

M.Tech. (Fibres and Textile Processing Technology)**Semester I**

No.	Contents	Course Code	Subject	Hours/Week (L+T)	Marks	Credits
1.	Core I	TXT 2502	Advanced Textile Materials	(2+1)	50	3
2.	Core II	TXT 2803	Sustainable Textile Processing	(2+1)	50	3
3.	Core III	PYT 2106	Physical Methods of Analysis	(2+1)	50	3
4.	*Elective I			(2+1)	50	3
5.	*Elective II			(2+1)	50	3
6.	Project I	TXP 2001	Seminar & Critical Review	6	50	3
7.	Practical I	TXP 2301	Advanced Textile Characterisation Techniques	6	50	3
8.	Research I	TXP 2002	Literature survey, project plan and proof of concept	12	100	6
Total				39	450	27

Semester II

No.	Contents	Course Code	Subject	Hours/Week (L+T)	Marks	Credits
1.	Core IV	TXT 2804	Management of Textile Waste	(2+1)	50	3
2.	Core V	TXT 2503	Smart Textile	(2+1)	50	3
3.	Core VI	TXT 2203	Developments in Textile Processing Machinery	(2+1)	50	3
4.	*Elective III			(2+1)	50	3
5.	*Elective IV			(2+1)	50	3
6.	Practical II	TXP 2302	Process Optimisation & Performance Evaluation	6	50	3
7.	Research II	TXP 2003	Mid project Evaluation	18	150	9
Total				39	450	27

Semester III

No.	Contents	Course Code	Subject	Week (L+T)	Marks	Credits
1.	Project II	TXP 2004	In-plant Training	15 weeks (40 hours/week)	450	30
Total				15	450	30

Semester IV

No.	Contents	Course Code	Subject	Week (L+T)	Marks	Credits
1.	Research III	TXP 2005	Research Thesis & Open Defence	15 weeks (40 hours/week)	450	30
Total				15	450	30

***List of electives recommended by the department for Sem I**

1. PHT 2101: Research Methodology
2. BST 2106: Intellectual Property Rights

***List of electives offered by the department for Sem II**

1. TXT 2902: Entrepreneurship Development
2. TXT 2903: Laboratory Management systems
3. TXT 2904: Supply Chain Management
4. TXT 2205: Continuous Processing of Textile
5. TXT 2601: Biotechnology in Textiles
6. TXT 2204: Developments in Textile Auxiliary Chemicals

Note: Department will offer the course provided more than 5 students are opting the course.

Syllabus for the M. Tech. (Textile Processing) Two Year (4 Semesters) Course

Semester I

Code & Title of the Course	TXT 2502:Advanced Textile Materials
Marks	50
Number of Hours per Week	2+1
Credits	3
Class	M Tech
Semester	I

Sr.No.	Topic	Hrs.
1.	Definition & Classification of Technical Textiles, Economics, Growth Potential, Selection Criteria for the fibres to be used in individual fields	4
2.	Application & Growth of individual segments like geo textiles, medical textiles, automotive textiles, etc, Detailed description of some products of each category	8
3.	Fibre composites, preparation, testing, applications	6
4.	Introduction to basic principles of coating and laminating, Processes, Preparation for coating and lamination, Coating and Lamination methods, Applications	8
5.	Methods of characterization of advanced materials	4

Reference books:

1. Hand book of technical textiles, A.R. Horrock and S.C. Anand
2. Coated textiles Principles and applications by Dr. A.K. Sen
3. Medical textiles '96 by Subhash Anand
4. Automotive textiles by Dr. S.K. Mukhopadhyay and J.F. partridge, The Textile Institute.
5. Smart textile coatings and Laminates, Edited by William C. Smith

Code & Title of the Course	TXT 2803:Sustainable Textile Processing
Marks	50
Number of Hours per Week	2+1
Credits	3
Class	M Tech
Semester	I

