AFFILIATED INSTITUTIONS

ANNA UNIVERSITY, CHENNAI

REGULATIONS - 2009

CURRICULUM II TO IV SEMESTER (FULL TIME)

M.TECH. TEXTILE TECHNOLOGY (TEXTILE CHEMISTRY)

SEMESTER II

Course Code	Course Title	L	T	P	C
Theory					
TC 9321	Advanced Finishing Technology	3	0	0	3
TC 9322	Advances in Processing Machinery	3	0	0	3
TC 9323	Garment Processing	3	0	0	3
E1	Elective I	3	0	0	3
E2	Elective II	3	0	0	3
E3	Elective III	3	0	0	3
Practical					
TC 9326	Production Process Lab	0	0	3	2
	TOTAL	**18**	**0**	**3**	**20**

SEMESTER III

Course Code	Course Title	L	T	P	C
Theory					
E4	Elective IV	3	0	0	3
E5	Elective V	3	0	0	3
E6	Elective VI	3	0	0	3
Practical					
TC 9333	Textile Manufacturing and Quality Evaluation Lab	0	0	3	2
TC 9334	Project Work (Phase I)	0	0	12	6
	TOTAL	**9**	**0**	**15**	**17**

SEMESTER IV

Course Code	Course Title	L	T	P	C
Practical					
TC 9341	Project Work (Phase II)	0	0	24	12
	TOTAL	**0**	**0**	**24**	**12**

LIST OF ELECTIVES

Course Code	Course Title	L	T	P	C
TC 9001	Modern Printing Technology	3	0	0	3
TC 9002	Applied Bio – Technology	3	0	0	3
TC 9003	Energy Management in Textile Industry	3	0	0	3
TC 9004	Textile Marketing and Merchandising	3	0	0	3
TC 9005	Non woven and Specialty Textiles	3	0	0	3
TX 9222	Technical Textiles	4	0	0	4
TC 9007	Fabric Mechanics & Principles of Fabric Manufacturing	3	0	0	3
TX9221	High Performance Fibres	4	0	0	4
TC 9009	Textile Composites	3	0	0	3
TC 9010	Engineering Research Methodology	3	0	0	3
TC 9011	Chemical Processing of Man Made Textiles	3	0	0	3
TC 9012	Advanced Garment Manufacturing Technology	3	0	0	3
TC 9013	Textile Costing & Process Optimisation	3	0	0	3
TC 9014	Textile Industry Management	3	0	0	3
TC 9015	Advanced Knitting Technologies	3	0	0	3
TC 9016	Advanced Instruments for Textile Wet Processing	3	0	0	3

TC9321 ADVANCED FINISHING TECHNOLOGY L T P C
3 0 0 3

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 PERIODS

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

TC9322 ADVANCES IN PROCESSING MACHINERY L T P C
3 0 0 3

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, Impotance of maintenance of processing machineries, Machineries used for foam application. Preparation of screens for Rotary Printing machines.

TOTAL : 45 PERIODS

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.

TC9323 **GARMENT PROCESSING** **L T P C**
3 0 0 3

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 PERIODS

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

TC9326 **PRODUCTION PROCESS LAB** **L T P C**
0 0 3 2

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.

TOTAL: 45 PERIODS

TC9333 **TEXTILE MANUFACTURING AND QUALITY EVALUATION LAB** **L T P C**
3 0 0 3

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

TOTAL : 45 PERIODS

TC9001 MODERN PRINTING TECHNOLOGY L T P C
3 0 0 3

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 PERIODS

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. Ujiie, 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.

TC9002 APPLIED BIO – TECHNOLOGY L T P C
3 0 0 3

UNIT I INDUSTRIAL BIO-TECHNOLOGY **9**
Industrial microbial products – applications, primary metabolloids and secondary metabolloids, Enzymes & Proteins – sources and applications, cell and enzyme immobilization, Industrial plant products – production of enzymes and polysacchrides.

UNIT II ENVIRONMENTAL BIO-TECHNOLOGY **9**
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 ENZYMES USED IN TEXTILE INDUSTRY **9**
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 EVALUATION OF ENZYME TREATED FABRICS 9

Weight loss, Whiteness index, Absorbency, Tensile strength, Handle of fabric and Abrasion resistance. SEM analysis and other structure related studies.

UNIT V BIO – PROCESSING IN TEXTILES 9

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

TOTAL : 45 PERIODS

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

TC9003 ENERGY MANAGEMENT IN TEXTILE INDUSTRY L T P C
3 0 0 3

UNIT I INTRODUCTION 9

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 ENERGY CONSUMPTION ANALYSIS 9

Textile machines — Ancillaries — Component wise consumption — Specific energy consumption (UKG) — Cost of energy Vs sales value of textile product.

