

Chapter 5

Fabrics Around Us

2marks

Q1: What is the primary purpose of fabrics in our daily lives?

Answer: Fabrics serve the purpose of providing comfort, warmth, color, and texture in our daily activities. They are used in various products like bedsheets, clothing, and accessories.

Q2: Define yarn in the context of textiles.

Answer: Yarn is a continuous strand of textile fibers, filaments, or material suitable for knitting, weaving, or intertwining to form a fabric.

Q3: How are fibres, yarns, and fabrics related in the textile production process?

Answer: Fibres are processed into yarns, and yarns are then woven or knitted to produce fabrics. Fibres serve as the basic building blocks, and the relationship involves a sequential transformation in the production process.

Q4: Name two natural cellulosic fibres and their sources.

Answer: Cotton (from cotton plants) and linen (from flax plants) are examples of natural cellulosic fibres.

Q5: What is the purpose of the spinning process in yarn production?

Answer: The spinning process converts loose fibres into a continuous strand of yarn. It involves attenuating, drawing out, and twisting the fibres to the required size and twist for fabric production.

Q6: Differentiate between carded yarn and combed yarn.

Answer: Carded yarn is made from carded sliver, retaining short fibers and impurities, resulting in a bulkier texture. Combed yarn undergoes an additional combing process to remove short fibers and impurities, yielding a smoother and finer texture.

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Q 1: Explain the process of yarn processing from natural staple fibres, including the stages of cleaning, making into a sliver, and attenuating, drawing out, and twisting.

A: Yarn processing from natural staple fibres involves several stages:

Cleaning: Natural fibres, like cotton or wool, contain impurities like seeds or suint. In the cleaning stage, these impurities are removed, and fibres are sorted into laps, rolled sheets of loose fibres.

Making into a Sliver: Laps are unrolled and subjected to straightening processes, such as carding and combing. Carding disentangles fibres and lays them straight, while combing removes finer impurities. The lap is then converted into a sliver, a rope-like mass of loose fibres.

Attenuating, Drawing Out, and Twisting: The sliver is attenuated to the desired size, combining several slivers for uniformity. The slivers are drawn out gradually, making them longer and finer. If a blended yarn is required, slivers from different fibres are combined. The resultant sliver, still of the original diameter, is taken to the roving machine for further attenuation before spinning.

Q2: Compare and contrast weaving and knitting as methods of fabric construction, highlighting their characteristics and applications?

A:Weaving:

Characteristics: Involves interlacing two sets of yarns (warp and weft) at right angles to form a compact fabric.

Applications: Traditional method, used for making a wide range of fabrics, from shirts to denim. Jacquard or dobby attachments can create intricate designs.

Knitting:

Characteristics: Interlooping at least one set of yarns, producing fabrics with more elasticity.

Applications: Ideal for articles requiring shaping, such as socks, vests, and sportswear. Knitted fabrics are porous, allowing air circulation and comfort.

Comparison:

Weaving creates a stable, grid-like structure, while knitting produces a series of interconnected loops.

Weaving involves warp and weft yarns, while knitting uses a single set of yarns.

Knitted fabrics are faster to produce and have more elasticity.

Q 3: Discuss the significance of textile finishing, emphasizing the types of finishes and their impact on fabric characteristics.

A: Textile finishing is crucial in enhancing fabric properties for specific uses. Different finishes alter the fabric's appearance, texture, and behavior. Some types of finishes include:

Durable Finishes: These remain after washing or dry cleaning, such as dyeing. They permanently change the fabric's color or add other properties like flame resistance.

Renewable Finishes: These need reapplication after washing, like starching or blueing.

Common Finishes:

Cleaning: Scouring and bleaching to remove impurities.

Smoothening: Calendering and tentering for straightening and smoothening.

Water Repellent: Making fabric resistant to water.

Permanent Press: Reducing wrinkling.

Antishrink: Sanforisation to prevent shrinking.

Finishing enhances fabric comfort, durability, and appearance, contributing to consumer satisfaction.

Q 4: Explain the concept of yarn number and its significance in determining the fineness of yarn.

