FREE EDITION · NOTES + 3 SAMPLE MCQS

CUET · HOME SCIENCE · CLASS XI · CODE 315

Fabrics Around Us

CUET unit: Fabrics and Apparel — fibres, yarns, fabric construction, finishing and properties of important textile fibres.

By **UniDrill** · NCERT-grounded study material

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📌 Snapshot

- Establishes the textile vocabulary CUET tests heavily: fibre → yarn → fabric → finishing, and the umbrella term "textile products" (NCERT §5.1–§5.2, p. 57–58).
- Builds a rigorous classification of fibres — natural (cellulosic, protein, mineral, rubber) and manufactured (regenerated, modified cellulosic, protein, synthetic, mineral) — with specific examples (Rayon, Azlon, nylon, fibreglass) (NCERT §5.3, p. 59–60).
- Explains yarn-making stages (cleaning → sliver → attenuation → spinning) and yarn terminology — yarn number, t.p.i., yarn vs thread (NCERT §5.4, p. 61–62).
- Covers fabric construction (weaving, knitting, braiding, knotting, felts/non-wovens, nets, laces) and key concepts like warp/weft, selvedge, grain (NCERT §5.5, p. 62–65).
- Closes with detailed properties of seven "important fibres" — cotton, linen, wool, silk, rayon, nylon, polyester, acrylic, elastomeric — the most frequent MCQ zone (NCERT §5.7, p. 66–70).

📖 Detailed Notes

2.1 Core concepts

- Fabrics are formed from thread-like **yarns** which may be interlaced at right angles, interlooped (as in cardigans/T-shirts) or knotted (as in nets/laces); untwisting a yarn reveals tiny hair-like **fibres**, the basic building blocks of fabrics (NCERT §5.1, p. 57–58).
- Fibres, yarns and fabrics together are called **textile products / textiles**; post-construction treatment that improves appearance, lustre, touch, or service ability is called **finishing** (NCERT §5.1, p. 58).
- For a fibre to be useful it must be available in large quantity, economical, and above all possess **spinnability** — the sum of length, strength, flexibility and surface structure that enables conversion to yarn (NCERT §5.2, p. 58).
- Fibres are classified by origin (natural/man-made), chemical type (cellulosic, protein, synthetic), generic type (animal hair, animal secretion) and trade name; by length they are **staple** (short, like cotton) or **filament** (long, like silk, polyester) (NCERT §5.3, p. 59).

- Four types of natural fibres: cellulosic (cotton/kapok seed-hair, flax/linen-hemp-jute bast, pineapple/sisal leaf, coir nut-husk); protein (wool/speciality hair animal-hair, silk animal-secretion); mineral (asbestos); natural rubber (NCERT §5.3 Natural Fibres, p. 59).
- The first manufactured fibre, **Rayon**, was commercially produced in AD 1895; rayons were long called "Artificial Silk" or "Art Silk" (NCERT §5.3 Manufactured Fibres, p. 59).
- Manufactured-fibre production: raw material is converted to a **spinning solution** of specific viscosity, extruded through a **spinnerette** (thimble-shaped nozzle with tiny holes) into an atmosphere that hardens/coagulates it into filaments, which are then stretched and texturised (NCERT §5.3, p. 60; Fig. 2).
- Types of manufactured fibres: (a) regenerated cellulosic — Rayon (cuprammonium, viscose, high-wet-modulus); (b) modified cellulosic — Acetate (secondary acetate, triacetate); (c) protein — Azlon; (d) non-cellulosic/synthetic — nylon, polyester (terelene/terrene), acrylic (Orlon, Cashmilon), modacrylic, spandex, rubber; (e) mineral — glass (fibreglass), metallic (lurex) (NCERT §5.3, p. 60).
- **Yarn** is a continuous strand of textile fibres, filaments or material suitable for knitting, weaving or intertwining; processing natural staple fibres into yarn is called **spinning**, with spinning being the last stage (NCERT §5.4, p. 61).
- Yarn processing stages: (i) **Cleaning** removes impurities (seeds/leafy matter from cotton; twigs/suint from wool) producing **laps** (rolled sheets of loose fibres); (ii) **Making into a sliver** by **carding** (disentangling, laying straight and parallel) and **combing** (for finer fabrics — removes finer impurities and short fibres) yields a **sliver**, a 2–4 cm diameter rope-like mass; (iii) **Attenuation, drawing and twisting** combines several slivers, attenuates to size, gives slight twist; on the roving machine it is further attenuated to 1/4 – 1/8 of original diameter; finally **spinning** stretches and twists it to the desired fineness and t.p.i., winding on cones (NCERT §5.4, p. 61–62).
- All manufactured fibres are first made as filaments; yarns may be single-filament or multifilament, or filaments may be cut to staple length and spun ("spun yarns"); staple length is needed for blends like terecot (terene+cotton), terewool (terene+wool), polycot (rayon+cotton) (NCERT §5.4, p. 62).
- Yarn terminology: **Yarn number** — higher number = finer yarn (fixed relationship between fibre weight and yarn length); **Yarn twist** indicated as **t.p.i.** (twist per inch) — loose twist = softer/lustrous, tight twist = ridged (denim); **Yarn vs Thread** — yarn is used to make fabric, thread is used to join pieces of fabric (NCERT §5.4, p. 62).
- Two fabrics made directly from fibres are **felts** and **non-wovens / bonded fibre fabrics** — made by laying fibres into a matt and adhering them (NCERT §5.5, p. 63).
- Major fabric construction methods: **weaving**, **knitting**, and to a lesser extent **braiding** and **knotting** (NCERT §5.5, p. 63).

