GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT

COURSE CURRICULUM
COURSE TITLE: TEXTILE TESTING
(COURSE CODE: 3362903)

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

1. RATIONALE

The advances in textile manufacturing technology are improving the quality of the textile day by day. This has further raised the expectations of customer. To ensure best quality as per the needs of the customer, many advances in textile testing are also taking place simultaneously. It is therefore essential for textile engineers to appreciate the importance of testing and to develop skills to test the textiles as per standards using advance testing methods. After learning this course, students would be able to measure property of textile material and analyze the result for specific end use or next process. Also they can pinpoint the any deficiency in the process using the result of testing and take remedial measures to ensure the quality. This course is therefore a key course for textile engineers.

2. COMPETENCY

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

- **Test fibers, yarn and fabrics to take corrective actions**.

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.

i. Employ various sampling techniques in textile testing.
ii. Test different types of textile fibers using the relevant instrument.
iii. Measure yarn count, twist and irregularity using the relevant instrument.
iv. Test fabric based on different quality parameters using the relevant instruments.
v. Test tensile strength of fibers and fabrics using the relevant instrument

4. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				
				Theory Marks		Practical Marks		Total
L	**T**	**P**	**C**	**ESE**	**PA**	**ESE**	**PA**	
3	0	2	5	70	30	20	30	**150**

Legends: L-Lecture; **T** – Tutorial/Teacher Guided Student Activity; **P** -Practical; **C** – Credit;; **ESE** -End Semester Examination; **PA** - Progressive Assessment.

5. COURSE CONTENT DETAILS

Unit	Major Learning Outcomes (in the cognitive domain)	Topics and Sub-topics
Unit - I Textile Testing	1a. Justify the need for testing of textiles. 1b. Describe the Standard atmospheric condition for testing 1c. Differentiate various sampling methods.	1.1 Need for Textile Testing. 1.2 Standard atmospheric condition. 1.3 Sampling: Aim of Sampling 1.4 Types of Sampling: Random Sampling, Bias Sampling, Numerical Sampling, Zoning technique
Unit - II Fibre Testing	2a. Identify fibre length parameters 2b. Describe Fibre Fineness Testing 2c. Explain Moisture content/ regain 2d. Measure Trash content	2.1 Fibre length measurement: Importance, determination, fibre parameter, bear sorter, digital fibrograph 2.2 Fiber Fineness Measurement: Importance, different method of measuring, airflow method, Sheffield Micronair Tester, ATIRA fineness tester 2.3 Fibre maturity: Importance, determination of maturity, caustic soda swelling method 2.4 Fibre moister regain testing: oven method: Shirley moisture Tester 2.5 Shirley Trash Analyser
Unit - III Yarn Count, Twist and Irregularity	3a. Measure yarn count 3b. Determine the twist 3c. Identify irregularity of yarn	3.1 Yarn numbering system: Instrument used - Quadrant Balance, Knowles Balance, Wrap Reel 3.2 Yarn Twist Testing: Type of twist, Effect of twist on fabric property, Different methods of twist measurement - Continuous Twist Tester, twist contraction method 3.3 Testing of evenness of yarn: Different method of measuring yarn evenness, uster tester
Unit - IV Fabric Testing	4a. Describe the different quality parameters of fabric 4b. Describe the working principle of the different testing instrument 4c. Describe procedures to test various parameters of the fabric	4.1 Quality parameters of fabric 4.2 Shirley Thickness Tester 4.3 Fabric abrasion resistance: Classification of abrasion, Parameters affecting testing of abrasion resistance. Assessment of abrasion damage, BFT abrasion Tester 4.4 Pilling of fabrics: Factors responsible, ICI Pilling box Tester 4.5 Measurement of Air permeability and

Unit	Major Learning Outcomes (in the cognitive domain)	Topics and Sub-topics
		water repellency: Air permeability Test, Water permeability, Drop Test, Spray Test, Shirley hydrostatic head test 4.6 Measurement of flame resistance: Vertical Test, Inclined Test 4.7 Parameters affecting handle of fabric: Drape meter, Shirley stiffness tester 4.8 Crease resistance and crease recovery tester
Unit -V Tensile Property and Advancement in Testing	5a. Explain different Tensile Terms 5b. Describe the principle for measuring tensile strength of textile material 5c. Describe the working principle of Fibre Strength tester 5d. Explain working principle of Yarn Strength tester 5e. Explain the working principle of fabric Strength testers	5.1 Tensile Terms: Load, breaking load, Stress, Strain, Initial Modulus, Work of Rupture, CSP, RKM Value 5.2 Principle for testing tensile strength: CRT, CRL 5.3 Fibre strength Testers: Stelometer, Pressley Strength Tester 5.4 Single yarn Strength Tester 5.5 Fabric strength tester 5.6 hydraulic Bursting Strength Tester 5.7 Tearing Strength Tester
	5f. Describe the working of High Volume Instrument (HVI) 5g. Describe the working of UTM 5h. Describe the working of AFIS	5.8 High Volume Instrument HVI 5.9 Universal testing machine UTM 5.10 AFIS

