## Semester – III (w.e.f. Session 2016-2017)

<table>
<thead>
<tr>
<th>S N</th>
<th>Course No.</th>
<th>Course Title</th>
<th>Teaching Schedule (hrs)</th>
<th>Allotment of Marks</th>
<th>Dur.of Exam (hrs)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>L</td>
<td>T</td>
<td>P</td>
</tr>
<tr>
<td>1</td>
<td>TT-201N</td>
<td>Introduction to Textiles</td>
<td>3</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>2</td>
<td>TT-203N</td>
<td>Textile Fibre - I</td>
<td>3</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>3</td>
<td>TT-205N</td>
<td>Yarn Manufacturing-I</td>
<td>3</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>4</td>
<td>TT-207N</td>
<td>Fabric Manufacturing-I</td>
<td>3</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>5</td>
<td>TT-209N</td>
<td>Textile Chemical Processing-I</td>
<td>3</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>6</td>
<td>TT-211N</td>
<td>Textile Fibre - I Lab</td>
<td>-</td>
<td>-</td>
<td>3</td>
</tr>
<tr>
<td>7</td>
<td>TT-213N</td>
<td>Yarn Manufacturing-I Lab</td>
<td>-</td>
<td>-</td>
<td>3</td>
</tr>
<tr>
<td>8</td>
<td>TT-215N</td>
<td>Fabric Manufacturing-I Lab</td>
<td>-</td>
<td>-</td>
<td>3</td>
</tr>
<tr>
<td>9</td>
<td>TT-217N</td>
<td>Textile Chemical Processing-I Lab</td>
<td>-</td>
<td>-</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Total</strong></td>
<td><strong>15</strong></td>
<td><strong>5</strong></td>
<td><strong>12</strong></td>
</tr>
</tbody>
</table>

*MPC-201N is a mandatory course and student has to get passing marks in order to qualify for the award of degree but its marks will not be added in the grand total.

## Semester – IV (w.e.f. Session 2016-2017)

<table>
<thead>
<tr>
<th>S N</th>
<th>Course No.</th>
<th>Course Title</th>
<th>Teaching Schedule (hrs)</th>
<th>Allotment of Marks</th>
<th>Dur.of Exam (hrs)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>L</td>
<td>T</td>
<td>P</td>
</tr>
<tr>
<td>1</td>
<td>TT-202N</td>
<td>Yarn Manufacturing-II</td>
<td>3</td>
<td>1</td>
<td>---</td>
</tr>
<tr>
<td>2</td>
<td>TT-204N</td>
<td>Fabric Manufacturing-II</td>
<td>3</td>
<td>1</td>
<td>---</td>
</tr>
<tr>
<td>3</td>
<td>TT-206N</td>
<td>Textile Chemical Processing-II</td>
<td>3</td>
<td>1</td>
<td>---</td>
</tr>
<tr>
<td>4</td>
<td>TT-208N</td>
<td>Textile Testing-I</td>
<td>3</td>
<td>1</td>
<td>---</td>
</tr>
<tr>
<td>5</td>
<td>TT-210N</td>
<td>Textile Fibre - II</td>
<td>3</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>6</td>
<td>TT-212N</td>
<td>Yarn Manufacturing-II Lab</td>
<td>---</td>
<td>-</td>
<td>3</td>
</tr>
<tr>
<td>7</td>
<td>TT-214N</td>
<td>Fabric Manufacturing-II Lab</td>
<td>---</td>
<td>-</td>
<td>3</td>
</tr>
<tr>
<td>8</td>
<td>TT-216N</td>
<td>Textile Chemical Processing-II Lab</td>
<td>---</td>
<td>-</td>
<td>3</td>
</tr>
<tr>
<td>9</td>
<td>TT-218N</td>
<td>Textile Testing-I Lab</td>
<td>---</td>
<td>-</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Total</strong></td>
<td><strong>15</strong></td>
<td><strong>5</strong></td>
<td><strong>12</strong></td>
</tr>
</tbody>
</table>

*MPC-202N is a mandatory course and student has to get passing marks in order to qualify for the award of degree but its marks will not be added in the grand total.

*Note: All the students have to undergo six weeks industrial training after IV semester and it will be evaluated in V semester.
INTRODUCTION TO TEXTILES

UNIT-1
Textile Industry

UNIT-II

UNIT-III
Textile Technology
Introduction to fiber, yarn, fabrics. Sequence of operation for conversion of natural and manmade fibers into finished fabrics. Fabric construction technology: knitting, weaving and production of non-wovens.

