4.1 POWER DRIVEN CIRCULAR MACHINE TECHNOLOGY

L	T	P
3	-	3

RATIONALE

Diploma holders in Textile Technology (Knitting) are required to do all the technical activities in knitting industry. In order to perform these job responsibilities, knowledge and skills about knitting machines, their working and mechanism are essential. It is expected that efforts will be made to provide appropriate learning experiences in the use of basic principles/ procedures of different types of knitting machines and their operating mechanisms.

DETAILED CONTENTS

1. Yarn Supply System on large diameter circular knitting machines (06 hrs)
   - 1.1 Circular Cone carrier equipment.
   - 1.2 Creel arrangement on the side.
   - 1.3 Creel arrangement on three sides.
   - 1.4 Circular Creel, one sided & double sided.

2. Cam system of Sinker body (single jersey) machine and sinker timing. (04 hrs)

3. Basic study of interlock machine, its cam set, function of cams. (04 hrs)

4. Basic study of rib machine. (04 hrs)

5. Drawing off mechanism and its function (06 hrs)
   - 5.1 Working principle of Neverest Drawing off Mechanism
   - 5.2 Working of Dead Weight Drawing Off Mechanism.

6. Coordination between Cylinder & Dial Cams (timings of cams) (06 hrs)
   - 6.1 Synchronized timing between cylinder and dial.
   - 6.2 Delayed timing between cylinder and dial.

7. Loop formation of latch needle with loop forming sinkers. (04 hrs)

8. Loop formation of latch needle with holding down sinkers. (04 hrs)

9. Monitoring & maintenance system (05 hrs)
   - 9.1 Yarn monitoring
   - 9.2 Needle monitoring

9.3 Fabric monitoring
9.4 Lubricating & oiling system
9.5 Cleaning system

10. Knitting defects in fabrics produced on power driven machines, their causes and remedies.

(05 hrs)

LIST OF PRACTICALS

1. Demonstration of various parts of power driven circular machine.
2. Demonstration of cam sets of single jersey machine and interlock machines.
3. Demonstration of different sizes of machines according to the size of vests and gauges of machines.
4. Demonstration on threading up the sinker body, interlock, rib and plush machine.
5. Demonstration on feeding of yarn and adjustment of yarn through IRO or yarn feeding equipments.
6. Demonstration on insertion and replacement of needles and sinkers in these machines.
7. Demonstration on adjustment of yarn guides, stop motions, tensioners and drawing off mechanism.
8. Demonstration on timing and adjustment of cylinder and dial needles.
9. Practice in knitting fabrics with vertical and horizontal stripes of different colours on interlock machines.
10. Demonstration of Cam adjustment.
11. Demonstration on taking off the fabric from the machines and running on the fabric on the machine.
12. Practice in knitting check designed fabric on interlock machines.
13. Practice in knitting plush fabric on interlock machines.
14. Practice in producing knitted fabrics with tuck and over knit design on interlock machines.
15. Demonstration on practice on producing self knits using tuck, miss, knit on single jersey machine.
16. Demonstration on adjustment of the stitch cams with the relevant count of yarn and gauge of machine.
17. Demonstration on setting of GSM of fabric.

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

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. Circular Knitting By Chandrasekara Iyer, Mahajan Publishers, Ahmedabad
2. Knitting Technology By D.J. Spencer, Mahajan Publishers, Ahmedabad

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	06	16
2	04	08
3	04	08
4	04	08
5	06	12
6	06	12
7	04	08
8	04	08
9	05	10
10	05	10
Total	**48**	**100**

4.2 FLAT KNITTING TECHNOLOGY - II

L	T	P
3	-	4

RATIONALE

Diploma holders in Textile Technology (Knitting) are required to do supervision for production of knitwear. This demands knowledge about hand driven flat knitting machines and power driven flat knitting machines. Hence this subject. It is expected that efforts will be made to provide appropriate learning experiences in use of basic principles/procedures for production of knitwear on hand driven and power driven flat knitting machines.