Sr.No.	Topic	Hrs.
1.	Sustainability, Concept and introduction, Eco-friendly preparation, dyeing, printing and finishing - Pollutants in processing industry and their effect on ecology, Standards for fresh water as well as waste water, Special techniques for reducing pollution caused by textile processing, Eco-friendly substitutes of chemicals and processes	14
2.	Hazardous substances in clothing and other textiles, Concept of RSL, APL, Zero Discharge of Hazardous Chemicals, Higg's Index, Mark and Spencer Plan A, Greenpeace and its campaigns	6
3.	Life Cycle Assessment (LCA) of textiles, eco-audit, eco-norms and eco-labeling	6
4.	Carbon footprint in textile industry, Importance of Compliances for brands and retailers, importance of SIN (Substitute It Now!)	4

Reference books:

1. Sustainable Apparel, Richard Blackburn
2. Sustainable Textiles, Richard Blackburn
3. Handbook of Sustainable Textile Production, [Marion I Tobler-Roh](#)
4. Environmental Issues - Technology Options for Textile, Chavan R.B., Radhakrishnan J
5. Environmental Chemistry of dyes and pigments, Wiley, Reife A and Freeman H.S

Code & Title of the Course	PYT 2106:Physical Methods of Analysis
Marks	50
Number of Hours per Week	2+1
Credits	3
Class	M Tech
Semester	I

Sr.No.	Topic	Hrs.
1.	Fourier Transform Infrared Spectroscopy: Molecular vibrations, frequency shifts associated with structural changes, basic theory of FTIR spectroscopy, interferogram, digitization of interferogram, data points collection, instrumentation and advantages of FTIR spectrophotometry, qualitative and quantitative analysis using infrared spectrophotometry	5
2.	Ultraviolet and visible spectrophotometry: Electronic transitions, spectrum, shift of bands with solvents, isolated double bonds, conjugated dienes, carbonyl compounds, aromatic and hetero-aromatic compounds, application in pollution control and chemical industry	5
3.	Nuclear Magnetic Resonance: Basic principles of NMR phenomenon, relaxation processes, spin-spin interaction, chemical shifts, interpretation of NMR spectra, correlation - hydrogen bonds to carbon and other nuclei, instrumentation, continuous and pulsed NMR, carbon-13 NMR.	5
4.	X-ray Diffraction: Crystal geometry and structural determination, Bragg's law of X-ray diffraction, powder method, X-ray spectrometers - wide and small angle diffractometers, chemical analysis by X-ray diffraction	2
5.	Particle size analysis: Particle size, sampling, conventional techniques of particle size measurement, light scattering, particle size measurement by light scattering techniques, dynamic light scattering (DLS), fibre-optic dynamic light scattering (FDLS)	5
6.	Chromatography: Basic theory of separation, efficiency, resolution, liquid chromatography, high performance liquid chromatography (HPLC), gas chromatography - columns and detectors, qualitative and quantitative analysis	5
7.	Mass Spectroscopy: Basic principles, ionization of a molecule on electron impact, fragmentation processes in organic compounds, interpretation of mass spectra, molecular weight, molecular formula, instrumentation - different types of ionization sources and magnetic analysers	3

Reference books:

1. Fundamentals of Molecular Spectroscopy - C. Banwell and E. McCash
2. Instrumental Methods of Analysis - H. H. Willard, 1.1. Merritt and J. A. Dean
3. Dye Lasers - F. P. Schafer
4. Infrared Spectra of Complex Molecules - L. J. Bellamy
5. Fundamentals of Surface and Thin Film Analysis - L. C. Feldman and J. W. Mayer
6. X-ray Structure Determination - G. H. Stout and I. H. Jensen
7. High Resolution NMR Spectroscopy - E. D. Becker
8. Nuclear Magnetic Resonance Spectroscopy—RXHarris
9. Physical Methods - R. S. Drago
10. Advances in Electrochemical Science and Engineering -1.1. Gerischer and C. W. Tobnia (eds.)

