GUJARAT TECHNOLOGICAL UNIVERSITY (GTU)

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

Course Title: Fabric Structure-III
(Course Code: 4352905)

Diploma programmes in which this course is offered	Semester in which offered
Textile Manufacturing Technology	5th Semester

1. RATIONALE

Uses of textile materials are not limited to garments only but are used for other domestic, industrial, and decorative purposes. Diploma students must know all types of special structures required for these special purpose applications, these types include Double cloth, Leno, Gauze, Damask, Brocade, Toilet quilt, and their related calculations for fabric like cloth cover, ends/units and picks/units space. In this course, students will be able to develop skills to prepare special/advanced/ decorative types of woven designs on point paper/computer and also will be able to prepare samples accordingly on a computerized Sample loom/ weaving machine/electronic Jacquard.

2. COMPETENCY

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

- **Select the weave according to the end use of the fabric to satisfy industrial needs. Develop design, draft, peg-plan, and denting plan for special/advanced/ decorative types of fabric**.

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) Develop different designs on double cloth.
b) Use thread diagram for Gauze and leno weave.
c) Develop Damask and Brocade fabrics.
d) Develop designs on Tapestry and Quilt fabric.
e) Develop Jacquard design and calculation for fabric cover.

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'*.

S. No.	Practical Outcomes (PrOs)	Unit No.	Approx. Hrs. required
1	Draw Structural design for 'Double Cloth' on point paper: a) Tubular cloth, Double cloth opening in two widths. b) Self stitched Double cloth with Warp Tie and Weft Tie.	I	02*
2	Draw Structural design for 'Double Cloth' on point paper: a) Wadded double cloth. b) Centre stitch double cloth.	I	02*
3	Prepare a double cloth sample on the sample loom. a) Tubular Cloth. b) Self Stitch double cloth.	I	02*
4	Draw designs, draft and peg plan for 'Gauze and Leno Design' on point paper: a) Simple gauze or plain leno b) Counter leno	I	02*
5	Draw designs, draft and peg plan for 'Gauze and Leno Design' on point paper: a) Cross leno b) Twill leno	II	02*
6	Draw designs, draft and peg plan for 'Gauze and Leno Design' on point paper: a) Net leno b) Russian cord	II	02*
7	Draw Damask design on point paper with the suitable motif.	III	02*
8	Draw Brocade design on point paper with the suitable motif.	III	02*
9	Draw Warp Tapestry design on point paper with the suitable motif.	IV	02*
10	Draw Weft Tapestry design on point paper with the suitable motif.	IV	02*
11	Draw Loose back toilet quilt design on point paper.	IV	02*
12	Draw Fast back toilet quilt design on point paper.	IV	02*
13	Develop Jacquard design on point paper.	V	02
14	Prepare small motif showing the arrangement of Jacquard designing.	V	02*
15	Calculate the warp cover, weft cover, and fabric cover of the given sample and with possible maximum EPI and PPI for a	V	02*

S. No.	Practical Outcomes (PrOs)	Unit No.	Approx. Hrs. required
	particular weave.		
16	Analyze the given fabric sample, based on weave structure, draft and peg plan to suggest the loom equipment required and end use of the fabric.	V	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 of an experimental setup	20
3	Operate the equipment setup	20
4	Follow safe practices measures	10
5	Record observations correctly	20
6	Interpret the result and conclude	20
Total		**100**

5. 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	Point paper	All Practical
2	Pick glass	15,16
3	Hand loom	3

6. 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/ team member.
b) Follow safety practices while using textile equipment.
c) Realize the importance of green energy.
d) Practice environmentally friendly methods and processes.

The ADOs are best developed through 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 the 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 Double Cloth	1a. Justify end use of Double Cloth fabric. 1b. Describe the method of producing the double cloth. 1c. Develop design, draft, peg-plan and cross section of double cloth on point paper in: opening in two width, Tubular cloth, Self stitched (with Warp Tie, Weft Tie), Wadded, Centre stitch double cloth. 1d. Justify loom equipment required to produce Double cloth.	1.1 Double cloth structure, Double cloth designing and features of double cloth with end use of the fabric. 1.2 Principle of tying or stitching double cloth. 1.3 Construction of point paper design for Double cloth for the following: opening in two widths, Tubular cloth, Self stitch, wadded, Centre stitch double cloth. 1.4 Loom mechanism required for producing double cloth.
UNIT-II Gauze and Leno Weave	2a. Differentiate between Gauze and Leno weave. 2b. Describe the principle of Gauze and leno weaving. 2c. Describe the function of easer bar and shaker motion. 2d. Using thread diagram, draft and lifting plan to distinguish the following for a) Simple Gauze or Plain leno b) Counter leno c) Cross leno d) Twill leno e) Net leno f) Russian cord	2.1 Features and end use of Gauze and Leno weave. 2.2 Principle of Gauze and leno weaving. 2.3 Loom mechanism required for leno. 2.4 Types of Gauze and leno weave. a) Simple Gauze or Plain leno b) Counter leno c) Cross leno d) Twill leno e) Net leno f) Russian cord
UNIT-III Damask and Brocade Fabric	3a. Differentiate Damask and Brocade fabric. 3b. Justify end use of Damask and Brocade fabric. 3c. Develop the design for small motif of true Damask and ordinary one sided Damask. 3d. Explain the loom equipment required to produce Damask fabric. 3e. Develop the design for the small motif of Brocade.	3.1 True Damask structure. 3.2 Loom mechanism for damask fabric and end use of the fabric. 3.3 Construction of damask on point paper 3.4 Damask and brocade structure. 3.5 Loom mechanism required for brocade fabric. 3.6 Construction of small brocade motif.

