

Anna University, Coimbatore
Faculty of Textile Technology
M.Tech Textile Technology (Textile Chemistry)

Full Time - Curriculum 2007

Semester I

Code. No	Course	Hours / Week			Marks		
		L	T	P	Sessional Marks	Exam Marks	Total
THEORY							
07 TC 101	Theory of Textile Chemical Processing	3	0	0	50	50	100
07 TC 102	Clothing Science & Textile Product Engineering	3	0	0	50	50	100
07 TC 103	Advanced Chemical Processing	3	0	0	50	50	100
07 TC 104	Theory of Dyeing & Auxiliaries	3	0	0	50	50	100
07 TC 105	Theory of Colour & Colourisation	3	0	0	50	50	100
07 TC 106	Quality Assurance & Experimental Methods	3	0	0	50	50	100
PRACTICAL							
07 TC 107	Product Development Lab	0	0	3	50	50	100

Semester II

Code.No	Course	Hours / Week			Marks		
		L	T	P	Sessional Marks	Exam Marks	Total
THEORY							
07 TC 201	Advanced Finishing Technology	3	0	0	50	50	100
07 TC 202	Advances in Processing Machinery	3	0	0	50	50	100
07 TC 203	Garment Processing	3	0	0	50	50	100
	Elective I	3	0	0	50	50	100
	Elective II	3	0	0	50	50	100
	Elective III	3	0	0	50	50	100
PRACTICAL							
07 TC 204	Production Process Lab	0	0	3	50	50	100

Semester III

Code. No	Course	Hours / Week			Marks		
		L	T	P	Sessional Marks	Exam Marks	Total
THEORY							
	Elective IV	3	0	0	50	50	100
	Elective V	3	0	0	50	50	100
	Elective VI	3	0	0	50	50	100
PRACTICAL							
07 TC 301	Textile Manufacturing & Quality Evaluation Lab	0	0	3	50	50	100
07 TC 302	Project Work (Phase I)	0	0	12	50	50	100

Semester IV

Code. No	Course	Hours / Week			Marks		
		L	T	P	Sessional Marks	Exam Marks	Total
PRACTICAL							
07 TC 401	Project Work (Phase II)	0	0	24	200	200	400

List of Electives for M.Tech Textile Technology (Textile Chemistry)

Code	Course Title	L	T	P	M
07 TCE 01	Modern Printing Technology	3	0	0	100
07 TCE 02	Applied Bio – Technology	3	0	0	100
07 TCE 03	Energy Management in Textile Industry	3	0	0	100
07 TCE 04	Textile Marketing and Merchandising	3	0	0	100
07 TCE 05	Non – woven & Specialty Textiles	3	0	0	100
07 TCE 06	Technical Textiles	3	0	0	100
07 TCE 07	Fabric Mechanics & Principles of Fabric Manufacturing	3	0	0	100
07 TCE 08	High Performance Fibres	3	0	3	100
07 TCE 09	Textile Composites	3	0	0	100
07 TCE 10	Engineering Research Methodology	3	0	0	100
07 TCE 11	Chemical Processing of Man Made Textiles	3	0	0	100
07 TCE 12	Advanced Garment Manufacturing Technology	3	0	0	100
07 TCE 13	Textile Costing & Process Optimisation	3	0	0	100
07 TCE 14	Textile Industry Management	3	0	0	100
07 TCE 15	Advanced Knitting Technology	3	0	0	100
07 TCE 16	Advanced Instruments for Textile Wet Processing	3	0	0	100

Anna University Coimbatore
Faculty of Textile Technology
Curriculum 2007 -08

M.Tech Textile Technology (Textile Chemistry)

Full Time Detailed Syllabus

Semester I

07 TC 101

Theory of Textile Chemical Processing

UNIT I

9

DE-SIZING: Necessity for Desizing and grey preparation - Mechanism of Desizing - important Desizing chemicals for grey fabrics and their chemistry – Efficiency of Desizing.

SCOURING: Mechanism of Scouring - surface tension and the mode of action of surface-active compounds - theory of detergency - important Scouring agents for Textile fibres and their chemical actions – practical problems in the Scouring of cotton and its blends.

UNIT II

9

BLEACHING: Mechanism of Bleaching - important Bleaching agents for Textile fibres and their chemical actions - chemistry of peroxide bleach and use of per-acetic acid for synthetic fibres – concept of full bleach and half bleach- Application of OBA to textile materials.

MERCERISATION: Mechanism of Mercerization - influencing parameters on Mercerisation quality of textile materials — methods of Mercerisation – evaluation of Mercerisation.

UNIT III

9

ELEMENTS OF DYE CHEMISTRY:

Classification of dye stuffs according to their chemical constitution / structure and specific applications –VBT and MO Theory of colour - interaction of dye molecules with polymeric chains – Fick's first and second Laws of diffusion – Adsorption theory – Study about natural dyes and their application to fibres like cotton, wool and silk.

UNIT IV

9

PRINTING

Printing methods and styles – Dye selection for Printing –Study about Printing thickeners and other Printing auxiliaries. Importance of various after treatment for printing materials. Printing of cellulosic, silk, polyester and nylon materials.

UNIT V

9

FINISHING

Necessity for Finishing – important mechanical finishes like heat setting, anti shrink , calendaring, Finishing chemicals for textile fibres and their chemistry – assessment methods for finished materials.

TOTAL 45 HRS.

REFERENCES:

1. Trotman,E.R., “Dyeing and Chemical Technology of Textile Fibres’, Charles Griffin & Co. Ltd., U.K., 1984.
2. Clifford Preston., “The Dyeing of Cellulosic fibres”, Dyer Company Publications Trust, 1986.
3. Shore.J.”Cellulosics Dyeing”, SDC, 1995
4. Lueas.J. et al, Colour Measurement - Fundamentals — Vol.1, Eurotex 1996
5. Shore.J., Colorants & Auxiliaries (Vol. 1 & 2) SDC, 1990
6. Burkinshaw.S.M, Chemical Principles of Synthetics Fibre Dyeing, Blackie, 1995

07 TC 102 - Clothing Science & Textile Product Engineering

UNIT I

9

DIMENTIONAL STABILITY: Hygral expansion - Relaxation shrinkage - Felting shrinkage - methods of measuring dimensional stability to dry cleaning and dry heat.

SERVICEABILITY: Snagging - Pilling - Abrasion resistance - Tearing strength - Tensile strength - Bursting strength -Corrosive strength - Launderability - Crock resistance - Flammability - Scorching - Fusing - Static electricity - Seam strength and slippage

UNIT II

9

COMFORT: Thermal comfort & conductivity - Air permeability - Water vapour permeability - moisture transport - wetting - wicking - sensorial comfort - water absorption - water repellency – oil repellency – soil resistance.

AESTHETICS: Colour - colour fastness - shade variation – colour measurement

UNIT III

9

FABRIC HANDLE: Bending - Drape - Crease recovery - fabric thickness - Shear - Bias extension - formability - fabric friction - objective evaluation of fabric hand by KES and FAST

UNIT IV

9

INTRODUCTION TO DESIGN LOGIC OF TEXTILE PRODUCTS – Classification of textile products and components.

