GLANCE

COTTON: Technical

COTTON CORPORATION OF INDIA (JUNIOR COMM EXECUTIVE)

INDIAN IQ

Cotton fiber possesses a variety of distinct properties, and we know that CCI focuses more on cotton crop in their exam that's why we have compiled this piece of information. Also once you decide to enter an organisation you should be smart enough to known at least some of its associated background.

- Cotton is the most important natural textile fiber, as well as cellulosic textile fiber, in the world, used to produce apparel, home furnishings, and industrial products. Worldwide about half of the fiber consumed is cotton.

- Cotton fibers are seed hairs from plants of the order Malvales, family Malvaceae, tribe Gossypieae, and genus Gossypium. Botanically, there are four principal domesticated species of cotton of commercial importance: hirsutum, barbadense, aboreum, and herbaceum.

- Thirty-three species are currently recognized; however, all but these four are wild shrubs of no commercial value. Each one of the commercially important species contains many different varieties developed through breeding programs to produce cotton with continually improving properties (e.g., faster maturing, increased yields, and improved insect and disease resistance) and fibers with greater length, strength, and uniformity.

- The cotton fibers used in textile commerce are the dried cell walls of formerly living cells. Botanically, cotton fibers are trichomes or seed coat hairs that differentiate from epidermal cells of the developing cottonseed. The cotton flower blooms only for one day and quickly becomes senescent thereafter.

- On the day of full bloom, or anthesis, the flower petals are pure white in most hirsutum varieties. By the day after anthesis, the petals turn bright pink in color, and, usually by the second day after anthesis, the petals fall off the developing carpel (boll).

- Each cotton fiber is composed of concentric layers and a hollow central core is known as the lumen. The outermost layer, known as the cuticle, is a thin layer of fats, proteins, and waxes.

- Beneath the cuticle is the primary wall, composed mainly of cellulose in which fibrils are arranged in a criss-cross pattern. Further towards the center is the secondary wall composed of cellulose, which consists of the bulk of the fiber.

History of the cotton industry in India

The history of the cotton industry in India dates back millennia. India held a global monopoly over the manufacturing of cotton textiles for about 3,000 years – from 1500 BCE to 1500 CE.

It served as an ideal medium of exchange in the barter economy during the ancient period.

- During the Middle Ages, it was exported to Eastern and European markets.

This was followed by the establishment of cotton mills by imperial powers in the modern period.

- The first cotton mill in India was established in 1818 at Fort Gloster near Kolkata but was a commercial failure.
- The second cotton mill in India was established by KGN Daber in 1854 and was named Bombay Spinning and Weaving Company.
- This mill is said to mark the true foundation of the modern cotton industry in India.
- In **Ahmedabad – also referred to as the 'Manchester of India'** – the opening of the Shahpur mill in 1861 and the Calico mill in 1863 marked the city's spectacular rise as one of the world's prime cotton manufacturing locales.

However, the real expansion of the cotton textile industry in India took place in the 1870s.

- During this period, the number of mills rose to 47, of which over 60 % were in Mumbai.

The First and Second World Wars, the Swadeshi Movement, and the grant of fiscal protection rapidly propelled the growth of this industry.

- As a result, the number of mills increased from 334 in 1926 to 389 in 1939, and to 417 in 1945.
- Production of cotton cloth also increased from 4,012 million yards in 1939-40 to 4,726 million in 1945-46.

Growth of the cotton industry

Cotton production in India increased from 119 lakh bales in 1991-92 to 345 lakh in 2016-17, a growth of 190%.

Nearly two-thirds of cotton production in India comes from the states of Maharashtra, Gujarat, Andhra Pradesh, and Telangana – collectively known as the Cotton Basket of India.

- Within the country, Maharashtra has the highest area under cultivation, at 41.2 lakh ha, followed by Gujarat at 27.1 lakhs and Telangana at 17.9 lakh.
- Together, these three states account for 72% of the total cotton acreage in the country.
- Approximately 62% of India's cotton is produced in rainfed areas, and 38% is on irrigated lands.
- India grows all four known species of cultivated cotton.

The cotton industry in India leans towards apparel exports, contributing approximately 51% to overall apparel exports. Approximately 74% of the apparel exported from India is made of cotton.

Cotton is freely exportable from India, with major export destinations being the US, Bangladesh, China, Vietnam, Pakistan, Indonesia, Taiwan, and Thailand, among others.

- Bangladesh has been the largest importer of Indian cotton since FY 2015. India's cotton exports are expected to jump more than 43% due to strong overseas demand, especially from China.
- India is the second largest exporter after the USA and the second largest consumer after China.

