Vocational Higher Secondary Education (VHSE)

Second Year

TEXTILE TECHNOLOGY

Reference Book - Teachers' Version

Government of Kerala
Department of Education

State Council of Educational Research and Training (SCERT),
KERALA
2016

Foreword

Dear Teachers

This reference book **(Teachers' Version)** is intended to serve as a transactional aid to facilitate classroom transaction and as a ready reference for teachers of Vocational Higher Secondary Schools. It offers some guidelines for the transaction of the course content and for undertaking the practical work listed in the course content. As the curriculum is activity based, process oriented and rooted in constructivism focusing on the realisation of learning outcomes, it demands higher level proficiency and dedication on the part of teachers for effective transaction.

In the context of the Right- based approach, quality education has to be ensured for all learners. The learner community of Vocational Higher Secondary Education in Kerala should be empowered by providing them with the best education that strengthens their competences to become innovative entrepreneurs who contribute to the knowledge society. The change of course names, modular approach adopted for the organisation of course content, work-based pedagogy and the outcome focused assessment approach paved the way for achieving the vision of Vocational Higher Secondary Education in Kerala. The revised curriculum helps to equip the learners with multiple skills matching technological advancements and to produce skilled workforce for meeting the demands of the emerging industries and service sectors with national and global orientation. The revised curriculum attempts to enhance knowledge, skills and attitudes by giving higher priority and space for the learners to make discussions in small groups, and activities requiring hands-on experience.

The SCERT appreciates the hard work and sincere co-operation of the contributors of this book that includes subject experts, industrialists and the teachers of Vocational Higher Secondary Schools. The development of the teachers' version of reference books has been a joint venture of the State Council of Educational Research and Training (SCERT) and the Directorate of Vocational Higher Secondary Education.

The SCERT welcomes constructive criticism and creative suggestions for the improvement of the book.

With regards,

Dr. J. Prasad
Director
SCERT, Kerala

Vocational Higher Secondary Education in Kerala is a unique scheme of education which combines both vocational and academic stream of education. Learning vocational skills along with conventional academic education gives the students double advantage of vertical mobility as well as employability. It helps to develop vocational aptitude, work culture, values and attitudes of the learner and enhances his productivity. The vision of Vocational Higher Secondary Education in Kerala is to equip the youth with multiple skills matching the technological advancements and to produce skilled work force for meeting the demands of the emerging industries and service sectors with national and global orientation.

As India is emerging as a manufacturing hub to the world the demand for skilled manpower is on the rise. Kerala, traditionally known for its high quality man power all over the world can embark on this opportunity and equip our students with skills for the manufacturing sector and reduce the unemployment problems of the state. The Textile technology course in VHSE is one such course from the manufacturing sector

Textile industry is the one of the oldest industries in India. The industry basically involves the manufacturing of various types of fabrics both natural and synthetic, production of machinery, and planning and development of new technology. The industry has categorized three areas of work namely research and development, manufacturing and merchandizing. It provides direct employment to 30 million peoples. Textile technology is the study of textile production , processing and its capability for the use of common man. It combines the principles of engineering with specific knowledge of textile equipments and textile process. Textile technology is deals with the application of scientific and engineering principles to the design and control of all aspects of fibre, textile and apparel process, its products and machinery. These include natural and man made material , interaction of materials with machines , safety and health, energy conservation ,and waste and pollution control. There is wide scope for research in this area as the industry demands the need to improve currently available products and develop new ones.

Textiles are utilized for innumerable purposes other than manufacturing of garments. They are used in the manufacture of carpets and furnishings like bed sheets and bed covers , quilts, table cloth, curtains ,towels etc. it is also used rags, dusters, tents and nets, kites, parachutes etc. According o the usage and texture textiles are classified as Apparels ,Furnishings , Technical textiles , Medical textiles, Agro textiles and Geo textiles.

This course is now offered in modular format consisting of four modules which focus on multi skills development. One month On The Job Training and Production cum training centers are also an integral part of the course which gives exposure to real time work environment.

On the successful completion of this course the candidate will be able to join Textile industries as junior level technicians / operators and are also eligible for attending advanced courses on Textile Technology or any other courses that can be pursued after plus two science stream A few institutes offering higher learning courses in Textile Technology are listed below.

