



GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Engineering

Level: UG

Branch: Textile Technology

Subject Code: BE04029031

Subject Name: Fabric Manufacturing Techniques- II

w. e. f. Academic Year:	2024-25
Semester:	4
Category of the Course:	PCC

Prerequisite:	Students should have knowledge of basics of textile and preparatory processes for warp and weft yarns meant for weaving.
Rationale:	Warping and sizing is very important machines for Warp beam which is use for weaving process and Weaving is one of the important methods of fabric formation. The main device for making woven fabric, loom, has undergone developments from non automatic to automatic looms.

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT Level
01	Understand the objectives, process & basics functions of warping, sizing and weaving process.	R, U
02	Know working principle of warping, sizing and weaving machine to develop various end use product.	U, A, E
03	Identify and analyze output product faults & their causes for warping, sizing and weaving process.	A, E, N
04	Understand the objectives and operating principle of drop box and automatic loom.	U, A, E
05	Calculate the production and efficiency of warping, sizing and weaving machine.	U, A, E

*Revised Bloom's Taxonomy (RBT)

Teaching and Examination Scheme:

Teaching / Learning Scheme (in Hours per semester)					Total Credits	Assessment Pattern and Marks					Total Marks
L	T	P	TW/ SL	Total no of hours per semester		Theory		Tutorial / Practical			
						ESE (E)	PA / CA (M)	PA/ CA (I)	TW/ SL (I)	ESE (V)	
45	0	30	45	120	4	70	30	20	30	50	200

* Problem Based Learning (PBL) aims to accommodate learning beyond syllabus as per clause 9.4 of NBA manual.



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Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	Warping: Objects; Systems of warping; Constructional details & features of warping machine; drive to machine parts; types of creels, 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.	7	16
2.	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; 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. Warp Preparation after sizing: Threading & Looming; Drawing-in, Warp tying equipment	13	29
3.	Plain Power Loom: Classification of looms, Passage of yarn through loom. Idea about cycle of loom and various motions, Loom drives, Loom timing. Primary Motions Shedding: Types of sheds, types of shedding, Tappet shedding – Positive and negative tappets, reversing mechanisms, limitations of tappet shedding, heald staggering, geometry of the shed, depth of the shed, Designing of shedding tappet. Picking: Introduction to shuttle picking, classification, shuttle timing. cone under pick mechanism, advantages and limitations, shuttle checking, relation between shuttle velocity and loom speed, loom width and rate of weft insertion, expression for power required for picking, Beat Up: Movement of sley, beat up, sley eccentricity and the factors influencing it, timing available for shuttle flight, Beat up force Secondary Motions: Take up motion: Objectives, negative and positive take up systems, seven wheel take up mechanism with change wheel and pick wheel calculation. Let off motions: Negative and positive let off motions, tension variations factors Auxiliary Motions: Temples, Weft stop - side fork and center fork motions, Type of drop wires, castellated bars, mechanical and modern electrical warp stop motion, loose reed, and fast reed - warp protector motions. Calculation for production and efficiency related to weaving.	16	35



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4.	Drop Box Motions: Introduction and importance, Types of Multiple box motion, 4x1, Eccle's drop box motion, box plan and pattern card for box change Automatic Loom: Classification of Automatic Shuttle Looms, Classification of Weft Feelers, Object, construction, working and important settings of midget, 2- prong electrical and photoelectric weft feelers, automatic cop change mechanism – Its object, construction, working and requirements for efficient working, temple cutter and shuttle eye cutter, changes required to convert plain loom to semi-automatic power loom.	9	20
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. Weaving: Conversion of yarn to fabric, by Lord and Mohammed.
2. Yarn Preparation Vol I & II, by R. Sengupta
3. Technology of Fabric Manufacture-I by R. Muthusamy and S. Kathirvelu
4. Sizing: Material Methods and Machineries by D. B. Ajgaonkar, M. K Talukdar and Wedekar,
5. Textile Sizing by B. C. Goswami, Rajesh Anandjiwala& David M. Hall
6. Sizing by Sydel.
7. Handbook of Weaving, by Sabit Adanur
8. Woven Fabric production – I The Plain Power Loom, NCUTE publication
9. Woven Fabric production – II Automatic Looms, NCUTE publication
10. Principles of Woven Fabric Manufacturing: Abhijit Majumdar (CRC Press)
11. Principles of weaving: R. Mark and T. C Robinson (Textile Institute).
12. Principles of Fabric Formation, P.K.Banerajee, CRC Press
13. Woven Textiles - Principles, Technologies and Applications: K Gandhi (Woodhead Publishing)
14. Modern Preparation & Weaving Machinery, by A. Ormerod.