UNIT-IV

Suggested Text Books & References:

UNIT I
Fibre, textile fibre, Classification of textile fibres, Essential and desirable properties of textile fibres, Cotton - cultivation and harvesting Practices, ginning, grading, baling, Physical and chemical properties of cotton fibre.

UNIT II
Cultivation, Production, morphological structure, physical and chemical properties and end uses of: Flax, Jute and Ramie.

UNIT III
Production of silk (raw), Morphological structure of silk, chemical composition, physical and chemical properties of silk, various varieties of silk with brief description.

Wool - Sheep rearing, wool shearing, grading baling, Morphological structure, physical and chemical properties of wool.

UNIT IV
Polymer system, physical and chemical properties and application of various man-made and regenerated fibres such as: viscose, polyester, polyamide, acrylic, polypropylene, elastomeric fibres (Spandex).

Suggested Text Books & References:

1. Moncriff, W., “Textile Fibres”.
TT-205N
YARN MANUFACTURING-I

L_T_P
Sessional: 25 Marks
3 1 -
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
Mixing & Blending
Objectives of mixing and blending, Formulation of cotton mixing – scientific bale management, Different Blending methods with their advantages and disadvantages, Tinting & Application of additional spin finish for manmade fibres.

UNIT-II
Opening and Cleaning
Need for opening and cleaning, Objective of blowroom, Various types of opener and cleaner – construction and working, Lap forming mechanism, Blow room accessories, Selection of blow room line for different cotton and man-made fibres, Production and cleaning efficiency level attainable in blowroom, Causes of lap defects and their remedies, Modern developments in blowroom.

UNIT-III
Carding
Objective, Comparison of lap feed and flock feed system. Principle of carding, stripping and brushing action, Design and construction of carding machine, Flexible and metallic card clothing, Processing of man-made fibres on carding, Optimization of process and machine parameters of carding, Autolevelling in card. Modern developments in carding, Calculations pertaining to draft and production.

UNIT-IV
Drafting
Objective, Fundamental concept of Ideal drafting, Actual drafting, Working principles of draw frame including constructional details, Weighting in draw frame, Draft distribution, Different types of drafting roller arrangements, Relation between drafting & doubling, Drafting irregularities, Autolevelling, modern developments in draw-frame, Calculations pertaining to draft and production.

Suggested Text Books & References:

TT-207N  
FABRIC MANUFACTURING-I

<table>
<thead>
<tr>
<th>L</th>
<th>T</th>
<th>P</th>
<th>Sessional: 25 Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>1</td>
<td>-</td>
<td>Exam: 75 Marks</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Total: 100 Marks</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Time: 3 hrs</td>
</tr>
</tbody>
</table>

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-1  
**Warp Winding:** Object of warp winding, requirement of a good package, Basic features of a winding machine, Yarn withdrawal-side withdrawal, overend withdrawal, yarn tensioner, additive type tensioner, multiplicative type, combined type, yarn clearers, mechanical yarn clearer, electronic yarn clearer, yarn faults, uster classmate yarn fault measuring system, yarn rejoining techniques- knotting, splicing, classification of splicing, pneumatic splicing, classification of winding machines, random winding machine, principle, advantage and disadvantage of random winding, precision winding, principle, advantage and disadvantage of precision winding, angle of wind, coil angle, traverse ratio, coil pattern on the package, patterning and its remedy basic features of automatic winding machines, stop motions in winding machine, types of warp packages, types of package build calculation related to production and efficiency,  
**Pirn Winding:** Objectives, Difference between warp winding and weft winding, yarn path on pirn winding machine, basic feature of pirn winding, difference in traverse mechanism in warp and weft winding, calculation related to production and efficiency

UNIT-2  
**Warping:** Object of warping process, classification of warping, creels used for warping process, beam warping, calculation related to beam warping, sectional warping, beaming, head stotck, relation between section height and cone angle, drum storage capacity, calculations related to sectional warping, various controls on warping machines, calculations related to production and efficiency

UNIT-3  
**Sizing:** Objectives, stresses on warp yarn during weaving, classification of sizing process, sizing parameters-size concentration, size percentage, size add-on, features of conventional slasher sizing machine, creels for sizing process, size boxes, drying section- single cylinder dryer and multi cylinder dryer, infrared dryers, head stock, controls on sizing machine, sizing materials, size preparation. Starch, modification of starch, polyvinyl alcohol, carboxyl methyl cellulose, acrylics, binders, lubricants and other additives, sizing of spun yarns, sizing of filament yarn, developments in sizing, single end sizing, cold and pre wet sizing, foam sizing, sinter roller sizing. Calculation related to sizing parameters, production and efficiency

UNIT-4  
**Drawing-In:** Object of drawing in, different types of heald wires, different types of drop wires, reed, reed count, drawing in order of plain weave, drawing in order of twill weave, drawing in order of satin weave, automation in drawing in, knotting and gaiting. Calculation related to reed count and drafting plan.

