

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

DEPARTMENT: TEXTILES

**CURRICULUM
B. Tech. Textile Chemistry Program**

Final Year
With Effect From
2023 - 2024



Promoting Excellence in Teaching
Learning & Research

**Final Year B. Tech Textile Chemistry
Semester-I**

Sr. No.	Course Code	Course Title	Course Category	Teaching scheme				Course Credits
				L	T	P	Contact Hrs/wk	
1	TCL441	Textile Process Planning and Management	HSMC	3			3	3
2	TCL442	Testing and Analysis of Textiles	PCC	3			3	3
3	TCL443	Fluid Flow and Heat Transfer	PCC	3			3	3
4	TCLOE2	Departmental Open Elective	OEC	3			3	3
5	TCLEL1	Elective - I	PEC	3			3	3
6	TCP452	Textile Process Planning and Management Lab	HSMC		1		1	1
7	TCP453	Testing and Analysis of Textiles Lab	PCC			2	2	1
8	TCD454	Project Phase - I	PST		4		4	4
9	TCP455	Fluid Flow and Heat Transfer Lab	PCC			2	2	1
		Total		15	5	4	24	22

Course Category	List of Departmental Open Electives
HSMC - Hum. & Social Sc., Mgt	TTL444 – Non woven Technology
BSC - Basic Science	TML445 - High Performance Fibers
ESC - Engineering Science	TPL446 - Maintenance Management in Textiles
PCC - Prof. Core Courses	TFL448 - Retail Management
PEC - Prof. Elect. Courses	List of Electives
OEC- Open Elct. Courses	TCL449 - Textile Mill Management
MC - Mandatory Courses	TCL450 - Import Export Management
PST - Project / Seminar / Ind. Training	TCL451 – Nano Technology in Textiles

DKTES Textile and Engineering Institute, Ichalkaranji Final Year B. Tech. Textile Chemistry (Semester – VII) TCL441: TEXTILE PROCESS PLANNING AND MANAGEMENT		
Teaching Scheme: Lectures: 03 Hrs/Week	Credits 03	Evaluation Scheme: MSE: 25 Marks ISE: 15 Marks SEE: 60 Marks
Course Objectives: <ol style="list-style-type: none"> 1. Describe the general objectives, organization structure of dye-house and the principle and functions of management to comply with quality with respect to ISO. 2. Explain the location, site and factors to be considered for building construction with respect to work place. 3. Calculate the production of each machine used in process house and its norms and also calculate the water and energy requirement for each step and costing of the same and conservation steps. 4. Discuss lay-out and equipment used for material handling, positioning and norms for lighting costing and its classification; Calculate chemical cost in various operation in textile chemical processing. 		
Course Outcomes: At the end of the course, students will be able to <ol style="list-style-type: none"> 1. Understand the objectives and organization structure of dye-house with the role of management, HRD and ISO quality management. 2. Summarize important factors for selection of location, site and building construction & Understand the norms with production calculations for unit operations in textile chemical processing. 3. Analyze and calculate water requirement, thermal energy requirement for each step of processing and also to calculate cost and recommend steps towards conservation. 4. Prepare lay-out plan, material handling and equipment used, lighting positioning and norms, costing and its classification, chemical cost in various operations in textile chemical processing. 		
Course Contents		
Unit I	Quality aspects	05 Hours
Objectives of dyehouse, Structure of the organization, Principle and functions of management, Role of HRD in management, Concept of ISO.		
Unit II	Setting up of modern process house	06 Hours
Selection of location, Selection of site, Construction of building for modern process		
Unit III	Norms for machine production	07 Hours
Norms of production for singeing m/c, jiggers, jet dyeing and soft flow dyeing M/cs, flat bed and rotary screen printing m/c, production norms for heat setting and other finishes. Norms of production for CBR and CDR m/c.		

Unit IV	Consumption of Water and thermal energy	07 Hours
Consumption of water in pretreatment, dyeing and printing. Water consumption measures. Various fuels used in process houses. Consumption of energy in pretreatments, dyeing, printing and finishing. Energy consumption measures		
Unit V	Lighting requirement and costing	07 Hours
Work place and norms of lighting. Position of lighting. Classification of costing. Chemical costing per kg. in pre treatment, dyeing, printing and finishing.		
Unit VI	Material Handling and Quality aspects	07 Hours
Goals of material handling. Material handling and plant layout. Material handling equipments. Concept of R & D. in process house, Quality assurance department & their functions, Production planning department (PPD) their functions.		
References Books:		
<ol style="list-style-type: none"> 1. Dyehouse management manual by James Park and John Shore 2. Plant-layout and material handling by Fred E. Meyers. 3. Management of Textile Industry by V.D. Dudeja. 4. Management perspectives in textile industry – BTRA. 5. Textile Manufacturing by M.G. Kulkarni. 6. PMR's Textile laws and Policy by Somesekhar B.V. and Dr.Raj Mogili A. 		

DKTES Textile and Engineering Institute, Ichalkaranji Final Year B. Tech. Textile Chemistry (Semester – VII) TCL442: TESTING AND ANALYSIS OF TEXTILES		
Teaching Scheme: Lectures: 03 Hrs/ Week	Credits: 03	Evaluation Scheme: MSE: 25 Marks ISE: 15 Marks SEE: 60 Marks
Course Objectives:		
<ol style="list-style-type: none"> 1. Describe concepts and importance of testing, statistical terms, sample preparation, test standards and quality matter. 2. Describe testing of textile products such as colour fastness, care label, performance of functional finishes and auxiliaries used in processing. To explain various methods of heat transfer and their laws. 3. Describe testing equipment, working principles, laws and precautions in testing. 4. Describe testing of material performance properties and chemical residue, its impact on and related environmental concern; standards on hazards chemicals. 		
Course Outcomes:		
At the end of the course, students will be able to		
<ol style="list-style-type: none"> 1. Explain concepts and importance of testing, statistical terms, sample preparation, test standards and quality matter. 2. Demonstrate testing of textile products such as colour fastness, care label, performance of functional finishes and auxiliaries used in processing. 3. Explain testing equipment, working principles, laws and precautions in testing. 4. Explain testing of material performance properties and chemical residue, its impact on and related environmental concern; standards on hazards and restricted chemicals 		
Course Contents		
Unit I	Introduction to Testing	06 Hours
Importance of testing, Sample preparation, Statistical terms, Acceptance Sampling, Errors and Quality. Introduction to the standards like ISO, ASTM, AATCC and BIS; Certifications like Okö-tex, Organic cotton, GOTS and restricted chemicals.		
Unit II	Colour Fastness of Dyed and Printed Goods	08 Hours
General Principle of colour fastness testing, sample preparation, multifibres, grey scale, conditions of viewing and illumination. Evaluation of colour fastness to washing, home laundering and various reference detergents; Colour Fastness to Rubbing, Perspiration, Water, Sea water, Chlorinated pool water, Light, Sublimation, Bleaching with hypochlorite and Peroxide, atmospheric ozone, Dry-cleaning and saliva.		
Unit III	Evaluation of Functional Finishes	05 Hours
Importance and principle of evaluation of functional finishes like Durable Press Rating, Flammability, soil release, Anti-microbial and Sun Protection.		
Unit IV	Care Labeling	03 Hours
Introduction, voluntary and mandatory care label, Care label symbols. Various systems of care label, Instructions for washing, bleaching, drying, ironing, dry cleaning, and placement of care label.		

