

3.1 BASIC KNITTING TECHNOLOGY

L T P
3 - 4

RATIONALE

Diploma holders in Textile Technology (Knitting) are required to supervise the knitting operations. For this, it is essential that they are made familiar with working and mechanism of hand driven socks machine and hand driven circular knitting machine. Hence this subject.

DETAILED CONTENTS

1. Textile fabrics and their systems (02 hrs)
 - 1.1 Principles of manufacturing of textile fabrics
 - 1.2 Intersection, Looping system, Twisting and felting
2. Knitting and Knitting Industry: Classification of Knitting Industry (03 hrs)
 - 2.1 Socks Industry
 - 2.2 Innerwear garments Industry
 - 2.3 Outerwear Knitwear Industry
3. Looping elements (08 hrs)
 - 3.1 Definition of looping elements, Knitting Needle (general explanation)
 - 3.2 Latch Needle, its different parts, function and features of Latch Needle.
 - 3.3 Compound Needle, its parts and function
 - 3.4 Bearded Needle, its parts
 - 3.5 Double ended needle
 - 3.6 Sinkers and their types
 - 3.7 The point or transfer Element
 - 3.8 Jacks

4. General terms of knitting technology (08 hrs)
Gauge, Wales, Courses, Needle loop, Sinker loop, Knitted Stitch, Face of stitch loop, Reverse stitch loop, Stitch density or stitch length, Tuck stitch, Float stitch, Jacquard design, Plating, Tucking.
5. Yarn winding (08 hrs)
 - 5.1 Meaning of winding (Hand winding, Machine winding)
 - 5.2 Advantage of good winding of yarn in knitting and precautions during winding.
 - 5.3 Lubrication of Yarns, knot tying.
6. Hand driven socks machine and hand driven circular knitting machine (05 hrs)
 - 6.1 Cylinder and Dial Cam set of hand driven socks machine, its different parts and their functions with diagrams.
 - 6.2 Cam Set of hand driven circular knitting machine, its different parts and their functions
7. Different types of articles produced on hand driven socks machine. (05 hrs)
Hand gloves, Stockings, Knee caps etc.
8. Different types of products which can be produced on small diameter machines. (05hrs)
Mufflers, headwear, neck wear, children and ladies wear etc.
9. Loop formation of Latch needle (04 hrs)

LIST OF PRACTICALS

1. Demonstration of hand driver socks knitting machine
2. Demonstration of cam shell socks knitting machine, its different cams and their functions.
3. Demonstration of dial socks knitting machine, its different cams and their functions.
4. Disassembling and assembling of hand driven socks knitting machine.

5. Practice on feeding yarn on machine (threading or yarn feeding path).
6. Demonstration of tension wire, buckle, weights and hook adjustment and its effect on fabric quality.
7. Practice on adjustment of dial and yarn guide.
8. Practice on adjustment of stitch length or regulating of stitch length.
9. Preparation of sample of welt and 1x1Rib
10. Prepare a sample of heel and toe.
11. Preparation of sample of knitting elastic top with elastic wheel.
12. Linking of toe, pressing, finishing and packing of socks.
13. Practice to mend cuts and drop stitches.
14. Demonstration of hand driven round machines
15. Demonstration of Pattern wheel and its functioning
16. Demonstration of Jack round machine
17. Prepare the sample of knitted fabrics with different designs (tuck design, two colour design, horizontal striped design, vertical stripes design etc)
18. Practice on yarn winding machines.

Note: Sample book is to be prepared in which diagrams, short explanation of experiments and small samples are to be fixed along with their explanation.

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. Knitting Technology by DB Ajgoankar; Universal Publication, Bombay.

2. Principles of Machine Knitting Volume I, II & III by John Chamberlain; Mahajan Publishers Pvt. Ltd., Ahmedabad
3. Knitting by Vignol H.; Mahajan Publishers Pvt. Ltd., Ahmedabad
4. Knitting Technology by David J. Spencer; Mahajan Publishers Pvt. Ltd., Ahmedabad

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	02	04
2	03	08
3	08	18
4	08	16
5	08	16
6	05	10
7	05	10
8	05	10
9	04	08
Total	48	100

3.2 FLAT KNITTING TECHNOLOGY - I

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3 - 4

RATIONALE

Flat Knitting is backbone of knitting industry. As flat knitting machines are hand operated and can be adopted in a small-scale industry so students should know about the working of flat machines. Hence this subject.