Code & Title of the Course	TXP 2001: Seminar and Critical Review of One Research Publication
Marks	50
Number of Hours per Week	6
Credits	3
Class	M Tech
Semester	I

Sr.No.	Topic	Hrs.
1.	Student will be required to prepare critical reviews of selected topic in Chemical Technology and Allied subjects and submit in the form of standard typed report. The student will also be required to make an oral presentation of the review.	15
2.	Student will be required to review single research publication as decided by the faculty advisor. In general a written Critical Reviews report needs to be submitted in the form of standard typed report. The student will also be required to make an oral presentation of the review	15

Code & Title of the Course	TXP 2301:Advanced Textile Characterisation Techniques
Marks	50
Number of Hours per Week	6
Credits	3
Class	M Tech
Semester	I

Sr.No.	Topic
1.	DSC Analysis of neat and modified polyester, Nylon and polypropelene fibres on Differential Scanning Calorimeter
2.	Analysis of neat and modified polyester, Nylon and polypropelene fibres on TGA and LOI tester
3.	FTIR analysis of natural and synthetic untreated and finished fabrics on FTIR
4.	Structure analysis with respect to crystallinity, orientation and crystal size of neat and modified polyester, Nylon and polypropelene fibres on XRD machine
5.	Determination of zeta potential of untreated and surface modified cotton material on Electrokinetic Analyzer
6.	To measure particle size of nano TiO ₂ on nano particle size analyzer
7.	To study the morphology of different treated and untreated fibres using Image Analyzer
8.	To measure static charge decay time, bulk and surface resistivity of untreated and conducting polyester fabric.
9.	Measurement of contact Angle on untreated, finished and coated fabric on Contact Angle Analyzer
10.	Measurement of surface energy of untreated and finished fabric on Tensiometer

Code & Title of the Course	TXP 2002:Research I
Marks	100
Number of Hours per Week	12
Credits	6
Class	M Tech
Semester	I

Sr.No.	Topic	Hrs./Week
1.	Student will be required to make a detailed literature search of the proposed area to be undertaken under the guidance of the research supervisor. In general a written review report along with his proposed plan of research work emanating from it needs to be submitted in the form of standard typed report. The student will also be required to perform preliminary experiments to achieve proof of concept.	12

Semester II

Code & Title of the Course	TXT 2804:Management of Textile Waste
Marks	50
Number of Hours per Week	2+1
Credits	3
Class	M Tech
Semester	II

Sr.No.	Topic	Hrs.
1.	Understanding the textile and apparel recycling process, Designing textile products that are easy to recycle	3
2.	Reclaimed Fibres, the Source and Usage, Fibre Industry and Waste Management	5
3.	Cotton Waste Reclamation	5
4.	Recycling of High Tech Fibres	2
5.	Recycling and re-use of textile chemicals	6
6.	Nonwovens from Recycled Waste	3
7.	Apparel disposal, recycling and reuse	2
8.	Recycled textile products and market	2
9.	Applications of recycled textiles, Carpet recycling technologies and making composite products from post-consumer carpet	2

Reference books:

1. Recycling Textile and Plastic Waste, Richard Horrocks
2. Recycling in Textiles, Youjiang Wang

Code & Title of the Course	TXT 2503:Smart Textiles
Marks	50
Number of Hours per Week	2+1
Credits	3
Class	M Tech
Semester	II

Sr.No.	Topic	Hrs.
1.	Smart technology for textiles and clothing	3
2.	Heat-storage , thermo-regulated and thermally sensitive textiles and Clothing	3
3.	Multifunctional and multi-use intelligent materials	3
4.	Stimuli-responsive interpenetrating polymer network, Adaptive and responsive textile structures	3
5.	Optical fibres and fibre optic sensors	3
6.	Embroidery for technical applications	3
7.	Hollow fibre membranes for gas separation	4
8.	Smart medical textiles, Tailor-made intelligent polymers for biomedical applications, Textile scaffolds in tissue engineering	8

Reference books:

1. Smart fibres, fabrics and clothing, Xiaoming Tao
2. Smart textiles for medicine and healthcare, L. Van Langenhove
3. Textile advances in the automotive industry, R. Shishoo

Code & Title of the Course	TXT 2203:Developments in Textile Processing Machinery
Marks	50
Number of Hours per Week	2+1
Credits	3
Class	M Tech
Semester	II

