

Faculty of Engineering & Technology
P.K.University
Shivpuri (MP)



**Evaluation Scheme & Syllabus for
Department Of Textile Technology**

**M. Tech - (Textile Technology)
(I to IV Semester)**

(Effective from session 2019-20)

EVALUATION SCHEME

M.Tech- Textile Engg.						
SUBJECT CODE	SUBJECT NAME	THEORY		PRACTICAL		TOTAL
		SESS.(30)	EXT.(70)	SESS.(25)	EXT.(25)	
MTTE-101	Textile Quality Evaluation	30	70	25	25	150
MTTE-102	Modern method of Yarn Production	30	70	25	25	150
MTTE-103	Knitting and Nonwoven	30	70	NA	NA	100
MTTE-104	High performance fibers & Composites	30	70	NA	NA	100
MTTE-105	Research Process & Methodology	30	70	NA	NA	100
SUBJECT CODE	SUBJECT NAME	THEORY		PRACTICAL		TOTAL
		SESS.(30)	EXT.(70)	SESS.(25)	EXT.(25)	
MTTE-201	Characterization of Polymers and Fibres	30	70	25	25	150
MTTE-202	Modern Method of Fabric Production	30	70	25	25	150
MTTE-203	Nano technology in textiles	30	70	NA	NA	100
MTTE-204	Textile Costing and Cost Control	30	70	NA	NA	100
MTTE-205	Instrumentation & Automatic Controls	30	70	NA	NA	100
SUBJECT CODE	SUBJECT NAME	THEORY		PRACTICAL		TOTAL
		SESS.(30)	EXT.(70)	SESS.(25)	EXT.(25)	
MTTE-301	Dissertation phase-I	NA	NA	300	300	600
MTTE-302	Seminar	NA	NA	25	25	50
SUBJECT CODE	SUBJECT NAME	THEORY		PRACTICAL		TOTAL
		SESS.(30)	EXT.(70)	SESS.(25)	EXT.(25)	
MTTE-401	Dissertation phase-II	NA	NA	300	300	600

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I Year I Semester

MTTT 101- TEXTILE QUALITY EVALUATION

(L T P 3 0 0)

UNIT I: Fibre classification, properties and standards, methods of measuring fibre fineness, Methods of Measuring fibre length, HVI testing- the basics, Application of HVI, AFIS- the basics, Testing & data analysis, maturity and fineness testing, Application of NIR spectroscopy for textile measurement, properties.

UNIT II: MASS VARIATION OF TEXTILE STRANDS: Depiction of mass Variation of textile strands in time and frequency domain; interpretation and significance of U% and CV% for textile strands; classification and analysis of yarn faults created by mass variation, VARIANCE LENGTH CURVES AND SPECTROGRAM OF TEXTILE STRANDS: Effect of specimen length and total length on mass variation measurements of textile strands; theory of construction of VL curve; analysis of variance length curves to understand and avoid the introduction of mass variation during the spinning operation; determination of periodic mass variation in the form of spectrogram; determination of theoretical wave length from spectrum; comparison between normal and ideal spectrum; type of faults and their representation in spectrogram; interpretation of superimposed waves in spectrogram

UNIT III: Strength & Elongation tests:, definitions of different terms of tensile tests, factors affecting tensile testing, fibre strength, yarn strength & fabric strength test methods, Influence of testing factors on yarn tensile properties; measurement and application of yarn modulus; creep and stress relaxation of yarn; significance of estimating minimum yarn strength, seam strength.

UNIT IV: Hygral expansion, relaxation shrinkage, swelling shrinkage, methods of measuring dimensional stability, Snagging test, wrinkle recovery & pilling resistance, abrasion resistance test, factors affecting abrasion resistance,

UNIT V: Thermal comfort, air permeability, moisture transport, sensorial comfort, water absorption and water repellency tests, colour fastness testing, objective evaluation of fabric handle. Kawabata system, FAST: fabric assurance by Simple testing, FABRIC APPEARANCE AND OTHER PROPERTIES Study of fabric appearance in terms of drape, formability, crease recovery, evaluation of fabric properties like flammability, impact resistance, absorbency

TEXT BOOKS:

1. Varma H K, "Costing in Textile Industry", Dhanpat Rai publications, New Delhi, 1965 3.
2. Shinn William, "Elements of Textile Costing" School of Textiles, North Carolina state, 1965
3. Jain IC, "Cost accounting-An introduction", Prentice hall, New Delhi, 2001

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MTTT 102 MODERN METHODS OF YARN PRODUCTION

UNIT I & UNIT II :

Processing variables and their influence on properties of direct spun yarn, Physics of texturing, false twist texturizing, Tow crimping, edge crimping, air bulking, knit-de-knit and other methods of texturing. Effect of thermal and mechanical variables on properties of bulked yarns. Method of producing bulk yarn, production and properties of stretch yarn.

