



SGGS INSTITUTE OF ENGINEERING & TECHNOLOGY, NANDED
(An Autonomous Institute of Government of Maharashtra)

S.Y. B.Tech. (Textile Technology) Curriculum Structure: Academic year 2015-16 onwards

Semester III						
Course Code	Course Title	Lectures (L)	Tutorials (T)	Practical (P)	Credits	
					Th.	Pr.
UTT201	Yarn manufacture- I	04	00	02	04	01
UTT203	Weaving Technology-I	04	00	02	04	01
UTT205	Textile Testing-I	04	00	02	04	01
UTT207	Natural Fibres & Fibre Forming Polymers	04	00	02	04	01
UHS221	Human Values & Professional Ethics	02	00	00	02	00
Total		18	00	08	18	04
					22	
Semester IV						
Course Code	Course Title	Lectures (L)	Tutorials (T)	Practical (P)	Credits	
					Th.	Pr.
UMA202	Mathematics III	04	00	00	04	00
UTT204	Yarn manufacture- II	03	00	02	03	01
UTT206	Weaving Technology-II	04	00	02	04	01
UTT208	Textile Testing-II	03	00	02	03	01
UTT210	Textile Wet Processing- I	03	00	02	03	01
UHS222	Professional Communication	02	00	02	02	01
Total		19	00	10	19	05
					24	
Cumulative Total					87	

VISION

Committed to excel in high quality education, research and extension services in the field of textiles.

MISSIONS

- 1 Imparting quality textile education and creating conducive teaching and learning environment
- 2 Strengthening research, innovation activities and extension services
- 3 Networking with premier industries, institutions, research organizations and alumni
- 4 Improving professional, ethical and leadership attitude of learner

Program Educational Objectives (PEOs)

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|---|------------------------|--|
| 1 | Core Competency | Graduates of the program will have core knowledge of textiles covering technology and production |
| 2 | Analytical Proficiency | Graduates of the program will have induced interest in higher studies, research and development of applied technologies. |
| 3 | Managerial Skills | Graduates of the program will have the capability to learn professional, ethical and leadership skills to grab technical and professional careers. |
| 4 | Social Skills | The program will develop surrounding society through various skill development trainings and programs. |

UTT201: Yarn Manufacture I

(L4-T0-P2): 5Credit

Course Outcomes :

CO1	Students will learn basics about cotton fibres, yarns, mixing and blending and working mechanism and operation of various machines used in blowroom.
CO2	Students will also learn about various process and machine parameters and their influence on output materials.
CO3	This course will make the students competent to analyze the process and conduct experiment related to the process and its performances.
CO4	This course will enable students to design and manufacture intermediate products required for yarn production.

Cotton Fibre: Brief idea of length, fineness and strength measurement of cotton fibres, Influence and significance of these properties in spun yarn manufacturing and yarn quality.

Spun Yarns: Yarn count (English), linear density (Tex) of yarns/ textile strands and its measurement, Yarn twist and its role in spun yarns, Twist contraction and twist measurement by this principle, Structure of ring spun yarns, Brief outline of spun yarn manufacturing sequence/ spinning process.

Ginning of Cotton: Ginning of cotton, Mechanism and working of different types of gins and their limitations, Defects/ problems in ginning, Ginning performance.

Mixing & Blending: Objects and importance, Fundamentals of mixing and blending. Methods and techniques of blending, Measures of blending, Faults in blending, Prediction of blended yarn properties- Hamburger's model, Blending delay time, Bale Management.

Opening and Cleaning: Principle of opening and cleaning, modern concepts, Components of blow room machines- feeding and opening devices, grids and others, Construction and working of blow room machinery. Conventional and Automatic bale openers. Step cleaner, Super jet cleaner, Airflow cleaner, Monocylinder, Multimixers and Auto mixers, RN cleaner, Porcupine opener, ERM cleaner etc.

Scutcher: Functions and working of scutcher, Bladed beaters, Kirschner beater, Feed regulating device. Cone - drum mechanism. Cage-condenser, Lap defects.

Blow room sequence and Auxiliary Devices: Blow room lines for various types

of cotton, Transportation of material, Dust removal, Metal extractors and waste disposal in blow room.

Evaluation of blow room performances: cleaning efficiency, degree of opening, nep generation, lap weight variation, degree of opening and fibre breakage.

Advances in Blowroom: Cleanomat and Tuftomat openers & cleaners. Modern blow room lines, Concept of cleanability of cotton, C-factor and T/C^2 , Modern developments.

Practical Work:

1. Study of working mechanism of a bale breaker / bale opener. Calculate the rotational speed of evener roller and linear speed of the inclined lattice. Also calculate the number of rows of evener spikes passing per linear meter movement of spiked lattice.
2. Determine the cleaning efficiency of any opener / cleaner by Shirley analyzer. Also indicate the influence of trash composition on cleaning efficiency of the same opener.
3. Study the working mechanism of a bladed beater. Determine the intensity of beating (beats/cm) of a bladed beater. Also calculate the beater speed and feed rate.
4. Determine the degree of opening of fiber tufts. Compare opening of fibre tufts before and after processing through an opener.
5. Determine the position of the belt on the cone drums due to step change in thickness of the material passing in between the pedals and pedal rollers.
6. Study of the lap length control mechanism. Determine lap length constant of a scutcher. Also plot a graph of lap length vs change gear teeth.
7. Determine nep count in No. of neps per gram from a given lap.
8. Determine lap hank and also find out metre-to -metre variation in the form of CV% of a given lap.

