

**GUJARAT TECHNOLOGICAL UNIVERSITY (GTU)**

**Competency-focused Outcome-based Green Curriculum-2021 (COGC-2021)**

Semester - V

**Course Title: Apparel Quality Control**

(Course Code: 4355104)

Diploma programme in which this course is offered	Semester in which offered
Computer Aided Costume Design And Dress Making	5 <sup>th</sup> Semester

**1. RATIONALE**

The need for quality products by customers is increasing day by day and garment industry is no different. This course tries to develop requisite competency and skills in diploma holders to carry out inspection at various stages of garment construction viz. pre-production inspection of fabric, in work inspection etc. Thus after learning this course diploma holders would be able to ensure that quality is maintained during production and general quality checks that are essential before transit are carried out.

**2. COMPETENCY**

The course content should be taught and implemented with the aim to develop different types of skills leading to the achievement of the following competency:

- **Employ inspection and quality checks on apparel to ensure quality product.**

**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:

- Identify appropriate standard and specification for quality in apparel manufacturing.
- Select different fabric inspection systems and machines for fabric quality and testing
- Interpret the quality in cutting and fusing department
- Identify inspection checkpoints in sewing department and finishing defects

**4. TEACHING AND EXAMINATION SCHEME**

Teaching Scheme (In Hours)			Total Credits (L+T+P/2)	Examination Scheme				Total Marks
L	T	P		Theory Marks		Practical Marks		
			C	CA	ESE	CA	ESE	
3	0	0	3	30	70	00	00	100

*(\*): 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. *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	Nil	---	---

### Note

1. 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.
2. 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 required which are embedded in the COs and ultimately the competency..

S.No.	Sample Performance Indicators for the PrOs	Weightage in %
1	Nil	---

## 6. MAJOR EQUIPMENT/ INSTRUMENTS REQUIRED

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

S. No.	Equipment Name with Broad Specifications	PrO. No.
1.	Nil	---

## 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) 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 1<sup>st</sup> year

- ii. 'Organization Level' in 2<sup>nd</sup> year.
- iii. 'Characterization Level' in 3<sup>rd</sup> 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
<b>Unit-I Introduction to quality</b>	1a. Identify the need for quality in apparel manufacturing.	1.1 Definition 1.2 Quality Assurance 1.3 Quality Control 1.4 Quality Management
<b>Unit– II Standards and specifications</b>	2a. Select appropriate standard and specification for apparel manufacturing.	2.1 Standards 2.1.1 Importance 2.1.2 Type 2.1.2.1 National and International standards (AATCC, ASTM, ANSI, ISO, BSI, BIS) 2.2 Specification 2.2.1 Need and Importance 2.2.2 Process of development
<b>Unit– III Fabric Quality and Testing</b>	3a. Carry out inspection and fabric grading. 3b. Apply requisite test for ensuring fabric quality	3.1 Fabric defects 3.2 4 point and 10 point system 3.3 Fabric Inspection and grading 3.4 Fabric Inspection machines / Equipment 3.5 Types of Test: 3.5.1 Physical Tests- GSM Fiber Diameter Ends per inch Linear Density 3.5.2 Mechanical Test Tensile Testing, Abrasion Testing, Pilling Testing 3.5.3 Chemical Test

		Color fastness tests
<b>Unit – IV Quality in Cutting and Fusing</b>	4a. Appreciate the role of quality in cutting department. 4b. Appreciate the role of quality in fusing.	4.1 Quality parameters 4.1.1 Marker making 4.1.2 Spreading 4.1.3 Cutting 4.1.4 Bundling 4.1.5 Ticketing 4.2 Quality problems during fusing process.
<b>Unit-V Inspection in Sewing and finishing</b>	5a. Explain the inspection procedure in sewing department. 5b. Identify Garment checkpoints 5a. Identify the Finishing Defects	5.1 Types of Inspections 5.2 Inspection checkpoints 5.2.1 Inline checkpoints for Garment Inspections. 5.2.2 Inspection Loop 5.3 Different finishing Defects.

## 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	Introduction to quality	5	3	3	0	6
II	Standards and specifications	8	7	4	3	14
III	Fabric Quality and Testing	10	7	7	4	18
IV	Quality in Cutting and Fusing	10	10	4	4	18
V	Inspection in Sewing and finishing	9	3	4	7	14
<b>Total</b>		<b>42</b>	<b>30</b>	<b>22</b>	<b>18</b>	<b>70</b>

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

## 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:

- Students will visit to nearest garment industry.
- Critically observe the process of quality checking and testing in garment industry.
- Identify basic fabric defects in given sample
- Collect the fabric swatches and perform tests and record the findings.
- Prepare fabric/garment inspection report.

## 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) Show samples/ photographs/ video films to depict the good and bad examples of quality
- h) Arrange a visit to nearby garment factory/boutique to show samples of quality products with their defects
- i) Show the different testing procedures and techniques through industry visit.