1. Three Government polytechnics colleges in Kerala offer Diploma in Textile Technology

2. IEI offers Diploma and B. Tech. level courses similar to AMIE schemes

3. Various universities out side Kerala offer B. Tech. in Textile Technology

4. ATDC provides various Diploma Courses in Garment manufacturing Merchandizing, Pattern making etc.in all over India

5. NIFT offers various Degree and Diploma courses related to Textile designing and Fashion Technology

Thus finally you have a wonderful opportunity to learn in demand skills with higher learning opportunities. Come… let's explore the wonderful world of Textiles

1. Job roles

Textile is one of the essential need of the human being. Textiles are present around us in clothing materials, house hold articles, automobile, aircraft, medical products, geo textiles, and various industrial applications. It is impossible to live without textiles. Textile industry is the largest industry in India which offer many employment opportunities and is growing at a rate of 20 - 30% CAGR. As the per capita consumption of textile materials in India is far below the global average, the industry will continue to show robust growth in the next 10 - 15 years. This will create millions of job opportunities in Textile industries at all levels.

Textile Technology course explores different Textile materials, their properties, important application and processing to make final products.

VHSE course in Textile Technology provides the candidates with hands-on and theoretical knowledge that prepares them for technician level jobs in the textile and allied industries. This is a great opportunity to learn in-demand job skills.

PUBLIC SETCOR

• Lab assistant

• Trades man in Polytechnic Colleges

• Technical assistant in Textile mills

• Technical assistant in textile research organization

PRIVATE SECTOR

• Skilled Technician in Textile Industry

• Junior technician

• Lab technician

• QC inspector

• Textile processing technician

• Weaving machine operator

SELF EMPLOYMENT

• Handloom Weaving Unit

• Power loom Unit

• Textile Processing Unit

• Wick manufacturing Unit.

• Yarn sourcing

• Fabric sourcing

2. Major Skill

- Warping Technician/Operator
- Sizing technician/Operator

- Weaving Supervisor/Technician/operator
- Dye house technician/Operator
- Textile Printer/Screen Printer

8. Learning outcomes of the course

After completing the course, the learner will be able to:

• Understand basic Concepts in Textile technology

• List the domestic and industrial uses of fibres, yarns and fabrics

• Elaborate on techniques involved in manufacturing of Textile products

• Know the working principles, features and components of machines used for Yarn manufacturing, Fabric manufacturing and Textile Wet Processing

• Demonstrate skill in the mixing of fibers

• Understand the working principles, features and components of machines used in Yarn and Fabric manufacture.

• Demonstration skill in the working of spinning machineries.

• Know the different Winding techniques

• Demonstrate the skill in the manufacturing of Fabrics

• Know the standards & specifications of systems and products

• Know the safety guidelines

9. Course structure

Module No.	**Module Name**	**No. of periods**
MODULE I	Textile Fibers	340
MODULE II	Yarn manufacture	340

MODULE III	Weaving technology	340
MODULE IV	Textile dyeing and printing technology	340

10. Syllabus:

Module 3 : Weaving technology

Periods: 340

Unit	Name of unit	Periods
1	Weaving preparatory processes:	100
2	Handloom	40
3	Power loom	140
4	Fabric structure	60

Module 4 : Textile dyeing and printing technology

Periods: 340

Unit	Name of unit	Periods
1	Preparatory processes for dyeing and printing	100
2	Classification of textile dyes based on water solubility:	20
3	Dye application on cotton textile	120
4	Textile printing	100

11. Learning outcomes of the units (module-wise)

Module 3

3.1 Weaving preparatory processes

Definition of weaving preparatory process

Various steps involved in preparatory process

3.1.1 Warp winding

Definition of Warp winding process

Objectives of warp winding process

Understand the working of drum driven and spindle driven warp winders

State the functions of various components of warp winding machines

Names the different types of knots employed in winding

3.1.2 Warping

Objectives of warping

Various method of warping

Differentiate beam warping and sectional warping

Various components used in warping machines and its function

Describe the working of sectional warping machine

State the limitations of sectional warping machines

3.1.3 Sizing

Objectives of sizing

List the ingredients used in the size paste

Function of each ingredients in size mixture

Sizing diagram

Suggest receipe for coarse , medium and fine cotton yarns

3.1.4 Weft winding

Objects of weft winding

Describe parts of weft winding machine

Types of Weft winding machines.

Passage of yarn through a weft winding machines

3.1.5. Drawing-in

Describe drawing-in process.

Understand the heald hooks and reed hooks

Know the calculations to find heald count.

Know the calculations to find reed count

Selection of suitable heald and reed for different types of fabrics

3.2 Handloom

3.2.1 Types of handlooms:

Frame looms

Pit looms

3.2.2 Parts of handloom:

weavers beam,

Back rest,

Lease rods,

Healds,

Reed,

Shuttle box,

Side levers,

Sley,

Treadles,

Front beam

Cloth rollers and etc.

3.2.3 Sketch the passage of warp yarn through a hand loom .

Study the working of hand loom

3.2.4 Define

Design,

Draft

Peg plan

Treadiling plan

Types of designs for hand looms

Preparation of draft using minimum number of healds

Preparation of peg plan from design and draft

Marking of treadiling plan .