References Books:

1. The Technology of Short Staple Spinning, (Short Staple Spinning Series, Vol.-I), **W. Klein.**
2. A Practical Guide to Opening and Carding, (Short Staple Spinning Series, Vol.-II), **W. Klein.**
3. Spinning of Manmades and Blends on Cotton System, **K. R. Salhotra.**
4. Spun Yarn Technology, (Vol.-I) **A. Venkatasubramani.**
5. Textile Progress (Vol. 24, No-2), **The Textile Institute, Manchester.**

UTT203: Weaving Technology-I

(L4-T0-P2): 5Credit

Course Outcomes:

CO1	Fundamental of science of weaving.
CO2	The subject requires collection of information from journals, net, book and understands the complex problem deeply like shed- geometry, tappet designing, understand different types of shed and calculations.
CO4	Understand kinematics of different loom motions such as velocity, acceleration of sley, motion of shuttle in boxing.

Outline of various fabric formation methods: Weaving, knitting, non- woven, braiding. Describe brief sequence of each process.

Outline of weaving mechanism:

Classification of weaving machines, their weft insertion rate. Basic motions such as primary, secondary and auxiliary motions used on any loom and their objectives. Timing cycle of loom.

Shedding: Function of shedding, types of shed, principles of sheds and their use. Movements of healds, construction of shedding tappet for plain and twill weave. Geometry of warp shed and its calculation. Positive tappet shedding, shedding by Link mechanism. Asymmetric shedding. Heald reversing motions –such as roller reversing motion, clock spring reversing motion. Shed timing, early and late shedding. Different types of healds, calculation on heald count.

Picking and shuttle checking Mechanisms: Function of picking, Over picking & Under picking. Disadvantages of shuttle picking. Calculations relating to power of picking. Mechanism used for shuttle checking. Movement of shuttle during checking in the shuttle box. Early & late picking and their uses.

Beat-up Motion: Function. Beat-up mechanism. Kinematics of sley and

calculation of displacement, velocity & acceleration of slay. Eccentricity of loom, calculation related to eccentricity. Sley dwell. Types of reed, reed count and their calculations.

Take up Motions: Seven wheel motions and related calculations. Positive take up motion, Periodicity observed on fabric because of defective gears.

Let-off Motion: Negative Let off motion its requirement, details of negative let-off and its limitations.

Auxiliary Motions: Side weft fork, centre weft fork. Loose reed & fast reed motion, Different types of temples such as ring, roller, sun, nipper and full width temple. Calculation related to loom production.

Drafts: Necessity of drafts. Types of drafts; Plain, Skip, Straight, Pointed etc

Drawing-in: Its type like manual, semiautomatic and automatic.

Fabric Designing: Graphical representation of a fabric. Plain weave and matt weave and their derivatives such as warp rib & weft rib matt & variegated matt. Coloured effect of those weaves.

Some commercial Fabrics: Denim, Poplin and Voile.

Practical Work:

1. Study of shedding mechanism & its timing and setting.
2. Study of over pick mechanism and its timing and setting.
3. Study of beat – up mechanism (Dismantling & fitting)
4. Study of seven wheel take-up mechanism & its calculations.
5. Study of let-off mechanism.
6. Study of warp protection motion.
7. Study of side weft-fork mechanism.
8. Study of anti-crack motion & loom brake.
9. Practice in running of plain over pick loom.
10. Practice in drawing-in and knotting.
11. Prepare rib & matt weave on graph paper and use colour in warp/weft .

Reference Books:

1. Fundamentals of yarn Winding, **M. V. Koranne.**
2. Weaving Machines Mechanisms and Managements- **M.K.Talukdar, P.K. Sriramulu & D.B Ajgaonkar.**
3. Principles of Weaving – **Marks & Robinson.**
4. Mechanism of Weaving Machines - **J.L.Chakravorty.**
5. Weaving Mechanism – **N.N. Banarjee.**
6. Weaving Calculation – **Sen Gupta.**
7. Elementary Textile Designing - **William Watson.**

UTT205: Textile Testing-I

(L4-T0-P2): 5Credit

Course Outcomes :

CO1	To understand the methods of characterization of fibres and yarns
CO2	To understand the effects of external factors like sampling, moisture, loading etc. on fibre and yarn properties from application point of view
CO3	Analyze textile material using appropriate test methods
CO4	Writing textile testing reports
CO5	Apply a knowledge of testing in process control
CO6	Using a knowledge of textile testing in selection of raw material for textile industry

Objective of Textile Testing: Reasons for testing, Significance of Sampling and Standardization of Testing, Fiber Properties and their Significance, Fiber Sampling from Bale and Sliver.