Export trends

In 2020, India stood as the third highest exporter of raw cotton globally, accounting for about 10.2% of the total global exports.

- As per estimates provided by Committee on Cotton Production and Consumption (COCPC), India's total cotton exports are estimated to be 4 million bales in 2021-22.
- Bangladesh, China, and Vietnam were India's major cotton importers between April 2021-February 2022.
- Despite the COVID-19 pandemic, the export of cotton and cotton yarn from India has not stopped.
- China is the second largest importer of cotton from India after Bangladesh together accounting for over 80% of cotton imports from India.
- Vietnam and Indonesia are among the largest importer of cotton from India making over 15% of the total cotton exports.

Challenges faced by the cotton industry

There has been a significant decline in cotton production which has also resulted in a significant decline in the closing stock of the cotton market in India.

The major issues faced by the cotton sector in India can be listed below:

- India's cotton fields are vulnerable to insect infestation, which lowers both output and quality.
- Many factors, including lack of crop rotation, monoculture, adverse weather, poor soil quality, inadequate pest control, etc., contribute to pest infestation in cotton crops.
- India produces less cotton per hectare than other significant cotton-producing nations. This is mostly caused by the employment of out-of-date farming techniques, insufficient irrigation systems, and subpar seed quality.
- Small-scale cotton farmers in India struggle to make ends meet due to the high cost of inputs including seeds, fertilizer, and insecticides.
- The success of India's cotton crop is primarily dependent on the monsoon rains, which may be inconsistent and unexpected.
- There are a lot of indebted cotton farmers in India, which might result in a vicious cycle of debt and poverty.

- As they have no access to markets, many Indian cotton producers are compelled to sell their products to intermediaries for poor rates.

Government initiatives for the cotton sector

The government has been implementing various policy initiatives and schemes to encourage cotton-spinning millers in the country, including the announcement of key reforms under a Special Package.

- Amended Technology Upgradation Fund Scheme (ATUFS)
- Under the Market Access Initiative (MAI) Scheme, the government offers rebates on state and central taxes and levies that are integrated into production, as well as aid to exporters.
- Schemes like SAMARTH (Scheme for Capacity Building in the Textile Sector) aim to address the shortage of skilled workers in the textile sector with a target of training 10 lakh people.
- The government of India has launched Mega Investment Textiles Parks (MITRA) during the Union Budget for 2021-22 under which seven textile parks will be established over three years.
- Confederation of Indian Textile Industry (CITI), one of the leading industry chambers of the textile sector in India is working across 1700 villages of Rajasthan, Madhya Pradesh, and Maharashtra in association with about 90,000 farmers for improving yield and production of cotton sustainably.

Cotton Corporation of India (CCI)

The Cotton Corporation of India was established in July 1970 under the administrative control of the Ministry of Textiles, the Government of India as a Public Sector Undertaking under the Companies Act 1956.

- Initially, CCI served as a canalizing agency for cotton imports and raw cotton purchases to provide required pricing support to enterprising planters and to procure raw cotton for textile mills.
- CCI's role now however is to stabilize prices by enforcing price support measures whenever the market prices fall below the government-decided price supports.
- CCI also conducts commercial purchasing operations to meet the domestic textile industry's raw material requirements, particularly during the lean season.

Cotton as a industry in India:

- ✓ The cotton industry in India is considered the second most developed sector in the Indian textile industry after man-made fibers. India is one of the world's largest producer of cotton hence cradling a rich history related to the textile as well.

- ✓ Cotton is one of mankind's great discoveries, and it is a commodity that is virtually available everywhere. It is a testament to its utility, as well as huge impact the capitalism has had on its production and consumption by humans.
- ✓ Cotton production in India has focused on textiles for over thousands of years, generating significant employment for both skilled and unskilled labor thus helping strengthen the country's economy.
- ✓ The cotton sector in India is considered the second most developed sector in the Indian textile industry after man-made fibers. At 18% of the global total, India is the world's largest producer of cotton.
- ✓ It also has the largest area under cotton cultivation in the world, representing about 25% of the world's area under cultivation. The states of Gujarat, Maharashtra, Andhra Pradesh, Haryana, Punjab, Madhya Pradesh, Rajasthan, Karnataka, and Tamil Nadu are the major cotton-producing areas in India.

