted would be based on the syllabus for the present subject. It is preferably on data collection and techno economic interpretation.

Submission – Completed Assignment

Final Year B. Tech. Semester – VII
TPP411:THEORY OF TEXTILE MACHINES-II LAB

Teaching Scheme	
Practical	2 Hrs. / Week
Total Credits	1

Evaluation Scheme	
CIE	50
SEE	50
TOTAL	100

List Of Experiments

1. Static balancing of rotary masses.
2. Dynamic balancing of rotary masses.
3. Generation of Involute gear tooth profile.
4. Study of Epicyclic gearing on speed frame / carding / comber / Rapier machine.
5. Study of Brakes.
6. Study of clutches.
7. Calculation of natural frequency of single degree of freedom vibration.
8. Study of forced vibration characteristics.
9. Study of whirling of shaft.
10. Assembly & Dismantling of bearing of spinning / weaving machine.
11. Study of PIV & VPS, frequency control drive.
12. Study of power consumption of a loom or any spinning machine.

Submission – Minimum five experiments based on above.

Final Year B. Tech. Semester – VII

TPP412: DESIGN OF TEXTILE MACHINES-II LAB

Teaching Scheme	
Practical	2 Hrs. / Week
Total Credits	1

Evaluation Scheme	
CIE	50
SEE	50
Total	100

Design problems and drawing sheets based on above topics (Minimum five assignments) viz.

List of Experiments

1. Design against fluctuating load.
2. Design considerations of machine frames & cost considerations in design.
3. Design of Rolling contact bearings.
4. Design of Sliding contact bearings.
5. Design of Pressure vessels.
6. Design of Gears.

Submission – Completed Journal and drawing sheets.

Final Year B. Tech Semester- VII

TPD413: PROJECT PHASE- I

Teaching Scheme			Evaluation Scheme	
Project Hours	4 Hrs. /Week		CIE	50
Total Credits	4		**Total**	**50**

Course Objective

1 To identify the problem /idea and review and summarize the literature for the topic of the identified problem
2 To describe the process for undertaking the research.
3 To explain various tools of testing and analysis for the data in order to draw relevant conclusions.
4 To demonstrate effective communication skills and team work.

Course Outcomes Students will be able to

1 Able to identify the problem /idea and review and summarize the literature for the topic of the identified problem
2 Able to formulate and design suitable experimental plan.
3 Able to understand and use various tools of testing and analysis for the data in order to draw relevant conclusions.
4 Able to communicate effectivelyas amemberofteam

Guidelines for Project Phase-I

Selection of Topic and Registration:

Students based on their interest and availability of resources select the topic in one of the following area-

i. Process optimization.
ii. Product Development.
iii. Fabrication.
iv. Software in textiles.

Students should submit the registration form to dissertation committee filling all the details.

Literature review:

Literature related to topic selected should be searched from Reputed Research Journals, Books, and internet. Literature review should be prepared as per the standard format.

Plan of work:

Proposed plan of work in consultation with guide should be prepared. Plan of work consists of

- Raw Material details.
- Methodology to be adopted.
- Testing to be carried out.

Submission of Literature review and plan of work:

Spiral bound copy of Introduction, Literature review and plan of work as per the standard format should be submitted to dissertation committee.

Evaluation of Plan of work:

Students should present all above details of project work in front of project evaluation committee. If any recommendations are suggested by committee, those should be implemented and resubmitted.

Continuous Internal Evaluation (CIE):

Term work marks are allotted by continuous monitoring of the progress in the work and submission of spiral bound copy.

Submission

1. Spiral copy of Introduction, literature review and plan of work.

Final Year B. Tech Textile Plant Engineering
Semester-II

Sr. No.	Course Code	Name of the Course	Group	Teaching Scheme				Credits
				Theory Hrs/ Week	Tutorial /Project Hrs/ Week	Practical Hrs/ Week	Total	
1	TPL414	MAINTENANCE OF TEXTILE MACHINES	D	4			4	4
2	TPL415	FLUID FLOW SYSTEMS AND CONTROLS	D	3			3	3
3	TPLEL3	ELECTIVE - III	D	3			3	3
4	TPLEL4	ELECTIVE - IV	D	3			3	3
5	TPP422	MAINTENANCE OF TEXTILE MACHINES LAB	D			2	2	1
6	TPP423	FLUID FLOW SYSTEMS AND CONTROLS LAB	D			2	2	1
7	TPD424	PROJECT PHASE -II	F		8		8	8
8	TPD425	INTERNSHIP-II**	F					3
Total				**13**	**8**	**4**	**25**	26

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

List of Elective-III

TPL416 Instrumentation And Metrology
TPL417 Process Control In Weaving
TPL418 Manufacturing of Special Fabrics

List of Elective-IV

TPL419 Mechatronics
TPL420 Maintenance Management
TPL421 Merchandizing

Final Year B.Tech. Semester- VIII
TPL414:MAINTENANCE OF TEXTILE MACHINES

Teaching Scheme	
Lectures	4 Hrs. / Week
Total Credits	4

Evaluation Scheme	
SE	25
TA	15
SEE	60
Total	**100**

Course Objectives

1. To teach need of maintenance, its functions, types & scheduling.
2. To elaborate maintenance practices in Spinning preparatory & Spinning processes.
3. To describe maintenance practices in Weaving preparatory & Weaving processes.
4. To explain concepts and procedure of maintenance audit, SQC synchronization & recording of maintenance activities.

