5.1 SPINNING TECHNOLOGY-III

L	T	P
4	-	4

RATIONALE

Student of textile technology after completing his diploma has to work in textile mills/textile houses/quality control centres and therefore, should have knowledge of basic concepts, objectives and working performance, quality, production of Ring frame, Doubling Machine. Similarly the student can get job in the Woolen/Worsted mills. He should have the knowledge of basic concepts and objectives of machinery used in the woolen and worsted mills. He can also get job in the maintenance depart of the spinning mills, so he should acquire the basic knowledge of maintenance also. Hence this subject is introduced in the curriculum.

DETAILED CONTENTS

Sr. No.	Theory	Practicals
1.	**Ring Frame** **(6 hrs)**	
1.1	Introduction and objectives of a Ring Frame, nomenclature of various parts of a Ring Frame, passage of material through it (2 hrs)	Practice of passage of material through Ring Frame
1.2	Drafting, function of the drafting system, study of top arm drafting system, apron drafting, advantages of apron drafting. (2 hrs)	Practice of drafting roller settings. Mill visit be arranged to see top arm weighing system
1.3	Introduction to rings, sizes and different types of rings, ring travellers, its functions, types of ring travellers, their sizes. Numbering of ring travelers (2 hrs)	Practice on ring and ring traveller, spindle gauge/setting. Selection of ring travellers for different Counts
2.	**Twisting** **(2 hrs)**	
2.1	Insertion on of twist into the yarn, S and Z twists, effect of twist on yarn, selection of TM for various counts, ring and travellers speeds (2 hrs)	Practice of inserting S and Z twist in the yarn and draw sketches.

3.	**Winding (23 hrs)**	
3.1	Building motion mechanism, insertion of coil on bobbin. Yarn ballooning, yarn ballooning control rings, separators, lappets. (2 hrs)	Practice of drawing and setting of building motion of ring frame.
3.2	Reasons for end breaks and their remedies on Ring Frame (2 hrs)	
3.3	Principle of Auto doffing at Ring Frame (2 hrs)	
3.4	Principle of variable pulley speed at Ring Frame (1 hr)	
3.5	Workload distribution at Ring Frame (2 hrs)	
3.6	Gearing diagram of Ring Frame (3 hrs)	Practice of drawing gearing diagram of Ring Frame
3.6.1	Calculation of spindle speed, front roll speed, production per shift per machine (2 hrs)	Calculation of spindle speed and Front Roller speed of Ring Frame and calculation of production of machine per shift.
3.6.2	Calculation of total draft, break draft and individual zone draft. (2 hrs)	Calculation of total draft, break draft and individual zone draft.
3.6.3	Calculation of twist per inch and twist multiplier. (2 hrs)	Calculation of TPI and Twist Multiplier ™.
3.6.4	Calculation of production constant, draft constant, break draft constant and twist constant. (2 hrs)	Calculation of production constant, draft constant, break draft constant and twist constant.
3.6.5	Calculation of traveler speed (1 hrs)	Calculation of traveler speed.
3.6.6	Calculation of yarn content on bobbin (2 hrs)	Calculation of yarn content on bobbin.
4.	**Doubling (20 hrs)**	
4.1	Objects of Ring Doubling, Doubling, and its effects, dry and wet systems of doubling (2 hrs)	Practice of passage of yarn through Ring Doubling Machine. Different parts and their working.
4.2	Twist insertion in ply yarn, types and amount of twist. Factors effecting the multiplier for double yarn (2 hrs)	Practice to find the direction of twist in ply yarn.