- **Weaving** is the oldest form of textile art; a woven fabric has two sets of yarns at right angles — **warp yarns** (length-wise, fitted on the loom, determine length/width) and **filling/weft yarns** (interlaced over and under warp); dobby or jacquard attachments create figurative designs; extra yarns left as loops produce towel (uncut) or velvet/corduroy (cut) (NCERT §5.5 Weaving, p. 63).
- Direction of yarns is called **grain**: warp yarns run along the **length-wise grain or selvedge**; filling yarns along the **width-wise grain or weft**; the bound (un-cut) sides of a fabric are the selvedges and the fabric is strongest along the selvedge (NCERT §5.5, p. 63).
- **Knitting** is the interlooping of at least one set of yarns; **weft/filling knitting** (yarn moves along the width — used for shaped articles like vests, underwear, socks) versus **warp knitting** (interlooping between adjacent yarns on a warp-like set — gives continuous lengths that can be cut and stitched); knitted fabrics have more elasticity, are porous and comfortable, ideal for sportswear (NCERT §5.5 Knitting, p. 64).
- **Braiding** plaits three or more yarns originating from a single location (shoelaces, ropes, wire insulation, trimmings); **Nets** are open mesh fabrics inter-knotted by hand/machine; **Laces** combine yarn twisting, interloping and knotting (NCERT §5.5, p. 64–65).
- A **finish** changes appearance, texture or behaviour; absolutely necessary ones are called **routine**; finishes may be **durable** (don't wash out — dyeing) or **renewable** (starching, blueing). Categories: change appearance (scouring, bleaching, calendering, tentering), change textures (starching/sizing, special calendering), change behaviour (wash-and-wear, permanent press, water-repellent/proof, mothproof, flame-retardant/proof, anti-shrink — **sanforisation**) (NCERT §5.6, p. 65).
- **Dyes** add colour that does not easily wash out; application may be at fibre stage (yarns of different colours, designed felts), yarn stage (woven checks, stripes), or fabric stage (most common — solid dyeing, batik, tie-and-dye, printing). **Printing** is a specialised localised dyeing using blocks, stencils, screens or roller printing (NCERT §5.6, p. 65–66).
- **Cotton** — most widely used apparel/home textile fibre; India was the first country to grow it; obtained from the seed pod of the cotton plant; seeds separated by **ginning** and sent as bales. Properties: natural cellulosic **staple** fibre, shortest fibre (1–5 cm), dull and slightly rough, heavier; good moisture absorbency, dries easily, comfortable for summer; available as muslin, cambric, poplin, longcloth (latha), casement, denim, sheeting (NCERT §5.7 Cotton, p. 66).
- **Linen** — a **bast** fibre from stems of the flax plant; obtained by **retting** (steeping stems in water so soft parts rot away). Properties: cellulosic; longer and finer than cotton — yarn is stronger and more lustrous; absorbs moisture readily; does not absorb dyes very readily so colours are not bright; flax is cultivated in few areas and needs longer processing, so used less than cotton. Jute and hemp are coarser bast fibres used for ropes/gunny bags (NCERT §5.7 Linen, p. 66–67).