YARN DESIGN : Material, technology, and specifications - yarn design elements - design based on structure and material properties

FABRIC DESIGN : Material, technology, and specifications - Fabric design elements - design based on structure and material properties

UNIT V

9

DESIGN OF APPAREL FABRICS : Design of women's & Girl's wear - fabric types and materials for European, American and Indian styles - design of men's and boy's wear - fabric type and materials for European, American and Indian styles – Tailorability of fabrics – tailorability of woven and knitted garments – tailorability of leather garments – tailorability of fur garments.

TOTAL - 45

REFERENCES:

1. Booth J.E-Principles of textile testing, Newnes, Butterworths, London, 1983
2. Mastuida T., and Suresh M.N., -Design logic of textile products, Textile Progress, Textile Institute, Manchester, 1997
3. Saville B.P-Physical testing of textiles, The Textile Institute, Wood head publishing limited, Cambridge, 1999
4. Hearle J.W.S., Textile Design-Journal of the Textile Institute (special issue), The Textile Institute, Manchester, 1989
5. Pradip V.Mehta - An Introduction to quality control for the Apparel industry, ASQC Quality Press, Mareel Dekker inc., New York, 1982
6. Jacob Solinger - Apparel Manufacturing Analysis, Textile Book Publisher, New York, 1988
7. Wingate L.B and Mohler J.F-Textile fabrics and their selection, Prentice Hall, New Jercy, 1984
8. Postle R., Kawabata.S and Niwa.M.,-Objective Evaluation of Fabrics, Textile Machinery Society of Japan, Osaka, 1983

07 TC 103 - Advanced Chemical Processing

UNIT I

9

CHEMICAL PREPARATORY PROCESSES: Combined preparatory processes —High temperature desizing enzymes for batch wise methods Solvent scouring Process – Methods to improve efficiency of peroxide bleaching -.Mechanism of one bath dyeing and preparation. One bath resin finishing and reactive dyeing

MERCERISATION: Hot Mercerisation combined with Flash Scouring –Comparison between mercerization and Liquid Ammonia Process.

UNIT II

9

FINISHING: Detail study about micro encapsulation and its application in various finishing of textile materials –Finishing of technical textiles –Formaldehyde free crease recovery finishing. Problems and remedies in the flame retardant finishing of polyester and its blends considering eco friendliness

UNIT III

9

DYEING: Developments in the application of direct, reactive, disperse dyes to textile materials using batch wise and continuous methods..

Concept of Right First Time dyeing method and its application. Developments in E controls dyeing m/c's

UNIT IV

9

ENERGY CONSERVATION AND POLLUTION CONTROL: Energy conservation steps in chemical processing - low wet pick-up techniques - causes and remedies for water and air pollution –Detail study about characteristic of textile effluent Developments in membrane techniques in the effluent treatment. Bio-technology in textile effluent treatment plants

UNIT V

9

BIO-PROCESSING: Application of enzymes in Textile Chemical processing - mechanism of enzyme reactions - Bio-scouring and Bio-bleaching and the other combined processes – enzymatic decolourisation of denim fabrics - Bio-polishing - developments of new fibers using Bio technology.

TOTAL – 45 Hrs.

REFERENCES:

1. Gulrajani.M.L “Modern Production Technologies”, The Textile Association (India) Publication, 1983
2. DatyeK.V and Vaidya.A.A, “Chemical Processing of Synthetic Fibres and Blends”, John Wiley and Sons, New York, 1984.
3. Venkatraman.K, “Chemistry of Synthetic Dyes” Vol. III, Academic Press, New York, 1991
4. Duckworth.C, “Engineering in Textile Colouration”, Dyers Company Publications Trust, U.K. 1983

07 TC 104 - Theory of Dyeing & Auxiliaries

UNIT-I 9

Theory of Dyeing: Various Adsorption isotherms, Absorption, Diffusion & Fixation Processes, Glass Transition temperature and its importance in dyeing, influences of Heat setting in dyeing.

UNIT-II 9

Theory of dyeing for Direct Dyes Dyeing, Reactive dyes dyeing, Sulphur dyes dyeing, Vat dyes dyeing, Disperse dyes dyeing, Azoic Colors dyeing , Acid dyes dyeing ,Metal complex dyes dyeing, Basic dyes Dyeing

UNIT-III 9

Surfactants: General consideration, mode of action and classification of surfactants – cationic, anionic, nonionic and amphoteric surfactants. Auxiliaries associated with De-sizing, scouring, Bleaching of cellulosic fibres, Protein fibres and synthetic fibres.

UNIT-IV 9

Auxiliaries associated with Dyeing with Direct Dyes, Reactive, Vat, Azoic colors, Sulphur dyes, Acid dyes, Metal complex dyes, Basic and Disperse dyes.

UNIT-V 9

Auxiliaries associated with printing: Direct Style of Printing, Discharge style of Printing, Resist style of printing., Auxiliaries used in Resin Finishing, Stiff finishing, soft finishing, Water repellent, Water Proof, Flame retardant, Soil release.

TOTAL – 45 Hrs

REFERENCES

1. Shennai.V.A, ‘Organic Textile Chemicals’, Sevak Publication, Bombay, 1995
2. Vaidya.A.A, Chemistry of textile auxiliaries, Wheeler Publishing, New Delhi, 1999
3. John Shore, Colourants & Auxiliaries: Wiley and Sons Ltd, New York, Volume I & II, 1999

07 TC 105 - Theory of Colour & Colourisation

UNIT I

9

COLOUR AND COLOUR VISION:

Definition of colour and its classification– Structure and function of the eye — Detail study about rods and cones.– Modeling the colour vision process – Tests for defective colour vision. Study about metamerism

UNIT II

9

MODERN MEASUREMENT OF COLOUR:

Detail study about colour measuring instruments like Spectro-photometer — Color eye – Derivation of KM equation and its application. Colour difference equations and application

UNIT III

9

COMPUTER COLOUR MATCHING:

Derivation the equation for Evaluation of depth and relative depth – Evaluation of fastness test results – Evaluation of whiteness and yellowness – Recipe formulation and correction. Development in CCM. Problem and solution to measure OBA treated materials

UNIT IV

9

THE INFLUENCE OF FIBRE STRUCTURE ON DYEING:

Dyeing properties related to the inherent physical structure of the fibre– The relationship between preparation and the physical properties of man-made fibres – The interaction between dyes & fibre forming polymers. Methods to find out nature of bonding in dyes materials. Study about four types of adsorption isotherms

UNIT V

9

DYEING MODELS:

Mechanisms of reactions of reactive groups – Kinetics of hydrolysis of reactive groups – Methods to avoid hydrolysis and to get better fixation . Methods to improve dyeability of textile materials such as crafting, cationisation ,solvent treatment etc

TOTAL – 45 Hrs.

REFERENCES:

1. Shah.H.S and R.S.Gandhi, 'Instrumental colour measurements and computer aided colour matching for textiles', Mahajan book distributors, Ahmedabad, 1990
2. Ashish Kumar Chaudry, "Colour Science". Mahajan book distributors, Ahmedabad, 1990
3. Peters.A.T and Freeman H.S "Physico-chemical principles of colour chemistry", Blackie, 1995.
4. Allan Johnson, The Theory of colouration of textiles, SDC, 1989.
5. Wyszecki.G., and W.S.Stile, 'Colour science, concept and methods, Quantitative data and formulas', John Wiley and Sons, New York, 1982
6. Bilmeyer,F.W., and M.Saltzman, 'Principles of Colour Technology', John Wiley and sons, New York, 1981.