Course Outcomes

At the end of the course students will be able to

1. Understand and explain need of maintenance, its functions, types & scheduling
2. explain & use maintenance practices in Spinning preparatory & Spinning processes
3. explain & use maintenance practices in Weaving preparatory & Weaving processes
4. explain concepts of maintenance audit, SQC synchronization & recording of maintenance activities

	Course Contents	Hrs.
Unit 1.	**a) Maintenance** – concept, importance, objectives of maintenance, Breakdown & planned maintenance sub classification of planned maintenance, Procedure for planning, schedules for preventive maintenance. **b) Maintenance of spinning preparatory machines** - schedules, staff, precautions & methods to be followed during maintenance activities, tools & gauges used for maintenance.	**10**

Unit 2.	**a) Maintenance of Ringframe & Compact Spinning Mechanisms** - schedules, staff, precautions & methods to be followed, Tools & gauges used, Maintenance of Rotor Spinning Machines – Schedules, Precautions, Methods etc.	10
	b) Study of aprons & cots used in spinning & their maintenance.	
Unit 3.	**a) Machine audit** – concept and auditing of spinning machines. Energy conservation in spinning	**7**
	b) SQC synchronization with maintenance – SQC activities useful for maintenance in various departments of spinning.	
Unit 4.	**a) Maintenance of weaving preparatory machines**, schedules, critical points of maintenance, precautions to be taken during maintenance operations for Winding, Warping, & Sizing machines.	13
	b) Maintenance of plain & automatic loom - Schedules, critical points, precautions, mechanism wise auditing of plain & automatic looms.	
Unit 5.	**a) Maintenance of shuttleless weaving machines** - Approach towards maintenance of latest weaving machines, Critical maintenance points of various shuttleless weaving machines like projectile, rapier, air jet.	7
Unit 6.	**a)** Recording of maintenance activities & its importance.	5
	b) Introduction to logic & approach of maintenance of chemical processing machines.	

Reference Books

1. Maintenance manuals by BTRA for various spinning & weaving machines.
2. BTRA monograph series.
3. Spinning machinery maintenance by SITRA
4. Maintenance manuals of different machinery manufacturers of spinning & weaving machines.
5. Modern approach to maintenance in spinning, Woodhead publication.

FINAL YEAR B. TECH.Semester- VIII

TPL415: FLUID FLOW SYSTEMS AND CONTROL

Teaching Scheme	
Lectures	3 Hrs. /Week
Total Credits	3

Evaluation Scheme	
SE	25
TA	15
SEE	60
Total	**100**

Course Objectives	
1.	To discuss need of Hydraulic & pneumatic systems, their types, merits & demerits & ISO symbols.
2.	To study &learn elements of fluid systems like Air compressor, hydraulic power pack, filter, dryer etc.
3.	To study &learn different types of valves, actuators & working of basic pneumatic & hydraulic circuits.
4.	To learn concepts of maintenance, troubleshooting of pneumatic & hydraulic systems& piping required.

Course Outcomes

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

1. Explain use of Hydraulic & pneumatic systems, their types, merits & demerits & will be able to draw ISO symbols.
2. Explain elements of fluid systems like Air compressor, hydraulic power pack, filter, dryer etc.
3. Explain use of different types of valves, actuators & working of basic pneumatic & hydraulic circuits.
4. Explain concepts of maintenance, troubleshooting of pneumatic & hydraulic systems & piping required.

	Course Contents	**Hrs.**
Unit 1.	a) Introduction to hydraulic and pneumatic systems, Areas of applications, relative merits and demerits, comparison of above systems with electrical, mechanical and hybrid systems. b) ISO / JIC symbols used in pneumatics and Hydraulics and properties of compressed air for pneumatic systems, advantages of	**7**

