

# GUJARAT TECHNOLOGICAL UNIVERSITY

## TEXTILE ENGINEERING (25)

### THEORY AND DESIGN OF TEXTILE MACHINE II

SUBJECT CODE: 2722509

SEMESTER: II

**Type of course:** Core

**Prerequisite:** Theory of weaving preparatory and loom mechanism at BE level.

**Rationale:** Understanding of theory and design of weaving preparatory and different types of looms is required to enhance knowledge of developments which have led to current technology.

#### Teaching and Examination Scheme:

| Teaching Scheme |    |     | Credits<br>C | Examination Marks |         |                 |        |    |    | Total<br>Marks |
|-----------------|----|-----|--------------|-------------------|---------|-----------------|--------|----|----|----------------|
| L               | T  | P   |              | Theory Marks      |         | Practical Marks |        |    |    |                |
|                 |    |     | ESE<br>(E)   | PA (M)            | ESE (V) |                 | PA (I) |    |    |                |
|                 |    | ESE |              |                   | OEP     | PA              | RP     |    |    |                |
| 3               | 2# | 2   | 5            | 70                | 30      | 20              | 10     | 10 | 10 | 150            |

#### Content:

| Sr. No. | Topics  | Teaching Hrs. | Module Weightage |
|---------|---|---------------|------------------|
| 1       | Development trends in winding, warping and sizing machines for improving quality of preparation and cost reduction with specific reference to shuttleless weaving machines. Tension control and automation in warping and sizing. | 10            | 25               |
| 2       | Loom development trends and objectives. Single phase and multiphase looms. Theoretical analysis of weft insertion in various shuttleless looms.   | 10            | 25               |
| 3       | Kinematics of sley and heald motion with reference to shuttleless looms. Cloth fell position, beat up force and pick spacing. Warp loading. Concept of E-Shedding.  | 10            | 25               |
| 4       | Mechanism of warp breakage; Analysis of let off mechanism, electronic let off and take up. Set marks- causes and remedies. Loom monitoring systems.   | 10            | 25               |

#### Reference Books:

1. Adanur, S. "Handbook of Weaving", CRC Press, 2001
2. Lord, P.R. & Mohamed M.H. Weaving: conversion of Yarn to Fabric", Merrow Technical Library, 1982
3. Booth, J.E., "Textile Mathematics Vol. 3" The Textile Institute, 1977
4. Marks R. & Robinson A.T.C., "Principles of Weaving", The Textile Institute, 1976
5. Ormerod, A. & Sondhelm W.S., "Modern Weaving: Technology & Operations", The Textile Institute, 2004.
6. Goswami B. C., Hall, & Anadijiwala, "Textile Sizing", The Textile Institute,
7. Journals: Textile Research Journal, Princeton, USA and Journal of Textile Institute, Manchester, UK.

**Course Outcome:**

After learning the course the students should be able to:

1. Understand basics of theoretical and design related developments of weaving preparatory and looms.
2. Apply the knowledge for understanding effect of developments in improvement in quality and production and reduction in the cost of production.
3. Apply the basic concepts to design and translate the design into prototype / product and also to analyze and interpret data related to textile design, manufacturing and quality analysis.
4. Demonstrate their ability to solve technical problems via technical approaches, self study, team work and life-long learning approaches.

**List of Experiments:**

1. To determine the evaluation of yarn parameters affecting later on processes.
2. Tension parameters of the creel of warping machine and ways to control them.
3. To evaluate different sizing parameters affecting loom performance.
4. Study of sley parameters with reference to its design.
5. Analyzing parameters important for control of air stream on air jet loom.
6. Study of various newer let off mechanisms and their impact on quality of fabric.
7. Analyzing factors responsible for warp breakages on loom nad ways to control them.
8. Study of warp loading on loom.

**Open End Problems**

1. Analyze critically yarn parameters affecting the performance at various stages of weaving. How these are taken care of through the developments at weaving preparatory stages?
2. What are the latest developments with respect to the design of sley and shedding on modern looms?
3. What are the recent developments to take care of critical fabric defects occurring at loom stage e.g. start marks etc.

**Major Equipments: Winding, warping, sizing, various types of looms.**

**List of Open Source Software/learning website:** <http://nptel.iitm.ac.in>, World Wide Web, Google Search Engine etc.

**Review Presentation (RP):** The concerned faculty member shall provide the list of peer reviewed Journals and Tier-I and Tier-II Conferences relating to the subject (or relating to the area of thesis for seminar) to the students in the beginning of the semester. The same list will be uploaded on GTU website during the first two weeks of the start of the semester. Every student or a group of students shall critically study 2 papers, integrate the details and make presentation in the last two weeks of the semester. The GTU marks entry portal will allow entry of marks only after uploading of the best 3 presentations. A unique id number will be generated only after uploading the presentations. Thereafter the entry of marks will be allowed. The best 3 presentations of each college will be uploaded on GTU website.