6. SUGGESTED SPECIFICATION TABLE WITH HOURS and MARKS (THEORY)

Unit no.	Unit	Teaching hours	Distributed theory marks			
			R	U	A	TOTAL
I	Textile Testing.	6	3	2	2	7
II	Fibre Testing	8	2	6	5	13
III	Yarn Count, Twist and Irregularity	8	2	6	5	13
IV	Fabric Testing	8	2	6	5	13
V	Tensile Property and Advancement in Testing	12	11	7	6	24
	Total	**42**	**20**	**27**	**23**	**70**

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

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table

7. SUGGESTED EXERCISES/PRACTICAL

The practical/exercises should be properly designed and implemented with an attempt to develop different types of skills **(outcomes in psychomotor and affective domain)** so that students are able to acquire the competencies/programme outcomes. Following is the list of practical exercises for guidance.

***Note**: Here only outcomes mainly in psychomotor domain are listed as practical/exercises. However, if these practical/exercises are completed appropriately, they would also lead to development of certain outcomes in affective domain which would in turn lead to development of **Course Outcomes** related to affective domain. Thus over all development of **Programme Outcomes (**as given in a common list at the beginning of curriculum document for this programme) would be assured.*

Faculty should refer to that common list and should ensure that students also acquire outcomes in affective domain which are required for overall achievement of Programme Outcomes/Course Outcomes.

S. No.	Unit No.	Practical Experiment/Exercise (Outcomes in the Psychomotor Domain)	Approx. Hours Required
1	I	Measure fibre length using Barer sorter	2
2	II	Measure fibre length using Fibrograph	2
3	II	Measure Fiber strength measurements using Stelometer	2
4	II	Measure Fibre strength measurements using Presslley bundle strength tester	2
5	III	Measure Fiber fineness using air flow method	2
6	III	Measure count of yarn using wrap reel	2
7	III	Measure the yarn twist using continues testing method	2
8	IV	Measure the drape of given fabric using drape meter	2
9	IV	Measure the crease recovery angle of given fabric	2
10	V	Measure the CSP using lea strength tester	4
11	V	Measure the strength of yarn using single yarn strength tester	4
12	V	Measure the grab strength and strip strength using strength tester	4
13	V	Measure the tearing strength using tearing strength tester	2
14	V	Measure bursting strength using bursting strength tester	2
15	V	Record working of HVI	4
16	V	Record working of AFIS	4
		Total	**42**
Note: Perform any of the practical exercises from above list for total of minimum 28 hours depending upon the availability of resources so that skills matching with the most of the outcomes of every unit are included.			

8. SUGGESTED STUDENT ACTIVITIES

i. Internet based assignment topic wise.
ii. Industry visit for Testing Laboratory.

9. SPECIAL INSTRUCTIONAL STRATEGIES (if any)

i. Show educational video and CDs
ii. Prepare Charts for Testing Instrument
iii. Arrange Expert lectures by textile engineers
iv. Arrange visit to nearby textile industry, which is using the latest technology.

10. SUGGESTED LEARNING RESOURCES

A) Books

S. No.	Author	Title of Books	Publication
1	Booth J.E	Principles of Textile Testing.	Chemical Pub. Co., New York
2	Angappan P. & Gopalakrishnan R.	Textile testing	Valayakkaranoor, Tamil Nadu
3	Skinkle, John H.	Textile Testing	Chemical Pub. Co., New York
4	Collier, Billie J.	Textile Testing and Analysis	PHI Learning, New Delhi

B) Major Equipment/ Instrument with Broad Specifications

i. Textile Testing Laboratory.
ii. Shirley Moisture meter.
iii. Shirley Trash Analyzer.
iv. Stelometer
v. Pressly fiber Strength Tester.
vi. Sheffield Micronair Tester
vii. Quadrant Balance
viii. Thickness Tester
ix. Drap meter
x. Uster Single Thread Tester.
xi. Instron Strength Tester.
xii. Bursting Strength Tester.
xiii. Ballistic Strength Tester.
xiv. Uster Evenness Tester.

C) Software /Learning Websites

Searching engine could be used to locate textile related sites

i. http://www.ileusa.net/files/47258664.pdf
ii. http://nptel.ac.in/courses/116102029/
iii. http://www.uster.com/en/instruments/fiber-testing/uster-hvi/
iv. http://www.atira.in/Testing.aspx

11. COURSE CURRICULUM DEVELOPMENT COMMITTEE

Faculty Members from Polytechnics

- **Prof. Y. M. Gandhi**, HOD Textile Manufacturing, Shri BPTI, Bhavanagar
- **Prof. R. T. Patel**, Lecturer in Textile Manufacturing, R.C.Technical Institute, Ahmedabad.
- **Prof. B. B. Bhatt**, Lecturer in Textile Manufacturing, Sir BPTI, Bhavnagar
- **Prof. S. M. Zala**, Lecturer in Textile Manufacturing, Sir BPTI, Bhavnagar

Coordinator and Faculty Members from NITTTR Bhopal

- **Dr. C. K. Chugh**, Professor, Department of Mechanical Engineering
- **Dr. Joshua Earnest**, Professor Department of Electrical and Electronics Engineering