**GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT**
**Course Curriculum**

# YARN MANUFACTURING TECHNOLOGY- II

**(Code: 3332902)**

| Diploma Programme in which this courses offered | Semester in which offered |
|---|---|
| Textile Manufacturing Technology | 3rd Semester |

## 1.RATIONALE

Technological up gradation in yarn manufacturing technology has lead to design improvement in spinning machines and better process control. Higher productivity and improved yarn quality is achieved with vertical and horizontal integration in spinning process. This course imparts knowledge of recent technological development in drawing frame, Comber & speed frame. This course also provides knowledge of new drafting systems, new technique used for better fibre control in drafting zone and its effect on quality as it has significant effect on subsequent process and quality of end product.

## 2. COMPETENCY (Programme Outcome according to NBA Terminology):

The course content should be taught and with the aim to develop different types of skills so that students are able to acquire following competency:

- **Plan and supervise the yarn production to achieve the desired production quality.**

## 3. TEACHING AND EXAMINATION SCHEME

| Teaching Scheme (In Hours) | | | Total Credits (L+T+P) | Examination Scheme | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | 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.

## 4. DETAILED COURSE CONTENTS

| Unit | **Major Learning Outcomes** (Course Outcomes in Cognitive Domain according to NBA terminology) | **Topics and Sub-topics** |
|---|---|---|
| **Unit – I Draw frame** | 1a. Explain the object of draw frame<br>1b. Discuss importance of doubling on Draw frame<br>1c. Explain passage of material on draw frame<br>1d. State importance of each part.<br><br><br><br><br><br><br><br><br>1e. List latest developments in draw frame. | 1.1 Objectives of draw frame<br>1.2 Principles of drafting & doubling, effects of drafting & doubling on yarn quality.<br><br>1.3 Detail study of draw frame.<br>1.3.1 Passage of material & functions of important parts.<br>1.3.2 Different types of drafting systems.<br>• 3over 3 with pressure bar<br>• 4over 3 with pressure bar<br>• 5over 4 drafting with pressure bar<br>1.3.3 Different types of Top roller weighting systems<br>• Dead weight<br>• Top arm weighting system<br>• Magnetic weighting system<br>1.3.4 Electrical stop motion.<br>1.3.5 Routine maintenance in draw frame.<br><br>1.4 Technological design change in modern draw frame.<br>1.4.1 Drafting roller arrangement.<br>1.4.2 Top roller weighting arrangement.<br>1.4.3 Online monitoring and auto leveling.<br>1.4.4 Suction arrangement.<br>1.4.5 Automation in doffing.<br>1.4.6.Power driven creels<br>1.4.7 sliver guides<br>1.4.7 Safety measures. |
| **Unit– II**<br><br>**Comber** | 2a. Explain objects of comber<br><br>2b. Explain the importance of lap quality for combing processes<br><br><br><br><br><br>2c. Differentiate lap forming machines | 2.1Objects of combing, value of combing<br>2.2 Define the combing efficiency.<br><br>2.3 Requirements of the card with respect to combing.<br>- Fibre configuration in sliver-nep level<br>- Card sliver purity<br>- Card sliver evenness<br>2.4 Requirements of the draw frame with respect to combing.<br>- Predrawing - combing preparation<br>- Post drawing combing process.<br><br>2.5 Brief study of Sliver lap machine<br>2.6 Brief study of ribbon lap machine<br>2.7 Limitation of conventional sliver lap and ribbon lap sequence<br>2.8 Detailed study of super lap former.<br>2.9 Importance of the even passage between card and comber. |

| Unit | **Major Learning Outcomes** (Course Outcomes in Cognitive Domain according to NBA terminology) | **Topics and Sub-topics** |
|---|---|---|
| | 2d. Describe the combing cycle. | 2.10 Detail study of cycle of operation in comber.<br>2.11 Brief study of following motion in comber.<br>- Feeding, Nipping, Cylinder combing , Top comb combing Detaching. |
| **Unit– III Developments in comber** | 3a. List various parameters for better quality of combed sliver.<br><br>3b. List Modern Developments in combing process. | 3.1 Performance of comber.<br>3.1.1 Waste extraction & its control - waste setting.<br>3.1.2 Comber defects their causes & remedies.<br>3.2 Routine maintenance of comber.<br><br>3.3 Significant developments in combing.<br>3.3.1 Cylinder clothing<br>3.3.2 Increase in nips per minute<br>3.3.3 Optimizing lap strength<br>3.3.4 Clamping line distance<br>3.3.5 Concentric nipper movement<br>3.3.6 additional gripping arrangement<br>3.3.7 asymmetric web pan<br>3.3.8 Safety measures |

| Unit | **Major Learning Outcomes** (Course Outcomes in Cognitive Domain according to NBA terminology) | **Topics and Sub-topics** |
|---|---|---|
| **Unit–IV Speed Frame** | 4a. Explain objectives of speed frame | 4.1 Objectives of speed frame process/<br>4.2 Requirement of speed frame process. |
| | 4b. Describe different motions, working principle and Process parameters of the speed frame machine. | 4.3 Detail study of can fed inter<br>4.3.1 Passage of material<br>4.3.2 Function of important parts<br>4.3.3 Principle of twisting & winding<br>4.3.4 Building motion<br>4.3.5 Different modern drafting system<br>- SKF series<br>- Sussen<br>4.3.6 Principle of differential motion<br>4.3.7 Tweedles patent differential motion |
| | 4c. Discuss latest technological change in speed frame | 4.4 Design change in Speed frame.<br>4.4.1 Drafting - three roller drafting, four roller drafting.<br>4.4.2 Twisting<br>4.4.3 Building motion<br>4.4.4 Drive system<br>4.4.5 Other features - Creel, Package size, Roving tension control, Roving tension sensor, Flyers, Suctions, Online monitoring, Inverter drive, Safety measures |
| **Unit–V Production calculation** | 5a. Calculate the production based on machine capacity. | Production calculation for Draw frame, lap former Comber and Speed frame machine.<br>4.1 Calculate draft & production of Draw frame.<br>4.2 Calculate draft & production of Comber.<br>4.3 Calculate draft & production of Lap former.<br>4.4 Calculate draft, twist & production of Speed frame. |