4.3	Yarn defects and their causes and remedial measures in doubling machine (Expert Lecture) (2 hrs)	
4.4	Improvement in quality and productivity performance of a doubling machine (Expert Lecture) (2 hrs)	
4.5	Working principle of TFO (2 hrs)	Demonstration of working of TFO during mill visit / training.
4.6	Gearing diagram showing various drives of a Ring Doubling Machine (3 hrs)	Practice of drawing gearing diagram on Ring Doubling Machine
4.6.1	Calculation of production per machine, production constant. (2 hrs)	Calculation of production per machine and production constant
4.6.2	Calculation of spindle speed, delivery Roll speed (2 hrs)	Calculation of spindle speed, delivery roll speed
4.6.3	Calculation of twist per inch/twist Multiplier and twist constant of the Machine (3 hrs)	Calculation of twist per inch/twist Multiplier and twist constant of the Machine
5.	**General Calculations (6 hrs)**	
5.1	Calculation of resultant count and average count	Calculation of Resultant Constant, Average Count, Yarn Diameter,
5.2	Calculation of resultant count where yarns are made from different types of fibres	
5.3	Calculation of different types of yarn's diameter	
5.4	Calculation of balancing of machines in different sections for a particular spin plan requirement.	
6.	**Sequence of machinery used in the production of woolen yarn and worsted yarn and their brief description (4 hrs)**	
6.1	Woolen System (1 hr)	
6.2	Worsted system (1 hr)	
6.3	Difference between Woolen & Worsted yarn (2 hrs)	
7.	**Maintenance (3 hrs)**	
7.1	Preventive & Breakdown Maintenance in a spinning department/unit (2 hrs)	
7.2	Various maintenance schedules adopted in a spinning mill (1 hr)	

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.3 and 4 by Venkat Subramani
2. Cotton Drawing and Roving by GR Merril
3. Cotton Ring Spinning by GR Merril
4. Manual of Cotton Spinning by Textile Institute
5. Cotton Spinning by WS Taggart
6. A practical guide to Combining and Drawing by W Klein
7. Cotton Spinning calculations by WS Taggart
8. Essential Calculations of Cotton Spinning by Pattabhiram
9. Textile Mathematics Vol.-I, II and III by JE Booth

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	06	09
2	02	03
3	23	38
4	20	30
5	06	09
6	04	06
7	03	05
Total	**64**	**100**

5.2 WEAVING TECHNOLOGY-III

L	T	P
4	-	4

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
1.	Introduction to Automatic loom and various types of shuttleless weaving machines and comparative study of the above machines along with power loom. (6 hrs)	Preparation of weaving beam from either hank or cone to loom
2.	**Automatic Loom** (8 hrs)	
2.1	Introduction to Auto loom (2 hrs)	
2.2	Working of different motions/ mechanisms to be studied with neat sketches (4 hrs)	Finding faults occurring due to Malfunctioning of 5 wheel and 7 wheel take up motion.
2.3	Introduction to automatic cop changing and its limitations (2 hrs)	Fitting of cop changing mechanism after dismantling.
3.	**Warp Stop Motion** (8 hrs)	
3.1	Mechanical warp stop motion (4 hrs)	Practice on automatic loom.
3.2	Electric warp stop motion (4 hrs)	Sketching different parts of mechanical warp stop motion.
4.	**Shuttle-less Weaving** (26 hrs)	
4.1	Types of shuttleless looms, comparison of power loom and shuttleless weaving and among different shuttleless loom (2 hrs)	Practice on the shuttle less loom.
4.2	Introduction to different weft insertion methods - Rapier weft insertion - Gripper weft insertion - Pneumatic weft insertion(Air jet) - Hydraulic weft insertion(Water jet) (4 hrs)	Study of different parts of the Shuttle-less loom. Practice on gripper loom through mill visit.

4.3	Tuck in selvedges. Selvedge forming mechanism of rapier and gripper type looms (5 hrs)	- Practice on tuck-in selvedge forming mechanism - Mill visit for the same
4.4	Weft accumulators or weft measuring motion. Electronic Warp Stop Motion (5 hrs)	
4.5	Leno selvedges (2 hrs)	Practice on leno selvedge mechanism
4.6	Introduction to Knitting- warp, weft, plain, rib, interard structured (4 hrs)	Dismantling and proper fitting of positive let-off motion
4.7	Introduction to Non-woven fabrics; plain needle panch, bonded Non-woven. (4 hr)	
5.	Fabric defects due to raw material, mechanism and other miscellaneous reasons, their causes and remedies. (6 hrs)	
6.	Calculations relating to production and efficiency of loom, weight of warp and weft required/shift. (6 hrs)	
7.	Factors effecting the production and efficiency in the weaving and preparatory department. (4 hrs)	