- **Wool** — from sheep hair (also goats/rabbits/camels — "speciality hair fibres"); removed by **shearing**, kept in one piece called **fleece**; after sorting, fibres are **scoured** (remove dirt, grease, dried perspiration) and **carbonised** (remove vegetable matter). Properties: natural protein fibre, 4–40 cm length, natural **crimp/waviness** gives elasticity; low strength but good resilience and elastic recovery; surface scales are water-repellent yet wool absorbs large amounts of water without feeling wet — comfortable in humid/cold (NCERT §5.7 Wool, p. 67).
- **Silk** — natural filament fibre produced by silk-worm secretion; cultivated (mulberry) silk is smooth, longer, finer, more lustrous; wild silk (e.g., tussar) is coarser, stronger, shorter. Silk-worm cultivation is **sericulture**. Filaments are reeled from the cocoon (no spinning needed); broken filaments become **spun silk**. Properties: natural protein fibre, off-white to cream (wild silk brownish), high lustre/sheen, contains natural gum giving crisp texture, one of the stronger fibres with good elastic recovery and moderate elongation (NCERT §5.7 Silk, p. 68).
- **Rayon** — manufactured cellulosic; made from wood pulp treated with chemicals and regenerated. Properties: uniform diameter, clear and lustrous; cellulosic so behaves like cotton but lower strength and durability; advantage — can be reprocessed from waste material and looks like silk (NCERT §5.7 Rayon, p. 68).
- **Nylon** — the first true synthetic fibre (fully from chemicals); first introduced as bristles for tooth brushes; in 1940 first nylon fabrics were socks and stockings; gave impetus to other synthetics. Properties: smooth, shiny filaments with uniform diameter; very good strength and abrasion resistance (used in brushes/carpets); highly elastic — fine, transparent fibres used for one-size stockings; popular for apparel, socks, undergarments, swimsuits, gloves, nets, sarees — leading fibre for hosiery/lingerie (NCERT §5.7 Nylon, p. 69).
- **Polyester** — manufactured synthetic, also called Terylene/Terene; uniform diameter, smooth rod-like surface; partially transparent and lustrous; very low moisture regain so not comfortable in hot dry summer; greatest advantage is wrinkle resistance — commonly blended with rayon, cotton, wool and spun silk (NCERT §5.7 Polyester, p. 69).
- **Acrylic** — synthetic resembling wool so closely that even experts struggle to distinguish; commonly called **Cashmilon**; cheaper than wool; strength similar to cotton; high elongation with good elastic recovery; used as wool substitute in children's wear, apparels, blankets and knitted goods (NCERT §5.7 Acrylic, p. 69–70).
- **Elastomeric fibres** — elastic, rubber-like; natural form is rubber; synthetic equivalents are **spandex** or **Lycra**; used as blends with other fibres that have low elasticity (NCERT §5.7 Elastomeric fibres, p. 70).

Indian context expansions worth memorising for CUET: India is one of the world's top producers of cotton (Gujarat, Maharashtra, Telangana, Andhra), jute (West Bengal, Bihar, Assam — supplying Indian gunny bag and Hessian industries), and silk (Karnataka being the largest mulberry-silk producer; Assam famous for Eri, Muga and Tasar wild

silks). The Bureau of Indian Standards (BIS), through IS marks and the Silk Mark (operated by the Central Silk Board, an autonomous body under the Ministry of Textiles), guarantees fibre identity to Indian consumers — a Class XI fact that supports Class XII consumer-protection chapters. The Textiles Committee, set up under the Textiles Committee Act 1963, and the Handloom Mark (Office of the Development Commissioner for Handlooms) are other Indian institutional anchors mentioned indirectly when discussing textile policy. India was historically the first country to cultivate cotton (NCERT p. 66), and the Indus Valley civilisation evidence of cotton dyeing is the deep historical context behind this statement.

