GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Engineering

Level: Diploma

Branch: Textile Manufacturing Technology

Course / Subject Code: DI03029021

Course / Subject Name: Spinning Technology III

w. e. f. Academic Year:	2024-25
Semester:	3rd
Category of the Course:	PCC

Prerequisite:	**Basic knowledge of Ginning, Blowroom, Carding, Draw frame and Comber machine.**
Rationale:	Technological upgradation in yarn manufacturing has led to design improvement in spinning machines and better process control. This course is intended to impart knowledge of recent technological development in Roving frame & Ring frame. Roving frame and Ring frame are important machineries of the spinning operation because its influences yarn quality. Quality of yarn is directly related to the quality of Roving. To ensure even quality of yarn, the roving must have good quality. This course also provides knowledge of modern development in drafting system and different machine elements ensuring better fibre control and minimizes fibre loss with improved roving and yarn quality and maintaining machine efficiency. Now-a-days there is greater demand of fancy yarn in world. This course also provides skill to produce different types of fancy yarn. Doubling frame is used to produce such kind of fancy yarn. There are different types of process available to produce fancy yarn.

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT Level
01	Use Roving frame to produce uniform fault free roving.	R, U, A
02	Use Ring frame to produce different range of yarn count with desire quality.	R, U, A
03	Select relevant machine/process to produce different types of double and fancy yarn.	R, U, A
04	Calculate the production of Roving frame, Ring frame and Doubling frame.	R, U, A

**Revised Bloom's Taxonomy (RBT)*

Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+ (PR/2)	Assessment Pattern and Marks				Total Marks
				Theory		Tutorial / Practical		
L	T	PR	C	ESE (E)	PA(M)	PA(I)	ESE (V)	
3	0	2	4	70	30	20	30	150

Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1. Roving Frame	1.1 Tasks of Roving frame. 1.2 Importance of Roving process. 1.3 Operating sequence & drafting arrangement in Roving frame. 1.4 Detail study of Flyer assembly. 1.5 Principle of Winding in Roving frame. 1.6 Objectives and working Principle of Builder motion. 1.7 Principle of bobbin drive system. 1.8 Automation in Roving frame. 1.9 Roving defects, their causes & remedies.	12	26%
2. Ring Frame	2.1 Tasks of Ring frame. 2.2 Operating sequence & functions of important parts in ring frame. 2.3 Study on spindle structure, spindle drive and its influence on the spinning process. 2.4 Detail study of drafting system components such as top rollers, pressure roller loading like spring loading, pneumatic loading and various fibre guiding devices. 2.5 Importance of Ring and Traveler. 2.6 Study on various ring shape like Flange Ring, PSM Ring, Anti-wedge Ring, Self lubricated Ring, Orbit Ring, SU Ring. 2.7 Brief study on ring material, attachment of the ring, demands imposed on the ring when operating on machine, fibre lubrication on the ring and running-in new rings. 2.8 Study on traveler task and function, types, shape, material, mass and clearer. 2.9 Study of Cop building mechanism.	18	40%

	2.10 Brief study of Yarn Ballooning and its control. 2.11 Brief study of spinning triangle and its influence on yarn structure. - Angle of yarn pull. 2.12 Automation in Ring frame. 2.13 Principle of Compact spinning and its advantages, Comparison of ring spinning and compact spinning technology. 2.14 Different types of yarn and package faults, their causes & remedies. 2.15 Brief study of Energy consumption in spinning.		
3. Doubling Frame and production of Fancy yarn	3.1 Tasks of Doubling frame. 3.2 Operating sequence & functions of important parts in doubling frame. 3.3 Effect of yarn parameter on doubled yarn properties. 3.4 Uses of doubled yarn like Voile Yarn, Embroidery, Sewing thread, Tyre cord yarn and Lace yarn. 3.5 Production of different fancy yarn like Snarl yarn, Loop Yarn, Slub yarn, Spot yarn, Flake yarn and Milange yarn.	8	18%
4. Production calculation	4.1 Calculate draft, twist & production of Roving frame. 4.2 Calculate draft, twist & production of Ring frame. 4.3Calculate production of Doubling frame. 4.4 Calculate Resultant count.	7	16%
	Total	**45**	**100**

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks (in %)					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
20	**30**	**30**	**10**	**5**	**5**

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)

References/Suggested Learning Resources:

(a) Books:

1. The Rieter Manual of Spinning, Volume-III Spinning Preparation, W Klein, Rieter Machine Works Ltd., Winterthur, Switzerland, 2014, ISBN 10 3-9523173-1-4/ ISBN 13 978-3-9523173-1-0.
2. The Rieter Manual of Spinning, Volume-IV Ring Spinning, W Klein, Rieter Machine Works Ltd., Winterthur, Switzerland, 2014, ISBN 10 3-9523173-3-3-0/ ISBN 13 978-3-9523173-3-4.

