

#### 4.1. SPINNING TECHNOLOGY-II

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#### RATIONALE

Student of textile technology after completing his diploma has to work in textile mills/textile houses/quality control centres and therefore, he should have knowledge of basic concepts, objectives and working performance, quality, production of Silver Lap Machine, Ribbon Lap Machine, Comber, Doubling Machine Drawing and Simplex Machine etc . Hence this subject is introduced in the curriculum.

#### DETAILED CONTENTS

<b>1.</b>	<b>Drawing</b> <b>(11 hrs)</b>	
1.1	Objects of drawing, passage of material through Draw Frame and functions of different parts (2 hrs)	Demonstrate the passage of material through Draw Frame
1.2	Weighting systems for top rollers on modern draw frame (2 hrs)	
1.3	Factors affecting the roller settings in Draw Frame (1 hr)	roller setting of drafting rollers on draw frame
1.4	Importance and study of various stop motion on modern draw frame (1 hr)	To study the various stop motion
1.5	Object, Principle and working of auto-leveler at draw frame, type of auto leveller. (2 hrs)	
1.6	Work load distribution in draw frame deptt. (1 hr)	
1.7	Drawing of gearing diagram of Draw Frame. Calculations of Speeds, Drafts, Total Drafts, Draft Constant, Tension Draft, Production and Production Constant. (2 hrs)	Practice gearing diagram on draw frame machine. Calculations of speeds of various parts, total drafts, draft constant, tension draft, production and production constant

<b>2.</b>	<b>Combing</b> <b>(31 hrs)</b>	
2.1	Importance and uses of cotton combing sequence of machinery used for the manufacture of combed yarn (conventional and modern) (2 hrs)	
2.2	Preparatory machines for combing and their role (1 hr)	
2.3	Silver Lap Machine (SLM) - its objectives, nomenclature of various parts of SLM, and functions of various parts, passage of material through the machine, gearing diagram (3 hrs)	<ul style="list-style-type: none"> <li>- Sketch and describe the working of SLM.</li> <li>- Practice of gearing diagram of silver Lap Machine ( during mill visits/ industrial training)</li> </ul>
2.4	Ribbon Lap Machine (RLM) -its objects, nomenclature and functions of various parts, passage through the RLM, gearing diagram. (2 hrs)	<ul style="list-style-type: none"> <li>- Demonstration of Ribbon Lap Machine, passage through the machine.</li> <li>- Practice of gearing diagram of ribbon lap machine.</li> </ul>
2.5	Drawing, Lap Formation Combination Lap Winder, Whitin Super Lap Machine and its advantages over Silver Lap Machine. (2 hrs)	
2.6	Combing: its principles, objectives, evaluation of combing, historical development of combing, degree of combing (2 hrs)	
2.7.	Description and working of various parts, passage of material through modern comber (2 hrs)	Demonstration on comber machine, working of various parts and passage through the comber machine (during mill visit/industrial training)
2.8	Combing cycle, combing cycle with reference to relative position of various parts, combing cycle with reference to index numbers (3 hrs)	Demonstration and practice of combing cycle with reference to relative position of various parts and index numbers.
2.9	Study of comber cylinder, top comb, detaching rollers, nippers (2 hrs)	Demonstration of comber cylinder, top comb, nippers

2.10	Comber gearing diagram showing various drives (2 hrs)	Practice of drawing of gearing diagram of comber: Calculate draft, draft constant, production and production constant
2.11	Motions and mechanisms of nippers, top comb mechanism, detaching roller mechanism (2 hrs)	Demonstration of mechanisms of nippers, top comb, detaching roller to see their working with the help of a sketch.
2.12	Comber Noil, method of finding comber noil percentage and factors upon which comber noil depends, how to control comber noil percentage (2 hrs)	.
2.13	Settings and gauges of comber parts - Cylinder to brush - Cylinder to nippers - Nippers settings - Top comb settings (2 hrs)	Practice of setting and gauges of following parts. - Cylinder to brush - Cylinder to nippers - Nippers settings - Top comb settings
2.14.	Difference/comparison between carded and combed yarn (2 hrs)	
2.15	Modern developments in combing (Expert Lecture) (2 hrs)	Modern development to be seen in the mills during mill visits/mill training
<b>3.</b>	<b>Simplex Frame</b> (22 hrs)	
3.1	Introduction and object of Simplex Frame. Nomenclature of various parts, passage of material through the machine (1 hr)	Demonstration and practice for the passage through the simplex machine
3.2	Drafting mechanism, setting and weighting of drafting rollers (1 hr)	Practice of setting drafting rollers
3.3	Various drafting systems used in modern Simplex Machine (1 hr)	Mill visit be arranged to see the working of drafting systems on modern Simplex Frames
3.4	Twisting: twists, selection of twist, Twist multiplier, method of twisting, flyer and its function (2 hrs)	Practice of drawing diagram for the insertion of twist in roving on the machine
3.5	Winding: Principle of winding, bobbin leading and flyer leading system, coiling of roving. (2 hrs)	

