



GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Bachelor of Engineering

Level: UG

Branch: Textile Technology

Subject Code: BE04029041

Subject Name: Physical Testing - I

w. e. f. Academic Year:	2024-25
Semester:	4
Category of the Course:	PCC

Prerequisite:	Students should have basic knowledge of textile fibres and yarns.
Rationale:	Nowadays various developments in the textile fields open the opportunity for research and development of existing and new products for the textile industry. Physical testing-I is helpful tools for quality control, analyzing, selection of raw materials product quality control and product testing from textile materials.

Course Outcomes:

No	CO statement	RBT Level
01	Understand the basic concept of testing and sampling.	U,A,N,C
02	Know the various factors affecting and concepts related to textile fibre testing.	R,U,A
03	Identify and analyze properties and imperfections in textile yarn.	R,U,A
04	Understand the fundamental of yarn numbering and conversion system	UAN
05	Analyze the results of testing of textile materials	U,N,E

*Revised Bloom's Taxonomy (RBT)

Teaching and Examination Scheme:

Teaching / Learning Scheme (in Hours per semester)					Total Credits	Assessment Pattern and Marks					Total Marks
L	T	P	PBL*	Total no of hours per semester		Theory		Tutorial / Practical			
						ESE (E)	PA / CA (M)	PA/C A (I)	PBL (I)	ESE (V)	
45	0	30	15	90	3	70	30	20	30	50	200

* Problem Based Learning (PBL) aims to accommodate learning beyond syllabus as per clause 9.4 of NBA manual.

Content:

Sr. No.	Content	Total Hrs	% of Weightage
1	Introduction: Aim and scope of testing, Selection of sample, Type of sample, Sampling techniques for fibre, yarn and fabrics. Revisiting the statistical concepts, estimation of population characteristics from samples, confidence intervals, determination of sample size, test of significance.	6	13



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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.	5	11
3	Testing of Fibres: Measurement of fibre length, length uniformity, fineness, maturity, trash and colour; Concepts of span length, upper-half mean length, fibrograph; High Volume Instruments, Advanced Fibre Information System, Fibre quality index, Spinning consistency index; Determination of micronaire and maturity of cotton fibres.	18	40
4	Unevenness testing of fibrous materials, CV% and percentage mean deviation; Optical and capacitance principles measurement; Yarn imperfections and yarn faults (Classimat system), limit irregularity, index of irregularity, Spectrogram and variance-length curve analysis; Yarn hairiness, principle of measurement, expressing yarn hairiness.	9	20
5	Yarn numbering and conversion system, Measurement of yarn twist, CRE, CRL and CRT principles, tensile testing of lea, count strength product; Effect of gauge length, rate of extension and relative humidity, weak-link theory, strength-time coefficient; Various instruments for testing yarn properties— their principle of operation and inter-relations between different instruments.	7	16
TOTAL		45	100

Suggested Specification table with Marks (Theory):(For B.E. only)

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
25	30	15	10	10	10

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)

References/Suggested Learning Resources:

(a) 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.
7. Testing of Textile and Fibrous Material,2024, by Apurba Das, CRC Press

(b) Open source software and website:



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

Suggested Course Practical List:

1. Measurement of fibre length using baer sorter.
2. Measurement of fibre Length by Digital fibrograph method.
3. Determination of fibre bundle strength using pressley tester and stelometer
4. Determination of trash content in cotton.
5. Determination of fibre fineness using air flow method and gravimetric method.
6. Determination of various fiber properties using HVI and AFIS
7. Yarn count using gravimetric method and Knowles balance
8. Measurement of twist by manual and electronic method.
9. Determination of lea strength of given yarn using lea tester
10. Determination of thread strength of the given yarn using UTM
11. Measurement of hairiness of the spun yarns.
12. Measurement of evenness of sliver, roving and yarn using evenness tester
13. Measurement of ballistic strength of lea using impact strength tester.
14. Crimp rigidity measurement for filament yarn.
15. Measurement of snarling using snarl indicator.

List of Laboratory/Learning Resources Required:

Baer Sorter, Digital Fibrograph, Fiber Fineness Tester Stelometer, Pressley Tester, HVI & AFIS, Trash Analyzer, Wrap Reel for spun and filament yarns, Weighing Balance, Twist tester – Manual, Electronic Twist Tester, Lea strength tester, Snarl indicator, Crimp rigidity tester, Yarn hairiness tester, Evenness tester for sliver and roving, Knowles balance, Quadrant Balance etc.

Suggested Project List:

Suggested Activities for Students:

1. Visit to textile testing lab and preparing report

List of suggested activities for Problem Based Learning:

Sl. No.	Name of the activity	No. of hours	Evaluation Criteria
1	Industry/Research laboratory visit	Visit = 5h, Report preparation = 5h Total = 10h	Based on report submitted. Report should contain observations and calculations based on industry/ lab data
2	Assignment writing. Numericals based assignment is preferable.	5 assignments of 2h each. Total = 10h	Based on the assignment submitted.



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3	Self learning on-line course	Minimum duration of the course should be 10h.	Examination based assessment at the end of course. Based on the certificate produced.
4	Poster/chart/power point preparation on technical topics	Duration = 6 h	Based on poster/chart preparation and presentation skills
5	Technical Video based learning related to the subject	Duration of video = 5h Report preparation = 5h Total = 10h	Report /presentation based on the video learning outcomes.
6	Working/non-working model on technical topics	Working = 12 h Non- working = 8 h	Based on inter department/external evaluation
7	Industrial exposure for 2-3 days to observe and provide tentative solutions on society/environment/health/any other issue	Duration = 15 h for industrial exposure Problem identification and tentative solution = 10 h Total = 20 h	Based on evaluation of critical problems and solutions
8	Group Discussion on emerging/trending technical topics based on subject	Duration = 1 h each	Based on performance in group discussion, technical depth, knowledge etc.
9	Real world case studies-based learning	Duration of data collection/study = 5h Report preparation = 5h Total = 10h	Based on in-depth study, technical depth, data collected, fact finding, etc.

- All records pertaining to the evaluation and assessment of self-learning activities must be properly maintained and preserved at the institute level. These records should be made available to the university upon request.
- Institutes are encouraged to utilize digital platforms, such as Microsoft Teams, for effective record-keeping and to ensure transparency in the evaluation and assessment of self-learning activities.

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