

RAJASTHAN TECHNICAL UNIVERSITY,  
KOTA



SYLLABUS  
&  
SCHEME OF EXAMINATION

**M. TECH. Textile Technology**

Effective from session: 2020 – 2021

**RAJASTHAN TECHNICAL UNIVERSITY, KOTA**  
**Course Scheduling for M.Tech. (Textile Technology)**  
**Specialization: Textile Technology**  
**Semester - I**

S. No	Course Type	Course Code	Course Name	Contact Hours per Week			Marks				Credits
				L	T	P	Exam Hrs	IA	ETE	Total	
1	PCC	1MTX1-01	Design of Experiments and Statistical Analysis	3	0	0	3	30	70	100	3
2	PCC	1MTX1-02	Advances in Fibre Production	3	0	0	3	30	70	100	3
3	PCC	1MTX1-03	Total Quality Management Systems in Textiles	3	0	0	3	30	70	100	3
4	PEC	1MTX2-11	Theory and Design of Spinning Machinery	3	0	0	3	30	70	100	3
		1MTX2-12	Advances in Pretreatments and Dyeing Technology								
		1MTX2-13	Sustainable Textile Production								
5	MCC	1MCC3-21	Research Methodology and IPR	2	0	0	2	30	70	100	2
7	PCC	1MTX1-06	Design of Spinning and Processing Machinery Lab	0	0	4		60	40	100	2
8	PCC	1MTX1-07	Quality Management Systems in Textiles Lab	0	0	4		60	40	100	2
9	SODECA	1MTX5-00	Social Outreach Discipline & Extra Curriculum Activities							100	2
			<b>Total</b>					<b>270</b>	<b>430</b>	<b>800</b>	<b>20</b>

## Semester - II

S. No	Course Type	Course Code	Course Name	Contact Hours per Week			Marks				Credits
				L	T	P	Exam Hrs	IA	ETE	Total	
1	PCC	2MTX1-01	Evaluation of Textile Materials	3	0	0	3	30	70	100	3
2	PCC	2MTX1-02	Technical Textiles	3	0	0	3	30	70	100	3
3	PCC	2MTX1-03	Project Planning & Cost Management	3	0	0	3	30	70	100	3
4	PEC	2MTX2-14	Theory and Design of Weaving Machinery	3	0	0	3	30	70	100	3
		2MTX2-15	Advances in Textile Printing.								
5	MCC	2MCC3-XX	Audit Course-I	2	0	0	2				
6	PCC	2MTX1-06	Design of Weaving and Processing Machinery Lab	0	0	4		60	40	100	2
7	PCC	2MTX1-07	Physical and Chemical Analysis Lab	0	0	4		60	40	100	2
8	REW	2MTX4-50	Mini Project with Seminar	0	0	4		60	40	100	2
9	SODECA	2MTX5-00	Social Outreach Discipline & Extra Curriculum Activities							100	2
			<b>Total</b>					<b>300</b>	<b>400</b>	<b>800</b>	<b>20</b>

### Semester - III

S. No	Course Type	Course Code	Course Name	Contact Hours per Week			Marks				Cr
				L	T	P	Exam Hrs	IA	ETE	Total	
1	PEC	3MTX2-11	Modern Technology of Yarn Production								3
		3MTX2-12	Modern Technology of Fabric Production	3	0	0	3	30	70	100	
		3MTX2-13	Energy and Water Conservation in Processing Industries.								
2	MCC	3MCC3-XX	Open Elective	3	0	0	3	30	70	100	3
3	MCC	3MCC3-XX	Audit Course-II	2	0	0	2				
4	REW	3MTX4-60	Dissertation-I / Industrial Project	0	0	20		240	160	400	10
			<b>Total</b>	<b>6</b>	<b>0</b>	<b>20</b>		<b>300</b>	<b>300</b>	<b>600</b>	<b>16</b>

### Semester - IV

S. No	Course Type	Course Code	Course Name	Contact Hours per Week			Marks				Cr
				L	T	P	Exam Hrs	IA	ETE	Total	
1	REW	4MTX4-70	Dissertation-II	0	0	32		360	240	600	16
			<b>Total</b>	<b>0</b>	<b>0</b>	<b>32</b>		<b>360</b>	<b>240</b>	<b>600</b>	<b>16</b>

