

GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT

COURSE CURRICULUM

COURSE TITLE: YARN MANUFACTURING TECHNOLOGY-III

(Code: 3342902)

Diploma Programme in which this courses offered	Semester in which offered
Textile Manufacturing Technology	4 th Semester

1. RATIONALE

In industries, the textile diploma graduates are engaged in planning, operating and maintaining various kinds of yarn productions with the help of ring frames, and doubling machines. The textile diploma graduates should therefore have sufficient knowledge and skills of ring frames and doubling machines, such that they are able to plan individual machine production, operate machines and maintain production quality. This course has been designed to provide such knowledge and skills of ring frames and doubling machines for production of various kinds of yarns, as well as provide latest development in spinning process.

2. COMPETENCY

The course content should be taught and curriculum should be implemented with the aim to develop required skills in students so that they are able to acquire following competency:

- **Plan and supervise production of yarn using knowledge and skills of Ring frame and doubling processes.**

3. COURSE OUTCOMES (COs)

The theory should be taught and practical should be carried out in such a manner that students are able to acquire required learning out comes in cognitive, psychomotor and affective domain to demonstrate following course outcomes.

- Describe Ring frame, and doubling process.
- Describe drawing, twisting and package building process.
- Compare different type of ring and traveller.
- Describe the latest development in ring frame.
- Compare the ring spinning and compact spinning.
- Describe different type of doubling frame.
- Calculate the production output of spinning machines

4. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				
L	T	P		Theory Marks		Practical Marks		Total Marks
L	T	P	C	ESE	PA	ESE	PA	
3	0	4	7	70	30	40	60	200

Legends: L-Lecture; T – Tutorial/Teacher Guided Student Activity; P -Practical; C – Credit;; ESE -End Semester Examination; PA - Progressive Assessment.

5. DETAILED COURSE CONTENTS

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
Unit – I Ring Frame	1a. Describe objectives of Ring frames. 1b. Describe parts of a ring frame. 1b.1 Draw the passage path of the material in the Ring frame 1c. Describe importance of drafting and setting the draft. 1c.1 Explain working principle of Drafting system 1d. Classify the rings 1e. Describe working & construction of different Rings and Travellers. 1f. State the importance of ring 1g. List the parameters of specifications of rings & Travellers 1h. List the steps to start a new Ring for running in on ring frame. 1i. Enumerate the need of Ring Traveller 1j. Explain the working of Ring Traveller 1k. List the factors for selection of Ring Traveller 1l. Describe the function of Traveller Clearer 1m. Explain ring spindles and spindle drives. 1n. Describe control of the yarn tension & ballooning. 1o. List the Automation applied to the Ring frame	Ring Frame 1.1 Objectives of Ring frame 1.2 Passage of material through Ring Frame & functions of important parts. 1.3 Principles of Twisting and winding 1.4 Function of traverse motion & detail study of traverse motion. 1.5 Detail study of drafting system. - Function of drafting system - Roller Inclination - SKF - 3 roller Top Arm Drafting system. 1.5.1 Different Top Arm Drafting system. -Spring , Magnetic, & Pneumatic weighting system. 1.5.2 Study of cots, aprons, spacer and cradle. 1.6 Different type of Ring. 1.6.1 - Classification of Ring. - Flange Ring, PSM Ring, Anti-wedge Ring, Self lubricated Ring, Orbit Ring, SU Ring. -Flange width and number , Ring Diameter- importance & specification. -Running in of new Ring. 1.7 Study of traveller. -Function of Traveller -Requirement of Traveller. -Shape & Cross section of traveller. - Factors to be considered for the selection of traveller. -Function of Traveller Clearer. -Traveller no. 1.8 Spindle. -Function & Requirement of Good spindle. -Roller bearing spindle with advantages. 1.9 Spindle drive (1)Tape drive, (2) Tangential belt drive, (3)Direct drive. 1.10 Yarn ballooning & its control. 1.11 Brief study and control of yarn spinning tension

