AFFILIATED INSTITUTIONS

ANNA UNIVERSITY, CHENNAI

REGULATIONS - 2009

M.TECH. TEXTILE TECHNOLOGY

II TO IV SEMESTERS (FULL TIME) CURRICULUM AND SYLLABI

SEMESTER II

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1.	TX9221	High Performance Fibres	4	0	0	4
2.	TX9222	Technical Textiles	4	0	0	4
3.	E1**	Elective I	3	0	0	3
4.	E2**	Elective II	3	0	0	3
5.	E3**	Elective III	3	0	0	3
6.	E4**	Elective IV	3	0	0	3
		TOTAL	**20**	**0**	**0**	**20**

SEMESTER III

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1.	TX9231	Financial Management	3	1	0	4
2.	E5**	Elective V	3	0	0	3
PRACTICAL						
3.	TX9235	Project Work (Phase I)	0	0	12	6
		TOTAL	**6**	**1**	**12**	**13**

SEMESTER IV

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
PRACTICAL						
1.	TX9241	Project Work (Phase II)	0	0	24	12
		TOTAL CREDITS	**0**	**0**	**24**	**12**

TOTAL CREDITS TO BE EARNED FOR THE AWARD THE DEGREE 20+20+13+12 = 65

LIST OF ELECTIVES

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
1.	TX9251	Bonded Fabrics	3	0	0	3
2.	TX9252	Textile Reinforced Composites	3	0	0	3
3.	TX9253	Computer Applications in Textile Technology	3	0	0	3
4.	TX9254	Theory of Textile Structures	3	0	0	3
5.	TX9255	Theory of Colouration	3	0	0	3
6.	TX9256	Operations Research	3	0	0	3
7.	TX9257	Environmental Management for Textile Industry	3	0	0	3
8.	TX9258	Total Quality Management in Textile Industry	3	0	0	3
9.	TX9259	Medical Textiles	3	0	0	3
10.	TX9260	Characterization of Textile polymers	3	0	0	3
11.	TX9261	Clothing Science	3	0	0	3
12.	TX9262	Applied Mathematics in Textile Technology	3	0	0	3
13.	TX9263	Management and Information Systems	3	0	0	3
14.	TX9264	Protective Clothing	3	0	0	3
15.	TX9265	Supply Chain Management	3	0	0	3

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.

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 V 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.

TX 9223 FINANCIAL MANAGEMENT L T P C
3 1 0 4

UNIT I 12

Goals and functions of finance; costing – concepts, classification; preparation of cost sheet; costing of yarn, fabric and garment

UNIT II 12

Investment appraisal; Payback period method, Accounting Rate of Return; introduction to discounting and cash flows estimation, DCF methods - IRR, NPV, PI; Discounted payback methods; depreciation - concept, methods

UNIT III 6

Financing and dividend policies; cost of capital, source of capital

UNIT IV 6

Working capital management; estimation of working capital, requirements for spinning mill, composite mill and garment unit

UNIT V **24**

Tools of financial analysis and control – trading, profit and loss account, balance sheet; financial ratio analysis; funds flow analysis and financial forecasting; analysis of operating and financial leverage; illustrations for spinning mill, composite mill and garment industry

TOTAL : 60 PERIODS

REFERENCES

1. Pandey I. M., "Financial management", Vikas Publishing House Pvt. Ltd., New Delhi, 8th Edition, 1999.
2. Bhave P.V. and Srinivasan V., "Costing accounting to textile mills", ATIRA, Ahmadabad, 1976.
3. Thukaram Rao M.E., "Cost and management accounting", New Age International, Bangalore, Karnataka., 2004.
4. Thukaram Rao M.E., "Cost accounting and financial management", New Age International, Bangalore, Karnataka., 2004.
5. Prasanna Chandra, "Financial management, theory and practice", Tata McGraw -Hill Publishing Co Ltd., 5th edition, New Delhi, 2001.
6. James C. Vanhorne, "Financial management and policy", Pearson Education Asia (Low priced edition) 12th edition, 2002.
7. Narang, G. B. S. and Kumar V., "Production and costing", Khanna Publishers, New Delhi, 1988.
8. Aswat Damodaran, "Corporate finance theory and practice", John Wiley and Sons, Asia., 2000.
9. Hrishikes Bhattacharya, "Working capital management", strategies and techniques", Prentice – Hall of India Pvt.Ltd., New Delhi, 2001.
10. Khan and Jain, "Basic financial management and practice", Tata McGraw Hill, New Delhi, 5th edition, 2001.