## I SEMESTER M. TECH. Textile Technology

### 1MTX1-01: Design of Experiments and Statistical Analysis

**Credit: 3\***  
**3L+0T+0P\***

**Max. Marks: 100(IA:30, ETE:70)**  
**End Term Exam: 3 Hours**

#### **Contents of the Subject**

Sampling techniques, sample size, Principles of experimental design. Selecting a statistical design. Running experiments in Blocks, Latin squares. Factorial Designs & Analysis. Fractional factorial experiments. Use of replicates. Techniques of optimisation. Response surface designs. Statistical principles in data analysis. Fitting data. Linear regression with one, and several variables. Polynomial models. ANOVA. Use of Computers. software packages. Rank correlation, Coefficient of concordance. Sampling inspection. Acceptance sampling : OC curve, Acceptance sampling by variables, Producer risk condition. Control Chart: Average run length, Modified control limits for averages..

#### **REFERENCE BOOKS:-**

1. Modern Elementary Statistics – J. Freund., 2006
2. Mathematical Statistics – J. Freund., 1971
3. Practical Statistics for the Textile Industry – Part I & II – GAV Leaf, 1984 & 1987
4. Experimental Designs by Cochran & Cox. 1992
5. Some new three level designs for the study of Quantitative Variables– G E P Box & D W Behnken- Technometrics Vol-2 No-4, Nov 1960..
6. Design of Experiments – Montgomery.

**1MTX1-02: Advances in Fibre Production**

**Credit: 3\***  
**3L+0T+0P\***

**Max. Marks: 100(IA:30, ETE:70)**  
**End Term Exam: 3 Hours**

**Contents of the Subject**

Fibre modifications and evaluation of their properties. Advances in fibre extrusion processes and discussion on structure and properties of the product. Developments in post extrusion operations.

New fibres based on performance and functional applicability. High temperature resistant fibres – Nomex, Kelvar, PBO – production, properties, structure and applications. High strength, high modulus fibres – Spectra (UHMWPE) – production, properties, structure and application. Different routes for production of carbon fibres, their structure, properties and end uses. Optical fibres – Different types, Signal losses, their remedy, production and properties their end uses.

**REFERENCE BOOKS**

1. High Performance Fibres – J. W. S. Hearle, 2001
2. Carbon Fibres by Jean Baptiste Donnet&Roopchand Bansal – International Fibre Science & Technology Series, 1990
3. Hand book of Fibres Science & Technology : High Technology Fibres edited – ManachemLewin& Jack Preston, 1993
4. New Fibres by New Fibres – Second Edition – T. Hongu& Phillips- Wood Head Publishing Ltd., Cambridge, England, 1997
5. Kevlar Aramid Fibres – H.Yang – John Wiley & Sons., 1993

**1MTX1-03: Total Quality Management System in Textiles**

**Credit: 3\***  
**3L+0T+0P\***

**Max. Marks: 100(IA:30, ETE:70)**  
**End Term Exam: 3 Hours**

**Contents of the Subject**

Introduction –Total Quality Management Systems (TQMS) an overview- Advantages of TQMS,

TQM concepts- 5S, quality circle, Kaizen, TPM, SMED, GEMBA various philosophies of TQM, quality management principles

Manufacturing planning and control- Concept of Manufacturing planning and control (MPC), an overview of MPC system, MPC frame work and its evaluation

Demand and supply management- Forecasting, managing demand, material requirement planning, inventory control

Six sigma system, process capability, focus and approach, six sigma problem solving

International certification and standards- Energy management system, environment management system, quality management system, social accountability, occupational health and safety

**REFERENCE BOOKS:-**

1. Manufacturing planning and control for supply chain management, by Thomas E Vollmann, William Lee Berry, David Clay Whybark, F. Robert Jacobs Publisher McGraw Hill
2. Quality Control and Management by William M Lindsay, James R Evans, Publisher Cengage learning
3. Effective Operations Management: The Organizational and Functional Integration of Quality, Productivity, Safety and Environmental Responsibility by Patrick Ambrose Independent publisher
4. ISO 9001, ISO 14001, and New Management Standards (Measuring Operations Performance) by Iñaki Heras-Saizarbitoria Publisher: Springer
5. Purchase Management by Prof. Jhamb L.C Publisher: Everest Publishing House

