

w.e.f. 2020-21

Programme Name	Bachelor of Technology (Textile Engineering)	Semester VI
Course Title	TEXTILE TESTING - II	
Course Code	PCC-TEX-302A	
Purpose	To study the principles of physical and mechanical testing of fabric.	
Course Outcomes	After completing this course student will be able to: CO1-Test and evaluate the fabric dimensional and aesthetic properties. CO2-Perform and evaluate fabric tensile properties. CO3-Understand the testing methods of fabric comfort and handle properties. CO4-Understand the testing methods of technical textiles CO5-Explain various statistical quality control charts used in textiles.	
Prerequisite	Knowledge of Fabric Physical and mechanical properties.	

PCC-TEX-302A

TEXTILE TESTING - II

L T P
3 1 -

Sessional: 25 Marks
Exam: 75 Marks
Total: 100 Marks
Time: 3 hrs

Note:

Nine questions will be set in the question paper i.e. two from each unit. The student will be required to attempt one question from each unit. Question No.1 is compulsory. It is objective type 15 questions of multiple choice covering all the four units.

UNIT I

Fabric Testing

Importance of fabric testing, scope of fabric testing.

Structural Properties of Fabric:-

Thickness, crimp, weight and shrinkage test - Definition, significance, effect on fabric properties and measurement methods. Cover factor - Definition, significance, derivation of cover factor.

Serviceability testing parameters of fabrics:-

Abrasion resistance of fabric- Definition, factors affecting abrasion resistance, assessment of abrasion damage, methods of measuring abrasion resistance & evaluation of results.

Fabric Pilling, Creasing and crease recovery- Concept, mechanism, factors affecting and methods of assessment.

UNIT II

Mechanical Properties of fabric:-

Fabric Strength Testing: Tensile, tearing and bursting strength tests; principles and operation of equipment, Factors affecting test results, Evaluation and interpretation of tensile test results

Low stress mechanical properties of fabric:-

Fabric bending, stiffness, compression, softness, shearing and drape Test:-Principle, terminology, quantities and units, experimental method.

UNIT III

Fabric Comfort: - Introduction, importance and classification of comfort.

Transport Properties of Fabric:-Fabric Porosity and Air Permeability: -Concept, Importance, Factors affecting, methods of testing, relationship between fabric porosity and air permeability.

Water-Fabric Relation: - Concept, Importance, water vapour permeability, moisture transport, Fabric Wettability, Water proofing and water repellency testing.

Fabric Handle:-Introduction, factors affecting fabric handle, subjective & objective evaluation of

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fabric handle by KES and FAST system.

UNIT IV

Testing of Garment and Garment Accessories:-

Tests related to garment performance and appearance such as measurement of seam pucker, seam slippage and seam strength etc.

Testing of fusible Interlinings, zippers, elastic waistband, sewing threads, buttons, snap fasteners.

Statistical Quality control in Textiles: Concept of quality, quality assurance, concept of reproducibility and repeatability, methods pertaining to fibre, yarn and fabric testing.

International quality parameters & standards like USTER standards, AATCC, JIS and ASTM.

Suggested Text /References Books

1. Booth, J.E., "Principles of Textile Testing", Butterworths, London
2. Kothari, V.K., "Physical Testing of Textiles"
3. Fabric testing, ED. Jinlian HU, Woodhead publication CRC Press, 2008.
4. Saville, BP, Physical testing of textiles, Woodhead publication CRC Press 1999.
5. Slater, "Textile Progress – Physical Testing and Quality Control", Textile Institute, Manchester.

Programme Name w.e.f. 2020-21	Bachelor of Technology (Textile Engineering)	Semester VI
Course Title	Garment Technology	
Course Code	PCC-TEX-304A	
Purpose	To explain the process of conversion of fabric into garment.	
Purpose	After completing this course students will able to: CO1: Explain the overview and sequence of garment manufacturing. CO2: Discuss the concept of pattern making and marker planning process. CO3: Illustrate the spreading and cutting techniques CO4: Select different types of stitches, seams and sewing machines for garment manufacturing. CO5: Explain different types of finishing methods used for garment making.	
Prerequisite	Students should have knowledge of Fabric manufacturing and Yarn manufacturing	

PCC-TEX-304A

GARMENT TECHNOLOGY

L T P
3 1 -

Sessional: 25 Marks
Exam: 75 Marks
Total: 100 Marks
Time: 3 hrs

Note:

Nine questions will be set in the question paper i.e. two from each unit. The student will be required to attempt one question from each unit. Question No.1 is compulsory. It is objective type 15 questions of multiple choice covering all the four units.