07 TC 106 - Quality Assurance & Experimental Methods

UNIT I

9

QUALITY ASSURANCE: Concepts of quality, its control and assurance - ISO 9000, 14000 & SA 8000 certification and quality assurance systems.

UNIT II

9

FIBRE QUALITY: Quality parameters and their control for natural and synthetic fibres - optimisation of mixing quality - concept of fibre quality index.

YARN QUALITY: Quality parameters and their control in spun and filament yarns - concept of yarn quality index - on-line quality evaluation - Effect of winding and direction of twist on yarn quality, Influence of fibre characteristics on yarn quality.

UNIT III

9

FABRIC QUALITY: Quality parameters and their control in grey and processed woven and knitted fabrics - Fabric comfort and aesthetics - concepts of handle and its measurement systems - fabric defect control - Assessment of quality of chemical processing.

UNIT IV

9

GARMENT QUALITY: Quality parameters and their control in pattern making, cutting and in garments- Labeling and Packing quality.

UNIT V

9

METHODS: Probability distributions- techniques of collection of performance data - Methodology of data analysis and level of significance - fitting distribution to data - analysis of variance - Experimental design for ANOVA — Regression analysis.

Factorial designs - composite, orthogonal and rotatable designs -Response surfaces and their Canonical analysis - desirability function

TOTAL 45 .Hrs.

REFERENCES:

1. Saville, Physical Testing of Textiles, Woodhead Publications, January 1999
2. Chuter.A J, Quality management in the clothing and textile industry, Woodhead Publications, January 2002.
3. Booth J.E, Principles of Textile Testing, Newenes, Butterworths, London,2003
4. Anitha.A.Stamper “Evaluating Quality’ Fairfield Publications New York, 1986
5. Spivak.S, Quality - Journal of the Textile Institute Special Issue., The Textile Institute, 1993
6. Bishop.D., Fabrics, Sensory & Mechanical Properties (TP Vol 26 No.3) The Textile Institute, Manchester, 1996
7. Akhnazarova.S., & Kafarov.V., Experiment Optimisation in Chemistry and Chemical Engineering, Moscow Publications, Moscow, 1982
8. Mittal .R.M., & TrivedLS.S., Chemical Processing of polyester and Blends - ATIRA, Ahmedabad, 1983.

07 TC 107 - Product Development Lab

1. Single stage scouring and bleaching of cotton using hydrogen peroxide bleaching.
2. Solvent scouring of cotton fabric
3. Single bath bleaching and OBA treatment of polyester fabric.
4. Simultaneous dyeing and Resin finishing of cotton fabric.
5. Transfer printing of polyester
6. Transfer printing of Cotton
7. Bio polishing of cotton fabric
8. Dyeing of P/C blend using single bath method
9. Denim washing

Semester II

07 TC 201 - Advanced Finishing Technology

UNIT I

9

Commercial importance of finishing – Advances in Resin finishing, Mechanism of creasing, Types of Resins .Anti crease, wash and wear, durable press resin finishing. Causes & remedies of strength losses of Resin finished fabric. Mechanism of Chlorine retention. Formaldehyde Release from Resin finished goods. Study about eco friendly method of anti crease finishing

UNIT II

9

Concept of Flame proof & flame retardancy. Concept of pyrolysis, Flame retardant finishes for cotton, Concept of waterproof and water repellent Finishes, Durable water repellent finishes on cotton, Mildew proof finishes and Rot proof finishing.

UNIT III

9

Soil Release Finishing: Mechanism of soil retention & soil release. Various soil releases finishes for cotton, Polyester and its blends. Detail study of antistatic finishes. Ant pilling Finishing: chemical and mechanical methods to produce antipilling finish.

UNIT IV

9

Detail study about mechanical finishing of textile materials like calendaring, compacting ,Sanforising, Beach finishing. Object of Heat setting. Various methods of heat setting and mechanism of heat setting. Foam Finishing: Detailed study of various techniques of foam application. Drawbacks of foam finishing.

UNIT V

9

Mechanism in the weight reduction of PET by using alkali ; micro encapsulation techniques in finishing process, Detail study of the process to produce silk like Polyester. Felting of wool, Woolanisation of jute. Study about cationic, reactive and silicon emulsion softeners. Brief study about stiffening of textile materials

TOTAL 45 Hrs.

REFERENCES:

1. Perkins, W.S., “Textile colouration and finishing”, Carolina Academic Press.,U.K, 2001
2. Fiscus, G., and Grunenwald,D., “Textile finishing : A complete guide”, High tex, Blackwells Bookshop, Leeds, U.K.2004
3. Lewin & Sello, Functional finishes, Part A & Part B;CRC Press,1994
4. Microencapsulation in finishing, Review of progress of Colouration, SDC, 2001

07 TC 202 - Advances in Processing Machinery

UNIT I: 9

Advances in fiber dyeing machine - Advances in cheese dyeing machine- importance of winding in yarn dyeing — calculation of winding density — various yarn dyeing defects caused by cheese dyeing machine - detailed maintenance schedule for cheese dyeing machines.

UNIT II: 9

Advances in Beam dyeing - Advances in soft flow dyeing machines, Advances in jet dyeing machines — Developments in jiggers, Continuous dyeing machineries & its developments— Various dyeing defects caused by the above machineries.

UNIT III: 9

Hydro extractor, Rope opener RF dryer, Yarn dryer, Knitted fabric dryer, Hot flue dryer, Stenter & its type. Sanforising machine, Compacting machines, Beach finishing machines.

UNIT IV: 9

Principle and working of fully automatic flat bed screen printing machine –Rotary Printing machine- Transfer Printing machine-Garment Printing machines- Various practical problems & possible remedies in the above Printing machineries.

UNIT V: 9

Garment dyeing machines, Tumble dryer, Fusing machines, Backfilling machine, Importance of maintenance of processing machineries, Machineries used for foam application. Preparation of screens for Rotary Printing machines.

TOTAL 45 HRS.

REFERENCES:

1. R.S.Bhagwat, 'Wet Processing Machineries'.Mahajan Publications, 2000
2. Usenko V. Processing of man made fibres 1975, M.I.R. Publishers, Moscow
3. Gokhale S.V. & Dhingra A.K. maintenance in chemical processing department of textile mills, ATIRA.1994,
4. Patel, Textile Wet processing machineries- ATIRA.1995.

07 TC 203 - Garment Processing

Unit I

9

Developments in garment processing and its future – Problems in garment dyeing – Remedies – Considerations and precautions to be taken for garment Dyeing – Pros and Cons of garment dyeing – Chemical preparation of garments for dyeing and printing. Use of enzymes in the preparation.

Unit II

9

Dyeing of cotton and P/C Blended garments using reactive dyes & vat dyes. Dyeing of socks and hose – Dyeing of fasteners – Machines for garment dyeing – Paddle, rotary torodial – Solvent dyeing, sancowad process – Dyeing of wool garments – Dyeing of polyester garments – Printing of garments – Cut process /pattern stage.

Unit III

9

Wash down effects, stone wash, Enzyme wash, Bio – polishing, Acid wash, sand blasting, leather finish, rubbery touch, feather touch, peach skin finish, ION wash, mud wash, chalk wash, easy care finishes, wrinkle free and wrinkle resistant finish, water repellent finish, UV protective garments, Anti – microbial (or) anti – bacterial inhibition finish, silicone softeners – dimensional stability of knit garments, ozone fading & anti – ozonisation, fire retardant finishes for garments, functional finishes for garments.