3.3 Power loom

3.3.1 Classification of powerlooms:

Conventional type of power loom.

Brief study of Automatic power looms

Brief knowledge about Terry looms.

3.3.2 Primary motions in power looms

1).Shedding :

Define sheds

Describe objectives of warp shedding.

Study of tappet shedding mechanism

Study of dobby shedding mechanism

Study of Jacquard shedding mechanism.

a). Various kind of sheds

Study of open shed,

Semi open shed and fully open shed

Study of closed shed

Center closed and bottom closed shed

b). Classification of shedding mechanisms

Study of negative shedding mechanisms

Study of positive shedding mechanisms

Compare positive and negative shedding mechanisms

2).Picking:

Describe objects of picking.

Study various types of picking mechanism used in power looms.

Study of :-

Various types Shuttles,

shuttle boxes,

Picking stick,

Pickers,

Picking tappets,

Study of overpicking mechanisms,

Study of underpicking mechanism.

Brief understand of shuttleless picking mechanism.

3). Beating Up

Objects of beating up motions

Study of important parts in beating up mechanism

Study of eccentricity of slay

3.3.2 Secondary Motions

1). Warp Let off motions

Objects of let off motions

Classification of let off motions

Study of negative Let-off motion-Chain lever principles

Brief study of positive let off motions

2). Takeup motions

Objects of Take up motions

Classification of Take up motions

Detailed study of seven wheel take up motions

3.3.3 Auxiliary motions

Objects of auxiliary motions

Study of :-

1.)Warp protector motions

Detailed study of loose reed motions

Detailed study of fast reed motions

2).Study of weft stop motions.

Detailed study of side weft fork motions

3).Study of warp stop motions

Detailed study of mechanical type warp stop motion- Mid jet

4). Study of check strap mechanism

5).Study of shuttle boxes

6) Study of break mechanism

3.3.4 Describe timing diagram of Plain power loom.

Calculations related to production of plain power looms.

Speed calculations related to power looms

3.4 Fabric structure

3.4.1 Describe the different types of Designs

Definition of Textile Designs

Use of design/Pointed paper in Textile designing

Classification of fundamental Textile Designs

3.4.2 Study of Plain weave structure and its modifications

Characteristics of plain weave

Importance of plain weave

Modifications of plain weave:-

Decorative ornamentations

Structural ornamentations

Combination of Decorative and Structural ornamentations

Huck a Back

Honey comb

3.4.3 Study of twill weaves structure and its Classifications

Characteristics of Twill weave

Importance of motif

Types of twill weave

Left hand twill

Right hand twill

Warp faced twill

Weft faced twill

Even faced twill

High angled twill

Low angled twill

3.4.4. Modifications of twill weave

Rearranged twills

Cork screw Twill

Satins

Broken Twill

Broken and reversed

Combined twill

Wavy twill

Diamond twill

Module 4

4.1 Pre treatments for dyeing and printing

4.1.1 Describe the objects of grey fabric Desizing process.

Study the various methods of desizing.

4.1.2 Describe the objects grey fabric/yarn scouring process

Study the various methods of scouring .

Study of chemicals used for scouring.

Brief Study of machineries used for scouring

4.1.3 Describe the objects of grey fabric/yarn bleaching process

Study the various classification of bleaching agents.

Study the various methods of bleaching .

4.2 Classification of Textile Dyes based on water solubility

4.2.1 Describe the characteristic properties of soluble dyes

4.2.2 Describe the characteristic properties of Insoluble dyes

4.3 Application of dyes on cotton Textiles

4.3.1 Study of :-

Concepts of ML ratio,

Percent shade,

Rate of exhaustion,

Fastness properties,

Strength of solutions.

4.3.2 Describe the concept of dyeing:

Preparation of Dye solution,

Leveling agents

Exhausting agents,

Dyeing assistants

Effect of temperature.

Study the concept of standing bath.

Study concept of after treatments and stripping.

4.3.3 Describe the properties of direct dyes.

Study the application of direct dyes on cotton textiles

Chemical used and its functions

4.3.4 Describe the properties of reactive dyes.

Study the application of reactive dyes on cotton textiles

Chemical used and its functions

4.3.4 Describe the properties of vat dyes.

Study the application of vat dyes on cotton textiles

Chemical used and its functions

4.4 Textile Printing

4.4.1 Definition of Textile printing

4.4.2 Describe Methods of printing;

Hand block printing

Screen printing

4.4.3 Describe Styles of Textile printing

Direct style,

Resist style

Heat transfer style

Discharge styles.