DETAILED CONTENTS

1. Power Operated Flat Knitting Machines, their types and makes (03 hrs)
2. Advantage of power operated machines over hand operated flat knitting machines (03 hrs)
3. Cam set of Power flat machine (Collar making machine), its different cams and functions (04 hrs)
4. Cam set of Power flat (Garment length machine) (03 hrs)
5. Cam set of Mechanical Power Flat Jacquard Knitting machine (Dubied Type) showing needle path while knitting, missing, tucking, transferring of stitches and its explanation. (06 hrs)
6. Jacquard Selecting mechanism of Power Flat Machine, its working. (04 hrs)
7. Fully fashioned machine or bearded needle straight bar machine, its introduction and its main features. (03 hrs)
8. Loop formation of fully fashioned machine, needle bar motion, catch bar motion. (03 hrs)
9. Loop formation of double ended latch needle on purl flat knitting machine. (03 hrs)
10. Calculation of number of courses according to garment length, number of narrowing widening for a fully fashioned garment of different sizes. (04 hrs)
11. Latch Needle with transfer spring, its different parts. (03 hrs)
12. Loop transfer action of latch needle. (03 hrs)
13. Machine maintenance schedule and its advantages. (03 hrs)
14. Oiling of machine, method of proper oiling, side effects of wrong oiling methods. (03 hrs)

LIST OF PRACTICALS

1. Study of Flat Knitting machine and its different parts.
2. Demonstration of cam set of flat knitting machine showing needle path.
3. Demonstration on method of feeding yarn, setting of yarn feeder and operation of machine.
4. Demonstration on method of making collar on knitting machine.
5. Preparation of knitted sample of garment length.
6. Practice on knitting separation course.
7. Demonstration on narrowing and widening.
8. Practice on method of lubrication and maintenance of machine.
9. Demonstration of jacquard knitting.
10. Demonstration of working of fully fashioned machine.
11. Demonstration of working of mechanical power flat machine.

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 D.B. Ajgaonkar; Universal Publication Corporation, Mumbai
2. Flat Knitting by Samuel Raz; Meisenback GmbH., Bamberg, Germany

SUGGESTED DISTRIBUTION OF MARKS

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

4.3 TEXTILE CHEMICAL TESTING

L	T	P
4	-	3

RATIONALE

A diploma holder in Textile Processing is responsible for controlling the quality of finished product. He is also required to supervise chemical testing of textiles. For this purpose, knowledge and skills about various chemical tests carried out in processing need to be imparted to him. Hence this subject.

DETAILED CONTENTS

1. Introduction to textile chemical testing-aim & scope (2 hrs)

2. Quantitative Analysis of Fibres in a Blended Yarn/Fabric (6 hrs)

   Introduction & method of determination of quantitative analysis of following blends: cots wool, Terry wool, Polyster cotton (PC), Polyster Viscose (PV), Acrylic wool (acru wool), Nylon & wool.

3. Discussion on various types of mechanical or chemical damages occurring to textile materials during the preparatory processes. Quantitative estimation of chemical degradation to cotton, wool, & polyester by the following tests with their principles and procedures: (12hrs)

   - Copper Number Test
   - Damage tests for salt and cystine linkages
   - Methylene Blue Test
   - Critical dissolution time
   - Cuprammonium fluidity test.

4. Discussion on tests for assessing the mercerization process - Barium Activity number,Axial Ratio,Deconvolution Count. (4 hrs)

5. Determination of fat and wax content in textile material (2 hrs)

6. Quantitative estimation of Processing chemicals – likes bleaching powder/ Sodium hypochlorite & hydrogen peroxide, acids, alkali, hydrosulphite (8 hrs)

7. Colour fastness Tests (26hrs)

   Introduction and importance of colour fastnes tests Method of evaluation of colour fastness by grey scales, international standards Methods of determination of colour fastness to washing, perspiration, hot pressing, sublimation, rubbing, wet scrubbing, light, sea water. Instruments used in colour fastness testing-laundrometer, perspirometer, crockmeter, exposure rack & light fastness tester .

