

# CURRICULUM AND SYLLABUS

## *Diploma in Handloom and Textile Technology*

(With effect from 2014-2015 Admitted Batch Onwards)

# STUDY SCHEME FOR DHTT (Effective from 2014 – 2015)

## FIRST YEAR DHTT

S. No.	Name of the Subject	No. of hrs per week	Marks		
			Internal	External	Total
	<b>Theory</b>				
1.1	English & Communication Skill	3	20	80	100
1.2	Applied Mathematics	3	20	80	100
1.3	Applied Physics	3	20	80	100
1.4	Applied Chemistry	3	20	80	100
1.5	Fiber & Yarn Technology	4	20	80	100
1.6	Weaving Technology & Textile Calculation - I	3	20	80	100
1.7	Fabric Structure - I	3	20	80	100
	<b>Practical</b>				
1.8	Applied Chemistry Practice	3	20	80	100
1.9	Weaving Technology Practice - I	6	20	80	100
1.10	Engineering Drawing Practice	3	20	80	100
	<b>Total:</b>	<b>34</b>	<b>200</b>	<b>800</b>	<b>1000</b>

## SEMESTER – III

S. No.	Name of the Subject	No. of hrs per week	Marks		
			Internal	External	Total
	<b>Theory</b>				
3.1	Weaving Technology & Textile Calculation - II	4	20	80	100
3.2	Fabric Structure - II	4	20	80	100
3.3	Chemical Processing of Textiles - I	4	20	80	100
3.4	Material Science & Engineering Mechanics	4	20	80	100
	<b>Practical</b>				
3.5	Chemical Processing Practice - I	6	20	80	100
3.6	Weaving Technology Practice - II	6	20	80	100
3.7	Computer Application Practice	3	20	80	100
3.8	Colour Concept and Textile Designing Practice - I	3	20	80	100
	<b>Total</b>	<b>34</b>	<b>160</b>	<b>640</b>	<b>800</b>

## SEMESTER – IV

S. No.	Name of the Subject	No. of hrs per week	Marks		
			Internal	External	Total
	<b>Theory</b>				
4.1	Weaving Technology & Textile Calculation - III	4	20	80	100
4.2	Fabric Structure - III	4	20	80	100
4.3	Chemical Processing of Textiles - II	4	20	80	100
4.4	Ecology & Pollution control in Textile Industry	4	20	80	100
4.5	Professional Ethics & Personality Development	3	20	80	100
	<b>Practical</b>				
4.6	Chemical Processing Practice - II	6	20	80	100
4.7	Weaving Technology Practice - III	6	20	80	100
4.8	Colour Concept and Textile Designing Practice - II	3	20	80	100

	<b>TOTAL</b>	<b>34</b>	<b>160</b>	<b>640</b>	<b>800</b>
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### SEMESTER – V

S. No.	Name of the Subject	No. of hrs per week	Marks		
			Internal	External	Total
	<b>Theory</b>				
5.1	Weaving Technology & Textile Calculation - IV	4	20	80	100
5.2	Fabric Structure - IV	4	20	80	100
5.3	Chemical Processing of Textiles - III	4	20	80	100
5.4	Principles of Textile Testing - I	3	20	80	100
5.5	Principles of Management and Entrepreneurship	4	20	80	100
	<b>Practical</b>				
5.6	Chemical Processing Practice – III & CCM	6	20	80	100
5.7	Weaving Technology Practice – IV & CATD	6	20	80	100
5.8	Textile Testing Practice - I	3	20	80	100
	<b>Total</b>	<b>34</b>	<b>160</b>	<b>640</b>	<b>800</b>

### SEMESTER –VI

S. No.	Name of the Subject	No. of hrs per week	Marks		
			Internal	External	Total
	<b>Theory</b>				
6.1	Weaving Technology & Textile Calculation - V	4	20	80	100
6.2	Fabric Structure - V	4	20	80	100
6.3	Chemical Processing of Textiles - IV	4	20	80	100
6.4	Principles of Textile Testing - II	4	20	80	100
	<b>Practical</b>				
6.5	Chemical Processing Practice – IV & CCM	6	20	80	100
6.6	Weaving Technology Practice – V & CATD	6	20	80	100
6.7	Textile Testing Practice - II	3	20	80	100
6.8	Project Work	3	20	80	100
	<b>Total</b>	<b>34</b>	<b>160</b>	<b>640</b>	<b>800</b>

S.No.	CLASS	Total Marks
1.	First Year	1000
2.	Second Year (IIIrd + IVth Sem.)	1600
3.	Third Year (Vth + VIth Sem.)	1600
	<b>Grand Total:</b>	<b>4200</b>

## 1.1 English & Communication Skill Syllabus

### Unit I

- Grammar: Parts of Speech.  
Composition: 1. Letter Writing – Personal & Official Letters.  
2. Comprehension.

### Unit II

- Grammar: Nouns, Pronoun, Adjective.  
Composition: 1. Letter Writing – Business Letters.  
2. Comprehension.

### Unit III

- Grammar: Verb, Adverb.  
Composition: 1. Hints development – Paragraph writing.  
2. Comprehension.

#### Fundamentals of Communications:

Definition of communication, importance of communication, models of communication, types of communication, barriers in communication, essential elements of communication.

### Unit IV

- Grammar: Preposition, Conjunction.  
Composition: 1. Dialogue Completion.  
2. Answer 'what' & 'when' questions.

#### Spoken Communication:

Importance of spoken communication, designing receiver oriented message, face to face communication, telephonic interviews, instructions and dictations.

### Unit V

- Grammar: Simple, compound, Complex sentences.  
Composition: 1. Dialogue writing.  
2. Answer 'why' & 'how' questions.

#### Functional Grammar:

Articles, prepositions, tenses, punctuations, common errors, reading and listening comprehension.

## **1.2 APPLIED MATHEMATICS**

### **Schema:**

1. The subject is divided into five units.
  2. Each unit is given a weightage of 16 marks
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### **UNIT – I:**

1. Matrices and determinations.
2. Determination up to 3<sup>rd</sup> order.
3. Properties of Determinants.
4. Solutions of simultaneous equations using Cramer's rule.
5. Properties of Matrices.

### **UNIT – II:**

1. Trigonometry – Introduction.
2. Trigonometry ratios – Multiple angles.
3. Trigonometry identities – Simple problem only.
4. Properties of triangles – Sine formulae – Cosine formulae and Projection formulae – problems.

### **UNIT – III:**

1. Differential Calculus. \
2. Differentiations – Concept – Differentiation of standard function.
3. Differentiations of Sum, Product & Division.

### **UNIT – IV:**

1. Integral Calculus – Introduction.
2. Integration – Basic Definition.
3. Definite Integrals and properties.
4. Integration by substitution.
5. Integration by parts.
6. Simple Problems.

### **UNIT – V:**

1. Linear equation involving two variables only.
2. Solution of simultaneous linear equations involving two variables.
3. Co- linear points.
4. Statistics – Introduction.
5. Frequency distributions Mean, Median, Mode, Standard Deviation and C.V.%.

### **Reference Books:**

1. Engineering mathematics by Y M Gaura
2. Engineering mathematics by D N Vyas

## 1.3. APPLIED PHYSICS

### Schema:

1. The subject is divided into five units.
  2. Each unit is given a weightage of 16 marks
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### UNIT – I:

#### **UNITS AND DIMENSIONS**

1. M.K.S. system and C.G.S. system.
2. Fundamental quantities and units (S.I. system)
3. Derived quantities and units (S.I. system)
4. Supplementary SI units.
5. Dimension and Dimensional formula.
6. Application of Dimensional equations with examples, limitations.

### UNIT – II:

#### **HEAT**

1. Expansion of Solids, Liquids and gases.
2. Definition of Co-efficient of linear, superficial and cubical expansion and derivation of their relationship.
3. Volume and pressure coefficients of Expansions of gases.
4. Boyle's law, Charle's law and derivation of ideal gas equations.

### UNIT – III:

#### **LIGHT AND SOUND**

1. Optical instruments – Simple Microscopy.
2. Derivation of expressions for magnification of image at near point and far point.
3. Refractive index, Critical angle and total internal reflection, Conditions for TIR.
4. Derivation for the refractive index of prism.
5. Definition for oscillation, period, frequency, amplitude, velocity and wave length
6. Definition of Transverse wave and longitudinal wave, progressive wave and stationary wave.
7. Free, damped and forced vibrations.

### UNIT- IV:

#### **ELECTRICITY**

1. Definitions of Ohm's law-Resistance, conductance & inductance.
2. Resistance in series and parallel – EMF-potential difference coulomb's law for Electricity charges.
3. Electric potential capacity capacitor in series and parallel.
4. Kirchhoff's laws.
5. Explanation and application of Kirchhoff's laws to Whetstone's Bridge.

### UNIT – V:

#### **ELECTRONICS**

1. Conductors, Insulators and Semi Conductors.
2. Intrinsic and Extrinsic Semi Conductors – P type and N type.
3. P – N Junction diode – forward bias and Reverse bias diode as a half wave rectifier and full wave rectifier.
4. PNP and NPN transistor and their characteristic.
5. Logic gates – OR, and NOT only.

### **Reference Books:**

1. Engineering Physics by R K Gaura
2. Principles of physics by N Subramaniam & Brijlal

## 1.4 APPLIED CHEMISTRY

### Schema:

1. The subject is divided into five units.
  2. Each unit is given a weightage of 16 marks
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### UNIT – I:

1. Occurrence and classification of water and expressions of water hardness.
2. Disadvantages of hard water (with special focus of its use in textiles).
3. Softening of hard water by Clark's, Permutit and Calgon methods.
4. Oxidation and reduction – definition and examples.
5. Oxidizing and reducing agent and their functions.
6. Expressions of Acidity and Alkalinity – pH and pH scale.

### UNIT – II:

1. Properties and uses of Sodium Hydroxide, Sodium Hydrosulphite Sodium carbonate, Hydrochloric Acid, Sulphuric Acid and Rongolite C (Sodium Sulphoxylate Formaldehyde).
2. Properties and uses of Sodium sulphate (Glauber's salt).

### UNIT – III:

1. Study of the large scale manufacturing process, properties and uses of Hydrogen peroxide, Bleach power, Sodium Hypo Chlorite and Sodium Chlorite.
2. Brief introduction of Equivalent Weight, Atomic Weight and Molecular weight.
3. Introductory notes on Solute, Solvent, Solutions and Solubility.

### UNIT – IV:

1. Classification and IUPAC Nomenclature of Organic Compounds.
2. Properties and uses of Benzene, Aniline, Naphthalene and Anthracene.
3. Conversion, General reaction and two examples in each of addition, substitution, esterification, hydrolysis and diazotization.

### UNIT – V:

1. Definition and uses of soap and detergents.
2. Carbohydrates – definition, classification.
3. Polymers and their classification.
4. Brief study of Polymerization Reaction (emphasis on Addition and Condensation Polymerization)
5. Chemical Structure and properties of Textile fibers viz. Cotton, wool, silk, polyester, nylon and acrylic.