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(b) Open source software and website:

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

Suggested Course Practical List:

1. Study yarn path through Direct and Sectional warping machine.
2. Study of other types of warping machines.
3. Study passage of material and important parts of sizing machine.
4. Study creel, head stock and calculation of sizing machine.
5. Study of different parts and passage of warp sheet through plain power and automatic shuttle loom.
6. Study of loom drive and timing diagram of shuttle loom.
7. Study of tappet shedding mechanism of shuttle loom.
8. Study of picking mechanism of shuttle loom.
9. Study of sley beat-up motion and calculation of sley eccentricity.
10. Study of negative let-off motion.
11. Study of different temples and
12. Study 7 wheel take up motion.
13. Study of loose reed and fast reed warp protection motion.
14. Study of mechanical and electrical type warp stop motion.
15. Study of side and centre weft fork mechanism.
16. Study of multiple drop box motion.

List of Laboratory/Learning Resources Required:

Direct warping machine, Sectional warping machine, Sizing Machine, Plain power loom, Shuttle loom with cone underpick/overpick mechanism, Shuttle loom with Drop box Mechanism, Automatic Shuttle loom with Cop change mechanism, Sample warping machine, Sample sizing machine and Sample weaving machine with latest features etc.

Suggested Project List:

Suggested Activities for Students:

1. Visit to weaving unit and preparing report



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• **List of suggested activities for Problem Based Learning:**

Sl. No.	Name of the activity	No. of hours	Evaluation Criteria
1	Industry/Research laboratory visit	Visit = 5h, Report preparation = 5h Total = 10h	Based on report submitted. Report should contain observations and calculations based on industry/lab data
2	Assignment writing. Numericals based assignment is preferable.	5 assignments of 2h each. Total = 10h	Based on the assignment submitted.
3	Self learning on-line course	Minimum duration of the course should be 10h.	Examination based assessment at the end of course. Based on the certificate produced.
4	Poster/chart/power point preparation on technical topics	Duration = 6 h	Based on poster/chart preparation and presentation skills
5	Technical Video based learning related to the subject	Duration of video = 5h Report preparation = 5h Total = 10h	Report /presentation based on the video learning outcomes.
6	Working/non-working model on technical topics	Working = 12 h Non- working = 8 h	Based on inter department/external evaluation
7	Industrial exposure for 2-3 days to observe and provide tentative solutions on society/environment/health/any other issue	Duration = 15 h for industrial exposure Problem identification and tentative solution = 10 h Total = 20 h	Based on evaluation of critical problems and solutions
8	Group Discussion on emerging/trending technical topics based on subject	Duration = 1 h each	Based on performance in group discussion, technical depth, knowledge etc.
9	Real world case studies-based learning	Duration of data collection/study = 5h Report preparation = 5h Total = 10h	Based on in-depth study, technical depth, data collected, fact finding, etc.

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- All records pertaining to the evaluation and assessment of self-learning activities must be properly maintained and preserved at the institute level. These records should be made available to the university upon request.
- Institutes are encouraged to utilize digital platforms, such as Microsoft Teams, for effective record-keeping and to ensure transparency in the evaluation and assessment of self-learning activities.

CO- PO Mapping:

Semester ____	Course Name (Course Code:)											
	POs											
Course Outcomes												
CO1												
CO2												
CO3												
CO4												
CO5												

Legend: '3' for high, '2' for medium, '1' for low and '-' for no correlation of each CO with PO.

Any Other:
