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

DEPARTMENT: TEXTILES

CURRICULUM
B. Tech. Man Made Textile Technology Program

Final Year
With Effect From
2019 - 2020

DKTE
Promoting Excellence in Teaching
Learning & Research

Final Year B. Tech Man Made Textile Technology
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	TML401	TEXTILE MILL PLANNING AND ORGANISATION	C	3			3	3
2	TML402	YARN & FABRIC SCIENCE	D	3			3	3
3	TML403	UTILITY ENGINEERING IN TEXTILES	B	4			4	4
4	TMLEL1	ELECTIVE-I	D	3			3	3
5	TMLEL2	ELECTIVE-II	D	3			3	3
6	TMP410	TEXTILE MILL PLANNING AND ORGANISATION	C		1		1	1
7	TMP411	YARN & FABRIC SCIENCE LAB	D			2	2	1
8	TMD412	PROJECT PHASE-I	F		4		4	4
Total				**16**	**5**	**2**	**23**	**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

TML404 Textile Mill Management
TML405 Import Export Management
TML406 Entrepreneurship Development

List of Elective-II

TML407 Garment Technology
TML408 Nonwoven Technology
TML409 Maintenance of Textile Machines

Final Year B. Tech. Semester – VII
TML401: 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 Finance – Estimates of sales & production – cost of production – working capital requirement – Profitability Projection – Break even point – Projected cash flow statements.	6

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. 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.	6
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. Labour Complement - Types of labour required, labour complement, labour	6

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

TML402: YARN AND FABRIC SCIENCE

Teaching Scheme	
Lectures	3 Hrs. /Week
Total Credits	3

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

Course Objectives

1. To discuss geometry of different yarn structures.
2. To study mechanical properties of yarn.
3. To discuss comfort and aesthetic properties of fabric.
4. To explain serviceability of fabric in relation to their performance aspect.

Course Outcomes

At the end of the course students will be able to

1. Understand different yarn structures in relation to properties.
2. Apply the effect of yarn structure to mechanical properties of yarn.
3. Demonstrate aspects of comfort and aesthetic in relation to various fabric properties.
4. Explain relation between fabric structural parameters in relation to serviceability.

Unit No.	Course Contents	Hrs.
1	**Geometry of Twisted Yarns** Geometry of twisted yarns, idealized helical geometry, twist contraction, twist and packing of fibers in yarns, idealized packing and packing in actual yarn, concentrating and deviating features of actual yarn, specific volume and packing fraction,	04
2	**Fiber Arrangement in Twisted Yarns** Fiber migration– Ideal migration, Characterization of migration behavior, Factors	04

	affecting migration of man-made fibers in the yarn, tension variation as a mechanism of migration, frequency and order of migration.	
3	**Tensile Behavior of Actual Yarns** Mechanics of yarn structures, tensile behavior of continuous filament yarns. Influence of processing factors on tensile properties of yarns. Observed extension & breakage of spun yarns, experimental studies	05
4	**Comfort Properties of Textile Structures** **a) Air Permeability** Nomenclature, Measurement, Factors affecting Air Permeability of Fabrics, significance of air permeability of fabrics **b) Compressional Resilience** Nomenclature, compressional resilience properties of textile structures, factors contributing compressional resilience, Methods of measurement. **c) Thermal Transmission Properties of Textile Structures** Nomenclature, Definitions of terms –thermal properties- thermal insulation, cold feel, chillproofness, Factors affecting thermal properties, Methods of measuring thermal properties **d) Moisture Transmission** Nomenclature, Moisture permeability properties of fabrics, factors affecting moisture transmission, Measurement.	10
5	**Aesthetic and Tactile Comfort** **a) Crease Retention Wrinkle Resistance & Dimensional Stability** Nomenclature, Mechanics of Wrinkle Resistance, Inherent Wrinkle Resistance properties of fibres, effect of humidity and wetting on wrinkle resistance, chemical methods for improving wrinkle resistance and their effects, geometric factors influencing wrinkle resistance, Methods of Measurement, dimensional stability and shape retention. **b) Fabric Hand** Objective & subjective evaluation of fabric hand, Hand Nomenclature, Factors	08

	influencing fabric hand, Measurement of fabric hand by Kawabata & FAST techniques **c) Luste**r Subjective aspects of luster, Physics of light reflection in luster, Measurement of Luster, effect of fabric construction on luster **Serviceability, Wear & Abrasion**	
6	Nomenclature, serviceability, wear & abrasion, Mechanics of abrasion, Influence of fabric/yarn/fiber structural parameters on abrasion resistance of fabric	05

Reference Books

1. Structural Mechanics of fibres, yarns & fabrics by Herle, Grosberg and Backer.
2. Textile Yarn by Martindale and Goswami.
3. Properties of fibres, yarns & fabrics by Kaswel.
4. Physical Testing and quality control textile progress, Vol.23, No.1/2/3, by K. Slater.
5. Principle of Textile Testing by J.E. Booth.
6. Cotton Testing by Steadman.
7. Physical Testing of Textiles by B.P. Saville
8. Textile Testing – Fibre Yarn & Fabric – by Dr. ArindamBasu (SITRA)
9. Testing & Quality Management by Dr.V.K. Kothari (IIT-Delhi)

Final Year B.Tech. Semester- VII
TML403:UTILITY ENGINEERING IN TEXTILES

Teaching Scheme	
Lectures	4 Hrs. / Week
Total Credits	4

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

Course Objectives

1. To learn need of humidification in textile industry.

   To learn various psychrometric processes for air treatment.

