

**GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT**

**COURSE CURRICULUM  
COURSE TITLE: MODERN SPINNING TECHNOLOGY  
(COURSE CODE: 3362901)**

<b>Diploma Program in which this course is offered</b>	<b>Semester in which offered</b>
Textile Manufacturing Technology	Sixth

**1. RATIONALE**

Modern spinning technology has a number of advantages, over the ring spinning technology, such as, increased spinning speed, absence of spinning preparatory machines such as speed frames, draw frames, etc., as well as, absence of certain, post spinning operations, like, cheese/ cone winding, etc., which are needed, in case of ring spinning. Because of the absence of some, preparatory and post spinning operations, as well as high output per machine, Modern spinning machines give a substantial, saving in labour cost. This technology has thus become essential for all textile manufacturing engineers. This course therefore aims to develop some of the basic skills of modern spinning technologies.

**2. COMPETENCY**

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

- **Produce yarn by operating modern spinning line effectively and by maintaining process parameters.**

**3. COURSE OUTCOMES**

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

- i. Produce yarn using open end spinning processes.
- ii. Produce yarn using rotor spinning processes.
- iii. Produce yarn utilising friction spinning process and other modern spinning equipment.
- iv. Maintain modern blow rooms.
- v. Maintain polyester fibre spinning units.

**4. TEACHING AND EXAMINATION SCHEME**

<b>Teaching Scheme (In Hours)</b>			<b>Total Credits (L+T+P)</b>	<b>Examination Scheme</b>				
<b>L</b>	<b>T</b>	<b>P</b>		<b>Theory Marks</b>		<b>Practical Marks</b>		<b>Total</b>
			<b>C</b>	<b>ESE</b>	<b>PA</b>	<b>ESE</b>	<b>PA</b>	
3	0	2	5	70	30	20	30	<b>150</b>

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

## 5. COURSE CONTENT DETAILS

Unit	Major Learning Outcomes (In the Cognitive Domain)	Topics and Sub-topics
<b>Unit – I Open-End Spinning.</b>	1a. Explain limitations of Ring spinning 1b. Explain the principle of open end spinning with its advantages 1c. Describe different methods of open end spinning	1.1 Ring spinning and open end spinning. 1.2 Basic methods of open end spinning: Vortex assembly, Axial assembly, Discontinuous assembly, Friction spinning, Rotor spinning
<b>Unit – II Rotor Spinning</b>	2a. Describe Rotor Spinning principle and the operations of the Rotor 2b. Explain important functions of Rotor spinning machine 2c. Describe properties, merits and demerits of rotor spun yarn 2d. Calculate production, draft and twist of Rotor spinning machine.	2.1 Rotor spinning and principles of operation. 2.2 Parts of the Rotor spinning machine. 2.3 Fibre opening, fibre transfer and twist-insertion in rotor spinning. 2.4 Properties of Rotor spun yarn. 2.5 Calculation for production, draft and twist
<b>Unit – III Friction Spinning and Other Modern Spinning System</b>	3a. Describe principle of operation of friction spinning 3b. Differentiate the different types of friction spinning machines. 3c. Describe properties of friction spun yarn 3d. Describe various modern spinning systems 3e. Describe properties of the yarn spun by other modern spinning machines	3.1 Friction spinning 3.2 Different types of Friction spinning machines: Dref-I, Dref -II, Dref-III, P.S.L) 3.3 Properties of friction spun yarn. 3.4 Other modern spinning systems and the yarn spun from them: Air jet spinning, Cover spinning, Twistless spinning (Bobtex, Twillo, Faciated), Siro-spinning, Self twisted
<b>Unit – IV Modern Developmen ts in Blow Room to Ring Frame</b>	4a. Describe the working of the Chute feed systems 4b. Describe the working of the Auto leveller in Card and Draw frame 4c. Describe modern developments in blow room to Ring frame	4.1 Chute feed systems. 4.2 Auto leveller in Card and Draw frame. 4.3 Developments in blow room, card, draw frame, comber, speed frame and ring frame - Ring cam system.
<b>Unit –V Polyester Fibre Spinning and Use of</b>	5a. Describe the requirement of polyester fibre spinning 5b. Describe machine sequences and process parameters of polyester fibre spinning.	6.1 Polyester fibre spinning and its requirement. 6.2 Machine sequences and process parameter used for polyester fibre spinning.