Unit V	Testing and Analysis of Auxiliaries	08 Hours
<p>Surfactants: identification of classes like anionic, cationic and non-ionic, evaluation of solid content and moisture content, effective active content, determination of cloud point and HLB. Auxiliaries: chelation value of chelating agent, peroxide retention property of stabilizers, evaluation of efficiency of leveling agent, dispersing agent, defoamers. Softeners: ionic nature of softeners, polymer content, oil content, Active content of cationic softeners.</p>		
Unit VI	Eco-Testing	09 Hours
<p>Concepts of Eco-Testing of Textiles; Principles of evaluation of Banned amines, Formaldehyde, PCP, heavy metals and restricted chemicals. Sources of hazards chemicals and acceptance norms. Instruments: Classification of chromatographic methods, Principle and working and Application of HPLC, GCMS; Concept, laws, instrument and working principle of UV – Visible spectroscopy and AAS.</p>		
References Books:		
<ol style="list-style-type: none"> 1. Textile Physics by B P Savili 2. AATCC and ISO Standards Manual 3. Textile Finishing by Scholinger 4. Fabric Care by Naomi D'soza 5. Testing of Eco-Parameters by S Subramanian, Anita hazara; Textile Committee 6. Elementary Organic spectroscopy – Principles and Chemical Application by Y R Sharma 		

DKTES Textile and Engineering Institute, Ichalkaranji Final Year B. Tech. Textile Chemistry (Semester – VII) TCL443: FLUID FLOW AND HEAT TRANSFER		
Teaching Scheme: Lectures: 03 Hrs/Week	Credits 03	Evaluation Scheme: MSE: 25 Marks ISE: 15 Marks SEE: 60 Marks
Course Objectives: <ol style="list-style-type: none"> 1. To understand properties of fluid and flow measurement devices. 2. To explain fluid dynamics and pumps. 3. To explain various methods of heat transfer and their laws. 4. To explain various types of heat exchangers and their effectiveness. 		
Course Outcomes: At the end of the course, students will be able to <ol style="list-style-type: none"> 1. Understand properties of fluid and flow measurement devices. 2. Explain fluid dynamics and pumps. 3. Explain various methods of heat transfer and their laws. 4. Explain various types of heat exchangers and their effectiveness. 		
Course Contents		
Unit I	Introduction to Fluid Flow	08 Hours
Definition, nature & classification of fluids. Study of fluid properties like density, viscosity, surface tension, vapour pressure. Principles of fluid statics. Applications of fluid statics. Newton's law of viscosity Newtonian & non Newtonian fluids. Rheological behaviour of fluids, Numerical based on above topics Manometers, mechanical gauges. Numerical based on fluid pressure measurement. Fluid flow measuring devices (classification). Study of venturimeter. Orifice meter, rota meter, pitot tubes & weirs. Numerical based on above.		
Unit II	Fluid Dynamics	09 Hours
Study of flow patterns, Reynolds experiment. Rheological behaviour of fluids, Equation of continuity, Bernoulli's equation, and pump-work calculations based on above equations. Applications of equations of fluid flow for discharge through pipe, a small orifice & pumps. Fluid Flow Through Pipes & Open Channels: - Flow resistance in pipes. Concept of friction factor & calculations of energy losses based on friction factor. Energy losses in straight pipes, changing cross sections, fittings. Concept of equivalent diameters. Study of pipes, pipe fitting & tubing & valves suitable in textile process.		
Unit III	Pumping of Liquids / Gases	06 Hours
Suction, discharge, net-positive suction heads, centrifugal & reciprocating pumps. Pumps used in textile wet processing industry. Pumping of gases – Fans, blowers & compressors.		

Unit IV	Introduction to Heat Transfer	06 Hours
<p>Need of understanding the fundamentals of heat transfer Modes of heat transfer like conduction, convection & radiation. Fourier's law of heat conduction, heat flow through infinitely long hollow cylinder, a plane wall & a sphere & their respective composites. Applications of conduction heat transfer to industry e.g. thermal insulation over steam pipes, insulation over drying chamber, cabinet etc. Numerical based on above.</p>		
Unit V	Heat Transfer by Convection and Radiation	05 Hours
<p>Definition, concept of dimensional analysis, dimensionless numbers. Heat transfer coefficients, free & forced convection. Heat transfer with change of phases like boiling & condensation. Numerical based on above Definition, Terminologies, pertaining to radiation. Steafan-Boltzmanm's Law of Radiation, Kirchhoff's law of radiation, Wien's law of radiation. Numerical based on above. Application of radiation heat transfer to industry in general & textiles in particular.</p>		
Unit VI	Heat Exchangers	05 Hours
<p>Definition and classification of heat exchangers. Study of heat exchangers suitable in textile process house, Fouling factor, Log-mean temperature difference, effectiveness of heat exchangers. Numericals based on above topics.</p>		
References Books:		
<ol style="list-style-type: none"> 1. Fluid Mechanics and Hydraulics, by Giles, McGraw-Hill (1971). 2. Fluid Mechanics, by R.K.Bansal, Laxmi Publications ;(2016). 3. Fluid Mechanics, by Dr. P.N. Nodi and S.M. Seth (2009). 4. Heat Transfer, by S.P.Sukhatme (2005). 5. 'Process Heat Transfer' by Kern, McGraw-Hill, (1954). 6. A course in Heat and Mass Transfer by Arora and Domkundwar. DhanpatRai and Co. 7. Fluid Mechanics by FM White McGraw-Hill. 		

DKTES Textile and Engineering Institute, Ichalkaranji Final Year B. Tech. Textile Chemistry (Semester – VII) TCLDOE-TTL444: NONWOVEN TECHNOLOGY		
Teaching Scheme: Lectures: 03 Hrs/Week	Credits 03	Evaluation Scheme: MSE: 25 Marks ISE: 15 Marks SEE: 60 Marks
Course Objectives: <ol style="list-style-type: none"> 1. To understand the concept of Nonwoven Textiles 2. To describe the stages of nonwoven fabric manufacturing 3. To illustrate the scope and merits of nonwovens in different applications 4. To analyze and identify the Nonwoven products 		
Course Outcomes: At the end of the course, students will be able to <ol style="list-style-type: none"> 1. Explain basic terms in nonwovens, classification and market potential of nonwoven 2. Describe web formation methods like dry laid and spun laid and its process parameter 3. Identify and describe various methods of web bonding and its process parameters 4. Identify the suitability of the nonwoven technology for various applications 		
Course Contents		
Unit I	Introduction of Nonwoven	04 Hours
Historical background of nonwovens, non-woven definition, stages in non-woven manufacturing. Web Forming Techniques: carding, air laid, wet process, polymer extrusion. Comparison.		
Unit II	Classification of Nonwoven	03 Hours
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.		
Unit III	Web forming Techniques	09 Hours
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 bonded and Melt blown webs.		
Unit IV	Mechanical Bonding Techniques	10 Hours
Mechanically bonded webs – needle punched nonwovens, 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 V	Thermal Bonding Technique	06 Hours
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. Applications.		

Unit VI	Chemical Bonding Technique	04 Hours
Chemically bonded nonwoven – Latex binder, other types of nonwoven binders, formulation, order of formulation, bonding technology. Application of chemical bonded nonwovens.		
References Books:		
<ol style="list-style-type: none"> 1. Non-Woven – Process, Structure, Properties and Applications, T. Karthik, Prabha Karan C & R. Rathinamoorthy, Woodhead Publishing India Pvt. Ltd., 2016. 2. Handbook of Nonwovens, 1st Edition By: S Russell, Woodhead Publishing 2007 3. Nonwoven Fabrics: Raw Materials, Manufacture, Applications, Characteristics, Testing Processes, Prof. Dr. Wilhelm Albrecht, Prof. Dr.-Ing. Hilmar Fuchs, Dr.-Ing. Walter Kittelmann, WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim, 2003 4. Nonwovens Technology Market & Product Potential, Proceedings of the Seminar IIT New Delhi, 2007 5. NPTEL Study material on Nonwoven Technology by Dipyan Das 6. Nonwovens: Monogram by BTRA 7. Nonwovens BY DR.P.K. Banerjee 8. Manual of Nonwovens by Krcma 		

DKTES Textile and Engineering Institute, Ichalkaranji Final Year B. Tech. Textile Chemistry (Semester – VII) TCLDOE-TML445: HIGH PERFORMANCE FIBERS		
Teaching Scheme: Lectures: 03 Hrs/Week	Credits 03	Evaluation Scheme: MSE 25 Marks ISE: 15 Marks SEE: 60 Marks
Course Objectives: <ol style="list-style-type: none"> 1. To describe the concept of high performance fibres 2. To explain the manufacturing process of commonly used high performance fibres 3. To explain structure and properties of commonly used high performance fibres 4. To explain the applications of high performance fibres 		
Course Outcomes: At the end of the course, students will be able to <ol style="list-style-type: none"> 1. Understand concept of high performance fibres 2. Understand manufacturing process of commonly used high performance fibres 3. Analyse structure and properties of commonly used high performance fibres 4. Apply high performance fibres for various products 		
Course Contents		
Unit I	Introduction to high performance fibres	06 Hours
<ul style="list-style-type: none"> • Concept and requirements of high performance fibres. Comparison of regular fibres with high performance fibres. 		
Unit II	Carbon Fibres	06 Hours
<ul style="list-style-type: none"> • Introduction to PAN and pitch based carbon fibres – their production, properties and applications. 		
Unit III	High molecular weight polyethylene fibres. & Fully aromatic polyester fibres	06 Hours
<ul style="list-style-type: none"> • Introduction, manufacture, fibre characteristics and applications of high molecular weight polyethylene fibres. • Fibre manufacture, properties and applications of fully aromatic polyester fibres 		
Unit IV	High temperature resistant fibres	06 Hours
<ul style="list-style-type: none"> • Manufacture, fibre characteristics and applications of PBI, PBO, and other high temperature resistant fibres 		
Unit V	Aramid Fibres	06 Hours
<ul style="list-style-type: none"> • Introduction, polymer preparation, spinning of fibres, structure and properties and applications of meta and para aramid fibres 		
Unit VI	Inorganic Fibres	06Hours
<ul style="list-style-type: none"> • Glass fibre manufacture, Glass fibre composition, properties and applications • Types of ceramic fibres, their production, characteristics and applications 		