DETAILED CONTENTS

1. History of fashioned hosiery (01 hrs)
2. Different types of garments which can be made on V bed flat knitting machines, pullover, slipover, ladies cardigan fashioned knitwear and sweaters etc. (04 hrs)
3. Knitting details & measurements. (04 hrs)
4. Wales per Inch (WPI) & Courses per Inch (CPI), stitch quality and its importance. (03 hrs)
5. Knitting faults while knitting fabrics on flat knitting machine, causes and their remedies. (04 hrs)
6. Types of V bed flat knitting machine and their features. (04 hrs)
7. Cam set of hand driven flat knitting machine, different parts and function of each part. (05 hrs)
8. Cam set of jacquard flat machine, its different parts and function. (05 hrs)
9. Cam set of intarsia flat machine and its working. (05 hrs)
10. Loop formation of latch needle on V bed flat knitting machine. (03 hrs)
11. Types of welts and their formation (05 hrs)
 - French welt
 - Roll welt
 - Racked welt
12. Introduction to fashioning, need of fashioning (narrowing and widening) Raglan sleeves and calculation of courses, according to garment length. (05 hrs)

LIST OF PRACTICALS

1. Demonstration of hand driver flat knitting machine.
2. Demonstration of cam set of flat knitting machine showing needle path.
3. Practice on feeding yarn and starting the machine.
4. Practice on knitting of sample of welt.
5. Prepare sample of 1x1 and 2x2 rib.
6. Prepare a sample of single bed fabric.
7. Preparation of sample of double bed fabric.
8. Preparation of sample tuck ribbed fabric and racked rib fabric.
9. Prepare a knitted sample of half milano and full milano.
10. Preparation of knitted sample of half cardigan stitch, full cardigan stitch.
11. Preparation of samples of different types of deca designs.
12. Practice on knitting separation course.
13. Practice on production of garment length.
14. Preparation of sample of narrowing and widening and jacquard knitting.
15. Demonstration of lubrication and maintenance of machine.
16. Sampling on Intarsia Machine.

NOTE: Above samples should be knitted on different gauges to have difference ie. 4GG, 8GG, 10GG and 14GG.

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. Knitting Technology by DB Ajgoankar; Universal Publication, Bombay
2. Flat Knitting by Samuel Raz; The New Generation Meisenbach, GmbH

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	01	02
2	04	10
3	04	08
4	03	08
5	04	08
6	04	08
7	05	10
8	05	10
9	05	10
10	03	06
11	05	10
12	05	10
Total	48	100

3.3 KNITTING MATHEMATICS

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RATIONALE

Diploma holders in Knitting Technology are required to do calculations of yarn count, yarn dimensions and other textile calculations related to knitting machines and industry. In order to perform these job responsibilities, relevant knowledge, skill & abilities are required. Hence this subject.

DETAILED CONTENTS

1. Units of length and weight used in textile calculations. (04 hrs)
2. Yarn numbering systems, direct and indirect systems, conversion from one system to other system. (06 hrs)
3. Calculations on yarn count, resultant count, fancy and folded yarn counts. (04 hrs)
4. Calculations of yarn diameter, crimp, shrinkage and take up yarn. (03 hrs)
5. Percentage and quantity determination of different fibers/yarn in knitted structures. (02 hrs)
6. Gear wheel, pulley and chain drive, speed calculations. (02 hrs)
7. Simple calculations of winding, warping and production. (03 hrs)
8. Calculations of relative humidity, moisture content and moisture regain in yarns. (04 hrs)
9. Calculations of conditioned weight of different yarns, conditioned count, weight and length. (03 hrs)
10. Calculations of knitting machine gauge, diameter, width of bed & number of needles in machine. (04 hrs)
11. Relationship between yarn count and machine gauge. (03 hrs)
12. Relationship between number of courses and wales per unit length, compilation of formulae for gauge and stitch length. (03 hrs)
13. Relationship between yarn count & twist (03 hrs)
14. Knitted fabric geometry, tightness factor & robbing back (04 hrs)

