GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering
Subject Code: 3172917
Semester: VII
Subject Name : Process and Quality Control in Textile

Type of course : Professional Elective Course

Prerequisite : Students should have basic knowledge of spinning and weaving processes.

Rationale : It is important to understand different theories used for controlling process and quality of spinning and weaving machines and their products, to ensure yarn and fabric quality, improve process efficiency and minimize process waste.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
L	T	P	C	Theory Marks		Practical Marks		
				ESE I	PA (M)	ESE (V)	PA (I)	
4	0	0	4	70	30	0	0	100

L- Lectures; T- Tutorial/Teacher Guided Student Activity; P- Practical; C- Credit; ESE- End Semester Examination; PA- Progressive Assessment

Content:

Sr. No.	Content	Total Hrs
1	Scope of the process control in spinning. **Control of mixing quality and cost** Instrumental evaluation, control of mixing quality through fibre characteristics, simultaneous control of mixing quality and cost.	3
2	**Control of waste in spinning:** Yarn realization, control of blowroom waste, control of card waste, control of comber waste, contamination removal techniques, determination of trash content and cleaning efficiency.	4
3	**Control of yarn quality: imperfection & yarn unevenness** Yarn imperfections, Control of neps generation at blow room, card and comber, control of thick and thin places, Influence of modern developments on nep removal in card and comber; Types of yarn irregularities, unevenness, mass CV%.	5
4	**Control of count, strength and its variation:** Control of within & between bobbin count variation, control of variability of lea strength, Control of yarn strength and elongation.	4
5	**Control of yarn hairiness in spun yarn:** Influence of preparatory process on yarn hairiness, influence of ring frame parameters on generation of yarn hairiness, control of hairiness of ring spun yarns, effect of post spinning operations on hairiness.	3
6	**Yarn faults and package defects:** Common yarn faults in ring yarn, Slubs, soft yarn, Oily slub, Kitty yarn, Foreign matters, cork screw yarn, Snarl/ over twisted yarn, Oil stained yarn, Spun in fly, Neppy yarn,	4

	Crackers, Spinner's Doubles, Bed Piecing and double gaitings, Slough off and hairiness.	
7	**Measurement & Improvement of productivity:** Definition, measurement of productivity for shortfall, productivity analysis, productivity & profitability, Control of end breakage rate in ring spinning, scope & means of improving productivity, maximizing machine efficiency.	4
8	**Introduction to process control in weaving:** Approach to process control, methodology of direct control, machinery audit, control of fabric quality.	3
9	**Process control in winding** Digital online systems for yarn clearing and quality control in modern winding, Optimising quality of preparation in winding, Control of Productivity in Winding, Approach to control of productivity, Winding package faults.	5
10	**Process control in pirn winding** Scope & Approach, minimising end breaks, Improving the build of pirn, productivity, control of speed, efficiency.	3
11	**Process control in warping:** Minimizing end breaks, process control programme in modern warping & sectional warping machines, quality of warping beams, troubleshooting in modern warping machines.	4
12	**Process control in sizing:** Selection of size material, control of size add-on/ pick up, sizing- weaving curve, control of yarn stretch, evaluation of size material and sized yarn, quality of sized beams, troubleshooting in modern sizing machines.	6
13	**Drawing in and warp tying:** Care in use and selection of heads and reeds. **Process control in weaving** Control of productivity in loomshed, control of loom speed and efficiency, loom performance, control of quality of fabrics in weaving, grey fabric inspection, control of fabric defects, hard waste control.	8

Suggested Specification table with Marks (Theory): (For BE only)

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
10	20	25	10	5	0

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's 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.

Reference Books:

1. Process Control in Textile Manufacturing, Edited by Abhijit Majumdar, Apurba Das, R. Alagirusamy and V. K. Kothari, Woodhead Publishing Limited, 2013.
2. Process Control in Cotton Spinning, A.R Garde and T A Subramanian, ATIRA, Ahmedabad 1978.
3. Process Control and Yarn Quality in Spinning, Dr. G Thilagavathi and Dr. T Karthik, Woodhead Publishing India Pvt Ltd, 2015.
4. Process Control in Weaving, M.C. Paliwal & P.D.Kimothi, ATIRA, Ahmedabad, 1974.
5. Handbook of Weaving, Sabit Adanur, CRC Press Publication, 2001.
6. Textile Sizing, Anandjiwala, Goswami & Hall, CRC Press Publication, 2004.
7. Cotton Fibre Selection & Grading by SITRA.
8. Processing of Manmade and Blend on Cotton Spinning Systems-K.R.Salhotra, 2004.
9. Spinning Tablets of Blow-room, Carding, Comber, Speed Frame, Ring-Frame and Rotor by R.G. Owalekar published by TAI.
10. Brochures and Catalogues of Modern Machine Manufacturers.

Course Outcomes:

Sr. No.	CO statement	Marks % weightage
CO-1	Optimization of mixing cost/quality, spinning waste and yarn realization.	20
CO-2	Describe factors affecting yarn quality in terms of yarn fault, count, strength, unevenness, imperfection and hairiness.	20
CO-3	Analyze the productivity & efficiency of various machinery involve in the spinning process.	10
CO-4	Describe scope, approach and methodology of process control in weaving.	10
CO-5	Understand the application of process control parameters in winding, pirn winding, warping, sizing and loom shed.	30
CO-6	Control fabrics quality (fabric defects) in weaving.	10

List of Open Source Software/learning website: Any Search Engine, NPTEL, Swayam portal.