References Books:

1. High Performance Fibres, Edited by J. W. S. Hearle, Published by wood head publishing Ltd., England in association with Textile Institute Manchester
2. Hand book of Fibres Science and Technology, High Technology Fibres, Edited by Manachem Lewin and Jack Preston.
3. New fibers. T. Hongu and G. O. Phillips Ellis Horwood Ltd, Chichester
4. Kevlar aramid fiber. By H.H. Yang. John Wiley and Sons, Chichester, New York,
5. High-Performance and Specialty Fibers, Editors: Technology, Japan, Society of Fiber Science & (Ed.)

DKTES Textile and Engineering Institute, Ichalkaranji Final Year B. Tech. Textile Chemistry (Semester-VII) TCLDOE-TPL446: MAINTENANCE MANAGEMENT IN TEXTILES		
Teaching Scheme: Lectures: 03 Hrs/Week	Credits 03	EvaluationScheme: MSE: 25Marks ISE: 15Marks SEE: 60Marks
Course Objectives: <ol style="list-style-type: none"> 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. Explain way to enumerate indices related to machine downtime, utilization, spare part management and inventory. 4. To teach uses 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 <ol style="list-style-type: none"> 1. explain maintenance management, basic functions, methodology and application to planned maintenance, condition-based maintenance. 2. understand and describe management functions planning, scheduling, organizing, controlling, budgeting, record keeping related to machine maintenance. 3. calculate and use indices related to machine downtime, utilization, spare part management and inventory control. 4. use of value analysis, value engineering, machine replacement, modernization decisions to improve profitability of company using maintenance management. 		
Course Contents		
Unit I	Introduction	05 Hours
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.		
Unit II	Condition based maintenance	07Hours(5+2)
Condition based maintenance – Importance, subjective & objective inspections, types of condition monitoring techniques, Detailed study of (NDT) non-destructive testing, performance evaluation, debris analysis, dynamic analysis. Equipment Replacement – Need for replacement, Selection of appropriate alternative of replacement.		
Unit III	Performance Evaluation and Inventory Control	08Hours(3+5)
Performance Evaluation of maintenance function – Control – Methods of control and use of various indices. Spare parts management – Importance & means of inventory control.		

Unit IV	Failure Analysis and Planning	08Hours(4+4)
<p>Failure Analysis – Classification of failures, method of failure analysis, use of trouble shooting charts & other techniques.</p> <p>Planning, scheduling, maintenance organization, performance evaluation of maintenance function, PERT, CPM and other techniques for planning.</p>		
Unit V	Value Analysis and Lubrication Management	06Hours(3+3)
<p>Value Analysis & value Engineering – concept and techniques of value analysis & value engineering</p> <p>Lubrication management – Importance, measures for economy in lubrication management.</p>		
Unit VI	Maintenance Budgeting	05 Hours
<p>Maintenance budgeting – Methods of budgeting, selective budgeting control, techno economics of maintenance.</p>		
References Books:		
<ol style="list-style-type: none"> 1. Maintenance Management volumes 1 to 21, by IMME Delhi. 2. Maintenance Management, SITRA Publication. 		

DKTES Textile and Engineering Institute, Ichalkaranji Final Year B. Tech. Textile Chemistry (Semester – VII) TCLDOE-TFL448: RETAIL MANAGEMENT		
Teaching Scheme: Lectures: 03 Hrs/Week	Credits 03	Evaluation Scheme: MSE: 25 Marks ISE: 15 Marks SEE: 60 Marks
Course Objectives: <ol style="list-style-type: none"> 1. To describe retail industry and the retailing environment. 2. To develop competence in Retail Planning, Implementation and Management. 3. To describe retail buyers and merchandisers, store operations, supply chain management. 4. To classify trends in fashion retailing. 		
Course Outcomes: At the end of the course, students will be able to <ol style="list-style-type: none"> 1. Describe retail industry and the retail environment. 2. Develop competency in retail planning, implementation and management. 3. Describe retail buyers and merchandisers, store operations, supply chain management. 4. Classify trends in fashion retailing. 		
Course Contents		
Unit I	Principles of retailing	06 Hours
The history of retail, Understanding the difference between retailing and the retailer, Classification of retailers, On-site vs. off-site retailing, Multichannel retail approaches.		
Unit II	Consumer buying behavior	06 Hours
Consumer behavior, Consumer demographics, Site selection and store location, Emerging domestic and international markets. Factors affecting consumer behaviour. Effect of consumer behaviour on marketing strategies.		
Unit III	Retail Corporate Offices	06 Hours
Corporate offices and their role, Strategic planning; Supporting store teams, Ethics and corporate, Social responsibility, HRM, Importance & Motivation, Issues associated with HRM. Customer Relationship Management: CRM defined, Process Collection and evaluation of customer data..		
Unit IV	Planning Merchandise assortment and pricing	06 Hours
Process, Buying plans, Assortment planning. Retail Pricing strategies: Setting Retail Prices, Price adjustments, Pricing Strategies & Services. Buying Systems: Process, Buying plans, Assortment planning OTB, preparation.		
Unit V	Store Management	06 Hours
Types and methods, Store management and the back of house, Employee management, Store logistics, Merchandise controls and loss prevention. Manpower, infrastructure in retail.		

Unit VI	Trends in Retailing	06 Hours
E-commerce and the online shopper, Mobile retail, pop-up, and concept shops, Retailer and designer collaborations, Technology in the retail sector.		
References Books:		
<ol style="list-style-type: none">1. Retailing Management by William, Davidson, Daniel J. Sweeney. John Wiley & Sons publication. ISBN: 978-04718509462. Retailing Management by Michael Levy, Barton Weitz and Dhruv Grewal 9th edition McGraw-Hill Education publication. ISBN: 978-00780289913. Fundamentals Of Retail Management by Arupghosh, Neha Publishers & Distributors, ISBN: 97893814224654. Retail Management by Gibson G. Vedamani, Jaico Publishing House. 4th edition ISBN: 978-81799215175. Retail Management by Chetanbajaj, RajnishTuli, NidhiVarma and Srivastava, Oxford publication. 2nd edition. ISBN: 978-01980611516. Retail Management by S.C. Bhatia Atlantic publication, ISBN: 9788126909827		

DKTES Textile and Engineering Institute, Ichalkaranji Final Year B. Tech. Textile Chemistry (Semester – VII) TCLEL1-TCL449: TEXTILE MILL MANAGEMENT		
Teaching Scheme: Lectures: 03 Hrs/Week	Credits 03	Evaluation Scheme: MSE: 25 Marks ISE: 15 Marks SEE: 60 Marks
Course Objectives:		
<ol style="list-style-type: none"> 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		
<ol style="list-style-type: none"> 1. Explain the significance of management and its various functions 2. Discuss and apply the leadership, controlling and costing system in organization 3. Describe the concept of organizing and staffing 4. Utilizing the marketing techniques for selling the product and services of organization 		
Course Contents		
Unit I	Management	06 Hours
Nature, Importance, Elements, Levels of Management, Fundamental Managerial Skills, Functions of Management – Henry Fayol’s Principles of Management - Social responsibilities of a manager		
Unit II	Planning & organizing	04 Hours
The Nature, Characteristics & Process of Planning – Forms of Planning The Nature, Importance & Steps involved in the process of organizing		
Unit III	Staffing & Leadership	06 Hours
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 IV	Communication & Controlling	06 Hours
Meaning, communication process, effective communication. Meaning, Concept, Definitions, Steps in control process, Techniques and Types of control, Requirements of an effective control system		
Unit V	Financial Management	07 Hours
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, calculations		

Unit VI	Marketing Evolution	07 Hours
Nature of Marketing, Core concepts of marketing – Digital Marketing, Marketing Mix, Product Life Cycle, Meaning, Scope, Limitations of Marketing Research - Marketing Research Procedure – Types & Techniques		
References Books:		
<ol style="list-style-type: none"> 1. Essential of Management – by Harold Koontz & Heinz, Wehrich – 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. 		

