Textiles and Fabric Science

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1. While synthetic fibers are created by humans using chemical processes and have different qualities and uses, natural fibers are derived from plants or animals.
2. Based on where they come from, fibers are often divided into two categories: man-made (synthetic) fibers and natural (derived from plants, animals, or minerals).
3. The technique of drawing out and twisting fibers to create a continuous thread or yarn that can be used for knitting or weaving is known as spinning in the textile industry.

- 4. Natural and Renewable: Cotton is a sustainable and renewable resource since it is a natural fiber that comes from the cotton plant.
- In contrast to synthetic substitutes like polyeste, it is a plant-based fiber.
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- Comfortable and soft: Cotton is renowned for feeling cozy on the skin and having a gentle hand.
- For clothing, beds, and other materials that come into direct touch with the body, this makes it a popular option.

5. Compared to silk, wool has a far better capacity for absorbing moisture; it can absorb a greater proportion of its weight in water before becoming damp.

- Wool :
- can seem dry even after absorbing up to 35% of its own weight in water.
- Water vapor may freely flow through its porous surface scales, which helps regulate humidity and temperature.
- Wool binds to water molecules thanks to its keratin structure, which is abundant in amino acids.
- Silk: Silk can absorb up to 30% of its weight in moisture without feeling wet because of its high hygroscopicity.
- It is comfortable to wear in warm weather and when exercising because of its capacity to absorb water.

- 6. In the process of making fabrics, dyeing gives them color and turns raw fibers into completed goods with particular uses and looks while also guaranteeing washability and durability.
- 7. The process of weaving a fabric involves weaving warp and weft threads together; the most basic weaves are satin, twill, and plain.
- Basic Weave Types:
- Plain Weave:
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- One thread crosses and passes beneath the next in both the warp and weft directions, making this the most basic weave.
- Examples include gauze, muslin, and canvas.
- Variations include rib weave and basket weave, which combines two or more threads.

- Twill Weave:
- The weft threads in this weave travel over two or more warp threads before passing under one, giving the design a diagonal or « wale » appearance.
- Serge, gabardine, and denim are a few examples.
- Satin Weave:
- This weave gives the fabric a smooth, glossy look by having long « floats » on the face, where weft threads cross several warp threads without interacting.
- Examples include sateen and satin cloth, which are frequently used for bed linens and linings.

- 8. Fabric finishes, which include durable treatments like anti-shrink, functional finishes like flame retardant or water-repellent coatings, and aesthetic finishes like glazing, enhance a textile’s look, feel, and utility using a variety of mechanical or chemical procedures.
- 9.The denier system calculates a fiber’s linear mass density, which is the mass in grams of a 9,000-meter length, in order to determine the thickness of the fiber. Basically, a thread or fiber with a higher denier number is thicker and rougher, whereas one with a lower number is thinner and finer.

- 10. STRUCTURE
- Knitted: To construct the structure of the cloth, one continuous thread is interlaced.
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- The cloth is made flexible by the interlocking loops.
- Two sets of strands (warp and weft) are interlaced at right angles to create woven fabric.
- In a crisscross design, the weft yarns run transverse and the warp yarns run lengthwise.
- Weaved fabrics are more resilient and less prone to stretching because of their interwoven structure.
- 3. Uses
- Knitted: Because of its softness, breathability, and stretch, knits are frequently used in apparel such as t-shirts, sweaters, leggings, sportswear, and socks.

- Blankets and upholstery, among other uses.
- In addition to fabrics for upholstery, curtains, and other uses needing strength and structure, woven materials are used to make clothing such as shirts, pants, and jeans.
- Because woven cloth is durable, it is often used in purses, jeans, and suits.
- The ability of fabrics to endure real-world use and stress is assessed using a variety of mechanical testing, such as tensile, rip, and abrasion tests. Fabric strength is essential for durability and performance.
- By influencing how a fabric wears, feels, and functions, textile fibers' strength, elasticity, absorbency, heat regulation, and abrasion resistance all help to make garments more comfortable and long-lasting.

- Textile printing involves transferring designs or patterns onto fabric using numerous techniques, including direct, discharge, resist, screen, roller, block, heat transfer, and digital printing procedures.
- Synthetic fabric manufacture has major environmental implications, including carbon emissions, water pollution, microplastic pollution, resource depletion, and the release of toxic chemicals during production and disposal.
- Clothing's look and functionality are greatly influenced by fabric drape, or how a material hangs. Softer fabrics produce flowing, body-skimming outfits, while stiffer fabrics give them shape and structure.

Thank you