Unit IV

9

Finishing techniques, Dip process, Tumbling process, pad – dry – cure method. Stone washing machines, tumble dryer, used look finishing machines, garment finishers, hand finishers, multiform finishers, shirt finishers, pant finishers, cabinet finishers, tunnel finishers, continuous finishers.

Unit V

9

Selection of garments, need for garment care. Identification of stain – classification of soil and stains cleaning processes – Air & Wet cleaning, Stain removal, Laundering using detergents & dry cleaning. Laundry procedures for natural and synthetics. Drying, pressing, storage – protection against light temperature, microbes, hand washable and machine washable garments – Garment care and care labeling.

TOTAL 45 Hrs.

REFERENCES:

1. Trotman.E.R.”Dyeing and Chemical technology of textile fibres”,B.I.Pub.,New Delhi.1994.
2. Noemia D’ Souza ,Fabric Care, , New AGE International Pub.1998
3. NCUTE – Programme series, Finishing of Garments and Knits, held at Ichalkaranchi, IIT,Delhi.
4. NCUTE – Programme series, Garment Manufacturing Technology, IIT, New Delhi.
5. Harrison.P.W Garment Dyeing, , The Textile Institute Publication, Textile Progress, Vol .19 No.2,1988

Elective I

Elective II

Elective III

07 TC 204 - Production Process Lab

1. Scouring of cotton fabric in laboratory model kier
2. Bleaching of cotton fabric in laboratory model jigger for full white
3. Dyeing of cotton fabric in laboratory model jigger using reactive dyes
4. Dyeing of Polyester/Cotton fabric in laboratory model jigger using Disperse/Reactive dyes
5. Dyeing of knitted cotton fabric in laboratory model winch using reactive dyes
6. Dyeing of cotton woven fabric in laboratory model padding mangle
7. Pigment printing woven fabric using table screen printing.

Semester III

Elective IV

Elective V

Elective VI

07 TC 301 - Textile Manufacturing & Quality Evaluation Lab

1. Testing of Handle Properties
2. Testing of Comfort Properties
3. Testing of Medical Textiles
4. Analytical chemical analysis of industrial chemicals
5. Analytical chemical analysis of dyes
6. Testing of Dyed materials by CCM
7. Testing of knitted materials
8. Mechanical properties of yarn
9. Mechanical properties of Fabric

07 TC 302 - Project Work (Phase I)

Semester IV

07 TC 401 - Project Work (Phase II)

List of Electives for M.Tech Textile Technology (Textile Chemistry) - Full Time

07 TCE 01 - Modern Printing Technology

07 TCE 02 - Applied Bio – Technology

07 TCE 03 - Energy Management in Textile Industry

07 TCE 04 - Textile Marketing and Merchandising

07 TCE 05 - Non – woven & Specialty Textiles

07 TCE 06 - Technical Textiles

07 TCE 07 - Fabric Mechanics & Principles of Fabric Manufacturing

07 TCE 08 - High Performance Fibres

07 TCE 09 - Textile Composites

07 TCE 10 - Engineering Research Methods

07 TCE 11 - Chemical Processing of Man Made Textiles

07 TCE 12 – Advanced Garment Manufacturing Technology

07 TCE 13 - Textile Costing & Process Optimisation

07 TCE 14 - Textile Industry Management

07 TCE 15 - Advanced Knitting Technology

07 TCE 16 - Advanced Instruments for Textile Wet Processing

ELECTIVE Courses SUBJECTS SYLLABUS

07 TCE 01 - Modern Printing Technology

UNIT I	9
Computer aided design systems for textile printing - Recent developments in textile printing machinery including automation.	
UNIT II	9
Developments in Digital printing -Developments in Photo printing and Blast printing with Indigo.	
UNIT III	9
Developments in Xerox printing and Laser printing for fancy effects.	
UNIT IV	9
Developments in preparation of printing inks.	
UNIT V	9
Developments in Auxiliary chemicals used in printing - Developments in post-printing operations.	

Total = 45 Hrs.

REFERENCES:

1. Miles.L.W.C., Textile Printing, Dyers company Publishing Trust, U.K., 1981
2. Shenai.V.A, "Technology of Printing", Sevak Publishers, Mumbai. 1990
3. Shore.J, Colorants & Auxiliaries, Vol. I & II, S.D.C, 1990
4. Ujiiie, Digital Printing of Textiles, CRC,ISBN-10: 0849391008, Wood Head Publishing Ltd,UK, 2006.
5. Tyler, Textile Digital Printing Technologies, Textile Institute Publication UKVol.37 No.4, 2005.

07 TCE 02 - Applied Bio – Technology

UNIT I

9

INDUSTRIAL BIO-TECHNOLOGY – Industrial microbial products – applications, primary metaboloids and secondary metaboloids , Enzymes & Proteins – sources and applications, cell and enzyme immobilization, Industrial plant products – production of enzymes and polysacchrides.

UNIT II

9

ENVIRONMENTAL BIO-TECHNOLOGY –Detailed study about pollution and its control in textile processing industries. Waste water treatment systems – Anaerobic & Aerobic systems, Bio-degradation – Micro organism in pollution control; Bio mass production; waste as renewable sources of energy — Production of bio gas production of hydrocarbon – Hydrogen fuel.

UNIT III

9

ENZYMES USED IN TEXTILE INDUSTRY – enzymes for desizing, scouring & bleaching Enzyme activity – initiation, propagation and termination reactions – reaction conditions – properties of substrates and results of enzyme treatment. Enzyme activity of amyloglucosidase, pectinase, glucose oxiclase, peroxidases and other enzymes used for bleaching decolourisation of textiles using laccases. Bio-Polishing enzymes such as cellulases. Bio-washing enzymes using cellulase proteases for scouring of animal fibres, degumming of silk and modification of wool properties.

UNIT IV

9

EVALUATION OF ENZYME TREATED FABRICS – Weight loss, Whiteness index, Absorbency, Tensile strength, Handle of fabric and Abrasion resistance. SEM analysis and other structure related studies.

UNIT V

9

BIO – PROCESSING IN TEXTILES - Bio-bleaching, combined bio - processing, bio washing, bio polishing, Denim fading, anti odour and anti microbial finishes, bio finishing and other applications.

TOTAL = 45 Hrs.

