CLASS 10 · CONTEMPORARY INDIA II · CHAPTER 6

Manufacturing Industries

Every section of the chapter in one sentence, with the key terms highlighted. Cover the highlighted words with a card or strip of paper and say them from memory. The figures, flow charts and maps are taken from the chapter PDF; the interactive version lets you enlarge each one.

One-liners Industry table Memory tricks Flashcards Quiz Revision plan

One line per section

1 Manufacturing

Production of goods in large quantities after processing **raw materials into more valuable products** is manufacturing; it belongs to the **secondary sector**, and a country's **economic strength** is measured by the development of its manufacturing industries.

1.1 Importance of Manufacturing

Manufacturing is the **backbone of development** because it **modernises agriculture** and reduces **dependence on agricultural income**, removes **unemployment and poverty** (the idea behind **public sector and joint sector** industries, set up also in **tribal and backward areas** to cut **regional disparities**), and its **exports bring foreign exchange**.

1.2 Agriculture and industry move hand in hand

Agro-industries raise farm productivity: they take **raw materials** from farmers and sell them **irrigation pumps, fertilisers, insecticides, PVC pipes** and machines; in today's **globalisation**, **self-sufficiency alone is not enough**, our goods must be **at par in quality with the international market**.

2 Classification of Industries

By **source of raw material** (**agro based** / **mineral based**), by **main role** (**basic or key**, e.g. iron and steel / **consumer**, e.g. sugar, toothpaste), by **capital investment** (small scale: max **₹ one crore**), by **ownership** (**public**: BHEL, SAIL; **private**: TISCO, Bajaj Auto, Dabur; **joint**: Oil India Ltd; **cooperative**: Maharashtra sugar, Kerala coir) and by **bulk and weight** (**heavy**: iron and steel / **light**: electrical goods).

3 Agro-based Industries

Cotton, jute, silk, woollen textiles, sugar and edible oil industries are based on **agricultural raw materials**.

3.1 Textile Industry

It has a unique place as it adds to **industrial production, employment and foreign exchange**, and is the **only industry that is self-reliant and complete in the value chain**, from **raw material to the highest value-added products**.

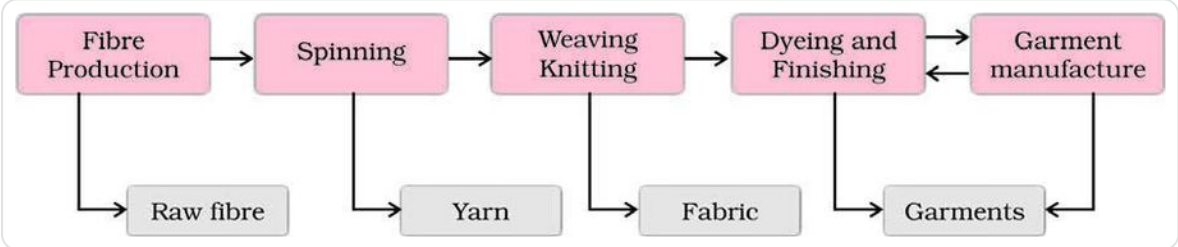


Fig. 6.1: Value addition in the textile industry

3.2 Cotton Textiles

Ancient India used **hand spinning and handloom weaving**; **power-looms** came **after the 18th century**, colonial rule hurt it against **mill-made cloth from England**, the **first successful mill** opened in **Mumbai in 1854**, and it first grew in the **cotton belt of Maharashtra and Gujarat** thanks to **raw cotton, market, transport and ports, labour and moist climate**.



India: Distribution of cotton, woollen and silk industries

3.3 Spinning, weaving and khadi

Spinning is **centralised in Maharashtra, Gujarat and Tamil Nadu** and is **world class**, but **weaving is highly decentralised** (handloom, powerloom, mills) to keep **traditional skills** and gives **low quality fabric**; **handspun khadi** gives large scale employment as a **cottage industry**, and the industry supports **chemicals and dyes, packaging and engineering**.