A: Yarn number is a designation indicating the fineness of yarn. It is represented by numbers like 20, 30, 40, etc., found on thread reels. Higher numbers denote finer threads. Yarn number is determined by the relationship between the weight of the fibre and the length of yarn drawn from it. Understanding yarn number helps consumers choose yarns appropriate for specific applications. Finer yarns are suitable for delicate fabrics, while coarser yarns are used for heavier textiles.

Q 5: Compare natural fibres and manufactured fibres, discussing their classifications and providing examples.

A:Natural Fibres:

Classification: Origin-based (seed, bast, leaf, nut husk), chemical type (cellulosic, protein), generic types (animal hair, animal secretion), common trade name (cotton, wool).

Examples: Cotton, linen, wool, silk.

Manufactured Fibres:

Classification: Regenerated cellulosic (Rayon), modified cellulosic (Acetate), protein (Azlon), non-cellulosic (nylon, polyester, acrylic, modacrylic, spandex).

Examples: Rayon, polyester, nylon, acrylic.

Comparison:

Natural fibres come from natural sources, while manufactured fibres are produced through industrial processes.

Manufactured fibres can be tailored for specific properties and uses.

Natural fibres may vary in length, while manufactured fibres are often filaments.

Q 6: Discuss the properties of cotton and its significance in textile products.

A: Cotton possesses several properties that make it significant in textile products:

Natural Cellulosic Staple Fibre: Cotton is a natural fibre with staple length, contributing to the texture and appearance of the fabric.

Moisture Absorbency: Cotton absorbs moisture easily, making it comfortable to wear, particularly in warm conditions.

Weight and Versatility: Cotton fabrics are available in various weights, fineness, structures, and finishes, making them suitable for a wide range of products such as muslin, denim, and sheets.

Availability: Cotton is widely grown, and India is one of the largest cotton-growing areas globally.

These properties contribute to the popularity of cotton in apparel and home textiles.

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Q 1: Discuss the stages involved in the production of fabrics through weaving. Explain the significance of warp and weft yarns in the weaving process, and highlight the characteristics of woven fabrics.

A: The production of fabrics through weaving involves several stages:

Warping: In this stage, the warp yarns are wound onto a beam to form a warp beam. The number of warp yarns and their arrangement on the loom determine the length and width of the fabric.

Sizing: To strengthen and protect the warp yarns during weaving, they are coated with a sizing agent. This process is known as sizing and helps prevent breakage.

Drawing-in: The warp yarns are threaded through the heddles and reed, determining the pattern and structure of the fabric. This process is called drawing-in.

Weaving: The actual weaving process occurs on the loom. The warp yarns, held under tension, are lifted and lowered by the heddles, allowing the weft yarn to pass through and interlace with the warp, forming the fabric.

The significance of warp and weft yarns:

Warp Yarns: These are the lengthwise yarns that provide the foundation of the fabric. They are held under tension and determine the fabric's length.

Weft Yarns: These are the crosswise yarns interlaced with the warp during weaving. They contribute to the fabric's width.

Characteristics of Woven Fabrics:

Woven fabrics have a stable structure due to the perpendicular arrangement of warp and weft yarns.

They often have a clear grain, with warp yarns running lengthwise and weft yarns running widthwise.

Woven fabrics can exhibit various patterns and designs depending on the weaving technique used.

In summary, weaving is a fundamental process involving the interlacing of warp and weft yarns to create stable and versatile fabrics.

Q2: Compare and contrast natural and manufactured fibres, discussing their production processes, classifications, and examples. Evaluate the environmental impact of each type of fibre.

A:Natural Fibres:

Production Process: Obtained directly from natural sources such as plants, animals, or minerals. The fibres undergo processes like ginning, retting, or shearing.

Classifications: Based on origin (seed, bast, leaf, nut husk), chemical type (cellulosic, protein), generic types (animal hair, animal secretion), and common trade name (cotton, wool).

Examples: Cotton, linen, wool, silk.

Manufactured Fibres:

Production Process: Produced through industrial processes using raw materials like cellulose, petrochemicals, or minerals. The processes include spinning, extrusion, and chemical treatments.