UNIT III ENERGY CONSERVATION 9

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 ENERGY EFFICIENT EQUIPMENT 9

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 APPLICATION OF NON CONVENTIONAL ENERGY SOURCES 9

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 PERIODS

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

TC9004 TEXTILE MARKETING AND MERCHANDISING L T P C
3 0 0 3

UNIT I MARKETING 9

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

UNIT II BUYING BEHAVIOUR 9

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 MARKETING MIX 9

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

UNIT IV PRODUCT LIFE CYCLE 9

Life cycle of product -Marketing strategy for various stages of life cycle - new product development.

MARKETING RESEARCH: Purpose, Procedure and applications

UNIT V MERCHANDISING 9

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 PERIODS

REFERENCES

1. Philip Kotler, ‘Marketing Management “,Printice HallInc 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 millineum 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”, Prenctice Hall, 1997.

TC9005 NON WOVENS AND SPECIALTY TEXTILES L T P C
3 0 0 3

UNIT I **9**

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**

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 PERIODS

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.

TX 9222 TECHNICAL TEXTILES L T P C
4 0 0 4

UNIT I FILTRATION TEXTILES 12

Theory of dust collection, cleaning systems, fabric selection for dust collection, finishing treatments; solid, liquid separation, fabric selection - filtration, requirements, yarn and fabric construction for filter fabrics, finishing treatments

UNIT II GEO TEXTILES 6

Geo textiles – types, structures, manufacture, properties, evaluation, applications

UNIT III DEFENCE AND PROTECTIVE TEXTILES 12

Thermal insulation materials; study of water vapour permeable / water proof materials, military combat clothing systems; camouflage textiles, UV wave band, visible wave band, visual decoys; infrared camouflage; protective textiles against micro organisms, chemicals and pesticides, evaluation technique

UNIT IV TRANSPORTATION TEXTILES 6

Fibre requirements–fibre, plastic composites; textiles applications in all kinds of road transport vehicles, rail, aircrafts, marine

UNIT V MEDICAL TEXTILES 12

Textile materials in medical applications; bandages and pressure garments; evaluation technique; study of various kinds of wound care dressing and advanced wound dressings; implantable and non implantable materials; study of sutures

UNIT VI FINISHING AND COATING OF TECHNICAL TEXTILES 6

Mechanical finishes – types, machines; heat setting; chemical finishes - coating of technical textiles, different techniques; fusible interlinings

UNIT VII AGRO TEXTILES 6

Agricultural fabrics – construction details, properties, applications

TOTAL: 60 PERIODS

REFERENCES:

1. Horrocks A.R. and Anand S.C., “Handbook of Technical Textiles”, The Textile Institute, Manchester, 2000, ISBN: 1855733854.
2. Anand S.C., “Medical Textiles”, Textile Institute, Manchester, 2001, ISBN:185573494X.
3. Adanur S., “Wellington sears handbook of Industrial textiles” Technomic publishing co. inc., 1995, ISBN : 1 – 56676 – 340 – 1.
4. Pushpa Bajaj and Sengupta A.K., “Protective clothing”, the Textile Institute, 1992, ISBN 1-870812 – 44-1.
5. Scott R.A., “Textiles for protection”, Woodhead Publishing Ltd, Cambridge, UK, 2005, ISBN 1-85573-921-6.
6. Fung W, “Coated and laminated textiles”, Woodhead Publishing Ltd, Cambridge, UK.2002, ISBN 1-85573-576-8.
7. Anand S.C, Kennedy J.F., Miraftab M. and Rajendran S., “Medical textiles and biomaterials for health care”, Woodhead Publishing Ltd, Cambridge, UK.2006, ISBN 1-85573-683-7.
8. Fung W. and Hardcastle, “Textiles in automotive engineering”, Woodhead Publishing Ltd,Cambridge, UK, 2001, ISBN 1-85573-493-1.
9. John N.W.M., “Geo Textile”, Blackie and Sons Ltd, London, U.K.1987, ISBN 0-412-01351-7.
10. Allison Mathews and Martin Hardingham, “Medical and Hygiene Textile Production – A hand book”, Intermediate Technology Publications, 1994.

11. David Arvil, “An Innovative Approach to Spunbond Agricultural Crop Cover”, Journal of Industrial Textiles, Vol.30, No.4, April (2001) 311-319.
12. Jurg Rupp, “Creating a garden with needle – punched fabrics”, Nonwovens and Industrial Textiles, 2 (2002) 49-50.

