

5.1 SPINNING TECHNOLOGY – III

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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 (06 hrs) | |
| 1.1 | Introduction and objectives of a Ring Frame, nomenclature of various parts of a Ring Frame, passage of material through it (02 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. (02 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 (02 hrs) | Practice on ring and ring traveller, spindle gauge/setting. Selection of ring travellers for different Counts |
| 2. | Twisting (02 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 (02 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 (02 hrs) | Practice of drawing and setting of building motion of ring frame. |

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| 3.2 | Reasons for end breaks and their remedies on Ring Frame (02 hrs) | |
| 3.3 | Principle of Auto doffing at Ring Frame (02 hrs) | |
| 3.4 | Principle of variable pulley speed at Ring Frame (01 hr) | |
| 3.5 | Workload distribution at Ring Frame (02 hrs) | |
| 3.6 | Gearing diagram of Ring Frame (03 hrs) | Practice of drawing gearing diagram of Ring Frame |
| 3.6.1 | Calculation of spindle speed, front roll speed, production per shift per machine (02 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. (02 hrs) | Calculation of total draft, break draft and individual zone draft. |
| 3.6.3 | Calculation of twist per inch and twist multiplier. (02 hrs) | Calculation of TPI and Twist Multiplier TM . |
| 3.6.4 | Calculation of production constant, draft constant, break draft constant and twist constant. (02 hrs) | Calculation of production constant, draft constant, break draft constant and twist constant. |
| 3.6.5 | Calculation of traveler speed (01 hrs) | Calculation of traveler speed. |
| 3.6.6 | Calculation of yarn content on bobbin (02 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 (02 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 (02 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) (02 hrs) | |
| 4.4 | Improvement in quality and productivity performance of a doubling machine (Expert Lecture) (02 hrs) | |

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| 4.5 | Working principle of TFO (02 hrs) | Demonstration of working of TFO during mill visit / training. |
| 4.6 | Gearing diagram showing various drives of a Ring Doubling Machine (03 hrs) | Practice of drawing gearing diagram on Ring Doubling Machine |
| 4.6.1 | Calculation of production per machine, production constant. (02 hrs) | Calculation of production per machine and production constant |
| 4.6.2 | Calculation of spindle speed, delivery Roll speed (02 hrs) | Calculation of spindle speed, delivery roll speed |
| 4.6.3 | Calculation of twist per inch/twist Multiplier and twist constant of the Machine (03 hrs) | Calculation of twist per inch/twist Multiplier and twist constant of the Machine |
| 5. | General Calculations (06 hrs) | |
| 5.1 | Calculation of different types of yarn's diameter | |
| 5.2 | 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 (04 hrs) | |
| 6.1 | Woolen System | (01 hr) |
| 6.2 | Worsted system | (01 hr) |
| 6.3 | Difference between Woolen & Worsted yarn | (02 hrs) |
| 7. | Maintenance (01 hr) | |
| 7.1 | Various maintenance schedules adopted in a frame | (01 hr) |
| 8. | Process control Parameter with reference to productivity and yarn quality (02hrs) | |

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 | 01 | 02 |
| 8 | 02 | 03 |
| Total | 64 | 100 |

5.2 WEAVING TECHNOLOGY-III

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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 |
|---------|--|---|
| 1. | Introduction to Automatic loom and various types of shuttleless weaving machines and comparative study of the above machines along with power loom (06 hrs) | Preparation of weaving beam from either hank or cone to loom |
| 2. | Automatic Loom (08 hrs) | |
| 2.1 | Introduction to Auto loom (02 hrs) | |
| 2.2 | Working of different motions/ mechanisms to be studied with neat sketches (04 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 (02 hrs) | Fitting of cop changing mechanism after dismantling |
| 3. | Warp Stop Motion (08 hrs) | |
| 3.1 | Mechanical warp stop motion (04 hrs) | Practice on automatic loom |
| 3.2 | Electric warp stop motion (04 hrs) | Sketching different parts of mechanical warp stop motion |
| 4. | Shuttleless Weaving (24 hrs) | |
| 4.1 | Types of shuttleless looms, comparison of power loom and shuttleless weaving and among different shuttleless loom (02 hrs) | Practice on the shuttle less loom |
| 4.2 | Introduction to different weft insertion methods - Rapiert weft insertion - Gripper weft insertion - Pneumatic weft insertion(Air jet) - Hydraulic weft insertion(Water jet) (04 hrs) | Study of different parts of the Shuttle-less loom Practice on gripper loom through mill visit. |

