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Programme Name	Bachelor of Technology (Textile Engineering)	Semester V
Course Title	TEXTILE TESTING - I	
Course Code	PCC-TEX-301A	
Purpose	To study the principles of physical and mechanical testing of fiber and yarn	
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-301A

TEXTILE TESTING - I

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 students 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

Sampling Methods and Moisture Calculation

Introduction of textile testing, Reason for Testing, standardization of testing, sampling, sampling techniques, square, cut square, zoning technique, Routine sampling techniques used in the textile industry

Moisture:-effect of moisture or physical properties regain and content, correct invoice weight, Atmospheric conditions for testing, Control of testing room atmosphere, moisture regain & moisture content, importance of moisture in textiles, measurement of moisture regain & content, effect of moisture on properties (physical & mechanical) of textile material, factors affecting the regain, Shirley moisture meter.

Unit II

Cotton Fibre Testing

Fibre Dimension: fibre fineness, fineness measurement, fibre length, method of measurement: direct method high volume instrument, advance fibre information system Grading of cotton fibre with respect to staple length, laboratory measurement of fibre length, span length, Baer sorter, servo fibro graph, maturity coefficient measurement by NaOH method, fibre fineness by airflow meter. Fibre bundle strength by Pressley, Stelometer, determination of trash content: Shirley trash analyzer.

Fibre quality index, salient features of HVI, AFIS, Nep count. Wrapping test for lap, sliver and roving.

Unit III

Yarn Evenness Testing

Yarn testing, linear density, yarn numbering systems, conversion methods, and measurement of yarn number.

Twist, classification of twist, twist measurement, Twist, Measurement of twist in continuous filament spun and plied yarns.

Evenness testing of yarns. Nature and causes of irregularities, principles and methods of evenness testing: evaluation and interpretation of evenness measurements. Measurement of sliver and yarn unevenness, Capacitive and optical principle of measuring unevenness, salient features of Uster evenness tester, yarn imperfections and classimat yarn faults.

Unit IV

Yarn Tensile Testing

Strength and elongation test, Definition, force-elongation curve, Factor affecting tensile testing, Fibre strength and Yarn strength.

Various terms related to tensile testing, stress-strain curve, various methods for finding the yield point, Application of tensile force by CRL, CRE and CRT method, various principles (pendulum lever, balance principle, inclined plane, strain gauge principle, etc.) to apply tensile load on textile specimen.

Yarn testing machines- Single yarn strength tester, Uster, Instron testing machine, lea strength testing. Hairiness: Determination of yarn hairiness.

Suggested Text Books & References:

1. Booth, J.E., "Principles of Textile Testing", Butterworths, London
2. Quality Control and Testing Management by Dr. V.K. Kothari
3. Slater, "Textile Progress – Physical Testing and Quality Control", Textile Institute, Manchester
4. "Handbook of Methods of Tests for Cotton Fibres, Yarns and Fabrics", CTRL, Bombay
5. "Cotton Assessment and Appreciation", SITRA Report, Coimbatore.
6. Savile, B.P., "Physical testing of textiles"
7. Grover, E. and Hamby, D.S., "Handbook of Textile Testing and Quality Control", Wiley Eastern, New Delhi, 1969

Programme Name	Bachelor of Technology (Textile Engineering)	Semester V
Course Title	YARN MANUFACTURING-III	
Course Code	PCC-TEX-303A	
Purpose	-To study the unconventional spinning techniques	
Course Outcomes	After completing this course, students will be able to: CO1 – Interpret mechanism of yarn formation in open end spinning systems. CO2 – Understand the false twist principle in air-jet spinning system. CO3–Compare the structure and properties of rotor, air-jet, friction and compact yarn with ring yarn. CO4 – Understand the electrostatic, self-twist, wrap and adhesive spinning methods. CO5 – Illustrate the production of compact, fancy yarns and sewing yarns.	
Prerequisite	Fundamentals of yarn manufacturing process.	

PCC-TEX-303A
YARN MANUFACTURING-III

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

Forces acting on yarn and traveler during spinning, spinning tension in ring frame, Theory of yarn balloon, Limitations of ring spinning systems, modern developments in ring frame, Introduction to new spinning systems, Advantages and comparison of new spinning system over ring spinning system, Introduction to open-end spinning.