**1MTX2-11: Theory and Design of Spinning Machinery**

**Credit: 3\***  
**3L+0T+0P\***

**Max. Marks: 100(IA:30, ETE:70)**  
**End Term Exam: 3 Hours**

**Contents of the Subject**

Design principles of modern openers and blenders. Feed Regulation. Theories of carding. Design aspects of high production cards. Drafting force. Theories of drafting. Mechanism of hook removal during drafting. Auto leveling. Combing- effect of lap preparation, fractionating efficiency of comber and its assessment, measurement and improvement, latest development in machine design. Developments in high speed fly frames. Twist flow in Ring Spinning, Spinning Tension. Developments in design of ring travelers. Spindles and high speed ring frame. Automated Spinning. Compact spinning – mechanism and role of process variables.

**REFERENCE BOOKS:-**

1. Advances in Yarn Spinning Technology – Edited by C.A. Lawrence – Woodhead Publishing Ltd. U.K 2010
2. The Textile Institute Publication - Manual of Textile Technology – Short Staple Spinning Series  
Vol.I – The Technology of short staple spinning by W. Klein. 1987  
Vol.-IV – A Practical Guide to Ring spinning by W. Klein. 1987  
Vol.V – New Spinning Systems – W. Klein.1993  
Vol.VI - Man-made fibre spinning – W.Klein1994
3. Series publications of NCUTE Training Programs.
4. Textile Progress Series – Textile Institute,Manchester, 1971
5. Fundamentals of Spun Yarn Technology – Carl A. Lawrence, 2002-2003
6. Yarn Production-Theoretical Aspects –P.Grosberg&C.Iype. , 1987



## 1MTX2-12: Advances in Pretreatments and Dyeing Technology

Credit: 3\*

Max. Marks: 100(IA:30, ETE:70)

3L+0T+0P\*

End Term Exam: 3 Hours

### Contents of the Subject

**Process modifications in Pretreatments** - Developments in singeing, desizing, scouring, bleaching and its eco-aspects, size recovery, **Eco-friendly** peracetic acid bleaching, Eco-friendly retting of Jute, Redox H<sub>2</sub>O<sub>2</sub> bleaching, Concept of Eco-friendly stabilizers for H<sub>2</sub>O<sub>2</sub> bleaching. Combined operations like desizing- scouring- bleaching, solvent scouring, Hot and ammonia mercerization, add-on mercerization. **Use of Biotechnology in Pretreatments**- classification of enzymes, Mode of action of enzyme, Factors affecting efficiency of enzyme treatment. Enzyme retted flax using different formulations, influence of enzymatic pretreatment on the colours of bleached and dyed flax fibers, effect of ultrasound on the performance of industrial enzymes used in cotton bio-preparation/bio-finishing applications, Enzymatic degumming, enzymatic H<sub>2</sub>O<sub>2</sub> bleaching.

**Developments in Dyeing** - Dyeing and its eco-aspects, new dyes and their advantages. Eco-friendly dyeing with sulphur & vat dyes. New developments in reactive dyes like HF dyes, low and no salt reactive dyes, multifunctional dyes, neutral fixing and acid fixing reactive dyes. Photo chromic dyes, thermo chromic dyes, fluorescent dyes. Natural Dyes - Sources and classification of natural dyes, extraction methods, mordants, dyeing of natural and synthetic fibrous material with natural dyes. Concept, mechanism, methods and technoeconomical features of dyeing with Supercritical carbon dioxide, Ultrasound in dyeing and Low temperature dyeing .

Processing of textured man-made fibers. Rapid dyeing techniques, Foam dyeing .

Chemistry and process of warp dyeing with indigo, indigo dyeing equipments, dyeing with mixture of indigo and other dyes.

Process sequence and machines used for terry towel manufacturing, essential properties of terry towel fabrics,

**Processing of Lyocell** - General properties and uses of lyocell (Tencel). Pretreatment, dyeing and finishing of lyocell. Concept of fibrillation, its causes and remedies.

**Processing of Fabric containing spandex** - Properties and uses of spandex fibres and blends. Wet processing of Cotton / Spandex, polyester / Spandex fabrics.