TX 9251 **BONDED FABRICS** **L T P C**
3 0 0 3

UNIT I INTRODUCTION **9**

Definition; Classification of bonded fabrics; fibres used in bonded fabric industry; consumption and production figures of bonded fabrics

UNIT II WEB PREPARATION **9**

Fibres used for wet and dry method of web preparation; fibre orientation in the web; opening and cleaning machines used; machines used for the production of parallel laid; cross-laid and random laid webs; web uniformity

UNIT III BONDING **9**

Technology of bonding webs by mechanical, thermal and chemical methods; production of bonded, melt blown and spun lace techniques

UNIT IV FINISHING AND END USES **9**

Dry and wet finishing of bonded fabrics; various end uses of bonded fabric properties

UNIT V STRUCTURAL MECHANICS **9**

Evaluation of non woven fabrics; effect of fibre, web and processing parameters on bonded fabrics

TOTAL: 45 PERIODS

REFERENCES
1. Lunenschloss J., Albrecht W. and David Sharp., "Non-woven Bonded Fabrics", Ellis Horwood Ltd, New York, 1985, ISBN: 0-85312-636-4.
2. Gulrajani M.L., "Non wovens", Textile Institute, Manchester, 1992.
3. Mrstina V. and Feigl F., "Needle punching Textile Technology", Elsevier, New York, 1990.
4. Dharmadhikary R.K., Gilmore T.F., Davis H.A. and Batra S.K., "Thermal bonding of nonwoven fabrics", Textile Progress, Vol.26, No.2, Textile Institute Manchester, 1995, ISBN: 1870812786
5. Jirsak O. and Wadsworth L.C., "Non woven Textiles", Textile Institute, Manchester, 1999, ISBN: 0 89089 9788
6. Russell S., "Hand book of nonwovens", Textile Institute, Manchester, 2004, ISBN: 1 85573 603 9.

TX 9252 TEXTILE REINFORCED COMPOSITES L T P C
3 0 0 3

UNIT I CHARACTERISATION OF COMPOSITES 13

Classification of composites; characteristics of composites - tensile, shear, composition, flexural; thermoplastic responses of composite; use of high performance fibres

UNIT II COMPOSITES WITH GLASS FIBRES 9

Glass fibres properties; glass fibre reinforced polymers; manufacture of glass fibre composites

UNIT III COMPOSITES WITH CARBON FIBRES 9

Carbon fibre reinforced composites; testing of carbon reinforced composites

UNIT IV COMPOSITES WITH FABRICS 9

Textile structure of composites- woven, knitted, braided material and three dimensional fabrics

UNIT V FLEXIBLE COMPOSITES 5

Fibre reinforced plastics; fabric reinforced composites; flexible composites; applications

TOTAL: 45 PERIODS

REFERENCES
1. Fitzer E., "Carbon fibre and their composites", Sporinger Verlag, Weinheim, 1985
2. Richardson M.O.W., "polymer engineering composites", Elsevier, Amsterdam 1977.
3. Miravele A., "Three dimensional textile reinforcement for composite materials", Textile Institute, 1999, ISBN:1855733765.

TX 9253 COMPUTER APPLICATIONS IN TEXTILE TECHNOLOGY L T P C
0 0 6 3

LIST OF EXPERIMENTS

1. File handling
2. Correlation and regression
3. ANOVA
4. Graphical programming – mechanical link simulation
5. Image Analysis – Filament yarn filament count and diameter variation
6. Simple Back- Propagation ANN for modeling
7. Local serial port programming (Input and Output)
8. Local parallel port programming (Input and Output)
9. Data acquisition and Plotting – ADC
10. Inverter control DAC
11. Binary Control Loop – Hardware setup and programming
12. PIC controller hardware setup, programming and performance plot
13. Remote port access – Parallel port
14. Remote port access – Serial Port (virtual port)
15. Socket programming – Ethernet
16. Multi drop bus Data system -RS-485 based data access and control

TOTAL : 90 PERIODS

TX 9254 THEORY OF TEXTILE STRUCTURES L T P C
3 0 0 3

UNIT I YARN GEOMETRY 9

Elements of yarn geometry; geometry of helix and its application to yarn structures; yarn diameter, packing of fibres in yarn; estimation of packing density and radial packing density of yarn; geometry of folded yarns