Unit	Major Learning Outcomes (In the Cognitive Domain)	Topics and Sub-topics
Microprocessors	5c. Explain the applications and requirement of microprocessor controls in modern spinning technology.	6.3 Micro processors controls used in modern spinning.

## 6. SUGGESTED SPECIFICATION TABLE WITH HOURS and MARKS (Theory)

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total
I	Introduction to Open-end Spinning.	08	02	08	04	14
II	Rotor Spinning.	12	04	12	06	22
III	Friction Spinning.	10	02	08	04	14
IV	Modern Developments in Blow Room to Ring Frame.	06	02	05	03	10
V	Polyester Fibre Spinning and Use of Microprocessors	06	02	05	03	10
<b>Total</b>		42	12	38	20	<b>70</b>

**Legends:** R = Remember, U = Understand, A= Apply and above Level (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 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 mainly 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.	Practical Experiment/Exercise (Outcomes in the Psychomotor Domain)	Approx. Hours Required
1	I	Find out important features of Open End Spinning assembly.	02
2	I	Draw sketches of different open end Systems.	02
3	II	Draw passage of material in Rotor spinning.	02

S. No.	Unit No.	Practical Experiment/Exercise (Outcomes in the Psychomotor Domain)	Approx. Hours Required
4	II	Set the yarn production on Rotor spinning	02
5	II	Set the various devices in Rotor spinning.	02
6	II	Set the draft, twist and speed in Rotor spinning.	02
7	II	Calculate Production, TPI, and back doubling and Draft of rotor spinning machine	02
8	III	Draw passage of material of Friction spinning. DREF-I, DREF-II, DREF-III, P.S.L.	02
9	IV	Draw sketch of Air jet spinning..	02
10	IV	Draw sketch of Cover spinning process	02
11	IV	Draw sketch of Twistless spinning.	02
12	V	Discover important features of Modern Blow room machine and chute feeding.	02
13	V	Discover important features of Modern Carding, Combing, Draw frame, Fly frame and Ring frame process.	02
14	V	Draw sketch of type of auto levelers and Describe the important features of Auto levelers in card and draw frame.	02
<b>Total</b>			<b>28</b>

### 8. SUGGESTED STUDENT ACTIVITIES

- i. Prepare journals based on practical performed in laboratory
- ii. Literature survey of Modern spinning Technology.
- iii. Collection of Sample of Technical Textiles.
- iv. Visit to Modern spinning textile industry and preparing report with sketches.

### 9. SPECIAL INSTRUCTIONAL STRATEGIES (if any)

- i. Show educational video and CDs
- ii. Prepare Sample Charts
- iii. Arrange Expert lectures by textile engineers
- iv. Arrange visit to nearby textile industry, which is using the latest technology.

### 10. SUGGESTED LEARNING RESOURCES

#### A) Books

S.No.	Author	Title of Books	Publication
1	Oxtoby	Spun Yarn Technology	Butterworths Publication
2	Nield	Open-End Spinning	The Textile Institute (August 1975)
3	Lawrence C.A. and Chen, K.Z.	Rotor Spinning	The Textile Institute, Textile Progress Vol.13,
4	Klein, W.	Short Staple Spinning - Vol. I-VI	The Textile Institute
5	Gowda, R. V. Mahendra	New Spinning System	NCUTE
7	W.Klein	Open-End Spinning	The Textile Institute

