GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering
Subject Code:
Semester – V
Subject Name: Theory of Textile Machines

Type of course: Open Elective

Prerequisite: Basic Knowledge of Engineering and Textile Processes

Rationale: Basic knowledge of theory of machines and mechanisms will help students in understanding ways in which various processes are carried out in spinning and weaving.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
L	T	P	C	Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
2	0	2	3	70	30	30	20	150

Content:

Sr. No.	Content	Total Hrs
1	**Transmission of Motion- Belt, Ropes, Chain & Gears Drives:** Types of Belt drives, Flat, V, Round & timing belts, Belt drive for special purpose, Adjustment of belt tension, Transmission of power by rope. Chain drive, polygonal effect, Relative advantages and disadvantages of chain and belt drives. Classification of gears, Terminology used in gear, Velocity ratio of simple, compound, reverted and epicyclic gear train.	6
2	**Introduction of Cams and Follower, Clutches and Brakes & Bearings:** Types of cams and followers and related Terminology Different types of brakes and clutch. Classification of ball & roller bearings and its application	4
3	**Introduction to Rotary motion:** Linear displacement, Angular displacement, Speed, Transmission of rotary movement in machines**,** Uniform Velocity Motion, Simple Harmonic Motion, Uniform Acceleration and Retardation Motion and Cycloidal Motion, Study of Knife edged & roller type of followers **Centre of gravity :** Introduction, Centre of gravity of irregular bodies, Centre of gravity of levers **Definitions and units** : Force, mass and momentum, Work and power	4
4	**Friction:** Types of friction, coefficient, laws, friction in clutches, bearing and other transmission mode.	4
5	**Application in Textiles** Differential gearing in roving frame and comber, Speed calculation of comber considering index wheel movement, Design of transmission shaft and drafting rollers. Designing of shedding cam. Roller eccentricity and vibration, The crank and connecting rod mechanism, Kinematics of sley and heald motion, Analysis of let-off mechanism, Design of knitting cam, estimation of needle velocity etc.	10

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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	**20**	**20**	**20**	**20**	**20**

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. Ganapathy Nagarajan, "Textile Mechanisms for Spinning and Weaving Machines", Woodhead Publictions India, 2015
2. N. Gokarneshan, B. Varadrajan & C.B. Senthilkumar, "Mechanics and Calculations of Textile Machinery", Woodhead Publishing India Pvt Ltd, India, 2013
3. Booth J E, "Textile Mathematics" Vol 1,2,3. The Textile Institute Manchester Publication.
4. Rengasamy R S, "Mechanics of Spinning Machinery" IIT Delhi Publication.

Course Outcomes:

Sr. No.	CO Statement	Marks % weightage
CO-1	Select power transmission systems for textile machinery.	25
CO-2	Suggest the types and use of epicyclical gear trains in textile machinery.	25
CO-3	Design and construct the cam profile graphically based on follower motions.	25
CO-4	Recognize the concept of mechanisms in the machine parts and determine velocity and acceleration involved in simple mechanisms.	25

List of Experiments:

1. Study of Flat belt drives.
2. Study of Rope drives.
3. Study of V-belt drives.
4. Drawing work related to inversion of four bar mechanism and slider and crank mechanism.
5. Drawing work related to velocity and acceleration diagram of various mechanisms.
6. Drawing work related to cam profile.
7. Drawing work and computation related to synthesis.
8. Analysis related to belt, rope, and chain drive.
9. Analysis related to brakes, and clutches.
10. Analysis related to gears and gear train.

Major Equipment: Theory of machine lab, Basic spinning and weaving machinery

List of Open Source Software/learning website: NPTEL, Swayam, search engine like Google etc.