GUJARAT TECHNOLOGICAL UNIVERSITY (GTU)

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

Course Title: Fabric Structure-II
(Course Code: 4342903)

Diploma programmes in which this course is offered	Semester in which offered
Textile Manufacturing Technology	4th semester

1. RATIONALE

Knowledge of other special woven structures is required as per the specific need of industries and society. It is necessary to describe and correlate special fabric structure and its properties with view of end use of product. Fabric structure plays vital role in fabric properties like strength, feel, drape and appearance etc. It is necessary to develop design on graph paper with all necessary details like weave, draft, peg-plan and denting required for actual fabric production on machine. With use of suitable mechanical device movement of warp group can be controlled and order of lifting can be planned. This course is aimed to provide the necessary knowledge, skills and attitudes to produce fabrics like- Bedford cord, welts and pique, pile fabrics and warp backed, welt backed and wadded backed structure

2. COMPETENCY

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

- **Develop structures, derivatives and "special structures" with design, draft, peg-plan, denting plan for various weaves like- Bedford cord, welts and pique, pile fabrics and warp backed, welt backed and wadded backed structure (Warp and weft**).

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 colour and weave effect
b) Develop cord effect on fabric using Bedford cord, welt and pique structures.
c) Develop various pile structures
d) Develop designs for backed cloth
e) Analysis and relevant calculation for fabric.

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	2	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 following effect by simple colour & weave combination on point paper : a) Continues line effect b) Step pattern	I	02*
2	Draw following effect by simple colour & weave combination on point paper : a) Hounds Tooth Pattern b) Birds eye / spot effect	I	02*
3	Draw following effect by simple colour & weave combination on point paper : a) All over effect	I	02*
4	Prepare any one sample of colour and weave effect	I	02*
5	Draw Structural design for 'Bedford cords' on point paper of the following. a) Plain Face Bedford cord structure b) Twill face Bedford cord structure c) Wadded Bedford cord structure	II	02*
6	Draw Structural design for 'Bedford cords' on point paper of the following. a) Arranged on alternate pick b) Crepon Bedford cord	II	02*
7	Prepare any one sample of Bedford cord structure	II	02*
8	Draw the Structural design of welt and Pique on point paper. a) Ordinary welt structure b) Weft wadded welt c) Fastback welt	II	02
9	Draw designs, draft, peg plan & cross section for following. a) All over or plain Velveteen b) Weft Plushes	III	02
10	Draw designs, draft, peg plan & cross section for following. a) Corded Velveteen or Courduroys/ Fustians b) Terry Piles (3 pick, 4 pick, 5pick,6pick) c) Wire piles (Fast structures, Loose structures)	III	02*

S. No.	Practical Outcomes (PrOs)	Unit No.	Approx. Hrs. required
11	Draw designs, draft, peg plan & cross section for following. a) Terry Piles (3 pick, 4 pick, 5pick,6pick)	III	02*
12	Draw designs, draft, peg plan & cross section for following. Wire piles (Fast structures, Loose structures)	III	02*
13	Draw structural design for warpBack fabric.	IV	02*
14	Draw structural design for weft Back fabric.	IV	02*
15	Draw design of the given sample on pointpaper	V	02*
16	Calculate EPI, PPI, warp weight, weft weight and fabric weightof the given sample.	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 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**

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	Point paper	All Practical
2	Pick glass	13,14
3	Hand loom	4, 7

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 fulfil the development of this course t competency.

a) Work as a leader/ team member.
b) Follow safety practices while using textile equipment.
c) Realize importance of green energy.

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 Colour and weave effect	1a. Describe the classification of colour and weave effects. 1b. Describe the method of producing variety of effect in the same weave and Colour. 1c. Develop various effects by using colour and weave Combinations on graph paper.	1.1 Classification of colour and weave Effect. 1.2 Method of producing variety of effects in the same weave & colour. 1.3 Various colour and weave effect. a) Continuous line effect. b) Hound's tooth pattern. c) Bird eye and spot effect. d) Step pattern. e) All-over effect
UNIT-II Bedford Cord, Welt and pique structure and its features.	2a. Describe the Bedford cord effect. 2b. Describe the methods for producing cord effects. 2c. Develop a design draft peg. plan & Cross section for a) Plain face Bedford cord structures. b) Twill face Bedford cord structures. c) Wadded Bedford cord. d) Structure arranged on alternative picks. e) Crepon Bedford cord 2d. Explainthe use and need of welts and pique structures. 2e. Describe the method for producing cord effectively.	2.1 Principle of Bedford cord & itsfeatures. 2.2 Methods for producing cord effects. 2.3 Plain face Bedford cord structure. 2.4 Twill face Bedford cord structure. 2.5 Wadded Bedford cord structure. 2.6 Arranged on an alternate pick. 2.7 Crepon Bedford cord. 2.8 Method for producing cord effect in pique structure. 2.9 Ordinary welt structure. 2.10 Weft wadded welt. 2.11 Fastback welt.