REFERENCES

1. Betrabet S.M. BTRA Seminar, Book of papers (Jan 1994)
2. Tyndall R.M and Raligh N.C. AATCC Book of papers (1991)
3. Asfert L.O and Videback.T Intl Textile Bulletin – Dyeing / Printing / Finishing (1990)
4. Cavaco - Paulo, Gubitz, Textile Processing With Enzymes, Wood Head Publishing Ltd,UK,2003.
5. Ignacimuthu.S & Tata McGrawS.J, “Basic Bio-Technology”,-Hill Publications,1995

07 TCE 03 - Energy Management in Textile Industry

UNIT I	9
INTRODUCTION: Concept of energy management — need for energy conservation — global energy scenario with specific reference to India— Demand side management (DSM) — Role of energy service companies (ESCOs)	
UNIT II	9
ENERGY CONSUMPTION ANALYSIS: Textile machines — Ancillaries — Component wise consumption — Specific energy consumption (UKG) — Cost of energy Vs sales value of textile product.	
UNIT III	9
ENERGY CONSERVATION: Electrical and Thermal audit — Productive and ancillary machines — Preparatory, Spinning, Post spinning, Weaving and Wet processing machines — Ancillaries — Humidification / Air conditioning, Lighting, Compressors and Boilers and Generators. Different types of fuels and then notes in energy conservation.	
UNIT IV	9
ENERGY EFFICIENT EQUIPMENT: Energy efficient equipment for various processing machines and ancillaries — economics with pay back period and Return on Investment (ROI). ENERGY INSTRUMENTATION: Energy monitoring instruments — Analog, Digital and computerized instruments and measurement techniques — maintenance of instruments / equipment.	
UNIT V	9
APPLICATION OF NON CONVENTIONAL ENERGY SOURCES: Solar energy: different type of collectors — photovoltaic cells. Wind energy, Bio energy, environmental impact on energy and co-generation by using different techniques.	

TOTAL 45 Hrs.

REFERENCES:

1. Kalyanaraman. A.R, “Energy conservation in Textile Industries”, SITRA 1995
2. Palaniappan. C et al, “Renewable Energy applications to Industries”, Narose Publishing House, New Delhi, 1998
3. Energy Management an FCRA Monograph, 1998
4. Pradeep Chaturvedi & Shalini Joshi, “Strategy for energy conservation in India”, Concept publishing Co., New Delhi, 1995

07 TCE 04 - Textile Marketing and Merchandising

UNIT I

9

MARKETING: Marketing Concepts, Marketing Management, Marketing System, Marketing environment, Marketing Organisation, Strategic Marketing Process, Competitive marketing strategy - Marketing of Apparel and Fashion Products

UNIT II

9

BUYING BEHAVIOUR: Factors influencing buying behaviour - Buying process
SEGMENTATION: Market segmentation - segmentation variables - Target Marketing

MARKET MEASUREMENT- Market Potential- estimation - Demand Forecasting -methods of forecasting

UNIT III

9

MARKETING MIX: Product, Price - Promotion and Distribution - Advertising and Sales Promotion - Public Relations.

UNIT IV

9

PRODUCT LIFE CYCLE: Life cycle of product -Marketing strategy for various stages of life cycle - new product development.

MARKETING RESEARCH: Purpose, Procedure and applications

UNIT V

9

MERCHANDISING: Merchandise – definition - Apparel and Fashion Merchandising - Role of Merchandiser - Types of Merchandises - Export House, Manufacturer, Buying House, Buying Agency and Comparison between them - Selection of Buyers and Buying Agencies - Merchandising Correspondence - orders, handling of orders and dealing with manufacturers - Advertising - Trade fair participation and other methods of sales promotion in merchandising

TOTAL = 45 Hrs.

REFERENCES:

1. Philip Kotler, 'Marketing Management', Printice Hall Inc 1996
2. Taarno, Guerreiro & Judelle 'Inside the fashion business' 1995
3. "Clothing Retailing in Europe", Corporate intelligence on retailing, 1997
4. "The Textile Industry", Winning strategies for the new millennium volume 2" Textile Institute., 1999.
5. Evelyn C. Moose, Wey II. "Path For Merchandising" 1999.
6. Jarnow.J & Dickerson.K.G, "Inside the Fashion Business", Prentice Hall, 1997.

07 TCE 05 - Non – Wovens & Specialty Textiles

UNIT I

9

NON-WOVENS: Classifications of Non-woven fabrics - Raw materials. Principles of web forming – Role of cross lapper.

Web bonding techniques - chemical, mechanical, thermal, air-bonding, spun bonding, needle punching, hydro entanglement processes.

UNIT II

9

Structure of Non-woven fabrics - Macro structure, Structural elements - their arrangement, bonding and binding. Homogeneity of non-wovens.

Evaluation of Non-woven fabrics. End uses and Techno-economics. Felts and in the process of Felting – technical considerations of felting. Decorative techniques in non-woven production.

UNIT III

9

NARROW FABRICS: Classification and Definition - Preparatory processes. Fabric Production - Conventional shuttle looms, Endless Tape Looms, Circular Hose Pipe looms. Shuttleless Looms - Catch thread and flat knitting edge looms; Multi colour Needle Jacquard looms.

UNIT IV

9

Production of Industrial Tapes, Elastic Tapes, Zip fastener tapes; Woven and printed Laboratoryels.

Stretch fabrics - classification and its production; Elastomeric stretch fabrics; Braided fabrics; - Tubular structures - Braiding Machine; Nets and Laces - Types and description of Lace Machines - Knitting of laces - Tricot Lace Machines. Flocked fabrics - The process of focking.

UNIT V

9

Carpets - Non-pile carpet weaves and their looms. Tufted carpets and their production -Pile surfaced carpet weaves and their looms. Needle felt floor coverings.

TOTAL 45 Hrs.

REFERENCES:

1. Gulrajani.M.L., “Non wovens”, The Textile Association(India) publication 1996.
2. Birrell.V., The Textile Arts, Harper & Brothers Publications, New Yak, 1999.
3. Denise Musk, Machine Knitting, B.T.Batsford Ltd, London, 1999
4. Wilhelm Albrecht etal., " Nonwoven fabrics", WILEY - VCH Verlag Gmbh & Company, Germany, 2003.
5. Russel.S, "Handbook of Nonwovens", The Textile Institute Publication, 2007.
6. Irsak.C, " Nonwoven Textiles" Textile Institute", Manchester, 1999
7. Krcma.R., Manual of Non-wovens, Textile Trade Press, Manchester 1993.

07 TCE 06 - Technical Textiles

UNIT I

9

HIGH PERFORMANCE FIBRES: Manufacture of glass filaments and staple fibre - properties and applications of filament and staple fibre yarns. Asbestos Thread: Manufacturing process - properties and applications of asbestos yarn. Ultra High Modulus fibres - Carbon fibres - Aramid fibres.

UNIT II

9

TYRE CORDS AND FABRICS: Requirements of tyre cord — suitability of various fibres— Polyester and Nylon tyre cords — manufacture of tyre cords — physical and mechanical property requirements of tyre cord fabrics— fabric design — Specifications - Rubberised textiles.

UNIT III

9

BELTS: Conveyor belts — physical and mechanical properties— construction, manufacture of conveyor belts & power transmission belts.
HOSE: Construction, applications and properties (physical and mechanical).

UNIT IV

9

FILTER FABRICS: General consideration of filtration of solids from liquids, solid from gases, solids from solids, liquids from liquids, liquids from gases and gases from gases.

PROTECTIVE CLOTHING: Fire protection—thermal protection — electro-magnetic protection — water proof fabrics — protection against microorganisms, chemicals and pesticides – protection against aerosols.

UNIT V

9

MEDICAL TEXTILES: Surgical Textiles — Suture threads, Cardio Vascular Textiles — Knitted cardiac biological valves. Dialysis Textiles— Hollow fibres as dialysis membrane. Hospital Textiles - Operation and post operation clothing—disposable draperies; sanitary applications.

GEO-TEXTILES: Geo Textile functions — raw materials — woven, non-woven and knitted geo textiles— Applications of geo-textiles for drainage, separation, soil reinforcement, filtration and erosion control.