UNIT-I

Overview of clothing manufacturing and related fabric quality requirements

Introduction to clothing manufacturing, the structure of clothing industry, Organization chart of clothing factory, Relationship between fabric properties and making up process. Fabric quality requirement for garment industry, Evaluation of sewability.

UNIT-II

Pattern making, Spreading and Marker Planning

Pattern Making: Introduction to pattern making and garment construction. Different terminologies, Drafting, Basic bodies blocks. CAD for pattern making.

Spreading and Marker Planning: Planning, drawing and reproduction of marker, Methods of marker planning and marker used-normal marker planning and computerized marker planning, Introduction to symmetrical and asymmetrical fabrics, Criteria for spreading, methods of spreading, spreading machines, Principles of lay plan, types of lay plan.

UNIT-III:

Cutting and Sewing

Cutting: Criteria for cutting, cutting methods and cutting machines- straight knife, band knife, notches and drills, computer-controlled knives, die cutting, laser cutting, plasma cutting and ultrasonic cutting.

Sewing: Properties of seams, seam types, stitch types, sewing feed mechanisms, sewing machine needles, sewing threads and sewing problems.

Introduction to Sewing Machinery: Basic sewing machines and associated work aids.

UNIT-IV

Pressing, Fusing and Trimming and Garment Accessories

Pressing: Purpose of pressing, equipment used and various pressing methods.

Fusing: Requirements of Fusing, fusing process and equipment used.

Trimming and Garment Accessories: definition, types, trimming methodologies, Care labeling in garment manufacturing.

Suggested Text /References Books

1. Cooklin Gerry, Steve G. H., and John M, “Garment Technology for Fashion Designers”, Wiley-Blackwell, 2012 Edition.
2. Gini S. F, “Fashion from Concept to Consumer”, Pearson Education, 2009.
3. Harold Carr & Barbara Latham, “The Technology of Clothing manufacture,4th Edition Wiley-Blackwell, 2008.
4. Aldrich W, “Metric Pattern Cutting for Women’s Wear, Wiley-Blackwell, 2008.
5. Mehta P V and Bhardwaj S K, “Managing Quality in Apparel Industry”, New Age International Pvt Ltd, 1998.

Programme Name	Bachelor of Technology (Textile Engineering)	Semester VI
Course Title	Knitting Technology	
Course Code	PCC-TEX-306A	
Purpose	To understand the technologies of knitting	
Course Outcomes	After completing this course students will able to: CO1: Understand the basic concept of knitting and its elements CO2: Relate and contrast different weft knitted methods and weft knitted structures CO3: Compare different warp knitted methods and warp knitted structures CO4: Solve numerical problems associated with knitting CO5: Compare woven and knitted structure	
Prerequisite	Yarn and fabric manufacturing process and their properties	

PCC-TEX-306A

KNITTING TECHNOLOGY

L T P
3 1 -

Sessional: 25 Marks
Exam: 75 Marks
Total: 100 Marks
Time: 3 Hrs.

Note:

Nine questions will be set in the question paper i.e. two from each unit. The student will be required to attempt one question from each unit. Question No.1 is compulsory. It is objective type 15 questions of multiple choice covering all the four units.

UNIT-I

Concept of knitting, weft knitting, warp knitting, comparison between woven and knitted fabric, comparison of warp and weft knitting, **Knitting needles**: spring beard, latch, compound needles, knitting cycle of latch, spring bearded and compound needle, classification of knitting machines, yarn quality requirements for weft knitting, **Knitting elements**: cylinder, knitting cam, sinker, feeder, stop motions.

UNIT-II

Working of plain, rib and interlock knitting machine, pattern wheel, pattern drum, punched steel tape needle selection mechanism, basic principles and elements of flat knitting machines- different types of flat knitting machines; mechanical and computerized knitting machines, weft knit structures, technical terms and symbolic representation of weft knit structures, Characteristics of plain, rib, Interlock, purl knit structures

UNIT-III

Fundamentals of formation of knit, tuck and float stitches, Derivatives of weft knit structures, Faults in knitted fabrics and their causes and remedies - dimensional parameters such as stitch length, WPI, CPI, stitch density, GSM, Tightness factor-spirality, Production calculations of weft knitting.