Fiber Length: Fiber Length Significance, Staple length, Concept of Comb Sorter and Length Distribution for Cotton, Span Length, Uniformity Ratio, Fibrograph, HVI (High Volume Instrument) and relationship between Staple, Effective and 2.5% Span Length, Fiber Length Measurement of Wool.

Fiber Fineness and Maturity: Fiber Fineness Significance, Definition of Fineness, Optical and Gravimetric Measurement, Air Flow Method for Micronaire, Maturity Measurement and its Relation with Fineness.

Trash and Nep Measurement: Significance of Trash , Trash Analyser and Opto Electrical Method (HVI), Nep Measurement.

Yarn Properties: Yarn Properties and their Significance, Sampling Methods for Yarn.

Yarn Count: Direct and Indirect Methods and Calculations for Conversion, Wrap Reel and Automatic Count Tester, Yarn Count Measurement for Fabric, Relation between Yarn Count and Diameter.

Yarn Twist: Twist Direction, Relation between Yarn Count and Twist, Twist Measuring Methods for Single and Plied Yarn and Sampling, Relation between Yarn Twist and Yarn Strength and other properties.

Yarn Crimp: Crimp Measurement, Calculation and its Significance.

Tensile Properties: Significance of Tensile Strength and Basic Terminologies, Principles of Tensile Testing- CRL, CRE and CRT, Measurement of Fiber Tensile Strength, Stelometer, Pressley Strength Tester and HVI, Measurement of Single Yarn and Lea Strength, CSP, Instron and High speed Testers, Impact or Ballestic Strength Tester, Factors Affecting Tensile Strength and Calculations.

Moisture Testing: Relation between Moisture and Properties of Textile Material, Regain and Content, Relation between Humidity and Regain, Hysteris Effect, Regain of Various Textile Materials, Methods of Moisture Regain Measurement for Fibers, Yarn and Fabric, Calculations, Correct Invoice Weight, Factors Affecting Regain, Conditioning and Standard Testing Conditions.

Miscellaneous Topics: Fiber Friction Measurement and its Importance, Standard Methods and Norms- ASTM, BIS, ISO, Uster Statistics, Bale Management using HVI, Coefficient of Variation and its Significance.

Practical Work:

1. Compare 2.5% span length and uniformity ratio of cotton.
2. Find maturity of cotton.
3. Determine trash in cotton.
4. Find draft between sliver, roving and yarn.
5. Compare count of two yarns and convert it into direct and indirect systems.
6. Compare twist and twist multiplier of two single yarns.
7. Compare twist and twist multiplier of two double yarns.
8. Find single yarn strength and extension.
9. Compare CSP of two yarns.
10. Find yarn diameter and yarn count and establish relation between them.
11. Find moisture regain and content.
12. Compare warp crimp with weft crimp.
13. Determine fiber to metal and fiber to fiber coefficient of friction.

Reference Books:

1. Principles of Textile Testing, **J. E. Booth, Newnes-Butterworths**, London
2. Progrss in Textiles: Science & Technology, Vol-I, Testing and Quality Management, **Dr. V. K. Kothari**, IAFL Publications, New Delhi
3. Textile Testing Fiber, Yarn & Fabric, **Arindam Basu**, SITRA, Coimbtore
4. ASTM Handbook **Vol-07.01**
5. ASTM Handbook **Vol-07.02**
6. Science in Clothing Comfort, **Apurba Das & R. Alagirusamy**, Woodhead Publishing India Pvt Ltd., New Delhi
7. www.nptel.ac.in/courses/116102029.

UTT207: Natural Fibers & Fiber Forming Polymer (L4-T0-P2): 5Credit

Course Outcomes :

C01	Students understanding of engineering knowledge in synthesis, characterization, classification of different polymeric substances & fibre developed.
CO2	Student understanding of problem analysis skills in identifying different polymeric materials & fibre in raw and in mixture form developed.
CO3	Students understanding of conduct investigation of complex problems like measuring types of different fibre in a fibre mixture increased
CO4	Students understanding of modern tools of different fibre testing & polymer characterization happened
CO5	Student developed individual & team work spirit by conducting different individual & group assignment & practical job works.
CO6	Students developed Effective communication through repeated written & oral test & assignment of the subject.

Polymer Introduction & their types: Polymer introduction, Thermoplastics and thermosetts, Linear and cross linked polymers, Fibers, rubber and plastics, Stereo regularity in polymers, Co-polymers.

Polymer Synthesis: Step growth and chain growth polymerization, Mechanism of linear step growth polymerization, Reactivity of functional groups, Carother's theory, Free radical polymerization:- initiation, propagation and termination.

Polymer Molecular weights: Concept of molecular weight and its distribution, Molecular weight of different fibers, Methods of measurements of number average and weighted average molecular weights, End group analysis, Gel permeation chromatography, Viscosity average molecular weight.

Introduction to few common polymers: Polyester, Nylon, Polyacrylics, Polyethylene, Polypropylene, PVC, Polystyrene, Polycarbonate, Polyurethanes,

PVA, Polyisoprene, Teflon, Phenol Formaldehyde, Urea Formaldehyde & Epoxy polymers.

