SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI

Draft Syllabus of Semester V &VI of B.Text. Engg. [NEP-2020]

SEMESTER - V

PROGRAM COURE COURSE (PC) COURSE: FABRIC MANUFACTURING – II

Course Code: 5TX220PC **Course Hours: 3 Th Credits: 3**

Course Description:
This course serves as a core subject of the program. This course introduces the fundamental processes involved in fabric manufacturing by weaving, focusing on the critical steps required to transform yarn into fabric. It emphasizes the techniques, machinery, and materials used in preparing fabric by dobby and jacquard weaving process, ensuring efficiency and quality in fabric production.

Course Outcomes:
By the end of this course, students should be able to demonstrate:
1. Knowledge about the concept of fabric forming by weaving
2. Classification the primary, secondary, and auxiliary motions involved in weaving.
3. Analysis of sley kinematics, weaving resistance, and bumping conditions
4. Knowledge about the dobby shedding principle and it related machinery
5. Knowledge about jacquard shedding principle & its related machinery.
6. Knowledge about the various warp way, weft way and loom faults.

Course Topics

Section 'A'

Unit I: Introduction to Weaving:
- Classification of different fabric forming process viz. weaving, knitting, breading.
- Non woven: - Brief description of all methods & there application.
- Looming: - Working principle of drawing in with respect to plan, twill and satin weave.
- Study of warp tying, leasing, reaching in, warp knotting and drop pinning processes.

Unit II: Basic Weaving Mechanism
- Weaving:- classification of motions,
- Shedding:- Classification of shedding principle, types of shed,
- Head movement, shed geometry , reversing motion
- Brief description about shuttle picking and crank beat up

Unit III: Secondary and Tertiary Weaving Mechanism
- Brief description about warp protection system, weft stop motion and temple.
- Kinematics of sley, weaving resistance, bumping condition.
- Limitation of conventional let-up, take-up system.
- Calculations regarding reed count, average pick, efficiency and production of weaving machine.
- Automatic loom: - limitations of plain loom and brief description about automatic loom, cop changing mechanism, shuttle protector.

Section 'B'

Unit IV: Automatic Loom and Dobby
- Historical review of shuttle changing looms.
- Automatic let-off and positive take up system
- Historical review of about weft mixing by drop box motion.
- Dobby shedding: - objectives, classification, climax cam dobby, positive and rotary dobby,
- Method of pegging, dobby setting during weave change

Unit V: Jacquard Mechanism
- Jacquard shedding:- objectives, classification, principal parts , figuring capacity, harness,
- Working principle of Double lift double cylinder jacquard,
- Open shed jacquard,
- Electronic jacquard, comparison between various electronic jacquards

Unit VI: Fabric Defects
- Fabric defect & value less: - Various fabric grading system and its procedure.
- Fabric defects:- warp and weft defects with causes and remedies,
- Various loom faults with respect to their causes and remedies,
- Various dobby & jacquard related machines and fabric faults with their causes and remedies.

TEXT BOOKS AND REFERENCES:

1. *Weaving Machine, Mechanism Management By D. B. Ajagaonkar And M. K. Talukdar*, Published by Mahajan publisher private Ltd.

- **Relevance:** This book covers various motion and mechanisms essential for efficient weaving. The detailed content makes it a valuable reference for students, educators, and professionals in the textile industry, which is crucial for understanding Units 1, 2, 3, 4, 5 and 6 of your syllabus.

2. ***Weaving Calculations, By R. Sengupta,* Published by D. B. Taraporevala Sons and Company, spanning, 1961.**
- **Relevance:** This book is a comprehensive resource that deals into the mathematical aspects of weaving, providing essential formulas and methodologies, The book covers various topics, including yarn count, twist per inch, winding, warping, sizing, and weaving calculations, making it pertinent to Unit 3.

3. ***Textile Mathematics (Vol-3)', By J. E. Booth*, Published by the Textile Institute in 1977.**
- **Relevance:** This book is a comprehensive resource that delves into the mathematical principles applied in textile production. making it pertinent to Unit 3.

4. ***Weaving Technology And Operations, By Allan Armored And Walter S Sondhel,* Published by The Textile Institute in 1995.**
- **Relevance:** This book is a comprehensive resource that delves into the intricacies of weaving technology and its practical applications; book covers a wide range of topics, including: Winding, Warping, Sizing, Weaving Machines, Automation in Weaving, Quality Control. These subjects are crucial for understanding the complete process of fabric production, from yarn preparation to the final woven product, making it relevant for Units 1, 2, 3, 4, 5 and 6.

5. ***Principle of Weaving, By R. Marks and A.T.C. Robinson.* Published by the Textile Institute in 1986**
- **Relevance:** This book provides comprehensive information about the weaving and It covers the core mechanics of looms including shedding, picking, beat-up, cloth formation, and control systems which are foundational topics for weaving technology, which is crucial for understanding Units 1, 2, and 3 of your syllabus.

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Course: ADVANCE YARN MANUFACTURING TECHNOLOGY

Course Code: 5TX221PC Course Hours: 3 Th Credits: 3

Course Description:

This course serves as a core subject of the program. This course focuses on fundamental concepts related to advance yarn manufacturing processes. Through a series of lectures, students will be briefly introduced to key terms, principles, and processes involved in yarn production.

Course Outcomes:

By the end of this course, students should be able to:

1. Illustrate the process concepts, constructional details, and operational principles of rotor spinning and friction spinning machines.
2. Demonstrate the constructional features and working principles air jet and air vortex machines.
3. Explain the principles, machine components, and operational sequence of siro spinning and wrap spinning.
4. Describe the construction, functions, and process flow of self twist and twistless spinning.
5. Demonstrate the working principles and technical features of core spinning technology.
6. Evaluate key process parameters related to rotor, friction and air jet spinning to assess their influence on fibre behavior and yarn quality.

COURSE TOPICS:

Section 'A'

Unit I: Rotor Spinning
- Introduction, open end spinning principle, sequence of operations,
- Advantages and limitation of ring and rotor spinning
- Construction details of rotor spinning machines
- Process parameters influencing yarn quality
- Properties of rotor yarn, details of yarn structure
- Applications of rotor yarn, comparison of properties of rotor and ring yarn

Unit II: Friction Spinning
- Introduction, principle of friction spinning, sequence of operation
- Construction details of friction spinning machines-dref-I, dref-II, dref-III, dref-2000 and dref-3000.
- Advantages and limitations of friction spinning
- Process parameters influencing yarn quality
- Details of yarn structure, properties and application of friction yarn
- Developments in friction spinning

Unit III: Air Jet & Air Vortex Spinning
- Air jet spinning: Introduction, principle of air jet spinning,
- Construction details of air jet spinning machines,
- Details of yarn structure, properties and applications of air jet yarn
- Air vortex spinning- Introduction, principle of air vortex spinning,
- Construction details of air vortex spinning machine,

- Details of yarn structure, properties and application of air vortex yarn.

Section 'B'

Unit-IV: Siro & Wrap Spinning

- Siro Spinning: Introduction, principle and importance of siro spinning,
- working and construction details of siro spinning machine,
- Details of yarn structure, properties and applications of siro yarn,
- Wrap spinning: Introduction, principle of wrap spinning,
- Construction details of wrap spinning machine,
- Details of yarn structure, properties and applications of wrap yarn.

Unit-V: Selt Twist & Twistless spinning

- Self-twist spinning: Introduction, principle of self-twist spinning
- Yarn formation mechanism, concept and importance of phase shifting,
- Structure, properties and applications of self twist yarn.
- Twistless spinning- Introduction, principle of twistless spinning,
- Different techniques of twistless spinning
- Yarn structure, properties and applications of twistless yarn

Unit-VI: Core & Electrostatic Spinning

- Core spinning: Introduction, concept of core yarn spinning
- Different techniques of core yarn manufacturing
- Structure, properties and application of core spun yarn
- Electrostatic spinning: Introduction, principle of electrostatic spinning
- Yarn structure, properties and application of electro-static yarn
- Limitations of electrostatic spinning

Text Books & Reference Books :

1. **Klein W, Manual of New Spinning System Vol. I – III, The Textile Institute, UK, 1987.**
    - **Relevance:** This book provides comprehensive information on new spinning process including rotor spinning, friction spinning and air jet spinning, which are crucial for understanding Units 1 to 3 of your syllabus.
2. **Oxtoby E, Spun Yarn Technology, by Butterworth and Co. Ltd. publication, 1987**.
    - **Relevance:** This book covers various spinning process such as new spinning system which relates to Unit 1, 2 and Unit 3.
3. **Lord P R, Handbook of Yarn Production the Textile Institute, Woodhead Publication Limited.**
    - **Relevance:** This book offers detailed information on various advance yarn production methods, including rotor spinning, friction spinning and air jet spinning which relates to unit 1, 2 and 3.
4. **R V Gowda, New Spinning System, NCUTE Publication Limited.**
    - **Relevance:** This book offers detailed information on various advance yarn production methods, including rotor spinning, friction spinning and air jet spinning which relates to unit 1, 2,3,4,5 and 6.
5. **Carl A. Lawrence, Spun Yarn Technology. CRC Press.**
    - **Relevance:** This book covers various spinning process such as new spinning system which relates to Unit 1, 2,3,4,5 and 6.

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COURSE: CHEMICAL PROCESSING – I

Course Code: 5TX222PC Course Hours: 3 Th Credits: 3

Course Description:

Chemical Processing-I explores the fundamental principles of textile wet processing with special emphasis on preparatory processes and dyeing of textile materials. The course covers the sequence of wet processing for cotton, desizing, scouring, bleaching, mercerization, and their evaluation methods. It also introduces dye classification, dyeing mechanisms, dyeing machinery, and application of dyes on cellulosic, protein, synthetic, and blended fibres, providing a strong foundation for textile chemical processing.

Course Outcomes:

Upon successful completion of the course, students will be able to:

1. Recall the complete sequence of textile wet processing.
2. Discuss preparatory processes required for dyeing.
3. Explain different classes of dyes and their applications.
4. Understand the principles and working of various dyeing machines.
5. Identify suitable dyes for cellulosic fibres.
6. Identify suitable dyes for synthetic and protein fibres.

COURSE TOPICS:

SECTION 'A'

Unit-I: **Sequence of wet processing for cotton material:**

- Grey inspection, shearing, cropping, singeing and different singeing methods.
- Desizing- Object, chemistry and technology of different desizing process (Acid, enzymatic, oxidative, novel methods)
- Batch and continuous methods of desizing.

Unit-II: **Scouring**

- Object, chemistry of scouring (saponification, emulsification, detergency, surface tension),
- Technology of scouring (caustic boiling, soap soda ash process for colour goods),
- Bio-scouring batch and continuous scouring process.
- Introduction to Silk degumming, Wool scouring.
- Bleaching- Objective, Chemistry and technology of Hypochlorite, peroxide & chlorite bleaching.
- Preparation process for synthetic and blended fabric in brief, batch and continuous process.