UNIT-II

Rotor Spinning: Principle and raw material preparation. Design and working of rotor spinning machine and effect of each on the process and product quality. Production calculation, Effect of fibre properties on the rotor yarn property, Structure of rotor spun yarns, End uses of rotor yarns, new developments

Air-jet Spinning: false-twist process: generation of false twist, forming a yarn with the aid of false twist spinning elements. Murata Jet spinner: operating principle, Raw material requirements, Yarn Characteristics and end uses.

UNIT-III

Friction Spinning: Operating principle, Classifications, Dref-2 process & DREF-3 process: Working principle, Technological interrelationship, Advantages & disadvantages, use of friction spun yarn.

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Working principle and Specifications: Electrostatic spinning, Self-twist spinning (Recco spinning), Wrap spinning (Parafil process), Adhesive spinning, Twilo process (TNO), Bobtex process -.

UNIT-IV

Compact Spinning: principle, different methods of fibre compacting, properties of yarn. Comparative analysis of yarn structure, properties and their end use application produced from rotor, air-jet, friction techniques and compact spun yarn viz a viz ring spun yarn.

Production of fancy yarn & their applications.

Production of Industrial yarn- Sewing thread.

Suggested Text books and References

1. Klein. W., "Manual of Textile Technology", 'Short Staple Spinning Series', Vol. 1 to 6. - Textile Institute. Manchester.
2. Salhotra K R, "Spinning of Man Made Fibres and Blends on Cotton Spinning System", The Textile Association, Mumbai, 1989.
3. Oxtoby, E., Spun Yarn technology.
4. Lawrence C A, "Fundamental of Spun Yarn Technology" CRC Press, USA, 2003.
5. Fancy Yarns, "Their Manufacture and Application," 1st Edition, R H Gong R M Wright, Woodhead Publishing Limited, UK, 2002.

Programme Name	Bachelor of Technology (Textile Engineering)	Semester V
Course Title	FABRIC MANUFACTURING – III	
Course Code	PCC-TEX-305A	
Course Purpose	- To study the modern methods of fabric production - To understand the nonwoven production processes	
Course Outcomes	After completing this course, students will be able to: CO1 – Contrast between shuttle and shuttle-less weaving CO2 – Explain principles of projectile looms, rapier looms and jet looms. CO3 – Describe multiphase weaving machines. CO4 –Discuss the positive let-off and positive take-up motions of weaving machines. CO5 – Summarise nonwoven production techniques.	
Prerequisite	Completion of course Fabric Manufacturing- II	

PCC-TEX-305A

FABRIC MANUFACTURING-III

L T P
3 1 -

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

Note:

Nine questions each of 15 marks will be set in the question paper i.e. two from each unit. The students 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

Introduction to Shuttle-less Weaving. Advantages of Shuttle-less weaving, comparison with shuttle weaving. Features of unconventional weaving. Different Selvedge: Tucked-in, Leno, fused, Stitched. Their mechanism of formation, their characteristics and uses. Weft Accumulator.

Projectile Weaving Machine: Basic principle of projectile weaving. Feeding of yarn to projectile. Sequence of weft insertion. Cam driven shedding, Dwelling Sley beat-up, Torsion bar picking. Energy utilization during picking.

UNIT II

Rapier Weaving Machine: Classification based on type of rapier, system of weft insertion and number of rapiers. Sequence of weft insertion for Gabler and Dewas system, their comparison. Driving of flexible and rigid rapiers. Asynchronized rapier timing. Rapier buckling.

Air Jet Weaving Machine: Principle of weft insertion. Air requirements. Path of the yarn on loom. Sequence of weft insertion. Control of air stream by relay nozzle, confuser profile reed and suction. Design of air jet nozzle. Air drag force, factors affecting drag force.

UNIT III

Water Jet Weaving Machine: Principle of weft insertion. Path of the yarn on loom. Quality of water required. Sequence of weft insertion. Water jet nozzle. Merits and demerits of water jet weaving. Fabric drying on loom.

Multiphase Weaving: Principle of multiphase weaving. Warp way and weft way multiphase looms. Circular loom.

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Positive Let-off: Hunt's let-off, electronic let-off.

Positive Continuous Take-up: Sulzer take-up and Shirley take-up.