Fibre Classifications & Natural Cellulosic Fibres: Essential and desirable properties of textile fibres, Textile fibre classifications, Cotton fibre: Morphology, Fine structure, Chemical structure, Cotton fibre Physical & chemical properties, Oxy-cellulose and hydrocellulose, Brief idea of Jute fibre production, Chemical composition, Morphology, Physical and chemical properties and end uses, Introduction to other natural fibres like Flax, Banana & Coir.

Natural Protein Fibres: Silk fibre: Cultivation of mulberry silk & fibre production, Morphology and brief idea of fine structure, Chemical structure, Silk Fibre Physical and chemical properties. Introduction to wild silk, Wool Fibres: Morphology and brief idea of fine structure, Chemical composition and structure, Physical and chemical properties.

Practical Work:

1. Physical comparison & burning behavior of different polymeric materials like fibre, plastic & rubber.
2. Physical observation of different textile fibres.
3. Burning behavior of different textile fibres.
4. Fibre identification by chemical dissolution test of cotton, jute, wool & silk fibres.
5. Fibre identification by chemical dissolution test of polyester, nylon, polypropylene, polythelene & acrylic fibres.
6. Longitudinal view of different textile fibres under microscope.
7. Cross sectional view of cotton, jute, wool fibre under microscope.
8. Cross sectional view of silk, polyester & nylon fibre under microscope.

References Books:

1. Polymer Science, By : **Gowariker V. R., Viswanathan N. V. & Sreedhar J.**
Published By : **Wiley Eastern Ltd.**
2. Introduction to Polymers , By : **R. J. Young & P. A. Lovell.**

- Published by : **Chapman & Hall.**
3. Text Book of Polymer Science , By : **F. W. Billmeyer Jr.**
Published by : **John Wiley & Sons.**
 4. Textile Science , By : **Gohl E. P. G. & and Vilensky L. D.**
Published by : **Longman Cheshire.**
 5. Dyeing & Chemical Technology of Textile Fibres, By : **E. R. Trotman**
Published By : **Charles Griffin & Company Ltd.**
 6. Introduction to Textile Fibres; By : **H. V. Sreenivas Moorthy**
 7. Textile Fibres, By : **Dr. V.A.Shenai.**
Published by : **Sevak Publications, Mumbai.**

UHS221:Human Values & Professional Ethics

Credits:2;Teaching hours: 2+0+0(2 rs per week)

Examination Scheme: 30* + 70 marks *30 marks- *The marks can be awarded on the basis of formal Mid term Examination or sessional or assignments as prescribed by the concerned subject teacher(s) and the course co-ordinator for the specific semester/ academic year.*

Objectives of the course:

1. Making the students aware and sensitive to value system in real life situations.
2. To help the students to discriminate between ephemeral and eternal values
3. To discriminate between essence and form

Course Outcome:

- The students will be able to recognize importance of human values, harmony and ethical behavior in real life situations

Course contents:

Unit 1: Course Introduction

Need, Basic Guidelines, Content and Process for Value Education

- Understanding the need, basic guidelines, content and process for Value Education.
- A look at basic aspirations: Self Exploration, Happiness and Prosperity
- Fulfillment of human aspirations and harmony

Unit 2: Understanding the Harmony

- Thoughtful human being harmony, sentient, attitude and its importance in relationship
- Significance of restraint and health (*Yama and Niyama*)
- Human goal settings and life management techniques, existence and co-existence, trust, respect in universal order

Unit 3: Understanding professional Ethics

- Harmony at various levels and understanding professional ethics
- Creating environmentally aware engineers

- Humanistic universal education, natural acceptance of human values, ethical human conduct

Unit 4: Competence of professional ethics

- Management models for present technologies, strategies for integrating humans in family and at all levels of existence
- Relevance of the above strategies in becoming responsible engineers, technologists and managers

Unit 5: Motivation

- Contribution of ancestors in science and technology development to raise self esteem in Indian context.

References Books:

1. **R R Gaur, R Sangal, G P Bagaria**, 2009, A Foundation Course in Value Education.
2. **A. Nagraj**, 1998, Jeevan Vidya ek Parichay, Divya Path Sansthan, Amarkantak.
3. **Sussan George**, 1976, How the Other Half Dies, Penguin Press. Reprinted 1986, 1991
4. **PL Dhar, RR Gaur**, 1990, Science and Humanism, Commonwealth Purblishers.
5. **A.N. Tripathy**, 2003, Human Values, New Age International Publishers
6. **Subhas Palekar**, 2000, How to practice Natural Farming, Pracheen(Vaidik) Krishi Tantra Shodh, Amravati.
7. **Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III**, 1972, Limits to Growth – Club of Rome’s report, Universe Books.
8. **E G Seebauer & Robert L. Berry**, 2000, Fundamentals of Ethics for Scientists & Engineers , Oxford University Press
9. **M Govindrajran, S Natrajan & V.S. Senthil Kumar**, Engineering Ethics (including Human Values), Eastern Economy Edition, Prentice Hall of India Ltd
10. **Subroto Bagchi**, The Professional
11. **B P Banerjee**, 2005, Foundations of Ethics and Management, Excel Books.
12. **B L Bajpai**, 2004, Indian Ethos and Modern Management, New Royal Book Co., Lucknow. Reprinted 2008. Scheme and Syllabus Bachelor of Computer

MA14.202-Engineering mathematics-III

(Differential Equation)

(L4-T0-PO): 4credits

Course objectives: To acquaint student with: the basic concepts of an ordinary differential equations, partial differential equations, Mathematical Modelling in physical problems. Initial and boundary value problems. Motivate students to use critical thinking skill to solve practical problems.