Sr.No.	Topic	Hrs.
1.	Developments in machinery for pretreatment, dyeing, printing and finishing	14
2.	Automation and computer as well as microprocessor applications in processing	6
3.	Modifications for energy and water conservation	6
4.	Effluent treatment plant organization	4

Reference books:

1. Technology of Bleaching and Dyeing, Chakraverty, R.R., Trivedi S.S., Vol. 1, Mahajan Publishers Private Ltd., Ahmedabad, 1979.
2. Chemical Technology in the Pre-treatment Processes of Textiles by S.R.Karmakar
3. Introduction to Textile Printing, W. Clarke, Newness Butterworths, London, 4th edition, 1977.
4. Guide to Printing Techniques, Naoharu Oyabu, Mahajan Brothers Publish Ltd., Ahmedabad,1978.

Code & Title of the Course	TXP 2302: Process Optimisation & Performance Evaluation
Marks	50
Number of Hours per Week	6
Credits	3
Class	M Tech
Semester	II

Sr.No		
1.	To perform digital printing on the cotton and polyester using pigment colours and measure its fastness characteristics	6 hrs/week
2.	To coat the cotton fabric with TiO ₂ nano particles and measure its UPF	
3.	To measure BOD and COD of untreated and treated textile effluent	
4.	To measure the heavy metal content in the treated fabric and effluent water using Atomic Absorption Spectrophotometer	
5.	Characterization of the textile effluent on HPLC	
6.	Measurement of colour in the effluent using UV-Vis spectrophotometer	
7.	To study the process of decolourization by Ozonolysis	
8.	To make PVA nano fibres using electrospinning	
9.	Shade Matching using CCM	
10.	Design of Experiment for Textile Process optimization	

Code & Title of the Course	TXP 2003: Research II
Marks	150
Number of Hours per Week	18
Credits	9
Class	M Tech
Semester	II

Sr.No.	Topic	Hrs./Week
1.	Student will be required to make a detailed presentation to the guide in presence of an external referee on the research work done so far to ensure satisfactory progress.	18

Semester III

Code & Title of the Course	TXP 2004:In-plant Training
Marks	450
Number of Hours per Week	40
Credits	30
Class	M Tech
Semester	III

Sr.No.	Topic	Hrs./Week
1.	Student will undergo in plant training in the area of textile wet processing / allied areas. Students will be required to submit certificate of successful completion of the training along with the report and make a presentation.	40

Semester IV

Code & Title of the Course	TXP 2005: Research III
Marks	450
Number of Hours per Week	40
Credits	30
Class	M Tech
Semester	IV

Sr.No.	Topic	Hrs./Week
1.	Student should complete the research work, submit synopsis , face open defence and submit final copy of thesis.	40

Syllabus of electives recommended by the department for Sem I

Code & Title of the Course	PHT 2101:Research Methodology
Marks	50
Number of Hours per Week	2+1
Credits	3
Class	M Tech
Semester	I

Sr.No.	Topic	Hrs.
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1.	<p>Research</p> <p>Meaning of Research, Purpose of Research, Types of Research (Educational, Clinical, Experimental, Historical, Descriptive, Basic applied and Patent Oriented Research) – Objective of research- Literature survey – Use of Library, Books, & Journals – Medline – Internet, getting patents and reprints of articles as sources for literature survey. Selecting a problem and preparing research proposal for different types of research mentioned above.</p> <p>Methods and tools used in Research</p> <ul style="list-style-type: none"> • Qualitative studies, Quantitative Studies • Simple data organization, Descriptive data analysis • Limitations and sources of Error • Inquiries in form of Questionnaire, Opinionnaire or by interview • Statistical analysis of data including variance, standard deviation, students ‘t’ test and annova, correlation data and its interpretation, computer data analysis 	4
2.	<p>Documentation</p> <ul style="list-style-type: none"> • “How” of Documentation • Techniques of Documentation • Importance of Documentation • Uses of computer packages in Documentation 	4
3.	<p>The Research Report / Paper writing / thesis writing</p> <ul style="list-style-type: none"> • Different parts of the Research paper <ol style="list-style-type: none"> 1. Title – Title of project with author’s name 2. Abstract – Statement of the problem Background list in brief and purpose and scope 3. Key-words- 4. Methodology-Subject, Apparatus / Instrumentation, (if necessary) and procedure 	4
4.	<p>Results – tables, Graphs, Figures, and statistical presentation</p> <p>Discussion – Support or non- support of hypothesis – practical & theoretical implications, conclusions</p> <p>Acknowledgements</p> <p>References</p> <p>Errata</p> <p>Importance of spell check for Entire project</p> <p>Use of footnotes</p>	5
5.	<p>Presentation (Specially for oral)</p> <ul style="list-style-type: none"> • Importance, types, different skills • Content of presentation, format of model, Introduction and ending • Posture, Genstures, Eye contact, facial expressions stage fright • Volume- pitch, speed, pauses & language • Visual aids and seating <p>Questionnaire</p>	5