### **Reference Books:**

1. Organic Chemistry Vol I & II by I L Finar
2. ISC Chemistry Class XI and XII by Madan & Bist
3. Text book of Organic Chemistry by P L Soni
4. Text book of Organic Chemistry by B S Bahal & A Bahal
5. IIT Chemistry Vol I by O P Agarwal & Avinash Agarwal
6. Concise of Inorganic Chemistry by L D Lee
7. A Text book of Organic Chemistry by P L Soni & H M Chawla

## **1.5 FIBER AND YARN TECHNOLOGY**

### **Schema:**

1. The subject is divided into five units.
  2. Each unit is given a weightage of 16 marks
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### **UNIT – I:**

1. Definition of Textiles Fiber.
2. Classification of Textile fibers.
3. Requirement of basic properties and textiles fibers.
4. Physical, Chemical properties and end uses of cotton, wool, silk, and jute.
5. Ring spinning Technology for manufacture of Carded and Combed Cotton yarn.
6. Brief study of methodology in Blowroom, Carding, Drawframe, Unilap, Comber, Fly frame and Ring frame.

### **UNIT – II:**

1. Flow Charts for Manufacturing of Viscose rayon, Acetate rayon and Polyester.
2. Physical, Chemical properties and end uses of Viscose rayon and Acetate rayon.
3. Flow Charts for Manufacturing of Nylon-6, Nylon-66, Poly-Acrylic and Polyester.
4. Physical, Chemical properties and end uses of Nylon-6, Nylon-66 and Poly-Acrylic.

### **UNIT – III:**

1. Woolen and worsted yarn manufacturing Technology.
2. Silk rearing, Manufacturing of filament silk and spun silk yarns.
3. Production of Double/Twisted yarn.
4. Reeling, bundling and baling of yarn.

### **UNIT – IV:**

1. Open end spinning.
2. Friction spinning.
3. Air Jet spinning.
4. Comparison of ring spun yarn with open- end spun yarn.

### **UNIT- V:**

1. Preparation, Production and uses of Crepe yarn, Spot yarn, Crimped yarn, textured yarn, Chenille yarn, industrial yarns, Tyre cords and sewing threads.
2. Production of Blended Yarn (Polyester : Cotton, Polyester : Viscose and Polyester: Wool Blends)
3. Introduction of various techniques of fabrics production such as knitting, non-woven and carpets.
4. Process of Garment making – pattern making, cutting, stitching & finishing of garments.

### **Reference Books:**

1. Textile Fibres by J W Cook
2. Fibre to fabric by Corman
3. Manmade Fibres by Moncrieff



## 1.6 WEAVING TECHNOLOGY & TEXTILE CALCULATION – I

### Schema:

1. The subject is divided into five units.
  2. Each unit is given a weightage of 16 marks
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### UNIT –I:

1. Different forms of yarn packages like hanks, cones, cheeses, and spools – purpose and use.
2. Essential characteristic of warp and weft.
3. Yarn Preparatory processes.
4. Warping and its requirements.
5. Peg warping, vertical warping and sectional warping.
6. Objective and importance of sizing of cotton yarn.
7. Ingredients uses in size mixture and their functions.
8. Various forms of sizing- hank sizing and street warp sizing.
9. Illustrative Size Recipe for cotton, Viscose and Polyester- cotton blends.
10. Ideal sizing.
11. Common defects during sizing- causes and remedies.

### UNIT –II:

1. Evolution of Handlooms.
2. Various parts of a handloom and their function.
3. Type of handloom – Throw Shuttle handloom, Fly shuttle handloom – Pit loom & Frame loom.
4. Passage of warp in a fly shuttle handloom.
5. Motion of handloom – Definition of primary, Secondary & Auxiliary Motions.
6. Different type of shed formations – Centre Close shed, Bottom Closed shed, Top close shed, Open- shed and Semi – open shed.
7. Shedding mechanism of a handloom using treadles and Heald Reversing motions- Roller system, Pulley system and jack and lam-rod system.

### UNIT – III:

1. Picking mechanism of a handloom.
2. Type of shuttles – Throw shuttle, Fly shuttle and Roller Shuttle- Design and Suitability.
3. Beating up – Closed and beating and crossed shed beating.
4. Different type of read – bamboo reed, pith bound steel reed and all metal steel reed- suitability for various fabrics.
5. Let of Motion Handlooms- Ratchet and Pawl, rope and weight, rope and lever and weight.
6. Take up motion in handlooms – Poker rod and ratchet & pawl.
7. Auxiliary Motions of a handloom – Temple motion and terry motion.

### UNIT – IV:

1. Introduction to numbering yarn.
2. Indirect system of numbering of yarn – New English Cotton, New French, Decimal, Metric, Worsted, Woolen Yorkshire, Linen, Spun silk and Spun Rayon.
3. Direct System of numbering of yarn – Denier and Flax/ Jute/ Hemp.
4. Evolution of Universal system of numbering – Tex and it's derivatives like milli – tex and kilo.

### UNIT – V:

1. Determination of Conversion Factor.
2. Conversion of Count of yarn – Indirect to indirect.
3. Conversion of Count of yarn – Direct to Direct.
4. Conversion of Count of yarn – Direct to Indirect.
5. Conversion of Count of yarn – Indirect to Direct.

## 1.7 FABRIC STRUCTURE – I

### **Schema:**

1. The subject is divided into five units.
  2. Each unit is given a weight – age of 16 marks.
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### **UNIT – I:**

1. Classification of fabrics – Woven, Non-woven, Knitted and Braided fabrics – simple, Compound and complex.
2. Interlacement diagram – Warp way and weft way.
3. Graphical representation of structure of a woven fabric.
4. Study of plain weave.
5. Weave, Creation of draft, peg plan and tie-up from the weave repeat.
6. Ornamentation of plain fabrics. Study of derivative structures of plain – Regular and irregular Warp rib, Regular and irregular Weft rib and Regular and irregular Hopsack weaves.
7. Catch-cord technique for weaving warp rib and hop-sack.

### **UNIT – II:**

1. Study of twill weave up to 12 threads.
2. Classification of twills – warp faced twill, weft faced twill and equal faced twill.
3. Angle of inclination of twill diagonals, Influence of the twist direction of yarn over prominence of twill diagonals.
4. Study of derivatives of twill weave – Wavy twill, Herringbone, Transposed twill.
5. Broken twill and curved twill, Elongated combined twill and shaded twill.
6. Difference between various Twills.

### **UNIT – III:**

1. Diamond Weave.
2. Twill dice check.
3. Diaper.
4. Regular and irregular satin upto 12 threads.
5. Regular and irregular sateen upto 12 threads.
6. Satin dice check.
7. Different between Diamond and Diaper, Sateen and satin.

### **UNIT – IV:**

1. Study of Honey comb weaves – Ordinary Honey comb weaves – Single stitched, Double stitched.
2. Brighton Honey comb – cell formation – suitability for toweling purpose.
3. Study of Huck-a-Back weaves.
4. Study of Mock leno weaves.
5. Differences between Ordinary Honey comb and Brighton Honey comb
6. Differences between Huck-a-Back and Mock Leno.

### **UNIT – V:**

1. Study of Corkscrew weaves.
2. Simple Colour and weave effect; continuous line effects, hound's tooth patterns, bird's eye and spot effect, hairline stripes, step patterns, and all over effects.
3. Study of Crepe weaves – Construction upon sateen base, by combination of floating weaves with plain thread, by reversing and by insertion of one weave over another.

### **Reference books:**

1. Watson's Textile Design and colour by Z.J. Grosociki.
2. Watson's Advanced Textile Design and Colour by Z.J. Grosociki.
3. Structural Fabric Design by James W. Kilbbe,
4. Fabric Structure by James Golak.
5. Woven cloth construction by R. Mark.
6. Grammar of Textile Design by H. Nisbet.
7. Woven structure and Design by DoriGeomar.

## **1.8 CHEMISTRY PRACTICE**

### **Schema:**

1. The activities to be carried out are given in the syllabus
2. Every student shall be trained in all the listed activities

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1. Demonstration of the use of various apparatus of Chemistry lab.
  2. Demonstration of safe handling of Chemicals.
  3. Demonstration of weighing technique.
  4. Demonstration of measurement of pH by Universal Indicator.
  5. Demonstration technique of volumetric analysis.
  6. Preparation of standard solution required for volumetric analysis.
  7. Acid – Alkali titrations.
  8. Estimation the strength of Oxalic acid in terms of normality and g/l by using ferrous sulphate and potassium permanganate solution.
  9. Estimation the strength of ferrous Ammonium Sulphate in terms of normality and g/l using Potassium Permanganate solution.
  10. Estimation of the strength Bleaching Powder.
  11. Estimation of the strength Hydrogen Per Oxide.
  12. Estimation of Hardness of water by EDTA method.
  13. Preliminary testing to detected Acid and basic radicals.
  14. Detecting Acidic Radicals from given salt (Except Interfering Radicals)
  15. Detecting the Basic form the given salt.
  16. Analysis of the given salt for ACIDIC / BASIC Radicals.

## **1.9 WEAVING TECHNOLOGY PRACTICE – I**

### **Schema:**

1. The activities to be carried out are given in the syllabus
  2. Every student shall be trained in all the listed activities
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### **UNIT – I**

#### **PREPARATORY PROCESSES**

1. Sketching of different parts of preparatory equipments and familiarization of their functions.
2. Sketching of different kinds of handlooms and their parts, familiarization of their functions.
3. Sketching and Practice of various Knots and piecing. Bobbin winding for warp preparation. Pirn winding for weft preparation.
4. Mono colour Warping using peg warping board, vertical and horizontal warping machines.
5. Multi colour warping as per the given pattern using peg, warping board vertical and horizontal warping machines.

### **UNIT – II**

#### **FABRIC DEVELOPMENT**

1. Straight draft – Drawing –in and denting for plain weaving.
2. Practicing tie-up in the loom to weave plain in two treadles.
3. Setting- up of shedding mechanism for smooth weaving in the allotted loom.
4. Fabric sample development within plain weave in different textures and different materials using sample / handloom.
5. Preparation of Design, draft, denting plan and tie-up plan of all the weaves dealt in Fabric Structure – I.
6. Practicing to do drafting, tie-up in the loom as per the drafting order derived for the above weaves.
7. Practicing to do pegging / tie-up in the loom as per peg-plan / tie-up plan derived for the above weaves.
8. Finding drafting order in the loom (upto 4 healds) and creating possible weaves to produce in that draft order.
9. Setting-up of shedding mechanism for smooth weaving in the allotted loom.
10. Mending the broken ends by drawing the ends by following the continuity of drafting in the loom allotted.
11. Developing samples without any defects as per the peg-plan / treading order derived for the above weaves.
12. Preparing the album samples developed and writing their quality particulars.

### **UNIT –III:**

#### **FABRIC ANALYSIS**

1. General principles of cloth analysis.
2. Extracting warp and weft pattern
3. Analysis of fabrics like plain, twill and satin
4. Extracting fundamental details like count of warp and weft, ends and picks per unit space; warp and weft crimp and weave repeat.
5. Deriving drafting, denting, peg-plan / tie-up for the weave.

