

AFFILIATED INSTITUTIONS
REGULATIONS - 2013
CURRICULUM I TO IV SEMESTERS (FULL TIME)
M.TECH. TEXTILE TECHNOLOGY (WITH SPECIALIZATION IN TEXTILE CHEMISTRY)

SEMESTER I

COURSE CODE	COURSE TITLE	L	T	P	C
THEORY					
TY7101	Theory of Textile Chemical Processing	3	0	0	3
TY7102	Clothing Science and Textile Product Engineering	3	0	0	3
TY7103	Advanced Chemical Processing	3	0	0	3
TY7104	Theory of dyeing and Auxiliaries	3	0	0	3
TY7105	Theory of Colour and Colourisation	3	0	0	3
TX7201	Statistics for Textile Engineering	3	1	0	4
PRACTICALS					
TY7111	Product Development Lab	0	0	3	2
TOTAL		18	1	3	21

SEMESTER II

COURSE CODE	COURSE TITLE	L	T	P	C
THEORY					
TY7201	Advanced Finishing Technology	3	0	0	3
TY7202	Advanced in Processing Machinery	3	0	0	3
TY7203	Garment Processing	3	0	0	3
	Elective I	3	0	0	3
	Elective II	3	0	0	3
	Elective III	3	0	0	3
PRACTICALS					
TY7211	Production Process Lab	0	0	3	2
TOTAL		18	0	3	20

SEMESTER III

COURSE CODE	COURSE TITLE	L	T	P	C
THEORY					
	Elective IV	3	0	0	3
	Elective V	3	0	0	3
	Elective VI	3	0	0	3
PRACTICALS					
TY7311	Project Work (Phase I)	0	0	12	6
TY7312	Seminar	0	0	2	1
TOTAL		9	0	14	16

SEMESTER IV

COURSE CODE	COURSE TITLE	L	T	P	C
PRACTICALS					
TY7411	Project Work (Phase II)	0	0	24	12
TOTAL		0	0	24	12

TOTAL NUMBER OF CREDITS : 69

LIST OF ELECTIVES

M.TECH. TEXTILE TECHNOLOGY (WITH SPECIALIZATION IN TEXTILE CHEMISTRY)

SEMESTER – II

COURSE CODE	COURSE TITLE	L	T	P	C
TY7001	Modern Printing Technology	3	0	0	3
TY7002	Energy Management in Textile Industry	3	0	0	3
TY7003	Non Woven and Speciality Textiles	3	0	0	3
TY7004	Fabric Mechanics and Principles of Fabric Manufacturing	3	0	0	3
TY7005	High Performance Fibres	3	0	0	3
TY7006	Chemical Processing of Manmade Textiles	3	0	0	3
TY7007	Textile Costing and Process Optimization	3	0	0	3
TY7008	Advanced Instruments for Textile Wet Processing	3	0	0	3

SEMESTER – III

COURSE CODE	COURSE TITLE	L	T	P	C
TY7009	Applied Bio-Technology	3	0	0	3
TY7010	Textile Marketing and Merchandising	3	0	0	3
TY7011	Technical Textiles	3	0	0	3
TY7012	Textile Composites	3	0	0	3
TY7013	Design of Textile Experiments	3	0	0	3
TY7014	Advanced Garment Manufacturing Technology	3	0	0	3
TY7015	Textile Industry Management	3	0	0	3
TY7016	Advanced Knitting Technologies	3	0	0	3

OBJECTIVES

- To enable the students to study about the mechanism of Preparatory process
- To enable the students to study about elements of dye chemistry
- To enable the students to study the about Printing methods & styles and the Necessity of Finishing

OUTCOMES

Upon completion of this course the student shall be able to know the mechanism

- Preparatory process & Elements of dye chemistry
- Printing methods, styles & Necessity of Finishing

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

OBJECTIVES

- To enable the students to study about the essential properties of fabrics for clothing
- To enable the students to study about evaluation of essential properties of fabrics
- To enable the students to study the Design logic for Yarn, Fabric & Apparels.

OUTCOMES

Upon completion of this course the student shall be able to know

- The Various Properties of Fabrics & its Evaluation methods
- Design Logic for Yarn, Fabric & Apparels

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

OBJECTIVES

- To enable the students to study about the advanced techniques in Preparatory process
- To enable the students to study Modern concepts in Dyeing, Finishing & Bio Processing
- To enable the students to study the about Energy Conservation & Pollution control in Textile wet processing

OUTCOMES

Upon completion of this course the student shall be able to know the

- Advanced techniques in Preparatory process
- Modern concepts in Dyeing, Finishing & Bio Processing
- Energy Conservation & Pollution control in Textile wet processing

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 – Bioscouring 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

OBJECTIVES

- To study about the various theories of dyeing
- To study about the surfactants, their types & action on Natural & Manmade fibres
- To study about chemistry of auxiliaries involved in colouration, Printing & finishing

OUTCOMES

Upon completion of this course the student shall be able to know about the

- Various Theories of dyeing
- surfactants, their types & action
- chemistry of auxiliaries involved in colouration, Printing & finishing

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

OBJECTIVES

- To study about concept of colour vision & the measurement of colour
- To study about the influence of fibre structure on dyeing & various dyeing models
- To give basic idea about Application & importance of CCM

OUTCOMES

Upon completion of this course the student shall be able to know about the

- Concept of colour vision & the measurement of colour
- The influence of fibre structure on dyeing & various dyeing models
- Application of Computer color matching

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. 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.

TX7201	STATISTICS FOR TEXTILE ENGINEERING	L T P C
		3 1 0 4

OBJECTIVES

To make the students to learn about the

- Probability distributions, sampling and testing of hypothesis
- Process control using charts and process capability
- Design of experiments for textile applications and
- Modeling the probabilistic phenomena.

OUTCOME

Upon completion of this course, the student shall be able to

- Design the experiment, conduct statistical tests and analyse the results to arrive at the conclusions
- Study the capability of process and control the process based on data available and
- Make decisions with minimum error from available data.

UNIT I PROBABILITY DISTRIBUTION AND ESTIMATIONS 6

Applications of Binomial, Poisson, normal, t, exponential, chi-square, F and Weibull distributions in textile engineering; point estimates and interval estimations of the parameters of the distribution functions

UNIT II HYPOTHESIS TESTING 18

Sampling distribution; significance tests applicable to textile parameters – normal test, t-test, chi-square test and F-test; p-Values; selection of sample size and significance levels with relevance to textile applications; acceptance sampling

UNIT III ANALYSIS OF VARIANCE AND NON-PARAMETRIC TESTS 12

Analysis of variance for different models; non-parametric tests - sign test, rank test, concordance test

UNIT IV PROCESS CONTROL AND CAPABILITY ANALYSIS 12

Control charts for variables and attributes - basis, development, interpretation, sensitizing rules, average run length; process capability analysis

UNIT V DESIGN AND ANALYSIS OF EXPERIMENTS 12

2^k full-factorial designs; composite designs; robust designs; development of regression models, regression coefficients; adequacy test; process optimizations.

TOTAL : 60 PERIODS

REFERENCES

1. Montgomery D.C., "Introduction to Statistical Quality Control", John Wiley and Sons, Inc., Singapore, 2002, ISBN: 997151351X.
2. Leaf G.A.V., "Practical Statistics for the Textile Industry, Part I and II", The Textile Institute, Manchester, 1984, ISBN:0900739517.
3. Douglas C. Montgomery, "Design and analysis of experiments", John Wiley & Sons, Inc, Singapore, 2000, ISBN 9971 51 329 3
4. Ronald D. Moen, Thomas W. Nolan, Lloyd P. Provost, "Quality improvement through planned experimentation", McGraw-Hill, 1998, ISBN 0-07-913781-4

TY7111

PRODUCT DEVELOPMENT LAB

**L T P C
0 0 3 2**

OBJECTIVES

- To enable the students to know how to improve the absorbency, whiteness of fabric by various preparatory processes.
- To enable the students to know about the development of simultaneous dyeing & finishing process
- To enable the student to know about the Transfer printing process for Natural & Synthetics

OUTCOMES

Upon completion of this course the student shall be able to know about the

- Combined preparatory & Dyeing processes
- Eco friendly finishing processes
- Method of Transfer printing for cotton & PET

LIST OF EXPERIMENTS

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

LIST OF EQUIPMENTS REQUIRED

1. Dye Bath
2. Miniature Jigger
3. Miniature Winch
4. Miniature Kier
5. Padding Mangle
6. Vacuum ironing table & Suction Iron box
7. Steamer
8. Garment washing machine
9. High Temperature Dyeing Machine
10. Tumble Dryer

TY7201

ADVANCED FINISHING TECHNOLOGY**L T P C
3 0 0 3****OBJECTIVES**

- To study importance of finishing & various application techniques.
- To study about finishing chemicals & auxiliaries.
- To study about the evaluation of various finishes.

OUTCOMES**Upon completion of this course the student shall be able to know about the**

- Need for functional finishes
- Methods of application of finishes and its evaluation

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

TY7202

ADVANCES IN PROCESSING MACHINERY

L T P C
3 0 0 3

OBJECTIVES

- To study about the line diagrams & principle of machineries involved in processing.
- To study about the automation & recent developments in the same.

OUTCOMES

Upon completion of this course the student shall be able to know about the

- Principles of machineries involved in processing.
- Automation & recent developments in processing.

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, Impotence 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.

OBJECTIVES

- To study about the Developments in garment dyeing processing
- To study about the various Finishing techniques in garment processing.

OUTCOMES

Upon completion of this course the student shall be able to know about the

- Developments in garment dyeing processing
- Various Finishing techniques in 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 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

OBJECTIVES

- To enable the students to know about the preparatory and Dyeing processes for natural & Manmade fibres in suitable machines
- To enable the students to know about the Printing process.

OUTCOMES

Upon completion of this course the student shall be able to know about the

- Preparatory and Dyeing processes for natural & manmade fibres in suitable machines
- Printing process

LIST OF EXPERIMENTS

1. Scouring of cotton fabric in laboratory using different machines.
2. Bleaching of cotton fabric in laboratory using different machines.
3. Dyeing of cotton fabric in laboratory model jigger using reactive dyes to match a given sample
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 and to determine their fastness properties.
6. Dyeing of cotton woven fabric in laboratory model padding mangle and to determine the best mangle expression.
7. Pigment printing woven fabric using table screen printing and determine the appropriate fastness properties.
8. Dry cleaning for different types of fabric using Garment washing Machine

TOTAL: 45 PERIODS**LIST OF EQUIPMENTS REQUIRED**

1. Dye Bath
2. Miniature Jigger
3. Miniature Winch
4. Miniature Kier
5. Padding Mangle(Manual & Pneumatic)
6. Soft flow Dyeing machine
7. Infra red dyeing machine
8. High Temperature Dyeing Machine
9. Tumble Dryer
10. Table screen printing machine
11. Steamer
12. Garment washing machine.

OBJECTIVES

- To enable the students to know about the recent developments in textile printing machineries
- To enable the students to know about the Auxiliary chemicals used in Modern printing processes.

OUTCOMES

Upon completion of this course the student shall be able to know about the

- Recent developments in textile printing machineries
- Auxiliary chemicals used in Modern printing processes.

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.

TY7002	ENERGY MANAGEMENT IN TEXTILE INDUSTRY	L T P C
		3 0 0 3

OBJECTIVES

- To enable the students to know about the concept of energy management in Textile Industry
- To enable the students to know about the concept of energy consumption And conservation
- To enable the students to know about the Energy efficient equipment & application of Non conventional energy sources

OUTCOMES

Upon completion of this course the student shall be able to know about the

- Concept of energy management in Textile Industry
- Concept of energy consumption and conservation
- Energy efficient equipment & application of Non conventional energy sources

UNIT I	INTRODUCTION	9
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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
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Textile machines — Ancillaries — Component wise consumption — Specific energy consumption (UKG) — Cost of energy Vs sales value of textile product.