UNIT II FIBRE MIGRATION 9

Migration characteristics in continuous filament and spun yarns; effect of various parameters on migration; measurement of fibre migration in yarn; effect of migration on tensile behaviors and hairiness of the yarn

UNIT III YARN MECHANICS 9

Analysis of tensile behavior, prediction of breakage - continuous filament yarn and spun yarn; effect of fibre properties and geometrical configuration of yarn on the tensile and bending properties of yarn; design of yarn structures for certain functional uses

UNIT IV BLENDED YARN MECHANICS 5

Blend irregularity; measurement of blending irregularity; concept of elongation balance; effect of properties of constituent fibres and blend composition on behavior of blended yarns

UNIT V FABRIC MECHANICS 13

Pierce's geometry of plain weave fabrics; crimp balance equation; theoretical treatment of fabric deformation in tension, bending and shear, cloth buckling and recovery; geometry of nonwoven and knitted fabrics

TOTAL : 45 PERIODS

REFERENCES

1. Hearle J.W.S., Grosberg P. and Baker S., "Structural Mechanics of fibres, yarns and fabrics", Wiley Interscience, New York, 1969.
2. Goswami B.C., Martindale J.G. and Scardino F.L., "Textile Yarns: Technology, Structure and Applications", Wiley Interscience, New York, 1985.
3. Hearle J.W.S., Thwaitesand J.J. and Amikrbayhat A., "Mechanics of Flexible Fibre Assemblies", Maryland, 1980.
4. Postle P., Dejong S.and Carnaby G.A., "The Mechanics of Wool Structure", Ellis Horwood, London, 1988.

TX 9255 THEORY OF COLOURATION L T P C
3 0 0 3

UNIT I PHYSICAL CHEMISTRY 18

First law of thermo dynamics and its application in thermo chemistry, second law of thermo dynamics, free energy, thermodynamics of solutions, surface adsorption, adsorption at interface, activity of dye affinity, substantivity, heat of dyeing and entropy; donor membrane equilibrium, order of reactions

UNIT II PHYSICAL AND CHEMICAL STRUCTURE OF FIBRES AND DYE UP-TAKE 9

Effect of orientation, crystallinity, chemical structure and chemical modification of fibres on kinetics and equilibrium of sorption of solvent and dye molecules

UNIT III DYE-FIBRE BONDS 9

Surface energy and interfacial effects, inter molecular forces, identification of dye fibre forces, specific dye – fibre bonds

UNIT IV DIFFUSION AND RATES OF DYEING 9

Fick's law of diffusion, diffusion in the steady and non - steady state, boundary layers in diffusion, diffusion in final bath, parameters that affect diffusion and rates of dyeing, diffusion coefficient and concentration, activation energies of diffusion

TOTAL : 45 PERIODS

REFERENCES:

1. Johnson A., "The Theory of colouration of Textiles", SDC 2nd edition, 1989. ISBN: 0901956481.
2. Peters A.T. and Freeman H.S., "Physico – Chemical Principles of Colour Chemistry", Blackie, 1995, ISBN: 0751402109.
3. Bird C.L., "The Theory of coloration of Textiles", Dyers Co., Publications Trust,1975.
4. Vickerstaff T., "The Physical Chemistry of Dyeing", Imperial chemical Industries Ltd, 1950.
5. Peters R.H., "The physical Chemistry of Dyeing", Elsevier scientific publishing co, 1975.

TX 9256 **OPERATIONS RESEARCH** **L T P C**
3 0 0 3

UNIT I LINEAR PROGRAMMING TECHNIQUES 9

Linear programming – formulation, solution by graphical and simplex methods; dual simplex method; duality; sensitivity analysis

UNIT II TRANSPORTATION AND ASSIGNMENT MODELS 13

Transportation problem – North / West corner Solution, least cost method, Vogel's approximate method, optimality check - Modi method, stepping stone method; solution to assignment problem- Hungarian method; unbalanced, infeasible assignment problems; maximisation in assignment problems; transhipment problems