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Warp knitting machines: needle bar, sinker bar, guide bar, pattern wheel, chain link, Warp knitting fundamentals, knitting cycle for warp knitting- closed lap and open lap stitches, Raschel, compound needle and Tricot knitting machines, Comparison of raschel and tricot knitting machines

UNIT-IV

Materials for warp knitting: direct warping and indirect warping for warp knitting, production calculations of warp knitting. Representation of warp knit structures, chain link notation, basic warp knitted structures, Chain or pillar stitch and atlas lap, Two bar structures; Full tricot, Locknit, Reverse locknit, Satin. Application of weft and warp knit fabric in Technical Textiles. Seamless knitting: working and advantages.

Suggested Text /References Books:

1. Spencer D. J, "Knitting Technology" Woodhead Publishing Ltd. Cambridge, England.
2. Ajgaonkar, D. B. "Knitting Technology".
3. "Knitting Technology" NCUTE Publication.
4. Booth J. E., "Textile Mathematics Vol-3" The Textile Institute Manchester Publication.

Programme Name	Bachelor of Technology (Textile Engineering)	Semester VI
Course Title	THEORY OF TEXTILE STRUCTURE	
Course Code	PCC-TEX-308A	
Course Purpose	- To study the structural models of fibre assemblies.	
Course Outcomes	After completing this course, students will be able to: CO1 – Analyse the ideal yarn geometry. CO2 – Analyse and evaluate the fibre migration in yarn. CO3 – Analyse the mechanical properties of yarn. CO4 –Analyse the fabric geometry CO5–Solve the numerical problems associated with yarn and fabric structure.	
Prerequisite	Knowledge of yarn manufacturing and fabric manufacturing. Basic mathematics and physics	

PCC-TEX-308A

THEORY OF TEXTILE STRUCTURE

L T P
3 1 -

Sessional: 25 Marks
Exam: 75 Marks
Total: 100 Marks
Time: 3 hrs

Note:

Nine questions will be set in the question paper i.e. two from each unit. The student will be required to attempt one question from each unit. Question No.1 is compulsory. It is objective type 15 questions of multiple choice covering all the four units

UNIT-I

Yarn Geometry: Idealized yarn geometry, relationship of yarn number and twist factor, Twist contraction and retraction, limits of twist.

Packing of fibre in yarn: Ideal packing, hexagonal close packing and other forms. Packing factor and its measurement, measurement of packing density and radial packing density, specific volume of yarns, relation between twist, diameter and twist angle.

UNIT-II

Fibre migration: Ideal migration, tracer fiber technique, characterization of migration behavior, migration in spun yarns, mechanisms of migration, effect of various parameters on migration behavior

Mechanics of staple fibre yarns: Translation of fiber properties into yarn properties; Extension of continuous, filament yarn for small strains and large strains; Prediction of breakage, Nature of rupture for continuous filament yarn, Extension and breakage of spun yarn

UNIT-III

Elements of fabric geometry. Cloth setting theories, Fabric cover, fractional and total cover, Fabric cover and fabric weight relationship, Pierce's fabric geometry, flexible and elastic thread model, jammed structure, square fabric, crimp interchange, Relationship between h, p, c, Kemp's Race Track Model.

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UNIT-IV

Geometry of weft and warp knitted structures, influence of friction on knit geometry, Fabric, deformation under tensile stress, prediction of modulus; tensile properties in bias direction. Other fabric deformation – compression, shear, bending and buckling; fabric handle; Spirality and skewness formation and its control

Suggested Text/ References Books

1. Hearle, J. W. S., Grosberg, P., and Backer, S., “Structural mechanics of fibre, yarn and fabrics”, Wiley Inter-science Publication.
2. “Textile Yarn, Technology, Structure & Application” – Goswami B.C., Martindale, J.G., Scardino F.L., Wiley Inter-science publication, 1977, U.S.A.
3. Zurek, W., “Structure of Yarn”, Foreign Scientific Publications.
4. Cloth Geometry, F.T Pierce.
5. Woven Textile Structure: Theory & Application, B. K. Behera & P. K. Hari, Woodhead Textiles Series No. 115.