Textile materials in foot-wear, automotive, agriculture and maritime applications.

TOTAL: 45 Hrs.

REFERENCES:

1. Recent advances in Technical Textiles, Indian Journal of Fibre and Textile Research, Editor V.K.Kothari, CSIR, New Delhi, 1997
2. Horrocks.A.R, Anand.S.C, Technical Textiles, Wood head Publishing.2000
3. Sabit Adanur, Hand Book of Industrial Textile, Willington Sears,1995
4. Hearle, JWS, High Performance Fibers, Wood head Publishing.UK, 2001
5. Kendey, Anand,Miraftad,Rajendran, Medical Textiles and Bio Materials for Health Care, Wood head Publishing.UK, 2005
6. Scott, Textiles for Protection, Wood head Publishing.UK, 2005
7. Ed. Harrison, P.W.Design and analysis of Industrial fabrics, Rotterdam Conference, Textile Institute, Manchester, UK, 1997

07 TCE 07 - Fabric Mechanics & Principles of Fabric Manufacturing

UNIT I

9

FABRIC MECHANICS: Fabric specifications and cover factor. Plain cloth geometry - crimp ratio and thread spacing - fabric setting theory and maximum sett. Peirce's flexible and elastic thread model- Oloffson's general model.

Crimp interchange in woven fabrics-crimp balance-geometrical structure of twill and matt weave.

UNIT II

9

Tensile properties of woven fabrics-geometrical changes during the extension of cloth-load extension modulus. Application of force, energy and finite element method in fabric tensile behaviour.

UNIT III

9

Theories of Fabric Bending, Buckling, Shear and Drape, Tearing, Wrinkling and Hand.

THEORY OF FABRIC MANUFACTURING: Theory of weft unwinding and storage in high speed weaving. Theoretical calculations of weft insertion time-loom speed-multi section weaving.

UNIT IV

9

BALLISTIC WEFT INSERTION: Theory of torsion bar picking-Elastic theory of shuttle picking. Theory of weft insertion-velocity and acceleration-trajectory of flight-Braking of carrier-Picking force calculation in shuttle and gripper systems.

JET PICKING: Theory of air and water jet weft insertion-Air/Water Velocity-tractive force-acceleration of weft yarn.

UNIT V

9

BEAT-UP: Kinematics of sley driven by eccentric, crank, link and cam mechanisms-moment of inertia of sley - beat-up force - sley eccentricity-mechanics of beat-up - rotary beat-up.

DRIVE: Requirement of clutch and brake for high speed weaving machines-timing diagram and mechanics of clutch and brake.

TOTAL 45 Hrs.

REFERENCES:

1. Hearle. J.W.S., 'Fabric Geometry' The Textile Institute, 1987
2. Sriramalu P K, Ajaonkar D B & Talukdar M K, "Weaving Machines; Mechanisms, Management" Mahjan publishers: Ahmedabad 1998.
3. Marks P & Robinson A T C "Principle of weaving", The Textile Institute 1989.
4. Lord P R & Mohamed M K "Weaving: Convesion of Yarn and Fabric", Merrow Publications 1992.
5. Adamir S "Handbook of Weaving", Technormic Publish Company. inc 200

07 TCE 08 - High Performance Fibres

UNIT I **9**
 Introduction-Fibre Growth Pattern — Major attributes and advantages — Product development areas. Aramid — Fibre formation — fibre structural properties and performance — Applications.

UNIT II **9**
 Carbon and Graphite - Classification— manufacturing processes from Polyacrylonitrile (PAN) and Rayon. Glass fibres — Types and composition— Manufacturing processes - Fibre structures— Properties — Applications. Asbestos fibres — types — manufacturing processes— Fibre structure — Properties — Applications.

UNIT III **9**
 Ceramic fibres — Classification and fibre formation, composition and structure — properties and applications. Polyurethane Elastomeric fibres — manufacturing processes — Fiber properties — Applications and future trends.

UNIT IV **9**
 Polypheyl sulphide fibres — Fibre formation — Fibre properties — Applications.
 Metallic fibres - Aluminium Oxide fibres — Preparation and manufacturing process — Fibre structure — properties — applications – Composites of Aluminium Oxide fibres.

UNIT V **9**
 Polystyrene —based fibres-preparation —properties —application - water purification-removal of heavy metal ions - Ultra pure water - Bio absorbable fibre —cotton ,Rayon ,Modified Synthetics —Hollow fibres —Requirements of medical use— Mechanism of absorbency.

Total : 45 Hrs

REFERENCES:

1. Mukhopadyay. S.K, "High Performance Fibres", Textile progress Vol. 25, Textile Institute Manchester, 1993
2. Menachen Lewis & Jack Preston — High Technology Fibres Pt. B. Merceb Dekkar Inc., New York, 1993.
3. Hearle, JWS, High Performance Fibers, Wood head Publishing.UK, 2001

07 TCE 09 - Textile Composites

UNIT I

9

INTRODUCTION: Types of composites - fibre particulate and laminar composites - examples.

FIBRE COMPOSITES: Constituents - functions of fibre and matrix — Properties of fibres — Critical fibre length — Aligned and random fibre composites — property prediction - rule of mixtures — simple problems.

UNIT II

9

COMPOSITE MATERIALS: Types of high performance fibres - properties - types of matrix materials - Thermoset and Thermo plastics properties — short fibre composites — fibre matrix interface — coupling agents — coupling of interfaces and interfacial reaction in fibre composites — tensile strength of continuous and discontinuous composites -fracture mode in fibre composites.

UNIT III

9

PREPREGS: Introduction to manufacturing techniques - property requirements — Textile preforms - weaving, knitting and braiding.

UNIT IV

9

COMPOSITE MANUFACTURING TECHNOLOGY: Vacuum bagging - compression moulding — injection moulding - pultrusion – thermoforming — filament winding - resin transfer moulding.

UNIT V

9

PROPERTIES OF COMPOSITES: Testing of composites— Fibre volume fraction -Laminar tensile - shear - compression - and flexural properties — interlaminar fracture/failure modes in composites - applications for composites.

Total = 45 Hrs.

REFERENCES:

1. Hull.D, An introduction to composite materials - Cambridge University Press - Cambridge, 1998
2. Gupta.L, “Advanced Composite Materials”, Himalayam Books, New Delhi, 1998.
3. Mathews F.L and Rawlings R.D “Composite Materials Engineering science” Chapman & Hall, London 1994.
4. Bogdanovich.A and Pastore.C, Mechanics of Textile and Laminated composites, Chapman & Hall, 1997
5. Hearle. J.W.S — “High performance fibres composites and engineering textile structures Journal of the textile institute (special issues) - The Textile Institute 1990.

6. Kostikov, V.L., Fibre Science and Technology (Soviet Advanced Composites Technology Series), Chapman & Hall, 1995.
7. Carlsson L.A. and Byron Pipes R. “Experimental characteristics of advanced composite materials” Prentice Hall, Inc 1987.

07 TCE 10 - Engineering Research Methods

UNIT I

9

Research objectives & approaches— literature review — databases and search engines.
Defining research problem—Research design — formulation of Hypothesis

UNIT II

9

Measurement and Scaling techniques — Data collection & Processing of data for survey type studies.

UNIT III

9

Testing of Hypothesis — Statistical test methods — Parametric and Non-parametric methods - Analysis of variance — Multivariate analysis techniques.