Mordant style

Dyed style

12. Scheme of work

Month	Name of unit	Periods
	Weaving preparatory process	
Jun	Warp winding	25
	warping	25
	Sizing	20
	Weft winding	20
	Drawing-in	10
	Handloom	
July	Types of handlooms	5
	Parts of handloom	10
	Sketch of yarn passage	5
Aug	Design, draft and peg plan	15
	Working of handloom	5
	Power loom	
Sep	Types of power loom	15
	Primary motions	
	Shedding : tappet, dobby and Jacquard	35
	Picking: Shuttle, shuttleless	35
	Beat UP:	20
Oct	Secondary motions : Let-off motions Take up motions	20
	Auxiliary motions; Warp stop motion Weft stop motion	15
	Fabric structure	
	Textile Designs:	15
	Plain weave structure and its modifications	15
	Twill weaves structure and its Classifications	15
	Modification of Twill weave	15
	Pre Treatments for dyeing and printing	
Nov	Desizing	30
	Scouring	35
Dec	Bleaching	35
	Classification of textile dyes based on water solubility	
	Soluble types of dyes	10
	Insoluble types of dyes	10
	Dye application on cotton textiles	
	Direct dyes	40
Jan	Reactive dyes	40
	Vat dyes	40
	Textile printing	
Feb	Methods of printing	50
	Styles of printing	50

13. Structure of module 3

Unit No.	Name of unit	Periods
3.1	**Weaving preparatory process**	
3.1.1	Warp winding warping	25
3.1.2	Warping	25
3.1.3	Sizing	20
3.1.4	Weft winding	20
3.1.5	Drawing-in	10
3.2	**Hand loom**	
3.2.1	Types of hand looms	5
3.2.2	Parts of hand loom	10
3.2.3	Sketch of yarn passage	5
3.2.4	Design, draft and peg plan	10
3.2.5	Working of hand loom	10
3.3	**Power loom**	
3.3.1	Types of power loom	15
3.3.2	Primary motions	
1.	Shedding : Tappet, Dobby Jacquard	35
2.	Picking: Shuttle, Shuttles	35
3.	Beat Up	20
3.3.3	Secondary motions Let-off motions Take up motions	20
3.3.4	Auxiliary motions Warp stop motion Weft stop motion	15
3.4	**Fabric structure**	
3.4.1	Textile designs	15
3.4.2	Plain weave structure and its modifications	15
3.4.3	Twill weaves structure and its Classifications	15
3.4.4	Modification of Twill weave	15

14. Structure of module 4

Unit No.	Name of unit	Periods
4.1	**Pre treatment for dyeing and printing**	
4.1.1	Desizing	30

4.1.2	Scouring	35
4.1.3	Bleaching	35
4.2	**Classification of textile dyes based on water solubility**	
4.2.1	Soluble dyes	10
4.2.2	Insoluble dyes	10
4.3	**Application of Dyes on cotton textiles**	
4.3.1	Direct dyes	40
4.3.2	Reactive dyes	40
4.3.3	Vat dyes	40
4.4	**Textile printing**	
4.4.1	Methods of printing	50
4.4.2	Styles of printing	50

15. Classroom Activities

- Presentation through Power point
- Exhibitions of products
- Preparation of charts
- Video presentation
- Preparation of diagrams
- Animated CDs
- Group Discussions
- Debate
- Seminars
- Questionnaire preparation
- Assignment
- Mock interviews
- Project Work
- Demonstration
- Quiz
- Survey
- Sample collection

16. Practical activities (general)

Unit No.	Name of unit	Practical
3.1	**Weaving preparatory process**	
3.1.1	Warp winding	• Warp winding practice in hand operated winders
3.1.2	Warping	• Warping practice on vertical and horizontal hand operated warping machines • Sketch and labeling of passage of warp yarn through above mentioned warping machines
3.1.3	Sizing	• Different types of sizing- • Hank sizing practice • Street sizing practice
3.1.4	Weft winding	• Weft winding practice on hand operated winders • Sketch and passage of yarn through a weft winding machines
3.1.5	Drawing-in and Denting	• Drawing of warp ends in various orders – practice • Denting practice • Calculations to find out Heald count and Reed count
3.2	**Hand loom**	
3.2.1	Types of hand looms	• Classification of handlooms • Sketch and labeling of Frame loom and Pit loom
3.2.2	Parts of hand loom	• Sketch and marking of important parts of hand looms
3.2.3	Sketch of yarn passage	• Sketch the passage of warp yarn in a handloom and label the parts
3.2.4	Design, draft and peg plan	• Preparation of various designs, Identify the suitable draft for each designs • Preparation of peg plan and treadling plan for the designs
3.2.5	Working of hand loom	• Find out the draft of the loom ,mark peg plan and treadling plan • Tie up the loom as per the peg plan for weaving • Weave the design on the loom
3.3	**Power loom**	
3.3.1	Classification of power loom	• Classification of power looms- • Ordinary power loom