UNIT IV

Nonwoven: Definition and classification. Fiber properties requirements. Parallel laid, Cross laid, aerodynamic, Wet laid and Spunbonded technique of web formation. Web bonding techniques: Needle punching, Spunlace, Spunbond, Meltblown Thermal bond and Chemical bonding. Application of various non-woven fabrics.

Suggested Text Books and References

1. Talukdar, M., "Weaving Mechanism, Management", Mahajan Publisher, Ahmedabad.
2. Adanur, S. "Weaving Technology"

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Programme Name	Bachelor of Technology (Textile Engineering)	Semester V
Course Title	FABRIC STRUCTURE & DESIGN	
Course Code	PCC-TEX-307A	
Course Purpose	-To understand and apply the concept of designing of woven fabrics	
Course Outcomes	After completing this course, students will be able to: CO1 – Explain the fundamentals of woven design production CO2 – Understand and apply elements of colour in textile designing CO3– Construct different types of weave designs and their derivatives along with draft and peg plan. CO4 – Determine fabric parameters for a particular weave.	
Prerequisite	Basic knowledge of fabric manufacturing	

PCC-TEX-307A

FABRIC STRUCTURE & DESIGN

L T P
3 1 -

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

Note- Total eight questions will be set in the question paper taking two questions from each unit by the paper setter for the examination. The student will be required to attempt any five questions taking at least one question from each unit.

UNIT – I

Elements of colour -physical basis of color, light and color phenomenon, complementary colors and color measurements, attributes of primary and secondary color, color contrast and color harmony, application of color.

General passage of material through loom, Classification of woven structures, basic elements of woven design, Method of notation of structure or design, weave repeat, types of draft plans. Selection of reed and its importance in fabric design.

UNIT – II

Plain weave and derivatives- warp rib, weft rib, matt, hopsack, fancy matt, stitched hopsack
Classification of plain cloth.

Twill weave and derivatives- zig-zag, herringbone, broken, transpose, and rearrange twills on sateen base, combined, steep and flat twill, diamond, effect of twist on prominence of twill lines, characteristics of twill weave.

Fabric set calculation

Yarn and cloth relationships-GSM Calculation

UNIT – III

Sateen & Satins, Crepe weaves, Mock-leno, Cork screw, Honey-comb, Huck-a-back, Bed ford cord, Welt and pique fabrics.

UNIT – IV

Extra warp and weft figuring, Velvet and Velveteen, Backed fabric, Double cloth classification
Stitched double cloth, Wadded double cloth, belting structures, label weaving-narrow

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Suggested Text Books and References

1. Watson's Textile Design and Colour: Elementary weaves and Figured fabrics, edited by Z. J. Grosicki., Woodhead Publication, Seventh edition.
2. Watson's Advance Textile Design: Compound Woven Structure edited by Z Grosicki, Woodhead Publication, Series No.-2
3. Fabric Structure and Design, by N. Gokarneshan, New Age International, 2nd Edition
4. Woven Fabric Structure Design and Product Planning by J. Hayavadana, Woodhead Publishing India Pvt. Ltd.

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Programme Name	Bachelor of Technology (Textile Engineering)	Semester VI
Course Title	TEXTILE TESTING LAB - I	
Course Code	PCC-TEX-309LA	
Purpose	To provide hands-on experience on testing of physical and mechanical properties of fibers and yarns.	
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-309LA

TEXTILE TESTING LAB - I

L T P
2

Practical/viva: 60 Marks
Sessional: 40 Marks
Total: 100 Marks
Time: 2 hrs

1. To determine moisture parameters of the fibers.
2. To determine the staple length of natural fibers.
3. To determine the fineness of natural fibers.
4. To determine the maturity of the fibers.
5. To find the strength and elongation of natural, manmade & synthetic fiber.
6. To determine the linear density of fibers.
7. To determine the spin finish percentage in manmade fibers.
8. To determine blend percent of the material.
9. To determine the linear density of a given yarn.
10. To determine the twist per inch of the yarn.
11. To determine the hairiness of the yarn.
12. To determine the strength & elongation of a given yarn.
13. To determine the count strength product of the yarn.

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.

Programme Name	Bachelor of Technology (Textile Engineering)	Semester V
Course Title	FABRIC MANUFACTURING – III Lab	
Course Code	PCC-TEX-311LA	
Course Purpose	-To provide practical knowledge on modern methods of fabric production.	
Course Outcomes	After completing this course, students will be able to: CO1–Recognise various selvages and understand their manufacturing. CO2 – Demonstrate the weft insertion and various mechanisms in projectile, rapier and air-jet looms. CO3 – Compare the shuttle looms and shuttle-less looms.	
Prerequisite	Knowledge of fundamentals of weaving.	