Unit-III: **Mercerization**

- Chemistry and technology (Chainless, Padless, Pad chain)
- Physical chemical effect of mercerization.
- Evaluation of Desizing, scouring (Copper number method, methylene blue absorption method)
- Bleaching and mercerization performance (test methods).

SECTION 'B'

Unit-IV: **Dyeing**

- Define dye, classification of dyes based on method of application
- Chemical constitution and different term used in dyeing.
- Dyeing machines – Principal and working of different dyeing machines for fibre, yarn and fabrics.
- Latest Technological features of different dyeing machines.

Unit-V: **Dyeing of cellulosic fibres**

- Direct dye, Reactive dye, Vat dye, Azoic dye and Sulphur dye.
- Effect of Process parameters on dyeing performance.
- Various dyeing faults their causes and remedies.

UNIT-VI: **Dyeing of Protein and Synthetic fibres**

- Acid, Basic, Mordant and Disperse dyes.
- Dyeing of blend like polyester-cotton, polyester-viscose and polyester-wool.
- Effect of process and material parameter on dye performances
- various dyeing faults their causes and remedies

TEXT BOOKS AND REFERENCES:

1. **E. R. Trotman, Textile Scouring and Bleaching**.
   Relevance: Comprehensive coverage of preparatory processes and bleaching chemistry.
2. **V. A. Shenai, Technology of Bleaching and Mercerising**.
   Relevance: Detailed explanation of bleaching and mercerization processes.
3. **J. T. Marsh, Mercerization.**
   Relevance: In-depth treatment of mercerization principles and effects.
4. **V. A. Shenai, Technology of Textile Processing, Vol. II.**
   Relevance: Covers preparatory processes and dyeing technologies.
5. **V. A. Shenai**, **Chemistry of Dyes and Principles of Dyeing.**
   Relevance: Explains dye chemistry and dye–fibre interactions.
6. **V. A. Shenai, Technology of Dyeing.**
   Relevance: Provides practical and theoretical knowledge of dyeing methods.
7. **E. R. Trotman, Dyeing and Chemical Technology of Textile Fibres.**
   Relevance: Standard reference for dyeing of different textile fibres.
8. **K. V. Datye and A. A. Vaidya, Chemical Processing of Synthetic Fibres and Blends.**
   Relevance: Focuses on dyeing and processing of synthetic and blended textiles.
9. **Asim Kumar Roychowdhury, Textile Preparation and Dyeing**.
   Relevance: Covers preparation and dyeing techniques with industrial relevance.

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COURSE NAME: APPAREL MANUFACTURING

Course code: 5TX223PE Contact Hrs: 3 (TH) Credits:-3

Course Description:

This course imparts comprehensive knowledge of the global and Indian apparel manufacturing industry. To develop understanding of industrial garment production processes from design to dispatch. To familiarize students with modern machinery, production systems, CAD–CAM, and automation used in apparel manufacturing. To introduce quality control,

finishing, inspection, and compliance standards followed in the apparel industry. To enable students to analyze production planning, efficiency and sustainable.

Course Outcomes: After successful completion of the course, students will be able to:

1. Explain the structure, size, and functioning of the global and Indian apparel industry.
2. Apply knowledge of pattern making, sizing systems, and body measurements in industrial garment production.
3. Describe and analyze cutting, sewing, and fusing technologies used in apparel manufacturing.
4. Explain finishing, pressing, inspection, and quality assurance systems in garments.
5. Evaluate different industrial production systems and workflow layouts.
6. Analyze the application of CAD–CAM, automation, sustainability, and Industry 4.0 concepts in apparel manufacturing.

Unit I: Apparel Industry Overview and Manufacturing Process :

- Global and Indian apparel industry: size, growth, employment potential and contribution to economy, Structure of apparel industry: export houses, domestic manufacturers, MSMEs, buying houses and retailers,
- Types of apparel products: men's wear, women's wear, children's wear, work wear and fashion wear,
- Apparel market segments: domestic and export markets, Overview of export–import procedures in apparel industry,
- Industrial garment manufacturing process: design, pattern making, cutting, sewing, finishing, inspection and packing
- Factory organization, departments and workflow.

Unit II: Pattern Making, Sizing and Figure Analysis:

- Importance of pattern making in apparel manufacturing.
- Body measurement methods and tools.
- Standard sizing systems and size charts (national and international),
- Pattern making methods:- Drafting method, Flat pattern method,
- Industrial block method,
- Figure analysis: body types, proportions, posture variations.

Unit III: Fabric Preparation, Cutting and Sewing :

- Technology Fabric inspection and preparation for garment manufacturing,
- Fabric spreading: methods, equipment and lay planning,
- Marker planning: objectives, types and marker efficiency,
- Manual and computerized marker making,
- Cutting process:- Types of fabric packages, Types and functions of cutting machines, Sewing preparation: workflow, work aids and attachments, types of sewing machines and feed mechanisms.

Unit IV: Sewing Threads, Seams, Fusing and Pressing :

- Sewing threads: properties, types and ticket numbering system**,**
- Thread performance and selection criteria,
- classification of stitches and seams (ISO/ASTM), Seam performance and sewing defects Fusing:-Importance and applications,
- Types of interlinings- Fusing process and parameters, Fusing machines and quality control, Pressing: importance, types and pressing equipment.

Unit V: Garment Finishing, Accessories and Quality Control:

- Garment components and accessories: buttons, zippers, hooks, labels, trims and ornamental materials**,** Garment finishing processes**.**
- Garment washing and cleaning (basic overview)
- Types of garment inspection:- In-process inspection**.**
- End-line inspection**.** Final inspection.
- Quality standards and specifications**.**
- AQL concept and quality documentation

Unit VI: Production Systems, CAD–CAM and Sustainable Manufacturing :

- Industrial garment production systems:-Make-through system .
- Section system, Progressive bundle system, Straight line system, Unit production system , Modular and quick response systems,
- Material handling and warehousing: storage, packing and dispatch,
- Application of CAD in apparel manufacturing: pattern making, grading and marker making,
- Application of CAM and automation in garment production. Lean manufacturing and sustainable apparel practices.
- Overview of Industry 4.0 in garment manufacturing.

Text Books and References:

1. Patternmaking for Fashion Design" by Helen Joseph-Armstrong
Relevance: This book provides an in-depth understanding of patternmaking techniques and various methods of block construction, body analysis, and pattern manipulations. It's an essential resource for both beginners and advanced learners in pattern designing. Related to unit 1, 2

2. The Art of Fashion Draping" by Connie Amaden-Crawford
Relevance: This book complements the patternmaking process with insights into draping and the creation of garments, providing both theoretical and practical perspectives for students. Related to unit, 2

3. Patternmaking for Fashion Design" by Valerie C. Bates
Relevance: This book explores different patternmaking methods, including the metric pattern method and industrial block method, and offers practical exercises on block preparation, drafting, and pattern alterations. Related to unit 2, 3

4. Introduction to Clothing Production Management" by C. S. V. Murthy
Relevance: This book discusses the overall structure of the apparel industry, its size, product types, and technological advancements in garment manufacturing. It ties into the syllabus content related to the apparel industry scenario and garment manufacturing processes. related to unit 1, 3

5. Computer-Aided Fashion Design" by M. S. Deshmukh
Relevance: This book addresses the role of CAD-CAM systems in modern garment manufacturing and provides practical insights into the use of these technologies, aligning with the syllabus outcome related to analyzing production systems and technology in garment production. Related to unit.

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PROFESSIONAL ELECTIVE – I (PEC-I) COURSE: HIGH PERFORMANCE FIBRES

Course Code: 5TX223PE Course Hours: 3 Th Credits: 3

Course Description:
This course serves as a professional elective subject of the program. This course provides a comprehensive overview of high-performance fibres, high- tech fibres, carbon and glass fibres, high function fibres, specialty fibres, and thermally resistant fibres

Course Outcomes:
After completion of this course the students will be able to:

1. Understand the high-performance fibers
2. Analyse structure–property relationships of aramid fibres.
3. Evaluate properties and applications of carbon fibres
4. Explain applications of fibres in sportswear, marine, and intelligent textiles
5. Describe innovative fibres such as perfumed, bacterial, and electronic fibres
6. Understand fundamentals of thermally resistant fibre systems

Course Topics

SECTION 'A'

Unit I: Introduction to high performance fibres:
- High-tech fibres, natural versus synthetic fibre,
- Artificial fibre by bio-mimetics,
- Fibre characteristics and shapes
- High performance fibres and textiles and their applications.

Unit II: Aramids & Gel-spun high-performance polyethylene fibres:
- Aramids- Introduction, polymer preparation, spinning of aramids,
- structure and properties of aramid fibres, applications of aramid fibres;
- Gel-spun high-performance polyethylene fibres-
- Introduction, manufacturing of Gel-spun high-performance polyethylene fibres, its properties and applications.

Unit III: Carbon Fibres Glass fibres:
- Carbon Fibres- Introduction, PAN-based and pitch-based carbon fibre,
- Properties and applications of carbon fibres. Glass fibres-
- Introduction, raw material, manufacturing, fibre finishes,
- Properties and applications.

SECTION 'B'

Unit IV: High function fibres
- High function fibres- Introduction, sportswear using the high function fibre,
- Fibres in ocean, biomimetic and intelligent fibres,
- Introduction to chlorinated and fluorinated fibres.
- Super fibres.

Unit V: Specialty fibres

- Specialty fibres- Introduction, fibres for health,
- Dietary fibre – in health and disease
- Fibres produced by bacteria, fibres for space,
- Perfumed fibres, Electronics and fibres.

Unit VI: Thermally resistant fibres

- Thermally resistant fibres- Introduction, thermosets,
- Aromatic polyamides and poly-aramids,
- Polybenzimidazole (PBI),
- Poly-benzoxazoles (PBO).

TEXT BOOKS AND REFERENCES:

1. ***High Performance Fibres, By J. W. S. Hearl.*** **Published by Woodhead Publishing Ltd.,**

- **Relevance:** This book is a comprehensive resource and provide in-depth coverage of the design, manufacture, properties, and specialized applications of a critical class of advanced materials, which is crucial for understanding Units 1, 2, 3, 4, 5 and 6 of your syllabus.

2. ***New millennium fibers, by Tatsuya Hongu, Glyn O. Phillips and MachikoTakigami*** **Published by Woodhead Publishing Ltd.**

- **Relevance:** This book is a comprehensive resource that deals and identifies the scope of high-tech fibers. The present status and prospects of the fiber/textile technology are discussed and the high performance fibers are reviewed from origin to future applications, including carbon fiber. The book covers various topics, including new advance developed fibre, making it pertinent to Unit 2, 3, and 4.