DKTES Textile and Engineering Institute, Ichalkaranji Final Year B. Tech. Textile Chemistry (Semester – VII) TCLEL1-TCL450: IMPORT EXPORT MANAGEMENT		
Teaching Scheme: Lectures: 03 Hrs/Week	Credits 03	Evaluation Scheme: MSE: 25 Marks ISE: 25 Marks SEE: 50 Marks
Course Objectives: <ol style="list-style-type: none"> 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 <ol style="list-style-type: none"> 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		
Unit I	Introduction to international trade	06 Hours
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		
Unit II	International marketing	07 Hours
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		
Unit III	Foreign trade	05 Hours
Foreign trade control and-Exim policy-Export Promotions-Export procedures and documents- Major problem of India's export sector		
Unit IV	Export Preliminaries	05 Hours
Introduction, Establishment a business firm, importer exporter code number, Alignment documentation system, commercial documents, Regulatory documents.		
Unit V	Foreign Trade Documents	08 Hours
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		
Unit VI	Shipment and Customs	08 Hours
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		
References Books:		
<ol style="list-style-type: none"> 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. 6. Export Import Procedures – Documentation and Logistics , C ram Gopal, New Age International Publishers 		

DKTES Textile and Engineering Institute, Ichalkaranji Final Year B. Tech. Textile Chemistry (Semester – VII) TCLEL1-TCL451: NANOTECHNOLOGY IN TEXTILES		
Teaching Scheme: Lectures: 03 Hrs/Week	Credits 03	Evaluation Scheme: MSE: 25 Marks ISE: 15 Marks SEE: 60 Marks
Course Objectives:		
<ol style="list-style-type: none"> 1. To explain requirements of nanotechnology in textiles 2. To exemplify the manufacturing methods and properties of nanoparticles and nanomaterials 3. To describe different application of nanotechnology in textiles 4. To analyze the characteristics of nanoparticles by using various methods. 		
Course Outcomes:		
At the end of the course, students will be able to		
<ol style="list-style-type: none"> 1. Explain requirements of nanotechnology in textiles 2. Exemplify the manufacturing methods and properties of nanoparticles and nanomaterials 3. Describe different applications of nanotechnology in textiles 4. Analyze the characteristics of nanoparticles by using various methods 		
Course Contents		
Unit I	Fundamentals of Nanoscience and Nanotechnology	04 Hours
Introduction to Nanotechnology, Concept of nanoscale and historical background of nanotechnology, Approaches to Nanotechnology.		
Unit II	Manufacturing of Nanofibres	06 Hours
Principles of electrostatic atomization, Electrospinning and electrospinning by the capillary method, Electrospinning and Electrospinning by the charge injection method, Controlling fibre orientation, production of continuous and noncontinuous nanofibres, Various applications of nanofibres viz, tissue engineering, filter media.		
Unit III	Synthesis and Properties of Nanoparticles	06 Hours
Synthesis of Fullerenes and various forms of carbon. Synthesis of nanometal particles by various chemical, physical and biological methods. Properties of nano particles like organic and inorganic materials in various chemical forms.		
Unit IV	Nanotechnology in textile wet processing	05 Hours
Fundamental principles, nanoscouring, nanobleaching, nanosurface activation of textiles		
Unit V	Nano finishing of Textile Materials	11 Hours
Antimicrobial textiles, Conductive textiles, Controlled release of active agents, Flame Retardant textiles, water repellent and water proof textiles, Soil repellent, Magnetic textiles, Nano-crosslinking, Nano-softening, Self-cleaning textiles, nanofinishes for protective textiles		

Unit VI	Characterization of Nano-finishes	07 Hours
Scanning electron microscopy (SEM); Energy Dispersive X-ray Analysis (EDX), Transmission electron microscopy (TEM); Atomic Force Microscope (AFM), UV-Visible Spectroscopy, Wide Angle X-Ray Diffraction, Health, safety, and environmental aspects of textile nano-finishing		
References Books:		
<ol style="list-style-type: none">1. Principles of Nanotechnology by Phani Kumar2. Nanofibres & Nanotechnology in Textiles by P.J. Brown & K. Stevens.3. The Nanoscope, Encyclopedia of Nano Science & nanotechnology Vol.-1 to VI, Dr.ParagDiwan& Ashish Bharadwaj.4. Nanofinishing of Textile Materials by Majid Montazer Tina Harifi, The Textile Institute BookSeries5. Nanoparticle Technology Handbook, Edited by Masuo Hosokawa, Kiyoshi Nogi, MakioNaito, Toyokazu Yokoyama6. Nanosols and Textiles by Boris Mahltig, Torsten Textor7. Nanoscale Science and Technology Edited by Robert W. Kelsall, Ian W. Hamley, Mark Geoghegan,8. Nanotechnology Health and Environmental Risks, Editor Jo Anne Shatkin		

DKTES Textile and Engineering Institute, Ichalkaranji Final Year B. Tech. Textile Chemistry (Semester – VII) TCP452: TEXTILE PROCESS PLANNING AND MANAGEMENT LAB		
Teaching Scheme: Tutorial: 01 Hr /Week	Credits 01	Evaluation Scheme: CIE: 50 Marks
List of Experiments		
1	Preparation of layout plan and machinery layout for <ol style="list-style-type: none"> a) Package dyeing unit. b) 100% cotton woven goods processing. c) Synthetic and / or blend processing. d) Knit goods processing. 	
2	Preparation of project report for modern process house.	

Submission – Completed Submission of assignments.

DKTES Textile and Engineering Institute, Ichalkaranji Final Year B. Tech. Textile Chemistry (Semester – VII) TCP453: TESTING AND ANALYSIS OF TEXTILES LAB		
Teaching Scheme: Practical: 02 Hrs /Week	Credits 01	Evaluation Scheme: CIE: 50 Marks SEE: 50 Marks
List of Experiments		
1	Evaluation of colour fastness to Washing.	
2	Evaluation of colour fastness to Rubbing.	
3	Evaluation of colour fastness to Sublimation.	
4	Evaluation of colour fastness to Perspiration.	
5	Evaluation of colour fastness to Light.	
6	Evaluation of colour fastness to Bleach with hypochlorite and peroxide.	
7	Evaluation of dimensional stability to washing, dry heat relaxation shrinkage.	
8	Evaluation of water extracted from finished fabric.	
9	Determination of water repellency – Spray test.	
10	Determination of free Formaldehyde.	
11	Determination of Active Content of emulsion softener.	
12	Determination of Active Content of Levelling and Dispersing agent.	
13	Evaluation of Flammability.	
14	Evaluation of antimicrobial finish fabric.	
15	Industrial visit (ECO Lab).	

Submission – Completed Journal.

DKTES Textile and Engineering Institute, Ichalkaranji Final Year B. Tech. Textile Chemistry (Semester – VII) TCP455: Fluid Flow and Heat Transfer		
Teaching Scheme: Practical: 02 Hrs /Week	Credits 01	Evaluation Scheme: CIE: 50 Marks
List of Experiments		
1	Calibration of Venturimeter.	
2	Calibration of Orificemeter.	
3	Calibration of Triangular notch.	
4	Verification of Bernoulli's theorem.	
5	Determination of Reynolds number.	
6	Study of fluid friction through PVC pipe.	
7	Study of centrifugal pump.	
8	Determination of thermal conductivity of insulating material by sphere in sphere method.	
9	Determination of thermal conductivity Composite wall apparatus.	
10	Study of heat transfer by natural convection.	
11	Verification of Stefan - Boltzmann's Law.	
12	Study of Critical Heat Flux Apparatus.	
13	Determination of emissivity.	

Submission – Completed Journal.