		• Automatic power loom • Shuttles looms
3.3.2	Primary motions	•
1	Various types of Shedding mechanisms and types of Shuttles	• Sketch and labeling of shedding tappet. • Sketch and labeling, and classification of dobby shedding mechanisms. • Sketch and labeling of single lift single cylinder Jacquard shedding mechanism. • Timing circle and timing of plain tappet shedding. • Sketch the passage of warp yarn through a ordinary power loom and label the parts • Sketch and labeling of various types of shuttles • Setting of shedding mechanism • Dismantle and assemble the shedding mechanism • Identify the parts of shedding mechanisms
2	Shuttle Picking and shuttle less Picking	• Classification of picking mechanism: Under picking and Overpicking • Sketch and labeling of under picking mechanism and over picking mechanism • Sketch and label the passage of yarn through any one type of shuttles loom • Identify the parts of picking mechanisms
3	Beat Up	• Sketch and identify the various parts in the beat up motion • Dismantle and assemble the beat up mechanism • Study the setting of beat up mechanism for proper working • Study the eccentricity of the slay • Identify the parts of Beat up mechanisms
3.3.3	Secondary motions: Let-off motions	õ Study of Negative let-off motions.

	Take-up motions	õ Sketch and identify the various parts õ Dismantle and Assemble the parts õ Study the setting for proper working õ Study of seven wheel Take up motions. õ Sketch and identify various parts õ Dismantle and assemble the parts õ Study the setting for proper working
3.3.4	Auxiliary motions warp & weft stop motion	õ Warp stop motions õ Study of Mechanical warp stop motion with the help of sketch and identify the important parts õ Study of side weft fork motions õ Sketch and identify various parts. õ Dismantle and assemble the parts
3.4	**Fabric structure**	
	Types of weaves	
3.4.1	Plain	• Prepare Plain design ,draft, peg plan and treadling plan for plain and its derivatives • Weaving practice
3.4.2	Twills	• Prepare Twill design with various motifs, draft, peg plan and treadling plan for Twill weaves in different mottiffs. • Weaving practice
3.4.3	Modification of Twill weaves	• Prepare Design ,draft,pegplan Tei up and treddling plan for the following designs. • Horizontal and vertical designs • Diamond Designs • Huck a back • Honey comb • Mock Leno • Any designs with Two tradles other than Plain • Any designs with Three tradles • Any designs with Three tradles

		• Preparation of Designs from Draft and Peg plan
4.1	**Pre-Treatment given to textile materials for Textile dyeing and printing**	
4.1.1	Desizing	• Desizing gey fabric using dilute HCl .
4.1.2	Scouring	• Scour the fabric/Yarn using dil. ailkali(sodium hydroxide and sodium carbonate) – open vessel.
4.1.3	Bleaching	• Bleach the given scoured fabric/yarn using :- • 1. Bleaching powder • 2. Hydrogen peroxide • 3. Sodium Hypochlorite • 4. Potassium Permanganate:
4.2	**Classification of textile dyes based on water solubility**	
4.2.1	Soluble types of dyes	• Solubility test • Identification of water soluble dyes • Prepare a chart of soluble dyes including Trade names of the dye
4.2.2	Insoluble types of dyes	• Solubility test • Identification of water insoluble dyes • Prepare a chart of insoluble dyes including Trade names of the dye
4.3	**Dye application on cotton textiles**	
4.3.1	Direct dyes	• Application of direct dyes on cotton – various shades and colours • After treatments given to direct dyed materials to improve- • Fastness to Light • Fastness to wash • Fastness to Light & wash • Fastness to Perspiration
4.3.2	Reactive dyes	• Application of reactive dyes on cotton – various shades and colours •
4.3.3	Vat dyes	• Application of vat dyes on cotton – various shades and colours
4.4	**Textile printing**	

4.4.1	Methods of printing	• Printing of cotton fabrics using blocks with direct dyes • Printing of cotton fabrics using Screen with pigment colors. • Develop design using Batik style in mono colors and multi colors • Develop designs using Tie and dye to produce mono colors and multi colors • After treatments given to printed materials – practice

PART B

NTK Overview of Module 3

The objective of the course is to introduce the basic concepts of woven fabric manufacturing to the students of Textile Technology. The course material has been designed to create interest among students and sharpen their analytical ability.

After attending this course, the students will be able to understand and analyze the preparatory processes of weaving like winding, warping and sizing. They will also be able to analyse various mechanisms of shuttle looms like shedding, picking, beat-up, take-up and let-off.