3.6	Objective of building motion, construction and working of building motion. (2 hrs)	Practice of drawing of building motion and its operation
3.7	Differential motion: its objectives, principle, study of differential motions used on modern Simplex Machine (2 hrs)	Study and practice of construction and working of differential motion and its operation
3.8	Detailed study of gearing diagram of a Simplex Machine and various drives e.g. spindle drive, bobbin drive, bobbin rail drive, drafting mechanism drive (2 hrs)	Practice of drawing full gearing diagram on the machine showing various drives
3.9	Study of important change places in a Simplex Machine and there effect on material (2 hrs)	Mantling and dismantling of draft change pinion, twist, change wheel, lifter change wheel and ratchet wheel.
3.10	Modern development in the Simplex Machine (1 hr)	Modern developments will be shown in the mill (Mill visit)
3.11	Calculation of production per machine, per shift; calculation of front roll delivery and spindle speed; Calculation of twist per inch and twist multiplier; Calculation of production constant, draft constant, break draft constant and twist constant; Calculation of total draft, break draft and individual zone draft of the machine; Calculation of ratchet wheel, lifter change wheel, draft change pinion for various hanks with the help of gearing diagram of Simplex frame. (6 hrs)	Practice of gearing diagram of simplex frame and calculations relating to parameters as specified in theory.

### INSTRUCTIONAL STRATEGY

Teachers should lay emphasis on clarifying the concepts and principles. Teachers should use various teaching aids to clarify concepts and principles. The teachers should plan assignments so as to promote problem solving abilities and develop continued learning skills.

## RECOMMENDED BOOKS

1. Spun Yarn Technology, Vol.1 Venkatasubramani
2. Cotton Opening and Picking-Gilbert R merril
3. Manual of Cotton Spinning. Vol.-II and part-I, Textile Institute.
4. Opening, Cleaning and Picking by Zoltan S Szaloki
5. Essential Elements of Practical Cotton Spinning by T.K. Pattabhiram
6. Essential Elements of Practical Cotton Spinning by T.K. Pattabhiram
7. A practical Guide to Combing by W Klein
8. Cotton Spinning by WS Taggart
9. Spun Yarn Technology by Venktasubramani
10. Cotton Spinning Calculations By WS Taggart
11. Essential Calculations on practical Cotton Spinning by Pattabhiram
12. Cotton Combing by GR Merril
13. Toward Better Yarn Quality by N Balasubramanian and GK Trivedi
14. Doubled Yarn parts I to V by Coulson A.F.W. and Dakin G

## SUGGESTED DISTRIBUTION OF MARKS

<b>Topic No.</b>	<b>Time Allotted (Hrs)</b>	<b>Marks Allotted (%)</b>
1	11	15
2	31	50
3	22	35
<b>Total</b>	<b>64</b>	<b>100</b>

## 4.2 WEAVING TECHNOLOGY-II

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### RATIONALE

The subject weaving technology will impart awareness and different weaving techniques to produce the good quality of fabric.

### DETAILED CONTENTS

Sr. No.	Theory	Practical
<b>1.</b>	<b>Dobby</b> ( 9 hrs)	
1.1	Introduction to Dobby and its objects (1 hr)	Gait-up of warp on doobby loom
1.2	Introduction to different kind of dobbies with respect to lifts, shed formation, working of pattern cylinders. (2 hrs)	Setting of Cylinder, knives and Feelers of doobby and sketching of the same
1.3	Mechanism and working of different parts of keighley/climax doobby . (2 hrs)	Setting of T-lever  Techniques of levelling heal shafts on Climax doobby loom
1.4	Introduction to paper doobby (1 hr)	Techniques of leveling healdshafts on Paper doobby loom
1.5	Timing of various working parts of doobby. (1 hr)	Preparation of doobby chain. Construction, working and adjustment/setting of various parts of climax doobby with sketch.
1.6	Faults in doobby weaving and their rectification. (2 hrs)	
<b>2.</b>	<b>Box Motion</b> (9 hrs)	
2.1	Introduction to box-motion, its objects and different types of box motion. (1 hr)	Setting up drop-box and its timing.
2.2	Mechanism & working of following box motion: - Eccle's box motion (2 hrs)	Preparation of drop-box chain and working the same on loom
2.3	Chain making for the drop box (2 hrs)	Weaving practice on loom fitted with the doobby.
2.4	Faults in drop box and their rectification (2 hrs)	