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.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	06	10
2	08	12
3	08	12
4	26	40
5	06	10
6	06	10
7	04	06
Total	**64**	**100**

5.3 TEXTILE TESTING AND QUALITY CONTROL – I

L	T	P
4	-	4

RATIONALE

The diploma holders in textile technology have to ensure quality at all levels. The skills in testing of materials and textiles at various stages of production and finishing is essential to be developed in the students. To train the students in assessment of performance characteristics of various textile materials i.e. fibres, yarns and fabrics, this subject of textile testing and quality control has been included in the curriculum.

DETAILED CONTENTS

Sr. No.	Theory	Practical
1.	**Importance and objects of textile testing and quality control** (8 hrs.)	
1.1	Introduction to textile testing (Aim and Scope) (4 hrs)	
1.2	Sampling techniques, Random and biased samples. Techniques for sampling of fibres. Squaring and cut squaring techniques. Zoning techniques for raw cotton. (4 hrs)	
2.	**Fibre Dimensions** (12 hrs)	
2.1	Fibre length measurement by Analysis of Sorter diagram, Shirley Photoelectric Stapler, Digital. Fibrograph, principle and working of these machines (6 hrs)	Fibre length by Digital Fibrograph
2.2	Fibre maturity, primary and secondary wall and lumen in cotton. To find out maturity of cotton fibre by Caustic Soda Method, Differential Dyeing Method and Polarised Light Method. Definition of maturity percentage and maturity ratio. (6 hrs)	To find out maturity of cotton fibre by Caustic Soda Method,

3.	**Fibre Fineness (6 hrs)**	
3.1	Definition of fibre fineness. Importance of fibre fineness. Principle of air flow machines for measurement of fineness. To find out fibre fineness by Vibroscope, Arealometer and micronaire. Sheffield Micronaire (6 hrs)	To find out fibre fineness by air flow instruments. Sheffield Micronaire
4.	Moisture Contest and Moisture Regain of textiles. Relative and Absolute Humidity. Measurement of moisture regain by Oven Drying and Electronic Moisture Meter under Standard Atmosphere conditions. (8 hrs)	To find relative humidity by dry and wet bulb thermometers and Whirling Hygrometer. To find out moisture content of textiles by Oven Drying and Electronic Moisture Meter.
5.	Estimation of foreign matter Trash percent in cotton. Clearing efficiency of machine. Trash analysis in cotton by shirley analyser. Estimation of blow room and card machines efficiency by shirley analyser (6 hrs)	To find out trash content of cotton by shirley trash analyser.
6.	Yarn numbering systems. Direct, Indirect and Universal systems of yarn numbering. Conversion factors for various numbering systems. (hank and silver also) (10 hrs)	To find out count of yarn by simple weighing method Determination of count of yarn with the help of wrap reel, Beeslay balance , quadrant balance
7.	Twist and its importance. Its effects on yarn properties. Twist factor, single and ply yarn-Twist Testers (6 hrs)	Determination of yearn twist (Single and Ply yarns) by by twist testers
8.	- Quadrant Balance for weighing per square meter for knitting and woven fabric. - Theory of Yarn - Tensile strength Testing of Yarn (8 hrs)	-Method of determining yarn strength with the help of single yarn strength tester and Lea strength tester - Method with (GSM-Knitting) Round Cutter and Weighing Balance

INSTRUCTIONAL STRATEGY

The teacher should lay emphasis on understanding of basic concepts and various terms used in the subject. Practical exercises will reinforce various concepts. Industrial exposure must be given by organizing visits.