## **1.10 ENGINEERING DRAWING PRACTICE**

### **Schema:**

1. The activities to be carried out are given in the syllabus
  2. Every student shall be trained in all the listed activities
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1. Introduction, use and Practice of Engineering drawing instruments and different grades of pencil.
2. Use of I.S. Code and sheet layout of Engineering drawing.
3. Practice of Engineering lettering and numbering.
4. Use and meaning of different lines.
5. Practice and use of dimensioning.
6. Use and construction of Scales like Plain scale, Diagonal scale, Comparative scale, Reducing and increasing scale, physical signification of representative fraction.
7. Basic idea of Theory of projection.
8. Projection plane.
9. Use and practice of First angle projection.
10. Use and practice of Third angle projection.
11. Practice of Projection of point.
12. Practice of Projection of Straight line.
13. Practice of Projection of square plane.
14. Practice of Geometrical Construction (supported drawings)
15. Practice of Geometrical Construction of polygons.
16. Practice of construction of drawing of Cube, Prism, Pyramid, Cone and Cylinder in first position.
17. Practice of construction of drawing of Prism and Pyramid in first position with said inclines to V.
18. Practice of drawing of Prism and cylinder in second position.
19. Idea and practice of Isometric projection of solids – Terminology, Isometric view and Isometric projection.

### **Reference Book:**

1. Engineering Drawing by N D Bhatt

## SEMESTER – III

### 3.1 WEAVING TECHNOLOGY & TEXTILE CALCULATION – III

**Schema:**

1. The subject is divided into five units.
2. Each unit is given a weightage of 16 marks.

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**UNIT – I:**

1. Handloom dobbies – lattice doobby, barrel doobby and bottom closed shed doobby – Mechanism, Working principles and suitability.
2. Design and essential features of a pit loom – Structural Loom, Lay-out and relationship between the loom design and the product manufactured.
3. Design and essential features of a frame loom – Structural Loom, Lay-out and relationship between the loom design and the product manufactured.
4. Lay- out and design of an Industrial Handloom weaving unit.

**UNIT – II:**

1. Modern Cone Winding machine – Mechanism and working principle.
2. Modern High Speed Beam warping Machine – Mechanism and working Principles.
3. Types of Creels.
4. Modern High Speed multi- cylinder sizing machine- mechanism and working principles.
5. Modern High Speed Automatic Pirm Winding Machine – Mechanism and Working Principles.
6. Introduction to Power – loom-Primary, Secondary and Auxiliary motions of power-loom.
7. Tappet Shedding and Reversing motions-Plain, Twill and Satin.
8. Early Shedding, late Shedding.

**UNIT – III:**

1. Designing of Tappets – Plain, Twill and satin upto 5 shafts.
2. Picking Mechanism – Scope of Over- pick and Under- Pick Mechanism.
3. Cone Over- picks mechanism- Mechanism and working principles.
4. Parallel motion Under- Pick mechanism- Mechanism and working principle.
5. Early picking and Late picking,-.
6. Beating- up Mechanism- Eccentricity of sley.
7. Timing and Synchronisation of primary motions.
8. Seven wheel take- up motion.
9. Negative Let-off motion.

**UNIT IV:**

1. Expression of Count of folder yarns.
2. Contraction during twisting- Expression of Contraction as a percentage to original length.
3. Determination of Equivalent/Resultant Count of folder yarns.
4. Amount of component threads in folded yarn and costing.
5. Average Count of warp – combination of different counts, material and system of counting.
6. Reed Count- Dents per linear space and groups of dents per linear space models.
7. Dents per linear space- Stockport.
8. Relation between Reed count, Number of ends per dent, Cloth width, Reed width and ends per inch.

**UNIT- V:**

1. Driving of loom- Single motor and Counter- Shaft arrangements.
2. Gear Calculations – Spur Gear (simple and Compound arrangements), Driver and Driven Wheels, Direction of rotation – Worm and worm wheel.
3. Pulleys and belts- Flat belt and v belt – Slippage and Efficiency – Simple and Compound Arrangements.

**Reference Book:**

1. Modern preparation and weaving by A ormerod
2. Fabric forming by B Haskukhrai
3. Woven fabric production-1 by NCUTE
4. Weaving Calculation by Sengupta
5. Textile Mathematics Vol. 1, 2 and 3 by Booth
6. Warpping Calculation by WIRA

## **3.2 FABRIC STRUCTURE – II**

### **Schema:**

1. The subject is divided into five units.
  2. Each unit is given a weight – age of 16 marks.
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### **UNIT – I:**

1. Combination of weaves — Twill and plain, mock leno and plain, Honey comb and plain, tripe and check effect by these combinations — Care about beaming — Design, draft, denting, peg plan
2. Distorted thread effects — Salient feature - warp distortion and weft distortion — Design, draft, denting, peg plan

### **UNIT – II:**

1. Bedford cord weaves — Salient features - plain faced bed ford cord, (Regular and alternate pick principle) — Design, draft, denting, peg plan and thread interlacing diagram.
2. Twill faced bed ford cord, wadded bed ford cord, and Crepon Bedford cords — Design, draft, denting, peg plan.

### **UNIT – III:**

1. Welt structures — Salient features and manufacturing techniques - Ordinary welts, Wadded welts - Loose back welt and fast back welt - Design, draft, denting, peg plan and thread interlacing diagram.
2. Pique structure - Salient features and manufacturing techniques - Ordinary Pique, Wadded Pique - Loose back Pique and fast back Pique - Design, draft, denting, peg plan
3. Differences between Bedford cord and welt
4. Difference between welt and piques

### **UNIT – IV:**

1. Double cloth-classification on the basis of techniques of achieving unison.
2. Double width plain cloth, Plain Tubular cloth Double Ply cloth - Interlacement diagram and its graphical representation
3. Self stitched double cloth - two methods of stitching - selection of appropriate binding points. Design, draft, peg plan and interlacing Diagram
4. Self itched double cloth using twill, satin, and sateen — Design, draft, peg plan;
5. Center stitched double cloth - Two methods of stitching ( using additional series of warp or weft) using twill, satin, and sateen — Design, draft, peg plan,

### **UNIT – V:**

1. Thread interchanging double cloth - warp thread interchanging double cloth and weft thread interchanging double cloth - using twill, satin, and sateen — Design, draft, peg plan,
2. Cloth interchanging double cloth — Design, draft, peg plan, thread interlacement diagram and beaming using plain and twill - Creation of column stripes, row stripes and check effects using warp and weft patterning
3. Wadded Double Cloth - Warp wadding and weft wadding - Design, draft, peg plan, thread interlacement diagram and beaming using plain and twill.

### **Reference books:**

1. Watson's Textile Design and colour by Z.J. Grosociki.
2. Watson's Advanced Textile Design and Colour by Z,J. Grosociki.
3. Structural Fabric Design by James W. Kilbbe,
4. Fabric Structure by James Golak.
5. Woven cloth construction by R. Mark.
6. Grammar of Textile Design by H. Nisbet.
7. Woven structure and Design by DoriGeomar

### **3.3 CHEMICAL PROCESSING OF TEXTILES – I**

#### **Schema:**

1. The subject is divided into five units.
  2. Each unit is given a weight – age of 16 marks.
- 

#### **UNIT- I:**

1. Morphological and Chemical aspects cotton, Composition of Raw Cotton.
2. Dry preparatory process viz. Mending, Stitching, Shearing & Cropping, Spotting and singeing.
3. Need for preparation of Grey Goods for dyeing and printing.
4. Designing, Scouring and Bleaching of Cotton with Hypo Chlorites, Hydrogen, peroxide and Sodium Chlorite Covering process conditions.

#### **UNIT- II:**

1. Description & working of Singeing M/c, Kier, and J-Box.
2. Preparatory Process Sequence for different Cotton materials (for White, to be Dyed in pale & medium shades and/or to be printed goods.)
3. Definition of Dyes, Pigment, Auxochrome and Chromophore.
4. Basic concept involved in dyeing such as solubility and affinity. Concept of Banneddyes.

#### **UNIT- III:**

1. Basic parameters of dyeing viz. percentage of shade, percentage of exhaustion, percentage expression and effect of M:L ratio.
2. Methods of dyeing cotton with Direct, Azoic and Sulphur dyes, Process conditions (Effect of electrolyte, Time, Temperature and pH etc.) and functions of chemical used.
3. After treatment of cotton dyed with direct dyes with the cationic dye fixing agent for improvement Fastness Properties.

#### **UNIT- IV:**

1. Classification of Vat dyes.
2. Chemistry and Methods of their application on Cotton.
3. Process of Dying of cotton with Solubilised Vat dyes.

#### **UNIT- V:**

1. Brief concept of Reactive dyes.
2. Method of cotton dyeing with Hot Cold Brands Reactive Dyes.
3. Introduction to Bi- Functional Reactive dyes.
4. Process conditions and Process control parameter application to above dyeing.

#### **Reference Books:**

1. Technology of Textile processing Vol. II, III & VI by Dr. V A Shenai
2. Scouring and Bleaching by E R Trotman
3. Dyeing and Chemical Technology of Textile Fibres by E R Trotman
4. Chemical Processing of Textiles –by NCUTE



### **3.4 MATERIAL SCIENCE AND ENGINEERING MECHANICS**

#### **Schema:**

1. The activities to be carried out are given in the syllabus
  2. Every student shall be trained in all the listed activities
- 

#### **UNIT- I:**

1. Introduction to Engineering materials.
2. Ferrous metals properties and uses of grey cast iron, low, medium, high, carbon steel, stainless steel, nickel steel, tungsten steel and non ferrous metals.
3. Timber – defects of timber, uses of timber, seasoning of timber.
4. Plastic- properties and uses of thermo plastic and thermosetting plastic.
5. Paint and varnishes – constituents of paint and varnishes, characteristics of paint and varnishes, uses of paint and varnishes.
6. Lubrication of oil – properties and uses of lubrication oil.

#### **UNIT- II:**

1. Force, effect of force, characteristics of force and its graphical representation.
2. Co- planar concurrent forces- resultant and equilibrant, resolution of force.
3. Parallelogram law of forces, triangle law of forces and polygon law of forces.
4. Lame’s theorem, condition of equilibrium and states of equilibrium.
5. Introduction to Dynamics – speed, velocity and acceleration.
6. Equation of liner motion.
7. Motion under gravity and acceleration due to gravity.
8. Newton’s three law of motion.

#### **UNIT- III:**

1. Introduction to strength of materials.
2. Property of elastics, plastics and Fiber Forming Polymers.
3. Simple stress and strain – Elastic limit, Hook’s law and Young’s modulus.
4. Stress strain diagram for ductile material.
5. Introduction to Work, Power and Energy.
6. Definition of work, power and energy.
7. Unit of work, power and energy.
8. Horse power, break horse and frictional loss.
9. Law of conservation of energy of freely falling body.