2. To learn different types of air conditioning systems, elements used and their features in modern plants.

   To learn how to estimate heat load and capacity of Humidification plant.

3. To learn and select different type of drives in Textile engineering.

   To learn and select illumination system for textile processes.

   To learn, apply and calculate energy bill in textile industry.

4. To learn and apply energy auditing in textile industry.

   To learn and improve power quality.

Course Outcomes

At the end of the course students will be able to

1. know importance of humidification in textile industry and its systems and components. Able to select various psychrometric processes for air treatment.
2. select different types of air conditioning systems, elements used and their features in modern plants, Able to calculate heat load and capacity of humidification plant.
3. select proper drives in textile engineering. Able to select proper illumination system for textile processes. Able to calculate energy bill in textile industry and understand how to reduce cost of energy and save money.
4. audit a system and arrest the loss and save energy. Able to understand effect of bad quality of power and how to improve the quality and design a system.

	Course Contents	Hrs.
Unit 1.	**a) Need for humidification in Textile Mills**- Effect of temperature & R.H. on human body &Textile processes. Ambient conditions required in various departments of a textile mill. Basic definitions related to Psychrometry, interrelations of various properties, Psychrometric chart and its use, various psychrometric processes like cooling, heating, humidification, de-humidification, etc. Aspects of evaporating cooling method and refrigerative cooling method. **b)** Arrangements and layout of standard humidification methods for spinning, weaving and knitting processes – Return air ducts, Return Air Plenum, Filters, Return Air fans, Dampers, Supply Air Fans, Washers, Eliminators, Supply Air Plenum, Supply Air Duct, Diffusers etc. Study of the construction of each component.	**10**
Unit 2.	**a) Humidification plant design**: Considerations for a humidification plant design and air circulation systems, Heat load calculations in the department, air circulation and the design features of the plant such as fan capacity, Sizes of Dampers, Washers, Ducts, Return Air and Supply Air openings in the department. **b)** Various controls in humidification plants. Recent developments in humidification plant used in spinning, weaving, knitting departments.	8
Unit 3.	**Pumps, Compressors and Fans used in Textile Industry:-** **a)** Various types of pumps, its classification and characteristics. Suitability of pumps used in textile mills. **b)** Compressors: - Compression methods, intermittent, continuous. Classification of compressors and brief study of construction, working, advantages, limitations of each type. Compressed air requirement in Textile mills, Calculation of compressor capacity. Compressor accessories such as reservoir, dryer, lubrication system, filters, cooling towers, etc. **c)** Fans: -Classification, construction and working of different types of	**6**

fans. Centrifugal, Axial flow and Radial flow. Fan capacity, power and efficiency. Fan selection. Pneumatic conveying of materials in textile mills.

Unit 4. **a) Drives Used on Textile machines:-** 10

Selection of drives, AC and DC motors, starters, losses, efficiency, speed control, of AC and DC motors, vector control, soft starters, inverters for speed control, factors affecting energy consumption in induction motors.

Design features of energy efficient motors, motor capacity calculation for Air compressors, blowers, pumps, hydraulic systems. Motors used in textile industry, operation of compressor and its power consumption and tips.

Unit 5. a) **Energy Management:-** Electrical power required in Textile mills. Maximum demand, Average demand, Power factor, Load factor, Calculation related to energy requirement. Methods of power measurement, introduction to power analyzer and tariff. Control of maximum demand for saving. Power factor control for saving. Load factor and saving. Receiving and Distribution of Power in Textiles 8

b) Power Quality Improvement: 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.

Unit 6. **a) Electricity Transmission & its application -** High Tension substation Transformers, Capacitors, Switch yard, Panels, etc. Types of cables–sizes andcalculations. Methods of Power distribution in the department. Methods of procuring H.T. supply and policies and charges and deposits based on connected load and maximum demand. Methods of captive generation Brief production to D.G set and furnace oil, calculation of techno-economic viability. Energy Audit - Principle, energy measurement and energy conservation. Recent developments 6

in energy efficient equipments. Harmonics in supply. Concept of power quality. Concept of payback and investment in the corrective action taken after auditing. Scope for energy audit in various dept. in text. Industry.

b) Unconventional energy sources – solar energy, solar photovoltaic cell, wind energy, Tidal energy, bio-energy, fuel cell.