Unit1: Basic Concepts & Ideas, Geometric Meaning of $y' = f(x, y)$, direction field, exact equations, Integrating factors, Linear differential equation, Bernoulli's equations, orthogonal trajectories, applications to electrical circuits.

Unit2: Second Order Differential equations, Homogeneous linear differential equation for real & complex roots, Euler Cauchy equation, existence & uniqueness theorem (Without proof) & Wronskian.

Unit3: Non homogeneous equation, solutions by undetermined coefficients & Variation of parameter methods, modelling, forced oscillation, resonance & electrical circuits, system of differential equations.

Unit4: Fourier Series, Periodic function, Fourier theorem Euler's formulae for the Fourier coefficients, convergence of Fourier series, change of interval, even & odd function functions, half range Fourier series.

Unit5: Partial differential equations, Separation of Variables, Vibrations of string, one dimensional equation.

Reference Books:

- Advanced Engineering Mathematics – **R. K. Jain & S. R. K. Iyenger.**
- Advanced Engineering Mathematics- **Erwin Kreyszig.**
- Elementary Differential Equation(eighth edition) **W. E. Boyce & R. Dprima. (John Wiley 2005)**
- Fourier series & boundary Valued Problems., **R. V. Churchill & J. W. Brown** (Seventh edition) **Mc Graw Hill**(2006).

Course Outcomes: At the end of the course the student is expected to understand

1. Importance of differential equations i.e. ODE and PDE in physical problems.
2. Able to solve IVP in electrical and mechanical problems.
3. Analysing physical phenomena in engineering and technology by using this theory.

UTT204: Yarn Manufacture-II

(L3-T0-P2): 4 Credit

Course Outcomes:

CO1	Students will learn fundamentals of technology and working mechanism of Carding and Drawframe machines.
CO2	They will understand the relationship of various process and quality aspects of slivers production.
CO3	Students will be able to analyze and experiment on the processes and evaluate the quality parameters.
CO4	This course will enable students to design and manufacture intermediate products required for yarn production.

Carding: Design and working of carding machine, Drive of carding machine-speeds, drafts and production calculations, Principle of carding- stripping and carding action, Lap feeding and chute feeding, Design of feed plate, Significance of few machine and process parameters on carding and yarn quality, Carding segments and its importance, Licker-in zone details and various modifications, Flat movements

Theories of carding: Action between cylinder and flats, Forces acting on fibre tufts in carding zone, Carding force and factors affecting it. Flat strip and its control.

Fibre transfer from cylinder to doffer: Mechanism of hook formation and factors affecting it, Details of modern web stripping devices, Types of coiling, Mechanism of coiling and related calculations.

Card clothing: Geometry and specification of licker-in, cylinder, doffer and flat wires, Grinding of metallic wires, Settings in card, Carding faults, Assessment of neps in carding.

Transfer efficiency and cylinder load: Determination of transfer efficiency and factors affecting it, Design features of High production Cards. Close and open loop auto levelers in cards

Drawing: Objects, working of draw frame, Drive of draw frame, draft and production calculation. Role of different components/ parameters in a drafting system, Conventional drafting and draft distribution, Shirley drafting concepts, Various modern drafting arrangements and working. Roller setting, Stop motions, Close and open loop auto-levellers in draw frame.

Principle of roller drafting: concept of ideal drafting, Draft and drafting force, Doubling, Law of doubling, Law of addition of irregularity, Causes and control of irregularity of a drafted textile strand. Roller lapping- cause and remedies. Concepts of hook removal in drawing- forces assisting and resisting, Method of wrapping, Design features of modern high speed draw frames.

Practical Work:

1. Study of the general features of the carding machine. Draw a diagram of the carding machine showing all parts and components with their dimensions.
2. Determine the feed roller, licker-in, cylinder and doffer speeds and drafts between any two of these rollers of the carding machine. Also calculate the draft constant and production constant.
3. Study of web doffing device. Calculate the speeds of various rollers of the related device and table calends roller. Also calculate production of the card.
4. Study of the coiling mechanism. Also find the coiling speed and circumferential shifts of coils along the periphery of the can.
5. Study of the flat driving mechanism in the card. Calculate the flat speed from the gearing.
6. Various setting of a card. All major settings are to be studied.
7. Study of draw frame and its drive. Calculate the speeds of the rollers of the drafting system and also the speeds of other moving parts. Also calculate the production of the machine.
8. Study of the drafting system of draw frame. Calculate the draft and draft constant of the drafting system.