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. Weaving Calculation by R.Sen & Gupta; Bombay Taraporevala Sons & Co.
2. Knitting Mathematics & Mechanism by J. Chamberlain and JB Lancashire
3. Textile Mathematics by J. E. Booth; Textile Institute, Manchester

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	04	10
2	06	10
3	04	08
4	03	06
5	02	05
6	02	05
7	03	08
8	04	09
9	03	06
10	04	09
11	03	06
12	03	06
13	03	06
14	04	06
Total	48	100

3.4 TEXTILE PHYSICAL TESTING

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RATIONALE

A diploma holder in Knitting Technology is responsible for controlling the quality of the final finished product; for which he is supposed to know about physical testing of textiles. For this purpose, knowledge and skills about physical testing need to be imparted to him. Hence this subject.

DETAILED CONTENT

1. Introduction to textile testing- Aim & scope. (2 hrs)
2. Sampling techniques. General requirement. (2 hrs)
3. Sampling techniques for yarn and fabrics for specific tests. (2hrs)
4. Relative humidity & methods of its determination. (4 hrs)
5. Importance of moisture content in textile materials and its determination. (4 hrs)
Standard moisture regains of different textile materials.
6. Different yarn counts systems, their conversion and count calculations. (8 hrs)
Determination of count of yarn in different systems with the help of wrap reel, Beesley's balance, Quadrant balance, Knowle's yarn balance, yarn & cloth quadrant.
7. Measurement of twist in spun, continuous filaments & ply yarns. (6 hrs)
8. Methods of tests for fabric dimensions & other physical properties, viz thickness, weight, crimp. (6 hrs)
9. Concept of pilling and its testing (2 hrs)
10. Air permeability & its measurement. (2 hrs)
11. Wettability, waterproof ness, water resistance and their measurement. (4 hrs)
12. Flammability flame resistance & its measurement. (4 hrs)
13. Fabric strength testing: tensile, tearing and bursting strength tests. Principle & operation of equipment. (8 hrs)

14. Fabric handle, stiffness & draping properties – Terminology and experimental methods. (4 hrs)
15. Serviceability, wear and abrasion – methods for measuring abrasion resistance and interpretation of results. (4 hrs)
16. Fabric creasing and crease recovery testing. (2 hrs)

LIST OF PRACTICALS

1. Twist in yarn: To find out the number of folds/twist per inch of single and ply yarn using twist tester.
2. To find out the yarn count with Beesley's balance, Quadrant balance, Knowle's yarn balance.
3. To find out Wt/sqm (GSM) of fabric using quadrant balance.
4. To find out moisture content and moisture regain of the given textile material by conditioning oven.
5. To find out the relative humidity by dry & wet bulb thermometer.
6. Determination of bursting strength of fabrics by using bursting strength tester.
7. To find breaking strength and elongation of fabrics on fabric breaking strength testing machine.
8. To find flammability of fabric using flammability tester.
9. To find crease recovery angle using crease – recovery tester.
10. To find physical dimensions of fabric viz length, width & thickness of the fabric.
11. To find crimp of the yarn by crimp testing machine.

INSTRUCTIONAL STRATEGY

This is a practical subject. The students should be taken for field visit to a textile mill for showing various testings.

RECOMMENDED BOOKS

1. Textile Testing by J.E. Booth; CBS Publication, New Delhi.
2. Textile Testing by Angappan Jayaparkashan, Publication.
3. Textile Testing by Grover and Hamby; Abhishek Publishers, Chandigarh.
4. Quality Evaluation of Textiles by R. Kadiyan and M. Nagpal – AG Publication, Ambala

SUGGESTED DISTRIBUTION OF MARKS

Sr. No	Time Allotted (hrs)	Marks Allocation (%)
1	02	4
2	02	4
3	02	4
4	04	6
5	04	6
6	08	12
7	06	8
8	06	10
9	02	4
10	02	4
11	04	6
12	04	6
13	08	10
14	04	6
15	04	6
16	02	4
Total	64	100

3.5 COMPUTER APPLICATIONS IN KNITTING TECHNOLOGY

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RATIONALE

Students should be capable to run and implement various application softwares used in the designing and operating knitwear machine. Since some highly priced machines cannot be purchased, students should be taken to mills where these machine are being used e.g. M.1, M.1 plus (Stoll), Picasso (kavo heng machine), Moden (Stiger machine).