3. ***New Fibres, by Tatsuya Hongu, Glyn O. Phillips,*** **Published by Woodhead Publishing Ltd.,**

- **Relevance:** This book is a comprehensive resource that It examines many new high-performance, application-specific synthetic fibers recently introduced. Included are details of chemistry, research and development, properties and performance, processing, and specific industrial, consumer and medical applications. which is crucial for understanding Units 1, 2, 3, 4 & 6

4. ***Handbook of Textile Fibre Structure, Volume 1: Fundamentals and Manufactured Polymer Fibres, by S Eichhorn, J. W. S. Hearle, M Jaffe and T Kikutani,*** **Woodhead Publishing Ltd.,**

- **Relevance:** This book is highly relevant as a foundational textbook and reference for understanding the complex internal organization (crystalline/amorphous regions, polymer chains, tie molecules) of manufactured polymer fibres, crucial for textile science, engineering, and materials development, making it relevant for Units 4, 5 and 6.

5. ***Handbook of Textile Fibre Structure, Volume 2: Natural, Regenerated, Inorganic and Specialist Fibres, by S Eichhorn, J. W. S. Hearle, M Jaffe and T Kikutani,*** **Woodhead Publishing Ltd.**

- **Relevance:** This book provides to textile technologists, fibre scientists, and engineers, offering a comprehensive review of natural (cotton, wool, silk), regenerated (cellulosic, chitin), inorganic (glass, carbon), and specialist fibres, detailing their structure-property relationships to explain mechanical performance, making it an essential reference for understanding diverse textile materials and making it relevant for Units 4, 5 and 6.

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COURSE NAME: GARMENT MANUFACTURING TECHNOLOGY

Course code: 5TX227MD Contact Hrs: 2 (TH) Credits:-2

Course Description:

This course introduces students to the technical foundations of garment manufacturing and pattern designing. Emphasizing hands-on learning, it covers fabric identification, body measurement techniques, pattern drafting, basic garment construction, surface ornamentation, and sustainable production practices. It is designed to impart vocational skills and a practical understanding of the apparel production process.

Course Outcomes:

After successful completion of this course, students will be able to:

1. Identify various types of fabrics, trims, and their construction relevance.
2. Understand Quality standards in garment manufacturing.
3. Understand Apparel assembly line and operation sequencing.

UNIT-I: Introduction to Garment Construction

- Overview of garment assembly process from pattern to finished garment
- Preparation → Spreading → Cutting → Sewing → Finishing & Inspection
- Introduction to garment construction terminology: seams, stitches, hems, facings, plackets,
- Allowances, notches, grain line, etc. Classification of sewing operations in garment production.

UNIT-II: Advanced Garment Construction & Quality

- Quality standards in garment manufacturing (workmanship standards).
- Common garment defects and corrective measures.
- Introduction to industrial sewing machines & attachments: hemmers, binders, buttonholers, over lock.

UNIT-III: Industrial Applications and Production Practice.

- Apparel assembly line concept and operation sequencing.
- Introduction to industrial sewing production efficiency, ergonomics, and workstation layout.
- Introduction to garment costing basics (time, labor, operations).

TEXT BOOKS AND REFERENCES:

1. **Patternmaking for Fashion Design" by Helen Joseph-Armstrong**

Relevance: This book provides an in-depth understanding of patternmaking techniques and various methods of block construction, body analysis, and pattern manipulations. It's an essential resource for both beginners and advanced learners in pattern designing. related to unit 1,2

2. The Art of Fashion Draping" by Connie Amaden-Crawford

Relevance: This book complements the patternmaking process with insights into draping and the creation of garments, providing both theoretical and practical perspectives for students. Related to unit,2

3. Patternmaking for Fashion Design" by Valerie C. Bates

Relevance: This book explores different patternmaking methods, including the metric pattern method and industrial block method, and offers practical exercises on block preparation, drafting, and pattern alterations. Related to unit,2,3

4. Introduction to Clothing Production Management" by C. S. V. Murthy

Relevance: This book discusses the overall structure of the apparel industry, its size, product types, and technological advancements in garment manufacturing. It ties into the syllabus content related to the apparel industry scenario and garment manufacturing processes. related to unit 1,3

5. Computer-Aided Fashion Design" by M. S. Deshmukh

Relevance: This book addresses the role of CAD-CAM systems in modern garment manufacturing and provides practical insights into the use of these technologies, aligning with the syllabus outcome related to analyzing production systems and technology in garment production. Related to unit.

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COURSE: MDM – IV (APPAREL MERCHANDISING AND MANAGEMENT)

Course Code: 5TX228MD Course Hours: 2 Th Credits:2

Course Description:
This course serves as a Multidisciplinary Minor -IV. This course introduces the Organization of the apparel business and marketing, merchandising, sourcing and focusing on the process of Documentation during export and import.

Course Outcomes:
By the end of this course, students should be able to:
1) Understand the concept of apparel industry and summarise the responsibilities, objectives and strategies for marketing.
2) Understand the role and responsibilities of apparel merchandising.
3) Distinguish the various sourcing systems used in apparel business and Demonstrate procedures, types and documentation related to export business.

Course Topics:

Unit I: Introduction to Apparel industry
- Introduction to organization of apparel business,
- Structure of apparel industry,
- Basic business concepts,
- International trades,
- Introduction to Marketing and its objectives and strategies,
- Responsibilities of a marketing division,
- Types of markets.

Unit II: Introduction to Apparel Merchandising and Management
- Definitions of merchandising,
- Functions of merchandising division,
- Role and responsibilities of merchandise,
- Different types of communications with the buyers,
- Awareness of current market trends.

Unit III: Introduction to sourcing and Documentation process
- Need for sourcing,
- process of sourcing,
- Manufacturing resource planning principles of MRP,
- Overseas sourcing, sourcing strategies,
- Risk of overseas sourcing.
- Introduction to Documentation,

- Various types of export and import documents,
- Pre and post- shipment documentation,
- Terms of payment and shipment

TEXT BOOKS AND REFERENCES:

1. ***Management of Textile Industry By Dr. V. D. Dudeja,*** **Published by Textile Trade Press (Bombay/Ahmedabad) in 1981.**

Relevance: This book is frequently prescribed as a textbook in textile engineering programs which directly relates with unit 1 and unit 2.

2. ***Export Planning and Promotion-II By D. Sinha,*** **Published by IIM/IIMS (Indian Institute of Management / Indian Institute of Management, Calcutta) in 1989**

Relevance: The book is widely referenced in Indian university courses on export marketing, international trade, export documentation, and export strategy which directly relates with unit 1 and unit 3.

3. ***Import-Export Finance By Tunin K Nandi,*** **Published by Indian Institute of Management / IIMS Calcutta, 1989.**

Relevance: This book is widely referenced in undergraduate and vocational syllabi related to Fashion and Textile Engineering. The book explains the fundamental principles of marketing and apparel merchnadising Management and various strategies of merchandising which directly relates with unit 2.

4. ***In side the Fashion Business, By J. A. Jamow, M. Guerreiro, B. Judelle,*** **Published by Macmillan Publishing (New York) (4th Edition) in 1987.**

Relevance: This book Inside the Fashion Business is a standard textbook/reference work on the fashion industry, widely used in academic fashion, textile, business, merchandising and marketing courses which directly relates with unit 1 and unit 2.

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COURSE NAME: FASHION MANAGEMENT AND MARKETING

Course code: 5TX230 OE-I (i) Contact Hrs: 2 (TH) Credits:-2

Course Description:

This course introduces the foundational principles of fashion management and marketing. Students will explore the organizational structure of the fashion industry, consumer behavior, marketing strategies, branding, retailing and current trends including sustainability and digital innovations. The course provides insights into how fashion products are planned, positioned, and promoted, with an emphasis on critical thinking and awareness of contemporary challenges in the global fashion market.

Course Outcomes:

After successful completion of the course, students will be able to:

1. Explain the structure and operations of the fashion industry and its supply chain.
2. Apply marketing and branding principles within the context of fashion.
3. Analyze market trends and consumer behavior in the fashion sector.
4. Understand retail formats and merchandising strategies used in the industry.
5. Evaluate the impact of sustainability and digital technology on fashion businesses.
6. Explore opportunities and challenges in fashion entrepreneurship.

UNIT-I: **Fashion Industry & Market Structure**:

- Overview of Fashion Industry-Definition, scope & importance,
- Structure of the fashion business: primary, secondary and retail levels Fashion value chain from design to retail
- Industry Roles -Role of designers, merchandisers, manufacturers, retailers and support services,
- Interrelationships in fashion business. Domestic & Global Markets-Indian fashion market overview,
- International fashion markets and influence on Indian industry

UNIT: II **Marketing Principles for Fashion**

- Basics of Marketing-Meaning and scope of marketing in fashion,
- Fashion marketing terminology (e.g., market, target customers).
- Marketing Mix (4Ps)-Product: product decisions, classifications, Price: pricing strategies and policies. Place: distribution decisions, Promotion: advertising, sales promotion, personal selling,
- Consumer Segmentation & Trend Forecasting.
- Market segmentation, targeting and positioning, Basics of trend analysis and forecasting for fashion products.

UNIT-III: **Branding & Communication in Fashion**

- Fashion Branding-Brand identity: logo, name, visual identity.
- Brand equity and brand image: definition and significance.
- Brand Communication Tools, Advertising (print, digital), public relations,sales promotion, Fashion shows, events and exhibitions.
- Modern Communication Strategies,
- Influencer marketing and social media,
- Integrated promotion planning for fashion brands.

Text Books and References:

1. Fashion Marketing by Mike Easey
   Relevance: Useful for understanding the fundamentals of marketing strategies tailored to fashion and consumer behavior.
2. Fashion Management: A Strategic Approach by Rosemary Varley
   Relevance: Explains strategic planning, industry structures, and business models in fashion with a focus on entrepreneurship.
3. Visual Merchandising and Display by Martin M. Pegler
   Relevance: Supports understanding of in-store presentation, consumer interaction, and retail planning.
4. Sustainable Fashion and Textiles by Kate Fletcher
   Relevance: An essential text for learning about sustainability, ethical practices, and the environmental impact of fashion.
5. The End of Fashion by Teri Agins
   Relevance: Provides an industry-insider perspective on how branding and marketing overtook design in defining fashion success.
6. Digital Marketing for Fashion Brands by Clare Harris
   Relevance:
7. Explores how fashion brands are navigating digital channels, influencer marketing, and content creation.

Open Elective –III (OE-III) Course: TEXTILE REINFORCEMENT FOR COMPOSITES

Course Code: 5TX230OE 2 Course Hours: 2 Th. Credits: 2

Course Description:

This course serves as an open elective subject of the program. This course provides a comprehensive introduction to the fundamentals of composite materials, focusing on the essential roles of reinforcement forms, fibers, and matrix materials

Course Outcomes:
After completion of this course the students will be able to:

1. Understand the reinforcement forms
2. Understand the role of fibres in composites.
3. Understand the fibre reinforced composites and Structural composites

Course Topics

Unit I: Reinforcement forms:
- Reinforcement forms: roving, tows, yarns, chopped fibers.
- Nonwovens, other textile structures suitable for composites.
- Introduction to composite materials.
- Classification. Matrix-fibre synergy.