UNIT III:

Systems of yarn manufacture in cotton, worsted, woolen and semi worsted system. Comparative study of new spinning technologies. Break spinning assemblies. Comparison and properties of yarn made with different assemblies.

UNIT IV:

Internal structure of break spun yarn. Production and properties of self twist, twist-less core-spun, core-ply textured electrometric, Bob-tex, fascinated & friction spun yarn., cover spinning, siro spinning and compact spinning.

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MTTT 103: KNITTING & NON-WOVEN

(L T P 3 0 0)

UNIT I

Concepts of loop formation in weft and warp knitting. Different forces acting on the needle butt and mechanics of loop formation. Study of dynamics of knitting process. Study of different machines, process and yarn parameters affecting the yarn tension in knitting zone and loop length. Concept of 'Robbing Back' of yarn in loop.
Study of design and performance of high sped knitting cam and increase in machine production.

UNIT II

Yarn feeding devices on circular knitting machines. Geometry and properties of weft knitted fabrics – importance of Doyle's and Munden's research, k-values and Pierce's geometry. Outlines of process control in knitting. Use of electronics and computers and other developments in knitting. Features of warp knitted fabrics and their uses.

UNIT III

Classification and areas of application of nonwoven fabrics. Different methods of production of nonwoven fabrics. Effect of machines, fibre and process variables on properties of nonwoven fabrics. Failure mechanism of nonwoven fabrics. Prediction of needle punched nonwoven fabric behavior.

UNIT IV

Designing of nonwoven for engineering applications. Development in nonwoven machineries. Developments in various nonwoven manufacturing techniques.

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MTTT104: HIGH PERFORMANCE FIBRES & COMPOSITES

1. ARAMIDS & CO POLYESTERS: Fibres formation – Fibre & structure properties, performance and Application.
2. CARBON AND GRAPHITE: Classification and Types, manufacturing Processes from Polyacrylonitrile (PAN) and Rayon structured pitch based fibres, properties.
3. GLASS FIBRES: Types and Composition, Manufactures Processes, Fibre structures, Properties and Applications.
4. POLY ETHELENE FIBRES: Types - UHMWPE, HDPE, Manufacturing process, properties and applications
5. CERAMIC FIBRES: Classification and fibre formation, composition, structure, properties and application
6. POLYURETHANE ELASTOMERIC FIBRES: Manufacturing Processes, Fibre Properties, Application and future trends
7. METALLIC COMPOUND FIBRES: Aluminium Oxide fibres and lead oxide fibres – Preparation and processes, Fibre structure, properties and Application.
8. OPTICAL FIBRES: Light Propagation. Silica Fibres- Fibre manufacture and Application

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MTTT105: RESEARCH PROCESS AND METHODOLOGY

UNIT 1:

Introduction to Research and Problem Definition-Meaning, Objective and importance of research, Types of research, steps involved in research, defining research problem

UNIT 2:

Research Design-Research design, Methods of research design, research process and steps involved, Literature Survey

UNIT 3:

Data Collection-Classification of Data, Methods of Data Collection, Sampling, Sampling techniques procedure and methods, Ethical considerations in research

UNIT 4:

Data Analysis and interpretation-Data analysis, Statistical techniques and choosing an appropriate statistical technique, Hypothesis, Hypothesis testing, Data processing software (e.g. SPSS etc.), statistical inference, Interpretation of results

UNIT 5:

Technical Writing and reporting of research-Types of research report: Dissertation and Thesis, research paper, review article, short communication, conference presentation etc., Referencing and referencing styles, Research Journals, Indexing and citation of Journals, Intellectual property, Plagiarism

Text Books:

1. C. R. Kothari, Gaurav Garg, Research Methodology Methods and Techniques , New Age International publishers, Third Edition.
2. Ranjit Kumar, Research Methodology: A Step-by-Step Guide for Beginners, 2nd Edition, SAGE, 2005
3. Business Research Methods – Donald Cooper & Pamela Schindler, TMGH, 9th edition
4. Creswell, John W. Research design: Qualitative, quantitative, and mixed methods approaches. Sage publications, 2013.