Unit 2.	compressed air a)Fluid conditioning elements – filter, lubricator, dryers, heat exchangers, pressure regulators and strainers used in hydraulics and pneumatics. b) Study of control valves in pneumatics and hydraulics – A) Pressure control, B) Direction control C) flow control valves D) special valves	**11**
Unit 3.	. a) Air compressors – Reciprocating compressor and Numerical treatment. b) Study of actuators – Linear and rotary actuators in pneumatics and hydraulics.	**6**
Unit 4.	a) Pneumatic circuits and applications – Basic Pneumatic Circuits - Speed control, sequencing, time delay, actuation of pneumatic motor. b) Maintenance and trouble shooting in pneumatic and hydraulic system	**5**
Unit 5.	a) Hydraulic Systems – Introduction in brief, properties of fluid, types and selection of fluids. b) Study of pumps used in hydraulic system and hydraulic power pack.	**5**
Unit 6.	a) Hydraulic circuits and applications – Basic hydraulic circuit - Speed control, sequencing, counter balancing, study of systems in Textile machines. b) Pipes and Fitting, accumulator, Pressure intensifiers.	**5**

Reference Books

1. Pneumatics and Hydraulics – Harry L. Stewart.
2. Hydraulics & Pneumatics – Andrew Parr
3. Pneumatic systems (Principles & Maintenance) – S. R. Majumdar.
4. Oil Hydraulics – S. R. Majumdar.
5. Industrial Hydraulics – John Pippenger& Tyler Hicks.

Final Year B. Tech. Semester – VIII
TPLEL3- TPL416: INSTRUMENTATION AND METROLOGY(ELECTIVE-III)

Teaching Scheme	
Lectures	3 Hrs. / Week
Total Credits	03

Evaluation Scheme	
SE	25
TA	15
SEE	60
Total	100

Course Objectives

1. To understand the Need of measurement, Methods of Measurement, Study of different Instruments which require for measurement of line and angle dimensions.
2. To understand about surface finish, Straightness & Flatness, External Threads its measurement methods with the help of different instruments.
3. To understand about types of Comparators Interferometry, its applications in different industry. Students should be able to understand about Limit, Fits, Tolerances, its necessity in any industry.
4. To understand different types of Instruments and gauges used in spinning and weaving department, its applications.

Course Outcomes At the end of the course students will be able to	
1.	Explain need, methods of measurement and different types used for angle and line measurement.
2.	Explain about surface finish, Straightness & Flatness, External Threads its measurement methods.
3.	Explain different types of comparators, Interferometry, its application in different industry. To explain Limit, Fits, Tolerances, its necessity in any industry.
4.	Explain different Instruments and gauges used in spinning and weaving department, its applications.

	Course Contents	Hrs.
Unit 1.	**Measurement:-** Introduction, Need of measurement, Methods of Measurement, International standards of Measurement - a) Line standards b) End standards c) Wavelength standards, System of measurement. Accuracy & precision of measurement	4
Unit 2.	**Study of Instruments:-** **a) Linear measurement** : Vernier Calliper, Micrometer, Height gauge, Depth gauge, Slip gauges, Grades of Slip gauges, application, Universal measuring machine. **b) Angle measurement:** Measurement of angle by using instruments like Bevel protractors, Clinometer, Angle dekkor. Angle gauges, Auto collimator, case studies of measurement of an unknown angle by using Sine bar, Standard balls & Rollers etc.	8
Unit 3.	**Surface Finish measurement and Straightness - Flatness measurement : -** **a) Surface finish:** Roughness, Wavyness, lay, methods of measuring roughness, Ra value, RMS value, CLA value, Ten point height method, Instrument for measuring surface Texture, Profilometer **b) Straightness & Flatness:** Inspection of straightness & Flatness by using instruments straight edge, spirit level, Auto-collimator, Beam comparator, Tests to check squareness, parallelism of the axes.	8
Unit 4.	**Interferometry and Measurement of External Threads: -** **a) Interferometry:** Principles, optical flat, Typical applications of optical flat. **b) Measurement of External Threads**: Thread geometry, different errors in screw threads, measurement of form of thread with profile projector, pitch measurement, measurement of thread diameter with standard wires. Screw thread micrometer.	8

Unit 5. Comparators and Limit, Fits, Tolerances:

a) **Comparators :**Study of Mechanical, Electrical, Electronic, Pneumatic, Optical comparators

b) Limit, Fits, Tolerances: - Introduction to limit, fits, allowances, Tolerances, Unilateral, bilateral tolerances, Interchangeability, types of fits, Systems of fits, Introduction to limit gauges, GO-NOGO gauges. Taylor's Principle. 8

Unit 6. Study of Instruments and gauges used in spinning and weaving:-

Prism calliper, stroboscope, spring balance, tachometer, frame level, pressure gauge, saddle gauge, gauges used in looms like Simco, Ruti-C, Airjet etc. 3

Reference Books

1 Engineering Metrology – I.C. Gupta
2 Engineering Metrology – R.K. Jain
3 Practical Engineering Metrology – Sharp K.W.B. Pitman, London.
4 Metrology and quality control – M.S. Mahajan , B.S. chaudhari , vrinda pulications

Final Year B. Tech. Semester – VIII
TPLEL3- TPL417: PROCESS CONTROL IN WEAVING (ELECTIVE-III)

Teaching Scheme	
Lectures	03 Hrs. / Week
Total Credits	03

Evaluation Scheme	
SE	25
TA	15
SEE	60
Total	**100**

Course Objectives	
1.	To explain scope, approach and methodology of process management.
2.	To explain process management in weaving preparatory to optimize quality and improvement in efficiency after each process.
3.	To explain process management in weaving with respect to fabric quality and productivity.
4.	To explain methods to asses and reduce hard waste in weaving processes.