Fibre choice should follow climate, end-use and budget: cotton/linen for hot humid Indian summers because of high moisture absorbency; wool/silk for cold or formal use; nylon for hosiery and high-strength uses; polyester for crease-resistant blends; rayon for affordable silk-look; acrylic for warm winterwear at low cost; elastomerics in small percentages for stretch in sportswear and lingerie.

2.2 Definitions to memorise

Term	Definition	Page
Yarn	A continuous strand of textile fibres, filaments or material suitable for knitting, weaving or otherwise intertwining to form a fabric.	61
Fibre	The basic hair-like building block of a fabric, obtained by untwisting a yarn.	57–58
Textile products / Textiles	Collective term for fibres, yarns and fabrics.	58
Finishing	Treatment given to fabric to improve appearance, lustre, touch or service ability.	58
Spinnability	Sum of length, strength, flexibility and surface structure that enables a fibre to be converted into yarn.	58
Staple fibre	A short-length fibre, e.g., cotton.	59
Filament fibre	A long-length fibre, e.g., silk, polyester.	59
Spinnerette	Thimble-shaped nozzle with very small holes through which the spinning solution is extruded to form manufactured filaments.	60
Sliver	Rope-like mass of loose carded/combed fibres, 2–4 cm in diameter.	61
Lap	Rolled sheet of loose, cleaned fibres.	61
Attenuation	Drawing out of combined slivers so they become longer and finer.	61
Yarn number	Designation of yarn fineness — higher number means a finer yarn.	62
		62

Term	Definition	Page
t.p.i. (twist per inch)	Measure of yarn twist; tightly twisted yarns appear as ridges (denim).	
Warp	Length-wise yarns fitted on the loom; run along the selvedge.	63
Weft / Filling	Width-wise yarn interlaced across the warp.	63
Selvedge	Bound length-wise edge of woven fabric; fabric is strongest along the selvedge.	63
Grain	Direction of yarns in a woven fabric (length-wise = selvedge; width-wise = weft).	63
Felt / Non-woven	Fabric made directly from fibres laid into a matt and bonded by adhesion.	63
Weft / filling knitting	Knitting where the yarn moves along the width — used for shaped articles.	64
Warp knitting	Industrial knitting where interlooping occurs between adjacent warp-like yarns; gives cuttable continuous lengths.	64
Finish	Treatment that changes a fabric's appearance, texture or behaviour.	65
Sanforisation	Anti-shrink finish.	65
Dye	Substance that adds colour to fabric in a manner that does not easily wash out.	65
Ginning	Process of separating cotton seeds from the fibres.	66
Retting	Steeping flax stems in water so the soft parts rot away, freeing linen fibres.	66
Bast fibre	Fibre obtained from the fleshy part inside the bark (e.g., linen, jute, hemp).	66
Shearing	Removal of hair from sheep to obtain wool.	67
Fleece	The wool hair removed in one piece during shearing.	67
Sericulture	Controlled cultivation of silk-worms for good quality silk.	68
Spun silk	Silk yarn made by spinning broken cocoon filaments.	68

2.3 Diagrams / processes to remember

- **Figure 1: Fabric to Fibre** (p. 58) — visually decomposes a fabric into yarns and then fibres; the foundation visual for the fibre → yarn → fabric hierarchy.
- **Figure 2: Spinnerettes** (p. 60) — thimble-shaped nozzles with tiny holes that extrude spinning solution; central to the manufacture of rayon/nylon/polyester.
- **Figure 3: Cotton spinning** (p. 62) — shows the cotton boll → cleaned fibre → sliver → spun yarn progression for natural staple-fibre yarn processing.

- **Figure 4: Weft knitting** and **Figure 5: Warp knitting** (p. 64) — contrast the loop structures: weft knit loops run width-wise (shapeable articles), warp knit loops form between adjacent yarns (cuttable continuous lengths).
- Yarn-processing pipeline (p. 61–62): Cleaning → Lap → Carding → Combing → Sliver → Attenuation (roving, 1/4–1/8 diameter) → Spinning → Cone.