**Final Year B. Tech Textile Chemistry
Semester-II**

Sr. No.	Course Code	Course Title	Course Category	Teaching scheme				Course Credits
				L	T	P	Contact Hrs/wk	
1	TCL461	Theory of Dyeing & Colour Management	PCC	3			3	3
2	TCL462	Garment Manufacturing & Processing	PCC	3			3	3
3	TCLEL2	Elective - II	PEC	3			3	3
4	TCLEL3	Elective - III	PEC	3			3	3
5	TCD469	Project Phase - II	PST		5		5	5
6	TCD470	Internship- II **	PST					3
7	TCP471	Theory of Dyeing & Colour Management Lab	PCC		1		1	1
		Total		12	6	0	18	21

Course Category	List of Electives - TCLEL2
HSMC - Hum. & Social Sc., Mgt	TCL463 – Manufacturing of Technical Textiles
BSC - Basic Science	TCL464 – Energy Management in Chemical Processing
ESC - Engineering Science	TCL465 – Entrepreneurship Development
PCC - Prof. Core Courses	
PEC - Prof. Elect. Courses	List of Electives - TCLEL3
OEC- Open Elct. Courses	TCL466 – Advanced Chemical Processing
MC - Mandatory Courses	TCL467 – Effluent Treatment & Sustainability
PST - Project / Seminar / Ind. Training	TCL468 - Merchandizing

DKTES Textile and Engineering Institute, Ichalkaranji Final Year B. Tech. Textile Chemistry (Semester – VIII) TCL461: THEORY OF DYEING AND COLOUR MANAGEMENT		
Teaching Scheme: Lectures: 03 Hrs/Week	Credits 03	Evaluation Scheme: MSE: 25 Marks ISE: 15 Marks SEE: 60 Marks
Course Objectives:		
<ol style="list-style-type: none"> 1. To describe the importance of fibre structure, Drawing & heat setting on dyeing properties and basics of dyeing and kinetics of dyeing. 2. To define equilibrium absorption, diffusion co-efficient and time of dyeing and also to discuss various theory of dyeing and know factors affecting reactive dyeing, disperse dyeing and dyeing of nylon and acrylic 3. To discuss basics of color perception and laws of absorption of light. To know various methods of color specification like CIE, Hunter and Munsell 4. To discuss viewing geometry, mono-chromators and detectors and discuss principle and working of single, double beam and dual beam spectrophotometer. To analyze various outputs of color matching. 		
Course Outcomes:		
At the end of the course, students will be able to		
<ol style="list-style-type: none"> 1. Describe the importance of fibre structure, Drawing & heat setting on dyeing properties and basics of dyeing and kinetics of dyeing. 2. Define equilibrium absorption, diffusion co-efficient and time of dyeing and also to discuss various theory of dyeing and know factors affecting reactive dyeing, disperse dyeing and dyeing of nylon and acrylic 3. Discuss basics of color perception and laws of absorption of light. To know various methods of color specification like CIE, Hunter and Munsell 4. Discuss viewing geometry, mono-chromators and detectors and discuss principle and working of single, double beam and dual beam spectrophotometer. To analyze various outputs of color matching. 		
Course Contents		
Unit I	Fibre structure and its effect on dyeing	05 Hours
Fine structure of cotton, wool, silk, polyester, nylon and acrylic, various proposed theories of fibre structure. Influence of fibre structure, drawing and heat setting on dyeing behavior		
Unit II	Fundamental relation of Dye and substrate	08 Hours
Relation between dye molecules and polymeric chains of the fibres, Substantivity and affinity, Thermodynamic derivations of affinity equations, Kinetics of dyeing, Factors affecting kinetics of dyeing, Derivations of various absorption isotherms, Electrical effects in dyeing equilibrium. Monolayer technique and continuous variable method to identify dye – fibre bonds.		
Unit III	Diffusion, Absorption and factors affecting dyeing	08 Hours
Glass transition temperature and its effect on dye ability and dye diffusion, Factors affecting dye diffusion, Fick's first and second laws of diffusion, Concepts of equilibrium absorption, diffusion coefficient and time of half dyeing, Derivation of William Landel ferry (WLF) equation and its significance, Free volume		

and solubility parameter theory of dyeing, Various theories of carrier dyeing. Concept of partition coefficient Factors affecting reactive dyeing, dyeing of polyester, dyeing of nylon and acrylic, Concept of solid dyeing., reserve dyeing, cross – dyeing and tone on tone dyeing, Continuous Dyeing

Unit IV	Fundamentals of CCM and Colour specification	08 Hours
<p>Relation between light and dye, dye and eye. Light, colour and electromagnetic spectrum, Planckin radiations and colour temp, Daylight and CIE standard illuminants, Sources of artificial light, properties of artificial lights, Interaction of light with matter, Beer Lambert’s law of absorption of light Theories of colour vision, Colour primaries and colour mixing – Additive and subtractive, Colour specification – Munsell colour order system, Ostawald colour system, CIE system, CIE lab, System, Hunter lab, Tristimulus values, Standard observer</p>		
Unit V	Optics and spectrophotometer	07 Hours
<p>Concept of normal optics and reverse optics, Viewing geometry, Bidirectional geometry, circumferential bi-directional geometry, Concept of 2o and 10o observer angle, Concept of specular and diffuse reflection, Factors affecting diffusion of light, Types of monochromators, advantages and disadvantages of each type of monochromators, Precaution to be taken for monochromator, Photodetectors types - PMT & SPD, Principle and working of colorimeter. Principle, advantages and disadvantages of single beam, double beam, dual beam and microflash spectro-photometers, Precautions to be taken for spectro photometer, Reflectance and transmission spectrophotometer, Variables affecting visual and instrumental estimates of colour.</p>		
Unit VI	Metamerism and interpretation of CCM results	06 Hours
<p>Metamerism and Dichroism. Sample preparation for CCM Application to textile processing, Advantages & limitations of CCM, Colour difference, shade sorting, relative dye strength and tone analysis, Assessment of whiteness, yellowness and brightness, Computing and analyzing CCM results, Recipe formulation, batch correction, shade library.</p>		
References Books:		
<ol style="list-style-type: none"> 1. Physical chemistry of dyeing by Thomas Vickerstaff. 2. Theory of Coloration of Textiles by Alan Johnson, Society of Dyers and Colourists. 3. Computer colour analysis: Textile applications by Dr. A.D. Sule. 4. Instrumental colour measurements and computer aided colour matching for textiles by Dr. H. S. Shah & Dr. R. S. Gandhi. 5. Colour Physics for industry by Roderick Mc Donald. 6. Chemical Processing of Synthetic fibres by Dr. K. V. Datye& A. A. Vaidya. 		

DKTES Textile and Engineering Institute, Ichalkaranji Final Year B. Tech. Textile Chemistry (Semester – VIII) TCL462: GARMENT MANUFACTURING & PROCESSING		
Teaching Scheme: Lectures: 03 Hrs/Week	Credits 03	Evaluation Scheme: MSE: 25 Marks ISE: 15 Marks SEE: 60 Marks
Course Objectives: <ol style="list-style-type: none"> 1. To discuss the various operations & machinery used for garment making. 2. To understand the role of dyeing & special print effects in garment industry. 3. To discuss the various specialty finishes used in garment industry. 4. To discuss the process of wash down effects on denim garments. 		
Course Outcomes: At the end of the course, students will be able to <ol style="list-style-type: none"> 1. Explain the process & working principle of various machinery used for garment making. 2. Describe the process of various special print effects on garments. 3. Summarize various specialty finishes used in garment industry. 4. Formulate the various wash down effects on denim & non denim garments. 		
Course Contents		
Unit I	Departments & Machines in Garment Industry	06 Hours
Introduction to garment industry. Introduction to different departments with roles and responsibilities. Different types of machines used in various departments. SOP understanding of different departments.		
Unit II	Key terminologies of apparel industry	06 Hours
Lead time, 10 parameter report, marker making, types of markers, fabric consumption, SAM, SMV, Operation breakdown, work aids, productivity, WIP, line balancing, operator and line efficiency.		
Unit III	Garment Dyeing	08 Hours
Introduction, Advantages and limitations of garment processing, Comparison of different routes, Comparison of garment stage & pre garment stage dyeing, General precautions, machinery for Garment dyeing, paddle dyeing machine, drum dyeing machine, machinery like Hydroextractor, Tumble dryer, Problems in Garment dyeing and remedies.		
Unit IV	Garment Printing	06 Hours
Role of garment printing, recipes for Khadi, Metallic, Flock, Plastisol, Pearl, HD printing, Puff Printing, Foil Printing, Garment Printing Machinery- Multi arm flat bed machine, Digital printing, Transfer printing.		
Unit V	Garment Finishing	06 Hours
Mechanism application of Fragrance finish, UV protection finish, Cool finish, & Durable press, Stain Resistant finish. Process of Bio Polishing, Issues.		