3. Fundamentals of Spun Yarn Technology, Carl A. Lawrence, CRC Press publication, Florida. ISBN 0-203—00958-4 Master E book ISBN 1-56676-821-7 (Print Edition).
4. NCUTE Extension Program Drawing, Combing and Roving, Dr. R. Chattopadhyay, Dr. R. S. Rengasamy, NCUTE Pilot Program, Indian Institute of Technology, New Delhi, 2003.
5. NCUTE Pilot Program in Ring Spinning, Prof. K. R. Salhotra, Dr. R. Alagirusamy, Dr. R. Chattopadhyay, NCUTE Pilot Program, Indian Institute of Technology, New Delhi, 2003.
6. Handbook of Yarn Production, Peter R. Lord, Science and Economics, CRC Press publication, New York, 2002. Woodhead Publishing ISBN 1 85573 696 9 CRC Press ISBN 0-8493-1781-9.
7. Spun Yarn Technology, Oxtoby Eric, Butterworth's (Publishers) Limited, UK,1983, ISBN: 0-408-01464-4.

(b) Open source software and website:

1. http://nptel.ac.in/
2. http://www.textileassociationindia.org/
3. http://www.sitra.org.in/
4. http://www.itamma.org/
5. https://textilestudycenter.com/
6. http://www.textileschool.com/
7. https://archive.org/details/manmadefibres0000monc/page/n7/mode/2up
8. https://textilestudycenter.com/textile-books-free-donwload/
9. http://www.cottonsjourney.com/Storyofcotton/page5.asp
10. http://textilelearner.blogspot.in/
11. http://www.textileassociationindia.org/
12. http://www.rieter.com

Suggested Course Practical List:

1. Demonstrate the passage of material through Roving frame with a neat labeled sketch.
2. Determine the principle of twisting and winding on Roving frame.
3. Demonstrate the flyer with a neat labelled sketch.
4. Demonstrate the builder mechanism with a neat labelled sketch.
5. Demonstrate the passage of material through Ring frame with a neat labelled sketch.
6. Demonstrate the modern drafting system in Ring frame with a neat labelled sketch.
7. Demonstrate different types of Rings and Traveler with a neat labelled sketch.
8. Demonstrate spindle and different types of spindle drive with a neat labelled sketch.
9. Demonstrate cop building mechanism with a neat labelled sketch.
10. Demonstrate principle of Compact spinning with a neat labelled sketch.
11. Demonstrate the passage of material through Doubling frame with a neat labelled sketch.
12. Demonstrate the manufacturing process of different Fancy yarn with a neat labelled sketch.

13. Study Energy consumption in Spinning process.
14. Calculate the production of Roving frame and Ring frame from provided data.

List of Laboratory/Learning Resources Required:

1. Miniature Roving frame
2. Miniature Ring frame
3. Doubling frame

Suggested Project List:

1. Sample collection: Collect the sample of different feed and delivery material of Roving frame and Ring frame and prepare a chart with machine specifications.
2. Roving analysis: Calculate hank of Roving and weight/unit length (Linear density).
3. Roving defects analysis: Prepare a report on identification of various defects observed in Roving, provide reasons for those defects and suggest possible remedies to avoid them.
4. Yarn analysis: Calculate Count of yarn, Twist and CSP value and prepare chart.
5. Machine specifications: Prepare a report on machine specifications of Roving frame and Ring frame.
6. Yarn defect analysis: Prepare a report on identification of various defects observed in yarn, provide reasons for those defects and suggest possible remedies to avoid them.
7. Doubled and fancy yarn: Prepare a report on different types of double and fancy yarn production method. Collect sample of doubled and fancy yarn form industries.

Suggested Activities for Students:

1. Prepare a report on Roving frame of different manufacturers based on your industrial visit.
2. Prepare a report on Ring frame of different manufacturers based on your industrial visit.
3. Collection of various machine specifications, and process parameters for Roving frame and Ring frame.
4. Visit a nearby spinning unit and prepare a report with suitable machinery sketches.
5. Prepare a presentation on recent technological advancement of Roving frame and Ring frame.
6. Present a seminar PPT on any of the following relevant topic- Roving frame, Ring frame and Fancy yarn.
7. Explore library/internet facilities for preparing report on Roving frame, Ring frame and Doubling frame.
8. Internet based assignment topic wise.

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