### REFERENCE BOOKS

1. Handbook of Textile processing machinery – R.S. Bhagwat 1999
2. Chemical processing of polyester/cellulosic blends – R.M. Mittal and S.S. Trivedi 1983
3. Silk dyeing, printing and finishing – Hurst, George H. 1892
4. Synthetic Dyes- by Gurdeep R. Chatwal, 2009
5. The chemistry of Synthetic Dyes Vol-8 , by K. Venkataraman, 1978
6. The theory of coloration of textiles by C. L. Bird and W. S. Boston. Dyers Company Publication Trust, Bradford, England, 1975

## 1MTX2-13: Sustainable Textile Production

Credit: 3\*  
3L+0T+0P\*

Max. Marks: 100(IA:30, ETE:70)  
End Term Exam: 3 Hours

### Contents of the Subject

Sustainability: Definition, Overview of energy consumption pattern and its assessment, Assessment of environmental impacts, Concept of greenhouse gas emission and its impact on environment.

Renewable energy: Fossil fuel based energy and its impact on environment, Renewable energy sources and its future prospect

Sustainability in yarn manufacturing: Environmental impact of yarn manufacturing, Sustainable practices at different stage of yarn manufacturing, Sustainability for ring, rotor, and air-jet spinning system, Waste management in spinning, recent trends in energy usages.

Sustainability in fabric manufacturing: Energy consumption in fabric manufacturing, Energy conservation techniques in fabric manufacturing, Noise pollution and its control in fabric manufacturing, Solid waste problem, Wastewater generation and its control in fabric manufacturing

Sustainability in textile chemical processing: Textile dyes used in the textile chemical processing and its impact on environment, Energy consumption in textile chemical processing, Sustainable approaches in effluent treatment

Sustainability in garment manufacturing: Energy consumption in different phase of garment manufacturing, circular economy in fashion, Garment life cycle.

Recycling of textile products: Quantity of waste generated from the textile industry, Textile waste management, Current situation of textile recycling (global scenario), Textile recycling technologies, Factors influencing fabric waste recycling process, Fabric wastes valorization, Challenge of textile recycling

Sustainable raw materials: Ecological footprint of the fibers, Sustainable raw materials, Recycling of plastics into textile raw materials and products.

### REFERENCE BOOKS:-

1. Sustainable Technologies for Fashion and Textiles, Woodhead Nayak R K
2. Principles of Sustainable Energy, CRC Press, 2011. F. Kreith and J. Kreider
3. Sustainable Fibres and Textiles, Woodhead, UK Muthu

**1MTX1-06: Design of Spinning and Processing Machinery Lab**

**Credit: 2\***

**Max. Marks: 100(IA:60, ETE:40)**

**0L+0T+4P\***

**Contents of the Subject**

Practice on modern high speed preparatory machines including combing. Assessment and measurement of the productivity & efficiency of these machines. Practice and understanding the design problems associated with the latest Ring and Compact spinning machines available in the market. Study of the latest technique used on modern weaving machines.

Study the automation in dyeing machineries, color rooms, on line monitoring of concentration of dye and chemicals. Practice on jet dyeing, continuous dyeing, optimizing dyeing conditions.

**1MTX1-07 : Quality Management Systems in Textiles Lab**

**Credit: 2\***

**Max. Marks: 100(IA:60, ETE:40)**

**0L+0T+4P\***

**Contents of the Subject**

Work place management by 5S, employee involvement by suggestion scheme of Kaizen, solving routine problems by method of quality circle, worker and man power development by quality circle, continual improvement plan by quality concept methods use of quality concept tools in Statistical Quality Control, usage of quality concept techniques for general problem solving, application and management of various international standards, Production Planning and control methodology in industry, store and purchase system in production establishment.

## II SEMESTER M. TECH. Textile Technology

### 2MTX1-01: Evaluation of Textile Materials

**Credit: 3\***  
**3L+0T+0P\***

**Max. Marks: 100(IA:30, ETE:70)**  
**End Term Exam: 3 Hours**

#### **Contents of the Subject**

Characterization of Fibre : Birefringence, sonic modulus, density measurements, thermal analysis, X-rays (orientation and crystallinity). Yarn Testing: Tensile properties, hairiness, cross-sectional studies and yarn preparation.

Evaluation of spliced yarn and sized yarn. Testing of technical textile; coated fabrics, geo-textiles, filter fabrics. Simulation of knitted and woven structure, comfort properties of fabric, water repellency. Computer colour matching, measurement of U-V protective character of textile material.