6.	Protection of patents and trade marks, Designs and copyrights <ul style="list-style-type: none"> • The patent system in India – Present status Intellectual property Rights (IPR), Future changes expected in Indian Patents • Advantages • The Science in Law, Turimetrics (Introduction) • What may be patented • Who may apply for patent • Preparation of patent proposal 	5
7.	Sources for procurement of Research Grants Industrial- Institution Interaction - Industrial projects – Their feasibility reports	3

Reference books:

1. Research in Education – Johan V. Best James V. Kahn
2. Presentation skills- Michael Halton- Indian Society for Institute Education
3. A Practical Introduction to copy right – Gavin Mcfarlane
4. Thesis projects in Science and Engineering – Richard M. Davis
5. Scientists in legal system – Ann labor science
6. Thesis and Assignment writing – Jonathan Anderson
7. Writing a technical paper- Donald Menzel
8. Effective Business Report writing – Leland Brown
9. Protection of Industrial property rights- Purushottam Das and Gokul Das
10. Spelling for the million – Edna furrness
11. Preparing for publication – King Edwards Hospital fund for London
12. Information technology – The Hindu speaks
13. Documentation – Genesis & Development 3792
14. Manual for evaluation of Industrial projects – United Nations
15. Manual for the preparation of Industrial feasibility studies

Code & Title of the Course	BST 2106: Intellectual Property Rights
Marks	50
Number of Hours per Week	2+1
Credits	3
Class	M Tech
Semester	I

Sr.No.	Topic	Hrs.
1.	General Introduction to IPR and Essentials of IP management <ul style="list-style-type: none"> • History of Indian and International Patent System and International Treaties • Introduction to Trademark filing in India • Introduction to Design filing in India • Introduction to Geographical Indication filing in India • Introduction to Indian Patent Law • Assessment of Invention by documentation and Search • Analysis of R&D Activity for Patentability 	10
2.	Techno-legal requirements for filing of Patent Drafting of Patent Specification	4
3.	Patent Prosecution in India Patent Prosecution at International level (Convention and PCT Routs) Agreements & Contracts for Patent Management and drafting of same Infringements for Patent Commercialisation Search and Patentability Opinion	12
4.	Case Studies: Cases of Herbal medicines, biomolecules, agrochemicals, and bulk drugs, oil and textile in India and abroad before Patent Office/ Courts	4

Reference books:

- 1.
- 2.

List of electives offered by the department for Sem II

Code & Title of the Course	TXT 2902:Entrepreneurship Development
Marks	50
Number of Hours per Week	2+1
Credits	3
Class	M Tech
Semester	II

Sr.No.	Topic	Hrs.
1.	Introduction and meaning of Entrepreneurship; Qualities and Characteristics of Entrepreneur: Functions of an Entrepreneur, Types of Entrepreneur	3
2.	Innovation, decision, making ability, management and organization, leadership, Innovative, Adoptive, Fabian, Drone, qualities of entrepreneur	3
3.	Concept and Characteristics of Entrepreneurship; Evolution and Development of Entrepreneurship.	3
4.	Roles of Entrepreneur in economic development, Barriers of Entrepreneurship; Concept, functions and problems of Entrepreneurs	4
5.	Concept of EDP, short term objective, long term objectives, phases of entrepreneur development	4
6.	Meaning and objective of project, quantifiable and non-quantifiable project, sectoral project, techno	4
7.	Concept, need, elements of project formulation, feasibility analysis, Identification of Business	3
8.	Appraisal format, planning commission guidelines, check list for feasibility report	2
9.	Technical, Financial and Social Feasibility Study	2
10.	Various schemes and supports from Central Government Schemes like Technological Upgradation Fund (TUF), Objectives of Textile Committee, DC Handlooms and Handy Crafts.	2