Classifications: Regenerated cellulosic (Rayon), modified cellulosic (Acetate), protein (Azlon), non-cellulosic (nylon, polyester, acrylic, modacrylic, spandex).

Examples: Rayon, polyester, nylon, acrylic.

Comparison:

Natural fibres come from nature, while manufactured fibres are synthetically produced.

Manufactured fibres can be engineered for specific properties, allowing greater versatility.

Natural fibres may have variations in length, while manufactured fibres are often filaments.

Environmental Impact:

Natural Fibres: Generally considered more sustainable and eco-friendly. However, concerns include land use, water consumption, and chemical use in farming or processing.

Manufactured Fibres: Can have environmental impacts due to chemical processes and reliance on non-renewable resources. Recycling initiatives are improving sustainability.

In conclusion, the choice between natural and manufactured fibres involves considerations of origin, production processes, characteristics, and environmental impacts, with ongoing efforts to enhance sustainability in both categories.

Q3: Discuss the significance of natural fibres in the textile industry. Provide examples, characteristics, and applications of at least three natural fibres.

A: Natural fibres play a crucial role in the textile industry due to their diverse characteristics and applications. Here are three significant natural fibres:

Cotton:

Characteristics:

Cotton is a natural cellulosic staple fibre.

Staple length varies from 1 cm to 5 cm, resulting in a slightly rough texture.

Good moisture absorbency and quick drying, making it comfortable for summer use.

Applications:

Used in various fabrics such as muslin, denim, and sheets.

Commonly found in everyday clothing items like shirts, T-shirts, and undergarments.

Linen:

Characteristics:

Linen is a bast fibre obtained from the flax plant.

Longer and finer than cotton, resulting in stronger and more lustrous yarn.

Absorbs moisture readily but does not absorb dyes easily, leading to less bright colors.

Applications:

Commonly used in summer apparel due to its moisture-absorbing properties.

Linen fabrics are found in shirts, summer dresses, and casual wear.

Wool:

Characteristics:

Wool is a natural protein fibre obtained from sheep hair.

Fibres vary in length from 4 cm to 40 cm and exhibit natural crimp for elasticity.

Surface scales are water-repellant, providing comfort in humid and cold conditions.

Applications:

Used in various forms, from warm clothing items like sweaters and coats to blankets.

Wool blends well with other fibres, enhancing care and maintenance properties.

Natural fibres like cotton, linen, and wool offer diverse options for textile products, meeting different requirements and preferences.

Q4: Compare and contrast the properties of synthetic fibres, focusing on Nylon, Polyester, and Acrylic. Discuss their manufacturing processes, characteristics, and applications in the textile industry.

A: Synthetic fibres, such as Nylon, Polyester, and Acrylic, are essential components in the textile industry. Here's a detailed comparison of their properties:

Nylon:

Manufacturing Process:

Nylon is a synthetic polymer manufactured through the polymerization of adipic acid and hexamethylene diamine.

Characteristics:

Smooth and shiny filaments with uniform diameter.

Exhibits high strength, abrasion resistance, and elasticity.

Used in hosiery, lingerie, socks, and various apparel items.

Applications:

Commonly employed in garments, undergarments, swimsuits, gloves, and nets.

Polyester:

Manufacturing Process:

Polyester is produced through the polymerization of terephthalic acid and ethylene glycol.

Characteristics:

Uniform diameter, smooth surface, and rod-like appearance.

Low moisture regain, making it less comfortable in hot, dry conditions.

Known for wrinkle resistance.

Applications:

Widely used in blended fabrics with rayon, cotton, and wool.

Commonly found in clothing, home textiles, and outerwear.

Acrylic:

Manufacturing Process:

Acrylic is a synthetic fibre produced by polymerizing acrylonitrile.

Characteristics:

Resembles wool, cheaper than wool, and available in various crimps and lusters.

Lower strength compared to some fibres, high elongation with good elastic recovery.

Applications:

Used as a wool substitute in children's wear, blankets, and knitted goods.

While Nylon, Polyester, and Acrylic share the commonality of being synthetic, each possesses unique characteristics suited for specific textile applications, offering versatility in the industry.

