GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering
Subject Code: 3132906
Semester III
Subject Name:Textile Materials

Type of course: Engineering Science

Prerequisite: Basic knowledge of science subjects like physics, chemistry and mathematics.

Rationale: Yarn manufacturing is the first important conversion process for staple fibres. Out of two spinning systems for making spun yarn: namely long staple and short staple, cotton being predominant fibre for India, the sequence of operations for short staple is very important.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
L	T	P	C	Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
3	0	2	4	70	30	30	20	150

Content:

Sr. No.	Content	Total Hrs
1	Introduction to textile fibre. Definitions: textile fibres, staple, filament, multifilament, monofilament, yarn, thread, rope, fabric.Specification of fibers: Count, Denier, Tex etc. Fibre forming properties (crystalline and amorphous region), Molecular weight, degree of polymerization, Addition and Condensation polymerization.Essential and Desirable properties of fibres. Broad classification of textile fibres Cross sectional shape and density of different fibres.	6
2	Production of cotton. Methods of harvesting and effects, Types of cotton, Morphological structure of cotton, Detailed chemical and physical structure of cotton, Properties of cotton, Applications, brief idea about organic cotton.	7
3	Protein fibres Introduction to wool fibres, Morphological structure of wool, Detailed chemical, physical structure of wool, Definition of worsted wool, Properties and uses of wool, 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
4	Brief idea about cultivation, physical and chemical properties and application of bast fibres: Jute, Linen, Ramie, Hemp	3
5	Sources and applications of other minor natural fibres. Coir, Bamboo, Soyabean, Sisal, Banana, Pineapple.	2
6	Introduction to manmade fibres, Difference between natural and manmade fibres, Advantages and disadvantages of natural and manmade fibres, General principles of manufacturing manmade fibres by melt spinning, dry spinning and wet spinning.Regenerated fibers.Viscose: raw material, manufacturing and spinning of viscose, properties and application, Introduction to other types of	9

	rayons(acetate rayon, cupraamonium rayon, tencel, lyocell, modal fibres), Properties.	
7	Synthetic fibers – raw material, manufacturing process, physical and chemical properties and applications, Nylon, Polyester, Polypropylene, Acrylic.	**8**
8	Brief idea about high performance fibres like glass, carbon, aramid, spandex.	**2**

Suggested Specification table with Marks (Theory): (For BE only)

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
20	**30**	**20**	**20**	**05**	**05**

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. Introduction to Textile Fibres- H. V. Sreenivasa Murthy,
2. Production of Synthetic Fibres- A. A. Vaidya, Prentice-Hall of India, New Delhi.
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,
5. Hand Book of Textile Fibres (Vol-I & II) – J. Gordon Cook

Course Outcomes: Afterlearning the course, students should be able to:

Sr. No.	**CO statement**	**Marks % weightage**
CO-1	Describe the essential and desirable properties of fibres and classification of textile fibres.	**10**
CO-2	Identify the physical, chemical and biological properties of cotton,and other cellulosic	**40**
CO-3	Understand the physical, chemical and biological properties of wool,silk.	**05**
CO-4	Interpret the methods of fibre formation and physical, chemical properties of regenerated fibres.	**30**
CO-5	Identify the physical, chemical and biological properties of manmade fibres.	

List of experiments:

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

Major Equipment: 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.

List of Open Source Software/learning website:https://nptel.ac.in, World Wide Web, Google Search Engine etc.