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
	<p>1p. State the advantages of automation listed .</p> <p>1q. Describe the function & importance of the cop build. 1g.1</p> <p>1r. Describe the automation in ring frame.</p> <p>1s. Compare ring and compact spinning yarns.</p> <p>1t. Explain control of yarn and package defect.</p>	<p>1.12 Different types of winding (Progressive & Wild).</p> <p>1.13 Study of cop Building mechanism.</p> <p>1.14 Automation in Ring frame 1.14.1 Main Spindle Drive Motor Programmable / simple Controller 1.14.2 Roving / Yarn break detection system – Mechanical & Electronic 1.14.3 Main Spindle Drive Motor rover heat Stop motion 1.14.4 Auto doffing. 1.14.5 Ring data and ISM (Individual spindle monitoring) 1.14.6 Slubbing Controller</p> <p>1.15 Compact spinning need, Different techniques with brief study, comparison of compact yarn & Ring spun yarn. 1.15.1 Brief study of spinning triangle and angle of yarn pull</p> <p>1.16 Different type of defects in yarn & package. 1.17 Causes of end breakages.</p>
Unit– II Doubling	<p>2a. Describe Doubling Objectives.</p> <p>2b. Explain parts of doubling.</p> <p>2c. Explain different type of Double yarns.</p> <p>2d. Describe singeing process.</p> <p>2e. List the types of Twist (S & Z)</p> <p>2f. Compare S & Z Twist</p> <p>2g. List the application of Double yarn</p>	<p>Doubling 2.1 Objectives. 2.2 Preparation for doubling. 2.3 Passage of yarn through doubling frame and function of important parts. 2.4 Study of twist direction (S & Z). 2.5 Effect of yarn parameter on doubled yarn Properties. 2.6 Uses of Typical doubled Yarn -Voile Yarn -Embroidery -Sewing thread -Tyre cord yarn -Lace yarn. 2.7 Brief study of singeing process of yarn.</p>
Unit– III Fancy Yarn	<p>3a. List the types of Fancy yarn</p> <p>3b. Describe the production of listed fancy yarn</p>	<p>3.1 Production of fancy yarn - Snarls yarn - Loop yarn - Slub yarn - Flake yarns - Spots yarn - Milange Yarn.</p>

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
Unit-IV Production calculation	4a. Calculate production of Ring frame machine based on machine capacity. 4a.1 Calculate draft of Ring frame 4a.2 Calculate twist of Ring frame. 4a.3 Calculate traveler speed 4a.4 Calculate resultant Count 4b. Calculate production of Doubling	Production calculation for Ring frame 4.1 On draft, twist & production of Ring frame. 4.2 Calculate traveler speed. 4.3 4.3 Calculate Resultant count. Calculate production of Doubling.

6. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS (THEORY)

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total marks
I	Ring frame.	26	08	23	07	38
II	Doubling process.	08	04	06	04	14
III	Fancy yarn.	03	02	03	03	08
IV	Production calculation.	05	01	02	07	10
Total Hrs		42	15	34	21	70

Legends: R = Remember; U= Understand; A= Apply and above levels (Bloom's revised taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

7. SUGGESTED LIST OF EXERCISES/PRACTICALS:

The practical/exercises should be properly designed and implemented with an attempt to develop different types of skills (**outcomes in psychomotor and affective domain**) so that students are able to acquire the competencies/programme outcomes. Following is the list of practical exercises for guidance.

*Note: Here only outcomes in psychomotor domain are listed as practical/exercises. However, if these practical/exercises are completed appropriately, they would also lead to development of certain outcomes in affective domain which would in turn lead to development of **Course Outcomes** related to affective domain. Thus over all development of **Programme Outcomes** (as given in a common list at the beginning of curriculum document for this programme) would be assured.*

Faculty should refer to that common list and should ensure that students also acquire outcomes in affective domain which are required for overall achievement of Programme Outcomes/Course Outcomes.