Q5: Explain the process of textile finishing and its importance in the final characteristics of fabrics. Provide examples of common finishing treatments and their effects on fabric properties.

A:Textile finishing is a crucial stage in the textile production process that significantly influences the final characteristics of fabrics. Here's an overview of the process and its importance:

Textile Finishing Process:

Cleaning and Preparation:

Initial cleaning to remove impurities and foreign matter.

Preparing the fabric for subsequent treatments.

Dyeing and Printing:

Application of color to the fabric.

Dyes are applied at different stages, such as at the fibre stage, yarn stage, or fabric stage.

Printing involves localized application of color, creating specific designs.

Mechanical Processes:

Calendering and tentering for smoothening and straightening.

These processes impact fabric texture and appearance.

Special Finishes:

Additional treatments for specific properties, e.g., water repellent, flame retardant, or antimicrobial finishes.

Enhances fabric functionality and performance.

Importance of Textile Finishing:

Change in Appearance: Finishing treatments like cleaning, dyeing, and special coatings alter the fabric's visual characteristics.

Change in Texture: Mechanical processes and special finishes impact the feel and texture of the fabric.

Change in Behavior: Finishes like water repellent or flame retardant treatments modify the fabric's behavior for specific uses.

Durability and Maintenance: Some finishes, such as stain-resistant or wrinkle-free treatments, enhance fabric durability and ease of maintenance.

Examples of Common Finishes:

Scouring and Bleaching:

Effect: Removes impurities, brightens color.

Application: Common in cotton and linen fabrics.

Durable Finishes:

Effect: Permanent changes, e.g., dyeing or flame resistance.

Application: Enhances color or safety properties.

Renewable Finishes:

Effect: Requires reapplication after washing, e.g., starching.

Application: Used for temporary effects like stiffness.

Water Repellent Finishes:

Effect: Makes fabric resistant to water.

Application: Ideal for outdoor and sportswear.

Permanent Press Finishes:

Effect: Reduces wrinkling.

Application: Common in dress shirts and formal wear.

Textile finishing is a versatile process that caters to various consumer needs, ensuring that fabrics not only look appealing but also possess the desired functional properties for specific applications.

Choose the correct answer

Question 1: Which of the following natural fibres is known for its moisture absorbency and is often used in warm conditions?

- a) Wool
- b) Linen
- c) Silk
- d) Nylon

Correct Answer: b) Linen

Question 2: What is the primary source of raw material for the manufacturing of Rayon?

- a) Sheep
- b) Wood Pulp
- c) Cotton
- d) Flax

Correct Answer: b) Wood Pulp

Question 3: Among the synthetic fibres, which one is recognized for its high elasticity and is commonly used in hosiery and lingerie?

- a) Nylon
- b) Polyester
- c) Acrylic
- d) Rayon

Correct Answer: a) Nylon

Question 4: What is the primary characteristic of knitting as a fabric construction method?

- a) Involves interlacing warp and weft yarns
- b) Interlooping of yarns
- c) Diagonal surface effect
- d) Plaiting of three or more yarns

Correct Answer: b) Interlooping of yarns

Question 5: Which natural fibre is known for its natural crimp or waviness, contributing to its elasticity and elongation properties?

- a) Cotton
- b) Linen
- c) Wool
- d) Silk

Correct Answer: c) Wool

Question 6: Polyester is recognized for which of the following properties?

- a) High moisture absorbency

- b) Low elasticity
- c) Wrinkle resistance
- d) Brittle and curled texture

Answer: c) Wrinkle resistance

Fill in the blanks

1. Fibre **properties** contribute to the properties of the final fabric.
2. The most essential property for a fibre to be useful is its **spinnability** crucial for ease of conversion into yarn and later into fabric.
3. Textile fibres can be classified based on their origin as natural or **man-made** fibres.
4. The first manufactured fibre, **Rayon** was commercially produced in AD 1895.
5. Yarn can be defined as a continuous strand of textile fibres, filaments, or material suitable for knitting, weaving, or otherwise intertwining to form a textile **fabric**.