GUJARAT TECHNOLOGICAL UNIVERSITY (GTU)

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

Course Title: **Elements of Textile and Garment Technology**
(Course Code: C4312801)

Diploma programme in which this course is offered	Semester in which offered
Textile Processing Technology	First

1. RATIONALE

The textile processors (i.e. diploma in Textile processing holders) have to understand various types of textile manufacturing processes which are the prerequisite of Textile processing. i.e. basic processes of making textiles. Textile emanates from fibers. Natural or manmade fibers are converted into yarn and yarn is converted to cloth or textile. Textiles are formed by weaving, knitting, knotting or pressing fibers together. This subject provides basic knowledge of textile manufacturing along with Garment Technology. It includes various textile fibers, their classification. It also provides knowledge of spinning and weaving processes along with the knowledge of Textile Woven Design, Knitting and Texturising.

2. COMPETENCY

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

- **Apply textile manufacturing technology concepts, principles and processes-yarn spinning, weaving, knitting and garment manufacturing in Textile Processing.**

3. COURSE OUTCOMES (COs)

The practical exercises, the underpinning knowledge and the relevant soft skills associated with this competency are to be developed in the student to display the following COs:

a) Use different forms of conventional and eco textile fibers.
b) Select relevant processes of yarn manufacturing for the given material
c) Calculate the fineness of the given yarn.
d) Select relevant processes of yarn texturising and fabric manufacturing.
e) Select relevant Processes of garment manufacturing.

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	1	-	4	30*	70	0	0	100

(*):Out of 30 marks under the theory CA, 10 marks are for assessment of the micro-project to facilitate the 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.

S. No.	Practical Outcomes (PrOs)	Unit No.	Approx. Hrs. required
	– Not Applicable-		

6. MAJOR EQUIPMENT/ INSTRUMENTS REQUIRED – (Not Applicable)

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

S. No.	Equipment Name with Broad Specifications	PrO. No.
1	**– Not Applicable-**	

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 competency.

a) Work as a leader/a team member.
b) Follow ethical practices.
c) Follow safety precautions.
d) Practice environment-friendly methods and processes. (Environment-related)

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 development of the COs and competency. If required, more such 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 **Introduction of textile**	1a. Explain basic textile terminologies. 1b. Draw flow chart of textile manufacturing processes. 1c. Justify the need for eco fibres. 1d. Classify eco fibres based on their characteristics.	1.1 Textile terminologies- Meaning. 1.2 Yarn manufacturing process- Flow chart, components. 1.3 Woven fabric manufacturing process- Flow chart, components 1.4 Eco fibres: Introduction, characteristics, classification
Unit – II **Yarn manufacturing processes**	2a. Explain the working principle of cotton ginning machines. 2b. Describe the purposes of the given spinning process. 2c. Explain the passage of material through spinning machines.	2.1. Cotton ginning process 2.2. Knife roller ginning machine- Working principle 2.3. Objects of various spinning process. 2.4. passage of material through various machines: (i) Modern Blow room Line (ii) Card (iii) Draw frame (iv) Lap former (v) Comber (vi) Speed frame (vii) Ring frame
Unit-III **Yarn Numbering System**	3a. Compare different Yarn numbering systems. 3b. Use relevant yarn numbering system to calculate yarn count from the given data. 3c. Conversion of various numbering system.	3.1 Yarn numbering system: Types 3.2 Yarn numbering system (i) Indirect numbering system: English, Metric, Woolen, Worsted (ii) Direct numbering system: Tex, Denier 3.3 Yarn numbering and its conversion

Unit– IV **Yarn Texturising and Fabric manufacturing processes**	4a. Describe the texturising process. 4b. Describe the objectives/ purposes of the Weaving Preparatory &Weaving process 4c. Explain with sketch the passage of material through Weaving Preparatory & Weaving Machine. 4d. Describe the basic designs in weaving. 4e. Explain the principles of knitting.	4.1. Texturising process- Introduction 4.2. Texturising process-Objectives, Texturising methods, crimping, the passage of filament through false twist texturing m/c. 4.3. Purposes of Weaving Preparatory and weaving process. 4.4. Passage of material through following machines with the neat sketch: (i) Winding machine (ii) Warping machine (iii) Multi-cylinder sizing machine (iv) Plain Power loom 4.5. Basic weaves -Plain, Twill, Sateen, satin with design, draft and peg plan. 4.6 Knitting- Introduction, Warp and weft knitting principle.
Unit– V **Introduction to garment technology**	5a. State the importance of the garment industry 5b. Select suitable fabric for the end use 5c. Explain the garment manufacturing process.	5.1 Importance of garment industry to present textile trends 5.2 Factor affecting selection of fabrics for final end product. 5.3 Stages of the garment manufacturing process.