UNIT IV

9

Optimization techniques Optimisation by steepest ascent — multicriterion Optimisation — variables, constraints and objective functions — desirability function — D&G optimality.

UNIT V

9

Selection and use of measurement techniques — data acquisition and analysis.
Interpretation of results — Neural Network for data analysis.

TOTAL=45 Hrs.

REFERENCES:

1. Kothari.C.P, “Research Methodology — Methods & Techniques” Mishra Prakeshan, New Delhi 2000
2. Montgomery D.C., Design and analysis of experiments, John Wiley & sons, New York 1975
3. Doebeling E.O., Measurement systems — Application and Design, McGraw-Hill, Singapore, 1986.
4. Kidder LH, Research methods in social relations, Hall Saunders International, Japan, 1981.
5. Sedhu AM and Singh A, Research Methodology in Social Sciences, Himalaya Publishing House, Mumbai, 1998.

07 TCE 11 - Chemical Processing of Man Made Textiles

UNIT I

9

Various Preparatory processes for manmade textile -Heat setting of synthetic fabrics - effects of heat setting on dyeing. Mass Colouration of Polyester, Nylon, Acrylic and polypropylene, Advantages & Dis advantages of Mass Colouration; Difference between Mass Colouration and Dyeing.

UNIT II

9

Polyester Dyeing: carrier, HTHP and thermosal methods of dyeing. Practical problems and their solutions. Stripping of dyed PET.Dyeing of nylon. Dyeing with acid dyes-High temperature dyeing. Low temperature dyeing of Nylon 66 – Dyeing with disperses dyes.Barriness of dyeing.Dyeing of Acrylic Fibres: – Dyeing with cationic dyes– stripping of cationic dyes, dyeing with disperse dyes, dyeing of acrylic blends, differentially dyeable acrylic fibres.

UNIT III

9

Dyeing of Polyester Blends: Various shop floor practices of dyeing of polyester/cellulosic-blended fabrics. Practical problems and their solutions. Various shop floor practices of dyeing of polyester/wool blended fabrics. Practical problems and their solutions. Dyeing of polyester with cationic dyes. Dyeing of Micro polyester fabric. Dyeing of polyamide cellulosic blends – polyamide/wool blends, polyamide/ polyester blends-Stripping of Nylon dyed material. Practical problems and remedies in Nylon Dyeing. Dyeing of unmodified and modified polypropylene.

UNIT IV

9

Printing of synthetic and blended fabrics with different dye classes - Direct, resist and discharge styles of printing - Transfer printing of polyester and blends.

UNIT V

9

Different functional and easy care finishes on synthetics and blends like anti-stat, soil-release, soil-resistant, flame-retardant.

TOTAL = 45 Hrs.

REFERENCES

1. Vaidya, A.A., and Datye, K.V., “Chemical processing of Synthetic Fibres and Blends”, John Wiley and Sons, New Delhi,.1999
2. Shore, J. “Blend Dyeing”, SDC, London, 1998
3. Mittal.R.M. & Trivedi.S.S, Chemical Processing of polyester and blends – ATIRA.1998
4. C.Duckworth, Engineering in Textile colouration, Dyers company publications trust, U.K. 1983.
5. Burkinshaw.S.M., Chemical principles of synthetic fibre dyeing, Blackie, 1995.
6. Gulrajani, M.L., “Polyester Dyeing”, IIT, New Delhi, 1995.

07 TCE 12 - Advanced Garment Manufacturing Technology

UNIT I

9

INTRODUCTION: Garment classification for men, women, children and uniforms - fabrics selection for garments - properties of fabric finishes (fundamental and decorative) - specifications and testing.

UNIT II

9

PATTERN MAKING: Body Measurements- Methods of pattern development - flat pattern technique — shapes – fittings - commercial patterns — pattern alteration - Planning, Drawing and reproduction of patterns.

FABRIC CUTTING: Lay planning and Preparation for cutting - marking - pinning - cutting techniques and cutting machines.

UNIT III

9

STITCHING: Classification of stitches and seams - lining – interlining - Sewing machine- Types and applications - parts and their function of a sewing machine - timed sequence for stitch formation - sewing aids – bobbin winding - stitch length selection - feed pressure - stitch patterns - Types and Selection of sewing threads.

UNIT IV

9

GARMENT PROCESSING: Processing of grey fabric garments - processing of bleached fabric garments.

GARMENT DYEING: Chemicals and machines for garment dyeing.

UNIT V

9

GARMENT FINISHING: Light finishing - pre-cure, post cure, and two stage resin finishing techniques - heat treatment - Printing of Garments: STP Technique - Printing equipments. Production and processing of heavy weight garments like denim, gabardine

TOTAL = 45 Hrs.

REFERENCES:

- 1 Cooklin.G, Introduction to Clothing Manufacture, Blackwell Science, 1991
2. Bray.N. Dress Pattern Designing - The Basic Principles of cut and Fit Blackwell Science, 1996.
3. Peggat H.,” The complete dress maker”, Marshall coverdish, London.
4. Peggat H.,” Introduction to dress making”, Marshall coverdish, London.
6. Winks. I .M., Clothing Sizes International Standardisation, The Textile Institute, Due Summer 1997
7. “Complete guide to sewing, Readers Digest Association Inc. New York, 1988.
8. New Wave in garment exports, Garment Processing, ATIRA Proceedings, June 1990

07 TCE 13 - Textile Costing & Process Optimisation

UNIT I

9

An Introduction to cost terms and purposes, cost terminology, direct and indirect costs, cost-behavior patterns: variable costs & fixed costs, total costs and unit costs. Financial statements and inventory costs, types of inventory, production costs, prime costs and conversion costs, costing for manufacturing, merchandising and service sector companies.

UNIT II

9

Activity based costing and management, broad averaging via smooth or peanut — butter costing approaches, refining a cost system, costing hierarchies, comparison of alternate costing systems, using ABC system for cost management and profitability improvement - Activity based costing and department costing systems. implementing ABC system.

UNIT III

9

Cost application and revenues, purpose of cost allocation, allocating cost from one department to another and support departments. Cost allocation of joint products and by products.

Cost volume profit analysis, assumption, terminology, essentials of evp analysis, the break even point, target operative income and income taxes, cost planning and cvp - cvp analysis - service and non-profit organizations - effect of sales mix on income.

UNIT IV

9

Process costing, hybrid costing systems, operation costing, journal entries, spoilage rework and scrap costing - quality, time and theory of constraints - control charts - Pareto diagrams, cause and effect diagrams.

Inventory management - Just in Time (JIT) and back flush.

UNIT V

9

Inventory costing and capacity analysis, standard costs, cost estimation approaches, activity based costing and cost estimation, non-linearity and cost function.

Tools for planning and control, master budget and flexible budgets, the use of variances, flexible budget variances and sales volume variance, primary variance and efficiency for direct cost input, planning variable and fixed over head costs.

Decision marketing and retrieving information, pricing decisions and cost management, target costs.

Process optimization — methodology for spinning, weaving, knitting, chemical processing, garment making - case studies.

TOTAL = 45 Hrs.