Course Outcomes

At the end of the course students will be able to

1. Understand scope, approach and methodology of process management
2. Understand process management in weaving preparatory to optimize quality and improvement in efficiency after each process.
3. Understand process management in weaving with respect to fabric quality and fabric production.
4. Measure the hard waste consumption to control it.

	Course Contents	Hrs.
Unit 1.	**Introduction to process management:**	02

- Object, scope and approach to achieve quality and productivity in fabric production, and Methodology adopted for the same (SQC, Direct Approach, and online monitoring)

Unit 2. **Quality and production management in winding:** 08

- Control of yarn joints quality on Automatic Winding machines for various materials.
- Yarn clearing – Yarn fault classification, Yarn fault classification system, Assessment of clearing performance.
- Unwinding and winding tension- Unwinding tension from ring frame bobbin, Minimizing of balloon tension fluctuation through optimum guide distance, unwinding accelerator. .

- Control of Package quality- Causes and remedies for winding package defects.

Unit 3. **Process management in warping:** 04

- Characteristics of perfect beam and monitoring the beam quality.
- Machine parameters adjustment and machine condition maintenance for minimizing end breaks for various materials and counts.
- Method of assessing productivity of warping machine & measures to improve the productivity.

Unit 4. **Process management in sizing:** 08

- Deciding the size recipe according to material and count of yarn, Preparation of quality size pastes.
- Determination and achieving the correct size pick up by controlling various sizing conditions, Modern pick up control equipment.
- Stretch and moisture level control on multicylinder sizing machine.
- Characteristics of perfect sized beam and its achievement.
- Method to increase weavability .
- Minimizing the size losses at every stage.
- Control of productivity.
- Material handling and work practices to get optimum production and best-sized beams.

Unit 5. **Process management in weaving** 12

For Fabric quality (loom shed):

- Causes & remedies for yarn related faults: Weft bars, black ends, slub, and thick end, Double end.
- Causes and remedies for fabric defects on ordinary, automatic looms & shuttle less looms.
- Manual and automatic fabric inspection methods, various point grading systems

For productivity:

- Maintaining of loom speed on various weaving machines,

limitations on maximum speed from textile point of view, mechanical condition causing reduction in speed.

- Control of Technical, Human and organizational factors affecting loom shed efficiency. Assessment of loom performance after corrective actions
- Control of down time through SMED technique
- Use of snap study in controlling efficiency losses
- Management information system to control productivity

Unit 6. **Hard waste Reduction in Weaving Department:** 02

- Approach to the reduction of hard-waste
- Control of hard-waste

Reference Books

1. Process Control in Weaving by M.C. Paliwal & P.D. Kimothi
2. Weaving: Technology and Operations by Allan Ormerod.
3. Weaving Machine, Mechanisms, Management by Dr. Talukdar, Ajagaonkar, Sriramulu.
4. Machine Manuals of Various Shuttle less Looms and – Preparatory Machines.
5. Shuttle less Weaving: NCUTE Publication.
6. Fundamentals of Yarn Winding by Milind Koranne

Final Year B. Tech. Semester- VIII
TPLEL3- TPL418: MANUFACTURING OF SPECIAL FABRICS (ELECTIVE-III)

Teaching Scheme	
Lectures	3 Hrs. / Week
Total Credits	3

Evaluation Scheme	
SE	25
TA	15
SEE	60
Total	**100**

Course Objectives

1. To explain denim fabric and worsted fabric manufacturing
2. To explain Home textile and carpet fabric manufacturing
3. To explain terry fabric, narrow fabric, tyre cord and net fabrics
4. To explain various industrial fabrics manufacturing used for sports, automobile, canvas and coated fabrics

Course Outcomes

At the end of the course students will be able to

1. Explain denim fabric and worsted fabric manufacturing
2. Explain Home textile and carpet fabric manufacturing
3. Explain terry fabric, narrow fabric, tyre cord and net fabrics
4. Explain various industrial fabrics manufacturing used for sports, automobile, canvas and coated fabrics technology

