GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Master of Engineering

Level: PG

Branch: Textile Engineering

Subject Code : ME02025031

Subject Name : Theory and Design of Weaving Machines

w. e. f. Academic Year:	2024-25
Semester:	2
Category of the Course:	Professional Elective Course

Prerequisite:	Theory of weaving preparatory and loom mechanism at BE level.
Rationale:	Understanding of theory and design of weaving preparatory machines and different types of looms is necessary to enhance knowledge of developments which have led to current technology.

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT Level
01	Understand basics of theoretical and design related developments of weaving preparatory and looms.	R,U
02	Analyse various weft insertion systems in terms of their relative advantages and disadvantages for various fabrics.	U,A,E
03	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.	U,A,E,C
04	Demonstrate ability to analyse loom productivity issues and means of sorting them.	U,A,E,C
05	Develop basic idea about design related devlopments in knitted and technical textile manufacturing machines.	U,A,E,C

**Revised Bloom's Taxonomy (RBT)*

Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+ (PR/2)	Assessment Pattern and Marks				Total Marks
				Theory		Tutorial / Practical		
L	T	PR	C	ESE (E)	PA / CA (M)	PA/CA (I)	ESE (V)	
3	0	2	4	70	30	20	30	150

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Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	Development trends in winding, warping and sizing machines for improving quality of preparation and cost reduction with specific reference to shuttle less weaving machines. Tension control and automation in weaving preparatory processes.	10	24
2.	Loom development trends and objectives for single phase shuttle less and multiphase looms. Theoretical analysis of weft insertion in various shuttle less looms.	10	24
3.	Kinematics of sley and heald motion with reference to shuttle less looms. Theories and machine design developments with reference to cloth fell position, beat up force, pick spacing, warp loading etc.	09	19
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	24
5.	Design related developments in knitted and Technical Textile manufacturing machines.	06	9
	Total	**45**	**100**

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks (in %)					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
25	**30**	**20**	**15**	**5**	**5**

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)

References/Suggested Learning Resources:

(a) Books:

1. Adanur, S. "Handbook of Weaving", CRC Press, 2001
2. Lord, P.R. & Mohamed M.H. Weaving: onversion 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.

(b) Open source software and website:

1. https://nptel.ac.in
2. World Wide Web, Google Search Engine etc.

Suggested Course Practical List:

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 and ways to control them.
8. Study of warp loading on loom.

List of Laboratory/Learning Resources Required:

Winding Machine, Pirn Winding, Direct Warping Machine, Sectional Warping Machine, Sizing Machine, Shuttle loom, Airjet loom, water jet loom, Rapier loom, projectile loom, warp and weft knitting machine, nonwoven machine etc.

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