Composition of cotton

Constituent	Typical %	Range %
Cellulose	95.0	88.0–96.0
Protein (%N 6.25) *% N – The standard method of estimating percent protein from the nitrogen content*	1.3	1.1–1.9
Pectic substances	0.9	0.7–1.2
Ash	1.2	0.7–1.6
Wax	0.6	0.4–1.0
Total sugars	0.3	0.1–1.0
Organic acids	0.8	0.5–1.0

Constituent	Typical %	Range %
Pigment trace	–	–
Others	1.4	–

Classing cotton

Fiber Length

- ✓ Fiber length is the average length of the longer half of the fibers (upper half mean length). It is reported in both 100ths and 32nds of an inch. Fiber length is measured by passing a "beard" of parallel fibers through an optical sensing point. The beard is formed when fibers from a sample of cotton are automatically grasped by a clamp, then combed and brushed into parallel orientation.
- ✓ Length uniformity affects yarn evenness and strength and the efficiency of the spinning process. It is also related to short-fiber content (the content of fibers shorter than 1/2 inch). Cotton with a low uniformity index is likely to have a high percentage of short fibers. Such cotton may be difficult to process and is likely to produce low-quality yarn.

Fiber Strength

- ✓ Strength measurements are reported in grams per tex. A tex unit is equal to the weight in grams of 1,000 meters of fiber. Therefore, the strength reported is the force in grams required to break a bundle of fibers one tex unit in size. Strength measurements are made on the same beards of cotton that are used for measuring fiber length. The beard is clamped in two sets of jaws, 1/8 inch apart, and the amount of force required to break the fibers is determined. The table below is a guide to interpreting fiber strength measurements.

Micronaire

- ✓ Micronaire is a measure of fiber fineness and maturity. An airflow instrument is used to measure the air permeability of a constant mass of cotton fibers compressed to a fixed volume. The chart below is a guide to interpreting micronaire measurements.

Color Grade

- ✓ Color grade is determined by the degree of reflectance (Rd) and yellowness (+b) as established by official standards and measured by the high volume instrument. Reflectance indicates how bright or dull a sample is, and yellowness indicates the degree of pigmentation.

Trash

- ✓ The ratio between the percent area of trash and trash particle count is a good indicator of the average particle size in a cotton sample. For instance, a low percent area combined with a high particle count indicates a smaller average particle size than does a high percent area with a low particle count.
- ✓ A high percent area of trash results in greater textile mill processing waste and lower yarn quality. Small trash particles, or "pepper trash," are highly undesirable, because they are more difficult for the mill to remove from the cotton lint than are larger trash particles.

Purified Cotton Fiber Properties:

1. Upper Half Mean Length (in inches)	
A. #1 Upland Virgin Staple	0.70 – 1.30
B. Gin Motes	0.50 – 0.80
C. Comber	<0.50
D. First Cut linters	0.25- 0.50
2. Fiber Diameter	
A. Micronaire	2.0 – 7.0
B. Approximate Denier	0.7 – 2.5
3. Elastic Recovery (by percent)	
A. At 2 % Extension	74%
B. At 5% Extension	45%
4. Breaking Elongation (dry)	3-9.5
5. Tensile Strength (g per tex/g per denier)	
A. Dry	27 – 44 / 3.0 – 4.9
B. Wet	28 – 57 / 3.3 – 6.4
6. Moisture Regain at Standard Conditions	7%

7. Water Absorbing Capacity (USP method)	>24 grams of water per gram of fiber
8. Density (g/cm^3)	1.54
9. Degree of Polymerization	9,000 – 15,000
10. Crystallinity by X-ray Diffraction (average)	73%
11. Color (Whiteness Index)	90 – 100
12. Thermal Resistance A. Long exposure to dry heat above 300^0F will cause gradual decomposition B. Temperatures greater than 475^0F cause rapid deterioration	
13. Acid Resistance A. Disintegrated by hot dilute acids or cold concentrated acids B. Unaffected by cold weak acids	
14. Alkali Resistance A. Swelling in NaOH above 15% concentration but no damage	
15. Organic Solvent Resistance A. Resistant to most common industrial and household solvents	

- ✓ Cotton, like rayon and wood pulp fibers, is made of cellulose. Cellulose is a macromolecule made up of anhydroglucose unit connected by 1, 4 oxygen bridges with the polymer repeating unit being anhydro-beta-cellulose.

- ✓ Cotton cellulose differs from wood and rayon cellulose by having higher degrees of polymerization and crystallinity. The degree of polymerization is the number of repeating units that are linked together to form a molecule of cellulose.

- ✓ Crystallinity indicates that the fiber's cellulose molecules are closely packed and parallel to one another. Higher degrees of polymerization and crystallinity of polymers are associated with higher strengths.

Fiber Strength (grams/tex)

Fiber	**Dry Strength**	**Wet Strength**
Cotton	27 – 45	30 – 54
Rayon (regular)	22 – 27	10 – 14
Polyester	27 – 54	27 – 54

Next PDF- Cotton Production (Package of Practices)