#### **REFERENCE BOOKS:-**

1. Physical Properties of Textile Fibres – Morton W.E. and Hearle J.W.S. published by The Textile Institute Manchester , 1962
2. Physical Testing of Textiles by B.P. Saville , 1999
3. Fibre Microscopy – Stores J.L. – published by London National Trade Press.,2001
4. Structure / Property relationship in Textile Fibres – Textile Progress Vol.20, No.4 – The Textile Institute, Manchester.
5. Textile Yarn – Martindale and Goswami.,1979
6. Textile Testing & Analysis by B. J. Collier.
7. Handbook of Technical Textiles by A. R. Horrocks& S. C. Anand, 2000
8. Computer colour matching by Shah and Gandhi.

## 2MTX1-02: Technical Textiles

**Credit: 3\***

**3L+0T+0P\***

**Max. Marks: 100(IA:30, ETE:70)**

**End Term Exam: 3 Hours**

### **Contents of the Subject**

Introduction: Definition, Textile materials in technical applications.

Fibres: Natural and Man-made fibres suitable for technical applications and their relevant properties.

Geotextiles: Mechanics of reinforcement, filtration and drainage of soils by geotextiles. Typical applications. Determination of soil particle size and pore size distribution, relations between soil particle and size and pore size distribution for hydraulic applications.

Medical textiles: Textiles in various medical applications. Absorbency of textile materials & methods of sterilization; application oriented design of typical medical textiles (e.g. porous graft or trashed tube). Materials used and design procedure for protecting wounds, cardiovascular application, Sutures.

Automotive Textiles: Fibres used for automotive applications-upholstery, carpeting, preformed parts, tyres, safety devices, filters and engine compartment items. Brief description for the manufacture and application of these devices or parts.

Rigid composites: Three dimensional fabrics and triaxially braided materials for composites.

Filtration: Principles and some mathematical models of wet and dry filtrations. Characteristics properties of fibres and fabrics in selective examples of filtration.

Ropes and Cordages: Methods of production. Application oriented structure and production of ropes, cordages and twines.

Protective clothing: Thermal protection. Ballistic protection. Protection from electromagnetic radiation and static hazards. Protection against micro-organisms, chemicals and pesticides.

### **REFERENCE BOOKS**

1. The Textile Institute Advances in Fibre Science – S. K. Mukhopadhyaya
2. “Wellington Sears Handbook of Industrial textiles - S.Adanur, Technomic Publishing Co., Inc Lancaster, Pennsylvania ISBN: 1-56676-340-1, 1995.
3. Automotive Textiles - Mukhopadhyay, S.K. and partridge J.F,’ Text.Prog, Vol. 29, No.1/2, 1998, ISBN: 1870372212.
4. Technical Textiles - Horrocks, A.R and Anand S, Text.Inst. 1999, ISBN: 1855733854.
5. Handbook of Technical Textiles - A.R. Horrocks., 2000

## 2MTX1-03: Project Planning & Cost Management

Credit: 3\*  
3L+0T+0P\*

Max. Marks: 100(IA:30, ETE:70)  
End Term Exam: 3 Hours

### Contents of the Subject

An overview of capital expenditure, Phase of capital budgeting, Project development cycle. Objectives of investment, decision-making, Risk & return. Identification of investment opportunities – Governmental regulatory framework – Generation & screening of project ideas – Project identifications for an existing company. Market & demand analysis – Information required for market & demand analysis – demand forecasting methods – market planning.

Technical Analysis – Material inputs & utilities – Manufacturing process / technology – Plant capacity – location & site – structures & civil works – Machineries & equipments – Project charts & layouts – Work schedule – Need for tendering alternatives.

Analysis of Risk – Types & measurement of project risk – Analytical derivation or simple estimation – Sensitivity Analysis – Scenario analysis – Selection of a project-Risk analysis in practice.

Project implementation – Forms of project organization – Project planning – project control – Human aspects of project management – Pre-requisites for successful project implementation.

Review-Initial review, performance evaluation.

Management accounting- concept, need, importance and scope; cost accounting-meaning, importance, methods, techniques and classification of costs, inventory valuation.