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| 4.3 | Tuck in selvages. Selvedge forming mechanism of rapier and gripper type looms (03 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 (05 hrs) | |
| 4.5 | Leno selvages (02 hrs) | Practice on leno selvedge mechanism |
| 4.6 | Introduction to Non-woven fabrics; plain needle panch, bonded Non-woven. (04 hrs) | Dismantling and proper fitting of positive let-off motion |
| 4.7 | Introduction to Technical Textile, classification and uses (04 hrs) | |
| 5. | Terry pile weaving, features of Terry wool (04 hrs) | |
| 6. | Fabric defects due to raw material, mechanism and other miscellaneous reasons, their causes and remedies. (04 hrs) | |
| 7. | Calculations relating to production and efficiency of loom, weight of warp and weft required/shift. (04 hrs) | |
| 8. | Factors effecting the production and efficiency in the weaving and preparatory department. (04 hrs) | |
| 9. | Process Control parameter in weaving (02 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. Handbook of Technical Textiles” AR Horrocks and SC Anand, woodhead Publication Ltd, Cambridge 2000
7. Weaving Calculation by Sen Gupta
8. Weaving Technology in India by Kishar
9. Shuttle-less Weaving Mechanism-BTRA
10. 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 | 24 | 39 |
| 5 | 04 | 06 |
| 6 | 04 | 06 |
| 7 | 04 | 06 |
| 8 | 04 | 06 |
| 9 | 02 | 03 |
| Total | 64 | 100 |

5.3 TEXTILE TESTING AND QUALITY CONTROL – I

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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) (04 hrs) | |
| 1.2 | Sampling techniques, Random and biased samples. Techniques for sampling of fibres. Squaring and cut squaring techniques. Zoning techniques for raw cotton. (04 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 (06 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. (06 hrs) | To find out maturity of cotton fibre by Caustic Soda Method, |

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| 3. | Fibre Fineness | (06 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 (06 hrs) | To find out fibre fineness by air flow instruments. Sheffield Micronaire |
| 4. | Moisture Content and Moisture Regain of textiles. Relative and Absolute Humidity. Measurement of moisture regain by Oven Drying and Electronic Moisture Meter under Standard Atmosphere conditions. (08 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 (06 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) (08 hrs) | To find out count of yarn by simple weighing method Determination of count of yarn with the help of wrap reel, Beesley balance , quadrant balance |
| 7. | Twist and its importance. Its effects on yarn properties. Twist factor, single and ply yarn-Twist Testers (06 hrs) | Determination of yarn twist (Single and Ply yarns) by twist testers |
| 8. | - Quadrant Balance for weighing per square meter for knitting and woven fabric. - Theory of Yarn - Tensile strength Testing of Yarn (06 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 |
| 9. | Determination of count of yarn by simple weighing method and from small length by Bessley's yarn balance (04 hrs) | |

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 | 08 | 13 |
| 7 | 06 | 10 |
| 8 | 06 | 10 |
| 9 | 04 | 05 |
| Total | 64 | 100 |

5.4 KNITTING TECHNOLOGY

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RATIONALE

Some of the diploma holder in Textile Technology may find placement in knitting industry, so the basic operation in knitting are including in this subject.

DETAILED CONTENTS

| Sr. No. | Theory | Practical |
|---------|--|--|
| 1. | Comparison between knitted and woven fabrics, warp and weft knitting. Types of knitting needles, passage of material through circular and flat bed knitting machine, parts of knitting machine, advantages and disadvantages of each (08 hrs) | To study different needles and their cycles. Yarn parameters for hosiery yarn |
| 2. | Weft knitting; Types of stitches: Knit, tuck, float, Lay. Their representation, effects, methods of formation and end uses (06 hrs) | To make knit, tuck and float stitches |
| 3. | Weft knit structures: Plain, Rib, Interlock and Purl, their characteristics, representation, derivatives, end uses with knitting cycles of each (08 hrs) | <ul style="list-style-type: none"> - To study passage of yarn through flat bed and circular weft knitting machining. - To study different type of cams. - To prepare plain, rille, interlock and pure structures and its variations |
| 4. | Fabric defect in weft knitting, cover factor/tightness factor, Robbing back, calculations pertaining to production. Methods of production of hose, half-hose (04 hrs) | To study fabric defects on the machine knitting designs |
| 5. | Wrap Knitting: Introduction to under lap and overlap, closed lap and open lap. Brief description of Tricot and Raschel machines and fabrics lapping movement of warp knitting (06 hrs) | To study lapping movement of warp knits: Preparation of warp knit samples |

NOTE:

Student may be asked to do the work on weft knitting machines and construct the lapping movement of warp knits.

