

HS-103-TEXTILE, SCIENCE AND FABRIC CARE

Course Title	Textile Science and Fabric Care	Course Code	HS-103
Year	I Year	Course Group	Core
Teaching Scheme in Hrs (L:T)	4:1:0	Credits	3
Methodology	Lecture+ Assignment	Total Contact Periods	150 Periods
CIE	60 Marks	SEE	40 Marks

Pre-requisites

Basic knowledge of textile fibres, fabrics, weaving, and garment care is the pre-requisite for studying Textile Science and Fabric Care.

Course Outcomes

Upon completion of the course the student shall be able to

COURSE OUTCOME	
CO1	Explain the basic knowledge related to textile fibres.
CO2	Study natural and man-made textile fibres and their production.
CO3	Identify textile fibres using different testing methods.
CO4	Enumerate the stages of manufacturing process from textile fibre to fabric.
CO5	Outline the preparation methods of various stiffening agents, laundry reagents, and bleaching agents.
CO6	Explain the different methods of washing and finishing of fabrics.

COURSE CONTENT

UNIT – I: Introduction to Textiles

Duration: 25 Periods

Scope of textile materials in domestic and industrial applications. Different sectors of textile industry and major textile industries in India.

Basic textile terms – fibre, filament, yarn, thread, fabric, staple yarn, and filament yarn.

Classification of textile fibres based on source and chemical nature. Essential and desirable properties of textile fibres. General sequence of operations involved in conversion of fibre to garment.

UNIT – II: Natural Textile Fibres and Man-Made Textile Fibres

Duration: 28 Periods

Definition and classification of natural textile fibres – vegetable fibres, animal fibres, and mineral fibres.

Cotton

Botanical classification, cultivation, harvesting and picking, characteristics of cotton fibre, microscopic structure, and chemical composition.

Wool

Classification of wool, characteristics, factors influencing quality of wool, virgin wool and shoddy

wool, impurities in raw wool, physical structure of wool, importance of scales in wool, and chemical composition of wool.

Silk

Sericulture, life cycle of silk, stages in production of raw silk from cocoons, characteristics of silk fibre, chemical composition, and various types of silk threads.

Bast Fibres

Extraction (retting) process and characteristics of bast fibres.

Definition and classification of man-made and synthetic fibres. Basic raw materials used for production of synthetic fibres.

Definition of monomer, polymer, polymerization, and degree of polymerization. Degree of polymerization in various textile fibres.

UNIT – III: Identification of Textile Fibres

Duration: 22 Periods

Need for fibre identification tests and different methods of fibre identification.

Non-Technical Tests

Feeling test and burning test. Distinguishing characteristics of various textile fibres through feeling and burning tests.

Technical Tests

Solubility test – solvents used for different natural and man-made textile fibres.

Microscopic test – different microscopic methods for identification of textile fibres and microscopic appearance of various textile fibres.

UNIT – IV: Fibre to Fabric Manufacturing Process

Duration: 25 Periods

Definition of basic terms related to yarn and spinning. Material flow in spinning process.

Classification of yarns and their parameters.

Definition of yarn, sewing thread, and fancy yarns. Classification of yarns based on construction.

Fancy yarns and basic requirements of sewing threads.

Different methods of fabric manufacture and their principles. Basic weaving terms – warp, weft, and loom.

Weaving Preparatory Process

Winding, warping, warping systems, sizing, ingredients used in sizing of warp, importance and functions of sizing ingredients, and looming operations.

Weaving

Classification of weaving machines, parts and functions of loom with illustrations, and passage of warp on a plain power loom.

Weaves

Method of weave representation on graph paper. Plain weave and its variations, twill weave, satin and sateen weaves – characteristics and applications. Essential properties of fabrics.

UNIT – V: Stiffening Agents, Bleaching Agents, Blues and Laundry Reagents

Duration: 26 Periods

Stiffening Agents

Various kinds of stiffening agents and their importance. Preparation of boiling water starch, cold water starch, gum water, and tips for starching.

Bleaching Agents

Definition and types of bleaches.

Oxidizing bleaches – sunlight with moisture, air and grass, sodium hypochlorite, sodium perborate, hydrogen peroxide, and potassium permanganate.

Reducing bleaches – sodium hyposulphite.

Blues

Definition and types of blues – aniline blue, indigo blue, Prussian blue, and ultramarine blue.

Depth of colour in blueing.
Laundry Reagents
Washing soda, borax, rock ammonia, oxalic acid, salts of lemon, acetic acid, and vinegar.
Soaps and Detergents
Preparation of soaps and detergents. Soapless detergents.