Reference Books

1. Air Conditioning and Refrigeration by Arora and Domkundwar.
2. Air Conditioning and Refrigeration by Khurmi and Gupta.
3. Manual of Humidification – Batliboi Ltd.,
4. Air Conditioning in Textiles by S.P. Patel.
5. Compressors by Royce N Brown.
6. Refrigeration and Air Conditioning by P.L. Ballaney.
7. Refrigeration and Air Conditioning by P. Arora.
8. Utilisation and traction by S.L. Uppal.
9. Power system by V.K. Mehta.
10. Electrical power system by Dr. H.P. Inamdar.
11. Utilisation of electrical power and electric traction by J.b Gupta

Final Year B. Tech. Semester – VIII

TMLEL1- TML404: 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 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	7
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 Enterpreneurial 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 – VII
TMLEL1- TML405: IMPORT EXPORT 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 explain international trade, Exchange rate determination WTO & Trade liberalization.
2. To explain international marketing and foreign trade policies
3. To explain and identify firm establishment process and foreign trade documents.
4. To understand the import procedure, shipment and customs procedure.

Course Outcomes

At the end of the course students will be able to

1. Understand international trade, Exchange rate determination WTO & Trade liberalization
2. Understand international marketing and forging trade policies
3. Understand and identify the firm establishment process and foreign trade documents
4. Understand the import procedure and shipment and customs procedure.

	Course Contents	Hrs.
Unit 1.	**Introduction to international trade:** Introduction, trade policy, foreign trade, simplification of documentation, The emerging global scenario-The business of international trade- Trade barriers- Foreign exchange- Exchange rate determination (Spot & forward), the euro dollar market- WTO- Trade liberalization	6
Unit 2.	**International marketing:** Introduction- International marketing channels- Market selection and market profiling-Product strategies- Promotion Strategies-Export Pricing-Export finance- Export risk insurance-Export packaging and labeling- Quality control and pre-shipment inspection	7
Unit 3.	**Foreign trade:** Foreign trade control and-Exim policy-Export Promotions- Export procedures and documents- Major problem of India's export sector	5

Unit 4.	**Export Preliminaries**: Introduction, Establishment a business firm, importer exporter code number, Alignment documentation system, commercial documents, Regulatory documents.	5
Unit 5.	**Foreign Trade Documents:** Need, Rationale And Types Of Documents Relating To Goods – Invoice – Packing Note And List – Certificate Of Origin – Certificate Relating To Shipments – Mate Receipt – Shipping Bill Certificate Of Measurement – Bill Of Lading – Air Way Bill – Documents Relating To Payment – Letter Of Credit – Bill Of Exchange – Letter Of Hypothecation – Bank Certificate For Payment – Document Relating To Inspection – Certificate Of Inspection – Gsp And Other Forms	8
Unit 6.	**Shipment and Customs:** Pre-Shipment Inspection and Quality Control – Foreign Exchange Formalities – Pre-Shipment Documents. Shipment of Goods and Port Procedures – Customs Clearance Post Shipment: Formalities and Procedures – Claiming Duty Drawback and Other Benefits – Role of Clearing and Forwarding Agents.	8

Reference Books

1 Export Import procedure, C. Rama Gopal, New age international publication, New Delhi

2 International trade and Export management – Himalaya Publication, Mumbai (1998) Francis Cherunilam.

3 Exim Policy input Output norms – Duty exemption Scheme 2002-2007, Centax publication Pvt. Ltd. New Delhi (April 2003 Fourth Edition.) R.K. Jain.

4 Hand Book of Import And Export Procedures - Paras Ram

5 Govt. Of India: Hand Book of Import and Export Procedures.

Final Year B. Tech. Semester – VII
TMLEL1- TML406: 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	7

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.

Unit 2.	Business Opportunity Identification Business ideas, methods of generating ideas, and opportunity recognition, Meaning and significance of a business plan, components of a business plan, and feasibility study.	7
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

TMLEL2- TML407: GARMENT 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 explain the basics of apparel industry
2 To describe pre-production and post-production processes of apparel industry.
3 To describe production processes of apparel industry.
4 To explain applications of CAD-CAM in apparel industry.

Course Outcomes

At the end of the course students will be able to

1. Describe the structure and classification of Apparel industries as per size, labor, and product and understand the development of apparel industry in India.
2. Describe the various requirements and importance of pattern making, cutting, sewing, finishing and Inspection.
3. Compare various production technologies and its types.
4. Discuss the applications of CAD-CAM in apparel industry.