#### **UNIT- IV:**

1. Metal joining processes- Soldering, brazing, gas welding and electric arc welding.
2. Metal removal processes- engine lathe, drilling machine, shaping machine planning and milling machine.
3. Metal casting processes- two box sand moulding and casting.
4. Metal forming processes – hand smithy, powder forging and rolling.
5. Carpentry processes – Planning, sawing and types of joinery.

#### **UNIT- V:**

1. Introduction to friction and transmission.
2. Types of belt drive – open and cross belt drive.
3. Introduction to lifting machine.
4. Definition of machine, mechanical advantage, velocity ratio and efficiency.
5. Study of simple machine like wheel and axle, levers, Screw jack and winches.
6. Single fixed pulley, single moving pulley and pulley blocks.

#### **Reference Books:**

1. A textbook of Engineering Mechanics by K S Kulkarni
2. Workshop Technology by Hazara and Chaudhury
3. Workshop Technology by Raghuvanshi

### **3.5 CHEMICAL PROCESSING PRACTICE- I**

**Schema:**

3. The activities to be carried out are given in the syllabus
  4. Every student shall be trained in all the listed activities
- 

1. Demonstration on Identification of fiber by using Burning and Microscopic test and its conformation with solubility test.
2. Demonstration on Analysis of given blended sample for its blend percentage (P/V and P/C).
3. Desizing of the given cotton fabric by using Enzyme Desizing method.
4. Scouring of given cotton fabric / yarn and calculate the percentage weight loss.
5. Bleaching of the given cotton fabric by using Bleaching Powder.
6. Bleaching of the given cotton fabric by Hydrogen Per Oxide.
7. Bleaching of the given cotton fabric by Sodium Chlorite.
8. Practice on numerical problems on basic concept of dyeing.
9. Dyeing of the given sample of cotton with Direct dyes.
10. After treatment of direct dyed cotton sample with cationic dye fixing agent to improve its washing fastness.
11. Dyeing of the given sample of cotton with Azoic dyes.
12. Dyeing of the given sample of cotton with Sulphur dyes.
13. Dyeing of the given sample of cotton with cold brand Reactive dyes.
14. Dyeing of the given sample of cotton with hot brand Reactive dyes.
15. Dyeing of the given sample of cotton with Vat dyes.
16. Dyeing of the given sample of cotton with Solubilised Vat dyes.

## **3.6 WEAVING TECHNOLOGY PRACTICE – II**

### **Schema:**

1. The activities to be carried out are given in the syllabus
  2. Every student shall be trained in all the listed activities
- 

### **UNIT – I:**

#### **POWERLOOM MECHANISM**

1. Sketching of different parts of primary motions of power-loom and familiarization of their functions.
2. Dismantling, erecting and time setting of shedding mechanism and beat up mechanism.
3. Dismantling, erecting and time setting of over pick and under pick mechanisms..
4. Sketching of different parts of secondary motions of power-loom and familiarization of their functions.
5. Dismantling, erecting and time setting of Seven wheel take-up and let-off mechanisms.
6. Sketching of different parts of Warp protecting, Weft detecting and Drop box motion of power-loom and familiarization of their functions.
7. Sketching of different parts of Warp stop, Weft replenishing and positive let-off motions of Automatic power-loom and familiarization of their functions.
8. Creation of designs suitable for saree borders and dhoti borders using Dibbies up to 40 levers.
9. Pegging of lattices as per the mounting of dobbies on power-loom.

### **UNIT – II:**

#### **FABRIC DEVELOPMENT**

1. Preparing of Design draft, denting plan and tie-up plan of all the weaves dealt in Fabric Structure – II, Fabric Structure – III.
2. Practicing to do drafting in the loom as per the drafting order derived for the above weaves.
3. Practicing to do pegging / tie- up in the loom as per the peg-plan / tie-up plan derived for the above weaves.
4. Finding drafting order in the given loom (up to 8 healds) and creating possible weaves to produce in that draft order.
5. Developing sample without any defects as per the peg-plan / treading order derived for the above weaves.
6. Preparing the album of sample developed and writing their quality particulars.

### **UNIT – III:**

#### **FABRIC ANALYSIS**

1. General principles of cloth analysis.
2. Extracting warp and weft pattern.
3. Analysis of derivatives of plain, twill and satin fabrics.
4. Extracting fundamental details like count of warp and weft, ends and picks per unit space; warp and weft crimp and weave repeat.
5. Deriving drafting, denting, peg-plan/ tie-up for the weave.

### **3.7 COMPUTER APPLICATION PRACTICE**

**Schema:**

1. The activities to be carried out are given in the syllabus
  2. Every student shall be trained in all the listed activities
- 

1. Introductory notes on Evolution of Computer, Parts of Computer, Fundamental of computers, Hardware viz. Input processing and output devices, Composition of standard Key Boards.
2. Introductory notes on Application Software viz. MS office (Word, Excel, Access and Power point.)
3. Demonstration on Putting on and off the Computer.
4. Demonstration on Accessories viz. Notepad, Wordpad, paint.
5. Demonstration on command and shortcuts used in MS Word.
6. Practice on Using command and shortcuts used in MS Word.
7. Practice on Using Accessories.
8. Demonstration on command and shortcuts used in MS Excel.
9. Practice on Using command and shortcuts used in MS Excel
10. Demonstration on functions used in MS Excel.
11. Practice on using functions used in Ms Excel.
12. Demonstration on commands and shortcuts used in MS Power point.
13. Practice on Using command and shortcuts used in MS Power point.
14. Practice on preparation of presentation using Power point.
15. Demonstration in commands and shortcuts used in MS Access.
16. Practice on Using command and shortcuts used in MS Access.
17. Practice on Mail Merge.
18. Practice on Application of Data Base.
19. Introductory notes on Internet, Surfing, Downloading, E-mail, ID creation, Attachments.
20. Minor Project work e.g. Preparation of Presentation on a given topic, Creation of Data Base for a given application such as preparation of Mark Sheet, issue of Course completion certificates etc.

### **3.8 COLOUR CONCEPT AND TEXTILE DESIGNING PRACTICE – I**

#### **Schema:**

1. The activities to be carried out are given in the syllabus
2. Every student shall be trained in all the listed activities

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#### **LIST OF ACTIVITIES**

1. Practice on drawing of lines – Horizontal lines – Curve – lines – Lines of growth and grace – Thick and thin lines – Double lines – Broken lines – Oblique lines or lines of movement – Accented lines.
2. Practice on Foliage drawing – small plants and flowers – creepers – birds – animals – clouds – still water.
3. Light Theory of Colour.
4. Pigment Theory of Colour.
5. Practice and understanding Light and colour phenomena, colour vision, complementary colours.
6. The chromatic circle, Attributes of colour, Properties of colour – hue – value – intensity.
7. Modification of colour – Hue – Tone –Tint– Shade – Coloured grays – Colour schemes – Triadic colour factors.
8. Light, distance – special illusions – colour relationship, colour contrast – Monochromatic contrast – Polychromatic contrast – successive contrast – simultaneous contrast – contrast of hue – contrast of tone and colour harmony.
9. Basis of colour harmony – Harmony of analogy – harmony of contrast – Relative spaces occupied by the colours.
10. Positive image, Negative or after image, Colour appeal in Juxta position, colour relation injuxta position.

#### **REFERENCE BOOKS:**

1. Classic Textile Designs by M. Dupontauberville.
2. The Grammar of Ornament by Owen Jones.
3. The History Ornament by Speltz Alexander.
4. The Treasury of Ornament by Dolmetch Herinrich.
5. Decorative art of India by Stronge Susan.
6. English and American Teltiles by Mary Schodeser.
7. Free Hand outline and Model Drawing by Kancharla.
8. A History of Textiles by Kax Wilson.
9. History of Textile Design by Shenai.
10. The Illustrated History of Textiles by Madeleine Ginsbyrg.
11. Tanabana: Handwoven and Handcrafted Textiles of India by Romanie Jaitley and Mallika Sarabhai.
12. Handbook of Textile Design by Jacquie Wilson.
13. A Handbook of Designers by Marypaul Yates.
14. Clothings for Moderns by Erwin Kinchen.
15. Colour and Design in Apparel by Bernice G. Chambers.
16. Fashion Design and Merchandising (Fasion Illustration) by NIFT.
17. Fasion Design and Merchandising (Design Development) by NIFT

## **4.1 WEAVING TECHNOLOGY & TEXTILE CALCULATION – III**

### **Schema:**

1. The subject is divided into five units.
  2. Each unit is given a weightage of 16 marks
- 

### **UNIT – I:**

1. Warp protection motions – Loose Reed and Fast Reed Motions – Mechanism and working principles.
2. Weft detecting motion – Side weft fork and Centre weft fork motions – Mechanism and working principles.
3. Power – loom dobbies – Climax Dobby – Mechanism and working principle.
4. Lattices and Pegging.

### **UNIT – II:**

Multiple Box Motion – Drop Box – Mechanism and working principle.

1. Automatic Power- looms- Introduction.
2. Mechanism Warp Stop Motion.
3. Weft Replenishment Mechanism – Shuttle Changing & Cop Changing.
4. Brief description about loom width, speed and suitability of power – looms for manufacturing various varieties of cloth.
5. Preparation of lay-out for a loom shed.

### **UNIT – III:**

1. Mill Warping Calculations – Efficiency, Production, creel capacity, number of back beams, amount of yarn, wastage and production planning.

### **UNIT – IV:**

1. Sectional warping calculations – Creel capacity, No. of sections, no. of patterns per section, width of warp, and total no. of ends.
2. Sizing calculations – size pick-up, efficiency, production and production planning.

### **UNIT – V:**

1. Yarn Winding Calculations – Cone, Cheese and pirn- Efficiency, Production, and production planning.
2. Loom shed calculation – Efficiency, Production, and production planning.

### **Reference Book:**

1. The mechanism of weaving by Thomas W Fox
2. Modern preparation and weaving by A Ormerod
3. Weaving Mechanism Vol. I by N N Banarjee
4. Mechanism of weaving Vol I by J C Chakravarty
5. Fabric forming by B Haskukhrai
6. Woven fabric production-1 by NCUTE
7. Weaving Calculation by Sengupta
8. Textile Mathematics Vol. 1, 2 and 3 by Booth
9. Warping Calculation by WIRA

## **4.2 FABRIC STRUCTURE – III**

### **Schema:**

1. The subject is divided into Five Units.
2. Each is given a weightage of 16 marks.

### **UNIT- I:**

1. Treble width plain cloth – using plain twill, satin, and sateen. Design, draft, peg plan, thread interlacement diagram and beaming.
2. Treble width plain cloth – Interlacement diagram and its graphical representation.
3. Backed cloths – Salient features, Warp backed cloth – reversible and non-reversible and non-reversible warp backed cloth using twill, satin and sateen – Design, draft, peg plan, thread interlacement diagram and beaming.
4. Weft backed cloth – reversible and non-reversible weft backed cloth using twill, satin and sateen – design, draft, peg plan and thread interlacement diagram.