UNIT – VI: Dry Cleaning and Care of Textiles

Duration: 24 Periods

Dry Cleaning

Definition of dry cleaning, list of grease absorbents and solvents, rules to be followed in dry cleaning, procedure of dry cleaning with solvents and absorbents, advantages and disadvantages of dry cleaning.

Care of Textiles

Methods of washing and finishing.

Washing clothes by application of pressure, kneading and squeezing method, suction washing method, hand friction or rubbing method, rubbing and scrubbing method.

Ironing, pressing, calendaring, steaming, and mangling.

Washing and finishing procedures for white cotton sari, coloured cotton sari, coloured dress, white cotton dress material, synthetic dress material, woollen sweater, silk sari with contrast colour border and pallu, and velveteen fabrics.

Basic rules for storage of clothing.

Reference books

1. *Gohl and Velensky, Textile Science.*
2. *Venkatasubramani, Spun Yarn Technology.*
3. *J. E. Booth, Principles of Textile Testing.*
4. *Corbman, Textiles: Fibre to Fabric.*
5. *Anjali Karolia, Textile Science.*

Suggested learning Outcomes

After completion of this course, the student should be able to

CO1: Explain the basic knowledge related to textile fibres.

- 1.1 Scope of textile materials in domestic and industrial applications.
- 1.2 Identify different sectors of textile industry.
- 1.3 Name the major textile industries in India.
- 1.4 Basic textile terms – fibre, filament, yarn, thread, and fabric.
- 1.5 Difference between staple yarn and filament yarn.
- 1.6 Classify textile fibres based on source and chemical nature.
- 1.7 Explain the essential properties of textile fibres.
- 1.8 Explain the desirable properties of textile fibres.
- 1.9 Explain the general sequence of operations involved in conversion of fibre to garment.

CO2: Study of Natural Textile Fibres, Man-Made Textile Fibres and Their Production

- 2.1 Define natural textile fibres.
- 2.2 List the natural textile fibres.
- 2.3 Classify the natural textile fibres.
 - 2.3.1 Explain the fibres produced from vegetable sources.

- 2.3.2 Explain the fibres produced from animal sources.
- 2.3.3 Explain the fibres produced from mineral sources.
- 2.4 Cotton.
- 2.4.1 Explain the cultivation, harvesting, and picking of cotton.
- 2.4.2 List the characteristics of cotton fibre.
- 2.4.3 Explain the microscopic structure of cotton.
- 2.4.4 Mention the chemical composition of cotton.
- 2.5 List the natural protein fibres.
- 2.6 Wool fibre.
- 2.6.1 Classification of wool.
- 2.6.2 List the characteristics of wool fibre.
- 2.6.3 List the impurities in raw wool.
- 2.6.4 Describe the physical structure of wool.
- 2.6.5 State the importance of scales in wool fibre.
- 2.6.6 Mention the chemical composition of wool.
- 2.7 Silk.
- 2.7.1 Explain sericulture and the life cycle of silk.
- 2.7.2 Explain different stages in production of raw silk from cocoons.
- 2.7.3 List the characteristics of silk fibre.
- 2.7.4 Mention the chemical composition of silk.
- 2.7.5 Explain the various types of silk threads.
- 2.8 Bast fibres.
- 2.8.1 List the bast fibres.
- 2.8.2 Explain the extraction (retting) process of bast fibres.
- 2.8.3 List the characteristics of jute and flax.
- 2.9 Define man-made fibres.
- 2.10 Classify man-made fibres based on chemical composition.
- 2.11 List the synthetic fibres.
- 2.12 List the regenerated/semi-synthetic fibres.
- 2.13 Define monomer, polymer, polymerization, and degree of polymerization.
- 2.14 Write the monomers used for common textile fibres and their chemical structure.

CO3: Identify the textile fibres using different testing methods.

- 3.1 State the need for fibre identification tests in testing labs.
- 3.2 Name the different methods of fibre identification.
- 3.3 Distinguish the results of various textile fibres through feeling test.
- 3.4 Explain the process of burning test of textile fibres.
- 3.5 Tabulate identification of textile fibres by burning test.
- 3.6 Explain the process of solubility test of textile fibres.
- 3.7 List the solvents used for dissolving textile fibres.
- 3.8 Tabulate various solvents used for different natural and man-made textile fibres.
- 3.9 Explain the different methods of microscopic tests for identification of textile fibres.
- 3.10 Describe the microscopic appearance of various textile fibres.

CO4: Enumerate the stages of manufacturing process of textile fibre to fabric.