Unit II: Role of Fibres in composites
- Role of Fibres in composites, load transfer, anisotropy, failure modes,
- Fiber-matrix interface: adhesion mechanisms (mechanical, chemical, physical)
- Types of fibres used in Composites, Natural and Manufactured fibres.
- Glass fibres, Carbon fibres.

Unit III: Definition of composites
- Definition of composites, Polymer composites.
- Fibre reinforced composites and Structural composites.
- Materials for composites, Matrix and Reinforcements, matrix materials - polymers, metals and ceramics.
- Hybrid fibers and hybrid architectures, Effect of architecture on mechanical properties and failure modes.

TEXT BOOKS AND REFERENCES:

1. ***Composite materials: Science and engineering by Chawla, K. K.*** **Published by Springer (2012).**
- **Relevance:** This book is a comprehensive resource and provide in-depth coverage of the New material on the advances in non-conventional composites (which covers polymer, metal and ceramic matrix nanocomposites), self-reinforced composites, bio-composites and laminates made of metals and polymer matrix composites is included and for unit no. 1 and 2.

2. ***Structure and properties of high-performance fibers by Bhat, G.*** **Published by.. Woodhead Publishing (2016).**

- **Relevance:** This book is a comprehensive resource that deals and identifies the scope of high-tech fibers. The present status and prospects of the fiber/textile technology are discussed and the high performance fibers are reviewed from origin to future applications, including carbon fiber. The book covers various topics, including new advance developed fibre, making it pertinent to Unit 1 and 2.

3. ***Fiber-reinforced composites: Materials, manufacturing, and design by Mallick, P. K.*** **Published by CRC Press (3rd Ed.) (2007).**

Relevance: This book is a comprehensive resource that It examines many new high-performance, application-specific synthetic fibers recently introduced. Included are details of chemistry, research and development, properties and

performance, processing, and specific industrial, consumer and medical applications, which is crucial for understanding Units 3.

4. ***Composites manufacturing: Materials, product, and process engineering by Mazumdar, S.*** **Published by CRC Press (2001).**

Relevance: This book is highly relevant as a foundational textbook and reference for understanding the material required for manufacturing of product by using the suitable composite manufacturing process, which is crucial for understanding Unit 3.

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SEMESTER - VI

COURSE: PROCESS CONTROL IN TEXTILE MANUFACTURING

Course Code: 6TX231PC Course Hours: 3 Th Credits: 3

Course Description:

This course is a core component of the program and focuses on the principles and applications of process control in textile manufacturing. It introduces fundamental concepts related to monitoring, analysis, and control of textile production processes. Through lectures and illustrative examples, students are familiarized with key terminology, control techniques, and methodologies used to achieve consistent quality, improved productivity, and process optimization in textile industries.

Course Outcomes:

After completion of this course, students will be able to:

1. Describe the fundamentals, objectives, and importance of process control in textile manufacturing, including yarn realization and raw material evaluation.
2. Analyze process parameters and control techniques in blow room, carding, combing, drawing, and speed frame operations to improve productivity and yarn quality.
3. Evaluate the effects of machine settings and process variables in ring spinning on yarn properties such as evenness, strength, hairiness, and imperfections.
4. Apply process control methods in winding and warping operations to control package quality, yarn clearing efficiency, beam quality, and production performance.
5. Analyze and optimize sizing and weaving processes with respect to weavability, loom efficiency, fabric quality, defect control, and waste reduction.
6. Explain maintenance management systems in textile industries, including planned maintenance, machine audit, and ISO-based quality and maintenance practices.

COURSE TOPICS:

Section 'A'

Unit–I:

- Introduction to process control in textile manufacturing
- Objectives, scope, and importance.
- Raw material cost and instrumental evaluation of fibre characteristics.
- Yarn realization: concept, estimation, influencing factors, and industrial analysis.
- Process control in blow room-productivity, quality, waste, cleaning efficiency.
- Process control in carding- productivity, quality, waste, cleaning efficiency, neps.

Unit–II:

- Introduction to process control in comber preparatory and combing
- Process parameters, control of productivity, efficiency, sliver quality and noil%.
- Introduction to process control in drawing, drafting irregularities,
- Control of productivity, efficiency, waste, sliver quality, drawing performance
- Process control in speed frame: control of roving quality, roving stretch
- Control of productivity, efficiency and waste.

Unit–III:

- Process control in ring spinning: control of productivity, yarn quality and waste.
- Influence of machine and process parameters on yarn properties.
- Control of yarn irregularities & unevenness.
- Control of count & strength variation.
- Control of yarn hairiness & yarn faults.
- Control of end breakages & package faults.

SECTION 'B'

Unit–IV

- Control of productivity, quality and waste in winding operations.
- Control and evaluation of splice quality, yarn clearing efficiency.
- Assessment of clearing performance.
- Control of unwinding and winding tension, package density and package build.
- Process control in warping-beam formation, beam quality, process parameters.
- Control of end breakages, productivity, efficiency and monitoring of performance.

Unit–V

- Objectives, selection of sizing ingredients and size paste.
- Control of size pickup, size add-on, yarn stretch and moisture content,
- Characteristics of sized beams and optimization of weavability.
- Control of productivity and waste in sizing operation.
- Process control in weaving-objectives, control of loom speed and fabric quality.
- Control of productivity, efficiency, waste and fabric defects.

Unit–VI

- Maintenance management in textile industry: objectives and importance.
- Basic concepts of maintenance management, planning and scheduling.
- Types of maintenance- planned, preventive, predictive, and breakdown
- Mechanism and implementation of planned maintenance systems.
- Machine audit and breakdown analysis.
- Introduction to ISO-based maintenance & quality management systems.

TEXT BOOKS & REFERENCE BOOKS:

1. **Abhijit Majumdar, Apurba Das , R. Alagirusamy, V. K. Kothari, Process Control in Textile Manufacturing, Woodhead Publishing Series.**

   Relevance: This book explains process control principles applied to textile manufacturing operations. It focuses on quality improvement, productivity enhancement, and waste reduction. The content closely supports the course syllabus and industrial practices.
2. **Process Management in Spinning, R. Senthil Kumar**

   Relevance: This book explains process management concepts specific to spinning operations. It focuses on controlling productivity, quality, and waste across spinning processes. The content supports practical understanding and complements the course syllabus.
3. **Process Control in Weaving, M.C. Paliwal and P.D. Kimothi**

   Relevance: This book focuses on process control principles and practices in weaving operations. It emphasizes optimization of loom performance, fabric quality, and reduction of defects and productivity losses. The content aligns well with the weaving section of the course syllabus and industrial applications.
4. **Quality Control in Spinning‖, Ratnam T.V. and Chellamani. K. P. - SITRA Coimbatore 1999.**

   Relevance: This book focuses on quality control practices specific to spinning processes. It emphasizes measurement, analysis, and improvement of yarn quality attributes to reduce defects and enhance consistency. The content aligns with the spinning quality control aspects of the course syllabus and industry standards.
5. **Maintenance Management volumes 1 to 21, by IMME Delhi.**

   Relevance: This reference provides comprehensive coverage of maintenance management practices across textile operations. It emphasizes scheduling, planned maintenance, breakdown analysis, and productivity improvement. The content supports the maintenance management topics in the syllabus and practical industry implementation.
6. **Maintenance Management, SITRA Publication**

   Relevance: This book covers maintenance management principles and practices relevant to textile industries. It emphasizes planned maintenance, machine reliability, and performance improvement. The content aligns with the maintenance management unit of the course and supports practical understanding of maintenance systems.

7. **Process Control in Spinning by A. R. Garde & T. R. Subramaniam, ATIRA Publication.**

   Relevance: This book explains process control concepts specific to spinning operations with practical industrial examples. It focuses on controlling productivity, yarn quality, and waste through proper process parameters. The content closely supports spinning-related units of the course syllabus and industry practices.
8. **Total Quality Management by John M. Kelly, Published by Aleycuder, Hamitton Institute Inc.**

   Relevance: This book introduces the principles and tools of Total Quality Management applicable to manufacturing industries. It emphasizes continuous improvement, customer satisfaction, and systematic quality control practices. The content supports the quality management and process optimization aspects of the course syllabus.
9. **Process Control in Spinning by Dr. K. R. Salhotra, ATIRA Publications**

   Relevance: This book presents fundamental and applied aspects of process control in spinning operations. It focuses on controlling process parameters to achieve consistent yarn quality, higher productivity, and reduced waste. The content directly supports the spinning process control components of the course syllabus.
10. **Weaving: Technology and Operations by Allan Ormerod.**

    Relevance: This book provides detailed coverage of weaving technology and operational practices. It emphasizes control of loom performance, fabric quality, and process efficiency. The content supports the weaving process control topics of the course syllabus and industrial applications.

11. **Weaving Machine, Mechanisms, Management by Dr. Talukdar, Ajagaonkar**
    Relevance: This book explains weaving machine mechanisms and their management in industrial settings. It focuses on controlling machine performance, productivity, and fabric quality. The content aligns with weaving process control and management topics of the course syllabus.
12. **Machine Manuals of Various Shuttle less Looms and Preparatory Machines**
    Relevance: These manuals provide specific operational and technical guidance for shuttle-less looms and preparatory machines. They include machine-level instructions for setup, troubleshooting, maintenance, and performance monitoring. The content supports the practical understanding and application of process control and machine management covered in the syllabus.

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COURSE: ADVANCE FABRIC MANUFACTURING TECHNOLOGY

Course Code: 6TX232PC Course Hours: 3Th Credits: 3

Course Description:

This course serves as a core subject of the program. The objective of this course is to describe the performance limitations of shuttle loom and the concept behind innovation of various shuttle-less weaving machines and Analyze various technological designs, working principle and their implications on the application scope of various shuttle-less weaving machines.

Course Outcomes:

By the end of this course, students will be able to:

- Describe the theories of picking power, complexities and performance limitations of shuttle loom and demonstrate the knowledge about various technical requirements of shuttle -less weaving technology.
- Recall the technical features, design and working principle of projectile weaving machine.
- Recall the technical features, design and working principle of rapier weaving machine.
- Recall the fluid flow theories, technical features, design and working principle relating to air and waterjet weaving machines
- Recall the technical features, design and working principle of multiphase weaving machines.
- Describe the specifications, function, properties and production process flow of Multi-axial,Multi-dimensional, Denim and Narrow fabrics.

Course Topics

SECTION 'A'

Unit I: Limitations and Complexities of shuttle loom:

- Role of yarn and fabric construction, composite material.
- Theories of shuttle velocity loom speed and picking power. Theories of beat up forces.
- Introduction to shuttle-less weaving technologies- Classification of shuttle-less weaving machines.
- Theories of weft velocities and acceleration, weft accumulator, weft measuring systems, cam beat up.
- Selvedges formation on shuttle-less weaving machines, yarn quality requirements of shuttle-less weaving.

Unit II: Projectile Weaving:

- Introduction, technical features, advantages, transfer of weft from projectile feeder to projectile,
- design of projectile, phases of weft insertion, projectile picking mechanism
- Timing cycle of projectile weaving, tuck in selvedge, weft tension variation, energy utilization,
- Scope, limitations and modern developments in projectile weaving viz: Electromagnetic projection, Magnetic timing belt, FOR-Maglev etc.

