GUJARAT TECHNOLOGICAL UNIVERSITY (GTU)

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

Course Title: Advance Garment Technology
(Course Code: 4362906)

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

1. RATIONALE

Readymade garment market is growing by leaps and bounds due to rising income in urban and rural areas in country. Besides domestic market, international market is also growing. But Indian readymade garment market needs to catch the international readymade garment market. This is possible only when Indian products are equal in quality but less in price as compared to garments manufactured by competitor countries. As far as question of capital requirement is concerned, it is possible to operate garment making industry at micro, small and medium or large level, and hence this industry provides opportunities for self employment since diploma pass outs can start their micro/small business depending upon availability of capital. This course is therefore been designed to provide necessary knowledge and skills in garment making technologies. So that students can also get self/wage employment in this sector.

2. COMPETENCY
The course content should be taught and implemented with the aim to develop required skills so that students are able to acquire the following competency required by the industry:

- **Use advanced garment technologies to manufacture garments of good quality**.

3. COURSE OUTCOMES (COs)

The theory should be taught and practical should be carried out in such a manner that students are able to acquire required learning outcomes in cognitive, psychomotor and affective domain to demonstrate following course outcomes:
   a) Apply store management system & production cycle in garment production unit.
   b) Use computerized grading, spreading, marking and cutting.
   c) Design garments using CAD software.
   d) Maintain parameters related to sewing quality.
   e) Stitch garments using different types of automatic sewing machines.
   f) Analyse the quality of garment based on various stages of inspection.

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	0	0	3	30*	70	0	0	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. *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
	– Not Applicable-		
			.

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.
	– 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 t competency.

   a) Work as a leader/ team member.
   b) Follow safety practices while using Garment production machinery.
   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 Store Management & production Cycle	1a. Explain different type of store management system. 1b. Describe production cycle 1c.Describe the steps to reduce production cycle 1d. short production cycle and lead time.	1.1 Store management system (LIFO , FIFO, Delivery Chalan, Stock management) 1.2 Stages of production cycle. 1.3 Various steps to reduce time of production. 1.4 Lean manufacturing system in garment industry 1.5 advantages of short production cycle and lead time. 1.6 ERP & SAP 1.7 Environmental aspects in garment industry.
Unit–II Computerized Grading, Marker Planning and Cutting Room Equipment	2a. Explain Computerized grading and marker planning. 2b. Distinguish between an Automatic and Interactive marker 2c. Describe the features of different types of cutters. 2d. Describe the functions of a steam table and boiler	2.1 Computerised grading and marker planning. 2.2 Automatic marker making. 2.3 Interactive marker making. 2.4 Automatic spreading machine. 2.5 Cutters: Laser Cutter, Ultrasonic Cutter, Water jet Cutter Automatic Cutter – single ply and multiply 2.6 Steam press with steam table and boiler 2.7 Types of bugs, Non-Return Valve, steam trapper, cladding, steam line
Unit–III CAD/CAM Software Tools	3a. Operate Design System Tool. 3b. Identify parameters of CAD/CAM software tools 3c. Grade the pattern and develop marker plan.	3.1 Design System Tool 3.2 Principles of X and Y Vectors. 3.3 Points and Lines: Measuring and Changing line lengths, moving lines, 3.4 Cutting and drafting lines, rotating lines, Mirroring lines, Moving internal lines. 3.5 Darts; Add darts, Manipulate darts, designer darts.
Unit–IV Sewing Quality	4a. Determine parameters related to sewing quality	4.1 Seams and seam finishes: Fullness and its types –Gathers/Pleats, Shirring, Smocking; Plackets and fasteners; Hem finishes; Lining/interlining; Facing/interfacings; 4.2 Decorative Detail: Frills, flounces, peplums; Trimmings; Belts and bows.