2.5 Key data / textile properties table (Indian context)

Fibre / property	Value	Source
Cotton staple length	1–5 cm	NCERT p. 66
Wool fibre length	4–40 cm	NCERT p. 67
Cotton classification	Natural cellulosic, staple	NCERT pp. 59, 66
Linen origin	Bast of flax plant	NCERT p. 66
Wool extraction	Shearing → fleece	NCERT p. 67
Silk extraction	Reeling from cocoon	NCERT p. 68
Silk-worm cultivation	Sericulture	NCERT p. 68
Cotton seed separation	Ginning	NCERT p. 66
Linen extraction step	Retting (steeping in water)	NCERT p. 66
First commercial manufactured fibre	Rayon, AD 1895	NCERT p. 59
First true synthetic fibre	Nylon	NCERT p. 69
Polyester alternative name	Terylene / Terene	NCERT p. 69
Acrylic trade name (India)	Cashmilon	NCERT p. 69
Spandex trade name	Lycra	NCERT p. 70
Sliver diameter	2–4 cm	NCERT p. 61
Attenuation reduces diameter to	1/4–1/8 of original	NCERT p. 62
Yarn number rule	Higher number = finer yarn	NCERT p. 62
Energy/fineness measure of twist	t.p.i. (twist per inch)	NCERT p. 62
Strongest direction of woven fabric	Along the selvedge	NCERT p. 63
Knitted fabric typical end-use	Vests, underwear, socks (weft knit); cut-stitch garments (warp knit)	NCERT p. 64
Anti-shrink finish name	Sanforisation	NCERT p. 65
	Central Silk Board / Silk Mark	India context

Fibre / property	Value	Source
Indian institution for silk authentication		
Indian textile quality mark	BIS / Handloom Mark	India context

2.4 Common confusions / NTA trap points

- **Yarn vs thread** — yarn makes the fabric, thread joins pieces of fabric; NTA loves to swap these in MCQs (p. 62).
- **Warp vs weft / selvedge vs grain** — warp = length-wise = selvedge, weft = width-wise; "fabric is strongest along the selvedge" is a frequent fact (p. 63).
- **Weft knitting vs warp knitting** — weft knit cannot be cut and stitched freely; warp knit can. Don't reverse which is "like a loom" (warp knitting is) (p. 64).
- **Staple vs filament** — cotton is staple (1–5 cm); silk is filament (long, reeled directly without spinning). Polyester is filament unless deliberately cut into staple length for blends (p. 59, 62, 66, 68).
- **Rayon classification** — Rayon is a regenerated cellulosic manufactured fibre, not a synthetic. Acetate is modified cellulosic; nylon/polyester/acrylic are non-cellulosic synthetics (p. 60).
- **Ginning vs retting vs shearing vs scouring** — ginning is for cotton (separating seeds), retting is for linen (soaking flax stems), shearing is removal of wool from sheep, scouring is washing wool after sorting (p. 66–67).
- **Yarn number direction** — higher yarn number means finer yarn (not coarser); a common reversal trap (p. 62).
- **Acrylic is NOT wool** — it merely resembles wool; chemically acrylic is a synthetic, not a protein fibre.
- **Cashmilon is acrylic; Lycra is spandex; Terene is polyester** — Indian-market trade names that NTA frequently swaps.
- **Sericulture is silk-worm cultivation**, NOT silk weaving — a common misread.
- **Sanforisation is anti-shrink**, not anti-crease — distinguish from wash-and-wear or permanent-press.
- **Rayon is regenerated cellulose**, NOT a synthetic in the strict sense (synthetics are made fully from chemicals).

🎯 Practice MCQs

📊 PYQ Alignment

Fabrics Around Us is a high-yield chapter in CUET Home Science Domain papers, typically contributing 5–8 MCQs each year, drawn most heavily from §5.3 (classification of natural and manufactured fibres), §5.5 (warp/weft, weaving vs knitting) and §5.7 (properties of cotton, wool, silk, nylon, polyester). Expected formats are direct factual recall (definitions of ginning, retting, sericulture, spinnerette), statement-based "which of the following is correct" on fibre properties, and match-the-following items pairing fibres with their categories or processes.