Unit III: Rapier Weaving:

- Classification of rapier weaving machines, rigid and flexible rapiers
- Methods of weft insertion viz. Dewas and Gabbler.
- Rapier driving mechanism, design of rapier heads, displacement and velocity of rapiers.
- Weft control mechanism, weaving timings, scope, limitations.
- Latest developments in rapier weft insertion,
- Shedding, take up, selvedge formation and quick style change.

SECTION 'B'

Unit IV: Airjet Weaving:

- Theories of fluid flow applicable to fluid based weft insertion, air stream, friction drag forces,
- Working principle of air weaving, phases of weft insertion, air requirements, airjet nozzles, buckling of

weft

- Traverse aids for maintaining air flow, confuser system, profile reed and relay nozzles, methods of air jet control
- Timings of air jet loom, scope and limitations of airjet weaving. Modern developments in airjet weaving.
- Waterjet weaving-weft supply system, requirement of water, phages of weft insertion, hydraulic weft insertion system, Timings of water jet weaving, quick style changing, weft yarn tension variation,
- Modern developments, scope and limitations of water jet looms.

Unit V: Multiphase Weaving:

- Classification and warp way multiphase. Warp way principle of shedding, picking and beat up mechanism.
- Weft way multiphase principles of shedding, picking and beat up mechanism.
- Scope, limitation and advantages of multiphase weaving technology.
- Standard woven fabrics-Definition and quality particulars of important fabrics viz. Alpaca, bagging, belting, blankets, brocade, blazer cloth, calico, chenille, chiffon, corduroy, cashmere, cotton suiting and trousers, cheese cloth, crepe fabrics, chiffon, denim, damasks, dimity, dhotis, drills, duck/canvas, fiber glass, filter, flannel, foulard, fustian, gabardine, gauze, georgette, gingham, jean, khadi, khaki, lawn, laminated, leno, mousseline, muslin, narrow, organdy, poplin, quilts, saris, satin, sateen, sheeting, shirting, taffeta, tartan, velvet, voile.

Unit VI: Multi-axial, Multi-dimensional Fabric:

- Introduction, classification, functionality, properties and applications.
- Brief outline of major techniques used in production of multi-axial and multi-dimensional fabrics.
- Denim fabric- Types, specifications, functionality, properties, applications and process flow of various production techniques.
- Weaving machines used in denim production. Narrow fabric- Types, specifications, properties, applications and process flow and weaving machines used in their production.

TEXT BOOKS AND REFERENCES:

1. **Allen Armord, Weaving Operations**.
- **Relevance:** This book covers classifications technical textiles, properties of textile materials, applications which directly relates to units 1,2, 3, 4,5 and 6

2. **J. J. Vincent, Shuttle-less loom.**
- **Relevance:** This book covers applications of technical textiles, properties of textile materials, which directly relates to units 1,2, 3, 4,5 and 6

3. **Sabit Adanur, Handbook of Weaving**
- **Relevance:** This book covers applications of technical textiles, properties of textile materials, which directly relates to units 1,2, 3, 4,5 and 6

4. **D. B. Ajagaonkar, M.K.Talukdar, Weaving Machine, Mechanism**.
- **Relevance:** This book covers applications of technical textiles, properties of textile materials, which directly relates to units 1,2, 3, 4,5 and 6

5. **R. Marks, A.T.C. Robinson, Principle of Weaving.**
- **Relevance:** This book covers applications of technical textiles, properties of textile materials, which directly relates to units 1,2, 3, 4,5 and 6

6. **Z. J Grosicki, Watson's Advance Textile Design.**
- **Relevance:** This book covers applications of technical textiles, properties of textile materials, which directly relates to units 1,2, 3, 4,5 and 6

7. **Sobhey Badawi, Development of the Weaving Machine and 3D Woven Spacer Fabric Structures for Lightweight Composites Materials, Dissertation.**
- **Relevance:** This book covers applications of technical textiles, properties of textile materials, which directly relates to units 1,2, 3, 4,5 and 6.

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COURSE: CHEMICAL PROCESSING – II

Course Code: 6TX233PC Course Hours: 3 Th Credits: 3

Course Description:

Chemical Processing – II focuses on advanced textile chemical processing techniques with emphasis on textile printing, functional finishes, and computer colour matching. The course covers fundamentals of printing, styles and methods of printing, printing recipes for various dye classes, evaluation of fastness properties, and different finishing processes. It also introduces modern finishing machinery, testing of finishes, and the principles of colour measurement and computer colour matching, preparing students for industrial textile processing applications.

Course Outcomes:

Upon successful completion of the course, students will be able to:

1. Understand the basic fundamentals of textile printing.
2. Identify and compare various textile printing methods.
3. Select appropriate printing recipes for different classes of dyes.
4. Explain the concept and applications of functional finishes.
5. Evaluate different types of textile finishes.
6. Understand the principles of computer colour matching.

Course Topics:

SECTION 'A'

Unit-I: Printing

- Definition of printing, difference between dyeing and printing.
- Steps involved in printing such as preparation of material, ingredients of printing paste, different thickeners and their chemical and rheological behaviour,
- Drying of prints and fixation of prints including after-treatments of printing.

Unit-II: Styles of printing

- Styles of printing such as direct, resist and discharge printing and their comparison.
- Flock printing and batik printing.
- Methods of printing including block, roller and screen printing (flat bed and rotary). Non-conventional methods such as transfer printing and inkjet/digital printing machines.

Unit-III: **Printing recipes**

- Standard recipes for printing with various classes of dyes such as direct, reactive, azoic, vat, sulphur, disperse and acid dyes, and pigment colours with relevant after-treatments.
- Printing faults, their causes and prevention.
- Evaluation of fastness properties including wash, light, rubbing, perspiration, sublimation and other allied fastness properties.

SECTION 'B'

Unit-IV: **Finishing**

- Object and classification of textile finishing.
- Concept of anti-crease, wash-and-wear and durable press finishes.
- Specialty finishes such as anti-shrink, antistatic, soil release, water repellent, waterproof, flame retardant, parchmentization and softening finishes.
- Novel finishes including antimicrobial, cool finish and aroma finish.

Unit-V: **Finishing Machineries**

- Detailed study of finishing machines such as calendaring (types of calendars), sanforising, stenter and drying machines.
- Testing of finishes including anti-crease, anti-shrink, flame retardant, waterproof, water repellent and antimicrobial finishes.

Unit-VI: **Computer Colour Matching**

- Concept of colour and relationship between colour and chemical constitution.
- Factors governing transmission, tristimulus values, Kubelka–Munk equation.
- Methods of colour estimation including manual methods and their limitations, instrumental methods, pass–fail criteria
- Brief introduction to computer colour matching and formulation.

TEXT BOOKS AND REFERENCES:

1. **L. W. C. Miles, Textile Printing.**
   Relevance: Provides fundamental principles and industrial practices of textile printing.
2. **W. Clarke, An Introduction to Textile Printing.**
   Relevance: Covers basic concepts, styles and methods of textile printing.
3. **V. A. Shenai, Technology of Printing.**
   Relevance: Detailed explanation of printing chemistry, recipes and machinery.
4. **A. J. Hall, Textile Finishing.**
   Relevance: Explains objectives, types and applications of textile finishing processes.
5. **J. T. Marsh, Introduction to Textile Finishing.**
   Relevance: Provides foundational knowledge on finishing techniques and effects.
6. **V. A. Shenai, Technology of Finishing.**
   Relevance: Comprehensive reference on conventional and modern finishing processes.
7. **Shah and Gandhi, Instrumental Colour Measurements and Computer Aided Colour Matching for Textiles.**

Relevance: Covers colour measurement techniques and computer-aided colour matching systems.

8. **Asim Kumar Roychowdhury, Modern Concept of Colour and Appearance.**
   Relevance: Explains colour science, perception and appearance of textile materials.

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COURSE: TEXTURED YARN TECHNOLOGY

Course Code: 6TX234PE (Program Elective Course-II)

Course Hours: 3 Th Credits: 3

Course Description:
The course focuses on principles, processes, and industrial applications of textured yarn manufacturing. It includes study of various texturing techniques, associated machinery, process optimization, and structure–property relationships. The course equips students with analytical skills to evaluate and optimize texturing processes for quality and productivity in textile industries.

Course Outcomes:

Upon successful completion of this course, students will be able to:
1: Explain the principles, classification, and need of various yarn texturing techniques.
2: Describe the construction, working mechanisms, and process flow of major texturing machines.
3: Analyze the influence of process parameters on yarn structure and properties in different texturing processes.
4: Apply process optimization techniques to control quality and productivity in textured yarn manufacturing.
5: Evaluate the performance of different texturing methods based on yarn quality, end use, and industrial requirements.
6: Analyze recent developments and industrial challenges in textured yarn technology, including noise control and specialty texturing methods.

Course Topics:
SECTION 'A'

Unit I Principles and Classification of Texturing

- Principles and objectives of yarn texturing.
- Need and significance of texturing in synthetic and blended yarns.
- Modern classification of texturing methods.
- Basic concepts of bulk, stretch and texture development.
- Applications of textured yarns in textiles.
- Recent developments in texturing methods

Unit II: False Twist Texturing

- False twist texturing process—principle.
- Mechanisms, and machinery; heater systems and twisting devices.
- Process parameters and their optimization.
- Barre' effect and its control.
- Structure–property relationships of false twist textured yarns.
- Application false twist textured yarns.

Unit III: Draw Texturing and Friction Texturing

- Draw texturing—need, fundamental approaches, and process sequence.
- Friction texturing—need, development, and mechanics.
- Types of friction units.
- Recent developments in texturing devices.
- Optimization of quality parameters.
- Noise generation and noise control in texturing operations.

SECTION 'B'

Unit IV: Air Jet Texturing

- Principle of air jet texturing; development of air jets and machinery.
- Process mechanisms and parameters.
- Characterization of air jet textured yarns.
- Process optimization
- Air jet texturing of spun and blended yarns.
- Properties and application air jet textured yarn.

Unit V: Air Interlacement and Bulked Continuous Filament Yarns

- Air interlacement—principle, mechanism
- Jet development and yarn characterization.
- Bulked continuous filament (BCF) yarns
- Need, principle, technology development, applications.
- Performance characteristics.
- Properties and application of Bulked Continuous Filament Yarns

Unit VI: Hi-Bulk, Solvent, and Chemical Texturing

- Hi-bulk yarns—need and classification.
- Acrylic hi-bulk yarn production, mechanisms and machines involved.
- Other hi-bulk yarn products.
- Solvent and chemical texturing—need, principles
- Texturing of synthetic and natural fibres.
- Properties and application of solvent textured yarn.