- 4.1 Definition of basic terms related to yarn manufacturing/spinning process – fibre, mixing and blending, blow room lap, sliver, roving, and ring spun yarn.
- 4.2 Define spinning.
- 4.3 Explain the material flow in spinning process.
- 4.4 Classification of yarns and its parameters.
 - 4.4.1 Define the terms yarn, sewing thread, and fancy yarns.
 - 4.4.2 Give the classification of yarns based on construction.
 - 4.4.3 Classify the fancy yarns.
 - 4.4.4 Explain the basic requirements of sewing threads.
- 4.5 Mention different methods of fabric manufacture.
- 4.6 State the principles of different methods of fabric formation.
- 4.7 Define basic terms – warp, weft, selvedge, and loom.
- 4.8 State the objects of sizing.
- 4.9 List various ingredients used in sizing of warp.
- 4.10 Define weaving.
- 4.11 Classify weaving machines.
- 4.12 Explain the parts and functions of loom with illustrations.
- 4.13 Explain the passage of warp on a plain power loom.
- 4.14 Explain the method of weave representation on plain paper.
- 4.15 Explain the different types of weaves.
- 4.16 Explain the characteristics of different weaves – plain weave and its variations, twill weave, satin weave, and sateen weave.
- 4.17 Write the applications of plain weave and its variations, twill weave, satin weave, and sateen weave.
- 4.18 Explain the essential properties of fabrics.

CO5: Outline the preparation methods of various stiffening agents, laundry reagents, and bleaching agents.

- 5.1 Explain the various kinds of stiffening agents and their importance.
- 5.2 Explain the preparation of boiling water starch.
- 5.3 Explain the preparation of cold water starch.
- 5.4 Explain the preparation of gum water and tips for starching.
- 5.5 Definition of bleaching agents.
- 5.6 Types of bleaches.
- 5.7 Oxidizing bleaches – sunlight with moisture, air and grass, sodium hypochlorite, sodium perborate, hydrogen peroxide, and potassium permanganate.
- 5.8 Reducing bleaches – sodium hyposulphite.
- 5.9 Definition of blue and types of blues – aniline, indigo, Prussian, and ultramarine.
- 5.10 Test for depth of colour in blueing.
- 5.11 Explain different laundry reagents – washing soda, borax, rock ammonia, oxalic acid, salts of lemon, acetic acid, and vinegar.
- 5.12 Explain different soaps and detergents.
- 5.13 Explain the preparation of soaps and detergents and soapless detergents.

- 6.1 Define dry cleaning.
- 6.2 List grease absorbents and solvents.
- 6.3 General rules to be followed in dry cleaning.
- 6.4 Explain the procedure of dry cleaning with solvents and absorbents.
- 6.5 Explain the advantages and disadvantages of dry cleaning.
- 6.6 Define the terms steeping and rinsing.
- 6.7 Explain the methods of washing and finishing.
- 6.8 Explain the washing and finishing procedure for white cotton sari.
- 6.9 Explain the washing and finishing procedure for coloured cotton sari.
- 6.10 Explain the washing and finishing procedure for coloured dress material.
- 6.11 Explain the washing and finishing procedure for white cotton dress material.
- 6.12 Explain the washing and finishing procedure for synthetic dress material.
- 6.13 Explain the washing and finishing procedure for woollen material.
- 6.14 Explain the washing and finishing procedure for woollen sweater.
- 6.15 Explain the washing and finishing procedure for silk sari with contrast colour border and pallu.
- 6.16 Define ironing, pressing, calendaring, steaming, and mangling.
- 6.17 Explain the process of washing clothes by application of pressure.
- 6.18 Explain the process of washing clothes by kneading and squeezing method.
- 6.19 Explain suction washing method.
- 6.20 Explain washing of clothes by hand friction or rubbing.
- 6.21 Explain washing of clothes by rubbing and scrubbing.
- 6.22 Explain the process of washing and finishing of velveteen.

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QUESTION PAPER PATTERN FOR MID SEMESTER EXAMS

MID-I Examination

S. No	Unit	Questions to be set for MID Exam			
		R	U	A	Remarks
1	UNIT-1	1, 2	5(a) 5(b)	7(a) 7(b)	
2	UNIT-2	3, 4	6(a) 6(b)	8(a) 8(b)	
Total Questions		4	4	4	

MID-II Examination

S.No	Unit	Questions to be set for MID Exam			Remarks
		R	U	A	
1	UNIT-3	1, 2	5(a) 5(b)	7(a) 7(b)	
2	UNIT-4	3, 4	6(a) 6(b)	8(a) 8(b)	
Total Questions		4	4	4	

Semester End Examination

Sl No	Unit No.	Questions to be set for SEE				Remarks
1	I	1	9(a)		13(a)	
2	II					
3	III	2	10(a)		14(a)	
4	IV					
5	V	4	3	5,6	9(b),11(a), 11(b)	13(b), 15(a),15(b)
6	VI			7,8	10(b),12(a),12(b)	14(b),16(a),16(b)
Total Questions		8		8	8	
Legend:	Remembering (R)	1 Mark				
	Understanding (U)	3 Marks				
	Application(A)	5 Marks				

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DIPLOMA EXAMINATIONS (C-26)
MID -I EXAMINATION

HS-103 – TEXTILE, SCIENCE AND FABRIC CARE
Model Question Paper

Duration: 1 Hour

Max. Marks: 20

PART-A

Marks: $4 \times 1 = 4M$

Note:

(i) Answer ALL questions.