## 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 **14-16 (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 has to match the competency and the COs. Similar micro-projects could be added by the concerned course teacher:

- a) **Garment Inspection:** Students can be asked to inspect a garment for quality defects and identify the cause of the defects. They can create a report highlighting the defects, their causes, and possible solutions to prevent such defects in the future.
- b) **Product analysis:** Bring 5 different brand garment (Products should be the same) and Identify differences from each which are not related to design of the products (Stitches types, Seams, Finishes, Fasteners, Assembly etc.) and submit a report on its analysis.
- c) **Fabric Testing:** Students can visit to industry and conduct various fabric tests, such as tensile strength, colorfastness, pilling resistance, and shrinkage, and analyze the results. They can present their findings in a report, including recommendations for fabric selection for different apparel products.
- d) **Manufacturing Process Analysis:** Students can study the manufacturing process of a specific apparel product and identify potential quality issues that can arise during the

process. They can suggest improvements to the process to ensure consistent quality of the product.

- e) **Supplier Assessment:** Students can survey and evaluate the performance of apparel suppliers based on quality standards, delivery times, and pricing. They can present their findings in a report, including recommendations for selecting and managing apparel suppliers.

### 13. SUGGESTED LEARNING RESOURCES

Sr. No.	Title of Book	Author	Publication with place, year and ISBN
1	Managing Quality in	Mehta & Bharadwaj	New Age Publisher, Delhi
2	Handbook of Quality	Joseph Juran	Mc Graw Hill ISBN 978-0-07-0162973-7
3	Principles of Textile Testing	J.E. Booth	Published by CBS Publishers & Distributors Pvt. Ltd., 1996
4	Managing Quality in Apparel Industry	Mehta & Bharadwaj	New Age Publisher, Delhi
5	Handbook of Textile Testing and Quality Control	Elliot B. Grover, D.S. Hamby	Wiley India Pvt Ltd ISBN-13-978-8126531752
6	Apparel Merchandising and Quality Control	MD Mahfuzur Rahman	VDM ISBN-13 : 978-3639236828
7	An Introduction to Quality Control for the Apparel Industry	Pradip V. Mehta	CRC Press; 1st edition ISBN-13 : 978-0824786793
8	Fabric Inspection and Grading	Daniel Powderly	Bobbin International ISBN-13 : 978-9991111520

### 14. SOFTWARE/LEARNING WEBSITES

- <https://www.hqts.com/apparel-quality-control-standards-and-procedures/>
- <https://techpacker.com/blog/design/what-is-a-garment-spec-sheet/>
- <https://ordnur.com/journal/standardization-of-apparel-manufacturing-industry/>
- <https://textilevaluechain.in/in-depth-analysis/articles/textile-articles/textile-testing-and-quality-control/>
- <https://textilelearner.net/quality-control-in-fusing/>
- <https://in.apparelresources.com/business-news/manufacturing/online-final-inspection-cutting-sewing-finishing/>
- <https://textilelearner.net/stages-of-inspection-in-garment-industry/>

### 15. PO-COMPETENCY-CO MAPPING

Semester V	Apparel Quality Control (Course Code: 4355104)
	POs

<b>Competency &amp; Course Outcomes</b>	<b>PO 1 Basic &amp; Discipline specific knowledge</b>	<b>PO 2 Problem Analysis</b>	<b>PO 3 Design/ development of solutions</b>	<b>PO 4 Engineering Tools, Experimentation &amp; Testing</b>	<b>PO 5 Engineering practices for society, sustainability &amp; environment</b>	<b>PO 6 Project Management</b>	<b>PO 7 Life-long learning</b>
<b>Competency</b>	<b>Employ inspection and quality checks on apparel to ensure quality product</b>						
<b>Course Outcomes</b>							
CO a) Identify appropriate standard and specification for quality in apparel manufacturing.	3	2	-	-	3	2	3
CO b) Select different fabric inspection systems and machines for fabric quality and testing.	3	3	2	3	2	2	3
CO c) Interpret the quality in cutting and fusing department.	3	2	2	-	2	2	3
CO d) Identify inspection checkpoints in sewing department and finishing defects.	3	3	2	-	3	2	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

<b>Sr. No.</b>	<b>Name and Designation</b>	<b>Institute</b>	<b>Contact No.</b>	<b>Email</b>
1	Dr. F. V. Kugashiya HOD in CACD&DM	GGP, Ahmedabad	9825697874	farjana.kugashiya@gmail.com
2	Smt. S. H. Bhatt Lecturer in CACD&DM	GGP, Ahmedabad	9898068580	shbhatt99@gmail.com

3	Dr. R.O. Yadav Lecturer in CACD&DM	GGP, Ahmedabad	9428044847	yadavrajeshri@gmail.com
4	Mrs. D.B. Thakkar Lecturer in CACD&DM	GGP, Ahmedabad	9825615256	tdharti2001@gmail.com