Reference Books:

1. A Practical Guide to Opening and Carding, (Short Staple Spinning Series, Vol.-II)- **W. Klein.**
2. A Practical Guide to Combing and Drawing, (Short Staple Spinning Series, Vol.-III)- **W. Klein.**
3. Spun Yarn Technology (Vol. II)- **A. Venkatasubramani.**
4. Textile Mathematics (Vol. II)- **J. E. Booth.**

UTT206: Weaving Technology-II

(L3-T0-P2): 4Credit

Course Outcomes

CO1	Learning a technology of winding
CO2	Apply knowledge of winding machine in quality and production of products of these machines
CO3	Learning a technology of warping and sizing
CO4	Apply knowledge of warping and sizing machine in quality and production of products of these machines
CO5	Learning a latest developments of weaving preparatory process
CO6	Learn to analyze the fabric designs of twill & satin structures

Winding: Objects of winding, Types of winding & their uses. Methods of package drive such as surface drive & spindle drive. Angle of wind, wind per double traverse, coil angle, calculations. Gain in package building. Classification of ordinary clearers and their setting. Different types of tensioners. Ribbon breaking devices in winding and its importance. Different types of knots, Uniform build of yarn package, theory and practices. Yarn ballooning & their control.

Modern Winding: Classification & uses. Winding process such as yarn unwinding, tensioning & take up. Package requirements for warping, knitting and weaving. Automatic winders in detail, Yarn path, unwinding accelerator, pre cleaners, tensioners, waxing etc. Drive to drum, breaking device. (Autoconer 238,338, 6, Savio, Murata).

Yarn clearers: Use of electronic clearers, its benefits in fabric formation. Optimum clearing. Uster classmate as an aid for yarn clearing. Types of clearer such as optical and capacitance type clearer, Lofe , Quantum II etc.

Splicing: Types- mechanical & pneumatic type in detail. Testing of spliced joint (strength, appearance & hairiness).

Package faults: Its causes and remedies.

Weft Winding: Brief introduction of weft winding and its requirements.

Warping: Object of warping, classification of warping machines. Modern warping machines, its constructions, features (Benninger, Karl Mayer etc) with respect to creel, Pre-tensioners, central control of tensioners.

1. **Type of creeling:** Magazine truck, chain creels, semi-auto and auto creels, creel masters.
2. **Head Stock:** Auto leasing, drive, breaks and automatic doffing.
3. **Sectional warping:** Its objective, yarn path ,cone angle ,leasing technique, beam traverse. Calculation related to production, Taper angle etc.

Sizing: Object of sizing, sizing ingredients and their functions. Common starches & adhesives used in sizing for cotton and synthetic yarn.

Size Cooking: Need, Equipments used , addition of ingredients, cooking sequence such as geltinization, bursting, homogenizing, concentration and stable viscosity.

Study of modern sizing machine with reference to creel, sow-box, cylinder and beam drive, Mechanics of drying, drying methods like hot air and cylinder drying - advantages and disadvantages. Different control systems used in sizing such as - level controller, stretch controller, temperature controller and moisture controller. Calculations regarding add on %, pick up %, steam requirement, production and sizing cost calculation. Defects in sizing.

Fabric Designing: Twill weaves and their derivatives, prominence of twill, satin and sateen weaves, etc.

Practical Work :

1. Manual winder:

- A. Study the passage of yarn, drive & winding speed calculations and adjustment of tensioners according to yarn count.
- B. Different types of **slub catchers** & their settings with respect to yarn count.
- C. Alignment of winding package, pressure adjustment
- D. Study the anti patterning device & study of cone holder.
- E. Use some yarns, calculate its count and adjust the tension required

2. Pirn winding:

- A. Yarn path in pirn winding & study of spindle drive, traverse.
- B. Setting of traverse length, bunch length, pirn diameter, chase angle etc.

3. **Skill developments:** Winding 4/5 bobbins into cheese/cone for practice including knotting

4. Warping:

- A. Study the passage of warp sheet through warping m/c.
- B. Study the driving arrangement of drum, creels, stop motion, brake system.

5. Sizing: (During Mill Visit)

- A. To study the passage of yarn on a sizing machine and the functions of various mechanisms of the sizing machine.
- B. Observe lappers, migration of ends, patches of size paste on sized warp sheet if any.
- C. Enlist the ingredients used in size paste & observe the method of size preparation.
- D. Collect some size paste from sow box and cooking beak and determine the solid content.
- E. Note down size recipes used for different sorts.
- F. Note down sort particulars and sizing cost/kg of yarn.
- G. Study the measuring & marking motion, tape length calculations.

6. **Prepare at least 3 different samples** on pilot loom and represent them on graph paper with drafting and peg plan.

- A. Plain weave
- B. Satin
- C. Broken twill/ zigzag twill
- D. Diamond weave

7. **Working on CAD:** plain weave structure, create stripes, checks with different coloured yarn, create dobby designs (4 samples) along with their draft, lifting plan on computer.

