GUJARAT TECHNOLOGICAL UNIVERSITY (GTU)

Competency-focused Outcome-based Green Curriculum-2021 (COGC-2021)
Semester -III

Course Title: Weaving Technology-II
(Course Code: 4332903)

Diploma programmes in which this course is offered	Semester in which offered
Textile Manufacturing Technology	Third

1. RATIONALE

Fabric is final end product of mainline textile activity. The yarn is required to pass through preparatory processes before actual fabric making starts. Weaving preparatory plays very significant role for the success of fabric formation process. To produce better quality of fabric, weaving preparatory is most important process, which requires greatest care and attention. Warping and sizing processes are very important processes for fabric formation and quality of the fabric. To achieve higher productivity and improved fabric quality, it is desired to prepare yarn sheet with proper care. To produce fancy designs, better control on warp and operational knowledge of different dobby mechanism is required. In this course, the students are exposed to knowledge of weaving preparatory processes and dobby mechanism.

2. COMPETENCY

The purpose of this course is to help the student to attain the following industry identified competency through various teaching learning experiences:

- **Understand the objectives, process & functions of warping process, sizing process and dobby mechanism.**

3. COURSE OUTCOMES (COs)

The practical exercises, the underpinning knowledge and the relevant soft skills associated with the identified competency are to be developed in the student for the achievement of the following COs:

a) Understand the objectives, process & functions of warping process.
b) Understand the objectives, process & functions of sizing process.
c) Understand the objectives, working & functions of dobby mechanism.
d) Calculate the production of warping and sizing.

4. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P/2)	Examination Scheme				
				Theory Marks		Practical Marks		Total Marks
L	T	P	C	CA	ESE	CA	ESE	
3	-	2	4	30*	70	25	25	150

(*):Out of 30 marks under the theory CA, 10 marks are for assessment of the micro-project to facilitate integration of COs and the remaining 20 marks is the average of 2 tests to be taken during the semester for assessing the attainment of the cognitive domain UOs required for the attainment of the COs.

***Legends: L**-Lecture; **T** – Tutorial/Teacher Guided Theory Practice; **P** -Practical; **C** – Credit, **CA** - Continuous Assessment; **ESE** -End Semester Examination.*

5. SUGGESTED PRACTICAL EXERCISES

The following practical outcomes (PrOs) are the sub-components of the COs.*Some of the **PrOs**marked **'*'** (in approx. Hrs column) are compulsory, as they are crucial for that particular CO at the 'Precision Level' of Dave's Taxonomy related to 'Psychomotor Domain'*.

Sr. No.	Practical Outcomes (PrOs)	Unit No.	Approx. Hrs. required
1	Demonstrate the passage of yarn through warping machine.	I	02*
2	Demonstrate the passage of yarn through sectional warping machine.	I	02*
3	Demonstrate various types of creel in warping machine.	I	02*
4	Compare the features of latest direct and sectional warping machines.	I	02*
5	Demonstrate the passage of yarn through sizing machine.	II	02*
6	Demonstrate various types of creel in sizing machine.	II	02*
7	Demonstrate size box in sizing machine.	II	02*
8	Demonstrate yarn drying system in sizing machine.	II	02*
9	Demonstrate yarn splitting system in sizing machine.	II	02*
10	Demonstrate driving mechanism of head stock in sizing machine.	II	02*
11	Demonstrate various control devices in sizing machine.	II	02*
12	Demonstrate working of climax dobby.	III	02*
13	Demonstrate working of cross border dobby.	III	02*
14	Demonstrate working of cam dobby.	III	02*
15	Demonstrate working of paper dobby & electronically controlled dobby.	III	02*
16	Prepare peg lattice for various dobby design.	III	02*
17	Calculate the production of warping and sizing machine.	IV	02*
	Minimum 14 Practical Exercises		**28 Hrs.**

