GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT

COURSE CURRICULUM
COURSE TITLE: QUALITY AND PROCESS CONTROL IN SPINNING AND WEAVING
(COURSE CODE: 3352905)

Diploma Programme in which this courses offered	Semester in which offered
Textile Manufacturing Technology	5th Semester

1. RATIONALE

In the competitive world of market economy, to sell the product it is must to ensure the quality of the product at low cost. For this engineers have to have proper control of quality and processes in the industry. Considering this Quality and Process control in spinning and weaving is to be taught in this course. The change will make the students able to understand quality and process control in spinning process as well as in weaving process. The students also will be able to calculate cost of yarn and fabric and they will understand the importance of humidity in spinning and weaving process.

2. LIST OF COMPETENCY

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

- **Supervise quality and process control in spinning and weaving operations**.

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 out comes in cognitive, psychomotor and affective domain to demonstrate following course outcomes.

i. Explain the criteria to control the quality and cost in textile manufacturing plants by taking corrective steps.
ii. Describe the criteria for maintaining the quality of Blow Room, Card, Comber, yarn quality and to check the yarn faults.
iii. Select the relevant instruments with their specification to maintain spinning process machines.
iv. Explain the process control in winding, warping, sizing and loom shed.
v. Explain the process of online quality control of Spinning and Weaving operations.

4. 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	
4	0	0	4	70	30	00	00	**100**

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 cognitive domain)	Topics and Sub-topics
Unit – I Control of Mixing and Yarn Realization	1a. Explain the key variables of process control for yarn mixing and yarn realisation 1b. Describe the parameters to be controlled in spinning process 1c. Describe the preparation of samples for bulk, basic and laboratory	1.1 Process control in spinning 1.2 Key variables for process control 1.3 Norms of standards 1.4 Preparation of samples: Bulk. Basic and laboratory.
	1d. Describe the relationship of fibre characteristics with quality of yarn. 1e. Explain methods for improving mixing-cost ratio. 1f. With the given data, compute product waste and yarn realization 1g. State the Norms for yarn realization	1.5 Relationship of fibre characteristics with quality of yarn. 1.6 Fibre quality index. 1.7 Methodologies to improve mixing-cost ratio. 1.8 Norms for yarn realization and factors affecting it
Unit–II Quality Control of Blow room, Card, Comber, Yarn Quality, Yarn Faults and Package Faults	2a. Analyze the trash content in the material fed at B.R (Blow Room), Card and Comber. 2b. Describe the steps to set the machine settings and control the extraction of optimum waste in B.R., Card and combing process.	2.1 Trash content and cleaning efficiency, Norms for cleaning and waste in B.R. and Cards, Optimizing cleaning at carding. 2.2 Technological consideration for comber waste, Optimum level of comber waste.
	2c. Explain the factors affecting the count variations within bobbin and between bobbin 2d. Describe the steps to set the process/machine parameters for controlling above variations. 2e. Explain the factors affecting yarn strength. 2f. State the norms for U% of yarn, sliver and roving. 2g. Differentiate yarn irregularity, unevenness, imperfection and their	2.3 Factors affecting count variation within and between bobbin count variation 2.6 Control of variability of lea strength, Norms for lea strength. 2.7 yarn irregularity, unevenness, imperfection and their causes 2.8 Types of yarn thick, thin and neps 2.9 Different yarn faults: Slubs, crackers, hairiness. 2.10Package faults: slough off,

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
	causes 2h. Describe remedies to eliminate yarn faults: unevenness and imperfections. 2i. Analyse causes and remedies of package faults: slough off, spinners double, bad piecing.	spinners double, bad piecing
Unit–III Machine Audit	3a. Describe the Check/inspection points for the condition of important machine settings of the spinning process. 3b. Explain the features for the smooth running of spinning process machines. 3c. Select the relevant instruments with their specification to maintain spinning process machines.	3.1 Impact of machine condition of processing performance and yarn quality. 3.2 Different test instruments for machinery audit: Auto twist tester, Color matching computer, Strength testing instruments from Fibre to multiply yarn, Count testing instrument, Fibre length testing instruments, fibre to yarn Evenness testing instruments, blend testing instrument, temp. Controlled oven, lea preparation machine, humidity measuring machine
Unit–IV Process Control in Winding, Warping, Sizing and Loom Shed	4a. Explain the approach to process control in weaving. 4b. State the causes of yarn breaks in loom-shed. 4c. Describe the stoppages due to mechanical faults. 4d. Explain the loss of efficiency due to belt slippage. 4e. Apply the remedial measures for the above causes to improve the efficiency.	4.1 Process control in weaving. 4.2 Removal of spinning defects. 4.3 Quality of knot. 4.4 Causes and remedies for package defects. 4.5 Norms for process parameters. 4.6 Minimizing end breaks in warping. 4.7 Quality of warping beam. 4.8 Causes of low productivity at warping
	4f. Identify the processing parameters of sizing. 4g. Describe the process of control of size, pick-up, size viscosity and temperature control. 4h. Suggest the methods to control the stretch of yarn in the different zones. 4i. Explain the causes of faults and remedies in sizing beams. 4j. State the important factors that affect loom efficiency.	4.9 Control of size pickup 4.10 Control of yarn stretch. 4.11 Quality of size beam. 4.12 Control of loom efficiency. 4.13 Control of fabric defects.