TEXT BOOKS & REFERENCE BOOKS :

1. **Yarn Texturing Technology – Hearle, Hollick & Wilson**
   Relevance: Covers principles, classification, false twist, air-jet texturing, BCF yarns, and machinery and process mechanisms, useful for units I–V.
2. **False Twist Textured Yarns: Principles, Processing and Applications – C. Atkinson**
   Relevance: Detailed reference on false twist texturing, process parameters, machinery, quality optimization and applications, relevant to units II & III.
3. **Synthetic Filament Yarn Texturing Technology – H. M. Behery & A. Demir**
   Relevance: Focuses on texturing of synthetic filament yarns including process control and quality aspects, supports units I–IV.
4. **Textile Yarn Technology, Structure and Application – B. C. Goswami**
   Relevance: Provides fundamental understanding of yarn structures and structure–property relationships, supporting units I–V.
5. **Annual Symposium on Texturing – Edited by M. L. Gulrajani**
   Relevance: Contains recent research and industrial developments in texturing technology, process optimization and innovations, useful for units V & VI.
6. **Production of Textured Yarns by the False Twist Technique – D. K. Wilson & T. Kollu**
   Relevance: Specialized text on false twist process development, machine design and quality control, relevant to Units II & III.

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Course Code: 6TX234PE Course: Program Elective – II (APPAREL MERCHANDISING)

Course Hours: 3 Th Credits:3

Course Description:
This course serves as a program elective course-II. This course introduces the Organization of the apparel business and fundamental processes involved in marketing, merchandising, sourcing and focusing onthe critical steps required for Documentation during export and import and Quality management system.

Course Outcomes:
By the end of this course, students should be able to:

1) Understand the concept of apparel industry and business etiquettes.
2) Summarise the responsibilities, objectives and strategies for marketing.
3) Understand the role and responsibilities of apparel merchandiser.
4) Distinguish various sourcing systems used in apparel merchandising.
5) Demonstrate procedures, rules and documentation related to export business.
6) Identify the basic requirements for quality management systems for apparel industry.

Course Topics:
SECTION 'A'

Unit I: Introduction to Organization of the apparel business

- Introduction to apparel industry
- Current market scenario of apparel market
- Structure of apparel industry
- Basic business concepts
- Types of buyers and exporters
- International trades(WTO, MFA)

Unit II: Introduction to Marketing and its process

- Marketing objectives and strategies
- Responsibilities of a marketing division
- Marketing research
- Types of markets
- Marketing plan
- Labelling and licensing

Unit III: Introduction to Apparel Merchandising and its role and responsibilities

- Definition of merchandising
- Functions of merchandising division
- Role and responsibilities of merchandise
- Different types of communications with the buyers
- Awareness of current market trends
- Product development- line planning and line presentation

SECTION 'B'

Unit IV: Introduction to sourcing and its process

- Need for sourcing, sourcing materials
- Manufacturing resource planning principles of MRP
- Overseas sourcing
- sourcing strategies
- Supply chain and demand chain analysis
- JIT technology

Unit V: Introduction to Documentation

- Documents regarding Order confirmation
- Various types of export and import documents
- Pre and post- shipment documentation
- Terms of payment and shipment
- Export incentives: duty drawback, DEPB, etc
- Objectives of foreign exchange regulation acts (FERA) and management act (FEMA)

Unit VI: Introduction to Quality management system

- Objectives of ISO 9000 QMS
- Data, records and traceability, documenting the quality system
- Quality manual, quality audit
- ISO 9000 registration process
- Difference between ISO 9000 and ISO 14000
- ISO 14000: objectives, advantages and disadvantages

TEXT BOOKS AND REFERENCES:

1. ***Management of Textile Industry By Dr.V.D. Dudeja,*** **Published by Textile Trade Press (Bombay/Ahmedabad) in 1981.**
   Relevance: This book is frequently prescribed as a textbook in textile engineering programs in Indian technical universities and institutes, especially under subjects like mill planning, organization, and management principles which directly relates with unit 1 and unit 2.
2. ***Export Planning and Promotion-II By D. Sinha,*** **Published by IIM/IIMS (Indian Institute of Management / Indian Institute of Management, Calcutta) in 1989**
   Relevance: The book is widely referenced in Indian university courses on export marketing, international trade, export documentation, and export strategy particularly in B.Com, B.Voc, Fashion Technology, Textile Technology, and Management programs which directly relates with unit 2, 3, 4 and unit 5.
3. ***Import-Export Finance By Tunin K Nandi,*** **Published by Indian Institute of Management / IIMS Calcutta, 1989.**
   Relevance: This book is widely referenced in undergraduate and vocational syllabi related to Fashion and Textile Engineering. It appears alongside other key texts in export/import documentation, finance, and policy study units which directly relates with unit 4 and unit 5.
4. ***Export Marketing-A practical guide to Exporters By S. Shivaramu,*** **Published Wheeler Publishing, New Delhi, 1996.**
   Relevance: This book is a comprehensive resource that deals into the Export Marketing — A Practical Guide to Exporters is commonly listed as a reference text in Indian university syllabus for courses like export management, apparel/textile marketing, and international trade which directly relates with unit 2.
5. ***In side the Fashion Business, By J.A. Jamow, M. Guerreiro, B. Judelle,*** **Published by Macmillan Publishing (New York) (4th Edition) in 1987.**
   Relevance: This book Inside the Fashion Business is a standard textbook/reference work on the fashion industry, widely used in academic fashion, textile, business, merchandising and marketing courses which directly relates with unit 1, 2, 3 and unit 6.

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COURSE: TEXTURED YARN TECHNOLOGY

Course Code: 6TX234PE (Program Elective Course-II)

Course Hours: 3 Th **Credits: 3**

Course Description: The course focuses on principles, processes, and industrial applications of textured yarn manufacturing. It includes study of various texturing techniques, associated machinery, process optimization, and

structure–property relationships. The course equips students with analytical skills to evaluate and optimize texturing processes for quality and productivity in textile industries.

Course Outcomes:
Upon successful completion of this course, students will be able to:
1: Explain the principles, classification, and need of various yarn texturing techniques.
2: Describe the construction, working mechanisms, and process flow of major texturing machines.
3: Analyze the influence of process parameters on yarn structure and properties in different texturing processes.
4: Apply process optimization techniques to control quality and productivity in textured yarn manufacturing.
5: Evaluate the performance of different texturing methods based on yarn quality, end use, and industrial requirements.
6: Analyze recent developments and industrial challenges in textured yarn technology, including noise control and specialty texturing methods.

Course Topics:

SECTION 'A'

Unit I: Principles and Classification of Texturing

- Principles and objectives of yarn texturing.
- Need and significance of texturing in synthetic and blended yarns.
- Modern classification of texturing methods.
- Basic concepts of bulk, stretch and texture development.
- Applications of textured yarns in textiles.
- Recent developments in texturing methods

Unit II: False Twist Texturing

- False twist texturing process—principle.
- Mechanisms, and machinery; heater systems and twisting devices.
- Process parameters and their optimization.
- Barre' effect and its control.
- Structure–property relationships of false twist textured yarns.
- Application false twist textured yarns.

Unit III: Draw Texturing and Friction Texturing

- Draw texturing—need, fundamental approaches, and process sequence.
- Friction texturing—need, development, and mechanics.
- Types of friction units.
- Recent developments in texturing devices.
- Optimization of quality parameters.
- Noise generation and noise control in texturing operations.

SECTION 'B'

Unit IV: Air Jet Texturing

- Principle of air jet texturing; development of air jets and machinery.
- Process mechanisms and parameters.
- Characterization of air jet textured yarns.
- Process optimization
- Air jet texturing of spun and blended yarns.
- Properties and application air jet textured yarn.

Unit V: Air Interlacement and Bulked Continuous Filament Yarns

- Air interlacement—principle, mechanism
- Jet development and yarn characterization.
- Bulked continuous filament (BCF) yarns
- Need, principle, technology development, applications.
- Performance characteristics.
- Properties and application of Bulked Continuous Filament Yarns

Unit VI: Hi-Bulk, Solvent, and Chemical Texturing

- Hi-bulk yarns—need and classification.
- Acrylic hi-bulk yarn production, mechanisms and machines involved.
- Other hi-bulk yarn products.
- Solvent and chemical texturing—need, principles
- Texturing of synthetic and natural fibres.
- Properties and application of solvent textured yarn.

TEXT BOOKS & REFERENCE BOOKS:

1. **Yarn Texturing Technology – Hearle, Hollick & Wilson**

Relevance: Covers principles, classification, false twist, air-jet texturing, BCF yarns, and machinery and process mechanisms, useful for units I–V.

2. **False Twist Textured Yarns: Principles, Processing and Applications – C. Atkinson**
   Relevance: Detailed reference on false twist texturing, process parameters, machinery, quality optimization and applications, relevant to units II & III.
3. **Synthetic Filament Yarn Texturing Technology – H. M. Behery & A. Demir**
   Relevance: Focuses on texturing of synthetic filament yarns including process control and quality aspects, supports units I–IV.
4. **Textile Yarn Technology, Structure and Application – B. C. Goswami**
   Relevance: Provides fundamental understanding of yarn structures and structure–property relationships, supporting units I–V.
5. **Annual Symposium on Texturing – Edited by M. L. Gulrajani**
   Relevance: Contains recent research and industrial developments in texturing technology, process optimization and innovations, useful for units V & VI.
6. **Production of Textured Yarns by the False Twist Technique – D. K. Wilson & T. Kollu**
   Relevance: Specialized text on false twist process development, machine design and quality control, relevant to Units II & III.

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PROFESSIONAL ELECTIVE-III (PE-III)

COURSE: SUSTAINABLITY AND CERTIFICATIONS FOR TEXTILE AND APPREL INDUSTRY

Course Code: 6TX235PE Course Hours: 3Th Credits: 3

Course Description:

This course serves as a professional elective subject of the program. The objective of this course is to understand the need and importance of sustainability and its assessment in the field of engineering and management. Student should identify the use of various sustainable textile products and their manufacturing.

Course Outcomes:

By the end of this course, students will be able to:

- Explain the need, importance and core principles of sustainability in engineering and management field.
- Discuss the concept of sustainability assessment related to the design and manufacturing of products.
- Describe the various certifications and its related organizations that work for textile sustainability.
- Summarize the information about various sustainable fibers used in textile products manufacturing.
- Recommend sustainable production strategies for spinning and weaving industries.
- Explain about sustainable green processing methods and strategies used in fashion and garment manufacturing industry.

Course Topics

SECTION 'A'

Unit I: Fundamentals of Sustainability:

- Definition, sustainability and circularity,
- Core principles of sustainability pertaining to various domains viz. material, economic, life, social, spiritual.
- Goals of sustainability, Sustainable development indicators.

Unit II: Sustainability Assessment:

- Sustainability assessment steps and tools.
- Classification of sustainability assessment methodologies.
- Metrics for technology evaluation for sustainability.
- Trends and methods for textile and apparel industry sustainability assessment.