**B) Major Equipment/ Instrument with Broad Specifications**

S.No.	Machine Name	Specification
1	Rotor Spinning Machine	<ul style="list-style-type: none"> <li>• Number of Spinning position up to : 220</li> <li>• Range of yarn linear density: 12 – 125 tex, 8-80 Nm, 5-50 Ne</li> <li>• Draft: 25 to 400</li> <li>• Opening roller Speed: 6000 to 11000 rpm</li> <li>• Rotor speed: up to 150000 rpm</li> <li>• Rotor Diameter: 32 – 65 mm</li> <li>• Delivery speed: up to 200 mpm</li> <li>• Winding angle: 29° to 45°</li> <li>• Package (Mass): up to 5 kg</li> </ul>
2	DREF Spinning	<p>DREF-2</p> <ul style="list-style-type: none"> <li>• Number of Spinning position : 6 to 48</li> <li>• Count Range : 120 – 3300 tex, 0.18 -5 Ne</li> <li>• Raw Material: Wool / bast Fiber / Synthetic fiber</li> <li>• Delivery speed: 280 mpm</li> <li>• Feed stock : Card Sliver</li> <li>• Yarn type : Normal OE yarn</li> </ul> <p>DREF-3</p> <ul style="list-style-type: none"> <li>• Number of Spinning position : 12 to 96</li> <li>• Count Range : 33 – 165 tex, 3.5 -18 Ne</li> <li>• Raw Material: Cotton / Synthetic fiber</li> <li>• Delivery speed: 300 mpm</li> <li>• Feed stock : Draw Fame Sliver</li> <li>• Yarn type : Bundle Yarn</li> </ul>

**C) Software /Learning Websites-**

- i. <http://www.rieter.com/cz/rikipedia/articles/rotor-spinning/the-importance-of-rotor-spinning/the-principle-of-rotor-spinning/>
- ii. <http://nptel.ac.in/courses/116102038/new%20spinning%20systems/rotor%20spinning-1.htm>
- iii. <http://textilelearner.blogspot.in/2013/02/an-overview-of-developments-in-yarn.html>
- iv. <http://www.indiantextilejournal.com/articles/FAdetails.asp?id=2010>
- v. <http://textiletodaybd.com/magazine/printable.php?id=371>
- vi. <http://www.rieter.com/cz/rikipedia/articles/fibre-preparation/the-blowroom/summary-of-the-process/the-blowroom-installation-as-asequence-of-machines/>
- vii. <http://www.slideshare.net/nayen/blowroom>
- viii. <http://www.rieter.com/cz/rikipedia/articles/alternative-spinning-systems/the-various-spinning-methods/open-end-spinning-processes/friction-spinning/operating-principle/>
- ix. <http://www.indiantextilejournal.com/articles/FAdetails.asp?id=4636>
- x. <http://www.slideshare.net/aybalaozcan/aybala-te-550friction-spinning>
- xi. [http://textilelearner.blogspot.in/2011/08/high-speed-spun-yarn-production-rotor\\_5195.html](http://textilelearner.blogspot.in/2011/08/high-speed-spun-yarn-production-rotor_5195.html)
- xii. <http://nptel.ac.in/courses/116102038/32>
- xiii. <http://www.rieter.com/en/rikipedia/articles/technology-ofshort-staple-spinning/yarn-formation/assembly-of-fibers-to-make-up-a-yarn/the-positions-of-the-fibers-in-the-yarn-structure/open-end-spun-yarns/>
- xiv. <http://www.rieter.com/en/rikipedia/articles/ring-spinning/the-ring-spinning-machine/introduction/>

**11. COURSE CURRICULUM DEVELOPMENT COMMITTEE****Faculty Members from Polytechnics**

- **Prof. Y. M. Gandhi** , HOD Textile Manufacturing , Sir B.P.T.I, Bhavanagar
- **Prof. V. N. Soni** , HOD Textile Manufacturing , R.C Technical Institute, Ahmedabad
- **Prof. R. T. Patel**, Lecturer in Textile Manufacturing, R.C Technical Institute, Ahmedabad
- **Prof. S. P. Patel** , Lecturer in Textile Manufacturing, R C technical Institute Ahmedabad

**Faculty Member from NITTTR Bhopal**

- **Dr. C. K. Chugh**, Professor, Department of Mechanical Engineering
- **Dr. Joshua Earnest**, Professor Department of Electrical and Electronics Engineering