Reference books:

1. Management and Entrepreneurship N.V.R.Naidu, T.Krishna Rao, I.K. International - 2008, New Delhi.
2. Dynamics of Entrepreneurial Development & Management by Vasant Desai, Himalaya Publishing House
3. Entrepreneurship Development – Small Business Enterprises Poornima M Charantimath, Pearson Education 2006, 2nd Edition.
4. Entrepreneurship Development – Small Business Enterprises Entrepreneurship Development, SS. Khanka – S.Chand & Co

Code & Title of the Course	TXT 2903:Laboratory Management systems
Marks	50
Number of Hours per Week	2+1
Credits	3
Class	M Tech
Semester	II

Sr. No.	Topic	Hrs.
1.	Laboratory Selection Guidelines- Introduction to types of Laboratory, Designing basic layout of Laboratory, Laboratory Regulation, Machinery	6
2.	Good Laboratory Practice - Fundamentals of GLP	4
3.	Laboratory Management Systems- Introduction to Laboratory quality, Organization, Infrastructure, Purchasing and inventory, Process control, Internal Quality control, Assessments, Personnel, Occurrence management, Documentations and records	10
4.	Laboratory Safety: OSHA standards for Laboratory safety, Safety Requirements	4
5.	Certifications or accreditations: International standards and standardization bodies, National standards and technical guidelines, Certification and accreditation, Process of Accreditation, Benefits of Accreditation	6

Reference books:

1. Good Laboratory Practice Regulations, Sandy Weinberg, CRC Press, 2002
2. Good Laboratory Practice the Why and the How, Seiler, Jürg P, Springer, 2005
3. Laboratory Management: Principles and Processes, Denise M. Harmening, D.H. Publishing & Consulting Inc., 2012
4. Good Laboratory Practice, OECD Principles and Guidance for Compliance Monitoring, OECD: Organisation for Economic Co-Operation and Development, 2006
5. Good Laboratory Practice, Dr.P.V.Mohanan, Educational Book Centre, 2006

Code & Title of the Course	TXT 2904:Supply chain management for textile industry
Marks	50
Number of Hours per Week	2+1
Credits	3
Class	M Tech
Semester	II

Sr.No.	Topics	Hrs.
1.	Basic principles of supply chain management and logistics, supply chain models, supply chain for volatile market; supply chain drivers and metrics in apparel industries; roll of supply chain in the textile and apparel industries' financial stability	4
2.	Planning supply and demand in apparel production house, managing economies of scale, supply cycle and inventory levels; managing uncertainty in supply chain, safety pricing and inventory; make Vs buy decision, make Vs hire decision; geographical identification of suppliers, supplier evaluation, supplier selection, contract negotiations and finalization	8
3.	Distribution network and design for global textile and apparel products, models of distribution – facility location and allocation of capacity, uncertainty on design and network optimization; the role of transportation in supply chain, modes of transportation, characteristics of transportation, transport design options for global textile and apparel network, trade-off in transport design, risk management in transportation, transport decision in practice for textile and apparel industries.	6
4.	Coordination in supply chain- the bullwhip effect, forecasting, obstacles to coordination in supply chain; supply chain management for apparel retail stores, high fashion fad; supply chain in e-business and b2b practices	6
5.	Import - Export management, documentation, insurance, packing and foreign exchange; methods of payments – domestic, international, commercial terms; dispute handling modes and channels; supply chain and Information system; Customer relationship management	6

