

# Manufacturing Industries in India

## 23.1 INTRODUCTION

As you know, India is very rich in agricultural and mineral resources. These resources can be better utilised by processing or changing them into items of utility. The processing of resources into more, useful items is called manufacturing. These manufactured goods are finished products derived from the raw materials. These raw materials used in manufacturing industry may be either in natural form such as cotton, iron ore, wood or may be in the semi-processed material like cotton yarn, pig iron etc. which can be further used for making more useful goods. Thus some of these finished goods of an industry may be raw material for another or subsidiary industry.

In India manufacturing industries contributed about 15 percent of the country's gross national product and employes about 17 million workers. Thus it is an important source of national income of the country. Maharashtra contributes 20 percent of the total manufacturing output while West Bengal and Tamil Nadu contribute 10 per cent each, and Madhya Pradesh and Gujarat 7 percent each.

In this lesson, we will study different types of manufacturing industries, their classification and the way they are distributed in India.

## 23.2 OBJECTIVES

After studying this lesson you will be able to

- highlight role of manufacturing industries in the economic development of our country;
  - trace the historical development of manufacturing industries in India;
  - classify the manufacturing industries on the basis of different criteria;
  - describe spatial distribution of major agro-based and mineral based industries in India;
  - locate important industrial centres on the outline map of India; and
  - explain impact of industrial development on environment.
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### 23.3 DEVELOPMENT OF INDUSTRIES IN PRE-INDEPENDENCE PERIOD

The modern industrial development in India can be traced back to nineteenth century. The first cotton mill was set up in Calcutta in 1807 and subsequently in Bombay in 1854, predominantly with Indian capital and enterprise. Coal mining was started at Raniganj in 1772. Railways were introduced in 1854. This induced further growth of industries in different parts of the country. But most of these industries were located in Calcutta, Mumbai and Ahmedabad. The first effort was made to produce iron and steel at Kulti in 1874. In 1907 Tata Iron and Steel plant was set up at Jamshedpur. While cotton textile industry paved the way for modern agro-based industries, the Jamshedpur Iron and Steel plant opened up a new vista for modern mineral-based industries.

Several other medium and small size industries also came up rapidly. They include cement, glass, chemicals, soaps and some branches of engineering. Jute, sugar and paper industries too were initiated in pre-Independence era. The industrial production before Independence was neither adequate in quantity for meeting the demand of people nor it was diversified in character.

### 23.4 DEVELOPMENT OF INDUSTRIES IN POST-INDEPENDENCE PERIOD

Systematic industrial planning under different five year plans helped in establishing a number of industries like iron and steel plants, cement, paper, aluminium, chemical fertilizers, heavy engineering etc. The main feature of India's industrialisation in the post-Independence period is the substantial diversification of industrial base with the consequent ability to produce a large range of industrial goods. Indigenous capabilities were established with a goal to achieve self-sufficiency. As a result India could enter into the new sectors of mining, irrigation, power, chemicals, transport and communications based mainly on indigenous machinery and equipments. The process of industrialisation has also fostered development of wide variety of a technical, managerial, and operative skills. Today, India is in a position to provide consultancy services and undertake turn key projects even in other countries on a competitive basis.

- \* The industrial production before Independence was neither adequate in quantity for meeting the demands of people nor was it diversified in character.
- \* After Independence the main feature of industrialisation was diversification of industries and achievement of self-sufficiency.

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#### INTEXT QUESTION 23.1

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When and where was first cotton mill established in India ?

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2. Name the place and the year when the first iron and steel plant was established in India.  
\_\_\_\_\_
3. When and where was Tata Iron and Steel plant established?  
\_\_\_\_\_
4. What were the two main drawbacks of our industries before Independence?  
(i) \_\_\_\_\_ (ii) \_\_\_\_\_
5. State three important features of Industrial development during the post Independence period.  
\_\_\_\_\_  
\_\_\_\_\_

### 23.5 CLASSIFICATION OF MANUFACTURING INDUSTRIES

Industries can be classified on the basis of five criterias i.e. (i) source of raw material, (ii) ownership, (iii) function and role, (iv) size of industry and (v) weight of raw material of finished product.

