GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering
Subject Code: 3132907
Semester III
Subject Name: Fabric Formation I

Type of course: Engineering Core

Prerequisite: Basic knowledge of science subjects like physics, chemistry and mathematics.

Rationale: Fabric is final end product of mainline textile activity. The yarn is required to pass through preparatory processes before actual fabric making starts. So preparatory is very significant for the success of fabric formation process.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
				Theory Marks		Practical Marks		
L	T	P	C	ESE (E)	PA (M)	ESE (V)	PA (I)	
3	0	4	5	70	30	30	20	150

Content:

Sr. No.	Content	Total Hrs
1	Brief idea about different ways of fabric formation. Classification of fabrics. Sequence of Yarn Preparation Process for weaving Warp preparation: Winding: Objects of winding; Different bobbins (a) before winding; (b) after winding; Winding machines classification; Types of winders, Basic components of a winder; Different types of winding: parallel, random, precision, stepped precision; Package building, Winding parameters & their optimization; Yarn tension & tensioning devices; Yarn clearing, yarn faults, yarn clearing devices: Mechanical yarn clearers or Slub catchers- Fixed blade, Swinging blade type, Electronic yarn clearer- photo-electric detection, Capacitance detection, Concept of clearing curves and setting of electronic clearers, methods of yarn traversing & package drive; Yarn joining by knotting & Splicing; Package faults, remedies & Calculations related to production, efficiency etc.; Automatic winding machines.	**14**
2	Warping: Objects; Systems of warping; Constructional details & features of warping machine; drive to machine parts; types of creel, control devices, Direct & Sectional warping, defects and remedial measures; Calculations related to production, efficiency etc.; concept of ball warping, draw warping, features of modern machines.	**8**
3	Sizing: Introduction; Objects; Sizing Ingredients; Classification of sizing machines; features of sizing machine; size preparation and application, Methods of drying sized yarns, Sizing of synthetic yarns, staple fibre yarns, polyester-cotton blends etc.; Defects and remedies;	**14**

	Calculations related to Size concentration, size pick up, stretch, drying, count of warp, production, efficiency etc. Multi cylinder sizing for Spun yarn, beam to beam and single end sizing of filament, sizing for denim.	
4	Warp Preparation after sizing: Threading & Looming; Drawing-in, Warp tying equipment	**2**
5	Weft Preparation: Methods of Weft Preparation; Object of Pirn Winding, Types of Pirn winding machines; Build of pirn; Drive, Traversing, advancing, Automatic pirn winder; Calculations related to production, efficiency etc.	**4**

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
20	**30**	**20**	**20**	**5**	**5**

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. Handbook of Weaving, by Sabit Adanur
2. Modern Preparation & Weaving Machinery, by A. Ormerod.
3. Weaving: Conversion of yarn to fabric, by Lord and Mohammed.
4. Fundamentals of Yarn Winding, by Milind Koranne
5. Yarn Preparation Vol I & II, by R. Sengupta
6. An Introduction to Winding and Warping by M. K. Talukdar.
7. Technology of Fabric Manufacture-I by R. Muthusamy and S. Kathirvelu.
8. Sizing: Material Methods and Machineries by D. B. Ajgaonkar, M. K Talukdar and Wedekar,
9. The Technology of Warp Sizing by J. B. Smith
10. Textile Sizing by B. C. Goswami, Rajesh Anandjiwala & David M. Hall
11. Sizing by Sydel.

Course Outcomes: After learning the course, students should be able to:

Sr. No.	**CO statement**	**Marks % weightage**
CO-1	Understand the objectives, process & basics functions of winding, warping and sizing process.	**40**
CO-2	Apply technology of winding, warping and sizing machine to develop suitable	**20**

	packages.	
CO-3	Analyse the fundamental difference in various winding systems, direct and indirect warping process and different sizing systems.	**10**
CO-4	Identify and analyze package faults & their causes of winding, warping and sizing process.	**10**
CO-5	Calculate the production and efficiency of winding, warping and sizing processes.	**10**

List of Experiments:

1. Prepare chart of fabric formation and related processes.
2. Study of different types of tensioners.
3. Study of different types of yarn clearers
4. Package build on drum & precision driven winding machines
5. Study of different types of Traverse motions.
6. Study of Thread stop motion, drive and calculation of winding machine.
7. Study the features of latest winding machine.
8. Study passage of material and important parts of pirn winder.
9. Study traverse and drive mechanism on pirn winding machine.
10. Study yarn path through Direct and Sectional warping machine.
11. Study the features of latest direct and sectional warping machines.
12. Study of other types of warping machines.
13. Study passage of material and important parts of sizing machine.
14. Study creel, head stock and calculation of sizing machine.
15. To study the features of latest Sizing machine.
16. Report of the Mill visit.

Major Equipment: Winding Machine, Pirn Winding, Warping Machine, Sizing Machine

List of Open Source Software/learning website: https://nptel.ac.in, World Wide Web, Google Search Engine etc.