	Course Contents	Hrs.
Unit 1.	**a) Denim Fabric -** Introduction to denim, history of denim manufacturing, yarn properties required, spinning of yarn for denim fabric manufacturing, weaving preparatory, dyeing and sizing concept, weaving machine suitable for denim manufacturing, modifications required in weaving process, wet processing of denim, special treatments used **b) Worsted Suiting Fabric -** Yarn quality required, spinning of worsted yarn in brief, preparation and weaving of worsted yarns, weaving machines requirement and modifications. wet processing and special treatments requirements	07
Unit 2.	**a) Home Textiles -** Definition, applications **i) Bed sheet -** required qualities, sizes of different bed sheets, woven	07

and printed bed sheets manufacturing processes, quality parameters of yarn used, preparatory and weaving processes, weaving machine parameters and its selection, wet processes and finishing of bed sheets

ii) Curtains - Curtains and blinds, Basic requirements, quality requirements, types of fabric with respect to woven and knitting, quality parameters of yarn used, preparatory and weaving processes, weaving machine parameters and its selection, wet processes and finishing of curtain fabric. Knitted curtain manufacturing

b) **Carpet Manufacturing** - Introduction, applications, construction, types of piles – woven and non woven, woven – Wilton, patterned, plain, cord, Brussels, Axminister, Production of carpet worldwide, Moquette woven carpet, embroidered carpet, Tufted, cut pile, loop pile, Nonwoven Carpets – bonded, electro statically flocked, needle punched. Carpet selection criteria, carpet care

Unit 3. **a) Terry Towel Fabric - Introduction,** Basic requirements of towel fabric, types of towel fabric, importance of the terry towels, mechanisms of pile formation, terry towel parts, yarn quality requirements, process flow chart, preparatory and weaving of terry fabric, weaving machines specifications, wet processes and finishing of terry fabric, quality control in terry towel manufacturing 07

b) Narrow Fabric - Definition, applications, properties required, specifications and manufacturing of flexible and rigid tapes, finishing processes involved

Unit 4. **a) Sports Fabric -** Applications of different fabrics in various sports, fabric specifications for different sportswear and sports accessories, woven and knitted sportswear, statistics of fabric consumption, leading brands available 05

b) Net Fabric Manufacturing - definition, types of nets, yarn and fabric quality requirements for various applications, manufacturing processes.

Unit 5. **a) Automobile Fabric -** Applications of different fabrics in automobile, fabric specifications for different applications in automobiles, woven 07

and knitted automobile fabrics, statistics of automobile fabric consumption

b) **Tyre cord fabric -** Basic requirements of tyre, importance of tyre cord fabric, parts of tyre cord, structure of tyre cord, yarn quality requirement, preparation and weaving of tyre cord fabric, fabric quality requirements, machines used and finishing of the fabric

Unit 6 **a) Canvas Fabric -** Introduction, applications, yarn quality requirements, preparation and weaving machine modifications for canvas fabric preparation, wet process sequence and modifications 06

b) Coated and Laminated Fabric - Importance of coating, definitions, applications, coating machines, special polymers for coating of different applications, methods of coating rain wears manufacturing, yarn and fabric quality requirements for rainwear

Reference Books

1. Hand book of weaving by Sabit Adanur
2. Advances in knitting technology, Edited by K. F. Au
3. Woven Fabric Structure : Design and Product Planning, J. Hayavadana
4. Wellington Sears Handbook of Industrial Textiles by Sabit Adanur.
5. Handbook of Technical Textiles by A.R. Horrocks & S C Anand
6. Textiles in Automotive Engineering by W. Fung & M. Hardcastle.
7. Coated Textiles Principles and Applications by Dr. A. K. Sen
8. www.technicaltextiles.net
9. Textile advances in the automotive Industry by R. Shishoo
10. Automotive textiles by Textile progress Vol. 29 by S. K. Mukhopadhyay.
11. Performance of Home Textiles, 1st Edition , Subrata Das

Final Year B.Tech. Semester-VIII
TPLEL4- TPL419: MECHATRONICS

Teaching Scheme	
Lectures	3 Hrs. / Week
Total Credits	3

Evaluation Scheme	
SE	25
TA	15
SEE	60
Total	**100**

Course Objectives

1. To explain basic concepts, need and scope of mechatronic systems and robotics in modern textile machines.
2. To describe elements of mechatronic system- transducers, controllers and actuators & their types.
3. To explain design process of mechatronic system, modelling, programming, robotics and material handling.
4. To evaluate mechatronic systems used in textiles.

Course Outcomes

At the end of the course students will be able to

1. Explain basic concepts, need and scope of mechatronic systems and robotics in modern textile machines.
2. Describe elements of mechatronic system- transducers, controllers and actuators & their types.
3. Explain design process of mechatronic system, modelling, programming, robotics and material handling.
4. Evaluate mechatronic systems used in textiles.