Reference Books:

1. Fundamentals of yarn Winding, **M. V. Koranne.**
2. Winding- **M. K. Talukdar.**
3. Winding (Silver jubilee monograph series) – **BTRA.**
4. Yarn Winding (NCUTE Programme at IIT Delhi, March1999)- **Edited by P. K. Banerjee .**
5. Textile Math. (Vol. I to III) - **J. E. Booth.**
6. Sizing Materials, Methods, Machines: **D. B. Ajgaonkar, M. K. Talukdar and Wadekar.**
7. Grammar of Textile Designing: **H. Nisbeth.**
8. Elementry Textile Designing: **William Watson.**

UTT 208:Textile Testing-II

(L3-T0-P2): 4Credit

Course Outcomes :

CO1	Apply knowledge of science & engineering for textile testing
CO2	Analyze textile material using various test methods
CO3	Learning new methods/technology for testing
CO4	Understand textile testing from environmental angle
CO5	Writing textile testing reports
CO6	Assess textile material in relation to health and safety

Fiber Properties: AFIS (Advanced Fiber Information System), Working and Applications.

Yarn Properties: Irregularity, Law of addition of irregularity, Unevenness measurement, Imperfections, CV, Diagram, Spectogram and Calculations, Classimat faults measurement and significance, Hairiness measurement and factors affecting hairiness, Yarn to Metal and Yarn to Yarn Friction Measurement, Weavability Evaluation, Appearance Evaluation, EIB (Electronic Board Inspection).

Testing of Fabric Specifications: Sampling and Fabric Dimensions, Length, Width, Thickness measurement and factors affecting it, GSM (Mass per unit area).

Fabric Physical Properties: Tensile Properties Evaluation, Grab test, Sampling, Bursting strength, Tear strength.

Fabric Handle: Cover and its calculations, Crease Recovery, Stiffness, Drape, KES (Kawabata Evaluation System), FAST (Fabric Assurance by Simple Testing).

Durability and Serviceability: Abrasion Resistance, Types of Abrasion, Flat, Flex, measurement, Pilling.

Comfort Properties: Air Permeability, Water Repellency, Thermal Conductivity, Water Vapour Transport, Flammability.

Practical Work:

1. Compare evenness of two yarns.
2. Compare hairiness of two yarns.
3. Compare fabric specifications Thickness, EPI, PPI, GSM and cloth cover.
4. Compare crease recovery of two fabrics both warp and weft way.
5. Compare stiffness, bending modulus of two fabrics both warp and weft way.
6. Compare tensile strength of warp with weft of a fabric.
7. Compare tear strength of two fabrics.
8. Compare bursting strength of two fabrics.
9. Compare abrasion resistance of two fabrics.
10. Find water repellency of a fabric.
11. Compare flammability of two fabrics.
12. Compare impact strength of warp with weft of a fabric.

Reference Books:

8. Principles of Textile Testing, **J. E. Booth, Newnes-Butterworths**, London
9. Progress in Textiles: Science & Technology, Vol-I, Testing and Quality Management, **Dr. V. K. Kothari**, IAFL Publications, New Delhi
10. Textile Testing Fiber, Yarn & Fabric, **Arindam Basu**, SITRA, Coimbatore
11. ASTM Handbook **Vol-07.01**
12. ASTM Handbook **Vol-07.02**
13. Science in Clothing Comfort, **Apurba Das & R. Alagirusamy**, Woodhead Publishing India Pvt Ltd., New Delhi
14. www.nptel.ac.in/courses/116102029.

UTT210: TEXTILE WET PROCESSING-I

(L3-T0-P2): 4Credit

Course Outcomes :

CO1	In textile dye house students will understand dyeing preparatory processes & functioning of different machines.
CO2	Students will understand & appreciate different dyeing conditions & machine operations in dye house.
CO3	Students will understand quality evaluation aspects of dyeing process & products.
CO4	Students will understand color measurement procedures & standards.

Mechanical Fabric Preparation & Desizing: Grey inspection, Shearing, Cropping, Singeing & different singeing machines, Chemistry and technology of different desizing viz. Enzymatic, acid and oxidative.

Scouring and bleaching: Hard & soft water, chemistry of fats, waxes & soaps, Chemistry and technology of scouring cotton cloth in both in KIER and continuous process, Chemistry and technology of hypochlorite, peroxide and chlorite bleaching, Preparation processes for synthetic and blended fabric in brief, Scouring & Bleaching performances evaluation and norms for bleached cloth.

Wool Scouring & Silk Degumming: Composition of raw wool, Technology & chemistry of wool scouring, Technology of silk degumming & Wool & silk bleaching.

Mercerisation: Mercerisation, its chemistry and technology, Physical and chemical effect of mercerization, Chain & Chainless merceriser; Evaluations of mercerisation performances.

Color: Concept of light and color, Primary, secondary and tertiary color; Hue, value, chroma & color mixing concept, Chemical constitution responsible for color. Concept of washing fastness & light fastness & their measurements, Munsell, CIE & CIE Labcolor measurement systems, Principles of spectrophotometer for color measurement.

Dyeing: Introduction to theory of dyeing, Classification of dyes based on method of application, Chemical constitution of different dyes, Auxochrome, chromophore and pigments, Mechanisms of dissolution, absorption and fixation of different dyes viz. Direct, vat, solubilised vat, reactive, azoic, sulphur, acid and basic dyes on cellulosic and protein fibres, Effect of process and material parameters on dye performances, Various dyeing faults their causes and remedies.