Note

i. *More **Practical Exercises**can be designed and offered by the respective course teacher to develop the industry relevant skills/outcomes to match the COs. The above table is only a suggestive list**.***

ii. *The following are some **sample** 'Process' and 'Product' related skills(more may be added/deleted depending on the course) that occur in the above listed **Practical Exercises** of this course which are embedded in the COs and ultimately the competency.*

S. No.	Sample Performance Indicators for the PrOs	Weightage in %
1	Identify components.	10
2	Prepare experimental setup.	20
3	Operate the equipment setup.	20
4	Follow safe practices.	10
5	Record observations correctly.	20
6	Interpret the result and conclude.	20
Total		**100**

6. MAJOR EQUIPMENT/ INSTRUMENTS REQUIRED

This major equipment with broad specifications for the PrOs is a guide to procure them by the administrators to usher in uniformity of practical in all institutions across the state.

S. No.	Equipment Name with Broad Specifications	PrO. No.
1	Warping machine with creel Speed - 600-800 m/min, Flange Diameter – 800 -1400 mm, Working width – 1400-2400 mm, Creel capacity – 600 -750.	1,3,4
2	Sectional warping machine with creel Warping speed - 400-600 m/min, Beaming speed – up to 100 m/min, Flange Diameter – 800 -1400 mm, Working width – 1400-2400 mm, Creel capacity – 600 -750.	2,3,4
3	Multi cylinder sizing machine with creel Speed – up to 160 m/min, Flange Diameter – 800 -1400 mm, Working width – 1400-2400 mm, Double size box, Creel capacity – 8-12.	5 to 11
4	Dobby mechanism Various dobby mechanisms like climax, cross border, cam, paper and electronically controlled dobby.	12 to 16

7. AFFECTIVE DOMAIN OUTCOMES

The following ***sample*** Affective Domain Outcomes (ADOs) are embedded in many of the above-mentioned COs and PrOs. More could be added to fulfill the development of this course t competency.

a) Work as a leader/a team member.

b) Follow ethical practices.
c) Follow safety practices while using equipment.
d) Practice environmentally friendly methods and processes.

The ADOs are best developed through the laboratory/field based exercises. Moreover, the level of achievement of the ADOs according to Krathwohl's 'Affective Domain Taxonomy' should gradually increase as planned below:

i. 'Valuing Level' in 1st year
ii. 'Organization Level' in 2nd year.
iii. 'Characterization Level' in 3rd year.

8. UNDERPINNING THEORY

The major underpinning theory is given below based on the higher level UOs of *Revised Bloom's taxonomy* that are formulated for development of the COs and competency. If required, more such higher level UOs could be included by the course teacher to focus on attainment of COs and competency.

Unit	Unit Outcomes (UOs) (4 to 6 UOs at different levels)	Topics and Sub-topics
Unit – I **Warping**	1a.Explain functions of warping process. 1b.Classify types of warping process. 1c.Explain various types of creel in warping. 1d.Explain defects in warping beams, causes and remedies. 1e.Calculate output production of warping machine from given data.	1.1 Objects of warping process. 1.2 Classification of warping process. 1.3 Direct & Sectional warping. 1.4 Type of creel of warping machine. 1.5 Various mechanism like tensioner, stop motion, expandable comb, drum drive, beam drive, brake, traverse, leasing, beam pressing, doffing, donning, etc. 1.6 Comparison between direct warping and sectional warping. 1.7 Features of modern warping machines. 1.8 Defects in warping beams.
Unit – II **Sizing**	2a. Describe importance of sizing. 2b. Classification of sizing machines. 2c. Enlist sizing ingredients, recipe, preparation and applications. 2c. Enlist different sizing methods. 2e. Explain importance of different control devices for Sizing machine. 2f. Explain defects in size beams, causes and remedies. 2g. Describe need of recycling waste.	2.1 Objects of sizing. 2.2 Classification of sizing machines. 2.3 Types of creel. 2.4 Types of size box. 2.5 Methods of drying. 2.6 Various control devices on sizing machine. 2.7 Sizing ingredients & their functions. 2.8 Preparation of sizing recipe. 2.9 Different methods of sizing. 2.10 Sizing for various types of yarn.