Unit VI	Garment Washing	07 Hours
Objects of wash down effects, Stone washing, Stone less stone wash effects like enzyme wash, Mud wash, Ion wash, Chalk wash Novel wash down effects: Acid wash, Antique wash, Denim Hand Sand / Scraping-Sand Blasting, Ball Blasting, Whiskering, Ozone Fading, Back Staining, causes and remedies.		
References Books:		
<ol style="list-style-type: none">1. Apparel manufacturing technology by T. Karthik, P. Ganesan, D. Gopalakrishnan. CRC Press, Taylor & Francis Group, USA2. Garment Technology for fashion designers by Cooklin Gerry, Black well science Ltd, 1997, England.3. Dinkar Mahajan- Know All About Denim- Mahajan Publishers Private Limited,Ahmedabad.4. Chemical Finishing of textiles by W D Schindler and P J Hauser.5. Murphy J.M., “Improving Preparation Techniques for Garment Dyeing”, American Dyestuff Reporter, 1987, 41 – 48.		

DKTES Textile and Engineering Institute, Ichalkaranji Final Year B. Tech. Textile Chemistry (Semester – VIII) TCLEL2- TCL463: MANUFACTURING OF TECHNICAL TEXTILES		
Teaching Scheme: Lectures: 03 Hrs/Week	Credits 03	Evaluation Scheme: MSE: 25 Marks ISE: 15 Marks SEE: 60 Marks
Course Objectives: <ol style="list-style-type: none"> 1. To understand textile substrate, polymeric raw material for coating and coating technology. 2. To understand application, requirements of coated textiles. 3. To understand the use of textile in different technical field like defence and military, medical textiles, filtration, automotive textiles and geotextiles. 4. To understand the principle and manufacturing of water proof breathable fabric; work wear and protective textile. 		
Course Outcomes: At the end of the course, students will be able to <ol style="list-style-type: none"> 1. Explain textile substrate, polymeric raw material for coating and coating technology. 2. Describe application, requirements of coated textiles. 3. Enumerate the use of textile in different technical field like defense and military, medical textiles, filtration, automotive textiles and geotextiles. 4. Explain the principle and manufacturing of water proof breathable fabric; work wear and protective textile. 		
Course Contents		
Unit I	Coating Materials and Coating Technology	07 Hours
Material: Rubber (natural and synthetic), polyvinyl chloride, polyurethane, Acrylic polymers, Adhesive, coating additives and curing assistances Techniques: General features, knife coating, roll coating, Dip coating, transfer coating, Gravure coating, rotary screen coating, calendaring, Hot melt coating, scatter coating, laminating coating.		
Unit II	Coated Textile	06 Hours
Different textile substrates and their preparation Applications: synthetic leather, coated architectural textiles, fluid containers, tarpaulins, automotive air bag fabrics and interiors, carpet backing, Water proof breathable coating.		
Unit III	Military and Defence Textiles	05 Hours
Introduction, protective clothing, textiles used in defence systems and weapons.		
Unit IV	Medical Textiles	06 Hours
Introduction, materials used in bio-textiles, classification of medical textiles, textiles for implantation, non-implantable textiles, textiles for extra corporeal (biomedical), Health care and hygiene products.		

Unit V	Geotextiles, Filtration and industrial Textiles	07 Hours
Geo-synthetics and Geotextile materials, geotextile properties, geotextile functions and applications, Principles of filtration, equipment's, textiles in dry and liquid filtration, testing of filters. Air bags, seat belts, tarpaulins, hoses, belts, inflatable textiles.		
Unit VI	Protective and Sports Textiles	08 Hours
Thermo-physiological comfort, concept of water proof breathable fabrics, performance assessment of water proof breathable fabrics, Clothing and various textile-based sport's products. Concept and requirements of work wear and protective textiles, high temperature textiles, thermal insulation, flame resistant, Mechanical and electrical protective clothing, radiation protection, high visibility textiles. Concept and textile applications of phase change materials and shape memory polymers		
References Books:		
<ol style="list-style-type: none"> 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. Automotive textiles by Dr. S.K. Mukhopadhyay and J.F. partridge, The Textile Institute. 5. Wellington Sear's Hand book of Industrial Textile by Rd. Sabit Adnur. 		

DKTES Textile and Engineering Institute, Ichalkaranji Final Year B. Tech. Textile Chemistry (Semester – VIII) TCLEL2-TCL464: ENERGY MANAGEMENT IN CHEMICAL PROCESSING		
Teaching Scheme: Lectures: 03 Hrs/Week	Credits 03	Evaluation Scheme: MSE: 25 Marks ISE: 15 Marks SEE: 60 Marks
Course Objectives: <ol style="list-style-type: none"> 1. To understand basics and forms of energy required in textile processing unit, fuels and their properties. 2. To understand generation and distribution of thermal energy in the form of steam and thermic fluid; minimizing wastage, its utilization and consumption calculations. 3. To understand billing parameters of electricity, measures to utilize electrical energy efficiently and related consumption calculation. Explain efficient utilization of compressed air. 4. To understand measures to conserve energy in various forms; concept of energy audit; explain importance of non-conventional energy sources. 		
Course Outcomes: At the end of the course, students will be able to <ol style="list-style-type: none"> 1. Describe basics and forms of energy required in textile processing unit, fuels and their properties. 2. Explain generation and distribution of thermal energy in the form of steam and thermic fluid; minimizing wastage, its utilization and consumption calculations. 3. Describe billing parameters of electricity, measures to utilize electrical energy efficiently and related consumption calculation. Explain efficient utilization of compressed air. 4. Describe measures to conserve energy in various forms; concept of energy audit; explain importance and utilization of non-conventional energy sources. 		
Course Contents		
Unit I	Basics of Energy and Fuels	06 Hours
Basics of Energy: Types and sources of Energy, Forms of energy and units of measurement; Need of various Energy Sources required in Textile Processing like thermal, electrical and compressed air; Concept and need of Energy Management. Classification of Fuel, Types and Quality of fuels, Calorific value of fuel and its measurement.		
Unit II	Thermal Energy	05 Hours
Need of thermal energy in textile, Basics of thermal energy, Steam: Thermal behavior of water, heat balance equation, Methods of generation of Steam and its quality requirement, efficient steam generation - boiler, Thermopac: Need and concept, design of system and rating.		
Unit III	Steam Distribution and Consumption	07 Hours
steam distribution and Its utilization, size of steam pipe line, accessories in steam distribution line, Calculation related to measurement of thermal energy – Direct heating, Indirect heating, Batch process unit operations, Continuous process and thermopac, Calculation related to measurement of Steam Consumption in textile processing, norms and capacity requirement of boiler. Drying of Textile and its economics, machinery required.		

Unit IV	Electrical Energy and compressed air	07 Hours
Methods of Electricity Generation, Quality of Electric Supply, Leakages, voltage Fluctuations their reasons and economical aspects, Power Transmission and cables, Power Factor, Calculations related to measurement of electrical energy, norms for lighting Types, working and quality requirements of compressed air, its utilization.		
Unit V	Energy Audit	06 Hours
Need of energy audit, method & types of energy audits, Energy audit performance, instruments required, Energy consumption of various textile machines, Thermal energy for Batch operation, Thermal energy for Continuous operations, Electricity consumption.		
Unit VI	Energy Conservation and Non-Conventional Sources	08 Hours
Co-generation and its economics, advantages; Methods of energy conservation in various departments of process house with regards to thermal energy, electrical Energy, lighting, compressed air and water; Concepts of Reduce, Reuse and Recycle with textile specific examples, Energy saving through process modification, machine modification or alternative chemical / technology with textile specific examples non-conventional energy sources and their application areas in textile like Wind, Biogas and Solar energy either for thermal or electrical energy generation.		
References Books:		
<ol style="list-style-type: none"> 1. Energy Conservation in Industries – Vol.I & II, Centre of Plant Engg. Services Hydrabad. 2. Utilities by D K Bhattacharya, A K Jain, S. Saxena, Pub. NITRA 3. Energy Consumption & Conservation in Fibre Producing & Textile Industries Textile Progress Vol.13, No.3. 4. Conventional Energy Technology – By S.B. Pandya 5. ATIRA – Circular Report June, 1988, Mill Endavours to conserve electricity by D.H. Shah, J.S. Parajia 6. Renewable Energy Resources by John Twidell 		