UNIT III INTEGER LINEAR PROGRAMMING, GAME THEORY, DECISION MAKING THEORY 9

Solution to integer programming problem - Branch and bound algorithm, cutting plane algorithm; Game theory: Two person – zero sum games: saddle point, dominance rule, graphical and method of matrices; Decision making under risk: decision trees, decision making under uncertainty

UNIT IV PROJECT SCHEDULING 9

CPM and PERT networks for project scheduling- finding critical path, probability and cost consideration in the project scheduling; crashing; resource planning, levelling

UNIT V QUEING MODELS 5

Queuing theory – single and multi-channel models – infinite number of customers and infinite calling source

TOTAL: 45 PERIODS

REFERENCES

1. Panneerselvam R., "Operations Research", Prentice Hall of India, 2002.
2. Tulsin P.C., "Quantitative Techniques: Theory and Problems", Pearson Education, 2002.
3. Ronald L. Rardin., "Optimization in Operations Research", Pearson Education, 1998.
4. Hillier and Lieberman, "Introduction to Operations Research", McGraw-Hill International Edition, 7 th Edition, 2001
5. Hamdy A Taha, "An Introduction to Operations Research", Prentice Hall, Sixth edition, 2000.
6. Ravindran, Phillips, Solberg, "Operations Research: Principles and practice", 2nd edition, John Wiley, 1987.
7. Srivastava U.K., Shenoy G.V. and Sharma S. C., "Quantitative Techniques for Managerial Decision", 2nd Edition, Prentice Hall of India, 2001.
8. Gupta P. K. and Hira D. S., "Problems in Operations Research", S. Chand and Company, 2002.
9. Gupta P.K. and Hira D.S., "Operations Research", S. Chand and Co. Ltd., New Delhi, 2002.
10. Sharma J. K., "Operations Research: Theory and Applications", Macmillan, 1997.
11. Mustafi C.K., "Operations Research: Methods and Practice", New Age International Pvt. Ltd. Publisher, 2000.
12. Kalavathy S., "Operations Research", Vikas Publishing House Pvt. Ltd., 2000.

TX 9257 ENVIRONMENTAL MANAGEMENT FOR TEXTILE INDUSTRY L T P C
3 0 0 3

UNIT I **9**

Industrial policy of India; pollution monitoring and control, functions and activities of Ministry of environment, Central and State pollution control boards; environmental clearance and guidelines for industries; environment impact assessment; fiscal incentives for environmental protection; environmental auditing

UNIT II **9**

Wastewater characteristics; wastewater treatment - objectives, methods and implementation considerations, recycling of effluents

UNIT III **13**

Identification and reduction of pollution sources in textile wet processing, pollution control in man - made fibre industry; analysis of textile processing effluents – colour, odour, pH, total solids, suspended solids, total dissolved solids, BOD, COD, total alkalinity, chloride, sulphates, calcium and chromium; tolerance limits for effluents; bio - degradability of textile chemicals and auxiliaries

UNIT IV **9**

Technical regulations on safety and health aspects of textile materials – banned dyes and chemicals; eco labeling, eco friendly textile processes - machines and specialty chemicals; natural dyes and environmental considerations

UNIT V **5**

Air and noise pollution in textile industry; solid waste disposal

TOTAL: 45 PERIODS

REFERENCES

1. Trivedi R.K., “Handbook of Environmental laws, Acts, Guidelines, Compliances and Standards”, Vol. 1, Enviro Media, India, 1996.
2. George Thobanoglous and Franklin L. Burton., “Waste Water Engineering and Treatment, Disposal, Reuse (Metcalf & Eddy Inc., California)”, Tata McGraw-Hill Publishing co Ltd, New Delhi, 1995.
3. Manivasakam N., “Treatment of Textile Processing Effluents (including analysis)”, Sakhi Publications, Coimbatore, 1995.
4. “Eco-Textiles: Regulations, Labels, Processing and Testing, A Special Report”, The Bombay Textile Research Association, Mumbai, 1996.
5. “Symposium Proceedings on Eco - Friendly Textile Processing”, Department of textile Technology, Indian Institute of Textile Technology, New Delhi, 1995.
6. Skelly J. K., “Water Recycling in Textile wet Processing”, Woodhead Publishing Ltd, 2003, ISBN: 0 901956 80 5.
7. Cooper P., “ Colour in Dyehouse Effluent”, Woodhead Publishing Ltd, 1995, ISBN:0 901956 694
8. Slater K., “Environmental impact of textiles: Production Processes and Protection”, Woodhead Publishing Ltd, 2003, ISBN:1 85573 541 5.
9. Chritie R., “Environmental aspects of textile dyeing”, Woodhead Publishing Ltd, 2007, ISBN:1 84569 115 6.