Course Contents	Hrs.
Unit 1. Introduction Multidisciplinary approach, scope, elements in mechatronics design, applications, control system and its types, proportional, integral, differential controller, analog & digital controller.	**5**

Unit 2. Sensors and Drives in Mechatronics

Principles & types of transducers and sensors

Electrical motors, stepper motors, servo principle, Hydraulic and pneumatic actuators, variable frequency drives, relays and solenoids, selection criterion for drives. **8**

Unit 3. PLC and MEMS

PLC- Basic concept, fundamentals, ladder diagram & its construction, PLC - block diagram, internal circuit of discrete type input and output terminals, interfacing of sensors & actuators, PLC scan cycle, basic PLC programming procedure **9**

MEMS- Introduction, materials, sensors, actuators, fabrication methods, application of MEMS - Accelerometer, humidity micro sensor

Unit 4. Modelling

Basic concepts, spring, damper, mass/inertia element, equivalent elements in electrical, fluid and thermal systems, model of electrical motor. **3**

Unit 5. Automation and Robotics

Automation- need and types automation, factors affecting **6**

Robotics-Scope, anatomy, configuration, drives, types of robots, transmission systems, end effectors, applications, Methods of robot programming, limitations, capabilities, various commands in robot programming.

Unit 6. Design of Mechatronic System and Material Handling Applications

Design process, comparison of traditional and mechatronic design, some case studies piece counting, robotic walking machine. Auto feed and auto doffing, weft selector, yarn clearer systems in textile machines. **8**

Material Handling Applications – General consideration, task planning, pick & place, loading unloading, inspection and assembly etc.

Reference Books

1. “Mechatronics” by N. P. Mahalik, Tata McGraw Hill.
2. Mechatronics by M. D. Singh & J. G. Joshi, Prentice Hall Publication.
3. “Introduction to Mechatronics” by David G. Aleiatore& Michael B. Histand, Tata McGraw Hill.
4. “Programmable Logic Controllers” by John W. Webb & Ronald A Reis, Prentice Hall India.
5. “Robotics” by K. S. Fu, R. C. Gonzalez, C. S. G. Lee, McGraw Hill.
6. “Robotics Technology & Flexible Automation” Satyarajan Deb, Tara McGraw Hill.
7. “Industrial Robotics” Mikell P Grover, Mitchell Weiss, Roger N. Nagel, Nicols G. Odrey, McGraw Hill.
8. “Textile Robotics & Automation” by M. G. Mahadevan, Abhishek Publication, Chandigad
9. “Electronic Controls in Textile Machines” NCUTE Training Programme January 2000.

Final Year B.Tech. Semester-VIII
TPLEL4- TPL420: MAINTENANCE MANAGEMENT (ELECTIVE-IV)

Teaching Scheme	
Lectures	3 Hrs. / Week
Total Credits	3

Evaluation Scheme	
SE	25
TA	15
SEE	60
Total	**100**

Course Objectives

1. To explain management concept applied to maintenance of machines, basic functions, methodology and application to planned maintenance, condition based maintenance.
2. To describe management functions planning, scheduling, organizing, controlling, budgeting, record keeping related to machine maintenance.
3. Explanation to enumerate indices related to machine downtime, utilization, spare part managementand inventory.
4. To explain use of value analysis, value engineering, machine replacement, modernization decisions to improve profitability of company using maintenance management.

Course Outcomes

At the end of the course students will be able to

1. Able to explain maintenance management, basic functions, methodology and application to planned maintenance, condition based maintenance.
2. To understand and describe management functions planning, scheduling, organizing, controlling, budgeting, record keeping related to machine maintenance.
3. Able to calculate and use indices related to machine downtime, utilization, spare part managementand inventory.
4. To explain use of value analysis, value engineering, machine replacement, modernization decisions to improve profitability of company using maintenance management.

	Course Contents	Hrs.
Unit 1.	Basic concept of maintenance management its role in profitability of company, planned maintenance and breakdown maintenance & economic aspects, subclasses of planned maintenance, Mechanism of planned maintenance optimum planned maintenance, Computer applications in maintenance management.	**5**
Unit 2.	**Condition based maintenance –** Importance, subjective & objective inspections, types of condition monitoring techniques, Detailed study of (NDT) non-destructive testings, performance evaluation, debris analysis, dynamic analysis.	5
	Equipment Replacement – Need for replacement, Selection of appropriate alternative of replacement.	2
Unit 3.	**Performance Evaluation of maintenance function** – Control – Methods of control and use of various indices.	**3**
	Spare parts management – Importance & means of inventory control.	**5**
Unit 4.	**Failure Analysis** – Classification of failures, method of failure analysis, use of trouble shooting charts & other techniques.	4
	Planning, scheduling, maintenance organization, performance evaluation of maintenance function, PERT, CPM and other techniques for planning.	4
Unit 5.	**Value Analysis & value Engineering** – concept and techniques of value analysis & value engineering	3
	Lubrication management – Importance, measures for economy in lubrication management.	3
Unit 6.	**Maintenance budgeting** – Methods of budgeting, selective budgeting control, techno economics of maintenance.	5