RECOMMENDED BOOKS

1. Handbook of textile Testing and Quality Control by Grover and Hamby
2. Principles of Textile Testing by JE Booth
3. Physical Properties of Textile Fibres by Textile Institute Manchester
4. Fabric Defects causes and Remedies-by S.S.Satsangi-M/s Usha Publishers 53B/AC-IV Shalimar Bagh, Delhi-88.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	08	12
2	12	18
3	06	10
4	08	12
5	06	10
6	10	16
7	06	10
8	08	12
Total	**64**	**100**

5.4 TEXTILE PROCESSING - III

L T P
4 – 3

RATIONALE

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

DETAILED CONTENTS

1. Introduction to Textile Printing (04 hrs)

2. Classification of thickness (04 hrs)

3. Methods of Printing (08 hrs)
   (a) Stencil/Spray
   (b) Block
   (c) Screen
   (d) Rollar
   (e) Transfer Printing

4. Styles of Printing (08 hrs)
   (a) Direct
   (b) Discharge
   (c) Risist
   (d) Batik

5. Printing with metal complex dyes on wool (12 hrs)
   Printing of pigment/vat/reactive dyes on cotton

6. After treatment of printing goods (08 hrs)
   (a) Aging
   (b) Steaming
   (c) Curing
   (d) Washing

7. Classification of finishes and brief study of following finishing treatments (10 hrs)
   (a) Calendering
   (b) Heal setting
   (c) Decatizing/sanforizing

8. Chemical Finishing (10 hrs)
   (a) Moth proof
   (b) Water repellent and water proof
   (c) Resin finishes

LIST OF PRACTICALS

1. Block printing on cotton with 3 classes of dyes.
   (a) Pigment
   (b) Direct dye
   (c) Reactive dye

2. To print a cotton fabric sample by screen printing method using suitable dyes/colours in single and multi colour.

3. To prepare a sample of different printed effect using tie-dye technique

4. Visit of printing unit to demonstrate working of various machines for eg. Roller, rotary, curing machine etc.

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 printing by VA Sehnai
2. Textile printing by I.W.C. Miles
3. Principle of cotton printing by D.G. Kale
4. Printing Guide and technique by ATIRA

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	04	07
2	04	07
3	08	12
4	08	12
5	12	20
6	08	12
7	10	15
8	10	15
Total	64	100

5.5 COMPUTER APPLICATIONS IN TEXTILE TECHNOLOGY- I

L	T	P
-	-	4

RATIONALE

The objective of having Computer applications in Textile Technology is to have the course in the forefront of utilization of Information Technology and to leverage the power of Information Technology in making learning informative and entertaining.

DETAILED CONTENT

Unit I - Computer introduction using Tools in Corel Draw/Photoshop

Unit II - Scanning of Designs, Stitching the designs

Unit-III - Touch-ups, Cutting & Pasting, Resizing

Unit IV - Changing Colors, 2D and 3D effects

Unit –V - Use of Digitizer instead of mouse for scanning, touchups, 2D and 3D

Systematic teaching starting from unit 1 to V will give excellent results. Students should be encouraged to use the power of net in enhancing their technological and designing skills.

INSTRUCTIONAL STRATEGY

The teacher is expected to tell the students the applications of this subject area in various fields. Emphasis should be laid on practical examples.

RECOMMENDED BOOKS

1. www. Coreldraw help file
2. Photoshop help file

PERSONALITY DEVELOPMENT CAMP

This is to be organized at a stretch for two to three days during fifth or sixth semester. Extension Lectures by experts or teachers from the polytechnic will be delivered on the following broad topics. There will be no examination for this subject.

1. Communication Skills
2. Correspondence and job finding/applying/thanks and follow-up
3. Resume Writing
4. Interview Techniques: In-Person Interviews; Telephonic Interview' Panel interviews; Group interviews and Video Conferencing etc.
5. Presentation Techniques
6. Group Discussions Techniques
7. Aspects of Personality Development
8. Motivation
9. Leadership
10. Stress Management
11. Time Management
12. Interpersonal Relationship
13. Health and Hygiene