	2f. Develop design, draft, peg plan and cross-section of: a) Ordinary welt structure. b) Wadded welt structure. c) Fast beck welt. d) Waved pique	
UNIT-III Pile structures	3a. Describe the principle of warp and weft piles. 3b. List the principle of the formation of terry pile. 3c. Describe the uses of pile fabrics. 3d. Develop design, draft, peg plan and cross-section for 2,3,4,5 pick (pile on one sideand both side and fancy terry weave.) 3e. Describe the causes and remedies for uneven terry pile structure. 3f. Describe the principle of formation of true pile. 3g. Develop the design and cross-section for true pile design with the help of wire loom. 3h. Develop the design and cross-section for velvet and double plush fabric. 3i. Develop design draft, peg plan and cross-section for plain back velveteen, twill back velveteen and corduroy. 3j. Describe the factors affecting the pile length and density in warp and weft pile structure.	3.1 Formation of Terry pile fabric. 3.2 Ornamentation of Terry piles. 3.3 Formation of True warp piles. 3.4 Formation of Velvet & double plush fabrics. 3.5 3.5 Formation of weft piles. a) Velveteen structure. b) Plain and Twill back. c) Corded velveteen. d) Corduroy fabric 3.6 Factorsaffecting on length of pile & the density of the pile in warp and weft pile structure.
UNIT-IV Backed cloth	4a. Describe the purposes and uses of producing backed cloth. 4b. Discuss the structure of warp and weft-backed cloth. 4c. Describe the principle of tying the backed cloth. 4d. Develop design, draft, peg plan and cross-section for warp-backed, welt backed and wadded backed structure (Warp and weft) 4e. Describe the loom equipment for producing backed fabric	4.1 Warp-backed structure. 4.2 Weft-backed structure. 4.3 Wadded backed structure.
UNIT-V Cloth analysis and relevant	5a. Calculate each types of warp and weft per unit space. 5b. Judge count of threads, and read count. 5c. Draw design, draft and peg plan.	5.1 Yarn & Fabric calculation. 5.2 Selection of weave according to end use of the fabric and features / Quality Particulars of special structure for Blanket, Terry Towel, Velvet, corduroy

Calculations	5d. Calculate weight of fabric. 5e. Suggest loom equipment and end uses of fabric Blanket, Terry Towel, Velvet, corduroy . 5f. List the quality parameters for the special structure for Blanket, Terry Towel, Velvet, corduroy	

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	Colour and weave effect	04	3	3	3	9
II	Bedford Cord, Welt and pique structure and itsfeatures.	14	3	8	10	21
III	Pile structures	14	3	9	12	24
IV	Backed cloth	06	3	3	3	9
V	Cloth analysis andrelevant Calculations	04	2	2	3	7
Total		**42**	**14**	**25**	**31**	**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 different manufacturers' winding machine based on industrial visit.
b) Prepare report on Pirn winding machine based on industrial visit.
c) Prepare report on weaving machine based on industrial visit.
d) Give seminar on recent technological advancement of winding machine.

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 microproject 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) **Colour and weave:** Collection of various samples of colour and weave and analyse it.
b) **Bedford cord weave:** Collection of various samples of bedfordcordweave and analyse it.
c) **Welt and pique structure:** Collection of various samples of welt and pique structure and analyses it.
d) **Terry pile structure :-** Collection of various samples of terry pile structure and analyses it.
e) **Weft pile structure :-** Collection of various samples of weft pile structure and analyses it.
f) **Warp pile structure :-** Collection of various samples of warp pile structure and analyses it.
g) **Backed cloth:** Collection of various samples of Backed cloth and analyses it.

13. SUGGESTED LEARNING RESOURCES

S. 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	Z. Grosiky	Woodhead Publishing Limited,

S. No.	Title of Book	Author	Publication with place, year and ISBN
	and Colour		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. https://archive.org/details/advancedtextiled00watsrich/page/72/mode/2up
2. https://youtu.be/BUChpj2bIP0
3. https://youtu.be/G-N-ukyMIvU
4. https://youtu.be/6p9RFDKqExo
5. https://youtu.be/CLxUwlVBFlE
6. https://youtu.be/RI0X-OJs0_E
7. https://nptel.ac.in/courses/116102005
8. https://youtu.be/sWpSs8ntTrY
9. https://youtu.be/7U0Y8VlM_ho
10. https://youtu.be/VxWSaef0H3E
11. https://youtu.be/nQR47jIVLX0
12. https://youtu.be/j0VTQECjkrY
13. https://slideplayer.com/slide/4930361/
14. https://youtu.be/2QhTdHdrKTI
15. https://youtu.be/BRE3f_PiAdA
16. https://youtu.be/cSH51xhcJdw
17. https://youtu.be/-fwc1qXMfsI
18. https://youtu.be/XE4mR42KZW4
19. https://youtu.be/FPuRc32QJV8

15. PO-COMPETENCY-CO MAPPING

Semester IV	Fabric structure -II (Course Code: 4342903)						
	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 .	Develop structures, derivatives and "special structures" with design, draft, peg-plan, denting plan for various weaves like- Bedford cord, welts and pique, pile fabrics and warp backed, welt backed and wadded backed structure (Warp and weft).						
CO a) Develop different colour and weave effect	3	2	3	-	2	2	3
CO b) Develop cord effect on fabric using Bedford cord, welt and pique structures.	3	2	3	-	2	2	3
CO c) Develop various pile structures	3	2	3	-	2	2	3
CO d) Develop designs for backed cloth	3	2	3	-	2	2	3
CO e) Analysis and relevant calculation for fabric	3	2	3	2	2	2	3

*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
1	Zala Samrat Madansinh Lecturer in Textile	R C Technical institute, Ahmedabad	079-27664785	samrat.zala@gmail.com
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