Reference Books

1. Maintenance Management volumes 1 to 21, by IMME Delhi.
2. Maintenance Management, SITRA Publication.

Final Year B. Tech. Semester –VIII
TPLEL4- TPL421: MERCHANDISING (ELECTIVE-IV)

Teaching Scheme	
Lectures	3 Hrs. / Week
Total Credits	3

Evaluation Scheme	
SE	25
TA	15
SEE	60
Total	100

Course Objectives

1. To explain the organization of the Apparel business
2. To describe the Fashion marketing and merchandising process.
3. To describe product development and Sourcing Strategies
4. To describe various documents for exports

Course Outcomes

At the end of the course students will be able to

1. Explain the organization of the Apparel business
2. Describe the Fashion marketing and merchandising process.
3. Describe product development and Sourcing Strategies
4. Describe various documents for exports

	Course Contents	Hrs.
Unit 1.	**Organization of the Apparel Business:** Introduction to apparel industry – Different types of organization structure. **The Garment manufacturing process :** Apparel production process flow, order booking, pre-production meeting, production planning and control, cutting, sewing, finishing, quality control, printing process, embroidery process, sub-contracting work. **Various departments of garment unit:** Marketing, designing, merchandising, patternmaking, sampling, fabric & trim store, testing, cutting, sewing, finishing, IE, maintenance, quality control, account, HR, EDP	6
Unit 2.	**Marketing:** Definition, steps involved in marketing, Marketing evolution, selling vs marketing, marketing environment, marketing research, marketing objectives and Strategies, marketing mix, fashion marketing planning.	6
Unit 3.	**Product development :**	5

Different types of samples, sample approval procedure, sample review, pilot run, merchandiser's role in product development, pre-production activities and its importance purchase order, Bill of material, pricing terminologies (FOB, CMT).

Unit 4. Merchandising: 8

Introduction to fashion merchandising and its process, roles and responsibilities of merchandiser in different organizations, categories of apparel merchandising, Buying cycles and tools of merchandising – buying cycle, time and action calender, range planning, critical path, Costing techniques and Spec Sheets. Visual Merchandising

Unit 5. Sourcing: 6

Need for sourcing, Resource Planning – Global Sourcing Strategies, Supply Chain and demand chain analysis ,Supply chain management and its importance. JIT technology. Buying house –Its function and role in garment industry

Unit 6. Export Documentation: 8

Various types of export documents, Pre-shipment Post -shipment documentation, Terms of sale, payment, shipment etc. Export incentives: Duty drawback, DEPB, I / E license - exchange control regulation – (FEMA) foreign exchange management acts - export management risk - export finance. Various inco-terms, WTO / GATT / MFA - Functions and objectives, successes and failures.

Reference Books

1 Marketing Management by Philip Kotler. 15th edition Pearson Education. ISBN: 978-9332557185

2 Cooklin's Garment Technology for Fashion Designers, 2nd Edition by Gerry Cooklin, Steven Hayes, John McLoughlin, Dorothy Fairclough, Blackwell Publications, ISBN: 978-1-4051-9974-2

3 Garment Manufacturing: Processes, Practices and Technology by Prasanta Sarkar, Online Clothing Study. ISBN: 978-9383701759

4 Fashion Buying by Elaine Stone. McGraw-Hill In publication ISBN: 978-0070617469

5 Apparel Merchandising by kumar . Abhishek Publications, ISBN: 978-8182473010

6 Fashion Marketing by Mike Easey . john Wiley & Sons publication. ISBN: 978-0632034598

Final Year B.Tech. Semester- VIII
TPP422:MAINTENANCE OF TEXTILE MACHINES LAB

Teaching Scheme	
Practical	2 Hrs. /Week
Total Credits	1

Evaluation Scheme	
CIE	50
SEE	50
Total	**100**

Any 10 to 12 Experiments based on Maintenance practices in spinning & weaving.

List of Experiments

1. Auditing of carding machine and study of card room maintenance machines.
2. Auditing of draw frame, classimat analysis and roller setting.
3. Auditing of speed frame and spectrogram analysis.
4. Auditing of Ring frame and its settings.
5. Auditing of comber and its settings.
6. Study of basic pneumatic circuits.
7. Study of air circuits used on ring frame G5/1, speed frame LF 1400 and Airjet weaving machine.
8. Study of cots maintenance equipments.
9. Auditing and setting of shedding and picking mechanisms of plain loom.
10. Auditing and setting of pirn changing mechanism of autoloom.
11. Auditing and setting of sulzer picking mechanism.
12. Auditing and setting of sulzer shedding mechanism.
13. Mill visit – Spinning Maintenance.
14. Mill visit – Weaving Maintenance.

Submission – Completed Journal.