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I Year II Semester***

MTTT 201: CHARACTERIZATION OF POLYMERS AND FIBERS

(L T P 3 0 0)

1. **FIBRE STUDY:** Basic concept of crystalline regions, and orientation - their effects on fiber properties. Sources of elucidation of fiber structure.
2. **MOISTURE PROPERTIES:** Definitions, humidity, regain moisture content. Hygroscopic nature and moisture absorption behavior of textile fibers, relation between regain and relative humidity, Quantitative theory of moisture absorption , effect of temperature, stresses and hydrophilic groups, crystalline and non-crystalline regions on moisture regain. Heats of sorption. - Definition of heat absorption and heat of wetting.
3. **OPTICAL PROPERTIES:** Refractive index and birefringence - absorption, dichroism, reflection and lustre of fibers.
(i)**MECHANICAL PROPERTIES:** Expression of tensile test results - stress strain relations of fibers. Effect of moisture and temperature on stress, strain. Elasticity and elastic recovery properties of fibers.
(ii) **TIME EFFECTS:** Creep, stress relaxation phenomenon. Basic concepts in dynamic tension testing and visco-elastic behavior. Torsional and flexural rigidity of fibers.
4. **ELECTRICAL PROPERTIES:** Definition of mass specific resistance and the influence of moisture. Dielectric constant – factors influencing the dielectric properties of fibres.
5. **STATIC ELECTRICITY:** Problems and elimination in textile processes – electro static series. **CHARACTERIZATION OF CHEMICAL STRUCTURE:** Principle of Spectroscopy, FTIR Spectroscopy, ATR-FTIR Spectroscopy, NMR Spectroscopy, UV-VIS Spectroscopy, Mass Spectroscopy, Raman Spectroscopy, AES/AAS Spectroscopy.
6. **CHARACTERIZATION OF PHYSICAL AND MORPHOLOGICAL STRUCTURE:** Optical microscopy, Scanning Electron Microscope, Atomic Force Microscope, Transmission Electron Microscope, Xray Diffractometer, Density Gradient Column.
7. **THERMAL CHARACTERIZATION:** Differential Scanning Calorimetry, Differential Thermal Analysis, Thermo Gravimetric Analysis, Dynamic Mechanical Analysis.

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MTTT 202: MODERN METHODS OF FABRIC PRODUCTION
(L T P 3 0 0)

1. Advancement in wrap winding machines, study of automatic wrap winding machines, mechanism used in wrap winding machine. Different type of pirn winding machines, advancement in pirn winding machines.
2. High production warping machines with creel development. Modern developments in sectional warping machines. Various controls used in sizing, automatic sow box, modern drying system of sizing machine.
3. Basic mechanical principle of sulzer projectile loom, Modern developments in air jet and water jet looms. Study of flexible and rigid rapier loom, study of multiphase and circular looms.

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MTTT203: NANO TECHNOLOGY IN TEXTILES

(L T P 3 0 0)

UNIT I:

Nano-scale – Definition, various methods of manufacturing nano materials and their characterization. Nano-fibers - Manufacturing, properties and uses of nano fibre, Nano finishes - Super hydrophobicity and lotus effect, self cleaning, UV protection, Antimicrobial finishes

UNIT II:

Application of Plasma in Textiles

Concept, types of plasma and their generation, Plasma treatment of textile for water and oil repellency, Interfacial engineering of functional textiles for biomedical applications, plasma modification of wool, plasma modification of natural cellulosic fibers, characterization of plasma treated textiles.

UNIT III:

Development in Finishing

Various Low liquor and minimum application techniques in textile finishing, their advantages and limitations, wrinkle free finishing – concept of wet and moist cross linking, various eco- friendly resin finishes, Bio-Finishing, Concept of UV-A and UV-B, factors affecting UV protection. Various UV- protection finishes and their evaluation, antimicrobial finishes – mode of action, factors affecting, various antimicrobial finishes. Developments in textile finishing such as soil release, flame retardant, antistatic, fluoro chemicals, silicone finishes

UNIT IV:

Wash down effects on denim

Stone wash,, enzyme wash, combined stone and enzyme wash, acid wash, ball blast, whiskering, sand blast, ice wash. Developments in finishing machineries. Developments in stenters and physical finishing machines

