GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Bachelor of Engineering
Level: UG
Branch: Textile Technology
Subject Code : BE03029011
Subject Name : Textile Fibre - I

w. e. f. Academic Year:	2024 -25
Semester:	3
Category of the Course:	PCC

Prerequisite:	Basic knowledge of science subjects like physics and chemistry
Rationale:	This course covers the varieties of raw materials used in different textile processes, their properties and applications.

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT Level
01	Understand the role of polymer as a building block for fibre as a material	R,U
02	Understand the role of crystallinity and orientation in influencing fibre properties	R,U
03	Describe the essential and desirable properties of fibres and classification of textile fibres	U,A
04	Identify the physical, chemical and biological properties of natural fibres.	U,A,E
05	Interpret the methods of fibre formation and physical, chemical properties of regenrated fibres.	U,A,E,C

**Revised Bloom's Taxonomy (RBT)*

Teaching and Examination Scheme:

Teaching - Learning Scheme (in Hours per Semester)					Total Credits = TH/30	Assessment Pattern and Marks					Total Marks
						Theory		Tutorial / Practical			
L	T	P	PBL*	TH		ESE (E)	PA (M)	PA/ (I)	PBL (I)	ESE (V)	
45	0	30	45	120	04	70	30	20	30	50	200

Where L = Lecture, T= Tutorial, P= Practical, TW/SL = Term-Work / Self-Learning, TH = Total Hours, ESE = End-Semester Examination, PA = Progressive Assessment

Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	**Introduction to textile fibre Polymer**	8	14

	• Definitions: Polymer, Monomer, Degree of polymerization, Molecular weight • Arrangement of molecules, molecular orientation of fibres • Types of Polymerization: Addition and Condensation polymerization. • Types of Polymers • Requirement of fibre-forming polymers • Chemical composition and structure of textile fibres		
2.	**Introduction to textile fibre** • Definitions: textile fibres, staple, filament, multifilament, monofilament, yarn, thread, rope, fabric. • Specification of fibers: Count, Denier, Tex etc. • Essential and Desirable properties of fibres. • Broad classification of textile fibres	7	14
3.	Production of cotton. • Methods of harvesting and effects of cotton. • Organic cotton, BT cotton, Color cotton • Types of cotton. • Morphological structure of cotton. • Detailed chemical and physical structure of cotton. • Properties of cotton. • Application of cotton.	6	14
4.	Protein fibres (wool,silk). • Introduction to wool fibres • Morphological structure of wool • Detailed chemical, physical structure of wool. • Definition of worsted wool. • Properties and uses of wool.	6	14

	• Introduction to silk, sericulture of silk • Silk reeling process, throwing process and degumming of silk. • Different types of silk. • Detailed chemical, physical structure of silk.		
5.	**Brief idea about cultivation, physical and chemical properties and application of bast fibres:** Jute, Linen, Ramie, Hemp	4	10
6.	**Sources and applications of other minor natural fibres.** Coir**,** Bamboo**,** Soyabean**,** Leaf fibres: abaca, Sisal, Banana, Pineapple, Soyabean fibre, Milk protein fibre, **Mineral fibres**: Asbestos and other natural fibres,Bicomponent fibres	4	10
7.	Stress-strain properties and diagrams of Textile fibres and their definitions.	2	4
8.	• Cross sectional shape, longitudinal shape and density of different fibres. • Burning and chemical properties of fibres • Breaking test, feeling test of fibres • Moisture properties of textile fibres	4	10
9.	Instruments used to measure properties of fibres like X ray diffraction, birefringence, NMR,FTIR, Electron microscopy, Density Gradient Technique	4	10
	Total	**45**	**100**

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks (in %)					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
15	**20**	**20**	**5**	**5**	**5**

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. Introduction to Textile Fibres - H. V. Sreenivasa Murthy, Woodhead Publishing India Pvt Ltd, New Delhi.
2. Textile Fibres – Dave & Sahasrabudhe, ATA Publication
3. Textile Science- E.L.Gohl & L.D.Vilensky, CBS Publishers & Distributors Pvt.Ltd.
4. A Text Book of Fibre Science and Technology- S. P. Mishra, New Age International Publishers, New Delhi.
5. Hand Book of Textile Fibres (Vol-I & II) – J. Gordon Cook, Woodhead Publishing Ltd, Cambridge.

(b) Open source software and website:

http://nptel.iitm.ac.in; google search engine,

Suggested Course Practical List:

1. To study longitudinal view of the natural fibres and to learn to identify them.
2. To study the cross sectional view of the natural fibres to learn to identify them.
3. To identify fibres by burning test.
4. Identification of fibres using chemical analysis.
5. To investigate diameter swelling of fibres using microscope.
6. Moisture regains of fibres by absorption and desorption method.
7. Analysis of unknown blends of fibres.
8. Testing of unknown fibres present in the fabric.
9. To determine denier, tex and count of given fibres.
10. To prepare swatch file of variation fabric samples made by using different fibres.

List of Laboratory/Learning Resources Required:

Microscope (preferably projection type), Melt flow indexer, Density analyser such as density gradient column, electronic balance, suitable heating facility, and necessary glass wares, Differential scanning calorimeter, conditioning oven.

- **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.
3.	Self learning on-line course	Minimum duration of the	Examination based assessment at

		course should be 10h.	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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