More emphasis has been given on the fundamental aspects so that the students get the opportunity to think and learn rather than memorize and learn. All the equations have been derived so that students can understand the contexts better and this has been supplemented with some numerical problems at the end of each module. Some common descriptive part which requires memorizing has been deliberately avoided. This pithy course material is not a substitute of standard text books. Students are suggested to read text books for the details.

1.

18. Unit-wise (about the unit)

Unit 1 : Weaving preparatory processes

Study of warp winding, warping, Sizing, gaiting and Weft winding and Drawing-in process

Unit 2: Hand loom

Study of various types of hand looms, parts of hand looms and its functions.

Sketch the passage of warp yarn through a hand loom.

Study of Textile Designs, drafts and peg plan.

Weaving practice on hand loom

Unit 3: Power loom

Study of various types of power looms and accessories. Functions of accessories.

Primary motion

Study of various types of Shedding tappets, dobby and Jacquards

Study of various types of Picking methods – Shuttle and shuttles

Study of Beating-up motion

Study of Secondary motions -

Let-off,

Take-up,

Study of Auxiliary motions

warp & weft stop motion

Unit 4: Fabric structure

Study of various types of fundamental weaves – Plain and its derivatives, Twills and modification of twill weaves.

19. Unit grid

Ideas/concepts/skills	Learning outcomes	Suggested Activities	Assessment
Warp winding	To wind continuous yarn without yarn irregularities for warp preparation Able to calculate approximate quantity of yarn required for a specific length of warp	Calculate the quantity of yarn required . Identify the Ends/inch in the warp. Decide the length of warp required for a particular length of cloth.	Warp winding practice Calculations related to the quantity of warp yarn required in Kgs and in Pounds
Warping	Study of warping machines and components-Both hand driven and power driven. Speed calculations	Preparation of warp in various lengths and various ends/inch. Adjustments of warp width with density. Identifications of speed change places	Warp winding practice in vertical and horizontal warping machines(Hand driven)
Sizing	Study of various types of hand sizing used in hand loom industry. Study of various ingredients and its functions Study of various sizing machines and its components. Functions of important parts of sizing machines. study of size recipe .	Sizing practice – for hand loom. Preparation of size mixture - adjustment of viscosity and its ingredients	Sizing practice using various recipe. Hank sizing practice
Weft winding	Study of hand operated pirn winder General study of pirn winding machines and its accessories.	Weft winding practice using hand operated winder. Sketch the passage of yarn through ordinary and automatic pirn winders	Practice on weft winding.
Drawing-in	Study the passage of warp yarn through hand loom and power loom	Place the warp beam in the position of back frames – pass over back rest ,insert leases,draw the ends through heald and reeds , pass over he front rest and connect to cloth roller through the guide roller	Practice – Leasing, drawing-in, denting –in and piecing of new warp thread to the end of old warp
Types of Hand looms	Study of various types of hand loom like Pit looms and Frame looms	Sketch the diagram of loom Describe the importance of pit looms and frame looms	Sketch and discussion
Parts of hand looms	Study of important	Sketching the parts	Sketch and

	parts of power loom Warp beams Back rest Front rest Guide rollers Cloth rollers Lease rods Healds Reeds Mail eyes Dents Slay Slay sword Shuttle box Pickers Temples Side levers Top levers Treadle levers	Materials used for each parts Reed calculation Heald calculation Practice in weaving	discussion, Identification of parts
Sketch of warp yarn passage	Study he passage of warp yarn passage in hand loom	Sketch thewarp yarn passage and mark important parts	Sketch and Labeling of parts
Design ,Draft and Peg plan	Definition of design, draft and peg plan	Discuss the various types of design ,draft and peg plan	Drawing, Sample collection Identification of various designs
Working of hand looms	Weaving practice	Weaving practice	Weaving of different designs on hand looms
Types of power looms	Study various classification of power looms Plain, twill, automatic Brief study of automatic looms	Sketch the yarn passage through ordinary power loom and mark important parts	Sketch and labeling of important parts of power looms
Shedding	Study various types of shedding mechanisms-tappet, dobby and jacquard	Sketch and labeling of tappet, dobby and jacquard shedding mechanisms. Mechanisms of tappet, dobby and jacquard Timing cycle of tappet shedding mechanism	Sketch and labeling of important parts of tappet ,dobby and jacquard shedding mechanisms
Picking	Study various types of Picking mechanisms Study of positive picking, compare positive and negative picking Study of shuttles	Sketch and explain various types of shuttles Study of classification of shuttles picking	Sketch and labeling of important parts of picking mechanisms.