#### Classification of Industries

Criteria	Types of Industries	Main Character	Examples
Sources of raw material	Agro based	Raw material obtained from agriculture	Cotton, Jute, Sugar, Paper
	Mineral based	Raw material obtained from mining	Iron and Steel, Chemical, Cement
Ownership	Public Sector	Owned by Government	Bokaro Iron & Steel Plant, Chitara-unjan Locomotive.
	Private Sector	Owned by individual or group of people	Tata Iron and Steel plant, J.K. Cement Industry
	Joint Sector	Jointly owned by private and Government sectors	Maruti Udyog
	Cooperative Sector	Jointly owned by producers of raw material	Sugar mills of Maharashtra, Amul of Gujarat, IFCCO Kandla.

Criteria	Types of Industries	Main Character	Examples
Function or role	Basic Industry	Finished products of basic industries used as raw material of other industries.	Iron and Steel Plant Petro - Chemical
	Consumer Industry	Products are directly consumed by individuals	Tooth pastes. Soap. Sugar
Size of Industry	Large Scale	Huge investment and establishment - use of heavy machine - large number of workers - factory run round the clock	Birla Cotton Mills Tata Iron and Steel Plant
	Small Scale	Investment and establishment is small few factory workers	Atlas Cycle, Usha Fans
	Village and Cottage	Owned by family members Small machines are fitted in the house.	Art Work, Ornaments
Weight of raw material of finished products	Heavy Industry	Both raw material and finished products are heavy and bulky.	Iron and Steel plant BHEL Bhopal
	Light Industry	Both raw material & finished products are light in weight.	HMT Watches, Bangalore Ready made Garments

This classification is not rigid. They cut across different classifications of industries. for examples. Bhilai Iron & Steel Plant is a mineral based. It is in public sector. It is basic industry It is a large scale industry and also a heavy industry.

### INTEXT QUESTIONS 23.2

1. Name the five criteria under which Industries can be classified.  
(i) \_\_\_\_\_ (ii) \_\_\_\_\_ (iii) \_\_\_\_\_ (iv) \_\_\_\_\_ (v) \_\_\_\_\_
2. Group the following Industries into two column given below.  
Cotton textile, Jute textile, Iron and Steel, Petrochemicals, Sugar, Vegetable oil  
Cement, Transport Industry
 

	Agro - based Industries	Mineral based Industries
1	_____	_____
2	_____	_____
3	_____	_____
4	_____	_____
5	_____	_____
3. Which of the following industries belongs to public sector ?
  1. Raymonds Synthetics
  2. J.K. Cement
  3. Visweswaraya Iron and Steel plant
  4. Birla Cotton Mills
4. Which one of the following belongs to handloom industry ?
  1. Cycle Industry
  2. Watch Industry
  3. Embroidary Work
  4. Handmade Paper
5. Which one of the following is the basic Industry ?
  1. Biscuit Factory
  2. Petrochemicals
  3. Readymade garments
  4. Sugar industry