	3f. Explain the loom equipment required to produce Brocade.	
UNIT-IV Tapestry and Quilt Fabric	4a. Differentiate between tapestry and quilt fabric and their end use. 4b. Differentiate Warp tapestry structure and Weft tapestry structure. 4c. Describe the loom mechanism required to produce tapestry and quilt fabrics. 4d. Draw the design for following quilts. a) Loose back toilet quilts b) Fast back toilet quilts.	4.1 Tapestry and Quilt fabric features and end use. 4.2 Construction of: (a) Warp tapestry (b) Weft tapestry 4.3 Loom mechanism for tapestry and quilt fabric. 4.4 Construction of a) Loose back toilet quilts b) Fast back toilet quilts
UNIT-V Jacquard Fabric Designing and Fabric Calculation	5a. Discuss the different sources from where the motif of jacquard designs. 5b. Explain the factors affecting on Jacquard design 5c. Draw/Prepare Jacquard design for a particular need from simple motif on point paper/computer. 5d. Describe the different arrangements of Jacquard design. 5e. Interpret data with respect to fabric cover and density, warp cover and weft cover, cloth cover factor 5f. Establish relation with count, weave and sort of the fabric with formula. 5g. Analyze the given fabric sample, based on weave structure, draft and peg-plan to suggest the loom equipment required and end use of the fabric.	5.1 Different sources for motif jacquard design: Nature, Historical Incidence, Geometrical Shape, Reproducing from earlier Design 5.2 Factor affecting on Jacquard design 5.3 Preparation of Jacquard designing from simple motif on point paper/computer. 5.4 Different arrangement of Jacquard designing. 5.5 Cloth cover calculations. 5.6 Relation with count, weave and sort of fabric. 5.7 Analysis of given fabric sample.

9. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Double Cloth	08	3	8	3	14
II	Gauze and Leno Weave	10	3	10	5	18
III	Damask and Brocade Fabric	04	1	4	2	7
IV	Tapestry and Quilt Fabric	06	2	4	4	10
V	Jacquard Fabric Designing and Fabric Calculation	14	3	10	8	21
Total		**42**	**12**	**36**	**22**	**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) Collection of various textile fabric samples from the market.
b) Visit the design development studio of the weaving mill.
c) Prepare charts for quality particulars and end use of fabric.
d) Give seminars on different fabric structure, their manufacturing principle and end use.

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-project is 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 **14-15** ***(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) **Double Cloth:** Collection of various samples of double cloth fabric and make the chart.
b) **Gauze and Leno Weave:** Collection of various samples of gauze and leno fabric and prepare a sample book with the end use of each collected sample.
c) **Damask and Brocade Fabric:** Prepare the damask and brocade design using at least 3 different motifs.
d) **Tapestry and Quilt Fabric:-** Prepare a report on types of tapestry and quilt fabric presently available.
e) **Jacquard Fabric Designing and Fabric Calculation:-** Prepare a report on software available for jacquard designing.

13. SUGGESTED LEARNING RESOURCES

Sr. No.	Title of Book	Author	Publication with place, year and ISBN
1	Elementary Textile Design and Colour	William Wattson	Forgotten Books, United states 2018, ISBN-13- 978-1528462143, ISBN-10 - 1528462149
2	Advance Textile Design	William Wattson	Kessinger Publishing, LLCUnited states 2010, ISBN-13- 978-1166485962, ISBN-10 - 116648596X
3	Watson's Textile Design and Colour	Z. Grosiky	Woodhead Publishing Limited, England, 1975, ISBN-13: 978-185573-995-6, ISBN-10: 978185573995
4	Watson's Advance Textile Design	Z. Grosiky	Woodhead Publishing, UK 1977, ISBN-13 : 978-1855739963, ISBN-10 : 9781855739963
5	Grammar of Textile Design	Nisbet	Forgotten Books, United states 2018, ISBN-13- 978-1330304280,, ISBN-10 - 97813303042
6	Fabric Structure and Design	N. Gokarneshan	New Age International Private Limited New Delhi, India 2008, ISBN-13 : 978-8122424706, ISBN-10 : 8122424708
7	Weaving calculation	R. Sengupta	Imprint 1979, ISBN-13: 978-0906216613,ISBN-10: 0906216613

14. SOFTWARE/LEARNING WEBSITES

1. www.handweaving.net
2. www.cs.arizona.edu/patterns/weaving/articles770.html
3. www.fiber2fashions.com
4. www.mariaclaudiacortes.com/colors/Colors.html
5. http://www.worqx.com/resource-recommends.htm

6. www.designdiary.nic.in
7. https://www.textileassociationindia.org/

15. PO-COMPETENCY-CO MAPPING

Semester V	Fabric structure -III (Course Code: 4352905)						
	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 5 Project Management	PO 7 Life-long learning
Competency .	**Select the weave according to the end use of the fabric to satisfy industrial needs. Develop design, draft, peg-plan, and denting plan for special/advanced/ decorative types of fabric.**						
CO a) Develop different designs on double cloth	3	1	2		1	2	2
CO b) Use thread diagram for Gauze and leno weave.	3	1	2		1	2	2
CO c) Develop Damask and Brocade fabrics.	3	1	2		1	2	2
CO d) Develop designs on Tapestry and Quilt fabric.	3	1	2		1	2	2
CO e) Develop Jacquard design and calculation for fabric cover.	3	1	2	2	1	2	2

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

15. COURSE CURRICULUM DEVELOPMENT COMMITTEE

GTU Resource Persons

S. No.	Name and Designation	Institute	Contact No.	Email
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