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	Introduction of Textile	**06**	4	4	2	10
II	Yarn manufacturing processes	**11**	6	8	4	18
III	Yarn numbering system	**05**	2	2	6	10
IV	Yarn Texturising & Fabric manufacturing processes	**14**	8	8	4	20
V	Introduction to Garment Technology	**06**	2	8	2	12
Total		**42**	**22**	**30**	**18**	**70**

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

Note*: This specification table provides general guidelines to assist students 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 slightly vary 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 perform following activities in group and prepare reports of about 5 pages for each activity. They should also collect/record physical evidences for their (student's) portfolio which may be useful for their placement interviews:

a) Visit nearby spinning and weaving industries and prepare a detailed report of the visit
b) List out different manufacturers of spinning machines.
c) List out different manufacturers of weaving machines.
d) Collect specifications of different types of spinning and weaving machines.
e) Prepare survey report of different garments.

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/subtopics.
b) Guide student(s) in undertaking micro-projects.
c) ***"L" in section No. 4***means different types of instructional methods that are to be employed by teachers to develop the outcomes.
d) About ***20% of the topics/sub-topics*** which are simpler or descriptive could be given to the students for ***self-learning*** but need 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 using the knowledge of this course.

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 **14-16 (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 should relate highly to the competency of the course and the COs. The concerned course teacher could add similar micro-projects:

a) **Ginning**: Prepare the report of different Ginning machines with their specifications, material and processes.

b) **Yarn preparatory**: Prepare the report of different yarn preparatory machines with their specifications, material and processes.
c) **Weaving preparatory:** Prepare the report of different weaving preparatory machines with their specifications, material and processes.
d) **Weaving:** Prepare the report of different weaving machines with their specifications, material and processes.
e) **Garment Manufacturing**: Prepare the report of different types of garments used with their fabric specifications, material and processes.

13. SUGGESTED LEARNING RESOURCES

S. No.	Title of Book	Author	Publication with the place, year and ISBN
1	Volume-1-Technology of Short Staple Spinning	Werner Klein	Rieter Machine Works Ltd. Winterthur, 2014 ISBN 10 3-9523173-1-4/ISBN 13 938-3-9523173-1-0
2	fibre to fabric	Bernard P. Corbman	McGraw-Hill Education – Europe, 1983 ISBN: 978-007-0662-360
3	Weaving Machine, mechanism and management	Dr M. K. Talukdar, Prof. P. K. Shriramulu, Prof. D. B. Ajgaonkar	Mahajan publishers Pvt. Ltd. Ahmedabad, 1998 ISBN 81-85401-16-0
4	Weaving-Conversion of yarn to fabric	P.R.Lord and M.H.Mohamed	Merrow Publishing Co. Ltd., England, 1982 ISBN: 0 900 54178 4
5	Technology of Clothing manufacture	Carr& Latham	Black well publisher England,2009 ISBN: 978-1-4051-6198-5
6	Textile Spinning, Weaving and Designing	M.G.Mahadevan	Abhishek Publications, Chandigarh ISBN:978-81-8247-107-8

14. SUGGESTED LEARNING WEBSITES

a) https://nptel.ac.in/courses/116/102/116102048/
b) https://www.rieter.com/
c) https://www.textileschool.com/
d) https://www.fibre2fashion.com/
e) https://textileguide.chemsec.org/
f) https://www.textileassociationindia.org
g) https://www.nitma.com/
h) https://www.sitra.org.in/
i) https://www.itamma.org/
j) https://www.textileschool.com/154/eco-friendly-fibers/
k) https://www.slideshare.net/nisthachandela/garment-technology
l) https://www.youtube.com/results?search_query=garment+technology

15. PO-COMPETENCY-CO MAPPING

Semester I	Elements of textile and garment technology (Course Code: C4312801)						
	POs						
Competency & Course Outcomes	PO 1 Basic & Discipline -specific know-ledge	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	Apply textile manufacturing technology concepts, principles and processes-yarn spinning, weaving, knitting and garment manufacturing in Textile Processing.						
Course Outcomes							
CO1- Use different forms of conventional and eco-textile fibres.	3	1	-	-	1	1	3
CO2- Select relevant processes of yarn manufacturing for given material	3	1	1	1	2	2	3
CO3- Calculate the fineness of the given yarn	3	2	1	1	-	2	3
CO4- Select relevant processes of yarn texturising and fabric manufacturing	3	1	1	1	2	2	3
CO5- Select relevant processes of garment manufacturing.	2	1	2	-	3	1	3

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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