	picking		
Secondary motions	Study of Secondary motions- Let-off motions Take up motions	Sketch and labeling of important parts and working of Let-off motions Take up motions	Sketch and labeling of important parts of secondary motions Let-off motions Take up motions
Auxiliary motions	Study of Auxiliary motions Warp stop motions Weft stop motions	Sketch and labeling of important parts and working of Warp stop motions Weft stop motions	Sketch and labeling of important parts of Auxiliary motions Warp stop motions Weft stop motions
Fabric structure	Study the definition of Design Study various types of plain and twill weaves Study of modification of plain weaves-decorative and structural ornamentation Classification of twill weaves Modification of twill weaves	Mark the weaves in graph papers	Mark the weaves in graph paper

20.Addiional information

21.Assessment activities

Seminar

Project work

Written test

22. List of items in portfolio

23. At the end of the module 3

1.Extended activities

Field visits

Samples collection

Preparation of fabric samples record and design record

Chart preparation

2.List of practical

Warp winding

Sectional warping

Calculations related to warping

Select suitable reed for various types of warp

Identification of warping machine parts

Preparation Size recipe for various types of yarns.

Sizing calculations

Drawing in and gaiting in practice

Identify the parts of pirn winding machine

Identify the parts of handloom

Weaving in handlooms

Calculations related to Weaving

Identify the parts of power looms

Study of primary motions in power looms

Study of secondary motions in power looms

Study of auxiliary motions in power looms

Study of loom calculations in power loom

Study of production calculations in power loom

Study of various designs suitable for plain and twill looms.

24. Overview of Module 4

This module is designed to equip the learner with knowledge and skills required to work in a textile processing unit . The module consists of pre treatment given to fabric/yarn for dyeing and printing. . Study of various classification of textile dyes-based on solubility .Study of application of Direct dyes,Vat dyes and Reactive dyes on cotton material.

Study of various after treatment given to direct dyed materials to improve their fastness properties.

Brief idea about textile printing. Study of various methods of textile printing.

Study various styles of textile printing. Preparation of printing paste. After treatment given to printed materials

25. Unit-wise (about the unit)

Unit 1 :

Pre treatment given to textile materials for dyeing and printing

Study the objects of de-sizing, chemicals used for de-sizing, various types of de-sizing

Study of the objects of scouring, methods of scouring, chemicals used for scouring.

Brief study of machineries used for scouring

Study of the objects of bleaching, various classification of bleaching agents, various chemicals used for bleaching, method of bleaching

Unit 2:

Classification of textile dyes

Study of various classification of textile dyes based on the solubility. Characteristics of direct dyes. Method of application of direct dyes on cotton. After treatments given to direct dyed material to improve their fastness to Light, washing and perspiration. Reagents used in dyeing and after treatments and its functions.

Brief study of characteristic of reactive dyes. Method of application of reactive dyes on cotton. Reagents used in dyeing and its functions.

Brief study of characteristic of vat dyes. Method of application of vat dyes on cotton. Reagents used in dyeing and its functions

Unit 3

Textile Printing

Study the definition of textile printing. Study of various methods of printing. Study of various styles of production of patterns on textile materials. Preparation of printing paste. Ingredients used in printing paste and its function. After treatment given to printed materials.

26. Unit Grids

Module 4

Ideas/concepts/skills	Learning outcomes	Suggested Activities	Assessment
Unit 1 4.1.1Preparatory process for dyeing and printing: Desizing	Study of various types of de sizing	Remove size material from fabric using different de sizing agents	Practice using different de sizing agents
4.1.2 Scouring	Study of importance of scouring Reagents used in scouring and its functions Study different types of scouring Study of kier	Scouring practice using chemicals Both fabric and yarn	Practice scouring using chemicals Precautions when using chemicals
4.1.3 Bleaching	Study of various bleaching agents like – chlorinated and non chlorinated ,oxidized and reduced types with examples	Identification of reagents based on the classification	Identify reagents Preparation of bleach solution Measure the concentration of solution
Unit 2 4.2.1 Classification of textile dyes based on water solubility	Study of soluble dyes Study of insoluble dyes	Identify the soluble dyes using solubility test Identify the insoluble dyes using solubility test	Practice solubility test and identify soluble dyes and insoluble dyes
Unit 3 4.3.1Dye application	Study of method of application of direct	Dyeing practice with various dyes with	Dyeing practice with dyeing various colors

