GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering
Subject Code: 3172912
Semester: VII
Subject Name: Principles of Textile Processes

Type of course : Professional Elective Course

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

Rationale : Knowledge of different theories pertaining to spinning and weaving process are important to design and performance of the machine to enhance the quality of yarn and fabric.

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	0	3	70	30	0	0	100

Content:

Sr. No.	Content	Total Hrs
	Spinning	
1	Theory of cylinder load and transfer efficiency on card.	4
2	Fibre configuration in card and drawn sliver, fibre straightening and hook removal theory, derivation of drafting force equation.	4
3	Evaluation of comber fractionation efficiency.	2
4	Ballooning theory & forces acting on ring & traveller, derivation of winding tension and balloon tension.	5
5	End breaks on speed frame & ring frame.	3
6	Theory of end breaks in open end spinning.	2
	Weaving	
7	Control of size pick up % & stretch on sizing machine.	3
8	Sley kinematics - derivation of equations for sley velocity & acceleration; force, torque and power required to drive the sley.	4
9	Interrelationship between shedding and beating.	2
10	Picking- factors affecting velocity of shuttle, relationship between shuttle velocity, loom speed and WIR, Shuttle acceleration during picking, factors leading to uniform acceleration.	3
11	Retardation and theory of shuttle checking.	3
12	Theory of propulsion in air jet loom, velocity and acceleration of pick in air jet, Air index, tension profile of weft yarn.	2

13	Torsion rod mechanics, calculation of energy stored in torsion rod of a gripper propulsion system, velocity and acceleration of picker and projectile.	3
14	Displacement, velocity and Acceleration profile of rapier.	2

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	30	5	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. Technology of Carding, R. Chattopadhyay, NCUTE Publication, Ministry of Textiles, Govt. Of India, 2003.
2. Yarn Production Theoretical Aspects, P Grosberg, C Iype, Textile Institute, 1999.
3. Principles of Weaving, Marks & Robinson, Textile Institute, 1976.
4. Weaving: Conversion of Yarn to fabric, Lord & Mohammed, Merrow Publishing Co. Ltd., 1992.
5. Textile Mathematics Vol. III, Booth J. E, Textile Institute, 1977.
6. Weaving : Technology & Operations, Ormerod A, Textile Progress Publications, 1994.
7. Principles of Woven Fabric Manufacturing, Abhijit Majumdar, CRC Press, 2017.

Course Outcomes:

Sr. No.	CO statement	Marks % weightage
CO-1	Describe cylinder load, transfer efficiency on card and comber fractionation efficiency.	15
CO-2	Analyze various forces acting on fibre during carding, draw frame and ring spinning.	20
CO-3	Understanding the balloon tension and winding tension, end breaks on speed frame, ring frame and open end spinning.	15
CO-4	Analyse interrelation of shuttle velocity, retardation force and loom speed.	10
CO-5	Calculate sley velocity and acceleration.	10
CO-6	Analyze picking velocity and acceleration profile of projectile, rapier and air jet loom.	30

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