Programme Name	Bachelor of Technology (Textile Engineering)	Semester VI
Course Title	TEXTILE TESTING LAB - II	
Course Code	PCC-TEX-310LA	
Purpose	To provide hands-on experience on testing of physical and mechanical properties of fabrics.	
Course Outcomes	After completing this course student will be able to: CO1. Perform and evaluate fabric tensile strength tests. CO2. Test and evaluate the fabric dimensional and aesthetic properties. CO3. Test and evaluate the fabric comfort properties.	
Prerequisite	Knowledge of fabric physical and mechanical properties.	

PCC-TEX-310LA

TEXTILE TESTING LAB - II

L T P
2

Practical/Viva: 60 Marks

Sessional: 40 Marks

Total: 100 Marks

Time: 2 hrs

1. To determine the stiffness property of the fabric.
2. To determine the tensile strength of the fabric.
3. To determine the tearing strength of the fabric.
4. To determine the bursting strength of the fabric.
5. To determine air permeability of fabrics.
6. To determine the shower proof property of a fabric.
7. To determine the drape property of fabrics.
8. To determine the crimp and areal density of fabrics.
9. To determine crease resistance property of the fabric.
10. To determine the pilling property of the fabric.
11. To determine water vapor permeability of the fabric.
12. To determine the thermal comfort property of the fabric.
13. Determine and compare the seam strength, seam slippage and seam puckering of a fabric sewn with different types of sewing threads.

Note: The above experiment should be conducted and shall be decided on factors like:

1. Facilities installed at Institute
2. Accessibility to industry & nearby institute like IIT Delhi, NITRA Ghaziabad, Textile Committee and NITRA Panipat.
3. Trend of technological developments in National & International perspective

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Programme Name	Bachelor of Technology (Textile Engineering)	Semester VI
Course Title	Garment Technology Lab	
Course Code	PCC-TEX-312LA	
Purpose	To develop drafting and pattern making skills To impart hands on experience in various sewing machines.	
Purpose	After completing this course students will able to: CO1: Design and develop drafts for basic patterns. CO2: Make use of different types of sewing machines. CO3: Construct samples of various seam classes. CO4: Create different stitch classes	
Prerequisite	Students should have knowledge of Garment manufacturing.	

PCC-TEX-312LA
GARMENT TECHNOLOGY LAB

L T P
2

Practical/Viva: 60 Marks

Sessional: 40 Marks

Total: 100 Marks

Time: 2 hrs

1. Developments of patterns based on anthropometric data
2. Working on sewing machines
3. Production of different types of stitches (Chain stitch, Lock stitch and Overlock stitch)
4. Production of different seam types (Superimposed seam, Lapped Seam, Bound Seam, Flat Seam, Decorative seam, Edge neatening seam, Belt loop Seam etc.)
5. Determination of seam strength
6. Determination of seam pucker

w.e.f. 2020-21 Programme Name	Bachelor of Technology (Textile Engineering)	Semester VI
Course Title	Knitting Technology Lab	
Course Code	PCC-TEX-314LA	
Purpose	To impart practical knowledge of knitting machines To construct and analyse various knit structures	
Purpose	After completing this course students will able to: CO1: Identify various components of flat and circular knitting machines. CO2: Explain different process parameters in designing of weft knitted structure. CO3: Analyse weft knitted fabric structures.	
Prerequisite	Students should have knowledge of weaving and knitting technology	

PCC-TEX-314LA
KNITTING TECHNOLOGY LAB

L T P
- - 2

Practical/viva: 60 marks
Sessional: 40 marks
Total: 100 marks
Duration of Exam: 3 hours

List of Experiment:

1. Study on single jersey circular knitting machine-yarn supply arrangements, loop forming mechanism, take down motion and production calculations.
2. Study on Flat knitting machine-yarn supply arrangements, loop forming mechanism, take down motion.
3. Study on double jersey circular knitting machine-yarn supply arrangements, loop forming mechanism, take down motion and production calculations
4. Development of Plain, Rib, and Interlock fabric samples.
5. Setting of knitting Cam.
6. Development of derivative knitted structures on flat bed knitting machine.
7. Analysis of knitted structures.
8. Determination of K_s , K_c and K_w values.
9. Effect of stitch length, stitch density, course count, wale count on fabric aerial density.