Suggested Text Books & References:

14. Lord and Mohemad, "Conversion of Yarn to Fabric".
15. Hougton, "Hand Book of Cotton Warp Sizing".
TT-209N
TEXTILE CHEMICAL PROCESSING - I

L T P Sessional: 25 Marks
3 1 - 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-1
Introduction: Sequence of chemical processing of textiles. Natural and added impurities in textiles.
Preparatory Processes:
Desizing: Objective, types, method details and mechanism of removal of starch in various methods. Efficiency of desizing.

UNIT-2

UNIT-3
Dyeing of textiles: Dyeing technology of natural and manmade textiles with Direct, Reactive, Vat, Insoluble Azoic, Sulphur, Solubilised vat, Acid, Metal-complex, Basic and Disperse dyes.

UNIT-4
Wool Processing: Wool setting and milling. Mildew, rot and moth proofing of wool.
Silk Processing: Degumming, Silk Finishing: Weighting of silk and Scroop finish.

Suggested Text Books & References:
1. Identification of Cotton / Silk / Wool / Jute / Others Fibres using relevant instrument by physical methods.
3. Identification of Man made Fibres by Physical Methods
4. Identification of Man made Fibres by Chemical Methods.
5. Study and determine the TRASH contamination in the raw materials namely cotton.
6. Identification of different type of Dyes and Finishes from application technique & properties point of view.
7. A report on the sourcing & procurement of the textile raw material.
8. Prepare a cost comparison statement of at least
   (a) six fibres
   (b) six dyes
   (c) six textile auxiliaries
   (d) six chemicals.
10. Determination of vegetable matter content, wax & Greece content of wool by Soxhlet method.
11. Determination of fiber length properties of cotton by using Comb Sorter & compare with the manual grading from ginning.
12. Determination % of medullation of wool using projection microscope.
13. Study the longitudinal & cross-sectional view of fiber.

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.
Mixing

1. To study the different techniques of Mixing and Blending.

Opening & Cleaning

2. Study of general outline of opener and clearer machine employed in a modern Blowroom line.

3. Calculation of speeds of different machine parts for Cotton and Synthetic fibres, Blow/inch of Kirschner beater, Production calculation of blow room.

Carding

4. To illustrate the working principle of carding machine.

5. To study the change places and speed of different parts of a carding machine for Cotton and Synthetic fibres.

6. Calculation of the speed, individual draft & total draft and production of carding machine.

Drawframe

7. To study the working principle and important settings of drawframe machine.

8. Calculation of the total draft and its distribution in draw frame machine.

9. Study of drafting arrangement and top roller weighting system of draw frame machine.

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.
TT-215N
FABRIC MANUFACTURING – I LAB

L  T  P                  Practical/viva: 60 Marks
-  -  3                  Sessional: 40 Marks
                                  Total: 100 Marks
                                  Time: 3 hrs

Winding
1. To show different types of winders for single and Ply Yarn Final Packages.
2. Specification for all count range and material range, functions of all parts.
3. Cheese windings- Need and working.
4. To show the difference in packages needed for warping machines.

Warping
5. To show different type of warping machines used for different type of material and quality of fabric to be prepared. Functions of all parts.

Pirn Winding
6. To show working, functions of different types of Pirn Winding Machine.
7. Difference between cone winding and pirn winding.

Sizing
8. To show working explaining functions of different parts.
9. Different types of sizing materials used for different fibers.

Drawing In
10. To show different type of machines and use for different fabric design.

Calculation
11. To demonstrate actual use of weaving calculations in day-to-day use in different machines.