		2.11 Defects & remedies in sized beams. 2.12 Doffing, donning, maintenance in sizing 2.13 Recycling of preparatory waste.
Unit– III **Dobby**	3a. Discuss need of dobby. 3b. Enlist types of dobby. 3c. Explain working of dobby. 3d. Enlist different type of dobby mounting. 3e. Identify dobby cloth defects, causes & remedies.	3.1 Need & Classification of dobby. 3.2 Comparison of single lift & double lift dobby system 3.3 Construction & working of different dobbies like climax, cross border, cam, paper and electronically controlled dobby. 3.4 Dobby cloth defects & its remedies.
Unit– IV Production calculation	4a. Calculate the production.	4.1 Production calculation for warping. 4.2 Production calculation for sizing.

9. SUGGESTED SPECIFICATION TABLE FOR QUESTIONPAPER DESIGN

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Warping	12	06	10	04	20
II	Sizing	15	06	12	06	24
III	Dobby	11	04	10	04	18
IV	Production calculation	04	00	04	04	08
Total		**42**	**19**	**33**	**18**	**70**

Legends:*R=Remember, U=Understand, A=Apply and above (Revised Bloom's taxonomy)*

Note*: This specification table provides general guidelines to assist student for their learning and to teachers to teach and question paper designers/setters to formulate test items/questions to assess the attainment of the UOs. The actual distribution of marks at different taxonomy levels (of R, U and A) in the question paper may vary slightly from above table.*

10. SUGGESTED STUDENT ACTIVITIES

Other than the classroom and laboratory learning, following are the suggested student related ***co-curricular*** activities which can be undertaken to accelerate the attainment of the various outcomes in this course. Students should conduct following activities in group and prepare reports of about 5 pages for each activity. They also collect/record physical evidences for their (student's) portfolio which will be useful for their placement interviews:

a) Prepare report on warping machine based on industrial visit.
b) Prepare report on sizing machine based on industrial visit.

c) Prepare report on dobby based on industrial visit.
d) Collection of various machine specifications and process parameters for warping, sizing and dobby.
e) Prepare a comparative report from e-brochures and manuals available from different machine manufacturers for warping, sizing and dobby.
f) Present seminar on recent technological advancement of warping, sizing and dobby.

11. SUGGESTED SPECIAL INSTRUCTIONAL STRATEGIES (if any)

These are sample strategies, which the teacher can use to accelerate the attainment of the various outcomes in this course:

a) Massive open online courses (***MOOCs***) may be used to teach various topics/sub topics.
b) Guide student(s) in undertaking micro-projects.
c) ***'L' in section No. 4***means different types of teaching methods that are to be employed by teachers to develop the outcomes.
d) About ***20% of the topics/sub-topics*** which are relatively simpler or descriptive in nature is to be given to the students for ***self-learning***, but to be assessed using different assessment methods.
e) With respect to ***section No.10***, teachers need to ensure to create opportunities and provisions for ***co-curricular activities***.
f) Guide students on how to address issues on environment and sustainability.
g) Guide students for using data manuals.

12. SUGGESTED MICRO-PROJECTS

Only one micro-projectis planned to be undertaken by a student that needs to be assigned to him/her in the beginning of the semester. In the first four semesters, the micro-project are group-based (group of 3 to 5). However, **in the fifth and sixth semesters**, the number of students in the group should ***not exceed three.***

The micro-project could be industry application based, internet-based, workshop-based, laboratory-based or field-based. Each micro-project should encompass two or more COs which are in fact, an integration of PrOs, UOs and ADOs. Each student will have to maintain dated work diary consisting of individual contribution in the project work and give a seminar presentation of it before submission. The duration of the micro-project should be about **1416** ***(fourteen to sixteen) student engagement hours*** during the course. The students ought to submit micro-project by the end of the semester to develop the industry-oriented COs.