UNIT III	ENERGY CONSERVATION	9
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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

TY7003	NON WOVEN AND SPECIALITY TEXTILES	L	T	P	C
		3	0	0	3

OBJECTIVES

- To enable the students to know about the methods of producing non woven fabrics
- To enable the students to know about the structure & application of non woven fabrics in industrial purposes

OUTCOMES

Upon completion of this course the student shall be able to know about the

- Methods of producing non woven fabrics
- The structure & application of non woven fabrics in industrial purposes

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 York, 1999.
3. Denise Musk, Machine Knitting, B.T.Batsford Ltd, London, 1999
4. Wilhelm Albrecht et al., " 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.

TY7004 FABRIC MECHANICS AND PRINCIPLES OF FABRIC MANUFACTURING**L T P C
3 0 0 3****OBJECTIVES**

To enable the students to know about the

- Geometry of the different fabrics
- Parameters which affect the geometry of the fabric
- Effect of different way of weft pick up on geometry

OUTCOMES

Upon completion of this course the student shall be able to

- Identify the parameters for controlling of geometry of fabric
- Develop the theory for controlling the geometry of fabrics

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- reactive forceacceleration 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

TY7005**HIGH PERFORMANCE FIBRES**

L	T	P	C
3	0	0	3

OBJECTIVES

To enable the students to know about the

- Conventional fibre forming mechanism
- Need for high performance fibre and its application
- Production methodology for speciality fibres

OUTCOMES

Upon completion of this course the student shall be able to

- Modify the conventional spinning process to produce speciality
- Know about production and application of high performance fibres

UNIT I ADVANCED SPINNING TECHNOLOGY**12**

Advances in conventional fibre forming process; gel spinning; liquid crystal spinning; electrospinning

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 : 45 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.

- Kothari V. K., "Textile Fibres: Development and Innovations", Vol. 2, Progress in Textiles, IAFL Publications, 2000.
- Peebles L.H., "Carbon Fibres", CRC Press, London, 1995.

TY7006 CHEMICAL PROCESSING OF MAN MADE TEXTILES

L T P C
3 0 0 3

OBJECTIVES

To enable the students to know about the

- Various Preparatory processes for manmade textile
- Practical problems and their solutions in wet processing of manmade textiles

OUTCOMES

Upon completion of this course the student shall be able to know about the

- Need for Preparatory processes of manmade textiles
- Method of application of dyes, print and finishes on manmade 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/cellulosicblended 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

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

OBJECTIVES

To enable the students to know about the

- Various cost terminology and costing for manufacturing
- Purpose of cost allocation and Inventory management

OUTCOMES

Upon completion of this course the student shall be able to know about the

- Need for costing & process optimization
- Process optimization techniques in various textile departments

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)

OBJECTIVES

To enable the students to know about the

- Various techniques in textile wet processing
- Theory and application of various instruments in textile
- Fabric geometry general terms for different types of knits

OUTCOMES

Upon completion of this course the student shall be able to know about the

- Need for different types of chromatographic techniques
- Instruments to measure the various parameter of textiles.

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- all 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

OBJECTIVES

To enable the students to know about the

- Pollution and its control in textile processing industries
- Application of bio technology in textile wet processing

OUTCOMES

Upon completion of this course the student shall be able to know about the

- Identify the chemicals which cause pollution during wet processing of textiles and
- Replace the hazardous chemicals by Enzyme
- Create the Ecofriendly methods for textile wet processing.

UNIT I INDUSTRIAL BIO-TECHNOLOGY 9

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 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 oxidase, 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.

OBJECTIVES

- To enable the students to know about the concept of marketing management

- To enable the students to know about the buying behavior and market segmentation
- To enable the students to know about Merchandise

OUTCOMES

Upon completion of this course the student shall be able to know about the

- Concept of marketing management
- Buying behavior and market segmentation
- Concept of Merchandising

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 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.