REFERENCES

1. Janat Shah, "Supply Chain Management – Text and Cases", Pearson Education, 2009
2. Sunil Chopra and Peter Meindl, "Supply Chain Management-Strategy Planning and Operation", PHI Learning / Pearson Education, 2007
3. David Simchi-Levi, Philip Kaminsky, Edith Simchi-Levi, "Designing and Managing the Supply Chain: Concepts, Strategies, and Cases", Tata McGraw-Hill, 2005
4. Altekhar Rahul V, "Supply Chain Management-Concept and Cases", PHI, 2005

Code & Title of the Course	TXT 2205:Continuous Processing of Textile
Marks	50
Number of Hours per Week	2+1
Credits	3
Class	M Tech
Semester	I

Sr.No.	Topic	Hrs.
1.	Continuous pretreatment of textiles-Processes & Machinery	4
2.	Combined pretreatment of different textiles	4
3.	Continuous dyeing of natural & synthetic and blended fabrics-various dyeing processes , different classes of dyes used, dyeing machinery	18
4.	Recent advances in continuous processing	4

Reference books:

1. Technology of Scouring and Bleaching, Trotman E.R., Griffin, London, 1968.
2. Technology of Bleaching and Dyeing, Chakraverty, R.R., Trivedi S.S., Vol. 1, Mahajan Publishers Private Ltd., Ahmedabad, 1979.
3. Mercerizing by J.T.Marsh
4. Chemical Technology in the Pre-treatment Processes of Textiles by S.R.Karmakar
5. Encyclopedia of Textile Finishing, Rouette, H.K., Springer Verlag, New York, 2001.
6. Textile Finishing, Hall A.J., Heywood book, London, 1966.
7. An Introduction to Textile Finishing, Marsh J.T., B.I. Publication, Bombay, 1979.
8. Digital printing of textiles , Ujiiie.H.,Woodhead publishing,2006

Code & Title of the Course	TXT 2601: Biotechnology in Textiles
Marks	50
Number of Hours per Week	2+1
Credits	3
Class	M Tech
Semester	II

Sr.No.	Topic	Hrs.
1.	Biotechnology Definition, History and Branches	1
2.	Biodegradable Fibres: Concept, Different Fibres used and their Biodegradability study, Areas of applications	3
3.	Enzymes: Definition and Advantages, Sources of Enzymes, Classification Industrial Manufacturing of Enzymes using Fermentation: Application of different enzymes in various areas of Textiles: Bioscouring, Biodesizing, Biopolishing, silk degumming, effluent treatment.	15
4.	Genetic Engineering: Concept and Origin Application in Textiles: Bt Cotton, Genetic engineering of Silkworm	7
5.	Microbial Dyes: A rising concept in Textiles Introduction, Synthesis, Application, Advantages and Limitations	4

Reference books:

1. Textile processing with enzymes, A. Cavaco-Paulo and G. M. Gübitz, Woodhead Publishing Limited
2. Biodegradable and sustainable fibres, R. S. Blackburn, Woodhead Publishing Limited
3. Biodegradable polymers for industrial applications, Ray Smith, Woodhead Publishing Limited

Code & Title of the Course	TXT 2204: Developments in Textile Auxiliary Chemicals
Marks	50
Number of Hours per Week	2+1
Credits	3
Class	M Tech
Semester	II

Sr.No.	Topic	Hrs.
1.	Chemistry of new types of auxiliaries for processing	10
2.	Relation between structure and properties	5
3.	Methods of manufacture	5
4.	Methods for evaluation of auxiliaries as well as for their effectiveness or activity	10

Reference books:

1. Colourants and Auxiliaries: Organic Chemistry and Application Properties, Shore, J., SDC, Bradford, 1990.
2. Laundry Detergents, Smulders, E., Wiley VCH, Weinheim, 2002.
3. Chemistry and Textile Auxiliaries, Shenai V.A., Vol. 65, Sevak Publication, Bombay, 2nd edition, 2002.
4. Textile Auxiliaries, Batty, J.W., Dergamon Press, Oxford, 1967.
5. Textile Chemicals and Auxiliaries, Speel H.C., Reinhold Processing Corporation, New York, 1952.