2.5	Matching drop box with doobby. (2 hrs)	
<b>3.</b>	<b>Jacquard</b> (10 hrs)	
3.1	Introduction to figure weaving and objects of Jacquard shedding. (3 hrs)	<ul style="list-style-type: none"> <li>- Sketching of various parts of Jacquard,</li> <li>- Mounting of jacquard</li> <li>- Cylinder driving and griffe driving in Jacquard</li> <li>- Tracing 1<sup>st</sup> hook in jacquard</li> </ul>
3.2	Construction and working of various parts of a jacquard. Single and double lift Principles. Single Lift Single Cylinder (SLSC) Jacquard, its limitations. Double Lift Jacquards (with Single and Double Cylinders). Their merits and demerits. Comparison of jacquard weaving with doobby and tappet weaving. (7 hrs)	
<b>4.</b>	Study of mechanism of the following jacquards: Twilling Jacquard, Gauze & Leno Jacquard-Cross Border Jacquard, Fine Pitch Jacquard. (4 hrs)	Comparison of Single lift and Double lift jacquard.
<b>5.</b>	Study of working of various parts of Electronic Jacquard. (4 hrs)	
<b>6.</b>	<b>Harness building</b> (10 hrs)	
6.1	Parts of harness (2 hrs)	
6.2	Straight tie (2 hrs)	
6.3	Pointed tie (2 hrs)	
6.4	Mixed tie (2 hrs)	
6.5	Borders and middle tie. (2 hrs)	
<b>7.</b>	Sequence –wise Preparation of Jacquard Design – Example (from cloth design-graph paper design and Jacquard) (6 hrs)	
<b>8.</b>	Card cutting machine - its working and process of card lacing (chain maker) (6 hrs)	Preparation of harness Practice of Card-punching.
<b>9.</b>	Faults in jacquard weaving and their rectification (6 hrs)	Removal of faults during jacquard weaving Preparation of jacquard chain.

## INSTRUCTIONAL STRATEGY

Teachers should lay emphasis on clarifying the concepts and principles. Teachers should use various teaching aids to clarify concepts and principles. The teachers should plan assignments so as to promote problem solving abilities and develop continued learning skills.

## RECOMMENDED BOOKS

1. Weaving Mechanism by T.W. Fox
2. Rapier Loom-WIRA
3. Shutters Weaving Mechanism-BTRA
4. Weaving Mechanism by N.N. Banerjee
5. Weaving Mechanism by DS Verma
6. Weaving Calculation by Sen Gupta
7. Weaving Technology in India by Kishar
8. Shuttle-less Weaving Mechanism-BTRA
9. Jacquard Ek Saral Vidya (in Hindi and English both) by S.S Satsangi M/s usha publishers (SBB/AC-IV Shalimar Building Delhi-88).
10. Saral Vastra Sangrachna (Simple Fabric Structure – in Hindi) by S.S. Satsangi, M/S Usha Publishers, Shalimar Bagh, Delhi-88

## SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	09	15
2	09	15
3	10	15
4	04	06
5	04	06
6	10	115
7	06	09
8	06	09
9	06	10
<b>Total</b>	<b>64</b>	<b>100</b>



### 4.3 FABRIC STRUCTURE -II

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#### RATIONALE

The students of textile technology after completing their diploma has to work in textile mills/testing houses/quality control centers & have to perform tasks for which knowledge/skills of fabric structure is essential.

#### DETAILED CONTENTS

1. Weft backed cloths, warp backed clothes, Interchanging figured backed clothes, and backed cloth with wadded threads. (09 hrs)
2. Self stitched double clothes, centre stitched double cloth, wadded double clothes (Definition and design only). (06 hrs)
3. Pile Fabrics, Terry and fancy pile fabrics, simple & fancy Terry pile structure, wrap pile production with the aid of wires & on face to face principles, Weft pile fabrics, velveteen. (09 hrs)
4. Damasks (Definition and design only). (06 hrs)
5. Figured warp rib brocades (Definition and design only). (06 hrs)
6. Simple weft face tapestries (Definition and design only). (06 hrs)
7. Gauze and Leno structure (Introduction and principle only) (06 hrs)

#### LIST OF PRACTICALS

1. Study of the methods of calculating and finding the repeat of unit.
2. Methods of calculating various fabric parameters like shrinkage percentage, cloth/100mts, cloth/Mtrs.
3. EPI,PPI, yarn requirements of various fabric samples.
4. Reeds space required during analysis of various fabrics mentioned in theory.

## INSTRUCTIONAL STRATEGY

Student should be able to understand different weaves from fabric samples and by weaving. They must be taken to Textile industries for showing above mentioned various processes.