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Programme Name	Bachelor of Technology (Textile Engineering)	Semester VI
Course Title	MULTI FIBRE SPINNING	
Course Code	PEC-TEX-316A	
Purpose	- To study the various aspects multi fibre spinning.	
Course Outcomes	After completing this course, students will be able to: CO1-Select the right method of blending based on constituent fibres characteristics. CO2-Interpret the effect of blend composition and fibre characteristics on the properties of blended yarn. CO3-Explain the construction and working of woollen and worsted spinning systems. CO4-Illustrate the spinning of jute and silk. CO5-Classify and explain the methods of recycled fibre spinning.	
Prerequisite	Knowledge of short staple spinning.	

PEC-TEX-316A

MULTI FIBRE SPINNING

L T P
3 1 -

Sessional: 25 Marks
Exam: 75 Marks
Total: 100 Marks
Time: 3 hrs

Note:

Nine questions will be set in the question paper i.e. two from each unit. The student will be required to attempt one question from each unit. Question No.1 is compulsory. It is objective type 15 questions of multiple choice covering all the four units.

UNIT I

Characteristics of man-made fibres, objectives of blending, selection of fibre specification for blending, processing of short, medium and long staple manmade fibres on cotton system, measures of blend intimacy, factors influencing blend intimacy, structure and properties of blend yarns, Effect of blend composition & fibre characteristics on properties of blended yarn. Blend mechanics. Advantages & disadvantages of different blending technique.

UNIT II

Wool Spinning: Impurities in wool fibre. Wool blending, wool sorting, wool, wool scouring, drying, back washing. Woollen and worsted carding, intermediate gilling, auto leveler in gillbox, rectilinear combing, rubbing frame, and spinning.

UNIT III

Jute Spinning: Basic concepts of the spinning process and the machinery. Jute retting, stripping, jute grading, jute batching, fibre defects. Jute carding; breaker and finisher card. Drawing and Spinning.

UNIT IV

Silk Spinning: Introduction to Silk filament processing. Flow chart for spun silk processing – Cocoon beater, Filling operation, Circular dressing, Spreader, Sett Frame, Drawbox, Rover.

Waste Spinning: Cotton waste and its varieties, classification and possible end uses, machines and processes to produce waste yarns e.g. condenser system, coiled system.

Suggested Text/ References Books

1. Salhotra K R, “Spinning of Man Made Fibres and Blends on Cotton Spinning System”, The Textile Association, Mumbai, 1989.
2. Oxtoby, E. “Spun Yarn Technology”. Butterworths, London, 1987.
3. W S Simpson and G Crashaw, Wool: Science and Technology, Woodhead Publishing Series in Textiles, 2002.
4. Goswami, B.G. “Textile Yarns; Technology, Structure & Applications”. Textile Institute, Manchester.
5. Atkinson, R. R., Jute- Fibre to yarn, B. I. Publications, Bombay,1965.
6. Basu A. (Ed.), Advances in Silk Science and Technology, Woodhead Publishing Series in Textiles, 2015.
7. Lawrence, C.A., Fundamentals of Spun Yarn Technology, 1st Ed., CRC Press, LLC, Florida, USA, 2003.
8. Thornley T, Cotton waste: its production, manipulation and uses, University of California, London, Scott, Greenwood & Son 8 Broadway, Ludgate, B.C., 1912.
9. Horrocks A. R. (Ed.), Recycling Textile and Plastic Waste, Woodhead Publishing Limited, Cambridge, England, 1996.

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Programme Name	Bachelor of Technology (Textile Engineering)	Semester V
Course Title	STRUCTURE AND PROPERTIES OF FIBRES	
Course Code	PEC-TEX-318A	
Course Purpose	- To study the structure and properties of textile fibres	
Course Outcomes	After completing this course, students will be able to: CO1–Understand the fine structure and their physical and chemical properties of textile fibres CO2–Interpret the mechanical and frictional properties of textile fibres. CO3– Describe the moisture and optical properties of textile fibres CO4–Understand the thermal behaviour and electrical properties of textile fibres	
Prerequisite	Knowledge of textile fibers.	

PEC-TEX-318A

STRUCTURE AND PROPERTIES OF FIBRES

L T P
3 1 -

Sessional: 25 Marks
Exam: 75 Marks
Total: 100 Marks
Time: 3 Hrs.