RECOMMENDED BOOKS

1. Knitting technologies by D.B. Ajganokar
2. Knitting technology by Mark Spancer
3. Textile Mathematics Vol –III by J.E. Booth

SUGGESTED DISTRIBUTION OF MARKS

| Topic No. | Time Allotted (Hrs) | Marks Allotted (%) |
|------------------|----------------------------|---------------------------|
| 1 | 08 | 26 |
| 2 | 06 | 18 |
| 3 | 08 | 26 |
| 4 | 04 | 12 |
| 5 | 06 | 18 |
| Total | 32 | 100 |

5.5 ENVIRONMENTAL EDUCATION

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RATIONALE

Education about environment protection is a must for all the citizens. In addition, a diploma holder must have knowledge of different types of pollution caused by industries and construction activities so that he may help in balancing the eco system and controlling pollution by adopting pollution control measures. He should also be aware of environmental laws related to the control of pollution.

DETAILED CONTENTS

1. Definition, Scope and Importance of Environmental Education (02 hrs)
2. Basics of ecology, biodiversity, eco system and sustainable development (03 hrs)
3. Sources of pollution - natural and manmade, causes, effects and control measures of pollution (air, water, noise, soil, radioactive and nuclear) and their units of measurement (12 hrs)
4. Solid waste management – Causes, effects and control measures of urban and industrial waste (06 hrs)
5. Mining and deforestation – Causes, effects and control measures (04 hrs)
6. Environmental Legislation - Water (prevention and control of pollution) Act 1974, Air (Prevention and Control of Pollution) Act 1981 and Environmental Protection Act 1986, Role and Function of State Pollution Control Board, Environmental Impact Assessment (EIA) (10 hrs)
7. Role of Non-conventional Energy Resources (Solar Energy, Wind Energy, Bio Energy, Hydro Energy) (04 hrs)
8. Current Issues in Environmental Pollution – Global Warming, Green House Effect, Depletion of Ozone Layer, Recycling of Material, Environmental Ethics, Rain Water Harvesting, Maintenance of Groundwater, Acid Rain, Carbon Credits. (07 hrs)

INSTRUCTIONAL STRATEGY

The contents will be covered through lecture cum discussion sessions. In addition, in order to have more appreciation of need for protection of environment, it is suggested that different activities pertaining to Environmental Education like video films, seminars, environmental awareness camps and expert lectures may also be organized.

RECOMMENDED BOOKS

1. Environmental Engineering and Management by Suresh K Dhameja; SK Kataria and Sons, New Delhi.
2. Environmental Science by Dr. Suresh K Dhameja; SK Kataria and Sons, New Delhi.
3. Environmental and Pollution Awareness by Sharma BR; Satya Prakashan, New Delhi.
4. Environmental Protection Law and Policy in India by Thakur Kailash; Deep and Deep Publications, New Delhi.
5. Environmental Science by Deswal and Deswal; Dhanpat Rai and Co. (P) Ltd. Delhi.
6. Engineering Chemistry by Jain and Jain; Dhanpat Rai and Co. (P) Ltd. Delhi.
7. Environmental Studies by Erach Bharucha; UGC University Press.

SUGGESTED DISTRIBUTION OF MARKS

| Topic No. | Time Allotted for Lectures (Periods) | Marks Allotted (%) |
|--------------|--------------------------------------|--------------------|
| 1 | 02 | 04 |
| 2 | 03 | 06 |
| 3 | 12 | 24 |
| 4 | 06 | 12 |
| 5 | 04 | 10 |
| 6 | 10 | 20 |
| 7 | 04 | 10 |
| 8 | 07 | 14 |
| Total | 48 | 100 |

5.6 EMPLOYABILITY SKILLS – I

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RATIONALE

The present day world requires professionals who are not only well qualified and competent but also possess good communication skills. Our diploma students not only need to possess subject related knowledge but also soft skills to get good jobs or to rise steadily at their work place. The objective of this subject is to prepare students for employability in job market and survive in cut throat competition among professionals.

DETAILED CONTENTS

1. Writing skills (08 hrs)
 - i) Official and business correspondence
 - ii) Job application - covering letter and resume
 - iii) Report writing - key features and kinds

2. Oral Communication Skills (20 hrs)
 - i) Giving advice
 - ii) Making comparisons
 - iii) Agreeing and disagreeing
 - iv) Taking turns in conversation
 - v) Fixing and cancelling appointments

3. Generic Skills (04 hrs)
 - i) Stress management
 - ii) Time management
 - iii) Negotiations and conflict resolution
 - iv) Team work and leadership qualities

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