S. No.	Unit No.	Exercises/Practical (Outcomes' in Psychomotor Domain)	No of Hours
1	I	Draw the passage of material through Ring frame.	04
2	I	Draw the different Drafting system of Ring Frame.	06
3	I	Demonstrate different type of Ring.	04
4	I	Demonstrate different Types (Shape) of Traveller.	06
5	I	Demonstrate Cop building motion in Ring Frame.	04
6	I	Draw the Gearing Diagram of Ring Frame.	04
7	I	Compare the different between Ring and Compact yarn.	06
8	I	Draw and Demonstrate different type of compact spinning system.	06
9	II	Draw the Passage of yarn through Doubling.	04
10	III	Draw the sketches of different type of fancy yarn.	04
11	II	Draw the passage of singeing yarn.	04
12	I	Demonstrate spinning triangle and angle of yarn pull.	06
Total Hours			58

8. SUGGESTED LIST OF PROPOSED STUDENT ACTIVITIES

Following is the list of proposed student activities like: course/topic based seminars, internet based assignments, teacher guided self learning activities, course/library/internet/lab based mini-projects---etc.

- i. Internet based assignment topic wise.
- ii. Collection of various process parameters of ring frame, doubling frame and TFO from industries.(Lmw, Rieter, Trutzscheler.)
- iii. Visit to Spinning unit, and prepare a report with sketches.

9. SPECIAL INSTRUCTIONAL STRATEGY (If any)

- i. Arrange Industrial visit.
- ii. Show video films/animations/photographs/Charts of Ring frame machine, Doubling frame, Singeing machine etc.

10. SUGGESTED LEARNING RESOURCES

A. List of Books

S.No	Author	Title of Books	Publication
1	W.Klein	Vol.IV A Practical guide to Ring Spinning.	Year-1987 Textile Institute Manchester U.K.
2	A.R.Khare	Elements of Ring Frame and doubling.	Year- 2000 Sai Book Centre Mumbai.
3		Developments in Ring spinning & doubling,NCUTE.	NCUTE
4	C.A.Lawrance	Advancement in yarn spinning technology.	Year- 2010 Woodhead publication
5		NCUTE Pilot programmes in spinning.	NCUTE

B. List of Major Equipment/ Instrument

- i. Spinning laboratory: - Ring frame machine
- ii. Spinning laboratory: - Ring doubler

C. List of Software /Learning Websites-

Searching engine could be used to locate textile related sites

- i. <http://www.rieter.com>
- ii. <http://www.lmw.com>
- iii. <http://www.voltas.com/textilemach/spinning.asp>
- iv. <http://textilelearner.com>
- v. <http://textilelearner.com/compact-spinning-for-improved-quality-of-ring-spun-yarns/>
- vi. <http://textilelearner.com/spinning-standards-for-mill-planning/>
http://www.freewebs.com/jayaram-co/Yarn%20Manufacturing%20%20quiz/yarn_manufacturing.html
- viii. <http://textiletechinfo.com/spinning/ringframe-2.htm>
- ix. <http://textiletechinfo.com/spinning>
- x. <http://211.67.48.5/fsx/other/SEF201-Mod4.doc>
- xi. <http://www.scribd.com/doc/6935977/compact-spining>
- xii. <http://www.indiantextilejournal.com/articles/FAdetails.asp?id=503>
- xiii. <http://nptel.iitm.ac.in/courses/116102038/29>
- xiv. <http://nptel.iitm.ac.in>

11. COURSE CURRICULUM DEVELOPMENT COMMITTEE

Faculty Members from Polytechnics

- **Prof. Y. M. Gandhi** , HOD Textile Manufacturing , Shri B.P.T.I, Bhavanagar
- **Prof. R T Patel**, Lecturer in Textile Manufacturing, R.C Technical Institute, Ahmedabad
- **Prof. M. H. Vyas**, Lecturer in Textile Manufacturing, R.C Technical Institute, Ahmedabad

- **Prof. B. B. Bhatt**, Lecturer in Textile Manufacturing, R.C Technical Institute, Ahmedabad
- **Prof. S. P. Patel**, Lecturer in Textile Manufacturing, R C technical Institute Ahmedabad

Co-ordinator and Faculty Member from NITTTR Bhopal

- **Dr. C. K. Chugh**, Professor, Department of Mechanical Engineering
- **Prof. S. K. Gupta**, Professor & Coordinator for State of Gujarat.