### **UNIT – II:**

1. Weft wadded warp backed cloth - reversible and non-reversible using twill, satin and sateen – Design, draft, peg plan, thread interlacement diagram and beaming.
2. Warp wadded weft backed cloth - reversible and non-reversible using twill, satin and sateen – Design, draft, peg plan, and thread interlacement diagram.
3. Imitation backed cloth – Imitation warp backing and imitation weft backing – Design, draft, peg plan and thread interlacement diagram
4. Difference between warp backed and weft backed cloth.

### **Unit III:**

1. Pile fabrics – Salient features
2. Classification of pile fabrics; Loop pile and cut pile; warp pile and weft pile
3. Terry piles – Salient features – Technique of Pile formation.
4. Classification of terry pile structures – 3 pick, 4 pick, 5 pick and 6 pick - Thread interlacement diagram and graphical representation.
5. Terry Pile on one side of fabric only and on both sides – structure, thread interlacement diagram, graphical representation, drafting, denting and peg-plan.
6. Stripe and check effects – Terry Pile on one side and both sides – Fabric pattern and its design, draft, denting, peg plan, thread interlacement diagram and beaming.

### **Unit IV:**

1. Warp pile fabrics produced with the aid of wires: loop plies and piles production techniques - - Design, draft, denting, peg plan, thread interlacement diagram and beaming.
2. Simultaneous insertion of pick and wire and the twin shed formation technique.
3. Techniques of anchoring of piles – By using two beams for ground ends and by using ‘W’ binding – Design, draft, denting, peg plan, thread interlacement diagram and beaming.
4. Warp pile fabrics produced on face-to-face principle - Single shuttle and double shuttle weaving - Design, draft, denting, peg plan, thread interlacement diagram and beaming.

### **Unit V:**

1. Weft piles – Salient features – Manufacturing technique and processes involved
2. Allover velveteen and corduroys – Structure, graphical representation, draft, denting, peg plan and interlacement diagram.
3. Chenille Axminster pile fabrics manufactured using handlooms - technique of fabric manufacture and designing.
4. Difference between various pile fabrics.

### **REFERENCE BOOKS:**

1. Walton’s Textile Design and Colour by Z. Crosiciki
2. Walton’s Advanced Textile Design by Z. Crosiciki
3. Structural Fabric Design by James W. Klibbe
4. Fabric Structure by Golak
5. Woven cloth construction by R. Mark
6. Grammar of Textile Design by H. Nisbet
7. Woven Structure and Design by Dori Goernar

## **4.3 CHEMICAL PROCESSING OF TEXTILES – II**

### **Schema:**

1. The subject is divided into five units.
  2. Each unit is given a weightage of 16 marks
- 

### **UNIT – I:**

1. Morphological and chemical aspects of Wool and Silk
2. Composition of raw wool and silk.
3. Methods of scouring Wool (Suint, Emulsion, Solvent and Freezing),
4. Milling of Woolens (Dolly machine)
5. Methods of Degumming silk with soap, mild alkali and enzymes

### **UNIT – II:**

1. Bleaching of wool with Hydrogen peroxide
2. Bleaching of silk with Hydrogen peroxide
3. Setting process for woolens viz. Potting, Crabbing and Decatising.
4. Need of preparatory treatments for important Man Made fibres viz. Polyester, Nylon and Acrylic
5. Methods of Scouring and Bleaching for Polyester, Nylon and Acrylic

### **UNIT – III:**

1. Methods of dyeing of Wool and Silk with Acid, Chrome, Prematalized (1:1 & 1:2), and Reactive dyes with Process details such as time Temperature and pH, Effect of Electrolytes and use of leveling agents.

### **UNIT – IV:**

1. Description on working of Common machines used in Wet Processing of Textiles –Jigger, Hydro-extractor, Padding Mangles, Cabinet type Hank dyeing machines, Yarn package dyeing machine and Winch
2. Brief description of the working of Hot Air Stentor and vertical Can Drying Range.

### **UNIT – V:**

- 1 Natural Dyes- their advantages and disadvantages
- 2 Brief idea of methods of Application of natural Dyes (Pre-and Post Mordanting).
- 3 Brief introduction of Criteria for selection of dyes
- 4 Fastness properties (Washing, Rubbing, and Light) of dyed cotton material.
- 5 Common Defects and damages in Wet Processing of Cotton materials.

### **Reference Books:**

1. Technology of Textile processing Vol. II, III & VI by Dr. V A Shenai
2. Scouring and Bleaching by E R Trotman
3. Dyeing and Chemical Technology of Textile Fibres by E R Trotman
4. Chemical Processing of Textiles –by Dr. C V Kaushik and Mr. Antao Irwin Jojico



## **4.4 ECOLOGY & POLLUTION CONTROL IN TEXTILE INDUSTRY**

### **Schema:**

1. The subject is divided into five units.
  2. Each unit is given a weightage of 16 marks
- 

### **UNIT – I:**

1. Environmental Pollution & its harmful effects on Human beings, Vegetation Inert material and Physical features of Atmosphere.
2. Introduction of types of pollution viz. Air, Water, Soil, Noise, Radioactive / Radiation Pollution
3. Overview of Environmental Pollution in Textile Industry
4. Brief description on Pollutants in Textiles

### **UNIT – II:**

1. Air- Pollution – Definition, causes of Air Pollution
2. Classification, Sources & Characteristics of Important Air Pollutants
3. Sources of Air Pollution in a Textile Mill
4. Air quality standards, Outdoor air pollution & Indoor air pollution

### **UNIT – III:**

1. Water Pollution
2. Classification of water pollutants, Various sources of waste water in wet processing
3. Characteristics of waste water – e.g. SS, TDS, DO, COD, BOD etc,
4. Water conservation in Textile Industry, Various methods of waste reduction

### **UNIT – IV:**

1. Methods of wastewater / effluent treatment i.e. Physical, Chemical and Biological treatment.
2. Brief description of design and working of effluent treatment plant.
3. Methods of removal of colour from Textile Dye House waste
4. Tolerance level of Effluents in Wet Processing of Textiles
5. Impact of water pollution on Man, Marine life & Ecology of Textiles, Solid wastes, its sources and sledge treatment

### **UNIT – V:**

1. Noise Pollution
2. It's effects and Preventive & Control of Noise pollution in Textile Industry
3. New Challenges towards achievements of rigid standards in Textile Processing Effluents
4. Eco-Standards and Eco- Labels for Textiles
5. ISO 14000 & current environment related to Textile Industry

### **Reference Books:**

1. Sewage Disposal & Air pollution engineering by S K Garg
2. Environmental pollution and environmental management by Padmanabh Dwivedi
3. A Text book of Environmental studies by Thangamani & Shyamala Thangamani
4. Workshop on Environmental pollution & control in textile industry by BITRA

## **4.5 PROFESSIONAL ETHICS AND PERSONALITY DEVELOPMENT**

### **Schema:**

1. The subject is divided into five units.
  2. Each unit is given a weightage of 16 marks
- 

### **UNIT – I :**

1. Ethics-Meaning and definition. Different types of ethics
2. Professional Ethics-Meaning and definition
3. Employment responsibilities towards organisation and its functions
4. Learning Employer-Employee relationship, Behavioral Pattern, Use of power in Work Place.

### **UNIT – II :**

1. Development and growth of self through character traits
2. Living peacefully and respect for others
3. Respect for self and work place spirituality
4. Moral issues, moral dilemmas and moral autonomy

### **UNIT – III :**

1. Kohlberg's theory of moral development-Carol Gilligan's theory-Consensus consensus and controversy
2. Theories of right action
3. Self interest, customs and religion
4. Code of ethics and its positive roles
5. A balanced outlook on law, relationship between law and ethics
6. Safety and risk, assessment of safety and risk

### **UNIT – IV :**

- 1.. Introduction Perception – its meaning and significance
- 2 Principles of perceptual selection – external attention factors, internal set factors, characteristics of perceiver and the perceived attitude
- 3 Characteristics of attitude, Changing attitude and behaviour
- 4 Self assessment and development, personal goal setting and career planning, Self esteem and building of self confidence.

### **UNIT – V :**

1. Components of communication, Principles of communication, Barriers and types of communication based on channels of communication
- 2 Listening and observation skills- Body language
- 3 Written communication-Planning and Process
- 4 Business communication, Essential qualities of business communication
- 5 Culture ad work environment, Time management
- 6 Study skills and complex problem solving

### **Reference books:**

1. Ethics in engineering by Mike martin and Roland Schinzinger
2. Engineering Ethics by Govindarajan M, Nadarajan S and Senthil Kumar V S
3. Engineering Ethics-Concepts and cases by Charles E Harris, Michael S, Protchard and Michael J Rabins
4. Ethics and conduct of business by John R. Boatright
5. Fundamentals of Ethics for Scientist and Engineers by Edmund G Seebauer and Robert I Barry
6. You can win by Shiv Khera
7. Habits of highly effective people by Stephen Convey
8. Perfect Presentation by John Collin
9. Effective Interviews by Jenny Rogers
10. Organizational Behaviour by Keith Davis
11. Personality Development by Afford

## **4.6 CHEMICAL PROCESSING PRACTICE – II**

### **Schema:**

1. The activities to be carried out are given in the syllabus
  2. Every student shall be trained in all the listed activities
- 

- 1 Degumming of given sample of Silk with soap and Mild Alkali
- 2 Bleaching of given sample of Silk with H<sub>2</sub>O<sub>2</sub>
- 3 Scouring of the given sample of Wool by emulsion scouring method
- 4 Bleaching of given sample of Wool with H<sub>2</sub>O<sub>2</sub>
- 5 Dyeing of given sample of Wool with Acid dyes
- 6 Dyeing of given sample of Wool with 1:1 Metal Complex dyes
- 7 Dyeing of given sample of Wool with 1:2 Metal Complex dyes
- 8 Dyeing of given sample of Silk with Acid dyes
- 9 Dyeing of given sample of Silk with 1:1 Metal Complex dyes
- 10 Dyeing of given sample of Silk with 1:2 Metal Complex dyes
- 11 Dyeing of Silk with Reactive (Cold Brand ) dyes
- 12 Dyeing of Cotton with Reactive dyes in compound shades
- 13 Dyeing of cotton with Vat dyes in compound shades
- 14 Dyeing of Cotton with Direct dyes to Study the effect of Liquor Ratio
- 15 Dyeing of Cotton with Direct dyes to study the effect of Electrolytes
- 16 Dyeing of Cotton with direct dyes to study the effect of Temperature

## **4.7 WEAVING TECHNOLOGY PRACTICE – III**

### **Schema:**

1. Every student shall be trained in all the listed activities.
2. Every student shall be examined in all the three units during practical examination.

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The student shall practice the following assignments in batches both in third and fourth semester.