TX 9258 TOTAL QUALITY MANAGEMENT IN TEXTILE INDUSTRY L T P C
3 0 0 3

UNIT I INTRODUCTION TO QUALITY MANAGEMENT 9

Definitions of quality, quality philosophies of Deming, Crossby and Miller; customer focus; leadership – concepts; quality planning; quality costs; vision, mission statements and Quality Policy.

UNIT II PRINCIPLES OF TOTAL QUALITY MANAGEMENT 9

Evolution of TQM, TQM models; continuous process improvement – Juran Trilogy, PDSA Cycle, 5S, Kaizen; supplier performance measures; Deming wheel; internal external customer concept; customer satisfaction index, customer retention; team work and team building, empowerment

UNIT III QUALITY MANAGEMENT TOOLS 18

Principles and applications of Quality Function Deployment, Failure Mode and Effect Analysis, Seven old QC tools, Seven New Management tools, Statistical Quality Control techniques, Mistake proofing, Benchmarking, JIT, and Kanban; Taguchi Quality Loss Function, Total Productive Maintenance (TPM), Process Capability analysis

UNIT IV QUALITY SYSTEMS 9

ISO 9000 and other quality system – elements, implementation of quality system in spinning, weaving and garment industry; TQM implementation strategies

TOTAL: 45 PERIODS

REFERENCES:

1. Dale H. Besterfiled. et al., “Total Quality Management”, Pearson Education Asia, 1999.(Indian reprint 2002).
2. Rose J.E., “Total Quality Management”, Kogan Page India Pvt., Ltd., 1993.
3. William J. Kolarik., “Creating Quality”, McGraw-Hill, Inc., NY, 1995.
4. Jill A. Swift., Joel E. Ross and Vincent K. Omachonu, “Principles of Total Quality”, St. Lucie Press, US, 1998.
5. Samuel K. Ho, “TQM, An Integrated approach”, Kogan Page India Pvt Ltd, 2002.
6. Dale H. Besterfield et al, “Total Quality Management”, Pearson Education Asia, 2001.
7. P.L.Jain, “Quality Control and Total Quality Management”, Tata McGraw - Hill, 2001.
8. John Bank J.E., “Total Quality Management”, Prentice Hall, India, 1993.

TX 9259 MEDICAL TEXTILES L T P C
3 0 0 3

UNIT I 9

Bio materials – metals, ceramics, composites and textile materials; speciality medical fibres

UNIT II 9

Healthcare and hygiene products types; advanced textile materials in healthcare; infection control and barrier materials; study of non-woven hygienic products; plasma treated barrier materials

UNIT III 9

Specification, properties and manufacture of range of bandages and pressure garments - elastic and non elastic compression bandages, support and retention bandages, bandaging textiles, evaluation of bandage and bandages for various end uses

UNIT IV 9

Wound – types, healing process; requirement of wound dressing; an overview of wound care materials - study of various kinds of wound care dressing and advanced wound dressings;

UNIT V **9**

Implantable products; sutures – requirements, classifications, specifications, materials used –their properties and application; vascular grafts, artificial ligaments, artificial tendons and scaffolds; intelligent textiles for medical applications.

TOTAL : 45 PERIODS

REFERENCES

1. Allison Mathews and Martin Hardingham ., "Medical and Hygiene Textile Production - A hand book", Intermediate Technology Publications, 1994.
2. Anand S.C., Kennedy J.F. Miraftab M. and Rajendran S., "Medical Textiles and Biomaterials for Health care", Wood head Publishing Ltd. 2006.
3. Joon B. Park. and Joseph D. Bronzino., "Biomaterials – Principles and Applications",CRC Press Boca Raton London, NewYork, Washington , D.C. 2002
4. Anand S., " Medical Textiles", Textile Institute, 1996, ISBN: 185573317X
5. Horrocks A.R. and Anand S.C, "Technical Textiles", Textile Institute,1999, ISBN: 185573317X.
6. Adanur S., " Wellington Sears Handbook of Industrial Textiles"' Technomic Publishing Co., Inc., Lancaster Pennylvania 1995, ISBN 1-56676-340-1.
7. Michael Szycher and Steven James Lee, "Modern Wound Dressing: A Systematic Approach to Wound Healing", Journal of Biomaterials Applications, 1992