8. Analysis of fresh water and effluent, (4 hrs)

LIST OF PRACTICALS

1. Identification of blend percentage in following blends:
   - P/C blend
   - P/V Blend
   - P/W/V Blend
2. To evaluate the desizing efficiency
3. To measure scouring loss of a cotton fabric
4. To evaluate wet ability of textile finished fabric.
5. To measure the washing fastness of different dyed sample by different international standard test methods and to grade them.
6. To determine the dry rubbing fastness of different given dyed sample and to grade them.
7. To determine the wet rubbing fastness of given dyed sample for various dyes and to grade them.
8. To determine the residual shrinkage in a finished fabric.
9. To determine light fastness of given sample using exposure rack.
10. To determine the changes in colour on hot processing.
11. To study the effectiveness of Dispersing agent by Filter paper test

INSTRUCTIONAL STRATEGY

Teacher should explain the importance of the topics in the industry and these should be covered keeping in view the practical approach

RECOMMENDED BOOKS

1. Textile auxiliaries & chemicals by A.A Vaidya-Nitra Publication
2. Textile auxiliaries by Dr. V.A Shenai, Sevak Publication ,Bombay
3. Technology of bleaching by Dr. V.A Shenai, Sevek Publication
4. Quality control in textile wet processing by D.K.Sinha, BIRA paper
5. Chemical Testing of Textile by Hall; Mahajan Publication, Ahemdabad
6. Handbook of Textile Testing and Quality Control by Grover; Mahajan Publication, Ahemdabad.
7. Quality Control of Cloth dimensions and the shrinkage of yarn and fabrics by Shirley Institute
8. Quality Evaluation of Textiles by R.kadian & M.Nagpal

SUGGESTED DISTRIBUTION OF MARKS

Sr. No	Time Allotted (hrs)	Marks Allocation (%)
1	2	4
2	6	10
3	12	20
4	4	6
5	2	4
6	8	10
7	26	40
8	4	6
Total	**64**	**100**

4.4 DYEING AND FINISHING TECHNOLOGY - II

L	T	P
2	-	4

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

1. Classification of Dyes according to method of application. (02 hrs)
2. Principles of Dyeing. (02 hrs)
3. Dyeing of Cotton (06 hrs)
   - 3.1 Dyeing of Cotton with Direct Dyes.
   - 3.2 Dyeing of Cotton with Reactive Dyes.
   - 3.3 Dyeing of Cotton with Sulphur Dyes.
   - 3.4 Dyeing of Cotton with Vat Dyes.
4. Dyeing of Wool and Silk (06 hrs)
   - 4.1 Dyeing of wool and silk with Acid Dyes.
   - 4.2 Dyeing of wool and silk with Basic Dyes.
   - 4.3 Dyeing of wool and silk with Metal Complex Dyes.
5. Dyeing of Polyamides, Polyester and Acrylics. (06 hrs)
   - 5.1 Dyeing of Polyamide with Disperse Dyes.
   - 5.2 Dyeing of Polyester with Disperse Dyes.
   - 5.3 Dyeing of Acrylics with Basic Dyes & Modified Basic Dyes
6. Defects & Remedies in fabric during Dyeing& Processing (04 hrs)
7. Colour combination & Designing Aspects. (06 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 Dyes.
8. Dyeing of Polyamide with Acid Dyes.
9. Dyeing of Polyester with Disperse Dyes.
10. Dyeing of Acrylics with Basic Dyes.
11. Dyeing of Acrylics with Modified Basic dyes.

INSTRUCTINAL 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 Publication 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 (%)
1	02	06
2	02	06
3	06	20
4	06	20
5	06	18
6	04	12
7	06	18
Total	**32**	**100**

4.5 ESTIMATING & COSTING

L	T	P
3	-	-

RATIONALE

Diploma holders in Knitting Technology are required to do calculations related to machine gauge, production (theoretical & actual), fabric qualities (i.e. G.S.M, wales per inch, course per inch). In order to perform these job responsibilities, relevant knowledge, skill and abilities are required. Hence this subject.

DETAILED CONTENTS

1. Cost calculation of raw material after removal of impurities, effective cost of blends. (03 hrs)
2. Effective cost involved in production of knitted fabric. Such as purchase of material, cost of direct labour & machine, establishing charges, discounts and profit. (04 hrs)
3. Introduction and importance of establishment charges:- rent, rates, taxes, insurance, power light fuel, ventilation, depreciation of machinery plant, building etc. Staff and management, advertising, patent, and registration interest on lone, debenture, commission allowances, for bad debts and writing down of stocks. Departmental charges, administrative charges, % of cost of turnover. (10 hrs)
4. Calculation of production in number, length, and weight (03 hrs)
5. Calculation of total cost of production after discount. (03 hrs)
6. Testing and quality control calculations. (03 hrs)
7. Calculation of knitting machine gauge machine diameter, width of bed, no. of needles in the machine.(yarn count according to gauge in flat knitting) (04 hrs)
8. Calculation of related dimensions fabric cover tightness and fabric weight. (03 hrs)
9. Sewing and seaming calculation. (03 hrs)
10. Derivation and use of formulae for calculating fabrics weight. (03 hrs)
11. Calculation on theoretical production. (03 hrs)
12. Output and production calculations. (03 hrs)

