# GUJARAT TECHNOLOGICAL UNIVERSITY

**TEXTILE TECHNOLOGY (29)**
PHYSICAL TESTING - I
**SUBJECT CODE:** 2152906
B.E. 5th SEMESTER

**Type of course:** Engineering

**Prerequisite:** Students should have knowledge of Physics and Mathematics of 10+2 level and basic statistics.
**Rationale:** Physical Testing - I covers the testing of various properties of fibre and yarn.

**Teaching and Examination Scheme:**

| Teaching Scheme | | | Credits | Examination Marks | | | | | | Total Marks |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Theory Marks | | | Practical Marks | | | |
| L | T | P | C | ESE (E) | PA (M) | | ESE (V) | | PA (I) | |
| | | | | | PA | ALA | ESE | OEP | | |
| 3 | 0 | 2 | 5 | 70 | 20 | 10 | 20 | 10 | 20 | 150 |

**Content:**

| Sr. No. | Content | Total Hrs | % Weightage |
|---|---|---|---|
| 1 | **Introduction:** Aim and scope of testing, Selection of sample, type of sample, Sampling techniques for fibre, yarn and fabrics. | 4 | 9.52 |
| 2 | **Moisture Relation and Testing:** Terms and definitions, relation between r.h. and regain of textile materials. Measurement moisture regain & content - Principle and operation of equipment. | 4 | 9.52 |
| 3 | **Testing of Fibres:** Measurement of fibre length, fineness, maturity, crimp, strength and elongation, neps, trash content and grading of different cotton. Evenness testing of laps, slivers and rovings. Application of HVI and AFIS. | 18 | 42.86 |
| 4 | **Testing of Yarn:** Yarn numbering and conversion system, measurement of yarn twist, hairiness, tensile properties and Unevenness & imperfection. Various instruments for testing yarn properties—their principle of operation and inter-relations between different instruments. | 16 | 38.09 |

**Suggested Specification table with Marks (Theory):**

| Distribution of Theory Marks | | | | | |
|---|---|---|---|---|---|
| R Level | U Level | A Level | N Level | E Level | C Level |
| 10 | 12 | 12 | 12 | 12 | 12 |

**Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's 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

**Reference Books:**


1. Physical Testing of Textiles by B. P. Saville, 1999, Woodhead Publishing Ltd., U. K.
2. Principles of Textile Testing by J. E. Booth, 1961, Heywood Books, London.
3. Testing and Quality Management– Edited by V. K. Kothari, IAFL Publications, New Delhi.
4. Handbook of Textile Testing and Quality Control by E. B. Grover and D. S. Hamby.
5. Textile Testing by Angappan P & Gopalakrishnan R, SSM Institute of Textile Technology, Komarapalayam, 2002.
6. Textile Testing by Basu A, SITRA Coimbatore, 2002.


**Course Outcome:**

After learning the course the students should be able to:

1. Prepare the samples to be required for different testing methods.
2. Measure moisture content and regain of different textile materials.
3. Test the fibres for different properties.
4. Test the yarns for different properties.

**List of Experiments:**

1. Gravimetric Fineness of Manmade fibre
2. Gravimetric Fineness of cellulosic Fibres
3. Fibre Length By Fibrograph Method
4. Determination of Trash content in cotton.
5. Determination of Fibre Fineness using Air Flow Method.
6. Determination of fibre bundle strength using Pressley Tester
7. Determination of fibe bundle strength Using Stelometer
8. Determination of various fiber properties using HVI and AFIS
9. Yarn Grading By Visual Examination
10. Yarn Count By Gravimetric Method
11. Yarn count using Knowles balance.
12. Measurement of Twist by manual and electronic method.
13. Determination of Lea Strength of Given Yarn Using Lea Tester
14. Determination of Thread Strength of The Given Yarn Using UTM
15. Measurement of Hairiness of the spun yarns.
16. Measurement of Evenness of Sliver and roving using evenness tester
17. Measurement of Ballistic strength of lea using impact strength tester.
18. Crimp rigidity measurement for filament yarn.
19. Measurement of snarling using snarl indicator.

**Design based Problems (DP)/Open Ended Problem:** Apart from above experiments a group of students has to undertake one open ended problem/design problem. Few examples of the same are given below :

1. Develop a nep template.
2. Develop a system showing the principle of constant rate of traverse.
3. Develop a prototype device to measure the cleaning efficiency of machine.

**Major Equipment:**

1. Digital Fibrograph
2. Fiber Fineness Tester
3. Fiber Strength Tester – Stelometer
4. Fiber Strength Tester – Pressley Tester
5. Fiber Property testing using HVI & AFIS
6. Trash Analyzer
7. Wrap Reel for spun and filament yarns
8. Weighing Balance
9. Twist tester – Manual and Digital
10. Tensile Strength Tester
11. Lea strength tester
12. Ballistic Strength tester
13. Snarl indicator
14. Crimp rigidity tester
15. Yarn hairiness tester
16. Evenness tester for sliver and roving
17. Knowles balance

**List of Open Source Software/learning website:**

- Web sites of textile testing instrument manufacturers, namely Uster, SDL etc.,
- BIS, BS, ASTM and other standard methods of textile testing.
- http://nptel.iitm.ac.in, World Wide Web, Google Search Engine etc.

**ACTIVE LEARNING ASSIGNMENTS**: Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide. The best three works should submit to GTU.