PRACTICAL EXERCISES

1. Practice on any knitwear software such as M1, M1 plus, Picasso and Moden etc.
 - a) Hardware devices being used in the designing systems i.e. for data transfer to machine
 - b) Symbol used for basic knits and its notation
 - c) Application of symbols to make different design
 - d) Setting of machine in relation to design like i.e. selection of feeders, speed of feeders, take down and feeding of yarn and its setting
 - e) Repeat setting width wise and length wise
2. Demonstration of computer networking, its uses and application in knitwear machines.
3. Demonstration of CAM (Computer Aided Manufacturing) through visit to mills where such machines are in use.

NOTE

1. Time should be devoted according to depth of the individual software.
2. Student should be taken to those mills where such machine are operative and they should be shown the working of these machines.

3.6 DYEING & FINISHING TECHNOLOGY - I

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RATIONALE

A diploma holder is required to have knowledge and skills related to processing of yarn and knitted fabric. He must be well acquainted with the processes of dyeing and finishing. Hence this subject.

DETAILED CONTENTS

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|-----|---|----------|
| 1. | Scouring and bleaching of cotton. | (03 hrs) |
| 2. | Mercerization of cotton, its importance and application. | (05 hrs) |
| 3. | Scouring and bleaching of wool with Sodium hydrosulphite & Hydrogen peroxide. | (05 hrs) |
| 4. | Chlorination of wool. | (03 hrs) |
| 5. | Carbonization of wool. | (03 hrs) |
| 6. | Degumming and bleaching of Silk with Hydrogen peroxide. | (04 hrs) |
| 7. | Scouring & bleaching of Polyamides, Polyester and Acrylics. | (04 hrs) |
| 8. | Spot Removing. | (04 hrs) |
| 9. | Dry cleaning of woolen garments. | (03 hrs) |
| 10. | Drying of tubular Knitted Fabrics. | (03 hrs) |
| 11. | Finishing- objectives and classifications. | (03 hrs) |
| 12. | Finishing of woolen garments i.e. Damping, Steam Pressing, Folding and Packaging. | (04 hrs) |
| 13. | Finishing of Pile Fabrics. | (04 hrs) |

LIST OF PRACTICALS

1. Scouring and Bleaching of cotton with bleaching powder and Hydrogen Peroxide.
2. Mercerization of cotton fabrics.
3. Scouring and bleaching of wool with Sodium hydrosulphite & Hydrogen peroxide.
4. Chlorination of Wool.
5. Degumming and Bleaching of Silk with Hydrogen peroxide.

6. Scouring and bleaching of art silk. (viscose)
7. Scouring & bleaching of Polyamides, Polyester and Acrylics.
8. Spot Removing.
9. Dry cleaning of woolen garments.
10. Drying of Tubular Knitted Fabrics.
11. Finishing of woolen garments i.e. Damping, Steam Pressing, Folding and Packaging.

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. Textile finishing by JT Marsh, B.I. Publications, New Delhi
2. Technology of Finishing by V.A. Shehnai, Sewak Publications, Mumbai
3. Dyeing and Chemical Technology of Textile Fibres, By E.R. Trotman, Charles Greffing & Co. Ltd. London.
4. Technology of Dyeing by Dr. V.A. Shehnai, Sewak Publications, Mumbai
5. Dyeing of Wool, Silk and manmade fibers by R.S. Paryag. L.R Paryag Publishers

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
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4	03	06
5	03	06
6	04	08
7	04	08
8	04	08
9	03	06
10	03	06
11	03	06
12	04	08
13	04	08
Total	48	100