TX 9260 CHARACTERISATION OF TEXTILE POLYMERS **L T P C**
3 0 0 3

UNIT I MOLECULAR WEIGHT **14**

Polymer solution thermo dynamics; molecular weight and molecular dimensions by end group analysis, osmometry, light scattering, viscometry, gel permeation chromatography, high performance liquid chromatography

UNIT II MOLECULAR STRUCTURE CHARACTERISATION **9**

Infrared, NMR, UV –visible, raman spectroscopy, mass spectroscopy

UNIT III THERMAL PROPERTIES **13**

Thermal properties by differential scanning calorimetry, differential thermal analysis, thermo gravimetry, thermo-mechanical analyzer, dynamic mechanical and di-electric analysis

UNIT IV OTHERS **9**

Optical and electron microscopy; SEM, TEM, X-ray scattering from polymers, birefregence, crystallinity by density measurements,

TOTAL: 45 PERIODS

REFERENCES:

1. Gupta V.B. and Kothari V.K., "Man Made Fibre production," Chapman and Hall, 1985.
2. Bill mayer, "Textbooks of Polymer Science," 3rd ed., Wiley, 1984.
3. Sperling, "Introduction to Physical Polymer Science," Wiley, 1986.
4. Campell D. and White J.R, "Polymer characterization, Physical Techniques", McGraw – Hill, New York, 1969.
5. Stamm M., "Polymer surfaces and Interfaces", Springer1st ed., 2008.

TX 9261 CLOTHING SCIENCE L T P C
3 0 0 3

UNIT I COMFORT 9

Thermal properties, moisture-vapour transmission, liquid-moisture transmission, air-permeability, aesthetic comfort, static electricity

UNIT II DURABILITY 9

Abrasion resistance, tensile and tearing strength, launder ability, seam - slippage and strength

UNIT III HANDLE AND EASY CARE 13

Low - stress mechanical properties, formability, crease resistance, anti - shrink, pilling resistance behaviour – role of fibre properties and chemical treatments

UNIT IV ERGONOMIC REQUIREMENTS 5

Anthropometric, product sizing, size, fit and weights

UNIT V DESIGN OF TEXTILE PRODUCTS 9

Material selection for given end - use and design of textile products

TOTAL: 45 PERIODS

REFERENCES:

1. Slater K., “Comfort Properties of Textiles”, Textile Progress, Vol. 9, No. 4, 1977.
2. Booth J. E., “Principles of Textile Testing”, Newenes, Butterworth’s, London, 1983.
3. Postle R., (ed.), Kawabata S. and Niwa M.., “Objective Evaluation of Fabrics”, Textile Machinery Society, Japan, Osaka, 1983.
4. Morton W.E. and Hearle J.W.S., “Physical Properties of Textile Fibers”, North Holland, Amsterdam, 1986.
5. Goswami B.C., Martindale J. and Scandino F.L., “Textiles Yarns Technology, Structure and Applications”, Wiley Interscience, New York, 1997.

TX 9262 APPLIED MATHEMATICS IN TEXTILE TECHNOLOGY L T P C
3 0 0 3

UNIT I SYSTEM OF LINEAR EQUATIONS 9

Softwares for numerical analysis; Linear equations and solutions; Gauss elimination; partial pivoting; Gauss-Jordan elimination; Decomposition – LU decomposition, SVD; iterative methods – Jacobi iteration, Gauss - seidal iteration; applications in textile materials and machines

UNIT II CURVE FITTING AND INTERPOLATION 9

Least Square Curve fitting – linear, polynomial and exponential; Fourier transform- FFT versus DFT, physical meaning of DFT, yarn evenness spectrogram generation; Lagrange polynomial, Newton polynomial, cubic spline; polymer intrinsic viscosity determination from an experimental data and other applications

UNIT III NUMERICAL DIFFERENTIATION AND INTEGRATION 9

Numerical differentiation - Difference approximation for first, second and higher derivatives, approximation error; Numerical integration – Trapezoidal, Simpson method, Gauss quadrature, Double integral; analysis of stress strain curve, weaving sley acceleration and others