TY7011

TECHNICAL TEXTILES

**L T P C
3 0 0 3**

OBJECTIVES

- To enable the students to know about the concept, application & evaluation of technical textiles in various fields.
- To enable the students to know about finishing processes for technical textiles

OUTCOMES

Upon completion of this course the student shall be able to know about the

- Concept, application & evaluation of technical textiles in various fields
- Finishing processes for technical textiles

UNIT I	FILTRATION TEXTILES	9
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	4
Geo textiles – types, structures, manufacture, properties, evaluation, applications		
UNIT III	DEFENCE AND PROTECTIVE TEXTILES	9
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	5
Fibre requirements–fibre, plastic composites; textiles applications in all kinds of road transport vehicles, rail, aircrafts, marine		
UNIT V	MEDICAL TEXTILES	9
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	5
Mechanical finishes – types, machines; heat setting; chemical finishes - coating of technical textiles, different techniques; fusible interlinings		
UNIT VII	AGRO TEXTILES	4
Agricultural fabrics – construction details, properties, applications		

TOTAL: 45 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., Mirafab 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.

OBJECTIVES

- To enable the students to know about the
- Need and types of composites
- Different techniques for producing composites
- Testing methods for composites

OUTCOMES

Upon completion of this course the student shall be able to know about the

- Production methodology for composites
- Test and analyze the effect of fibre parameters on composite application

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.

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.

OBJECTIVES

To make the students to learn about the

- Fundamentals of experimental design and
- Selection of suitable design and analysis of the results.

OUTCOME

Upon completion of this course, the student shall be able to

- Design the experiment suitable for a given study and
- Conduct statistical tests and analyze the results to arrive at the conclusions.

UNIT I EXPERIMENTAL DESIGN FUNDAMENTALS 9

Importance of experiments, experimental strategies, basic principles of design, terminology, ANOVA, steps in experimentation, sample size, normal probability plot, linear regression model.

UNIT II SINGLE FACTOR EXPERIMENTS 9

Completely randomized design, Randomized block design, Latin square design. Statistical analysis, estimation of model parameters, model adequacy checking, pair wise comparison tests, in respect of textile process, machine and quality parameters.

UNIT III MULTIFACTOR EXPERIMENTS 9

Two and three factor full factorial experiments, 2^k factorial Experiments, Confounding and Blocking designs; application in textile experiments.

UNIT IV SPECIAL EXPERIMENTAL DESIGNS 9

Fractional factorial design, nested designs, Split plot design, Introduction to Response Surface Methodology, Experiments with random factors, rules for expected mean squares, approximate F- tests for textile applications.

UNIT V TAGUCHI METHODS 9

Steps in experimentation, design using Orthogonal Arrays, data analysis, Robust design-control and noise factors, S/N ratios, parameter design, case studies related to textile engineering.

TOTAL : 60 PERIODS

REFERENCES

1. Montgomery, D.C., Design and Analysis of experiments, John Wiley and Sons, 2003.
2. Nicolo Belavendram, Quality by Design; Taguchi techniques for industrial experimentation, Prentice Hall, 1995.
3. Phillip J.Rose, Taguchi techniques for quality engineering, McGraw Hill, 1996.
4. Leaf G.A.V., "Practical Statistics for the Textile Industry, Part I and II", The Textile Institute, Manchester, 1984, ISBN:0900739517.

TY7014 ADVANCED GARMENT MANUFACTURING TECHNOLOGY L T P C
3 0 0 3

OBJECTIVES

To enable the students to know about the

- Various body measurement and fabric cutting methods
- Different Classification of stitches and seams for garment manufacturing

OUTCOMES

Upon completion of this course the student shall be able to know about the

- Need for various pattern techniques
- Advanced technology and process for manufacturing of garment

UNIT I INTRODUCTION 9

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

TY7016

ADVANCED KNITTING TECHNOLOGIES

L T P C
3 0 0 3

OBJECTIVES

To enable the students to know about the

- Classification of knitted fabric
- Machines and techniques for producing different knits
- Fabric geometry general terms for different types of knits

OUTCOMES

Upon completion of this course the student shall be able to know about the

- Need for different types of knits and its production
- Patterning devices for producing knits

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.