## 5. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS (Theory)

| **Unit No.** | **Unit Title** | **Teaching Hours** | **Distribution of Theory Marks** | | | |
|---|---|---|---|---|---|---|
| | | | **R Level** | **U Level** | **A Level** | **Total** |
| 1. | Draw Frame. | 10 | 02 | 07 | 06 | 15 |
| 2. | Comber. | 11 | 02 | 06 | 08 | 16 |
| 3. | Developments in Comber. | 05 | 02 | 06 | 08 | 16 |
| 4. | Speed Frame | 12 | 02 | 07 | 07 | 16 |
| 5. | Production Calculation. | 04 | 00 | 00 | 07 | 7 |
| **Total** | | 42 | 08 | 26 | 36 | **70** |

**Legends:** R = Remember; U = Explain; 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.

## 6. SUGGESTED LIST OF EXERCISES/PRACTICAL

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

**Note**: Here only Course Outcomes in psychomotor domain are listed as practical/exercises. However, if these practical/exercises are completed appropriately, they would also lead to development of **Programme Outcomes/Course Outcomes in affective domain** as given in a common list at the beginning of curriculum document for this programme. Faculty should refer to that common list and should ensure that students also acquire those Programme Outcomes/Course Outcomes related to affective domain.

| S. No. | Unit No. | **Practical/Exercise(**Course Outcomes in Psychomotor Domain according to NBA Terminology) | Approx. Hours Required. |
|---|---|---|---|
| 1 | 1 | Draw sketch of Passage of material through Draw frame | 04 |
| 2 | 2 | Draw sketch of different drafting Systems | 04 |
| 3 | 3 | Set Electrical stop motion on Draw frame | 04 |
| 4 | 4 | Draw sketch of Auto leveller | 04 |
| 5 | 5 | Draw sketch of Passage of material on super lap former | 04 |
| 6 | 6 | Draw sketch of Passage of cotton through Comber | 04 |
| 7 | 7 | Demonstrate Combing cycle | 06 |
| 8 | 8 | Demonstrate Nipper motion on comber | 04 |
| 9 | 9 | Setting between cushion plate and B.S.D.R. | 04 |
| 10 | 10 | Demonstrate Detaching roller drive | 04 |
| 11 | 11 | Draw sketch of Passage of sliver / rove in C.F.I. | 04 |
| 12 | 12 | Draw sketch of Gearing diagram of Fly frame | 04 |
| 13 | 13 | Draw sketch of Builder motion in fly frame | 06 |
| 14 | 14 | Draw sketch of Twiddles patent Differential motion for fly frame m/c. | 04 |
| | | Total | 60 |

## 7. 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.

1. Internet based assignment topic wise.
2. Collection of various process parameters of draw frame lap former, comber &speed frame from industries.( Lmw, Rieter, Trutzscheler.)
3. Visit to Spinning unit, and preparing report with sketches.

## 8. SPECIAL INSTRUCTIONAL STRETERGY (If Any)

i. Arrange visit to nearby yarn manufacturing/spinning unit.
ii. Use charts to explain the concepts such as draw frame and speed frame.
iii. Show educational videos/animation to explain the yarn manufacturing process and functioning of different machines.
iv. Give internet based assignments on different aspects of yarn manufacturing.

## 9. SUGGESTED LEARNING RESOURCES

### A. List of Books

| S.No. | Author | Title of Books | Publication |
|---|---|---|---|
| 1 | S.Jayprakasam | Technology of yarn forming | |
| 2 | A.R.Khare | Elements of carding and drawing | |
| 3 | A.R.Khare | Elements of combing. | |
| 4 | Subramani | Spun yarn technology | |
| 5 | W.Klein | Spun yarn technology | |
| 6 | Dr. R.Chattopadhyay<br>Dr. R.S.Renngasamy | NCUTE Extension Programme | |

### B. List of Major Equipment/ Instrument

Spinning laboratory: - Comber machine.

### C. LIST OF SOFTWARE /LEARNING WEBSITES-

Search engines could be used to locate textile related sites. Following are some suggested sites.

i. http://www.textileassociationindia.org/
ii. http://www.nitma.org/
iii. http://www.sitra.org/
iv. www.itamma.org/
v. http://www.uttaindia.org/
vi. http://www.cottonjouney.com/Storyofcotton/page5.asp
vii. http://textiletechinfo.com/spinning/BLOWROOM.htm
viii. http://en.wikipedia.org/wiki/weaving
ix. http://textilelearner.blogspot.in
x. http://www.rieter.com
xi. http://www.lmw.com

## 10. 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

**Coordinator and Faculty Member from NITTTR Bhopal**

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