UNIT IV DIFFERENTIAL EQUATIONS 9

Ordinary differential equations and solutions- Taylor's series, Euler's method, Runge- Kutta method; water reservoir, heat transfer in sizing drying cylinder

UNIT V MODELING AND SIMULATION 9

Modelling and simulation of textile process - yarn irregularity due to change in the nip point and attenuation of the sliver; ballooning and yarn tension in ring frame, numeric solution of yarn shape and tension in rotor spinning, yarn motion in air jet weaving; tension during unwinding of yarn from drum feeder

TOTAL : 45 PERIODS

REFERENCES:

1. Gerald C. F and Wheatley P. O., "Applied numerical analysis", 7th Edition, Pearson Education Asia, New Delhi, 2007.
2. Jaan Kiusalaas, "Numerical Methods in Engineering With MATLAB", Cambridge University Press, 2005.
3. Won Young Yang et al., "Applied numerical analysis using MATLAB", Wiley Interscience, 2005.
4. Sabit Adanur, "Handbook of weaving", Technomic Publishing Co. Inc., 2001.
5. Grosberg P. C. Iype, "Yarn Production – Theoretical Aspects", Textile Institute, 1999.

TX 9263 MANAGEMENT AND INFORMATION SYSTEMS L T P C
3 0 0 3

UNIT I MANAGEMENT OF SYSTEMS – SYSTEM CONCEPT 9

Introduction to system - definition, classification, characteristics of a system; problem solving - conventional approach, systems approach and advantages, procedure for engineering a system; system theory of organization and management; textile system analysis case studies

UNIT II INFORMATION TECHNOLOGY 9

Computer and networking – intranet , internet, web server; information system, architecture, modern information systems; information system in business function – marketing, sales, HR, ERP; applications - data and knowledge management, data base architecture, web data base, data warehousing data mining, knowledge management

UNIT III MANAGEMENT INFORMATION SYSTEMS 9

Management functional areas; decision making in management; concept of DSS, EIS, ES; planning information system, implementation – cost benefit analysis, testing and security

UNIT IV ENTERPRISE RESOURCE PLANNING (ERP) 9

ERP – Origin, concept, Materials Requirement Planning, Manufacturing Resource planning, CIM, SCM, CRM, ERP and MIS – functional analysis; evaluation of ERP Tangible and intangible benefits

UNIT V ERP IMPLEMENTATION 9

ERP implementation – need analysis, feasibility analysis; ERP modules, soft wares, functional requirement specification, ERP consultant; case studies; business process reengineering and process innovation; BPR steps and techniques; implementation approaches; case studies for spinning and weaving mills

TOTAL : 45 PERIODS

REFERENCES:

1. Sharma S. C., "Management of Systems", Khanna Publishers, Delhi 1996.

2. Kenneth C., Laudon and Jane Price Laudon, “Management Information systems Managing the digital firm”, Pearson Education Asia.
3. Gordon B. Davis., “Management Information system: Conceptual Foundations, Structure and Development”, McGraw Hill, 1974.
4. Effy oz., “Management Information Systems”, 2nd Edition, Thomson Learning Course Technology, 2000.
5. W.S. Jawadekar, “Management Information Systems”, Tata McGraw Hill Publishing Company, Delhi, 2002.
6. Joyce J. Elam., “Case series for Management Information System” Silmon and Schuster, Custom Publishing, 1996.

TX 9264 PROTECTIVE CLOTHING L T P C
3 0 0 3

UNIT I FIBRE REQUIREMENTS 9

Suitability and properties of high performance fibres for various protective clothing – chemical composition and physical structure

UNIT II YARN AND FABRIC REQUIREMENTS 9

Types of yarns; woven, knitted and non - woven fabric structures, methods of production, effect of structure on their performance

UNIT III CLOTHING CONSTRUCTION 9

Method of construction of garments according to various protective end uses like protection against cold, ballistic protection, use of different fabric type (knitted, woven, and Non-woven), coated / laminated in different places; use of inter lining and composites; 3D structures; high tech textiles – variable electronics; protective garments for industrial and apparel end uses

UNIT IV FINISHING OF PROTECTIVE CLOTHING 9

Types of finishes - fire retardant finishes, water repellent finishes, anti - microbial finishes; chemical finishes against radiation and chemicals; method of application of finishes; protective finishes for health care garments

UNIT V QUALITY EVALUATION 9

Evaluation of protective fabrics; desirable properties of protective textiles, method of testing for thermal protective performance, abrasion and wear resistance, evaluation of resistance to mildew, ageing, sunlight, chemical, electrostatic and electrical resistivity, impact properties; ASTM standards for protective garments .