13. Weight of fabric per square unit calculation. (03 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 Sen & Gupta
2. Knitting Mathematics & Mechanism
3. Textile Mathematics by J. E. Booth

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	03	06
2	04	08
3	10	22
4	03	06
5	03	06
6	03	06
7	04	10
8	03	06
9	03	06
10	03	06
11	03	06
12	03	06
13	03	06
Total	**48**	**100**

4.6 WARP KNITTING TECHNOLOGY-I

L	T	P
3	-	3

RATIONALE

A diploma holder in Knitting Technology is responsible for controlling the production of the knitted products. For this purpose, knowledge and skills about warp knitting machines. Their mechanism and working need to be imparted to him. Hence this subject.

DETAILED CONTENTS

1. Preparatory Processes

    1.1 Warping & beaming of yarn.
    1.2 Detailed description of warping system.
    1.3 Advantages & disadvantages of warping processes.
    1.4 Types of creels.

2. Basics of warp knitting, glossary used in warp knitting, usage and application of warp knitting goods. Properties of warp knitted fabrics

3. Elements of warp knitting machine - Needle, Guide, Sinker and Trick plate.

4. Comparison of Warp and Weft Knitting.

5. Different mechanism in warp knitting technology

    5.1 Needle bar motion.
    5.2 Guide bar swinging motion.
    5.3 Guide bar shoging motion.
    5.4 Presser bar motion.
    5.5 Sinker bar motion.
    5.6 Warp let off motion.
    5.7 Role of Cam and Eccentrics in warp knitting machine

6. Loop formation Sequence (Knitting Cycle) using Latch Needle, Compound Needle and Bearded Needle.

7. Classification of Warp Knitting Machines and their description.

    7.1 Tricot Machine
    7.2 Raschel Machine (Single Needle Bar)
    7.3 Raschel Machine (Double Needle Bar)

8. Patterning mechanisms for warp knit designs (Pattern wheels, Pattern Chain Links)

9. Comparative Study in Pattern Wheel & Pattern Chain

10. Basic Knit in warp knitting - basic knit structure in warp knitting and its drafting on point paper.

LIST OF PRACTICALS (to be performed in Warp Knitting Machine Section)

1. Practice on working on indirect & direct warping machines, maintenance & operation of machine.
2. Preparation of warp beam and demonstration and rectification of defects.
3. Practice on threading of warp ends and knitting on Raschel warp knitting machines.
4. Operation & maintenance of general Raschel & Warp knitting machines with one, two, three and four guide bars.
5. Use of draft paper for drafting of designs on warp knitting machines.
6. Demonstration of casting of Needle led and Guide led.
7. Preparation of designs of basic structures and drafting process.
8. Development of laps for warp knitting designs. (Tricot laps, Atlas laps, Cord laps)

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. Warp Knitting Technology by Prof. D.B. Ajgaonkar; Sewak Publication, Mumbai
2. Knitting Technology by D.J. Spencer; Mahajan Publishers Pvt. Ltd., Ahmedabad
3. Warp Knitting Production by Dr. S.Raz; Melliand Textilberichte GmbH, Germany

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	05	12
2	04	08
3	04	08
4	03	06
5	10	22
6	04	08
7	06	12
8	04	08
9	04	08
10	04	08
Total	**48**	**100**

ENTREPRENEURIAL AWARENESS CAMP

The employment opportunities for diploma holders especially in public sector are dwindling. The diploma holders need to explore the possibilities of becoming entrepreneurs. For this, they must be acquainted with entrepreneurship development, scope of setting up small-scale industry, existing business opportunities, financial support available and various aspects of managing business. In this context, an entrepreneurial awareness camp is suggested. During the camp, experts from various organizations such as banks, financial corporations, service institutes etc. may be invited to deliver expert lectures. Successful entrepreneurs may also be invited to interact with the students. Students may be encouraged to read papers or give seminar during the camp on Entrepreneurship Development related topics.

The camp 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 self 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