

AFFILIATED INSTITUTIONS

ANNA UNIVERSITY, CHENNAI

REGULATIONS - 2009

CURRICULUM AND SYLLABUS I SEMESTER

M.TECH TEXTILE TECHNOLOGY (TEXTILE CHEMISTRY)

SEMESTER I

Course Code	Course Title	L	T	P	C
Theory					
TC 9311	Theory of Textile Chemical Processing	3	0	0	3
TC 9312	Clothing Science & Textile Product Engineering	3	0	0	3
TC 9313	Advanced Chemical Processing	3	0	0	3
TC 9314	Theory of Dyeing & Auxiliaries	3	0	0	3
TC 9315	Theory of Colour & Colourisation	3	0	0	3
TC 9316	Quality Assurance & Experimental Methods	3	0	0	3
Practical					
TC 9318	Product Development Lab	0	0	3	2
TOTAL CREDITS					20

UNIT I DE-SIZING 9

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 BLEACHING 9

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 ELEMENTS OF DYE CHEMISTRY 9

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 PRINTING 9

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 FINISHING 9

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 PERIODS

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

UNIT I DIMENSIONAL STABILITY 9

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 COMFORT 9

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 FABRIC HANDLE 9

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

UNIT IV INTRODUCTION TO DESIGN LOGIC OF TEXTILE PRODUCTS 9

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 DESIGN OF APPAREL FABRICS 9

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 PERIODS

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 Jersey, 1984
8. Postle R., Kawabata.S and Niwa.M.,-Objective Evaluation of Fabrics, Textile Machinery Society of Japan, Osaka, 1983

UNIT I CHEMICAL PREPARATORY PROCESSES 9

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 FINISHING 9

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 DYEING 9

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 ENERGY CONSERVATION AND POLLUTION CONTROL 9

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 BIO-PROCESSING 9

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 PERIODS**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

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 PERIODS**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

UNIT I COLOUR AND COLOUR VISION 9

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 MODERN MEASUREMENT OF COLOUR 9

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 COMPUTER COLOUR MATCHING 9

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 THE INFLUENCE OF FIBRE STRUCTURE ON DYEING 9

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 DYEING MODELS 9

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 PERIODS**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. Wyszecski.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.

UNIT I QUALITY ASSURANCE 9

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 FABRIC QUALITY 9

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 GARMENT QUALITY 9

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 PERIODS**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.

TC 9318

PRODUCT DEVELOPMENT LAB

L T P C
0 0 3 2

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

TOTAL: 45 PERIODS