FINAL YEAR B. TECH. Semester- VIII
TPP423: FLUID FLOW SYSTEMS AND CONTROL LAB

Teaching Scheme		Evaluation Scheme	
Practical	02 Hrs. / Week	CIE	50
Total Credits	01	SEE	-
		TOTAL	50

List Of Experiments

1. Study of direction control valves.
2. Study of meter – in flow circuit.
3. Study of meter – out flow circuit.
4. Operation of SAC – Unidirectional Control.
5. Operation of DAC – Bidirectional Control.
6. Study of circuits using sequence valve & time delay valve.
7. Study of pneumatic circuits on Textile Machines.
8. Study of different types of compressors used in pneumatic circuits.
9. Study of different types of pumps used in hydraulic circuits.
10. Study of ISO conventions used in pneumatics & hydraulics.
11. Study of power pack used in Hydraulic circuit.
12. Study of solenoid operated valves in Pneumatic & Hydraulic circuits.

Submission: Completed journal

Final Year B. Tech Semester- VIII

TPD424: PROJECT PHASE-II

Teaching Scheme	
Project Hours	8 Hrs. /Week
Total Credits	8

Evaluation Scheme	
CIE	100
SEE	100
Total	**200**

Course Objective

1 To identify the problem /idea and review and summarize the literature for the topic of the identified problem

2 To describe the process for undertaking the research/survey

3 To explain various tools of testing and analysis for the data in order to draw relevant conclusions.

4 To demonstrate effective communication skills and team work.

Course Outcomes Students will be able to

1 Able to identify the problem /idea and review and summarize the literature for the topic of the identified problem

2 Able to formulate and design suitable experimental plan.

3 Able to understand and use various tools of testing and analysis for the data in order to draw relevant conclusions.

4 Able to communicate effectivelyas amemberofteam

Guidelines for Project Phase-II

Experimentation work:

Students should start their experimental work as per the approved plan of work in consultation with Guide.

Progress Evaluation:

Dissertation committee evaluates the progress in project and confirm the work as per the approved plan of work.

Report Writing:

After completion of work, students should prepare the report as per the standard format and guidelines in consultation with guide.

Submission of Final Report:

Two bound copies of the report duly signed by Project Guide, Head of The Department and Principal along with a soft copy in the form of a CD should be submitted to Dissertation committee.

Continuous Internal Evaluation (CIE):

Term work marks will be allotted by continuous monitoring of the progress in the work and submission of final report.

Semester End Evaluation (SEE):

Students have to present their work in front of Internal and External examiner. Examiners assess the project work and allocate the marks.

Submission

1. Two hard bound copies of final thesis and one soft copy.

Final Year B. Tech. Semester - VIII
TPD425: INTERNSHIP-II

Teaching Scheme	
Training Period	04 weeks during winter vacation
Total Credits	3

Evaluation Scheme	
CIE	50
SEE	---
Total	**50**

Course Objectives

1. To expose the students to the industrial environment and its work culture.
2. To expose the students to machineries and processes.
3. To develop understanding of techniques like Production Planning, Quality Assurance, Maintenance practices, Environment and Pollution Control, Management Information System.
4. To provide hands-on training on machines and instruments

Course Outcomes

Students will be able to

1. Students will be able to understand the industrial environment and work culture.
2. Students will be able to understand the machineries and processes of industries.
3. Students will be able to reproduce the techniques like Production Planning, Quality Assurance, Students will be able to maintenance practices, Environment and Pollution Control, Management Information System.
4. Students will be able to use hand on training skills.

Course Contents

Unit 1. Training in Spinning, Weaving, Knitting, Machinery Manufacturing, Yarn, Fabric, Garment Chemical Processing, Machinery Manufacturing, Erection and Commissioning, Garment Manufacturing, Synthetics Fibre and Yarn Manufacturing, Technical Textiles, Non-Wovens, R & D Lab, Marketing etc. for study of :

Process Flow Chart,

Visit to various departments and study of machineries,

Important adjustments and settings,

Speed of Important Parts,

Modern Developments in machines/process,

Chemicals, Dyes used for carrying out various process,

Process parameters and effect on quality of product,

Actual Production and Efficiency,

Production Planning and Control,

Maintenance Practices, maintenance tools and gauges, maintenance schedule,

Study of lubrications,

Process Control and Quality Control activities,

Roles and responsibilities of various categories of workers/technical Staffs',

Labour allocation.

Unit 2. Special Studies:

Management information systems,
Waste study,
Costing,
Production planning and control,
Target achievement,
Information regarding humidification plant,
Utility,
Electrical supply,
Store, purchase,
Marketing,
Sales,
Samples,
Lay-out of Plant.

Unit 3. Project:

Objectives,
Procedures,
Observations,
Analysis and Conclusion of the projects carried-out.

Reference: Specific guideline points given in daily diary.