



GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Engineering

Level: Diploma

Branch: Textile Processing Technology

Course / Subject Code : DI03028021

Course / Subject Name : Bleaching Technology

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

| | |
|----------------------|--|
| Prerequisite: | The basic objective of pre-treatment processing is removal of added or natural impurities present in textile fibres to improve the absorbency. This prepares the textile substrate for downstream processes like dyeing, printing, finishing etc. This makes it imperative to understand the science of impurity removal and functions of various chemicals and auxiliaries used in pre-treatment. |
| Rationale: | The polytechnic graduates are required to supervise pre-treatment operations of fibre, yarn & fabric and their dyeing & printing processes in industry. They should have basic knowledge and skills to handle pre-treatment processes for different textiles as per the production requirements. This course provides in depth knowledge about purification processes of all type of textiles, chemistry and chemical technology involved in the application of various essential chemicals for pre-treatments. The course also provides the clear concept about the physical & chemical behaviour of various textiles and enables to conduct technological set up for various preparatory processes according to their characteristic & requirements. |

Course Outcome:

After Completion of the Course, Student will able to:

| No | Course Outcomes | RBT Level |
|----|---|-----------|
| 01 | Acquire knowledge on the significance of grey inspection and articulate the processes involved in inspecting and grading fabrics effectively. Insight into the shearing-cropping and singeing processes. | |
| 02 | Ability to outline the preparatory sequences for cotton and viscose rayon, recognizing the specific requirements and processes as well troubleshoot various defects encountered during the pretreatment process of cellulosic textiles effectively. | |
| 03 | Comprehend the objectives and chemical mechanisms involved in the mercerization treatment of textiles. Recognize key parameters affecting the mercerization process and their impact on fibre properties. Gain insight into the optical whitening process and its relevance in improving fabric brightness. | |



GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Engineering

Level: Diploma

Branch: Textile Processing Technology

Course / Subject Code : DI03028021

Course / Subject Name : Bleaching Technology

| | | |
|----|---|--|
| 04 | Describe the specific preparatory sequences involved in processing wool and silk and enable to apply them effectively for processing these fibres and enhance their quality for further textile applications. | |
| 05 | Understand the specific challenges and techniques involved in the pretreatment of synthetic textiles and their blended. Gain insight into the weight reduction process and its relevance in improving feel of polyester fabric. | |

*Revised Bloom's Taxonomy (RBT)

Teaching and Examination Scheme:

| Teaching Scheme (in Hours) | | | Total Credits L+T+ (PR/2) | Assessment Pattern and Marks | | | | Total Marks |
|-------------------------------|---|----|---------------------------------|------------------------------|-------|----------------------|---------|----------------|
| L | T | PR | C | Theory | | Tutorial / Practical | | |
| | | | | ESE (E) | PA(M) | PA(I) | ESE (V) | |
| 3 | 0 | 2 | 4 | 70 | 30 | 20 | 30 | 150 |

Course Content:

| Unit No. | Content | No. of Hours | % of Weightage |
|-------------|--|-----------------|-------------------|
| 1. | 1.1 Introduction and Importance of Pretreatment Processes 1.2 Classification of Impurities 1.3 Grey Inspection and Grading of Textile Fabric 1.3.1 Introduction to Grey Fabric and Common defects in grey fabric 1.3.2 Importance of Grey Inspection 1.3.3 Inspection Methods (4-Point System & 10-Point System) 1.3.4 Grading of Fabric 1.4 Object of Shearing & Cropping Process 1.5 Working Principle of Shearing & Cropping Machine 1.6 Object of Singeing Process 1.7 Working Principle of Gas Singeing Machine | 8 | 20 |
| 2. | 2.1 Introduction to pretreatment of cellulosic textiles 2.2 Preparatory sequences for cotton and viscose rayon 2.3 Desizing Process 2.3.1 Objects & Classification of Desizing Process 2.3.2 Common Sizing materials and their detection (TEGEWA Scale) 2.3.3 Mechanism of enzymatic desizing 2.3.4 Enzymatic desizing of cellulosic textiles 2.3.5 Various defects in desizing process with their remedies 2.4 Scouring Process 2.4.1 Objects & classification of scouring agents | 10 | 20 |



GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Engineering

Level: Diploma

Branch: Textile Processing Technology

Course / Subject Code : DI03028021

Course / Subject Name : Bleaching Technology

| | | | |
|----|---|---|----|
| | 2.4.2 Mechanism of Scouring process 2.4.3 Role of various scouring ingredients 2.4.4 Batch wise, Semi continuous and Continuous processes with recipes and conditions for scouring of cellulosic textiles 2.4.5 Various defects in scouring process with their remedies 2.4.6 Enzymatic scouring process 2.5 Bleaching Process 2.5.1 Objects & classification of bleaching agents 2.5.2 Mechanism of sodium hypochlorite bleaching and hydrogen peroxide bleaching with advantages and disadvantages 2.5.3 Batch wise, Semi continuous and Continuous processes with recipes and conditions for bleaching of cellulosic textiles 2.5.4 Various parameters affecting the efficiency of hydrogen peroxide bleaching 2.5.5 Various defects in bleaching process with their remedies 2.6 Working of Continuous Bleaching Range Machine 2.7 Combined scouring and bleaching of cellulosic textiles 2.8 Scouring and bleaching of yarn dyed fabric | | |
| 3. | 3.1 Introduction to Mercerization Process 3.1.1 Objects and Mechanism of Mercerization Process 3.1.2 Classification of mercerization methods 3.1.3 Various parameters for mercerization process 3.1.4 Mercerizing Machines 3.1.4.1 Chainless Mercerizing Machine 3.1.4.2 Chain Mercerizing Machine 3.1.5 Various defects in mercerization process with their remedies 3.2 Introduction to Optical Whitening Process 3.2.1 Objects and Mechanism of OBA treatment 3.2.2 OBA treatment of cotton and viscose rayon | 9 | 20 |
| 4. | 4.1 Introduction to pretreatment of natural protein textiles 4.2 Preparatory sequences for wool 4.3 Carbonization of wool 4.4 Scouring of wool 4.5 Bleaching of wool 4.6 OBA treatment of wool 4.7 Preparatory sequences for silk 4.8 Degumming of silk 4.8.1 Mechanism of degumming process 4.8.2 Various methods for degumming of silk 4.9 Bleaching of silk 4.10 OBA treatment of silk | 9 | 20 |



GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Engineering

Level: Diploma

Branch: Textile Processing Technology

Course / Subject Code : DI03028021

Course / Subject Name : Bleaching Technology

| | | | |
|--------------|--|-----------|------------|
| 5. | 5.1 Introduction to pretreatment of synthetic textiles 5.2 Preparatory sequences for polyester, nylon, acrylic and blended textiles 5.3 Scouring of polyester, nylon, CDPET, acrylic 5.4 Mechanism of sodium chlorite bleaching with advantages and disadvantages 5.5 Bleaching of polyester, nylon, CDPET, acrylic 5.6 Introduction to Weight Reduction Process 5.6.1 Objects and Mechanism of Weight Reduction Process 5.6.2 Weight reduction of polyester fabric 5.7 Optical Whitening Treatment for polyester, nylon, acrylic and blended textiles 5.8 Desizing, Scouring and Bleaching of P/C and P/V blend fabric 5.9 Pretreatment of Polyester/Wool Blend | 9 | 20 |
| 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 |
| 30 | 30 | 30 | 10 | 0 | 0 |

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

References/Suggested Learning Resources:

Books:

1. Bleaching, Mercerizing & Dyeing of Cotton Material - R. S. Prayag
2. Technology of Bleaching (Vol-III) – Dr. V. A. Shenai
3. Chemical Technology in the pretreatment process of Textiles - S. R. Karmakar
4. An introduction to Textile Bleaching - An introduction to Textile

Open source software and website:

1. www.nptel.iitm.ac.in
2. <https://ndl.iitkgp.ac.in>
3. www.textileschool.com
4. www.textileguide.chemsec.com
5. www.textilelearner.net
6. www.textiletutorials.com
7. www.textilefashionstudy.com



GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Engineering

Level: Diploma

Branch: Textile Processing Technology

Course / Subject Code : DI03028021

Course / Subject Name : Bleaching Technology

Suggested Course Practical List:

1. Desizing of cotton fibre fabric by enzymes.
2. Scouring of cotton fabric.
3. Bleaching of cotton with Sodium hypochlorite.
4. Bleaching of cotton with Hydrogen peroxide.
5. Mercerization of cotton fibre fabric.
6. OBA treatment of cotton fabric.
7. Desizing and scouring of Viscose rayon.
8. Bleaching of viscose rayon fabric with hydrogen Peroxide.
9. Combine bleaching of cotton/viscose rayon fabric.
10. Carbonization of wool fibre.
11. Scouring of wool fibre.
12. Bleaching of wool fibre.
13. Degumming of silk fabrics.
14. Bleaching of silk fabrics.
15. Scouring and bleaching and OBA treatment of polyester.
16. Weight reduction of Polyester fibre fabrics.
17. Scouring and bleaching and OBA treatment of nylon.
18. Scouring and bleaching and OBA treatment of CDPET.
19. Scouring and bleaching and OBA treatment of acrylic.
20. Scouring and bleaching of polyester/cotton blended fabrics.
21. Optical whitening of cotton, viscose, wool/silk and man-made fibre/fabric by Exhaust method (Batch process)
22. Optical whitening of polyester fabrics by pad-dry-cure method (Continuous process)
23. Assessment of absorbency, yellowness & whiteness index.

List of Laboratory/Learning Resources Required:

1. Electric Oven
2. Water Heating Bath
3. Electronic Weighing Balance
4. Suitable Glassware

Suggested Project List:

1. Literature survey of Preparatory Processes for Various Textile Fabrics.
2. Collection and Study of various samples of Preparatory Process for different textile.
3. Visit to textile industries to study impurities and improving quality of cotton, silk, wool & synthetic materials and prepare reports.
4. Group discussion on recent innovation in pretreatment (preparatory) processes.
5. Collection of data of various textiles pretreatment processes & Power point Presentation.
6. Seminar/Quiz/Presentation on recent developments in the field of preparation of textiles.



GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Engineering

Level: Diploma

Branch: Textile Processing Technology

Course / Subject Code : DI03028021

Course / Subject Name : Bleaching Technology

Suggested Activities for Students: If any

1. **Data sheet:** Prepare a data sheet for various combinations of chemicals and their quantities required for various chemical processing of textiles.
2. **Pretreatment:** Collect the data for various pretreatments processes applying industrial survey and internet search.
3. **Scoured sample collection:** Visit Textile Industries / Market shops and collect scoured sample of different types of textiles.
4. **Bleached sample collection:** Visit Textile Industries / Market shops and collect bleached sample of different types of textiles.
5. **Pretreatment machines:** Prepare a short video of different pretreatment machines by visiting industries and arrange as per process sequences.
6. **Green chemicals:** Prepare a report on chemicals currently consumed for pretreatments of textiles in textile chemical processing industries and suggest eco-friendly substitute for them.
7. **Biotechnology:** Compile a report related to scope of biotechnology in pretreatments of textiles.

* * * * *