3.4 Jute Textiles

India is the **largest producer of raw jute and jute goods** and **second exporter after Bangladesh**; mills lie along the **Hugli river** in West Bengal, the **first mill** was at **Rishra near Kolkata in 1855**, and after **Partition (1947)** **three-fourths of the jute area went to Bangladesh**; Hugli factors: **jute areas nearby, cheap water transport, rail-road network, water for processing, cheap labour** and **Kolkata's banking, insurance and port**.

3.5 Sugar Industry

India is **second in sugar** but **first in gur and khandsari**; cane is **bulky** and **loses sucrose in haulage**, so **60% of mills are in UP and Bihar**; being **seasonal** it suits the **cooperative sector**, and mills are shifting **south and west, especially Maharashtra**, for **higher sucrose**, a **cooler climate (longer crushing season)** and **more successful cooperatives**.

4 Mineral-based Industries

Industries that use **minerals and metals as raw materials** are mineral-based industries.

4.1 Iron and Steel Industry

It is the **basic industry** since all others depend on it for **machinery**, and steel use is the **index of a country's development**; it is a **heavy industry** (heavy, bulky inputs and goods, **high transport cost**) needing **iron ore, coking coal and limestone in the ratio 4 : 2 : 1**, plus **manganese to harden the steel**.

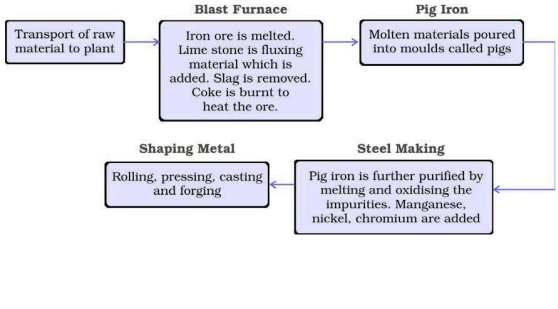


Fig. 6.2: Processes of manufacture of steel



India: Iron and Steel Plants

4.2 Chhotanagpur plateau

The **Chhotanagpur plateau** has the **maximum concentration** of iron and steel industries because of **low cost iron ore**, **high grade raw materials in proximity**, **cheap labour** and **vast growth potential in the home market**.

4.3 Aluminium Smelting

The **second most important metallurgical industry**: aluminium is **light, corrosion resistant, a good heat conductor, malleable** and used for **aircraft, utensils and wires** as a **substitute for steel, copper, zinc and lead**; it is made from **bauxite** (bulky, dark reddish rock), and its two location factors are **regular electricity** and **cheap assured raw material**.