PCC-TEX-311LA

FABRIC MANUFACTURING –III LAB

L T P
2

Practical/viva: 60 Marks
Sessional: 40 Marks
Total: 100 Marks
Time: 2 hrs

LIST OF EXPERIMENTS

1. To study the different selvedge formation: Tuck-in, Leno, Fused and Knitted selvedge.
2. To study the working of positive let-off and electronic let-off and their advantages.
3. To study the working of Matched cam beat-up.
4. To study the working of Electronic Dobby and development of designs in electronic doobby.
5. To study the working of Flexible Rapier loom system and sequence of weft insertion.
6. To study the working of Rigid Rapier loom system and sequence of weft insertion.
7. Studies of different mechanism on Somet flexible rapier drive.
8. To study the working of torsion bar picking and sequence of weft insertion in projectile loom.
9. To study the working of Air jet nozzle and sequence of weft insertion in air jet weaving.
10. To study the advantages and disadvantages of various shuttle less looms.

Note: Any 8 experiments from the above list of experiments are to be performed by each student.

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 Gaziabad, Textile Committee and NITRA Panipat.
3. Trend of technological developments in National & International perspective.

MC-903A ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE							
Lecture	Tutorial	Practical	Credit	Major Test	Minor Test	Total	Time
3	0	0	0	100	-	100	3 Hrs.
Purpose	To understand the values of Indian tradition.						
Course Outcomes							
CO1	Students will be able to understand the concept of Traditional knowledge and its importance						
CO2	Students will be able to know the need and importance of protecting traditional knowledge.						
CO3	Students will be able to know the various enactments related to the protection of traditional knowledge.						
CO4	Students will be able to understand the concepts of Intellectual property to protect the traditional knowledge.						

UNIT-I

INTRODUCTION TO TRADITIONAL KNOWLEDGE Define traditional knowledge, nature and characteristics, scope and importance, kinds of traditional knowledge, the physical and social contexts in which traditional knowledge develop, the historical impact of social change on traditional knowledge systems. Indigenous Knowledge (IK), characteristics, traditional knowledge vis-à-vis indigenous knowledge, traditional knowledge Vs western knowledge traditional knowledge vis-à-vis formal knowledge.

UNIT-II

PROTECTION OF TRADITIONAL KNOWLEDGE

Protection of traditional knowledge: The need for protecting traditional knowledge Significance of TK Protection, value of TK in global economy, Role of Government to harness TK.

LEGAL FRAMEWORK AND TK

A: The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006, Plant Varieties Protection and Farmer's Rights Act, 2001 (PPVFR Act); B: The Biological Diversity Act 2002 and Rules 2004, the protection of traditional knowledge bill, 2016. Geographical indicators act 2003

UNIT-III

TRADITIONAL KNOWLEDGE AND INTELLECTUAL PROPERTY

Systems of traditional knowledge protection, Legal concepts for the protection of traditional knowledge, Certain non IPR mechanisms of traditional knowledge protection, Patents and traditional knowledge, Strategies to increase protection of traditional knowledge, global legal FORA for increasing protection of Indian Traditional Knowledge.

UNIT-IV

TRADITIONAL KNOWLEDGE IN DIFFERENT SECTORS:

Traditional knowledge and engineering, Traditional medicine system, TK and biotechnology, TK in agriculture, Traditional societies depend on it for their food and healthcare needs, Importance of conservation and sustainable development of environment, Management of biodiversity, Food security of the country and protection of TK. 139

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Text Books:

1. Environmental Studies- Deswal and Deswal. Dhanpat Rai and Co.
2. Environmental Science and Engineering Anandan, P. and Kumaravelan, R. 2009. Scitech Publications (India) Pvt. Ltd., India.
3. Environmental Studies. Daniels Ranjit R. J. and Krishnaswamy. 2013. Wiley India.
4. Environmental Science- Botkin and Keller. 2012. Wiley, India

Reference Books:

1. Traditional Knowledge System in India by Amit Jha Atlantic publishers, 2002.
2. "Knowledge Traditions and Practices of India" Kapil Kapoor1, Michel Danino