DKTES Textile and Engineering Institute, Ichalkaranji Final Year B. Tech. Textile Chemistry (Semester – VIII) TCL465 - ENTREPRENEURSHIP DEVELOPMENT		
Teaching Scheme: Lectures: 03 Hrs/Week	Credits 03	Evaluation Scheme: MSE: 25 Marks ISE: 15 Marks SEE: 60 Marks
Course Objectives:		
<ol style="list-style-type: none"> 1. To understand type and characteristics of entrepreneurs, their role in economic development. 2. To know the business opportunity identification, business ideas, and environment and entrepreneurship 3. To understand the concept of project appraisal, institutional finance to entrepreneurs. 4. To understand social, rural and women entrepreneurship. 		
Course Outcomes:		
At the end of the course, students will be able to		
<ol style="list-style-type: none"> 1. Understand type and characteristics of entrepreneurs, their role in economic development. 2. Know the business opportunity identification, business ideas, and environment and entrepreneurship. 3. Understand the concept of project appraisal, institutional finance to entrepreneurs. 4. Understand social, rural and women entrepreneurship. 		
Course Contents		
Unit I	Entrepreneurship Perspectives	07 Hours
Concepts of entrepreneur, Importance and Characteristics of entrepreneurs, Functions of entrepreneurs, Types of entrepreneurs, Entrepreneur Vs Manager, Entrepreneur Vs. Intrapreneur. Benefits and potential risks of entrepreneurship, Factors affecting entrepreneurship growth in India, Role of entrepreneurship in economic development.		
Unit II	Opportunity Identification and Business Plan	06 Hours
Need for opportunity identification, Business opportunities in various sectors, Methods of generating business ideas, and opportunity recognition, Meaning of business plan, Contents of business plan, Significance of a business plan, Formulation of business plan.		
Unit III	Environment and Entrepreneurship	07 Hours
Concept of business environment, Constituents of business environment, Internal & External Environmental Factors, Entrepreneurial mobility, Factors influencing entrepreneur mobility, Occupational Mobility and Locational Mobility		
Unit IV	Project Appraisal	06 Hours
Concept of project appraisal, Methods of project appraisal–Economic analysis, Financial analysis, Market analysis, Technical analysis, Managerial competence. Project Appraisal Techniques.		
Unit V	Institutional Finance to Entrepreneurs	06 Hours
Need for institutional finance, Financing institutions – NABARD, SIDBI, SIDO, KVIC, NSIC, DIC, SFC, SSIDC, Other financial assistance.		

Unit VI	Social, Rural and Women Entrepreneurship	07 Hours
<p>Meaning of social entrepreneurship, difference between business entrepreneurship and social entrepreneurship, characteristics of social entrepreneurship, Meaning of rural entrepreneurship, Need and problems of rural entrepreneurship, Concept and functions of women entrepreneur, Problems of women entrepreneurs. Limitations of women entrepreneurs.</p>		
<p>References Books:</p>		
<ol style="list-style-type: none"> 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. A. Sahay, M. S. Chhikara, New Vistas of Entrepreneurship: Challenges & Opportunities. 6. Poornima M.CH., Entrepreneurship Development –Small Business Enterprises, Pearson, Delhi,2009. 		

DKTES Textile and Engineering Institute, Ichalkaranji Final Year B. Tech. Textile Chemistry (Semester – VIII) TCLEL3-TCL466: ADVANCED CHEMICAL PROCESSING		
Teaching Scheme: Lectures: 03 Hrs/Week	Credits 03	Evaluation Scheme: MSE: 25 Marks ISE: 15 Marks SEE: 60 Marks
Course Objectives: <ol style="list-style-type: none"> 1. To devise modified eco-friendly process for textiles. 2. To explain various modern machineries used for processing of textiles. 3. To invent the different applications of modified processes used in textile chemical processing. 4. To describe techno-economical features of machines used in wet processing of textiles. 		
Course Outcomes: At the end of the course, students will be able to <ol style="list-style-type: none"> 1. Devise modified eco-friendly process for textiles. 2. Explain various modern machineries used for processing of textiles. 3. Invent the different applications of modified processes used in textile chemical processing. 4. Describe techno-economical features of machines used in wet processing of textiles. 		
Course Contents		
Unit I	Process Modifications in Pretreatments	07 Hours
Developments in singeing, desizing and its eco-aspects, bleaching and its eco-aspects, Eco-friendly peracetic acid bleaching, Eco-friendly retting of Jute, Redox H ₂ O ₂ bleaching, Concept of Eco-friendly stabilizers for H ₂ O ₂ bleaching, Combined operations like desizing- scouring- bleaching, solvent scouring, Hot mercerization, add-on mercerization and ammonia treatment. Combined bioscouring and bleaching of cotton fibers, enzymatic degumming, enzymatic bleaching, nano- biotechnology.		
Unit II	Developments in Dyes and Dyeing Techniques	07 Hours
Dyeing and its eco-aspects, new dyes and their advantages, Eco-friendly dyeing with sulphur & vat dyes. New developments in reactive dyes like HF dyes, low and no salt reactive dyes, multifunctional dyes, neutral fixing and acid fixing reactive dyes, Photo chromic dyes, thermo chromic dyes, fluorescent dyes. Super critical CO ₂ dyeing – concept, mechanism, methods and techno-economical features. Ultrasound in dyeing - Concept, mechanism, methods and techno-economical features. Low temperature dyeing - concept, mechanism, methods and techno-economical features.		
Unit III	Digital Printing and Transfer Printing	06 Hours
Concept, methods of inkjet printing, colour separation, selection of dyes and developments in inks, techno-economical features Concept, selection of dyes and paper, mechanism of dye transfer, process sequences, techno-economical features, various transfer-printing machines		
Unit IV	Development in Finishing	07 Hours
Various Low liquor and minimum application techniques in textile finishing, their advantages and limitations, wrinkle free finishing – concept of wet and moist cross linking, various eco-friendly resin		

finishes, Concept of UV-A and UV-B, factors affecting UV protection. Various UV- protection finishes and their evaluation, antimicrobial finishes – mode of action, factors affecting, various antimicrobial finishes.

Unit V	Application of Nanotechnology in Textiles	06 Hours
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Nanoscale – Definition, various methods of manufacturing nano materials and their characterization, Nanofibers - Manufacturing, properties and uses of nanofibre, Nanofinishes - Super hydrophobicity and lotus effect, self-cleaning, UV protection finish, Antimicrobial finishes

Unit VI	Application of Plasma in Textiles	06 Hours
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Concept, types of plasma and their generation, Plasma treatment of textile for water and oil repellency, Interfacial engineering of functional textiles for biomedical applications, plasma modification of wool, plasma modification of natural cellulosic fibers, characterization of plasma treated textiles

References Books:

1. Biotechnology in Textile processing, by Georg M. Guebitz, Artur Cavaco-paulo, Ryszard Kozlowski, The Hawarth Press, Inc.
2. Dyeing of polyester & its blends by Prof. M. L. Gulrajani
3. Engineering in Textile coloration by C. Duckworth
4. Textile Finishing by Derek Heywood
5. Chemical Finishing of Textiles by W.D. Schindler and P.J. Hauser
6. Textile Energy & Waste Seminar – Textile Institute, 1997.
7. Nanofibres and nanotechnology in textiles edited by P.J.Brown and K. Stevens
8. Conventional Energy Technology – By S.B. Pandya.

DKTES Textile and Engineering Institute, Ichalkaranji Final Year B. Tech. Textile Chemistry (Semester – VIII) TCLEL3- TCL467: EFFLUENT TREATMENT & SUSTAINABILITY		
Teaching Scheme: Lectures: 03 Hrs/Week	Credits 03	Evaluation Scheme: MSE: 25 Marks ISE: 15 Marks SEE: 60 Marks
Course Objectives: <ol style="list-style-type: none"> 1. To understand the pollution generated in textile wet process, including its composition, characteristics, potential environmental impacts and environmental management systems. 2. To practice various treatment technologies used for pollution in textile wet processing industry. 3. To understand the concept and principles of sustainability in textile manufacturing 4. To apply sustainable practices in textile industry 		
Course Outcomes: At the end of the course, students will be able to <ol style="list-style-type: none"> 1. Understand the effluent generated in textile wet process, including its composition, characteristics, and potential environmental impacts. 2. Practice various treatment technologies used for pollution in textile wet processing industry. 3. Understand the concept and principles of sustainability in textile manufacturing 4. Apply sustainable practices in textile industry 		
Course Contents		
Unit I	Introduction to Effluent Treatment	08 Hours
Eco-Systems and Textile effluent: Eco system and current environmental problems, ecology and textiles, soil pollution, eutrophication, Risk assessment and Risk management. General waste categorization, and effective pollution prevention program, Testing of Effluents for various characteristics such as BOD, COD. Turbidity, TDS, SS, Grease, Oils and colour etc. Environmental Management Systems: Carbon cycle, carbon foot prints, concept of BT Cotton, organic fibres, concept of Ecolabels, Okotex standards and various certifications.		
Unit II	Textile Effluent Treatment	08 Hours
Waste water generated in various textile operations and their characterization, Methods of Treatment of Textile effluents, primary treatment - Screening, sedimentation, Equalization, Coagulation, Secondary Treatment - Activated Sludge Process, Trickling Filtration, sludge disposal, Tertiary treatment – Multimedia Filtration and Reverse Osmosis Analysis of effluents, Multi effect evaporator. Design of typical ETP and concept of common effluent treatment plant.		
Unit III	Noise and Air pollution	04 Hours
Noise Pollution and its control in Textile Industry, effect of noise on human beings, measurement of noise, sources of noise and methods of reducing noise and vibrations. Classification and properties of air pollutants, sources of emission, greenhouse gases; Plume behavior and fate of air pollutant, Analysis and control measures of gaseous pollutants and particulate matter		