Budgetary control- meaning, need, objectives, essentials of budgeting, different types of budgets; standard costing and variance analysis (materials, labour); marginal costing and its application in managerial decision making

Working Capital- meaning, need, determinants; estimation of working capital need; management of cash; inventory management; receivable management

### REFERENCE BOOKS :-

1. Textile Project Management – A. Ormerod, The Textile Institute Publication.1992
2. EnterpreneurialDevelopment – S.S. Khanta , S. chand& Company Ltd., Delhi – 110 055.
3. Management Accounting - Pandey, I.M., Vikas Publishing House, N.Delhi
4. Introduction to Management Accounting, Horngren&Sundem, Prentice Hall of India, N.Delhi.
5. Management Accounting Principles, Anthony R.N. and Reece J.S., 6th ed., Homewood, Illinois, Richard D.Irwin, 1995. .
6. Accounting: Anthony Robert and Hawkins David, Text & Cases, McGraw Hill, 1999
7. Advanced Cost Accounting – Jain, S.P and Narang, K.L., 1984
8. Financial Management, Kishore, R., Taxman’s Publishing House, New Delhi 1975

**2MTX2-11: Theory and Design of Weaving Machinery**

**Credit: 3\***  
**3L+0T+0P\***

**Max. Marks: 100(IA:30, ETE:70)**  
**End Term Exam: 3 Hours**

**Contents of the Subject**

Theory, measurement and control of yarn tension in unwinding from spinning packages during winding, Tension generators to control yarn tension. Study of warp tension variation during winding. Development in design and operation of modern winding, warping, sizing machines. Theory and design principles of latest automatic controls in size regulation in sizing. Factors affecting size pick up and drying rate in sizing. Expression for drying capacity of sizing machine.

Kinematics of loom slay. Picking system elastic model, shuttle checking. Cloth fell position and its applications, beam-driving mechanism, force acting at a floating back roller.

Principles underlying unconventional weaving machinery picking system: toggle torsion bar picking, air jet nozzle, water jet nozzle, rapier drives.

Kinematics of weft population in unconventional weaving machines: air drag theory i.e. air-jet flows, flow in air guiding system, analysis of yarn tension during unwinding of yarn from drum feeders, yarn flight in air-jet, analysis of yarn motion in air -jet. Loom timings for shuttle less looms.

**REFERENCE BOOKS :-**

1. Modern Preparation & Weaving Machinery – A. Ormerod.2004
2. Principles of Weaving - R. Marks & A . T. C. Robinson 1976
3. Warp Sizing – J.B. Smith
4. Textile Maths Vol-III – J.E. Booth, 1977
5. Weaving Technology & Operation – Allan Ormerod,1995
6. Shuttleless Weaving Machines – O. Talavasek& V. Svaty.,1981

## 2MTX2-12: Advances in Textile Printing.

**Credit: 3\***  
**3L+0T+0P\***

**Max. Marks: 100(IA:30, ETE:70)**  
**End Term Exam: 3 Hours**

### Contents of the Subject

**Digital Printing** - Concept, methods of inkjet printing, colour separation, selection of dyes and developments in inks, techno-economical features.

**Transfer Printing** – Concept, selection of dyes and paper, mechanism of dye transfer, process sequences, techno-economical features, various transfer printing machines.

**Special Printing Effects** – Advantages and disadvantages of pigment printing, various developments to overcome the problems, Special print recipes for fashion & garments. Khadi, Metallic, Floc, Plastizol, Reflective, Pearl, Fluorescent Printing, High Density Printing, Puff Printing, Foil Printing, Plastic Printing

### REFERENCE BOOKS :-

1. Technology of Textile printing by V. A. Shehnai, Vol 4, 2003
2. Digital Printing of Textiles, Ujiie. H. Woodhead publishing, 2006.
3. Pigment Printing Hand book –by AATCC, 1995
4. Wool Dyeing and Printing- by Gulrajani and Gupta, 1990

## 2MTX1-06: Design of Weaving and Processing Machinery Lab

**Credit: 2\***  
**0L+0T+4P\***

**Max. Marks: 100(IA:60, ETE:40)**

### Contents of the Subject

Principles underlying unconventional weaving machinery picking system: toggle torsion bar picking, air jet nozzle, water jet nozzle, rapier drives. Kinematics of weft population in unconventional weaving machines: air drag theory. Loom timings for shuttle less looms.