TEXT BOOKS:

- 1.Charles Tomasino, “Chemistry & Technology of Fabric Preparation & Finishing”, Department of Textile Engineering, Chemistry and Science, College of Textiles, North Carolina State University, Raleigh, 1992.
2. Perkins W S, “Textile Colouration and Finishing”, Carolina Academic Press, U.K, 1996.
3. Menachem L and Stephen B S, “Handbook of Fibre Science and Technology”, Volume II, Part B, Marcel Dekker Inc., New York, 1983

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MTTT204: TEXTILE COSTING & COST CONTROL

(L T P 3 0 0)

UNIT I:

FUNDAMENTALS OF COSTING: Cost concept. Classification of cost, elements of cost. Methods of costing. Unit and operating costing, preparation of cost sheet. Estimation of cost of production and component of total cost. Profit planning, job order, batch process, conversion cost. Inventory costing.

UNIT II: COSTING IN SPINNING INDUSTRY: Elements of cost – Ascertainment of Clean Cotton Cost – Cost Statements Quantity and value of total cotton/ Man-made fiber issued input, wastage and output in each processing cost center up to yarn stage- Net Mixing Cost- Waste multipliers for each cost center mixing wise Cost Centrewise conversion cost, Selling price of various wastes. Power cost estimation, Yarn realisation statement, Decision making using Contribution per frame shift among various counts of yarn production.

UNIT III: COSTING IN WEAVING INDUSTRY:–Elements of cost Calculation of Yarn requirements for weaving –computation of value loss and net realization, Cost Statements– Cost centre wise conversion cost from winding to weaving, Sort wise cost of production of Grey Cloth sort wise stock accounting of Grey cloth, Cost of Sizing material, Cost of sales of cloth sold in grey stage and sales realization

UNIT IV: COSTING IN KNITTING AND GARMENT INDUSTRY:– Elements of cost – Calculation of garment weight of different sizes, Dia determination, Setting the knitting program, Dyeing program,Consumption of fabric per garment. Estimating of cost of process loss in Compacting, Bleaching, Raising, Shearing, Printing and Dyeing. Estimating the Knitting rates, Calculation of CMT charges. Cost sheet with Profit margins and foreign quotes.

UNIT V: COST CONTROL AND COST REDUCTION: Introduction, Process of Cost Control and Cost Reduction, Cost Reduction Programme and its implementation, Methods and Techniques-Value analysis and Value Engineering, Just -In-Time (JIT), Activity Based Costing(ABC).

TEXT BOOKS:

1. Bhave P V and Srinivasan V, "Cost accounting in textile mills", ATIRA monograph, Ahmedabad, India, 1974
2. Varma H K, "Costing in Textile Industry", Dhanpat Rai publications, New Delhi, 1965
3. Shinn William, "Elements of Textile Costing" School of Textiles, North Carolina state, 1965
4. Jain IC, "Cost accounting-An introduction", Prentice hall, New Delhi, 2001

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**MTTT 205: INSTRUMENTATION & AUTOMATIC CONTROLS
(L T P 3 0 0)**

UNIT I:

Introduction

Generalized configuration and functional stages of measuring systems. Measurement of Force, Torque, Velocity, Acceleration, Pressure, Temperature, Flow, Level, Viscosity, Humidity & Moisture (Qualitative Treatment Only).

UNIT II & III:

Review of Industrial Instrumentation

The transducer and its environment; an overview; Sensing process and physical laws. Transducer classification and their modeling; information, energy and incremental models; Developments in sensors, detectors and transducer technology; displacement transducers; force, torque and motion sensors; piezoelectric transducers; capacity type transducers; Strain gage transducers; accelerometers, pressure transducers based on elastic effect of volume and connecting tubing.

UNIT IV:

Instruments and Control Systems Concepts

Characteristics of instruments, Design and selection of components of a measuring system. Dynamic Response of Instruments: Mathematical model of a measuring system, response of general form of instruments to various test inputs; Time domain and frequency domain analysis. Elementary transfer functions and Bode plots of general transfer functions. Nyquist, Nichols Plot. Stability by graphical and analytical Methods, Design of Stabilizing Networks, Minor loop correction Characteristics of control loop elements.

UNIT V:

Errors in Measurement

Errors in Measurement and Its Analysis: Causes and types of experimental errors; Systematic and random errors. Uncertainty analysis; Computation of overall uncertainty; Estimation for design and selection for alternative test method.