	Course Contents	Hrs.
Unit 1.	The Garment Industry: Structure of the garment Industry, sectors of Industry, product types and organization. Apparel industry in India, Domestic industry, size of the industry, nature of the industry, and its developments in recent years. Export industry: Size and nature of the industry.	6
Unit 2.	Basic Pattern Making: Measurement Taking – Size chart and Measuring of Sizes. Definition of various garments parts & positions. Methods: Bespoke method & Industrial method (Using Blocks) – Basic block construction – Block preparation & correction. Figure analysis: Body ideals, body proportion, height, weight distribution, body parts, individual figure analysis, study of body measurement of all age groups. Muslin pattern, commercial pattern, sizes and its understanding, fabric preparation for garment construction.	6
Unit 3.	Manufacturing Technology: Types of Fabric Packages,	10

Spreading, Marker preparation and its planning, Types and functions of cutting machine, preparation for sewing processes, Sewing Technology: feed systems, types of sewing machinery and equipment, Parts of needles and their function, Properties of sewing threads, ticket number, Federal classification of seam and stitches.

Unit 4.	Fusing Technology: Concerned factors, fusing process, Fusing machinery, quality control. Pressing Technology: Purpose, categories, means and equipment's	4
Unit 5.	Garment Finishing and Inspection: Study of various components such as buttons, zips, underlining, Hooks and ornamental materials, attaching buttons, marking, sewing labels, cleaning, final touch, fitting quality, live models, measurements, viewing the garments, quality standards.	4
Unit 6.	Production Technology: Manual systems, making through, section system, progressive bundle system, straight line system, mechanical transport systems, selective conveyor belt system, unit production system, quick response sewing system. Ware Housing: Handling equipment, storage equipment, packing equipment. CAD/CAM in Garment Manufacturing.	6

Reference Books

1 Introduction to clothing Manufacture by Gerry Cooklin
2 Technology of clothing manufacture by Harrold carr & Barbara Lathem
3 Apparel Manufacturing Handbook by Jacob Solinger.,
4 Clothing construction and wardrobe planning by Dora S. Lewin, Mabel Goode Bowers, Manetta Knttunen — The Macmillan co New York
5 Garment Technology by Dr. V.Subramaniam — Winter School booklets 1990
6 BIS publications 1989.

Final Year B. Tech. Semester – VII
TMLEL2- TML408: 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	8

webs.

Unit 4. **Mechanically bonded webs** – needle punched nonwovens, Application of needle punching, stitch bonded nonwovens, applications. 8

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

TMLEL2- TML409: ECONOMICS AND INDUSTRIAL LAWS (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 basic economic concept.
2. To explain the demand analysis and scale of production.
3. To understand the forms of market and concepts of National Income.
4. To explain the basic concepts of international trade.

Course Outcomes

At the end of the course students will be able to

1. Understand the basic concepts & problems of economics.
2. Understand demand analysis & scale of production
3. Understand the forms of market, National Income & Banking system.
4. Understand the basic concepts of international trade.

	Course Contents	Hrs.
Unit 1.	Definition of Economics – Nature and Scope of Economics, Economy types, Basic economics problems basic terms & concepts.	6
Unit 2.	Demand Analysis – Human Wants – Consumption and standard of living, Demand and law of demand – Elasticity of demand. Supply and Law of Supply - Consumer's surplus	7
Unit 3.	Scale of Production – Laws of returns to scale – Costs and cost curves – Equilibrium of the firm and industry.	6
Unit 4.	Markets and Forms of market - Features of Perfect and Imperfect	7

Competition. Price Determination under perfect competition – market price and normal price – price determination under imperfect competition.

Unit 5. National Income – Concept and importance – Nature and functions of money, Credit and Credit Instruments - Banking – Central Banking. 6

Unit 6. International Trade - Balance of Trade and Payments – Foreign exchange rate determination, Public finance, Public expenditure, Public revenue, Public debt, taxation. 7

Reference Books

1 Elementary Economics Theory by K. K. Dewett and J. D. Varma

2 Basic Economics by James A. Dgal, Nicholas Karatjas

3 Applied Economics by Derek T. Lobley.

4 Micro Economic Theory by M. C. Vaish.

5 Principles of Economics by D. N. Dwived.

6 Economics Analysis, Decision Making & Policy by George Leland Bach.

7 Contemporary Economics by Milton H.

8 Engineering Management by Frgidon Mazda – Addison Weley Longman Pearson Education.

9 Economics Environment of Business by V. K. Garg Sultan Chand & Sons Educational Publishers.

10 Management for Business and Industry by Cloute S. George.

11 Essentials of Management by Koontz Odonell.

Final Year B. Tech. Semester – VII
TMP410: 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

TMP411: YARN AND FABRIC SCIENCE LAB

Teaching Scheme	
Practical	2 Hrs. /Week
Total Credits	1

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

List of Experiments

1. To estimate the fibre migration in twisted yarn.
2. To determine wickability of fabrics.
3. To determine stretchaility of fabrics.
4. Estimation of fabric wear performance by using universal wear tester.
5. To estimate crease recovery of different fabrics.
6. To compare thermal insulation behavior of staple yarn & filament yarn, woven fabric.
7. To estimate the water proofing ability of fabric by water head tester.
8. To study the bending behavior for filament & staple yarn fabric by cyclic bending tester.
9. To determine air permeability of different fabrics.
10. Estimation of Fabric Wear performance by using Universal Wear Tester.