Study the automation in dyeing machineries, color rooms, on line monitoring of concentration of dye and chemicals. Practice on jet dyeing, continuous dyeing, optimizing dyeing conditions



**2MTX1-07: Physical and Chemical Analysis Lab**

**Credit: 2\***

**Max. Marks: 100(IA:60, ETE:40)**

**OL+OT+4P\***

**Contents of the Subject**

Testing of technical textile materials. Thermal analysis of textile fibres. Measurement of Birefringence, fibre density, yarn cross-sectional studies and related parameters. Yarn Testing: Tensile properties, hairiness, and yarn preparation.

Methods of analysing damage in textile materials, spectroscopic analysis, infrared spectra of natural and manmade fibres, identification of finishing agents using IR spectroscopy, experiments on fluidity, Diffusion coefficients of dyes, Performance of dyes using CCM technique. Evaluation of flame retardants.

**2MTX4-50: Mini Project with Seminar**

**Credit: 2\***

**Max. Marks: 100(IA:60, ETE:40)**

**OL+OT+4P\***

**Contents of the Subject**

**Mini project** should be based on the industries real time problems, new innovation in textiles, new product development etc. on any topic relevant to textile technology/textile engineering/textile chemistry. Each student has to prepare a write up in "A4" size sheets and submit it in duplicate as the term work. The student has to deliver a seminar on topic in front of the faculty members of the department and his/her classmates. The faculty members, based on the quality of the work and preparation and understanding of the candidate, shall do an assessment of the **mini project** internally - jointly. Some marks should be reserved for the attendance of the student in the seminars of the others students.

**REFERENCE BOOKS** - Research journals and other internet resource

### III SEMESTER M.TECH Textile Technology

#### 3MTX2-11: Modern Technology of Yarn Production

**Credit: 3\***  
**3L+0T+0P\***

**Max. Marks: 100(IA:30, ETE:70)**  
**End Term Exam: 3 Hours**

#### **Contents of the Subject**

Causes leading to advent of unconventional spinning systems. Principles and Engineering Design of rotor, air-jet and friction spinning. Fibre properties required for these spinning systems. Structure & property relationship. Effect of raw material and machine variables on spun yarn characteristics of Ring, Air-jet, Rotor and Friction spun yarns. Effect of plying on these yarns.

Other unconventional spinning systems, viz. Self-Twist, Twist-less, Repco. Integrated, Disc., Parafil, etc- their working principles, properties and end use of yarns spun of these system.

#### **REFERENCE BOOKS:-**

#### **REFERENCE BOOKS :-**

1. Advances in Yarn Spinning Technology – Edited by C.A. Lawrence – Woodhead Publishing Ltd. U.K 2010
2. The Textile Institute Publication - Manual of Textile Technology – Short Staple Spinning Series  
Vol.I – The Technology of short staple spinning – W. Klein.1987  
Vol.-II – A Practical Guide to Opening & Carding – W. Klein.  
Vol.III – A Practical Guide to Combing & Drawing – W. Klein.1987  
Vol.VI - Man-made fibre spinning – W.Klein
3. Series publications of NCUTE Training Programs
4. 'Fundamentals of Spun Yarn Technology' – Carl A. Lawrence.,2003
5. 'Spun Yarn Technology' – Eric Oxtoby., 1987
6. Yarn Production-Theoretical Aspects – P.Grosberg&C.Iype.
7. Textile Progress Series – Textile Institute, Manchester.,1971

**3MTX2-12: Modern Technology of Fabric Production**

**Credit: 3\***  
**3L+0T+0P\***

**Max. Marks: 100(IA:30, ETE:70)**  
**End Term Exam: 3 Hours**

**Contents of the Subject**

Yarn quality and preparation requirements for high speed weaving machines. Performance of yarn in air-jet, weaving machine. Weft yarn preparation for the shuttles weft insertion; the type of weft supply packages, the creels and its setting, weft consumption, weft tensioning, weft unwinding for individual picks, weft feed systems, weft measuring system. Ballistic weft insertion; theory of weft insertion, the weft carrier acceleration, the free flight of the weft carrier, the carrier breaking. Theory of weft insertion of projectile, developments in torsion rod picking motion, geometrical aspects of torsion rod, energy for picking, projectile flight & checking, developments in projectile weaving machine. Theory of weft insertion of air - jet picking, nozzles design, developments in air - jet machine. Theory of weft insertion of rapiers, developments in rapier heads, developments in rapier drives, developments in rapier weaving machine. Theory of weft insertion of water - jet picking, developments in water - jet machine. Multi-phase weaving machine - M8300. Developments in high speed shedding devices, beat-up, warp let off and take-up motions. Control systems - weft colour control, warp and weft monitor systems, lubrication system, intelligent monitoring system. Quick style change.