Note:

Nine questions will be set in the question paper i.e. two from each unit. The student will be required to attempt one question from each unit. Question No.1 is compulsory. It is objective type 15 questions of multiple choice covering all the four units.

UNIT-1

Structure of fibres

Morphology and order in fibre structure, concept and theories of orientation, crystallization and its measurement technique such as X-ray.

Chemical and physical structure of fibres such as wool, silk, cotton and bast fibre and man-made fibre such as Nylon, PET, Acrylic and Viscose.

UNIT-2

Mechanical properties

Theory of load-elongation curve, stress-strain curve, modulus, elasticity and visco elasticity, work of rupture/toughness, yield point, creep and stress relaxation behavior of fibres and simple spring and dash pot models simulating textile fibers.

Frictional properties of fibers

Nature and measurements.

UNIT-3

Moisture properties

Relation between moisture regain and relative humidity, hysteresis, absorption in fibers, diffusion theories of moisture absorption-general view, diffusion of moisture, quantitative analysis of moisture absorption, swelling.

Optical properties of fibers

Refractive index and polarization of light, birefringence and its measurement.

UNIT-4

Thermal properties

Molecular motion and transition phenomenon, thermal expansion behaviour, first order and second order transition phenomenon.

Electrical properties

Introduction to electrical properties such as dielectric properties such as electric properties and static charge generation

Suggested Text Books and References

1. Morton W E and Hearle J W S, "Physical Properties of Textile Fibres", The Textile Institute, Manchester (1993)
2. Meredith R, "The mechanical properties of Textile Fibres", North Holland co; Amsterdam (1959)

Programme Name	Bachelor of Technology (Textile Engineering)	Semester VI
Course Title	MANUFACTURING OF SPECIALTY FABRICS	
Course Code	PEC-TEX-320A	
Purpose	- To study the various aspects manufacturing of specialty fabrics	
Course Outcomes	After completing this course, students will be able to: CO1-Select the right method of production of technical fabrics bases on their requirement. CO2-Interpret the effect of manufacturing technology on the properties of fabrics. CO3-Understand the various 3D structure produced using weaving and knitting CO4-Illustrate the fabric manufacturing process used for terry, carpet and home furnishing.	
Prerequisite	Knowledge of basic fabric manufacturing	

PEC-TEX-320A

MANUFACTURING OF SPECIALTY FABRICS

L T P

3 1 -

Sessional: 25 Marks

Exam: 75 Marks

Total: 100

Marks

Time: 3 Hrs.

Note:

Nine questions will be set in the question paper i.e. two from each unit. The student will be required to attempt one question from each unit. Question No.1 is compulsory. It is objective type 15 questions of multiple choice covering all the four units.

UNIT-1

Introduction and method of production of some common fabrics like Lappets, Swivels, Ondule fabrics, Tuck fabrics, woven, Gauge and leno structure with their mechanism, Madras muslin structures

Industrial fabrics especially kind of canvases, Belts, Parachute Fabrics, Umbrella cloth and Lycra Fabric

UNIT-2

3D Weaving Structure: introduction, changes required in preparatory process, process parameters, study of the manufacturing setup of 3D weaving, quality aspects and end uses

3D Knitting Structure: introduction, changes required in preparatory process, process parameters, study of the manufacturing setup of 3D Knitting, quality aspects and end uses

UNIT-3

Woven Terry Fabrics: introduction, classification, raw material, different types of preparatory process used for terry weaving, weaving of terry fabrics, quality control in terry weaving, end uses of terry structure

Carpet Manufacturing: introduction, classification, raw material, different types of preparatory process modifications used for carpet weaving, carpet manufacturing process parameters and machine parameters, quality aspects and end uses.

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UNIT-4

Fabrics Used in Home Furnishing Applications: introduction, classification, raw material, different types of preparatory process used for home furnishing manufacturing. Fabric manufacturing process parameters and machine parameters for home furnishing, quality aspects and end uses.

Suggested Text/References Books

- 1) Singh Jitendra Pratap and Verma Swadesh, Woven Terry Fabrics: Manufacturing and Quality Management by Woodhead Publishing House
- 2) Goswami K K, Advance Carpet Manufacturing by Woodhead Publishing House