on cotton	dyes on cotton in various shades. Reagents used and its functions After treatments given to direct dyed material.	shades After treatment for improving Light, wash and perspiration fastness properties	and shades After treatments the dyed materials with suitable reagents for improve fastness Calculate the quantity of dye and reagents required for a particular quantity of materials
4.3.2Reactive dyes	Study of method of application of reactive dyes on cotton in various shades. Reagents used and its functions	Dyeing practice with various colours with different shades.	Dyeing practice with dyeing various colors and shades Calculate the quantity of dye and reagents required for a particular quantity of materials
4.3.3Vat dyes	Study of method of application of vat dyes on cotton in various shades. Reagents used and its functions	Dyeing practice with various colours with various shades	Dyeing practice with dyeing various colors and shades Calculate the quantity of dye and reagents required for a particular quantity of materials
Unit 4 4.4.1Textile Printing Methods of printing	Printing of cotton fabrics with various methods using hand block and screens. After treatments given to printed materials – practice	Printing practice with various dyes with shades Printing practice with various methods using with hand block and screens.	Identify the various method of printing Collect the samples of various types of printing
4.4.2 Styles of printing	Printing of cotton fabrics with various methods using hand block and screens. After treatments given to printed materials – practice	Identify printed materials using various styles of printing. Production of designs using various styles of printing on fabric	Identify the various style of printing Collect the samples of various types of printing

27.Addiional information

28.Assessment activities

Seminar

Project work

Written test

29. List of items in portfolio

30. At the end of the module 4

1. Extended activities

   Field visits

   Samples collection

   Preparation of Bleached, Dyed and printed samples record

   Chart preparation

2. List of practical

   Scouring

   Bleaching

   Application of Direct dyes on cotton with minimum four colours (light, medium and dark shades)

   After treatment to improve the fastness to light

   After treatment to improve the fastness to wash

   After treatment to improve the fastness to light and wash

   After treatment to improve the fastness to perspiration

   Application of Reactive dyes on cotton with minimum four colors (light, medium and dark shades)

   Application of Vat dyes on cotton with minimum four colors (light, medium and dark shades)

Preparation of printing table for block printing

Preparation of printing paste for block printing.

Print the sample cloth with direct dye (minimum four colors)

After treatment to material printed with direct dye.

Preparation of silk screen for textile printing

Preparation of screen printing paste .

Preparation of printing table for screen printing

Print the sample cloth with screen

After treatment for printed material

31. On -The- Job Training

To expose students to industrial/organizational experience and knowledge

To apply the management theories taught in lecture rooms in real industrial situations

To get a feel of work environment

To improve verbal/written skill with the interaction of industrial colleagues

To increase students job aspects

Activity

One faculty can be appointed as advisor for this industrial training.

Advisor can identify appropriate industry and co- ordinate the programe

Report

At the end of the training, individual report shall be prepared and submitted by each students. The report shall include

Nature and activity of industry/institution/collaborative work

Knowledge gained from the industrial exposure

Contribution to industry/institution/Society, if any, through the programe

Experience gained by the industrial exposure

32. List of Standard equipments and Tools

1. Counting glass - 12 nos
2. Hand looms -4 nos
3. Charka (hand winder) – 4 nos
4. Vertical warping machines (hand driven) -1 nos
5. Sectional warping machines (hand driven) -1 nos
6. Bobbin winder hand driven -1nos
7. Ordinary power loom -4 nos
8. Hand loom attached with dobby -1 nos
9. Hand loom attached with 100 hook jacquard -1 nos
10. Hand loom shuttles -24 nos
11. Power loom shuttles – 24 nos
12. Spanner set Various types- 4 set
13. Screw driver various types- 12 nos
14. Crank shaft spanner – 2 nos
15. Box spanner -2 set
16. Adjustable spanner -2 nos

17. Power line Tester - 2 nos
18. Dent hooks 12 nos
19. Heald hook -12 nos
20. Stainless steel dye pot 500 ml – 4 dozens
21. Stainless steel vessel 20ltr -4 nos
22. Stainless steel vessel 40ltr -4 nos
23. Mortar (grinding vessal) -4 nos
24. Stainless steel electrically heated water bath with six lids – 6 nos
25. Gas stove industrial type with six burners – 2 nos
26. Printing table for block printing 8 x 5 feet- 1 nos
27. Printing table for Screen printing 5.5 x 1.5 meter - 1 nos
28. Hand blocks various types -24 nos

33. List of References

1. Modern Preparation and Weaving Machinery - A Omerod(Butter Worth)
2. Winding - BITRA
3. Fabric forming - Hasmukh Rai
4. Principles of weaving - Marks and Robinson
5. Weaving Mechanism Vol I - N N Banerjee
6. Weaving Mechanisms - Thomas W.Fox
7. Grammar of Textile Designs - NIisbertT
8. Textile designs and Color - Watson
9. Cloth construction - Textile Institute

10. Technology of dyeing - V A Shenai.

11. Technology of Printing - J T Marsh

12. Dyeing & Chemical Technology of textiles - E R Trotman

13. Principles of textile printing - D G Kale

14. Recent process in Textile Bleaching,Dyeing & Finishing -Srivastave

15. Textile Printing - R S Prayag