Fig. 6.3: Strip casting mill at smelter of NALCO

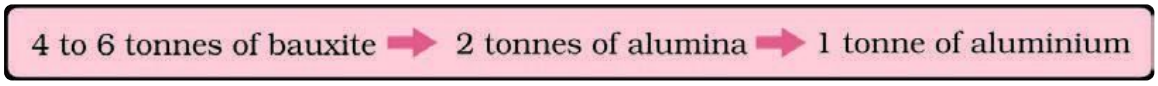


Fig. 6.4: 4 to 6 tonnes of bauxite → 2 tonnes of alumina → 1 tonne of aluminium

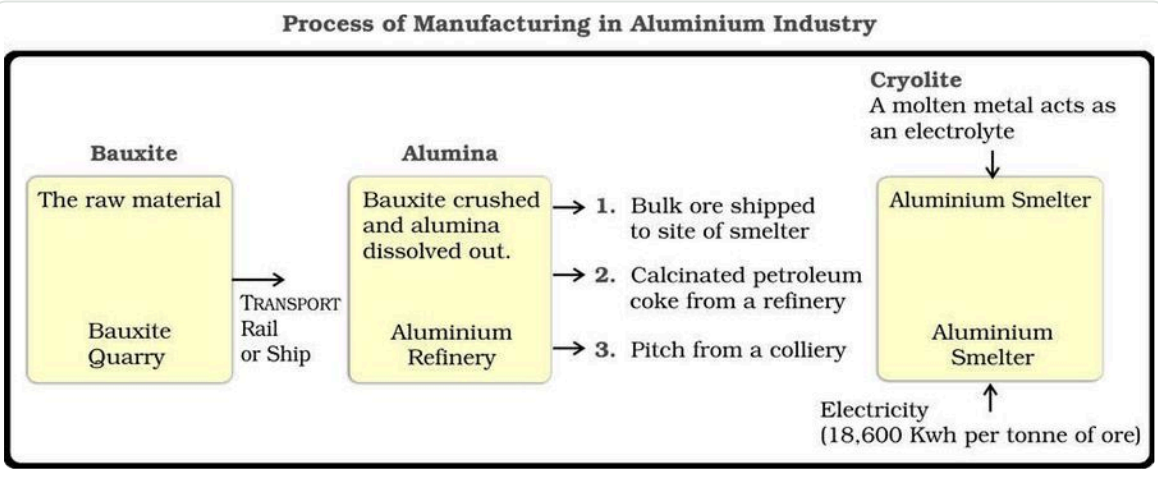


Fig. 6.5: Process of manufacturing in aluminium industry

4.4 Chemical Industries

A **fast growing and diversifying** industry: **inorganic** chemicals (**sulphuric acid**, nitric acid, alkalies, **soda ash**, caustic soda) are **widely spread**, **organic** chemicals (**petrochemicals** for synthetic fibres, rubber, plastics, drugs) are **located near oil refineries**, and the industry is **its own largest consumer**.

4.5 Fertilizer Industry

It makes **nitrogenous (urea)**, **phosphatic**, **DAP** and **complex N-P-K** fertilizers; **potash is entirely imported** as India has no usable reserves; it spread after the **Green Revolution**, and **Gujarat, Tamil Nadu, UP, Punjab and Kerala** make **half** of the output.

4.6 Cement Industry

Cement is needed for **houses, factories, bridges, roads, airports and dams**; it uses **bulky raw materials: limestone, silica and gypsum**, plus **coal, electric power and rail transport**; the **first plant** was in **Chennai in 1904**, and **Gujarat plants** can reach the **Gulf market**.

4.7 Automobile Industry

Trucks, buses, cars, two- and three-wheelers and multi-utility vehicles are made in India; **after liberalisation**, **new and contemporary models** raised demand; centres: **Delhi, Gurugram, Mumbai, Pune, Chennai, Kolkata, Lucknow, Indore, Hyderabad, Jamshedpur, Bengaluru**.

4.8 Information Technology and Electronics Industry

It ranges from **transistor sets to televisions, telephones, radars and computers**; **Bengaluru** is the **electronic capital of India**, major concentration is at **Bengaluru, Noida, Mumbai, Chennai, Hyderabad and Pune**, its big impact is **employment generation**, and growth in **hardware and software** is the key to its success.



Fig. 6.6: Cable manufacturing facilities at HCL, Rupnarainpur (West Bengal)



India: Some Software Technology Parks

5 Industrial Pollution and Environmental Degradation

Industries help growth but cause **four types of pollution: air, water, land and noise**; **thermal power plants** are also polluting industries.

5.1 Air pollution

Caused by undesirable gases like **sulphur dioxide and carbon monoxide** and **particulate matter** (dust, sprays, mist, smoke) from **chemical and paper factories, brick kilns, refineries, smelting plants** and burning **fossil fuels**; **toxic gas leaks** (the **Bhopal Gas tragedy**) harm people, animals, plants and buildings.

5.2 Water pollution

Caused by **organic and inorganic wastes** from **paper, pulp, chemical, textile and dyeing, refineries, tanneries and electroplating** industries (dyes, acids, **lead and mercury**); **fly ash, phospho-gypsum and iron and steel slags** are the major solid wastes, **thermal pollution** comes from **hot water** drained before cooling, and **nuclear wastes** cause **cancers, birth defects and miscarriages**.

5.3 Land (soil) pollution

Soil and water pollution are closely related: dumping **glass, harmful chemicals, effluents, packaging, salts and garbage** makes soil useless, and **rain water percolates**, carrying pollutants into the **ground water**.