**REFERENCE BOOKS :-**

1. Weaving Technology & Operation - Allan Ormerod.,2004
2. Shuttleless Weaving Machines - O. Talavasek& V. Svaty.,1981
3. Principles of Weaving - R. Marks &A . T. C. Robinson.,1976
4. Handbook of Weaving - SULZER - Sabit Adanur,2001
5. Handbook of Technical Textiles - A.R. Horrocks.,2000

**3MTX2-13: Energy and Water Conservation in Processing Industries**

**Credit: 3\***

**Max. Marks: 100(IA:30, ETE:70)**

**3L+0T+0P\***

**End Term Exam: 3 Hours**

**Contents of the Subject**

Water/Energy consumption in the industry, Quality and quantity requirements, reasons for conservations, approach to conservation, measurements of water/ energy consumption, target figures for water/ energy consumption, water energy conservation measures, consequence of water/energy conservation, energy conservation in generating steam, sizing, bleaching, mercerization, dyeing, printing, finishing and drying.

Alternate energy sources, waste heat recovery.

Processes for energy conservation e.g. E. Control, Hot Mercerization, Supercritical carbon-dioxide dyeing technique etc.

Right first time approach.

**REFERENCE BOOKS :-**

1. Economy, Energy & Environment in Textile Wet Processing-Edited by S. S. Trivedi
2. Textile Energy & Waste Seminar-Textile Institute, 1997
3. Environmental Issues and Technological option for Textile industry. Edited by R. B. Chavan.
4. Environmental Success: America Textile Industry, AATCC Symposium-1996
5. Energy Conservation in Industries – Vol.I& II, Centre of Plant Engg.ServicesHydrabad.

**3MTX4-60: Dissertation-I / Industrial Project**

**Credit: 10\***

**Max. Marks: 100(IA:60, ETE:40)**

**OL+OT+20P\***

**Contents of the Subject**

Each student individually will carry out a project of an experimental and/or theoretical nature in one of the main branches of textile technology/textile engineering/ textile chemistry. **Dissertation** should be on the industrial projects, innovative and technical textiles, new product development etc. (should be helpful for selecting a probable title of dissertation). Student has to do thorough literature survey on their topics and justify the reason of carrying out particular research topic. Each student has to prepare a write up in "A4" size sheets as per university format and submit and present his findings in a systematic manner in the Project Report duly approved and signed by his Supervisor / Guide (to be nominated by the Principal, MLVTEC). The student has to deliver a presentation on dissertation topic in front of the faculty members of the department and his/her classmates. The faculty members, based on the quality of the work and preparation and understanding of the candidate, shall do an assessment of the dissertation internally - jointly.

IVSEMESTER M.TECH Textile Technology

**3MTX4-70: Dissertation-II / Industrial Project**

**Credit: 16\***

**Max. Marks: 100(IA:60, ETE:40)**

**OL+OT+32P\***

**Contents of the Subject**

Each student individually will carry out a project of an experimental and/or theoretical nature in one of the main branches of textile technology/textile engineering/ textile chemistry. **Dissertation** should be on the industrial projects, innovative and technical textiles, new product development etc. (should be helpful for selecting a probable title of dissertation). Student has to do thorough literature survey on their topics and justify the reason of carrying out particular research topic. Each student has to prepare a write up in "A4" size sheets as per university format and submit and present his findings in a systematic manner in the Project Report duly approved and signed by his Supervisor / Guide (to be nominated by the Principal, MLVTEC). The student has to deliver a presentation on dissertation topic in front of the faculty members of the department and his/her classmates. Each candidate would submit three (3) typed copies of the Project Report after duly checked by the plagiarism software to Principal, MLVTEC at least 15 days before the commencement of fourth semester examination. One copy of the Project Report will be returned to the candidate after viva-voce examination. The original report and second copy will be retained by the concerned Department / Institution and the Supervisor respectively.