Unit IV	Introduction to Sustainability	06 Hours
Concept of sustainability, three pillars of sustainability, Overview of environmental, social, and economic impacts of textile production, Challenges and opportunities in sustainable textile production, Life Cycle Analysis, Circular Economy		
Unit V	Sustainable Fibre Production	06 Hours
Sustainable production of Cotton, Bast fibres, Wool, Silk, Regenerated cellulosic fibre and Synthetic fibres		
Unit VI	Sustainable Textile Processing	07 Hours
Introduction, Sustainability issues in current textile production, Sustainable processing, greener textile materials, Greener preparatory processes, Enzyme processing, Greener bleaching methods, Greener Dyeing process, Sustainable wastewater treatment methods. Various means to reduce effluent load at source.		
References Books:		
<ol style="list-style-type: none"> 1. Treatment of Textile Processing Effluents by N. Manivaskam (Shakti Publication) 2. Waste Water Treatment for Pollution control and Reuse by Soli J Arceivala and Shyam R Asolekar (McGraw Hill Publication) 3. Environmental Issues – Technology option for Textile Industry Edited by R. B. Chavan, (Indian Journal of Fibre & Textile Research Special Issue - March, 2001) 4. Sustainable Fibres and Textiles, Edited by Subramanian Senthilkannan Muthu, Woodhead Publishing Ltd. UK, Elsevier, 2017, ISBN: 978-0-08-102041-8 5. Roadmap to Sustainable Textiles and Clothing Eco-friendly Raw Materials, Technologies, and Processing Methods, Edited by Subramanian Senthilkannan Muthu, Springer Singapore Heidelberg New York Dordrecht London, 2014, ISBN 978-981-287-064-3, DOI 10.1007/978-981-287-065-0 6. Biodegradable and sustainable fibres, edited by R. S. Blackburn, Woodhead Publishing Limited, USA, 2005, ISBN-13: 978-1-85573-916-1 7. Roadmap to Sustainable Textiles and Clothing- Environmental and Social Aspects of Textiles and Clothing Supply Chain, Edited by Subramanian Senthilkannan Muthu, Springer Singapore Heidelberg New York Dordrecht London, 2014, ISBN 978-981-287-109-1, DOI 10.1007/978-981-287-110-7 8. Textiles and Clothing Sustainability- Sustainable Technologies, edited by Subramanian Senthilkannan Muthu, Springer Nature Singapore Pte Ltd. 2017 ISBN 978-981-10-2473-3, DOI 10.1007/978-981-10-2474-0 		

DKTES Textile and Engineering Institute, Ichalkaranji Final Year B. Tech. Textile Chemistry (Semester – VIII) TCLEL3-TCL468: MERCHANDISING		
Teaching Scheme: Lectures: 03 Hrs/Week	Credits 03	Evaluation Scheme: MSE: 25 Marks ISE: 15 Marks SEE: 60 Marks
Course Objectives: <ol style="list-style-type: none"> 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 <ol style="list-style-type: none"> 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		
Unit I	Organization of the Apparel Business	06 Hours
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 II	Marketing	06 Hours
Definition, steps involved in marketing, Marketing evolution, selling vs marketing, marketing environment, marketing research, marketing objectives and Strategies, marketing mix, fashion marketing planning.		
Unit III	Product Development	06 Hours
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 IV	Merchandising	06 Hours
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 calendar, range planning, critical path, Costing techniques and Spec Sheets. Visual Merchandising.		

Unit V	Sourcing	06 Hours
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 VI	Export Documentation	06 Hours
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 terms, WTO / GATT / MFA - Functions and objectives, success and failures.		
References Books:		
<ol style="list-style-type: none"> 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 3. Cooklin, Steven Hayes, John McLoughlin, Dorothy Fairclough, Blackwell 4. Publications, ISBN: 978-1-4051-9974-2 5. Garment Manufacturing: Processes, Practices and Technology by Prasanta Sarkar, Online Clothing Study. ISBN: 978-9383701759 6. Fashion Buying by Elaine Stone. McGraw-Hill In publication ISBN: 978- 0070617469 7. Apparel Merchandising by kumar . Abhishek Publications, ISBN: 9788182473010 8. Fashion Marketing by Mike Easey . john Wiley & Sons publication. ISBN: 978- 0632034598 		

DKTES Textile and Engineering Institute, Ichalkaranji Final Year B. Tech. Textile Chemistry (Semester – VIII) TCD469: PROJECT PHASE-II		
Teaching Scheme: Tutorial: 05 Hrs/Week	Credits 05	Evaluation Scheme: CIE: 50 Marks SEE: 50 Marks
Course Objectives: <ol style="list-style-type: none"> 1. To guide the students in their experiment work as per the plan of work. 2. To teach various tools of testing and analyze the test results. 3. To get the report prepared in the form of thesis as per the prescribed format. 4. To encourage them to work in group. 		
Course Outcomes: At the end of the course, students will be able to <ol style="list-style-type: none"> 1. Carry the experiment work as per the plan of work. 2. Use various tools of testing and analyze the test results. 3. Write the thesis as per the prescribed format. 4. Work in a group. 		
Course Contents		
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.as per the standard format.		
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 duly signed by all the team members, Guide, HOD, and Director along with one soft copy.

DKTES Textile and Engineering Institute, Ichalkaranji Final Year B. Tech. Textile Chemistry (Semester – VIII) TCD470: INTERNSHIP-II		
Teaching Scheme: Training Period four weeks during Winter vacation	Credits 03	Evaluation Scheme: CIE: 50 Marks SEE: -- Marks Total: 50 Marks
Course Objectives:		
<ol style="list-style-type: none"> 1. To expose the students to the industrial practice, environment its work culture and industrial practices. 2. To expose the students to machineries, processes and modern tools used in industries. 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 machineries and equipments. 		
Course Outcomes:		
At the end of the course, students will be able to		
<ol style="list-style-type: none"> 1. Understand the industrial, environment, work culture and industrial practices. 2. Understand the machineries, processes and modern tools used in industries. 3. Reproduce the techniques like Production Planning, Quality Assurance, Students will be able to maintenance practices, Environment and Pollution Control, Management Information System. 4. Acquire skills and techniques to work in industries. 		
Course Contents		
Unit I	Training	
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, Lay-out of the unit.		
Unit II	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 III	Project	
Objectives, Procedures, Observations, Analysis and conclusion of the project carried out.		
References Books:		
Specific guideline points given in Daily Diary.		

DKTES Textile and Engineering Institute, Ichalkaranji Final Year B. Tech. Textile Chemistry (Semester – VIII) TCP471: THEORY OF DYEING AND COLOUR MANAGEMENT LAB		
Teaching Scheme: Tutorial: 01 Hr /Week	Credits 01	Evaluation Scheme: CIE: 50 Marks
List of Assignments		
1	Preparation of database of Direct dye.	
2	Preparation of database of Disperse dye.	
3	Preparation of database of Vat dye.	
4	Preparation of database of Sulphur dye.	
5	Preparation of database of Reactive dye.	
6	Preparation of database of Acid dye.	
7	Preparation of database of Basic dye.	
8	Preparation of database of Cationic dye.	
9	Preparation of database of Pigment.	
10	Preparation of database of Natural dye.	
11	Recipe prediction of compound shade using CCM.	
12	Determination of rubbing fastness using CCM.	
13	Comparison of bleaching methods using CCM.	
14	Determination of washing fastness using CCM.	
15	Shade sorting using CCM.	
16	Determination of Tristimulus values.	
17	Estimation of whiteness Index & yellowness index.	
18	Determination of relative strength of dye.	
19	Batch correction using CCM.	
20	Estimation of colour strength difference.	
21	Determination of sublimation fastness using CCM.	
22	Determination of perspiration fastness using CCM.	

Submission – Two to Three Assignments per student.