### **POWERLOOM MECHANISM**

1. Sketching of different parts of primary motion of power-loom and familiarization of their functions.
2. Dismantling, erecting and time setting of shedding mechanism and beat up mechanism.
3. Dismantling, erecting and time setting of over pick and under pick mechanisms.
4. Sketching of different parts of secondary motion of power-loom and familiarization of their functions.
5. Dismantling, erecting and time setting of Seven wheel take-up and let-off mechanisms.
6. Sketching of different parts of Warp protecting, Weft detecting and Drop box motion of power of power-loom and familiarization of their functions.
7. Sketching of different parts of Warp stop, Weft replenishing and Positive let-off motions of Automatic power-loom and familiarization of their functions.
8. Creation of designs suitable for saree boarders and dhoti borders using Dobbies upto 40 levers.
9. Pegging of lattices as per the mounting of dobbies on power-loom.

## **4.8 COLOUR CONCEPTS AND TEXTILE DESIGNING PRACTICE – III**

### **Schema:**

1. The activities to be carried out are given in the syllabus.
  2. Every student shall be trained in all the listed activities
- 

### **LIST OF ACTIVITIES**

1. Ornamentation of fabric by using colour stripes and checks.
2. Spotted patterns, Single regular pattern, Single irregular pattern, compound order.
3. Conventionalizing natural object by simplifying.
4. Converting nature form of designs into simple conventional form suitable for printing and weaving technique.
5. Converting natural form of designs into abstract form retaining essential characteristic features.
6. Drawing of elements of Textile Design – motif – unit figure – design repeat.
7. Design setting using Textile Design Bases – Rectangular, Diamond, Ogee and diagonal bases.
8. Distribution of unit figures – Principles of simple drop and reverse drop – Sateen Distribution – All over effects.
9. Creation of layout of a ready to wear textile products – Saree, Dhoti, Lungi, Shwal etc.
10. Layout of home furnishing – Bedspread, Bed sheet, Table cover, Pillow cover, Window curtains, Door curtains, ladies top, baby wears etc.,
11. Preparation of an album containing pictures / samples of Traditional Indian Textiles and their documentation.
12. Preparation of an album containing pictures / samples of Indian brocade fabrics and their documentation.
13. Preparation of an album containing pictures / samples of Indian sarees and their documentation.

### **REFERENCE BOOKS:**

1. Classic Textile Designs by M. Dupontauberville.
2. The Grammar of Ornament by Owen Jones.
3. The History Ornament by Speltz Alexander.
4. The Treasury of Ornament by Dolmetch Herinrich.
5. Decorative art of India by Stronge Susan.
6. English and American Teltiles by Mary Schodeser.
7. Free Hand outline and Model Drawing by Kancharla.
8. A History of Textiles by Kax Wilson.
9. History of Textile Design by Shenai.
10. The Illustrated History of Textiles by Madeleine Ginsbyrg.
11. Tanabana: Handwoven and Handcrafted Textiles of India by Romanie Jaitley and Mallika Sarabhai.
12. Handbook of Textile Design by Jacquie Wilson.
13. A Handbook of Designers by Marypaul Yates.
14. Clothings for Moderns by Erwin Kinchen.
15. Colour and Design in Apparel by Bernice G. Chambers.
16. Fashion Design and Merchandising (Fasion Illustration) by NIFT.
17. Fasion Design and Merchandising (Design Development) by NIFT

## **SEMESTER – V**

### **5.1 WEAVING TECHNOLOGY & TEXTILE CALCULATION – IV**

#### **Schema:**

1. The subject is divided into five units.
  2. Each unit is given a weightage of 16 marks
- 
- 

#### **UNIT- I:**

1. Shuttle less weaving machines.
2. Rapiert weft insertion technique – Single and Double Rapiert – Mechanism and working principle.
3. Projectile weft insertion technique – Mechanism and working principle.
4. Air- jet weft insertion technique - Mechanism and working principle.
5. Water – Jet insertion technique - Mechanism and working principle.
6. Introduction to Multi- phase Weaving technique.

#### **UNIT- II:**

1. Jacquards – Structure and function of different parts of a jacquard. Working principle of electronic jacquard.
2. Single lift Single Cylinder jacquard – Mechanism and working principle.
3. Double lift Single Cylinder jacquard – Mechanism and working principle.
4. Double lift cylinder jacquard – Mechanism and working principle.
5. Open shed jacquard - Mechanism and Working principle.

#### **UNIT- III:**

1. Inverted hook jacquard - Mechanism and Working principle.
2. Cross Border jacquard - Mechanism and Working principle.
3. Self – twilling jacquard - Mechanism and Working principle.
4. Leno jacquard - Mechanism and Working principle.

#### **UNIT – IV:**

1. Diameter of yarns.
2. Ashenhurst's formula for estimation of diameter of yarns.
3. Pierce's formula for estimation of diameter of yarns.
4. Relative diameter of yarns.

#### **UNIT- V:**

1. Calculation on Cover of cloth.
2. Warp Cover, weft cover and cloth cover- Derivation and calculation.
3. Fractional Cover, Percentage cover and Cover factor – Calculation for light medium and heavy fabrics.

## 5.2 FABRIC STRUCTURE – IV

### Schema:

1. The subject is divided into five units.
  2. Each unit is given a weightage of 16 marks
- 

### UNIT – I:

1. Extra warp and extra weft – designing and comparison.
2. Extra Warp figuring technique using healds, healds with dobby – Continuous, intermittent and spot styles – anchoring of spot effects – Planting – Stitching with dedicated weft threads.
3. Extra Warp figuring technique using healds, healds with dobby – Continuous, intermittent and spot styles – anchoring of spot effects – Chintzing – Stitching with dedicated warp threads.
4. Combination of extra warp and extra weft.

### UNIT- II:

1. Basic of Patent – Satin, Design, draft, peg-plan, and beaming.
2. Tapestry – Traditional and modern tapestries.
3. Basic of non – reversible Weft Tapestry – 3 picks, 4 picks – Design, draft, peg-plan, and beaming and interlacing diagram.
4. Basic weaves of reversible Weft Tapestry – 3 picks, 4 picks – Design, draft, peg-plan, and beaming and beaming and interlacing diagram.
5. Simple combined warp and weft tapestry.

### UNIT- III:

1. Count of graph paper – Factors influencing the selection of appropriate count of graph paper.
2. Figured single cloth – Structure of cloth with different weave combination – use of Straight tie and straight draft.
3. Figure warp backed cloth – Structure of cloth – Use of sectional harness in simplification of graph development process and punching technique.
4. Figured weft backed cloth – Structure of cloth – Separation of two series of weft for simplifying graph development process and punching technique.

### UNIT – IV:

1. Figure double cloth – use of similar colours in warp and weft – Use of different colours in warp and weft – Structure of cloth – Design development and punching process for straight harnessing with straight draft – Structure of cloth.
2. Figure double cloth – Design development and punching process for straight harnessing with sectional draft – Structure of cloth.
3. Figure double cloth – Structure of cloth - Design development and punching process for sectional harnessing with sectional draft – Structure of cloth.

### UNIT – V:

1. Leno and gauze fabrics – Salient features; Bottom douping and top douping.
2. **Open, Crossed and plain sheds in leno weaving, Positive and negative Easer arrangements and Shaker Device.**
3. Indication of leno structures, drafting plan and lifting plan of straight and pointed draft structures.
4. Stripe and Check effect; plain, twill and leno combination;
5. Cord effect, Net leno.

### REFERENCE BOOKS

1. Watson's Textile Design and Colour by Z. Crosiciki
2. Watson's Advanced Textile Design by Z. Crosiciki
3. Structural Fabric Design by James W. Klibbe
4. Fabric Structure by James Golak
5. Woven cloth construction by R. Mark
6. Grammar of Textile Design by H. Nisbet
7. Woven structure and Design by Dori Goernar

## **5.3 CHEMICAL PROCESSING OF TEXTILES – III**

### **Schema:**

1. The subject is divided into five units.
  2. Each unit is given a weightage of 16 marks
- 

### **UNIT – I**

1. Brief description of Structural Parameters of polyester making it difficult to Dye
2. Need, Principle and Methods of Heat Setting Polyester
3. Approaches for dyeing,– Various methods of dyeing Polyester involving use of chemical and Thermal Energy (Carrier Dyeing and H.T.H.P. Dyeing)
4. Thermo sol method of dyeing polyester

### **UNIT – II**

1. Brief description of parts and working of HTHP Beam dyeing machine, Jet Dyeing machine and Soft Flow dyeing machines
2. Outlines of the common defects and damages while dyeing Polyester on above machines
3. Process sequences for. Polyester/cotton, Polyester/Viscose

### **UNIT – III**

1. Structural aspects of Polyamides (Nylon<sub>6</sub> and Nylon<sub>66</sub>) affecting their dyeing behaviour
2. Dyeing of Polyamides with Disperse, Acid, Metal complex and Reactive dyes; Process details including time, Temperature and pH; Functions of chemicals used
3. Structural aspects of Acrylic affecting their dyeing behaviour
4. Introduction to Method of Dyeing Acrylic with Cationic and Disperse dyes.

### **UNIT – IV**

1. Introduction to Textile Printing, Differences in Dyeing and Printing
2. Brief outlines of methods of Printing viz. Block Printing, Screen Printing, Rotary and Flat bed Screen Printing and Transfer Printing with their merits and demerits.
3. Brief outlines of Styles of Printing viz. Direct, Resist and Discharge Printing

### **UNIT – V**

1. Photographic Preparation of Printing Screens
2. Important Printing paste ingredients and their role
3. Outlines of Methods of Fixation commonly used in Printing of Textiles (Steaming, Ageing and Curing)

### **Reference Books:**

1. Technology of Textile processing Vol. II, III & VI by Dr. V A Shenai
2. Scouring and Bleaching by E R Trotman
3. Chemical Processing of Textiles –by Dr. C V Kaushik and Mr. Antao Irwin Jojico
4. An Introduction to textile printing by W Clarke.



## **5.4 PRINCIPLES OF TEXTILE TESTING**

### **Schema:**

1. The subject is divided into Five Units
  2. Each unit is given a weightage of 16 Marks
- 

### **UNIT – I:**

1. Importance and objectives of Textile Testing, Role of textile testing in quality control.
2. Sampling techniques – factors governing sampling – Random and biased samples
3. Elementary Statistics – Testing of sample and collection of data; Analysis of data to ascertain mean, mode, median, range, percentage mean range and frequency distribution.
4. Measures of Central Tendency and Measures of Dispersion – Standard deviation, Percentage mean deviation, coefficient of variation, standard error, confidence limits.

### **UNIT – II:**

1. Atmospheric conditions - Absolute humidity – Relative humidity, Standard testing atmosphere. Measurement of atmospheric condition.
2. Instruments used for determination of relative humidity – Wet and dry bulb hydrometer – Thermo hygrometry – Electrolytic hygrometer.
3. Measurement of Moisture Regain and Moisture Content – Moisture testing oven – Shirley Moisture Meter – Corrected invoice weight.
4. Effect of Moisture Regain on fiber properties – Factors affecting Moisture Regain in textile materials – Standard regain value of textile fibers.