(ii) Each question carries ONE mark.

1. What are fibre and filament?
2. Write the major textile industries in India.
3. List the natural textile fibres.
4. Write the impurities of wool.

PART-B

Marks: $2 \times 3 = 6M$

Note:

(i) Answer any TWO questions.

(ii) Each question carries THREE marks.

5. (A) Mention the classification of textile fibres based on source.
(Or)
(B) Write the difference between staple yarn and filament yarn.
6. (A) Describe the physical structure of wool.
(Or)
(B) State the physical characteristics of jute.

PART-C

Marks: $2 \times 5 = 10M$

Note:

(i) Answer any TWO questions.

(ii) Each question carries FIVE marks.

7. (A) Explain the cultivation of cotton.
(Or)
(B) Explain the microscopic structure of cotton.
8. (A) Explain the preparation of bast fibres by extraction (Retting) process.
(Or)
(B) Explain the life cycle of silkworm.

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DIPLOMA EXAMINATIONS (C-26)
MID -II EXAMINATION

HS-103 – TEXTILE, SCIENCE AND FABRIC CARE

Model Question Paper

Duration: 1 Hour

Max. Marks: 20

PART-A

Marks: $4 \times 1 = 4M$

Note:

(i) Answer ALL questions.

(ii) Each question carries ONE mark.

1. Define the terms monomer and polymer.
2. Define the term degree of polymerization.
3. Mention the solvents used for dissolving textile fibres.
4. Write any two microscopic methods of identification of textile fibres.

PART-B

Marks: $2 \times 3 = 6M$

Note:

(i) Answer any TWO questions.

(ii) Each question carries THREE marks.

5. (A) State the differences between semi-synthetic and synthetic fibres.
(Or)
(B) Write the advantages and disadvantages of melt spinning.
6. (A) Write the melting points of different textile fibres.
(Or)
(B) Write the differences between vegetable and animal fibres.

PART-C

Marks: $2 \times 5 = 10M$

Note:

(i) Answer any TWO questions.

(ii) Each question carries FIVE marks.

7. (A) Tabulate monomers and chemicals from which they are extracted.
(Or)
(B) Tabulate spinning methods used for production of different synthetic textile fibres.
8. (A) Describe the microscopic appearance of various textile fibres.
(Or)
(B) Tabulate solvents for different textile fibres.

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DIPLOMA EXAMINATIONS (C-26)
END EXAMINATION

HS-103 – TEXTILE, SCIENCE AND FABRIC CARE

Model Question Paper

Duration: 2 Hour

Max. Marks: 40

PART-A

Marks: $8 \times 1 = 8M$

Note:

(i) Answer ALL questions.

(ii) Each question carries ONE mark.

1. State the factors influencing quality of wool.
2. Define monomer and polymer.
3. Define ginning.
4. Name the different methods of fibre identification.
5. Write the chemical properties of polyester fibre.
6. Mention the end uses of nylon fibre.
7. Write any two applications of jute fibres.
8. Mention the types of yarn packages.

PART-B

Marks: $4 \times 3 = 12M$

Note:

(i) Answer any FOUR questions.

(ii) Each question carries THREE marks.

9. (A) Explain the microscopic structure of cotton using a sketch.
(Or)
(B) Write short notes on physical properties of polyester.
10. (A) Explain the method of producing fibre by melt spinning.
(Or)
(B) Explain the passage of material through an autoconer machine.
11. (A) Explain the physical properties of wool.
(Or)
(B) Write the applications of cotton and nylon.
12. (A) Explain the principal parts and functions of a carding machine.
(Or)
(B) Classify fancy yarns.

PART-C

Marks: $4 \times 5 = 20M$

Note:

(i) Answer any FOUR questions.

(ii) Each question carries FIVE marks.

13. (A) Explain the general sequence of operations involved in conversion of fibre to garment.
(Or)
(B) Explain the pre-spinning and post-spinning processes.
14. (A) Tabulate identification of textile fibres by burning test.
(Or)
(B) Tabulate the fibre formation methods used for various man-made fibres.
15. (A) Explain the physical properties of viscose.
(Or)
(B) Explain the chemical properties of wool.
16. (A) Explain the basic requirements of sewing threads.
(Or)
(B) Explain the passage of material on a ring frame.