Submission

Completed Journal

Final Year B. Tech Semester- VII

TMD412: 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 Man Made Textile Technology
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	TML413	PROCESS MANAGEMENT IN YARN FORMING	D	3			3	3
2	TML414	PROCESS MANAGEMENT IN FABRIC FORMING	D	3			3	3
4	TMLEL3	ELECTIVE-III	D	3			3	3
5	TMLEL4	ELECTIVE-IV	D	3			3	3
6	TMP420	PROCESS MANAGEMENT IN YARN FORMING LAB	D			3	3	1.5
7	TMP422	PROCESS MANAGEMENT IN FABRIC FORMING LAB	D			3	3	1.5
8	TMD423	PROJECT PHASE-II	F		8		8	8
9	TMD424	INTERNSHIP- II*	F					3
Total				**12**	**8**	**6**	**26**	**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

TML415 Technical Textiles
TML416 Speciality Yarns
TML417 Fibre Reinforced Composites

List of Elective-IV

TML418 Product Engineering Textile
TML419 Nano-fibre Technology
TML420 Merchandizing

Final Year B. Tech. Semester – VIII
TML413: PROCESS MANAGEMENT IN YARN FORMING

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 – 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 costing.	2
	c) Concepts of ISO –	2

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 –

Customer perception of quality, process versus customer, feedback, service quality customer relation & profitability, buyer supplier relationship, supplier partnership, continuous process improvement 2

c) Production Costing and Parameters influencing the production cost 1

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 2

b) Yarn Realization –

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 3

b) Process management at Draw frame

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	3
	Hairiness- measurement, role played by fibre properties and process parameters.	1
	d) End breaks in spinning –Importance, assessment and controls	
	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.	2
Unit 6.	a) Role of maintenance in product quality – Specific maintenance activities from blow room to ring spinning which directly reflect on yarn quality. Total productive maintenance.	2
	b) Role of On & off line monitoring and centralized data collection systems in spinning process.	1
	c) Productivity – 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.	2

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- VIII
TML414: PROCESS MANAGEMENT IN FABRIC FORMING

Teaching Scheme	
Lectures	3 Hrs. / Week
Total Credits	3

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 productivity
4. To explain process management in weaving with respect to fabric quality

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 production
4. Understand process management in weaving with respect to fabric production

	Course Contents	Hrs.
Unit 1.	**1) Introduction to process management:**	3
	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:**	7
	Control of splice quality Yarn clearing – Yarn fault classification, Yarn fault classification system, Assessment of clearing performance Control of Unwinding and winding tension, Control of Package quality	

Unit 3. Process management in warping: 5

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

Unit 4. Process management in sizing: 8

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, Stretch and moisture level control, Characteristics of perfect sized beam and its achievement. Method to increase weavability, Control of productivity.

Unit 5. Process management in weaving for productivity 7

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, MIS to control productivity

Unit 6. Process management in weaving for quality 6

Causes and remedies for fabric defects. Manual and automatic fabric inspection methods, various point grading systems

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
TMLEL3- TML415: TECHNICAL TEXTILES (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 market size, scope and difference between normal and technical textiles
2. To describe the 12 sectors of technical textiles and examples
   To discuss the various applications of technical textiles in filtration, Defence, medical etc.
3. To explain the coating and lamination technology
4. To explain market size, scope and difference between normal and technical textiles

Course Outcomes

At the end of the course students will be able to

1. Describe technical textiles and its importance
2. Explain the twelve sectors of technical textiles and suitable products.
3. Explain various technical applications of technical textiles like filtration, medical, composite and transportation.
4. Illustrate the fabric properties and requirements for military applications and other properties like insulation, electrical, sport including coating and lamination.

	Course Contents	Hrs.
Unit 1.	**Introduction -** Definition and scope of Technical Textiles – Development stages in Technical Textiles – present market and future trends in Technical Textiles – Differentiate with traditional textiles-Raw materials used- sectors of technical textiles	**04**
Unit 2.	**Filtration Application** – Introduction –Fabric construction & Finishing Treatments, Solid-liquid separation, liquid – liquid filtration, liquid-gas separation, Mechanism of filtration. **Geotextiles** – scope, definition, types, advantages and disadvantages of woven and nonwoven geotextiles, Raw material, Manufacturing-Testing-Applications.	**08**

Unit 3. **Textiles in Transportation** – Introduction, Textiles in passenger cars – Textiles in other road vehicles – Rail applications – Textiles in Air crafts – Marine application. **08**

Textiles in Defence – Introduction, Historical Background – Criteria for modern military textiles materials – various application of Textiles in various areas of defence such as environmental protection, thermal insulation, water proof water vapour permeable materials – ballistic protection – heat protection – biological and chemical warfare protection, High altitude fabrics, etc.