REFERENCES:

1. Cost control and costing in spinning mills – SITRA, Edition 1992.
2. Cost control and accounting for Textile industry – TAIRO, Edition 1990.
3. Kalyanaraman.A.R. “Energy Conservation in Textile Industries”, SITRA, 1985.
4. V.Dudeja “Textile Industry Management” (ATIRA), 1985.
5. Modern production Technologies edited by M.L.Gulrajani, The Textile Association (India) Publications, 1983
6. James.C. Van Home – “Financial management & Policy”, Prentice hall of India (p) Ltd., New Delhi (1980)

07 TCE 14 - Textile Industry Management

UNIT I 9

HRD: Management task of HRD – Social interest and relevance – Improving the working conditions (case studies) – Improving productivity (case studies) – Attention to human needs (case studies) – Role of personnel manager – Selection process – Induction process – Personnel appraisal – Reward systems – Training programmes (Case studies) – Role of HRD manager.

UNIT II 9

TQM: Tools and techniques – Motivation of workers – Customer focus-emphasis on team work – Emphasis on competitive spirit – concepts of quality circles – Improvement in performance of the company and quality of group behaviour through quality circles - decision making process – Approach to TQM in Textile Industry (Case studies) Facing internal and external competition (case studies) – work culture change through TQM – Top management perspective – Accomplishment of objectives.

UNIT III 9

INDUSTRIAL ENGINEERING: Job evaluation and job description in textile mills (categories of workmen duties and responsibilities) Spinning – weaving – knitting – chemical processing – garment industry – work norms – time study and other work measurement techniques – concept of performance rating – relaxation and other allowances – Time element sheets – Methods and mathematical models for assessing work norms in textile mills.

UNIT IV 9

ENERGY CONSERVATION: Case studies

MACHINERY MAINTENANCE: Maintenance schedules – Maintenance cost.

UNIT V 9

TAXATION: Principles of direct and indirect taxation – Income tax for local market and exports – Sales tax – CST – Central excise.

MODVAT & CENVAT – Customs duty – Rates of taxes applicable to textile mills.

REFERENCES:

1. Dudeja.V, “Textile Industry Management” (ATIRA), 1985.
2. Philip Cotler, “Industrial Management”. Prentice Hall, 1996.
3. “The Textile Industry”, Winning strategies for the new millennium volume 1 & 2” Textile Institute., 1999.
4. Ellis, “Industrial Engineering Hand book” Prentice Hall, 1980
5. Kalyanaraman.A.R. “Energy Conservation in Textile Industries”, SITRA, 1985.
6. Textile Machinery Maintenance – SITRA, 1999

07 TCE 15 - Advanced Knitting Technology

UNIT I

9

KNITTING STRUCTURES: Classification – comparison with woven structures – plain single jersey – end uses – double jersey – Ride Interlock – end uses, Purl knitting – end uses – flat knitting - Tricot warp knitting – end uses – Raschel warp knitting and simplex warp knitting – end uses – special knit structures.

UNIT II

9

KNITTING MACHINES – Classification – Weft knitting and warp knitting – comparison – circular – flat – straight bar – tricot – Raschel – simplex, Knitting elements – needles – sinkers – cylinder – dials – cams – compound needle, jack raising cam – stitch cam – counter cam – Guard cam timing diagrams – elements of cam design.

UNIT III

9

PROPERTIES OF KNITTED STRUCTURES – fabric geometry general terms – stitch density – representation of weft knitted structures – representation of warp knitted structures – comparison of single knit and double knit structures – stitches and their properties – properties of Rib and interlock structures and comparison of other structures – Spirality and other defects of knitted structures – tightness factor.

UNIT IV

9

KNITTING CYCLE – Single jersey m/c; Double jersey m/c- plain and Jacquard m/c, Purl m/c, single and double bed flat knitting machine, single and double straight bar m/c, tricot, raschel & simplex m/c – passage of materials and knitting action and mechanism of operation.

PATTERNING DEVICES – Principles of selection – effect of positive yarn feeding mechanism – autostop motions – fabric take up mechanism, patterning in weft and warp knitting – pattern needles and chain links – tension control – relation between loop length and construction – fabric relaxation and shrinkage.

UNIT V

9

KNITTING DYNAMICS & SPECIAL KNITS – Mathematical analysis of yarn tension and forces involved – effect of cam shape – increase in number of feeder – increase in linear speed – needle breakages and their control.

Elastometric yarn knitting and pile knitting.

MODERN TECHNIQUES OF KNIT PROCESSING – Advances in chemical processing of knits

TOTAL = 45 Hrs.

REFERENCES:

1. Ajgaonkar.D.B., "Knitting Technology"., Universal publishing corporation (1998)
2. Spencer, D.J., "Knitting Technology", Text. Inst., 2001
3. Raz., S., Flat Knitting, The Generation,, Meisenbach GMBH Hainstrasse 18, D-8600, Bamberg/Germany (1991)
4. Raz., S., Flat Knitting, Universal Maschinenfabrick, Flachstrick-maschinen, D-73641, Westhausen, Germany, (1993).
5. Iyer.C Bernd.M, Wolfgang,S, Circular Knitting", Meisenbach GMBH Hainstrasse 18, D-8600, Bamberg/Germany, 1995..

07 TCE 16 - Advanced Instruments for Textile Wet Processing

UNIT I

9

CHROMATOGRAPHIC TECHNIQUES: Introduction and classification – Theory, Instrumentation, Application of Paper Chromatography, Thin Layer Chromatography, Column Chromatography, Gas Chromatography, Gas-liquid Chromatography, Gel permeation Chromatography.

UNIT II

9

SPECTROSCOPY & COLOURIMETRY: Theory, deviations from Beer's law, Instrumentation (Line diagram alone) - applications. Ultraviolet spectroscopy – Theory, Instrumentation & application.

NMR spectroscopy – Quantum description, Instrumentation, chemical shift, applications & limitations.

UNIT III

9

INFRARED SPECTROSCOPY: Theory, fundamental vibrations, overtone, Hook's law, instrumentation, single & double beam spectrometers, application & limitations. Difference between Raman spectra and IR spectra.

MASS SPECTROSCOPY: Theory, Interpretation, some examples, applications and limitations.

UNIT IV

9

INSTRUMENTATION SYSTEMS: Functional description of instruments – Types & applications of Instrumentation – Generalised configuration - analog and digital modes of operation – Dynamic characteristics - mathematical model for first order & second order instruments and their response.

TRANSDUCERS: Turbo electric pick-up, infrared transducers – Torque measurement – elastic transducers - sound level meter – vibration measurements.

UNIT V

9

CONTROL SYSTEM COMPONENTS: Stepper motors, hydraulic valves – Pneumatic switches, proximity switches & flapper valves – Programmable logic controllers (PLC) and their applications – Temperature controllers, pH meters – Control systems and components, used in Dyeing, Finishing, Drying and Printing machinery.

TOTAL – 45 Hrs.

REFERENCES

1. Banwell,G.C., “Fundamentals of molecular spectroscopy”, TMH, 1992.
2. Day,R.A., and Unerwood,A.L., “Qualitative inorganic analysis, Vth edition”, Prentice-Hall of India, New Delhi, 1991.
3. Rouessac,F., “Chemical analysis – modern international method and techniques”, Wiely, New delhi, 1999.
4. Gurdeep Chatwal, Anand “Instrumental Methods of Chemical Analysis”.
6. Murthy.D.V.S, “Transducers and Instrumentation”, Prentice Hall of India Ltd. 1999