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
	4k. Describe the procedure to identify fabric defects to remedy them	
Unit–V Online control in Spinning and Weaving Operations	5a. Describe the process of online control in Spinning operations with sketches. 5b. Describe the process of online control in Weaving operations with sketches .	5.1 Online control in Spinning and Weaving operations

6. SUGGESTED SPECIFICATION TABLE WITH HOURS and THEORY MARKS

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total
1	Control of Mixing and Yarn Realization	08	2	6	1	09
2	Quality Control of Blow Room, Card, Comber, Yarn Quality, Yarn Faults and Package Faults	18	4	13	6	25
3	Machine Audit	06	2	4	2	08
4	Process Control in Winding, Warping, Sizing and Loom Shed	22	6	14	6	26
5	Online Control in Spinning and Weaving Operations	02	0	2	0	02
	Total	**56**	**16**	**39**	**15**	**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 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. Literature survey for process control in Spinning and Weaving.
ii. Prepare formats for taking different study in Spinning department.
iii. Prepare formats for taking different study in Weaving department.
iv. Collect data from spinning department of different mills.
v. Visit to Industries for study of process control methods used.

8. SPECIAL INSTRUCTIONAL STRATERGIES

i. Use of charts and diagrams.
ii. Video films on process control of weaving and spinning.
iii. Arrange Expert lectures from Industries.
iv. Use tutorial sessions for giving different problems and assignments to students and ask them to solve the problems on their and help them only when help is asked for.

9. SUGGESTED LEARNING RESOURCES

A. List of Books

S. No.	Title of Books	Author	Publication
1	Quality and Process control in Spinning Quality and Process control in Spinning	Garde, A.R. Subramanian T.A.	ATIRA, Ahmedabad
2	Quality and Process control in Weaving	Paliwal, M.C. Kimothi P.D.	ATIRA, Ahmedabad
3	Quality Control in Spinning	T.V. Ratnam, K.N. Seshan, K.P. Chellamani, S.Karthikeyan,	The South India Textile Research Association, Coimbatore
4	Norms for Textiles	Shri T.V. Ratnam, R. Rajamanicham, K.P. Chellamani, D. Shanmuganandan, Ms. Indra Doraiswamy, Dr. Arindam Basu.	The South India Textile Research Association, Coimbatore

B. List of Major Equipment/ Instrument with Broad Specifications

Not Applicable

C. LIST OF SOFTWARE /LEARNING WEBSITES-

i. www.textilearts.net/directory/techniques/colour
ii. www.teonline.com
iii. www.bharatextile.com/directory
iv. www.fibre2fashion.com
v. http://mytextilenotes.blogspot.com/
vi. http://www.textileassociationindia.org/
vii. http://textilelearner.blogspot.in

10. COURSE CURRICULUM DEVELOPMENT COMMITTEE

Faculty Members from Polytechnics

- **Prof. R T Patel**, Lecturer in Textile Manufacturing, R.C T I, Ahmedabad
- **Prof. Ms. S. S. Parmar**, Lecturer in Textile Manufacturing, R.C T I, Ahmedabad
- **Prof. D.V. Bihola,** Lecturer in Textile Manufacturing, R.C.T.I., Ahmedabad
- **Prof. S. M. Zala,** Lecturer in Textile Manufacturing, B.P.T.I., Bhavanagar
- **Prof. Ms. P. M. Parmar,** Lecturer in Textile Manufacturing, R.C.T.I., Ahmedabad

Co-ordinator and Faculty Member from NITTTR Bhopal

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