Unit 4. **Heat and Flame Protection** - Flammability, thermal characteristics and combustion mechanisms of fibres, prevention of combustion – Flame retardant fibres suitable for protective clothing –Factors affecting-Testing of Flame retardant and Flame proof fabrics. **08**

Medical Textiles – Introduction – special fibres- Non implantable materials, Extra corporeal devices – Implantable materials - Health care / hygiene products.

Unit 5. **Fibre Reinforced Composites (FRC) –** Introduction to composite materials –Types- functions of Fibre and Matrix- Mechanics- Applications of composites. **06**

Miscellaneous Applications – Electrical insulation – Battery separators –synthetic turf and sports application – sound insulation –power transmission, parachute textiles, ropes, cordage and twines.

Narrow fabric production methods –Applications in technical textiles.

Unit 6. **Coating & Lamination - Introduction** – difference - materials for coating – Substrate for coating – Coating methods - Fusible interlinings – physical properties of coated fabrics – Advantages and Applications.. **02**

Reference Books

1 Handbook of Technical Textiles by A.R. Horrocks and S. C. Anand
2 Coated Textiles Principles and Applications by Dr. A. K. Sen
3 Medical Textiles by Subhash Anand
4 Wellington Sear's Hand book of Industrial Textile by Rd. Sabit Adnur.
5 NPTEL, https://nptel.ac.in
6 Automotive Textiles by Warner Fung

Final Year B. Tech. Semester – VIII
TMLEL3- TML416: SPECIALITY YARNS (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 the importance and need for specialty fibres and yarns
2.	To explain the manufacturing of specialty yarns using conventional and Unconventional yarn manufacturing machinery
3.	To explain the properties of specialty yarns
4.	Describe the applications for specialty yarns

Course Outcomes

At the end of the course students will be able to

1. Understand the importance and need for specialty fibres and yarns
2. Explain the manufacturing of specialty yarns using conventional and Unconventional yarn manufacturing machinery
3. explain the properties of specialty yarns
4. Explain the properties of specialty yarns

	Course Contents	Hrs.
Unit 1.	**Core and cover yarns: -** Principles of formation of yarn, constructional details of machine, process description, production of different types of core and cover yarns, yarn properties & end uses.	**04**
Unit 2.	**Melange Yarn: -** Concepts of producing mélange yarn. Process and sequence used for production of Melange yarn. Neppy and fleck yarn: - Production, properties of yarn & applications.	**04**
Unit 3.	**Special Yarns on Unconventional Spinning Technologies: -** Manufacture Properties & end uses of, SIRO, Bobtex, Self-twist,	**04**

Twistless, etc. Concepts of composite yarns

Unit 4. **Metalized Yarns: -** Concepts of Metallic and Metalized yarns, Characteristics of metalized yarn – Manufacture of metalized yarns, Applications of yarns. **04**

Unit 5. **Sewing Threads: -** Introduction to thread construction, Characteristics of sewing threads, production methods, Types of threads packages, Embroidery Yarns, Laces & Braids: - Introduction, Process sequence, Manufacturing details & Machines required. Properties & application of embroidery yarns, Laces & Braids. **10**

Unit 6. **Ropes, Cordage, & Twines: -** Requirements of initial fibres & yarns, Manufacturing process, structures & properties of yarns. Manufacture of some special purpose yarns like:– Slub, double twist, Knop yarn, Chenille yarn, Diamond yarn, Eccentric yarn, Boucle yarn, Thick 'n' Thin Yarns. **10**

Reference Books

1 Sewing Threads' Textile progress vol.30 no.3/4, by J.O. Ukponmwan, The Textile Inst. Publisher.

2 'Modern Yarns for Modern Fabrics Seminar' Conference proceedings. By TTI, The Textile Inst. Publisher.

3 Woollen – Yarn manufacture' Textile progress, vol.15, no.1/2 by D.A. ROSS, The Textile Inst. Publisher.

4 'The production of textured yarn by methods other than the false – twist technique, The Textile progress vol.16, No.3, By D.K. Wilson and T Kollu, The textile Inst. Publisher.