5.4 Noise pollution

Unwanted sound from **industry, construction, generators, saws and pneumatic and electric drills** causes **irritation and anger**, **hearing impairment**, and **higher heart rate and blood pressure**.

6 Control of Environmental Degradation

Every litre of industrial waste water pollutes **eight times its quantity of freshwater**; reduce it by **reusing and recycling water**, **rainwater harvesting**, and **treating hot water and effluents** in three phases: **primary (mechanical: screening, grinding, flocculation, sedimentation)**, **secondary (biological)** and **tertiary (biological, chemical and physical, recycling)**; **overdrawing of ground water** must be **regulated legally**.



Fig. 6.7: Sewage Treatment plant under Yamuna action plan at Faridabad

6.1 Controlling air and noise

Cut particulate matter with **electrostatic precipitators, fabric filters, scrubbers and inertial separators** on smoke stacks, use **oil or gas instead of coal**, fit generators with **silencers**, **redesign machinery** for energy efficiency, and use **noise absorbing material** and **earplugs**.

6.2 NTPC shows the way

NTPC, a major power corporation with **ISO 14001 certification for EMS**, protects the environment by **optimum use of equipment**, **minimising waste by maximising ash utilisation**, **green belts**, **ash pond management and ash water recycling**, and **ecological monitoring with online databases**; sustainable development means **integrating economic development with environmental concerns**.



Fig. 6.8: Ramagundam plant

Industries in one table

INDUSTRY	RAW MATERIAL / INPUTS	WHY IT IS LOCATED THERE	CENTRES & KEY FACTS
Cotton textiles	Raw cotton	Raw cotton, market, transport & ports, labour, moist climate	Maharashtra & Gujarat cotton belt; first mill Mumbai 1854; spinning in Maharashtra, Gujarat, TN
Jute	Raw jute ("golden fibre")	Jute areas nearby, cheap water transport, rail-road network, water, cheap labour, Kolkata port & banks	Hugli basin, West Bengal; first mill Rishra 1855; largest producer, 2nd exporter after Bangladesh

INDUSTRY	RAW MATERIAL / INPUTS	WHY IT IS LOCATED THERE	CENTRES & KEY FACTS
Sugar	Sugarcane (bulky, loses sucrose)	Near cane fields; seasonal → cooperatives	60% mills in UP & Bihar; shifting to Maharashtra; 2nd in sugar, 1st in gur & khandsari
Iron & steel	Iron ore, coking coal, limestone 4 : 2 : 1 + manganese	Cheap high grade ore nearby, cheap labour, home market	Chhotanagpur plateau; basic & heavy industry; index of development
Aluminium	Bauxite (4–6 t → 2 t alumina → 1 t Al)	Regular electricity + cheap assured raw material	Odisha, WB, Kerala, UP, Chhattisgarh, Maharashtra, TN; 2nd metallurgical industry
Chemical	Inorganic: sulphuric acid, soda ash...; organic: petrochemicals	Inorganic widely spread; organic near oil refineries	Its own largest consumer
Fertilizer	N (urea), P, DAP, NPK; potash all imported	Spread after the Green Revolution	Gujarat, TN, UP, Punjab, Kerala = half of output
Cement	Limestone, silica, gypsum + coal, power	Bulky inputs; needs rail transport	First plant Chennai 1904; Gujarat plants reach Gulf market
Automobile	Vehicles of all kinds	Demand rose after liberalisation	Delhi, Gurugram, Mumbai, Pune, Chennai, Kolkata, Lucknow, Indore, Hyderabad, Jamshedpur, Bengaluru
IT & electronics	Hardware and software	Big employment generator	Bengaluru = electronic capital; also Noida, Mumbai, Chennai, Hyderabad, Pune

Memory tricks

5 BASES OF CLASSIFICATION

S-R-C-O-B

"Some Rich Cats Own Boats": Source of raw material, Role, Capital investment, Ownership, Bulk and weight.

4 KINDS OF OWNERSHIP

P-P-J-C

Public (BHEL, SAIL), **P**rivate (TISCO, Bajaj, Dabur), **J**oint (Oil India Ltd), **C**ooperative (Maharashtra sugar, Kerala coir). Joint = "OIL mixes with both".