### **UNIT – III:**

1. Measurement of linear density (count)
2. Warp reel and weighing balance method.
3. Direct reading count balances.
4. Knowles balance
5. Quadrant balance
6. Beesley's balance

### **UNIT – IV:**

1. Study of twist – Definition of twist – Twist direction – Amount of twist - Twist factor and twist multiplier.
2. Twist angle – function of twist in yarn structure – Twist and yarn strength – Effect of twist on fabric properties.
3. Measurement of twist – Sampling of yarn for twist testing - : Straightened fiber method, Twist contraction method..
4. Twist-Untwist method for folded yarn – Microprocessor twist tester

### **UNIT – V:**

1. Yarn evenness – Study of yarn evenness and its importance on process and product quality.
2. Classification of yarn irregularity – Expression of irregularity.
3. Measurement of yarn evenness by Visual examination, Cutting and weighing method.
4. Electronic capacitance method, Uster evenness tester, Uster – Classmate System – Yarn faults.

## **5.5 PRINCIPLES OF MANAGEMENT AND ENTREPRENEURSHIP**

### **Schema:**

1. The subject is divided into Five Units
  2. Each unit is given a weightage of 16 Marks
- 

### **UNIT – I**

1. History of Handloom Industry
2. Socio Economic importance of Handlooms
3. Organizational structure of Handloom Industry
4. Primary Handloom Weavers' Cooperative Society, Establishment, objectives and functions

### **UNIT – II**

1. Government of India's Schemes for upliftment of Handloom Weavers
2. Functions of WSCs and IIHTs
3. Cluster Development initiative for Handloom Industry
4. Scopes of Handloom Exports
5. Importance of Product diversification and Value addition in Handloom products

### **UNIT –III**

1. Definition of Marketing, Micro and Macro Marketing
2. Modern Approach, Classification of market
3. Objects and importance of marketing
4. Principles of marketing, Marketing mix
5. Market Planning, Market information and its importance
6. Branding and image creation, importance of geographical indication.

### **UNIT –IV**

1. Market Research
2. Types and Objectives of Market research, advantages
3. Market sampling, Primary and Secondary Data Sources
4. Definition, Importance and objectives of pricing
5. Factors affecting price decision, Single Price and Variable Price
6. Pricing Policy for Handloom Products

### **UNIT –V**

1. Significance of Rural Marketing, Urban and International Marketing
2. Understanding Entrepreneurship, its need and importance
3. Scope of Entrepreneurial development, Types of Entrepreneurs
4. Role of Entrepreneurship in economic development
5. Role of various agencies in promoting Entrepreneurship
6. Introduction to concepts of E. Business

## **5.6 CHEMICAL PROCESSING PRACTICE – III & CCM**

### **Schema:**

1. The activities to be carried out are given in the syllabus.
  2. Every student shall be trained in all the listed activities
- 

1. Demonstration on scouring and bleaching of Polyester, Nylon and Acrylic
2. Demonstration on scouring and bleaching of P/C and P/V blends
3. Dyeing of the given sample of Polyester with Disperse dyes by Carrier method
4. Dyeing of the given sample of Polyester with Disperse dyes by HTHP method
5. Dyeing of the given sample of P/C or P/V with Disperse and Vat / Reactive dyes (Solid / Cross / Reserve Shades)
6. Dyeing of the given sample of Nylon with Acid dyes
7. Dyeing of the given sample of Nylon with Metal Complex dyes
8. Dyeing of the given sample of Nylon with Disperse dyes
9. Dyeing of the given sample of Nylon with Reactive dyes
10. Dyeing of the given sample of Acrylic with Cationic dyes
11. Dyeing of the given sample of Acrylic with Disperse dyes
12. Brief outlines of Colour Physics
13. Introduction to CIE system of colour specification ( Meaning of L, a, b, C, H) Standard illuminants and observer
14. Calibration of Spectrophotometer
15. K/S. Data Generation

## **5.7 WEAVING TECHNOLOGY PRACTICE – IV & CATD**

### **Schema:**

1. Every student shall be trained in all the listed activities.
  2. Every student shall be examined in all the three units during practice examination.
- 

The student shall practice the following assignments in batches both in FIFTH and SIXTH semester.

### **UNIT- I**

#### **JACQUARD MECHANISM**

The students shall practice the following assignments both in fifth and sixth semester.

1. Sketching different parts of SLSC, DLSC, DLDC jacquards and familiarization of their functions
2. Sketching and familiarization of different system and different types of harnessing.
3. Sketching different parts of piano card cutting machine and familiarization of their functions.
4. Sketching lay-out of a jacquard loom and familiarization of mounting jacquard on a loom.
5. Preparing Jala frame to produce extra weft butta design in 40 ends and 40 picks.
6. Harness Calculation – Observing different harness set-up in the lab and calculating width of harness, Number of repeats, harness per inch and width of repeat.
7. Harness Building – Calculating the particulars required for harness building from the given particulars of cloth to be produced.
8. Practice harness building for straight tie, pointed tie, sectional tie, body – border tie.

### **UNIT- II**

#### **FIGURE FABRIC DEVELOPMENT**

1. Preparation of designs for different types of figured fabrics as per the calculated width and given length.
2. Preparation of graph designs of various figured fabrics dealt in Fabric Structure – IV, Fabric Structure – V.
3. Punching and lacing of cards – Punching the pattern cards from the graph prepared by using the Piano Card Cutting machine, Lace the punched cards in sequence.
4. Weaving – weave the design from the punched cards they prepared.
5. Developing sample without any defects using punched cards.
6. Preparing the album of samples developed and writing their quality particulars.

### **UNIT – III:**

#### **FABRIC ANALYSIS AND CATD**

1. Analysis of compound fabrics – double cloth, Bedford cord, welt, pique, terry, extra warp, extra weft, leno.
2. Extracting fundamental details like count of warp and weft, ends and picks per unit space, warp and weft crimp and weave repeat.
3. Deriving drafting, denting, peg-plan/ tie-up for the weave.
4. Preparation of design for different types of figured fabrics using CATD System.

## **5.8 TEXTILE TESTING PRACTICE -I**

### **Schema:**

1. Every student shall be trained in all the listed activities.
  2. Every student shall be examined in all the three units during practice examination.
- 

1. Demonstration of equipments available in the Testing Lab and their functions
2. Notes on Elementary Statistical Tools – Collection of data, Mean, Mode, Median, Standard Deviation, Percentage Mean Deviation, Standard Error and Co-efficient of Variation with their use in Analysis of Test Results .
3. Cross sectional and longitudinal views of different fibres (Demonstration only).
4. Brief notes on Moisture in Textiles and Atmospheric conditions.
5. Determination of Moisture Regain and Moisture Content of the given material by drying and weighing method.
6. Determination of Atmospheric Conditions in the Testing Lab (Relative Humidity and Temperature) – Wet and Dry Bulb Hygrometer.
7. Determination of count – Length and weight method.
8. Determination of count Direct reading – Knowles Balance.
9. Determination of count - from fabric swatch- Beesley's Balance.
10. Determination of count Direct reading – Quadrant Balance.
11. Elementary notes on Twist, its role in Yarn Structure.
12. Determination of Twist per inch in the given sample of yarn using Twist - Untwist Method.
13. Determination of Twist per inch in the given sample of yarn using Straightened Fibre Method.
14. Determination of Crimp in the given fabric swatch.
15. Determination of Weight of given fabric sample in terms of weight / square yard and GSM.

## **6.1 WEAVING TECHNOLOGY & TEXTILE CALCULATIONS – V**

### **Schema:**

1. The subject is divided into Five Units
  2. Each unit is given a weightage of 16 Marks
- 

### **Unit I**

1. Traditional Design Weaving Techniques of Handlooms - Adai (Warp & Weft) of Kancheepuram, Jala Weaving of Varanasi, Jamdani Weaving of West Bengal, Paithani Weaving of Aurangabad
2. Warp Tie&Dye Technique – Design preparation, design transfer to warp, weaving
3. Weft Tie&Dye Technique – Design preparation, design transfer to weft, weaving
4. Combined Warp and weft Tie&Dye Technique – Design preparation, design transfer to warp and weft, weaving

### **Unit II**

1. Harness ties – London and Norwich systems
2. Types of Harness ties – Straight, Pointed, Sectional, Border and mixed ties
3. Jacquard Design and Harness Calculations – Calculations related to Sett of harness, sett of warp, ends per repeat, size of repeat, number of repeats, symmetrical repeat setting for straight draft and pointed draft, number of cords per hook and casting out.

### **Unit III**

1. Determination of Ends per inch and picks per inch while changing count to maintain the same level of compactness.
2. Determination of Ends per inch and picks per inch while changing weave to maintain the same level of compactness.
3. Determination of Ends per inch and picks per inch while changing count and weave to maintain the same level of compactness.
4. Determination of Count of warp and weft and Ends per inch and picks per inch while increasing / decreasing the weight of fabric to maintain the same level of compactness

### **Unit IV**

1. Cloth calculations – Amount of warp and weft, weight per linear meter, weight per square meter using NE, Worsted, Woolen Yorkshire, Denier and Tex systems for fabrics woven with cotton, silk, worsted, woolen and polyester yarns.

### **Unit V**

1. Costing of Fabrics – Handloom-made, Power-loom-made and Mill-made – involving cotton, polyester, silk, wool, etc.,

## **6.2 FABRIC STRUCTURE- V**

### **Schema:**

3. The subject is divided into Five Units
  4. Each unit is given a weightage of 16 Marks
- 

### **Unit I**

1. Advantage of using healds along with jacquard.
2. Figured Extra warp – Structure of cloth – Designing using jacquard with heald.
3. Figured Extra weft – Designing using jacquard without heald but using plain card; Designing using jacquard with heald.
4. Combining Figured Extra warp, Extra weft – Use of two separate jacquards combined with healds.

### **Unit II**

1. Figured Patent satin – structure of cloth – Use of straight tie with healds. Designing, simplified enlargement and punching technique.
2. Figured Patent satin – use of working comber for saving of punched cards – Designing and simplified enlargement and punching technique.
3. Figured piques – Structure of cloth – Use of Straight tie with healds. Designing, simplified enlargement and punching technique.
4. Figured piques – use of working comber board in fast back structures to save punched cards- designing and Simplified enlargement technique.

### **Unit III**

1. Damask – Salient features – Structure of cloth – Designing, enlargement and punching techniques for fine pitch jacquards.
2. Damask – Structure of cloth – Designing, enlargement and punching techniques for self twilling jacquards, pressure harness and Bannister harness.
3. Contemporary Tapestry – 3 picks – Structure of cloth – 3 picks Tapestry using jacquard and heald method. Designing, simplified enlargement and punching techniques.
4. Contemporary Tapestry – 4 picks – Structure of cloth – 4 picks Tapestry using jacquard and heald method. Designing, simplified enlargement and punching techniques

### **Unit IV**

1. Figured Terry – 3 pick, 4 pick terry – structure of cloth – Graph Designing, punching technique for Straight tie – straight draft jacquard with heald method.
2. Figured Terry – 3 pick, 4 pick terry – Graph Designing, punching technique for Straight tie – sectional draft jacquard with heald method.
3. Figured Terry – 3 pick, 4 pick terry – Graph Designing, punching technique for Inverted hook jacquard with heald method.
4. Figured Terry-3 pick, 4 pick terry-Graph Designing, punching technique for sectional tie-sectional draft jacquard with heald method.