5 Yarns & Fabric Classification Main Items in wool and blends, Italtex Editor.

6 Fancy yarns: Their manufacture and application R H Gong and R M Wright, UMIST, UK, The Textile Inst. Publisher.

Final Year B. Tech. Semester – VIII
TMLEL3- TML417: FIBRE REINFORCED COMPOSITES (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 describe the concept, scope and logic of Fibre reinforced composites (FRC).
2. To describe the importance, types and properties of fibres suitable for composites
3. To explain the importance, types and properties of matrix suitable for composites
4. To discuss the different types of fabrication methods and applications of FRC

Course Outcomes

At the end of the course students will be able to

1. Understand significance and concept of FRC
2. Explain the types of fibres & their useful properties for FRC
3. Describe the properties of matrix suitable for FRC
4. Understand the manufacturing methods and applications of FRC

	Course Contents	Hrs.
Unit 1.	**Introduction**	**04**
	Definition of composites, overview of FRC, Classifications of composite materials.	
Unit 2.	**Components of Composites**	**08**
	Fibres	
	Requirements, properties of high performance fibres, advantage & disadvantages	
	Matrix	
	Requirements, types of matrix, advantage & disadvantages	
	Study of Adhesives, Resin, Hardener etc.	

Unit 3. Manufacturing of composites **06**

Liquid resin impregnation routes, pressurized consolidation of resin prepregs, injection mouldings of thermoplastics, hot press mouldings of thermoplastics, Filament winding, Pultrusion

Unit 4. Properties of FRC **06**

Fibre Architecture, Bonding mechanisms, Bond strength, Control of bond strength.

Strength of composites-Measurement Methods.

Thermal behavior of composites- thermal cycling of composites, thermal cycling of laminates.

Unit 5. General applications **06**

Sports, Medical, Aerospace, Wind Mill, Marine etc

Unit 6. Developments in FRC **06**

Fibre reinforced cement-based (FRC) composites, Sisal fibre and its composites, Hybrid composites, Advanced composites, Application of plasma technologies in fibre-reinforced polymer composites, natural fiber reinforced composites.

Reference Books

1 Fibre reinforced composites: Materials, manufacturing & Design, CRC Press, New York, 2007, P. K. Mallick.

2 Composite materials: Engineering & science, Frank L Matthews & R. D. Rawlings, CRC Press, New York, 1999.

3 Introduction to composites, D Hull & T W Clyne, second edition, Cambridge University Press, 1996.

4 New millennium fibres by T. Hongu & G. O. Phillips, CRC Press, New York, Woodhead Publications, 2000.

5 3-D Textile reinforcements in composite materials by Prof. A. Miravete, CRC Press, New York, Woodhead Publications, 2000.

Final Year B. Tech. Semester – VIII
TMLEL4- TML418: TEXTILE PRODUCT ENGINEERING (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 describe the concept, scope and logic of product development in Textiles
2. To describe the stages of product development such as market research, product life cycle and bench marking
3. To illustrate the scope and merits of simulation of textile products including simulation tools available like FABCAD, MECHFAB.
4. To discuss the different case studies related to the product development of textile products

Course Outcomes

At the end of the course students will be able to

1. Understand significance of product development in textiles and its overall design logic
2. Explain the market research, product life cycle and bench marking with suitable examples in textiles
3. Apply the knowledge of simulation for the product development
4. Study & Analyze the techno economics of each of the case studies

	Course Contents	Hrs.
Unit 1.	**Product Engineering**	**10**
	Objectives and Scope of product development in textiles and clothing. Performance and serviceability concepts in textiles. Effect of changes in fibre, yarn type and fabric construction and finishing on performance and serviceability of textile products. Consideration of a good product design. Maintainability, Reliability & Redundancy, Final Design, selection of product.	
Unit 2.	**Market Research & Customer Requirement Analysis**	**05**
	Product research, Market Research, Material Research, Product life cycle,	

Bench mark analysis, Functional, aesthetic, Manufacturing and economical analysis.

Unit 3. Textile Design **05**

Textile designer functions, types, Range planning, Range development, Range presentation, Retailing business, Merchanding Taxonomy, Merchandiser functions.

Unit 4. Simulation of specified properties or structures leading to design **05**

Computer simulation for 2D nonwovens, Design requirements for air filters, Matrix of fibres used and nonwoven technologies, Grosberg & Leaf model, Engineering design of woven structures.

Unit 5. Concept of overall designing **05**

Procedure, Texture by using computer graphics, CAD, FABCAD and MECHFAB.

Unit 6. Case studies **06**

Related to product development of textiles such as parachute textiles, Medical sutures, nonwovens for earthen dams, QFD etc.

Reference Books

1 Hand book of Textile Design Principles, Process and Practice by Jacquie Wilson, Textile Institute Publication.

2 The Design Logic of Textile Products, Textile progress vol. 27, No. 3, T Matuo and M. N. Suresh. The Textile Institute Publication.

3 Engineering Design by George Dieter.

4 Total Quality Management by Dale H. Besterfield.

5 Proceedings of the Seminar – Non woven Technology, Market and Product Potential, IIT, New Delhi, December 2006.

6 New product development in textiles: Innovation and production, Edited by L. Horne, Published by Woodhead Publishing Limited in association with The Textile Institute,2012

Final Year B. Tech. Semester – VIII
TMLEL4- TML419: NANO-FIBRE TECHNOLOGY (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 nano fiber concepts and significance.
2. To describe the manufacturing of electro spun nanofibres.
3. To explain useful properties of nano fibres
4. To explain developments in nanofibres.