COTTON LOCALISATION

R-M-T-L-M

"Real Mumbai Traders Love Monsoon": Raw cotton, Market, Transport and ports, Labour, Moist climate.

JUTE ON THE HUGLI

J-W-N-W-L-K

Jute fields near, cheap **W**ater transport, rail-road **N**etwork, **W**ater for processing, cheap **L**abour, **K**olkata's banks and port.

SUGAR MOVES TO MAHARASHTRA

S-C-C

More **S**ucrose, **C**ooler climate (longer crushing), **C**ooperatives work better. "Sweet, Cool, Cooperative".

STEEL RECIPE

4 : 2 : 1

Iron ore 4, **C**oking coal 2, **L**imestone 1: "I Can Lift". Add a pinch of **manganese** to harden it.

ALUMINIUM RECIPE

4–6 → 2 → 1

Bauxite → alumina → aluminium, halving each step. Two location needs: **power + raw material** ("Al needs Plug and Pit").

FERTILIZER HALF-SHARE STATES

G-T-U-P-K

"Good Teachers Use Proper Knowledge": Gujarat, Tamil Nadu, UP, Punjab, Kerala. And **K** (potash) is the one India fully imports.

CEMENT RAW MATERIALS

L-S-G

"Let's Start Grinding": Limestone, Silica, Gypsum. First plant Chennai 1904.

4 TYPES OF POLLUTION

A-W-L-N

Air, Water, Land, Noise: "A Wet Land is Noisy".

EFFLUENT TREATMENT

Machines → Microbes → Mix

Primary = **mechanical** (screen, grind, flocculate, settle), Secondary = **biological**, Tertiary = **biological + chemical + physical** (recycling).

SMOKE-STACK DEVICES

E-F-S-I

"Every Factory Should Improve": Electrostatic precipitators, Fabric filters, Scrubbers, Inertial separators.

NTPC'S FIVE STEPS

O-M-G-R-E

"OMG, RE!": Optimum equipment use, Minimise waste (ash use), Green belts, Reduce pollution (ash ponds), Ecological monitoring.

ONE-WORD ACTIVITY ANSWERS

P W M R P M P

Power (5), Worker (6), Market (6), Retailer (8), Product (7), Manufacture (11), Pollution (9).

Industry timeline: read it as a story

- `18th c.` Power-looms come into use after the 18th century.
- `1854` First successful cotton textile mill, Mumbai.
- `1855` First jute mill, Rishra near Kolkata.
- `1904` First cement plant, Chennai.
- `1947` Partition: mills stay in India but three-fourths of the jute area goes to Bangladesh.

Trick: cotton and jute are "twins" one year apart (1854, 1855), Mumbai then Kolkata, west then east. Cement comes 50 years later, down south in Chennai.

Which place, which fact

Maharashtra & Gujarat	Early cotton textile belt; spinning still centralised here (with Tamil Nadu)
Hugli basin (West Bengal)	Jute mills in a narrow belt; first at Rishra, 1855

Uttar Pradesh & Bihar	60% of sugar mills
Maharashtra	Sugar mills shifting here; cooperative sugar industry
Kerala	Cooperative coir industry
Chhotanagpur plateau	Maximum concentration of iron and steel plants
Bhilai (Chhattisgarh)	Public sector steel plant (puzzle answer)
Gujarat	Cement plants with access to the Gulf market
Bengaluru	Electronic capital of India
Varanasi (UP)	Railway diesel engines (puzzle answer)
Rupnarainpur (WB)	HCL cable manufacturing (Fig. 6.6)
Faridabad	Sewage treatment plant under the Yamuna action plan (Fig. 6.7)
Ramagundam	NTPC plant (Fig. 6.8)

Maharashtra appears three times (cotton, spinning, sugar). Steel plants on the map: Bhilai, Bokaro, Burnpur, Durgapur, Jamshedpur, Rourkela, Vishakhapatnam, Vijaynagar, Bhadravati, Salem.

Flashcards

Cover the answer line (→) and say the answer out loud first, then check.

What is manufacturing?