Unit III: Certifications in Textile Sustainability:

- Introduction to various textile certifications and its related organizations that works for sustainability in textile field.
- Better Cotton Initiative (BCI), Bluesign, Cradle to Cradle, Fair Trade, Global Organic Textile Standards (GOTS), Global Recycle Standard, Two Organic Standard Certifications, Good Weave, Made By, OE-100, Oeko-Tex, Social Accountability Accreditation Services (SAAS), SCS Certification, USDA Certified Organic, Zque, World Fair Trade Organization (WFTO), Fair Wear Foundation, Ethical Trading Initiative (ETI),B Corporation, Source map, Cotton Made In Africa, Responsible Down Standard, Responsible Wool Standard.
- People for the Ethical Treatment of Animals (PETA), Fashion Revolution, Sustainable Apparel Coalition.
- Higg Index, Ecolabel Index, Outdoor Industry Association, Textile Exchange.

SECTION 'B'

Unit IV: Sustainable Materials for Textile Industry:

- Introduction to the use of sustainable organic.
- Eco-friendly lingo-cellulosic natural fibers viz. cotton, hemp, linen, bamboo, pineapple etc.
- Recycled fiber viz. cotton, polyester and eco- nylon fiber.
- Semi synthetic vegan fibers viz. modal, tencel, loycell, casein, cupra etc.
- Animal derived Sustainable fibers.

Unit V: Sustainable Production Methods for Textile Industry:

- Introduction to the sustainability conscious product design and production approaches.
- Sustainable production strategies used in spinning and weaving industry.
- Concept of saving of water, chemicals and energy in textile industry.

Unit VI: Green Textile Processing Techniques:

- Introduction to new sustainable dyeing, printing and finishing technologies. Sustainability Practices in Fashion and Garment Industry: Front and back end design approach**.**
- Circular Fashion, fast and slow fashion.
- Sustainable material sourcing,
- Sustainable supply chain and close loop manufacturing in garment industry.

Text Books and References:

1. Subramanian Senthilkannan, Muthu and Miguel Angel Gardetti, Sustainability in the Textile and Apparel Industries.

- **Relevance:** This book covers classifications technical textiles, properties of textile materials, applications which directly relates to units 1,2, 3, 4,5 and 6

2. **Marion I. Tobler-Rohr Handbook of Sustainable Textile Production**.

- **Relevance:** This book covers applications of technical textiles, properties of textile materials, which directly relates to units 1,2, 3, 4,5 and 6

3. **R. S. Blackburn, Sustainable Textiles**.

- **Relevance:** This book covers basics of geotextiles raw material used in geotextiles and their required properties, which directly relates to unit 3.

4. **Subramanian Senthilkannan, Textiles and Clothing Sustainability.**

- **Relevance:** This book covers classification of medical textiles, various raw material, and required properties for medical applications which directly relates to unit 4.

5. **Subramanian Senthilkannan, Sustainable Fibers and Textiles.**

- **Relevance:** This book covers types of protective textiles, raw material, and required properties for protective textiles which directly relates to unit 5.

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PROFESSIONAL ELECTIVE-III (PE-III) - COURSE: TECHNICAL TEXTILES

Course Code: 6TX235PE Course Hours: 3Th Credits: 3

Course Description:

This course serves as a professional elective subject of the program. The objective of this course is to identify and describe the classification, properties, manufacturing processes, and applications of technical textiles across various sectors including medical, automotive, protective clothing, sports, and geotextiles.

Course Outcomes:

By the end of this course, students will be able to:

- Define and classify the technical textiles.
- Summarize the functioning and applications of textile material in filtration area.
- Apply the knowledge of technical textiles in the area of geotextile and transportation.
- Identify the fibre, yarn and fabric for medical textile applications.
- Apply the knowledge of technical textiles in the area of protective clothing.
- Discuss the sports and recreation textiles.

Course Topics

SECTION 'A'

Unit I: Introduction to Technical Textiles:

- Introduction: - Definition, scope, classification of Technical Textiles
- Role of yarn and fabric construction, composite material.
- Present and future market trends in Technical Textiles
- Difference between traditional textile and technical textile.

Unit II: Filtration Textiles:

1. Definition of filtration parameters, filtration mechanism and filtration requirements.
2. Concept of pore size and particle size, role of fiber, fabric construction and finishing treatments.
3. Dust filtration - general, protective masks and high temperature filtration purification and separation of gases.
4. Liquid filtration -solid liquid filtration, liquid - liquid separation.
5. Textiles used for the above applications and their features.

Unit III: Geo Textiles and Automotive Textiles:

1. Introduction, definition, basic functions of geo textiles, brief idea about geo synthetics and their uses.
2. Essential properties of geo textiles, types, raw material, Applications of geo textile
3. Woven geo textiles - Non-woven geo textiles - knitted geo textiles.
4. Automotive Textiles:- Classification of automotive textiles, functions of automotive textiles.
5. Properties of automotive textiles, Textiles in road vehicles- Car seat, air bag, seat belt, filters, carpets.
6. Textiles in Rail applications, Textiles in aircraft and marine applications.

SECTION 'B'

Unit IV: Medical Textiles:

1. Definition, classification of medical textiles.
2. Implantable material, non implantable material.
3. Extracorporeal devices and health and hygiene products.
4. Textiles used in medical applications and its characteristics.

Unit V: Protective and Defence Textiles:

1. Definition, Objective of protective textiles, different types and functional requirement of protective clothing.
2. Temperature and flame retardant clothing, chemical protective clothing, water proof breathable fabrics.
3. Defence Textiles:-Introduction, functional requirement of textiles in defence,
4. Ballistic protection and parachute cloth.

Unit VI: Sports Textiles and Industrial Textiles:

- Sports and Recreation Textiles: - Functional requirements of different type of products and their constructions.
- Textiles in Miscellaneous Industrial Applications: Introduction, paper making felt, bearing and sealing materials.
- Sound insulation, battery separators, electrical insulation, textiles re-inforced products.
- Transports bags and sheet, Fabrics to control oil spills, Canvas cover and tarpaulins.

Text Books and References:

1. **A R Horrocks and S C Anand, Handbook of Technical Textiles, Ed., Woodhead Publication Ltd., Cambridge, 2000.**
- **Relevance:** This book covers classifications technical textiles, properties of textile materials, applications which directly relates to units 1,2, 3, 4,5 and 6
2. **Sabit Adanaur, Handbook of Industrial Textiles, Ed. Technimic Publishing Company, Inc., Pennsylavania, USA, 1995.**
- **Relevance:** This book covers applications of technical textiles, properties of textile materials, which directly relates to units 1,2, 3, 4,5 and 6
3. **G V Rao and G V S Raju, Engineering with Geosynthetics", Ed., Tata McGraw Hill Publishing Co. Ltd., New Delhi, 1990.**
- **Relevance:** This book covers basics of geotextiles raw material used in geotextiles and their required properties, which directly relates to unit 3.
4. **Mukhopadhyay S K and Partridge J F, Automotive Textiles, Vol.29, The Textile Institute, 1999.**
- **Relevance:** This book covers classification of automotive textiles, various raw material, and their applications in automotive sector, which directly relates to unit 3.
5. **Medical Textiles-International Conference on Medical Textiles, Bolton, Woodhed Publication, Cambridge, 1997**.
- **Relevance:** This book covers classification of medical textiles, various raw material, and required properties for medical applications which directly relates to unit 4.
6. **Richard Scott, Textiles for Protection, Woodhed Publication.**
- **Relevance:** This book covers types of protective textiles, raw material, and required properties for

protective textiles which directly relates to unit 5.

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COURSE NAME: FASHION FORECASTING AND VISUAL MERCHANDISING.

Course code: 6TX239MD Contact Hrs: 2(TH) Credits:-2

Course Description:
This course introduces students to the principles and practices of fashion forecasting and visual merchandising. It focuses on understanding fashion trends, consumer behavior, color and style directions, and their application in effective visual presentation at retail. The course equips students with the ability to interpret trends and translate them into appealing visual displays that enhance customer engagement and drive sales in physical and digital retail environments.

Course Outcomes:
After successful completion of the course, students will be able to:

1. Explain the concept, importance, and process of fashion forecasting in the fashion industry.
2. Identify sources of fashion trends and analyze consumer lifestyle influences.
3. Understand the principles and elements of visual merchandising.
4. Apply visual merchandising techniques for effective product presentation.
5. Recognize the role of store layout, display planning, and window displays in retail success.
6. Assess the impact of visual merchandising on consumer buying behavior and brand image.

Unit–I: Fashion Forecasting Fundamentals

- Introduction to Fashion Forecasting – Definition, scope, and importance.
- Fashion Forecasting Process – Trend research, analysis, interpretation, and dissemination.
- Sources of Fashion Trends – Fashion shows, trade fairs, forecasting agencies, magazines, social media, street fashion, and cultural influences.
- Consumer Behavior & Lifestyle Analysis – Demographics, psychographics, socio-cultural and economic factors influencing fashion trends
- .Color Forecasting – Importance of color in fashion, seasonal color cycles, role of color forecasting agencies.

Unit–II: Principles of Visual Merchandising

- Visual Merchandising – Definition, objectives, and importance in retail.
- Elements of Visual Merchandising – Color, line, texture, balance, harmony, proportion, lighting and signage.
- Types of Visual Merchandising – Interior and exterior displays, product presentation techniques.
- Store Layouts – Grid, loop, free-flow and boutique layouts; advantages and limitations.
- Visual Merchandising Tools – Fixtures, mannequins, props, graphics and display materials.

Unit–III: Display Planning & Retail Presentation

- Window Displays – Types, objectives, themes, and techniques.
- In-store Displays – Point-of-purchase displays, focal points, and merchandise grouping.
- Theme-based Displays – Seasonal, festive, promotional and concept-based displays.
- Visual Merchandising for Branding – Creating brand identity and customer experience through visuals.
- Impact of Digital Visual Merchandising – Online visual presentation, virtual displays, and social media aesthetics.
- Role of Visual Merchandising in Sales Promotion and Customer Engagement.

Text Books and References:

1. **Fashion Forecasting** by Evelyn L. Brannon
   Relevance:– Provides detailed insight into trend analysis, consumer behavior, and forecasting techniques.1,2
2. **Visual Merchandising and Display** by Martin M. Pegler
   Relevance:– A comprehensive guide on store presentation, window displays, and retail planning.3
3. **Fashion Marketing** by Mike Easey
   Relevance:– Useful for understanding the relationship between forecasting, merchandising, and consumer markets.3
4. **The Fundamentals of Visual Merchandising** by S. L. Diamond
   Relevance:– Explains the principles and practical applications of visual merchandising.2,3
5. **Trend Forecasting in Fashion** by Janett R. L. Schaffner
   Relevance:– Focuses on trend research methodologies and interpretation.2,3.

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VOCATIONAL AND SKILL ENHANCEMENT COURSE (VSEC) : TESTING AND EVALUATION II

Course Code: 6TX240VS Course Hours: 1 Th. 2 Pr. Credits: 2

Course Objectives:

This course serves as a vocational and skill enhancement course subject of the program. This course introduces the fundamental processes involved in fabric testing for evaluating fabric dimensions, serviceability, dimensional stability , fabric handle and color fastness properties

Course Outcomes:
At the end of the course, students will be able to -
1) Demonstrate knowledge of measurement of fabric dimensions
2) Explain the various methods of measurement of dimensional stability
3) To understand technical significance of handle value and color fastness.