TC9007	FABRIC MECHANICS & PRINCIPLES OF FABRIC MANUFACTURING	L T P C 3 0 0 3

UNIT I **9**

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**

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**

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 PERIODS

REFERENCES

1. Hearle. J.W.S., ‘Fabric Geometry’ The Textile Institute, 1987
2. Sriramalu P K, Ajgaonkar 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

TX 9221 HIGH PERFORMANCE FIBRES L T P C
4 0 0 4

UNIT I ADVANCED SPINNING TECHNOLOGY 12

Advances in conventional fibre forming process; gel spinning; liquid crystal spinning; electro-spinning

UNIT II HIGH PERFORMANCE FIBRES FOR INDUSTRIAL APPLICATIONS 12

Manufacturing, properties and applications of glass fibres, basalt fibres; carbon fibres, high performance polyethylene fibres; ceramic fibres

UNIT III HIGH PERFORMANCE FIBRES FOR MEDICAL APPLICATIONS 18

Manufacturing, properties and applications of alginate fibres; chitosan fibres; regenerated silk and wool protein fibres; synthetic biodegradable fibres

UNIT IV SPECIALITY FIBRES 18

Hollow and profile fibres; blended and bi-component fibres; film fibres and functionalized fibres for specific applications; manufacturing, properties and applications of chemically and thermally resistant fibres

TOTAL: 60 PERIODS

REFERENCES

1. Hearle J. W. S., "High Performance Fibres", Woodhead Publishing Ltd., Cambridge, England, 2001.
2. Hongu T. and Phillips G.O., "New Fibres", Woodhead Publishing Ltd., England, 1997.
3. Kothari V. K., "Textile Fibres: Development and Innovations", Vol. 2, Progress in Textiles, IAFL Publications, 2000.
4. Peebles L.H., "Carbon Fibres", CRC Press, London, 1995.

TC9009 TEXTILE COMPOSITES L T P C
3 0 0 3

UNIT I INTRODUCTION 9

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 COMPOSITE MATERIALS 9

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.
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UNIT III PREPREGS 9

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

UNIT IV COMPOSITE MANUFACTURING TECHNOLOGY 9

Vacuum bagging - compression moulding — injection moulding - pultrusion – thermoforming — filament winding - resin transfer moulding.

UNIT V PROPERTIES OF COMPOSITES 9

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

TOTAL : 45 PERIODS

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.

TC9010 ENGINEERING RESEARCH METHODS L T P C

3 0 0 3

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 — niulticreterian 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 PERIODS

REFERENCES

1. Kothari.C.P, "Research Methodology — Methods & Technqiues" Mishra Prakeshan, New Delhi 2000
2. Montomery 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.

TC9011 CHEMICAL PROCESSING OF MAN MADE TEXTILES **L T P C**
3 0 0 3

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 PERIODS

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.

TC9012 ADVANCED GARMENT MANUFACTURING TECHNOLOGY L T P C
3 0 0 3

UNIT I INTRODUCTION 9

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

UNIT II PATTERN MAKING 9

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 STITCHING 9

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 GARMENT PROCESSING 9

Processing of grey fabric garments - processing of bleached fabric garments.

GARMENT DYEING: Chemicals and machines for garment dyeing.

UNIT V GARMENT FINISHING 9

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 PERIODS

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, l996.
3. Peggal H.," The complete dress maker", Marshall coverdish, London.
4. Peggat H.," Introduction to dress making", Marshall coverdish, London.
5. Winks. I .M., Clothing Sizes International Standardisation, The Textile Institute, Due Summer 1997
6. "Complete guide to sewing, Readers Digest Association Inc. New York, 1988.
7. New Wave in garment exports, Garment Processing, ATIRA Proceedings, June 1990

TC9013 TEXTILE COSTING & PROCESS OPTIMISATION L T P C
3 0 0 3

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 PERIODS

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)

TC9014 TEXTILE INDUSTRY MANAGEMENT L T P C
3 0 0 3

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**

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**

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.
ECO-AUDITING AND ECO-LABORATORYELLING: Norms & Procedures.

TOTAL : 45 PERIODS

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

TC9015 ADVANCED KNITTING TECHNOLOGIES L T P C
3 0 0 3

UNIT I KNITTING STRUCTURES 9

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 KNITTING MACHINES 9

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 PROPERTIES OF KNITTED STRUCTURES 9

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 KNITTING CYCLE 9

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 KNITTING DYNAMICS & SPECIAL KNITS 9

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 PERIODS

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.

TC9016 ADVANCED INSTRUMENTS FOR TEXTILE WET PROCESSING L T P C
3 0 0 3

UNIT I CHROMOTOGRAPHIC TECHNIQUES 9

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

UNIT II SPECTROSCOPY & COLOURIMETRY 9

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 INFRARED SPECTROSCOPY 9

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 INSTRUMENTATION SYSTEMS 9

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 CONTROL SYSTEM COMPONENTS 9

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 PERIODS

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".
5. Murthy.D.V.S, "Transducers and Instrumentation", Prentice Hall of India Ltd. 1999