Dyeing Machine: Principle of working of different dyeing machine like jigger, yarn dyeing machine, padding mangle & continuous dyeing range, Latest technological features of different dyeing machines.

Practical Work:

1. Determination of amount of size in Textile Fabric/Yarn through enzymatic, acid & chlorite desizing.
2. Cotton scouring & scouring loss determination.
3. Estimation of available Chlorine in hypochlorite bleaching liquor .
4. Bleaching of cotton yarn/cloth with hypochlorite & peroxides.
5. Dyeing of Cotton with direct dyes with different shades & after treatments.
6. Dyeing of Cotton with Hot& Cold brand reactive dyes with different shades.
7. Dyeing of Cotton with Vat dyes with different shades.
8. Dyeing of Cotton with solubilised Vat dyes with different shades.
9. Dyeing of Cotton with sulphur dyes with different shades.
10. Dyeing of silk/wool with acid dyes with different shades.

Reference Books:

1. Dyeing & Chemical Technology of Textile Fibres, By: **E. R. Trotman**; Published By: Charles Griffin & Company Ltd.
2. Textile scouring & bleaching, By: **E. R. Trotman** , Published By: Charles Griffin & Company Ltd.
3. Fundamentals & Practices in Colouration of Textiles, By: **Chakraborty J. N.**; Published By: Woodhead Publishing India in Textiles.
4. Textile Preparation & Dyeing, By: **Roy, Choudhury A.K.**; Published By: Oxford & IBH Publishing Co. Pvt. Ltd.

5. Technology of Textile Processing - Vol.3, "Technology of Bleaching", By: **Dr. V. A. Shenai** ; Published By: Sevak Publications, Mumbai.
6. Technology of Textile Processing - Vol.6, "Technology of Dyeing" By: **Dr. V. A. Shenai** ; Published By: Sevak Publications, Mumbai.
7. Technology of Textile Processing - Vol.2,"Chemistryof dyes & Principle of dyeing"By: **Dr. V. A. Shenai** .; Published By: Sevak Publications, Mumbai.
8. Bleaching Mercerization & dyeing of cotton materials By: **R. S. Prayag**.

Professional Communication

(L2-T0-P2): 3 Credit

Objectives of the course:

4. *To enable students to speak and write English with a good level of proficiency.*
5. *To build confidence in students to face interview, deliver speech, make presentation and participate in meeting and discussion.*
6. *To lay a strong foundation on the subject by revising and correcting the basics.*

Unit 1: Functional Grammar

Building of a sentence and its components, Tense- the time sense: Present, Past and Future tense with uses and applications, Verbs, Noun, Pronoun, Adjective, Adverb, Prepositions and Conjunctions: classification, identifications, uses and applications Active & Passive voice, direct and indirect speech, clause, principles of effective communication.

Unit 2: Listening Skills

Requirements of listening skill, Phonetics and phonology, Articulation of consonants and vowels, Syllables, Weak form stress, Rhythm and intonation, Face to face conversation, Telephonic conversation.

Unit 3: Reading Skills

Requirements of reading skill, Reading poetry, Reading prose, Reading article from standard news paper/ magazine .

Unit 4: Writing Skill

Paragraph, Resumes, Letters- formal and informal, Circular, Notice, Agendas, Minutes, Reports, E-mail and Blog writing.

Unit5: Speaking Skill

Requirement of speaking skills, Grammatical difficulties, Practice of public speaking, Conversation between /among students or groups on given situations.

Unit 6: Integration of skills

Group discussion, Personal interview, Debate and Quiz competition, ppt Presentation,

Practical and Assignments:

1. Practice of building of sentences and identification of components
2. Practice the uses and applications of tense
3. Identification of parts of speech and form changes- use in sentences
4. Identification of various clauses and their use in sentences
5. **Listening Skills:** Listen few BBC / Voice of America/ NDTV 24*7 or similar standard Television channel / Radio or any standard talk/discussion available in CD/DVD and answer the given questions/ write the summery
6. **Reading Skills:** Read few articles from standard news paper The Hindu/ The Times of India / magazine /books and answer the given questions /write the summery
7. **Writing Skills: (Assignments)**
 - A. Write your own CV.
 - B. Write an E-mail.
 - C. Write a blog on current topic of discussion .
 - D. Write a technical report.
 - E. Write a letter.
 - F. Comprehension Tests.
8. **Speaking and Integration of Skills:**
 - A. Converse on few given situations.
 - B. Group Discussions on a given topic.
 - C. Debate competition on a given topic.
 - D. Quiz competition among few groups of students.

E. ppt presentation.

Reference Books:

1. Essential English Grammar, **Raymond Murphy**, Cambridge University Press, 1 December, 2007.
2. Oxford English Grammar Course: Advanced, **Michael Swan and Catherine Walter**, Oxford, 24 February, 2012.
3. Advanced English Grammar, **Martin Hewings**, Cambridge University Press, 1 December, 2007.
4. *Developing Communication Skills*, **Krishna Mohan and Meera Banerjee**, Macmillan India Ltd, New Delhi, 2nd Edition, 2009.
5. Oxford Advanced Learner's Dictionary, 8th Edition.