Unit I: Fabric Dimension:

- Fabric Dimension: Length, Width, Thickness, their measurement, Fabric weight per unit area and per length, threads per inch in woven fabric, ends and picks per inch,
- Crimp of yarn in fabric, shrinkage, Measurement of crimp.
- Serviceability: Introduction, Snagging, Pilling, Factors affecting pilling of fabric Pilling test, Abrasion resistance, factors affecting abrasion resistance.

Unit II: Dimensional stability:

- Dimensional stability: Introduction, hygral expansion, relaxation shrinkage, swelling shrinkage, felting shrinkage, methods of measuring dimensional stability.
- Hydraulic bursting strength tester. Tear strength tester.
- Flammability terms used relating to flammability, factors affecting flame resistance, flammability testing and flame proofing.

Unit III: Fabric handle evaluation and color fastness

- Fabric handle evaluation (Total hand value), Low stress mechanical properties viz.:
- Tensile, shearing, bending, compression and surface friction, Drape, crease recovery, Kawabata system.
- Color fastness testing: Introduction, outline of color fastness tests. Color fastness to washing, rubbing, light, heat (sublimation), perspiration, sea water, chlorinated water, dry cleaning agents

Text Books and References Books:

1. ***Principles of Textile Testing by J.E. Booth*, Published by CBS Publishers & Distributors, 1996.**
- Relevance: This book covers various aspects of statistics. The detailed content makes it a valuable reference for students, educators, and professionals in the textile industry for measurement and investigation of Textile material Physical and mechanical properties, which is crucial for understanding Units 1, 2, ,3,

2. *Physical Testing of Textiles by B. P. Saville*, Published by Woodhead Publishing Series in Textiles.
- **Relevance:** This book provides various concept, factors and effect of moisture on textile martial. The detailed content makes it a valuable reference for students, educators, and professionals in the textile industry, which is crucial for understanding Units 1, 2 and 3 of your syllabus.

3. ***Hand book of Textile Testing and Quality Control by E. B. Grover and D. S. Hamby*, Published by Wiley India Pvt. Ltd.**
- **Relevance:** This book is a comprehensive resource that delves into the importance of Textile Testing, method, result collection and analysis of sample data for prediction of population value which is crucial for understanding Units 1, 2 and 3 of your syllabus.

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EXIT COURSE - KNITTING TECHNOLOGY

Course Code: 6TX310EC Contact Hours: 60 Credits: 4

Course Description:
The objective of this course is to describe the basic knowledge about the various knitting techniques and various loops formation process and mechanisms of knitting machines. Also analyse key parameters of warp and weft knitting process.

Course Outcomes:

By the end of this course, students will be able to:
1. Demonstrate basic knowledge of knitting process.
2. Distinguish the types of stitches in weft knitted fabrics.
3. Explain the working of various knitting elements.
4. Evaluate the forces acting during knitting process.
5. Distinguish the types of stitches in warp knit structures.
6. Interpret the various factors affecting behavior of knitted structure.

Course Topics

SECTION 'A'

Unit I: Knitting:

- History of knitting, types of knitting, difference between woven and knitted fabric, comparison of warp and weft knitting.
- Terms and definitions used in knitting.
- Types and specification of needles: spring beard, latch, compound, knitting cycle of latch, spring bearded and compound needle.
- Classification of knitting machines and their application, yarn quality requirements for weft knitting process.

Unit II: Circular Knitting Machine:

- Circular Knitting machine: - Cylinder, knitting cam, sinker, feeder, stop motions.
- Knitting cycle of plain, rib and interlock knitted structure. Basic principles and elements of flat knitting machines, different types of flat knitting machines,
- Various zones of knitting machines, yarn supply arrangement.
- Loop forming arrangement and fabric take down mechanism

Unit III: Weft knit structures:

- Technical face and back, terms and symbolic representation of weft knit structures.
- Anatomy of loop-stitch, cross-over points, characteristics of plain, rib, interlock and purl knit structures.
- Needle and cam arrangement for knit, miss, and float.

SECTION 'B'

Unit IV: Fundamentals of knit formation:

- Fundamentals of knit formation viz. tuck, float stitches. Derivatives of weft knit structures viz. lacoste, accordion and check effect etc.
- Knitting dynamics: introduction to forces acting on needle, cams, and needle breakages. Types of tension devices, positive feeders and stop motions.
- Concept of seamless knitting.

Unit V: Warp Knitting:

- Principle, construction of warp knitted fabrics, warp beams and guidebar.
- Warp knit structure : Underlap, overlap, closed lap and open lap stitches.
- Warp knitting machine Classification, knitting elements and cycle on tricot machine and raschel machine, difference between tricot and raschel machine.
- Applications of warp knitted fabrics.

Unit VI: Structure of knitted fabric:

- Design of dimensional parameters of knitted fabric such as stitch length, WPI, CPI, stitch density, GSM and tightness factor.
- Knitted fabric relaxation, problem of knitted structure
- in stability, asymmetry of plain loop.
- Curling and spirality in knitted fabric.
- Production calculations of knitting machines.
- Faults in knitted fabrics, their causes and remedies.

Text Books and References:

1. **W. B. Azagoankar, Knitting Technology, Mahajan Textile Publishers.**
   Relevance: This book covers types of knitting processes (weft and warp knitting), and the history of knitting, which directly relates to units 1,2, 3, 4,5 and 6
2. **David J. Spencer, Knitting Technology, Wood Head Publishing Company, England**.
   Relevance: This book covers basics of knitting which directly relates to units 1,2, 3, 4,5 and 6
3. **S. C. Ray, Fundamental sand Advances in Knitting Technology, Wood head Publishing**
   Relevance: This book covers the fundamentals of knitting structures, which directly relates to unit 3.
4. **C. Mazzaand P. Zonda Knitting: Reference Book of Textile Technologies.**
   Relevance: This book covers applications of kniiting fabrics.
5. **J. E. Booth, Textile Mathematics,Vol.–3,Textile Institute, Manchester.**
   Relevance: This book covers knitting structure parameters.
6. **NPTEL–Knitting Technology.**

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EXIT COURSE-TECHNICAL TEXTILES

Course Code: 6TX311EC Contact Hours: 60 Credits: 4

Course Description:

The objective of this course is to identify and describe the classification, properties, manufacturing processes, and applications of technical textiles across various sectors including medical, automotive, protective clothing, sports, agriculture and geotextiles,

Course Outcomes:

By the end of this course, students will be able to:

- Define and classify the technical textiles.
- Summarize the functioning and applications of textile material in filtration area.
- Apply the knowledge of technical textiles in the area of geotextile and transportation.
- Identify the fibre, yarn and fabric for medical textile applications.
- Apply the knowledge of technical textiles in the area of protective clothing.
- Describe manufacturing techniques, raw materials, and structural characteristics of agro-textiles.

Course Topics

SECTION 'A'

Unit I: Introduction to Technical Textiles:

- Introduction: - Definition, scope, classification of Technical Textiles
- Role of yarn and fabric construction, composite material.
- Present and future market trends in Technical Textiles
- Difference between traditional textile and technical textile.

Unit II: Filtration Textiles:

1. Definition of filtration parameters, filtration mechanism and filtration requirements.
2. Concept of pore size and particle size, role of fiber, fabric construction and finishing treatments.
3. Dust filtration - general, protective masks and high temperature filtration purification and separation of gases.
4. Liquid filtration -solid liquid filtration, liquid - liquid separation.
5. Textiles used for the above applications and their features.

Unit III: Geo Textiles and Automotive Textiles:

1. Introduction, definition, basic functions of geo textiles, brief idea about geo synthetics and their uses.
2. Essential properties of geo textiles, types, raw material, Applications of geo textile
3. Woven geo textiles - Non-woven geo textiles - knitted geo textiles.
4. Automotive Textiles:- Classification of automotive textiles, functions of automotive textiles.
5. Properties of automotive textiles, Textiles in road vehicles- Car seat, air bag, seat belt, filters, carpets.
6. Textiles in Rail applications, Textiles in aircraft and marine applications.

SECTION 'B'

Unit IV Medical Textiles:

1. Definition, classification of medical textiles.
2. Implantable material, non implantable material.
3. Extracorporeal devices and health and hygiene products.
4. Textiles used in medical applications and its characteristics.

Unit V: Protective and Defence Textiles:

1. Definition, Objective of protective textiles, different types and functional requirement of protective clothing.
2. Temperature and flame retardant clothing, chemical protective clothing, water proof breathable fabrics.
3. Defence Textile:-Introduction, functional requirement of textiles in defence,
4. Ballistic protection and parachute cloth.

Unit VI: Agro Textiles :

- Introduction to Agrotextiles:
- Definition and scope of agro textiles, Importance in agriculture and horticulture.
- Historical development and global trends, Advantages of using agrotextiles.
- Classification based on functions-crop protection, soil management, climate control, water management.
- Fibers used in agro textiles and their requirements.
- Properties and Testing of Agro textiles.

Text Books and References:

1. **A R Horrocks and S C Anand, Handbook of Technical Textiles, Ed.,Woodhead Publication Ltd., Cambridge, 2000.**

- **Relevance:** This book covers classifications technical textiles, properties of textile materials, applications which directly relates to units 1,2, 3, 4,5 and 6

2. **Sabit Adanaur, Handbook of Industrial Textiles, Ed. Technimic Publishing Company, Inc., Pennsylavania, USA, 1995.**

- **Relevance:** This book covers applications of technical textiles, properties of textile materials, which directly relates to units 1,2, 3, 4,5 and 6

3. **G V Rao and G V S Raju, Engineering with Geosynthetics", Ed., Tata McGraw Hill Publishing Co. Ltd., New Delhi, 1990.**

- **Relevance:** This book covers basics of geotextiles raw material used in geotextiles and their required properties, which directly relates to unit 3.

4. **Mukhopadhyay S K and Partridge J F, Automotive Textiles, Vol.29,The Textile Institute, 1999.**

- **Relevance:** This book covers classification of automotive textiles, various raw material, and their applications in automotive sector, which directly relates to unit 3.

5. **Medical Textiles-International Conference on Medical Textiles, Bolton, Woodhed Publication,**
6. **Cambridge, 1997**.

- **Relevance:** This book covers classification of medical textiles, various raw material, and required properties for medical applications which directly relates to unit 4.

7. **Richard Scott, Textiles for Protection, Woodhead Publication.**

- **Relevance:** This book covers types of protective textiles, raw material, and required properties for protective textiles which directly relates to unit 5.

8. **M. A. R. Ghani, Agro-textiles: Structure, Properties and Applications, Wood head publishing.**

- **Relevance:** This book covers classification of agro textiles, raw material, and required properties for agro textiles which directly relates to unit 6.

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