### **Unit V**

1. Study of Traditional Indian Fabrics – Fabric structure, colouring and designing features of Banarasi Brocades and sarees, Kancheepuram Sarees.
2. Study of Traditional Indian Fabrics – Fabric structure, colouring and designing features of Jamdani sarees, Himroo shawls, Palthani Sarees.
3. Study of Traditional Indian Fabrics – Fabric structure, colouring and designing features of Chanderi Sarees, Patola Sarees, Pochampalli Tie-Dye Sarees, Kota Doria.
4. Study of Traditional Indian Fabrics – Fabric structure, colouring and designing features of Riha, Lysemphy, Mekhala, Woolen Shwal, Tweed, Himroo Shwals.
5. Quality particulars of different Fabric- Sarees, Dhoti, Shirting, Dress material, Home Furnishings, Made-ups, Floor coverings.

### **REFERENCE BOOKS**

1. Watson's Textile Design and Colour by Z. Crosiciki
2. Watson's Advanced Textile Design by Z. Crosiciki
3. Structural Fabric Design by James W. Klibbe
4. Fabric Structure by James Golak
5. Woven cloth construction by R. Mark
6. Grammar of Textile Design by H. Nisbet
7. Woven structure and Design by Dori Goernar

## **6.3 CHEMICAL PROCESSING OF TEXTILES – IV**

### **Schema:**

1. The subject is divided into Five Units
  2. Each unit is given a weightage of 16 Marks
- 

### **UNIT – I**

1. Process of printing Cotton with Direct dyes, Reactive dyes in direct style with recipe, process conditions and role of chemicals used
2. Process of printing Cotton with Pigments with recipe, process conditions and role of chemicals used

### **UNIT – II**

1. Printing of Silk with Acid dyes and Prematalized dyes ,respective process details and role of chemicals used.
2. Printing of Polyester with Disperse dyes, respective process details and functions of Auxiliaries used.
3. Brief description of methods for Traditional styles of Printing viz. Tie & dye, Kalamkari and Batik printing.

### **UNIT – III**

1. Objects of Textile finishing, Factors affecting selection of Finishes, Classification of finishing processes viz. Mechanical and Chemical finishes, Temporary and Permanent Finishes
2. Brief outline of Mechanical Finishes Processes e.g. Calendaring, and Compressive shrinkage process.

### **UNIT – IV**

1. Description of mercerization – process details and Effect on Structural characteristics
2. Brief introduction of Machines used for Yarn and Fabric Mercerization
3. Brief Outlines of Chemical finishing process for improvement in serviceability viz. Anti crease finishes, Softening and Stiffening, Flame Retardency, Water Proofing & Water Repellency Finishes

### **UNIT – V**

1. Introduction to Bio-finishing
2. Outlines of Harmful Chemicals in Wet Processing of Textiles
3. Introduction to the concept of Eco-friendly Wet processing
4. Brief description of identification of dyes in powder

### **REFERENCE BOOKS :**

1. Technology of Textile processing Vol. – IV, VI, & X by Dr. V.A. Shenai
2. Dyeing and Chemical Technology of Textiles Fibres by E.R. Trotman
3. Chemical Processing of Textiles by Dr. C.V. Kaushik and Mr. Antao Irwin Josico
4. An introduction to Textile Printing by W. Clarke
5. A handbook of Textile Finishing by A.J. Hall
6. Chemical Finishing of Textiles by W.D. Schindler and P.J. Hauser



## 6.4 PRINCIPLES OF TEXTILE TESTING –II

### Schema:

1. The subject is divided into Five Units
  2. Each unit is given a weightage of 16 Marks.
- 

### UNIT-I

1. Tensile testing of Textiles – Introduction – Terminology and definitions.
2. The load and elongation curve – The stress and strain curve.
3. Elastic recovery – Instantaneous and time dependent effects.
4. The mechanics of Strength testing machines – CRL, CRE & CRT.
5. Factors influencing yarn strength – Factors affecting the test results obtained from testing instruments.

### UNIT – II

1. Pendulum lever principle (CRT) – single yarn strength tester,
2. Lea strength tester, Inclined plane principle (CRL) and Strain gauge principle.
3. Instron Tester, Ballistic strength tester.
4. CSP and Corrected CSP – Merits and demerits of single thread testing and tea strength testing.
5. RKM values, comparison of lea and single thread strength.

### INIT – III

1. Fabric strength testing – Types of test, sample preparation, Strip test & grab test.
2. Tearing strength test, Elmendorf tearing strength tester.
3. Pendulum lever; Ballistic strength tester.
4. Bursting strength testing.
5. Abrasion resistance – serviceability – Types of abrasion – Testing of abrasion resistance – Martindale abrasion tester.
6. Pilling of fabric and its causes - Measurement of pilling by using ICI pilling box tester.

### UNIT – IV:

1. Crease resistance and crease recovery – measurement of crease recovery – Shirley crease recovery tester.
2. Fabric stiffness, handle and drape – Bending length, Flexural rigidity, Bending modulus – Shirley stiffness tester.
3. Fabric drapes – Drape co-efficient and drape meter.
4. Crimp of yarn in fabric – Crimp and fabric properties – Measurement of crimp percentage by using Shirley crimp tester.
5. Fabric shrinkage and its measurement..
6. Fastness testing of fabrics – Wet and Dry Rubbing fastness.
7. Estimation of weight of fabric by direct weighing method and comparing with calculated weight.

### UNIT – V:

1. Fabric defects and identification.
2. Inspection of fabrics – Method of grading – American 10 point system – 4 point system.
3. Quality related terminology – Quality Management System; Quality circle, Quality policy; Quality plan; Quality assurance, Quality control; TQM and Six Sigma.
4. Concept of Quality assurance – TQM – ISO – Six Sigma Elements and Advantages.
5. Acceptance Quality Level (AQL), Military Standards – MIL-STD-105E, American National Standards Institute – ANSI/ ASQ – Z1.4.

## **6.5 CHEMICAL PROCESSING PRACTICE – IV & CCM**

### **Schema:**

1. Every student shall be trained in all the listed activities.
  2. Every student shall be examined in all the three units during practice examination.
- 

1. Printing of given sample of cotton in Direct Style with Direct dyes
2. Printing of given sample of cotton in Direct Style with Reactive dyes
3. Printing of given sample of cotton with Pigments
4. Printing of given sample of cotton with Reactive Dyes to produce a suitable design for Dress material in 3 colour
5. Printing of given sample of cotton with Reactive Dyes to produce a suitable design for Table cloth in 3 colour
6. Printing of given sample of cotton with Reactive Dyes to produce a suitable design for Bed sheet in 3 colour
7. Printing of given sample of Silk in Direct style with Acid dyes
8. Printing of given sample of Silk in Direct style with Metal Complex dyes
9. Printing of given sample of Silk in Discharge style with Acid dyes to produce white discharge effect
10. Formulation and Batch correction
11. Colour maker and Shade Library
12. Quality assurance
13. Exercises on Colour Difference
14. Pass-Fail and Shade sorting
15. Fastness rating using CCM

## 6.6 WEAVING TECHNOLOGY PRACTICE – V & CATD

### Schema:

1. Every student shall be trained in all the listed activities.
2. Every student shall be examined in all the three units during practical examination.

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The students shall practice the following assignments in batches both in FIFTH and SIXTH semester.

### UNIT- I

#### JACQUARD MECHANIS

The students shall practice the following assignments both fifth and sixth semester.

1. Sketching different parts of SLSC, DLSC, DLDC jacquards and familiarization of their functions.
2. Sketching and familiarization of different systems and different types of harnessing.
3. Sketching different parts of piano card cutting machine and familiarization of their functions
4. Sketching lay-out of a jacquard loom and familiarization of mounting jacquard on a loom.
5. Preparing Jala frame to produce extra weft butta design in 40 ends and 40 picks.
6. Harness Calculation – Observing different harness set-up in the lab and calculating width of harness, Number of repeats, harness per inch and width of repeat.
7. Harness Building – Calculation the particulars required for harness building from the given particulars of cloth to be produced.
8. Practice harness building for straight tie, pointed tie, sectional tie, body – border tie.

### UNIT – II

#### FIGURED FABRIC DEVELOPMENT

1. Preparation of designs for different types of figured fabrics as per the calculation width and given length.
2. Preparation of graph designs of various figured fabrics dealt in Fabric Structure – IV, Fabric Structure – V.
3. Punching and lacing of cards – Punching the pattern cards from the graph prepared by using the Piano Card Cutting machine, Lace the punched cards in sequence.
4. Weaving – weave the design from the punched cards they prepared.
5. Developing sample without any defects using punched cards.
6. Preparing the album of samples developed and writing their quality particulars.

### UNIT – III:

#### FABRIC ANALYSIS AND CATD

1. Analysis of figured fabrics – simple / ordinary, double cloth, backed cloth, terry.
2. Extracting fundamental details like count of warp and weft, ends and picks per unit space, warp and weft crimp and weave repeat.
3. Deriving drafting, denting, peg-plan/ tie-up for the weave.
4. Preparation of graph for the design of various figured fabrics – The students shall prepare the graph and learn enlargement techniques using CATD System.

## **6.7 TEXTILE TESTING PRACTICE -II**

### **Schema:**

1. Every student shall be trained in all the listed activities.
  2. Every student shall be examined in all the three units during practical examination.
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1. Determination of Washing fastness of dyed material following ISO 1,2, 3, 4, & 5 standards
2. Determination of Rubbing fastness of dyed material
3. Determination of Perspiration fastness of dyed material
4. Determination of Light fastness of dyed material
5. Determination of Sublimation fastness of dyed material
6. Visual assessment of Yarn evenness using ASTM Black Boards
7. Assessment of Single yarn strength
8. Assessment of Lea strength of yarn
9. Determination of Ballistic Strength of the given fabric
10. Determination of Tensile Strength of the given fabric
11. Determination of Fabric Tearing Strength using Elmendorf Tear Tester
12. Determination of Crease recovery of the given fabric
13. Bursting strength testing of the given fabric
14. Assessment of Pilling character of fabrics
15. Determination of bending length of the given fabric using Shirley Stiffness Tester
16. Assessment of Abrasion resistance of fabrics using Martindale Abrasion Tester
17. Assessment of Drape character of the given fabric

## **6.8 PROJECT WORK**

1. Every students / group of students shall be assigned a Project Work, He /She /They shall complete their Project Work in consultation with his/ her/ their Project Guide in a manufacturing establishment / organization or in the Institute itself. The Students may also be deputed for floor survey/ study in the Industry during winter vacations if required for the topic allotted to him/ her/ them.
2. The synopsis of work shall be evaluated for 20 marks by the Project Guide.
3. Evaluation of the Project shall be done for 80 marks by the committee of experts as constitution by the Institute.