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.
2. Scouring of Natural fibre in the form of yarn and fabric and find the scouring loss.
4. Degumming of Silk and calculation of weight loss percentage.
5. Bleaching of Natural fibre namely Cotton, jute with
   (a) Hyperchloride Bleaching
   (b) Peroxide Bleaching
7. Determination the pH value of a given material.
8. Determination of transmittance, absorbance and concentration of given dye liquor by visible spectrophotometer.
9. Dyeing of cotton yarn with direct dyes, reactive dyes and basic dyes
10. Dyeing of wool with direct dyes, basic dyes, and acid dyes.
11. Method of mordanting in respect of application of different fibre.
12. Extraction method of color from different color dyes.
13. Study the mechanical finishing and understand the mechanism of mechanical finishing.
14. Understand the color difference in AATCC grey scale (1-5) between standard and batches
    (I) Manually with the comparison of grey scale, and
    (II) by computer color matching machine
    and interpretation of color spectograph.
15. Print Different Material with relevant methods and style.
16. To do finishing of all type of materials using different chemicals and methods.
17. Effect to Heat Setting on Synthetic Materials.
18. To conduct practicals as per latest technology/material.

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.
UNIT I
(a) Forest Resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.
(b) Water Resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dam-benefits and problems.
(c) Mineral Resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
(d) Food Resources: World Food Problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
(e) Energy Resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, case studies.
(f) Land Resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.
Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyle.

UNIT II
Ecosystem- Concept of an ecosystem, Structure and function of an ecosystem, Producers, consumers and decomposers, Energy flow in the ecosystem. Ecological succession, Food Chains, food webs and ecological pyramids. Introduction, types, characteristic features, structure and function of the following ecosystem.
 a. Forest Ecosystem
 b. Grassland Ecosystem
c. Desert Ecosystem
d. Aquatic Ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)
Field Work: Visit to a local area to document Environment assets-river/forest/grassland/ hill/ mountain. Visit to a local polluted site- Urban /Rural/Industrial/Agricultural. Study of common plants, insects and birds. Study of simple ecosystems-pond, river, hill, slopes etc. (Field work equal to 5 lecture hours).

UNIT III
Environmental Pollution: Definition, Cause, effects and control measures of- (a) Air Pollution (b) Water Pollution (c) Soil Pollution (d) Marine Pollution (e) Noise Pollution (f) Thermal Pollution (g) Nuclear Hazards
Solid waste management- cause, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution. Pollution case studies. Disaster management: floods, earthquake, cyclone and landslides

UNIT IV
Social Issues and the Environment, From unsustainable to sustainable development, Urban problems related to energy, Water conservation, rain water harvesting, watershed management.

Suggested Text Books & References:
UNIT-I
Combing
Objective, Different combing preparatory process for lap preparation – Sliver lap, Ribbon lap and Unilap machine, Different types of comber, Combing cycle of rectilinear cotton comber, Timing diagram for combing operation, Configuration of fibre feed and its effect on quality of product, noil percentage and fractionation efficiency of comber, Influence of type of feed on noil extraction and cleanliness of sliver, Calculation pertaining to draft, production and noil percentage.

UNIT-II
Speed frame
Objective, Working principle of speed frame, Construction and working of important parts, Mechanism of drafting, twisting and winding, Basic principle of designing of cone drum, Differential motions & Building motions, Common defects in roving packages, their causes and remedies, Processing of man-made fibres on speed frame , Recent development in speed frame. Calculations pertaining to draft, TPI and production, twist multiplier and roving twist.

UNIT-III
Ring frame
Objective, Principle and mechanism involved in drafting, twisting and winding, Ordinary and high draft systems, Rising and falling lappets, balloon control rings, Design and types of spindle, ring and traveler, Concept of twist multiplier and yarn contraction due to twisting, types of builds, Mechanism of package formation, Causes and remedies to control end breaks, Recent developments in ring frame, Concept of average mill count and 20’s conversion.

UNIT-IV
Doubling
Objective and terminology, Requirement of feed package for yarn plying, Systems of doubling (dry &wet) study of ring doublers, Two for one twister (TFO)- objective & working principle, Calculation of draft, TPI and production of ring frame & doubling frame.

Suggested Text Books and References:

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

Basic Concepts: General loom elements, classification of looms, primary motions of loom.

Tappet shedding: Negative tappet shedding, eccentric motion of shedding, designing of a shedding tappet, movements of healds, geometry of warp shed, calculation of the stroke of shedding tappet, Positive tappet shedding—link mechanism, Heald reversing motion, shedding motion principles—open shed, closed shed, semi open shed, Loom timing diagram, early shedding, late shedding, split shedding or stragerring of shed, Asymmetric shedding, lease rods, back rest, effect of shed timing and back rest settings on properties of fabrics.

Shuttle Picking: Function of picking, essential features of good picking, over picking, under picking—cone under picking mechanism, disadvantages of shuttle picking, Shuttle box and shuttle checking device. Velocity and acceleration of picking elements, energy consumed, power of picking

Factors affecting the initial speed of shuttle, nominal movement of shuttle, theory of picking, picking cams—linear cam, parabolic cam, Factors affecting retardation of shuttle, Weft tension during propulsion and retardation of shuttle.

Beating: Function of beating, kinematics of sley, sley eccentricity ratio, reed drive by matched cams, accelerating force on sley, mechanics of beat up, relation between cloth fell position & beat up force, relation between pick spacing & beat up force, relation between cloth fell position & pick spacing, bumping of loom, effect of yarn irregularity on pick spacing.

UNIT-II

Secondary and auxiliary motions of loom, Secondary motion, Take up motion—negative take up, positive take up, five wheel take up motion, seven wheel take up motion, electronic take up.

Let Off Motion: Objective, negative let off motion, positive let off motion—basic requirements, tension control mechanism, electrical let off motion, warp tension variation. Auxiliary motions of loom, Objective, classification

Weft Stop motion: objective, side weft fork motion, centre weft fork motion

Warp Stop motion: objective, mechanical warp stop motion, electrical warp stop motion,

Warp Protecting motion: objective, loose reed warp protecting motion, fast reed warp protecting motion, electromagnetic warp protecting motion.

UNIT III

Automatic looms—basic features, advantages over plain looms, classification of automatic looms, weft feeling mechanism, mechanical weft feeler, electronic weft feeler, optical weft feeler, pirn changing mechanism, shuttle changing mechanism, bobbin loader mechanism.

Weft mixing motion, Multiple box motion, 4X1 drop box motion, preparation of pattern cards, pick at will motion.

UNIT IV

Dobby Shedding: Main parts of dobbey loom, types of Dobby, negative dobbey, single, double lift single jack dobbey, double lift double jack dobbey, design & peg plan for dobbies, positive dobbey, electronic dobbey, types of shed formed in dobbey

Jacquard Shedding:
Principle parts of jacquard machine, types of jacquard, types of shed formed in jacquard, single lift single cylinder jacquard, double lift single cylinder jacquard, double lift double cylinder jacquard, harness building, harness ties, design ties, card cutting, card lacing.

Suggested Text Books & References
UNIT-1
 Transfer Printing: Types, mechanism of transfer printing and machineries.
 Pigment Printing: Mechanism and recipe details of pigment printing.

UNIT-2
 Finishing:
 Mechanical Finishes: Calendaring - its types, construction and function of various calendaring m/cs. Sanforizing - method, mechanism and machineries involved. Sueding /raising, Napping and Shearing finishes. Foam finishing technology.

UNIT-3

UNIT-4
 Identification of dye on dyed natural and manmade textiles.
 Ecofriendly processing and Effluent generated from textile processing and its treatment.
 Fastness properties: Light fastness, Rubbing fastness, Sublimation fastness, Perspiration fastness, Washing fastness properties evaluation.

Suggested Text Books and References
TEXTILE TESTING -I

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 wt, 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.

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:
2. Quality control and testing management by Dr. V.K. Kothari
4. “Handbook of Methods of Tests for Cotton Fibres, Yarns and Fabrics”, CTRL, Bombay
6. Savile, B.P., “Physical testing of textiles”
UNIT-I
Polymerization:
Introduction of polymerization, monomer, oligomer, comonomer, polymer, classification of polymers, homopolymers and copolymers, Thermo sets, Thermoplastic, Elastomers, Tg, Tm, Polymerization techniques- bulk polymerization, solution polymerization, suspension polymerization and emulsion polymerization, New polymerization techniques-Gas Phase polymerization, Polymerization mechanisms addition polymerization, condensation polymerization. Criteria for fibre forming polymers

UNIT-II
Polymerization of different fibers:
Polymerization of polyester by DMT and TPA route, Polymerization of Nylon-6 and Nylon-6,6
Polymerization of polyacrylonitrile by suspension and solution polymerization, polymerization of polypropylene by suspension and gas phase polymerization.

UNIT-III
Melt Spinning:
Melt Spinning Line and its equipment, cooling system, General principle of spinning, fluid flow through a capillary, die swell effect, melt extrusion, spinning conditions such as spinneret size, rate of extrusion, spinning stretch and its effect on filament structure and properties with reference to polyester, polyamide and polypropylene fibers

UNIT-IV
Solution Spinning:
Solution Spinning, Classification of solution spinning-dry spinning, wet spinning, dry jet wet spinning, wet and dry spinning of viscose and acrylic fiber, effect of spinning variables on structure and properties in gel and final fibers, high shrinkage acrylic fiber. Drawing and heat setting.

Suggested Text Books & References:
TT-212N
YARN MANUFACTURING-II LAB

L  T  P
-  -  3

Practical/viva: 60 Marks
Sessional: 40 Marks
Total: 100 Marks
Time: 3 Hrs

Combing

1. To study the different methods of lap formation in combing preparatory.
2. To study the combing cycle of a rectilinear cotton comber.

Speedframe

3. To study the drafting, twisting and winding zone of speed frame.
4. To study the building motion in speed frame.
5. To study the differential motion of speed frame and calculation of bobbin speed.
6. Calculation of break draft constant, draft constant and twist constant and production of speed frame.

Ringframe

7. To demonstrate the working principle of a ringframe.
8. To study the different components of drafting system and twisting system.
9. Calculation pertaining to gearing, speed, constant, draft and production.

Note: The above experiment should be conducted and shall be decided on factors like:
  a) Facilities installed at Institute
  b) Accessibility to industry & nearby institute like IIT Delhi, NITRA Gaziabad, Textile Committee and NITRA Panipat.
  c) Trend of technological developments in National & International perspective.
Basic Concept
1. To show actual working of all motions of simple loom & with multiple boxes.

Automatic Loom
2. To show and compare all mechanisms of automatic loom with plan loom.

Introduction to Dobby, Jacquard and Terry Weaving
3. To show all type of mechanisms (Mechanical/Electronic) used for producing fabrics with different structures & designs.

Principles of Weft Insertion
4. To show all latest weft insertion methods - difference, comparison, need.

Shuttleless Looms
5. To show actual working of all latest looms - Advantages, Comparison.

Special Weaves
6. To analyze all type of weaving fabrics with different weaves.

Weaving Calculations
7. To do all types of calculations needed for all type of weaving machines.

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.
1. Conduct practicals on Conventional and latest machines (Preparatory / dyeing / Finishing).
2. Conduct practicals on Recent developed methods of dyeing using different type of dyes
   (a) Natural
   (b) Synthetic
   (c) Blends
3. Dyeing of cotton yarn with vat, reactive and sulphur in a sample pot dyeing machine.
5. Calibration of dyeing and recipe prediction with the help of CCM.
6. Study of fastness to washing and rubbing with the help of CCM.
7. Reproduction of shade with the aid of computer as well as visual methods.
8. Printing with kerosene and synthetic based thickeners. Evaluate the printing with qualitative and quantitative methods on different materials.
9. Conduct practical with transfer printing technique on different materials.
10. Compare the solvent dyeing and solvent assisted dyeing on a chosen piece of material.

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.
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.
14. To determine the hairiness of the given 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.
UNIT-I
Introduction: Types of energy, Conversion of various forms of energy, Conventional and Nonconventional sources, Need for Non-Convention Energy based power generation.
Energy Audit & Tariffs: Need, Types, Methodology and Approach.

UNIT-II
Conventional Energy sources: Selection of site, working of Thermal, Hydro, Nuclear and Diesel power plants and their schematic diagrams & their comparative advantages- disadvantages.

UNIT-III
Non Conventional Energy sources: Basic principle, site selection and power plant layout of Solar energy, photovoltaic technologies, PV Systems and their components, power plant layout of Wind energy, layout of Bio energy plants, Geothermal energy plants and tidal energy plants.

UNIT-IV
Energy Scenario: Lay out of power system, Role of Energy in Economic development, energy demand, availability and consumption, Commercial and Non-commercial energy, Indian energy scenario, long term energy scenario, energy pricing, energy sector reforms in India, energy strategy for the future.
PAPER SETTER’S NOTE: 8 questions of 15 marks each distributed in four sections are to be set taking two from each unit. The candidate is required to attempt five questions in all, taking at least one from each of the four sections.

Suggested Text Books & References:
1. Energy Studies-Wiley and Dream tech India
3. NEDCAP: Non Conventional Energy Guide Lines
4. G.D. Roy: Non conventional energy sources