Unit–V Types of Sewing Machines	5a. Differentiate the Machine Speed and Rate of Feed. 5b. Distinguish between the different types of Sewing Needles. 5c. Distinguish between the different types of automatic sewing machines	5.1 Machine Speed and Rate of Feed. 5.2 Stitch Size Regulation. Sewing needles: types, Single Needle Lock Stitch Machine with Control Panel, Double Needle Lock Stitch Machine, Multi-Needle Chain Stitch Machine with Puller and Elastic Tension Adjustment 5.3 Automatic Sewing Machines: Over Lock Machine (4 thread and 5 thread), Blind Stitch Machine, Three needle Flat Lock Machine, Double Needle, Feed off the Arm Machine.
Unit–VI Role of Garment Analysis in Garment Industry	6a. Distinguish between intrinsic and extrinsic parameters of garment. 6b. Describe the various stages of garment inspection process	6.1 Intrinsic and extrinsic parameters of garment. 6.2 Apparel professional: garment analysis, Methods and process of garment analysis 6.3 Inspection of raw materials – Sewing threads, construction and sewability, Trims inspection-zippers waist band, buttons, Interlining 6.4 Inspection in process -spreading, cutting, sewing quality parameter and types of defects occurring, assembly defects. 6.5 Final inspection: finishing defects, no inspection, 100% inspection, spot checking, and arbitrary sampling. 6.6 GarmentWaste recycling process .

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	Store Management & production Cycle	06	2	6	2	10
II	Computerized Grading, Marker Planning and Cutting Room Equipment	05	2	6	2	10
III	CAD Software Tools	05	2	4	4	10
IV	Sewing Quality	04	2	4	2	08
V	Types of Sewing Machines	12	4	8	6	18
VI	Role of Garment Analysis in Garment Industry	10	2	08	4	14
	Total	42	14	36	20	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:

i. Literature survey of Advanced Garment technology.
ii. Visit to Garment industry and preparing report with sketches.
iii. Prepare marker planning.
iv. Prepare course topic based seminar and mini internet based assignment.
v. Prepare journals based on practical performed in laboratory.

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:

i. Educational video and CDs.
ii. Prepare models
iii. Arrange Expert lectures by textile engineers
iv. Arrange visit to nearby textile industry, which is using the latest technology

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) **Store Management:** Prepare a report on types of Store Management.
b) **Production Cycle:** Prepare a chart of various Garment production cycle.
c) **Computerized Grading, Marker Planning:-** Prepare a report on types of Computerized Grading, Marker Planning.
d) **CAD Software:** Prepare a report on various types of CAD software available in market.
e) **Sewing Machines: -** Prepare a report on various types of sewing machines available in market.
f) **Garment Analysis: -** Prepare a report on various types of garment analysis process carried out in market.

13.   SUGGESTED LEARNING RESOURCES

Sr. No.	Title of Book	Author	Publication with place, year and ISBN
1	Garment Technology clothes	Carr& Lathan	Black well publisher, England ISBN:- 978-1405161985 (4th edition)
2	Managing Quality in Apparel Industry	Mehta & Bharadwaj	New Age Publisher, Delhi ISBN:- 978-8122411669
3	Clothing Technology from fiber to fashion	Kilgus R	Verlag Europa Lehrmittel Nourney , Vollmer ISBN-13 : 978-3808562260
4	An introduction to quality control for the apparel industry	Mehta P.V.	J.S.N International ISBN-13 : 978-0824786793
5	Elements of Fashion and Apparel Design	Sumathi G.J.	New age international limited publishers. ISBN-13 : 978-9395161381
6	Hand book of Garments Manufacturing Technology.	EIRI Board	ENGINEERS INDIA RESARCH INSTT ISBN-13 : 978-8189765026

14. SOFTWARE/LEARNING WEBSITES

1) www.textileassociationindia.org

2) www.cottonyarnmarket.net/OASMTP/textile_technology.htm

3) http://www.sitra.org /

4) www.itamma.org /

5) http://www.textilefashionstudy.com /

6) http://textilelearner.blogspot.in

7) www.textileschool.com

8) www.fibre2fashion.com /

9) www.garmento.org/process & skills

10) http://www.slideshare.net/DelwinArikatt/seams-used- in- garments

11) http://www.scribd.com/doc/44827468/Different-Types- of- Stitches

15. PO-COMPETENCY-CO MAPPING

Semester VI	Advance Garment Technology (Course Code: 4362906)						
	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
<u>Competency</u> .	**Use advanced garment technologies to manufacture garments of good quality.**						
CO a) Apply store management system & production cycle in garment production unit.	3	2	2	-	2	3	2
CO b) Use computerized grading, spreading, marking and cutting.	3	1	2	1	-	-	2
CO c) Design garments using CAD software.	3	1	2	1	-	1	2
CO d) Maintain parameters related to sewing quality.	2	1	1	-	-	-	2
CO e) Stitch garments	1	2	-	2	-	1	2

using different types of automatic sewing machines							
CO f) Analyse the quality of garment based on various stages of inspection.	3	2	2	2	2	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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