A suggestive list of micro-projects is given here. This has to match the competency and the COs.Similar micro-projects could be added by the concerned course teacher:

a) **Warping**: Prepare the report of different warping machines with their specifications.
b) **Sizing**: Prepare the report of different sizing machines with their specifications.
c) **Dobby**: Prepare the report of different dobby mechanism with their specifications.
d) **Beam defect**: Prepare a portfolio of samples of different types of beam defects.

e) **Dobby cloth defects:** Prepare a portfolio of samples of different types of dobby cloth defects.

f) **Recycling of weaving waste**: Observe the methods adopted in industries to minimise preparatory waste.

13. SUGGESTED LEARNING RESOURCES

S. No.	Title of Book	Author	Publication with place, year and ISBN
1	Weaving machine, material &management	Ajgaonakar D.B. &Talukdar	Mahajan Publisher Private Limited. Ahmedabad.1998. ISBN:81-85401-16-0
2	Weaving: conversion of yarn to fabric	Lord P.R. &Mohamed M.H.	Merrow Publishing Limited, England, 1992ISBN:0-900 -54178-4
3	Textile Sizing	B. C. Goswami, Rajesh Anandjiwala & David M. Hall	Publisher : CRC Press; 1st edition (13 February 2004) ISBN-10 : 0824750535 ISBN-13 : 978-0824750534
4	Weaving Preparation Technology	Gokarneshan N.	Abhishek Publications, Chandigarh, ISBN: 978-81-8247-247-1
5	Principle of Weaving	Marks & Robinson	The Textile Institute, Manchester, England,1976 ISBN:0-900739258
6	Woven Textile	Gandhi K. L.	The Textile Institutes, New Delhi, 2012, ISBN 978-1-84569-930-7
7	Sizing materials methods machines	D.B. Ajgaonakar, Dr. M.K.Taulkdar, & V.R. Wadekar	Textile Trade Press
8	Woven Fabric Production – I		NCTUE 2002
9	Woven Fabric Production - II		NCTUE 2002
10	Handbook of Weaving	Sabit Adanur	CRC Press; (31 December 2000) ISBN-10 : 9781587160134 ISBN-13 : 978-1587160134
11	Modern Preparation & Weaving Machinery	A. Ormerod	Butterworth-Heinemann (1 April 1983) ISBN-10 : 0408012129 ISBN-13 : 978-0408012126

12	An Introduction to Winding and Warping	M. K. Talukdar	
13	The Technology of Warp Sizing	J. B. Smith	Feng Chia, 1969

14. SOFTWARE/LEARNING WEBSITES

1. http://nptel.ac.in/
2. http://www.textileassociationindia.org/
3. http://www.itamma.org/
4. https://textilestudycenter.com/
5. http://www.textileschool.com/
6. https://textilestudycenter.com/textile-books-free-donwload/
7. http://textilelearner.blogspot.in/
8. http://www.textileassociationindia.org/

15. PO-COMPETENCY-CO MAPPING

Semester I	**Weaving Technology-II (Course Code: 4332903)**						
	POs						
Competency & Course Outcomes	**PO 1 Basic & Discipline specific knowledge**	**PO 2 Problem Analysis**	**PO 3 Design/ development of solutions**	**PO 4 Engineering Tools, Experimentation &Testing**	**PO 5 Engineering practices for society, sustainability & environment**	**PO 6 Project Management**	**PO 7 Life-long learning**
Competency .	Understand the objectives, process & functions of warping process, sizing process and dobby mechanism.						
Course Outcomes CO a) a) Understand the objectives, process & functions of warping process.	**3**	**2**	**2**	**2**	**2**	**2**	**2**
CO b)Understand the objectives, process & functions of sizing process	**3**	**2**	**2**	**2**	**2**	**2**	**2**
CO c) Understand the objectives, working & functions of dobby mechanism	**3**	**2**	**2**	**2**	**2**	**2**	**2**
CO d) Calculate the production of warping and sizing	**3**	**-**	**-**	**-**	**-**	**-**	**2**

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

16. COURSE CURRICULUM DEVELOPMENT COMMITTEE

GTU Resource Persons

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