## RECOMMENDED BOOKS

1. Watson's Textile Design & Colour Part I & II by Z. Grosicki
2. Jacquard – Ek Saral Vidya by S.S. Satsangi , M/S Usha Publishers, 53B/AC IV, Shalimar Bagh, Delhi 88

## SUGGESTED DISTRIBUTION OF MARKS

<b>Topic No.</b>	<b>Time Allotted (Hrs)</b>	<b>Marks Allotted (%)</b>
1	09	20
2	06	15
3	09	15
4	06	06
5	06	06
6	06	115
7	06	09
<b>Total</b>	<b>48</b>	<b>100</b>

## 4.4 TEXTILE PROCESSING II

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### RATIONALE

A diploma holder in Textile Technology must have the requisite knowledge and skill about various processing of textile i.e. bleaching, printing and finishing etc. Hence this subject.

### DETAILED CONTENTS

1. Classification of dyes, general terms used in dyeing on basis of methods of application (04 hrs)
2. Principle of dyeing (04 hrs)
3. Dyeing of cotton with (12 hrs)
  - a) Direct dyes
  - b) Reactive dyes
  - c) Sulphur dyes
  - d) Vat dyes
4. Dyeing of wool with (08 hrs)
  - a) Acid dyes
  - b) Metal complex dyes
5. Dyeing of silk with (08 hrs)
  - a) Acid dyes
  - b) Basic dyes
6. Dyeing of polyester with disperse dyes (08 hrs)
  - a) Carrier method
  - b) High temperature method
7. Dyeing of acrylic with basic dyes (04 hrs)
8. Introduction to natural dyes (04 hrs)
9. Basic machinery used in dyeing-Jigger, winch, padding manglo, fibre dyeing and hank dyeing, principle and working. (12 hrs)

## LIST OF PRACTICALS

1. Dyeing of cotton with direct dyes
2. Dyeing of cotton with reactive dyes
3. Dyeing of cotton with sulphur dyes
4. Dyeing of cotton with vat dyes
5. Dyeing of wool with acid dyes
6. Dyeing of wool with metal complex dyes
7. Dyeing of silk with acid dye
8. Dyeing of silk with basic dyes
9. Dyeing of polyester with disperse dyes
10. Dyeing of acrylic with basic dyes
11. Extraction and application of natural dyes on cotton
12. Extraction and application of natural dyes on silk
13. Extraction and application of natural dyes on Wool

## INSTRUCTIONAL STRATEGY

Use of audiovisual aids should be made to show specialized operations. Expose the students to real life problems. Stress should be given to acquaint the students with relevant industrial practices.

## RECOMMENDED BOOKS

1. Technology of dyeing by VA. Shehnai
2. Dyeing and Chemical Technology of textile fibre by ER. Trotman
3. Chemistry and Principle of Dyeing by VA. Shehnai
4. Dyeing of wool and silk by RS.Paryag
5. Dyeing of silk by VA. Shehnai

## SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	04	07
2	04	07
3	12	18
4	08	12
5	08	12
6	08	12
7	04	07
8	04	07
9	12	18
Total	64	100

## 4.5 MINOR PROJECT WORK

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Minor Project aims at exposing the students to experiments on the practice aspect to end product. The student has to select a type of minor project in the specialized areas of spinning, weaving, textile design and wet processes in the textile industry or different organisations or in the particular college/institution laboratories to enhance the competencies in the different fields as mentioned above. The minor project work should be individual assignment or a group assignment depending upon the situation. The areas covered under these industries may be related to production, maintenance, quality control, designing, development, product, quality and waste control etc.

The level of the project selected should not be too complex which is beyond the level of the students. The students may be assessed both by industry and polytechnic faculty

Projects for spinning/weaving/chemical processing: student has to select a topic from the knowledge which he has gained up to 4<sup>th</sup> semester. He will study in that field (either in industry or institute) and make a project report giving conclusions of study.

The teachers alongwith industry personnel will conduct performance assessment of students. The criteria for assessment will be as below:

Criteria	Weightage
Attendance and punctuality	15 percent
Initiative	15 percent
Relations with people	15 percent
Report Writing	25 percent
Presentation/Seminar	30 percent

## **ENTREPRENEURIAL AWARENESS CAMP**

This is to be organized at a stretch for two to three days during fourth semester. Lectures will be delivered on the following broad topics. There will be no examination for this subject

1. Who is an entrepreneur?
2. Need for entrepreneurship, entrepreneurial career and wage employment
3. Scenario of development of small scale industries in India
4. Entrepreneurial history in India, Indian values and entrepreneurship
5. Assistance from District Industries Centres, Commercial Banks, State Financial Corporations, Small industries Service Institutes, Research and Development Laboratories and other financial and development corporations
6. Considerations for product selection
7. Opportunities for business, service and industrial ventures
8. Learning from Indian experiences in entrepreneurship (Interaction with successful entrepreneurs)
9. Legal aspects of small business
10. Managerial aspects of small business