TOTAL : 45 PERIODS

REFERENCES:

1. Adanur S., “Wellington sears handbook of Industrial textiles” Technomic publishing co. inc., 1995, ISBN : 1 – 56676 – 340 – 1
2. Pushpa Bajaj and Sengupta A.K, “Protective clothing”, the Textile Institute, 1992, ISBN 1-870812 – 44-1
3. Chellamani K.P. and Chattopadhyyay D., “Yarns and Technical Textiles”, SITRA, 1999.
4. Mukhopadhyay S.K. and Partridge J.F., “Automotive Textiles”, Textile Progress, Vol29, No1/2, 1999, ISBN:1870372212
5. Horrocks A.R. and Anand S.C., “Handbook of Technical Textiles”, The Textile Institute, Manchester, 2000, ISBN: 1855733854.
6. Anand S.C., “Medical Textiles”, Textile Institute, Manchester, 2001, ISBN:185573494X.
7. Scott R.A., “Textiles for protection”, Woodhead Publishing Ltd., Cambridge, UK, 2005, ISBN 1-85573-921-6.

8. Saville B.P., “Physical testing of textiles”, Woodhead Publishing Ltd., Cambridge, UK, 1999, ISBN 1-85573-367-6.
9. Long A.C., “Design and manufacture of Textile Composities”, Woodhead Publishing Ltd., Cambridge, UK, 2005, ISBN 1-85573-744-2.
10. Fung W, “Coated and laminated textiles”, Woodhead Publishing Ltd, Cambridge, UK, 2002, ISBN 1-85573-576-8.
11. 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.
12. Fung W. and Hardcastle, “Textiles in automotive engineering”, Woodhead Publishing Ltd, Cambridge, UK, 2001, ISBN 1-85573-493-1.
13. John N.W.M., “Geo Textile”, Blackie and Sons Ltd, London, U.K. , 1987, ISBN 0-412-01351-7.
14. Allison Mathews. and Martin Hardingham, “Medical and Hygiene Textile Production – A hand book” Intermediate Technology Publications, 1994.

TX 9265 SUPPLY CHAIN MANAGEMENT L T P C
3 0 0 3

UNIT I **9**

Supply Chain Management - scope and importance, customer driver strategies, logistics and competitive strategy

UNIT II **9**

Management of transportation - inventory, order processing, purchasing, warehousing, materials handling, packaging; customer service management; marketing and supply chain interface; finance and supply chain interface

UNIT III **9**

Distribution network planning and warehouse location; integrated supply, production, distribution policies and plans

UNIT IV **18**

Import-Export logistic management; export shipping, air transportation management – documentation, insurance, packaging and others; Foreign exchange – concept; methods of International payment settlement; international commercial terms; exchange control regulations for imports and exports – textile products

TOTAL : 45 PERIODS

REFERENCES:

1. Donald J. Bowersox and David J. Closs, “Logistical Management”, Tata McGraw-Hill Editions, New Delhi, 2000.
2. Jeremy F. Shapiro, “Modelling and Supply Chain”, Thomson Learning, U.K., 2001.
3. Monczka, Trend, Handfiled, “Purchasing and Supply chain management”, Thomson south- western college publishing, Kentucky, 2000.
4. Bligh, Philip; Douglas Turk, “CRM unplugged – releasing CRM's strategic value”, Hoboken: John Wiley & Sons, 2004, ISBN 0-471-48304-4.
5. David Taylor and David Brunt, “Manufacturing Operations and Supply Chain Management”, Vikas Thomson Learning, New Delhi, 2001.

6. Philippe - Pierre Dornier, “Global operations & logistics”, John Wiley & sons Inc, New York, 2002.
7. Sahay B.S., “Supply chain management for global competitiveness”, Macmillan India Ltd, Delhi, 2000.
8. David Hutchins, “Just in Time”, Jaico Publishing House, Mumbai, 2001.
9. David Simchi, Levi and Philip Kaminsk, “Designing and Managing the supply chain”, McGraw-Hill Companies Inc., New York, 2000.