Course Outcomes

At the end of the course students will be able to

1. Understand the importance and concept of nano fibres
2. Explain the manufacturing of nano fibres by different methods
3. Explain the diversified applications and properties of nano fibres and nano composites
4. Describe the developments in nano fibres

	Course Contents	Hrs.
Unit 1.	**Introduction**	**04**
	Definition of nano fibres, concept, overview of nano fibres, types of nano fibres.	
Unit 2.	**Types and processing of structured functional nanofibers:**	**06**
	Core-shell, aligned, porous and gradient nanofibers, Core-shell nanofibers, Aligned nanofibers, Porous nanofibers Gradient nanofibers, Applications.	

Unit 3. Manufacturing of Nano fibres **06**

Introduction, principles of electrostatic atomization, Electrospraying and electrospinning by the capillary method, Electrospraying and electrospinning by the charge injection method, Solution electrospinning, Melt electrospinning. Advantages & Disadvantages.

Unit 4. Process control in electrospun nano fibre production **10**

Morphologies of electrospun nanofibres, Polymer concentration and fibre diameter, Fibre bead formation and fibre surface morphology, Controlling fibre alignment and web

Unit 5. Properties of Nano fibres **06**

Physical and mechanical properties, surface properties, optical.

Unit 6. Applications & developments - Nano fibres **04**

Reference Books

1 Nanofibers and nanotechnology in textiles, Edited by P. J. Brown and K. Stevens, Wood head Publishing Limited Cambridge, England, 2007

2 Functional nanofibers and their applications, Edited by Qufu Wei, Wood head Publishing Limited, 2012

3 Fundamentals of Fibre Formation: The Science of Fibre Spinning and Drawing,Andrzej Ziabicki, Wiley, 1976.

4 High speed spinning - Ziabicki and Kawai , Woodhead Publishing

5 Electrospinning: A Practical Guide to Nanofibers (De Gruyter Textbook) Kindle Edition

6 High performance fibres, J W S Hearle, CRC & Woodhead Publishing Limited, 2001.

7 New Millenium fibres, Tatsuya Hongu, Glyn O. Phillips and Machiko Takigami, CRC , WP, 2005

Final Year B. Tech. Semester –VIII
TMLEL4- TML420: 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:**	6

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

Unit 2. Marketing: 6

Definition, steps involved in marketing, Marketing evolution, selling vs marketing, marketing environment, marketing research, marketing objectives and Strategies, marketing mix, fashion marketing planning.

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
TMP421: PROCESS MANAGEMENT IN YARN FORMING LAB

Teaching Scheme	
Practical	3Hrs. / Week
Total Credits	1.5

Evaluation Scheme	
CIE	50
SEE	50
Total	100

List Of Experiments

1. Testing of various cotton samples & their suitability for various counts, Setting up of standards for given cotton to process carded & combed counts
2. To evaluate performance of a blow room for given cotton.
3. To study effects of various parameters on transfer efficiency of card.
4. To study influence of number of draw frame passages on fibre orientation in sliver.
5. To study Influence of step gauge setting on sliver quality.
6. To study effect of cylinder speed at comber.
7. To study effect of coil spacing at speed frame on stretch in roving & effect on U%.
8. To study break draft at speed frame & its effect on roving quality.
9. To study effect of break draft at ring frame on yarn quality
10. To study effect of yarn conditioning on yarn properties.
11. Mill visit – To observe idle spindle, end breaks & material channelling.
12. Mill visit – To evaluate blow room cleaning, waste Noil % & Soft waste

Submission – Completed Journal.

Final Year B. Tech. Semester –VIII
TMP422: PROCESS MANAGEMENT IN FABRIC FORMING LAB

Teaching Scheme	
Practical	3 Hrs. / Week
Total Credits	1.5

Evaluation Scheme	
CIE	50
SEE	50
Total	100

List Of Experiments

1. To determine the end breakage rate of warping machine in the visiting unit.
2. To study the effect of machine speed and squeezing pressure on sized yarn properties.
3. To prepare beam on the sample warping machine.
4. To weave fabric of various weaves on sample weaving.
5. To determine the % loss of efficiency for probable reasons through snap study in the visiting weaving unit
6. To find cost per meter for the given woven fabric considering all elements of the cost in the small scale manufacturing unit
7. To find cost per meter for the given knitted fabric considering all elements of the cost in the small scale manufacturing unit
8. Working of air jet machine with different air pressure combinations, blast timings and blast durations
9. Inspection of fabric defects and determination of the packing percent of the given Fabric length in the visiting unit
10. Fabric Analysis 2 samples
11. Fabric Analysis 2 samples
12. Fabric Analysis 2 samples

Submission – Completed Journal.

Final Year B. Tech Semester- VIII

TMD423: 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
TMD424: 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.