→ Production of goods in large quantities after processing raw materials into more valuable products

Manufacturing falls in which sector?

→ Secondary sector

What are basic (key) industries? Example?

→ Industries that supply their products as raw materials to make other goods, e.g. iron and steel

Maximum investment for a small scale industry?

→ Rupees one crore

Example of a joint sector industry?

→ Oil India Ltd. (OIL)

Two examples of cooperative sector industry?

→ Sugar industry in Maharashtra, coir industry in Kerala

Only industry complete in the value chain?

→ Textile industry

First successful textile mill: where and when?

→ Mumbai, 1854

Spinning is centralised in which states?

→ Maharashtra, Gujarat and Tamil Nadu

First jute mill: where and when?

→ Rishra, near Kolkata, 1855

India's rank in jute export?

→ Second, after Bangladesh

Why are 60% of sugar mills in UP and Bihar?

→ Cane is bulky and loses sucrose in haulage, so mills stay near cane fields

Ratio of iron ore : coking coal : limestone?

→ 4 : 2 : 1

Region with the most iron and steel plants?

→ Chhotanagpur plateau

Two prime location factors for aluminium?

→ Regular supply of electricity and assured cheap raw material (bauxite)

Which fertilizer input is entirely imported?

→ Potash (K)

Raw materials of cement?

→ Limestone, silica and gypsum

Electronic capital of India?

→ Bengaluru

Three phases of effluent treatment?

→ Primary (mechanical), secondary (biological), tertiary (biological, chemical, physical)

NTPC holds which certification?

→ ISO 14001 for EMS (Environment Management System)

Quick quiz

First two are the textbook MCQs; questions 3–6 are the word-search puzzle answers. Correct answers are marked in green.

1. Which one of the following industries uses bauxite as a raw material?

- **Aluminium smelting** ✓
- Cement
- Paper
- Steel

2. Which one of the following industries manufactures telephones, computers, etc.?

- Steel
- **Electronic** ✓
- Aluminium smelting
- Information Technology

3. Puzzle: which fibre is known as the 'Golden Fibre'?

- Cotton
- Silk
- **Jute** ✓
- Wool

4. Puzzle: public sector steel plant located in Chhattisgarh?

- Bokaro
- **Bhilai** ✓
- Rourkela
- Salem

5. Puzzle: railway diesel engines are made in Uttar Pradesh at...

- Lucknow
- Kanpur
- **Varanasi** ✓
- Noida

6. Puzzle: textiles, sugar, vegetable oil industries using farm raw materials are called...

- Mineral based
- **Agro based** ✓
- Basic
- Consumer

7. Iron ore, coking coal and limestone are needed in the ratio...

- 1 : 2 : 4
- **4 : 2 : 1** ✓
- 2 : 2 : 1
- 4 : 1 : 2

8. Most jute mills are located along the banks of the...

Ganga | **Hugli** | Mahanadi | Godavari

9. The first cement plant was set up in 1904 at...

Mumbai | Kolkata | **Chennai** | Delhi

10. Thermal pollution of water is caused by...

Plastic waste | **Hot water drained before cooling** | Fly ash | Pesticides

Revision plan

Day 1
Read the one-liners aloud twice. Then cover the highlighted words and recall them.

Day 2
Write the industry table from memory on blank paper. Check and fix in red.

Day 4
Flashcards + quiz. Re-read only the sections you missed.

Day 7
Explain the chapter to someone in 5 minutes without looking.

Day 14
Answer the 120-word questions (how industries pollute; steps to reduce degradation) using the key terms.

MAP METHOD

On a blank India outline map, mark the cotton belt, the Hugli jute belt, the ten steel plants and the software technology parks. Pictures stick better than lists.

MEMORY PALACE

Walk through your home: the **door** is "manufacturing = backbone", the **wardrobe** holds cotton and jute, the **kitchen** is sugar, the **garage** is steel, aluminium and cars, the **study desk** is IT, and the **bathroom drain** is pollution and effluent treatment.

BLURTING

Close the book, set a 5-minute timer and write every key term you remember. The gaps show you what to revise.