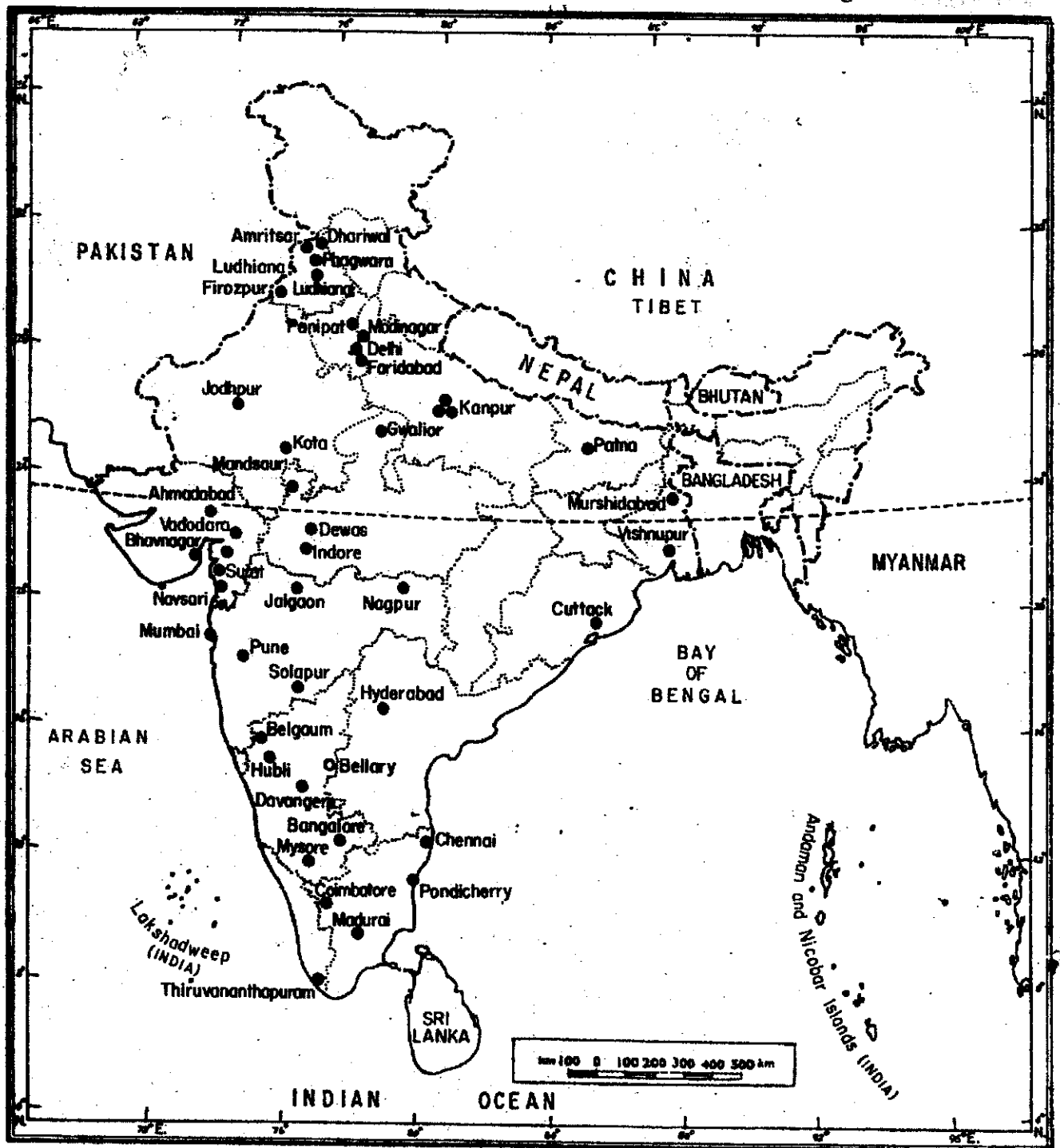
### 23.6 AGRO-BASED INDUSTRIES

Cotton textile, sugar, jute textile, paper industry are some of the examples of agro-based industries. Raw material used in these industries derived from agriculture.

#### (i) Cotton Textile Industry

The industrial development in India began with cotton textile industry. In 1854 a successful cotton textile mill was started in Mumbai. Since then industry has witnessed a phenomenal growth especially during the last five decades. The number of cotton and man-made fibre mills has increased from 378 in 1952 to 1475 in 1996. Out of 1475 mills, 188 mills are in the public sector, 145 mills in the cooperative sector and 1142 mills are in the private sector.

It has created more employment opportunities and now absorbs a large number of workers - nearly 65 million. The power loom plays an important role in meeting the clothing needs. It contributes about 72 percent of the total cloth production in the country as against 7 percent by mills and 21 percent by handloom sector.



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The government policy in the area of textiles industry caters to more than one national goals. Firstly, it preserves and promotes the traditional skills by promoting khadi and handloom sector. It ensures maximum employment in rural sector. Secondly it also encourages adoption of modern technology for producing quality cotton and synthetic fabrics that can compete with any country in the world. That is why our exports of cotton yarn fabrics and garment have become increasingly popular even in developed world.

Today, cotton textile industry is one of the most widely distributed industries in our country. Because raw material i.e. cotton is easily transportable. This industry is not tied to a particular region. It is also a market oriented industry not depending too much on the availability of raw material. Hence the cotton textile mills are located in more than 88 centres in different parts of the country. But majority of cotton mills are still concentrated in the cotton growing areas of great plains and peninsular India. (See fig. 23.1)

Maharashtra is the foremost state in the production of cotton yarn and cotton cloth in India, and Gujarat ranks second. Ahmedabad is the major centre of cotton textile. The other important centres are Mumbai, Sholapur, Pune and Nagpur in Maharashtra. Ahmedabad, Surat, Broach, Vadodra, Bhavnagar in Gujarat. During recent years, there has been rapid growth of cotton textile mills in Tamil Nadu too. The Coimbatore is important centre of cotton textile, others are Madurai, Tiruchirapalli and Chennai.

In Uttar Pradesh cotton textile mills are located in Kanpur and Modinagar. In Middle Pradesh mills are concentrated in Gwalior, Indore and Ujjain. In West Bengal most of the mills are situated in the radius of 45 Km. from Calcutta.

#### **Handloom Industry**

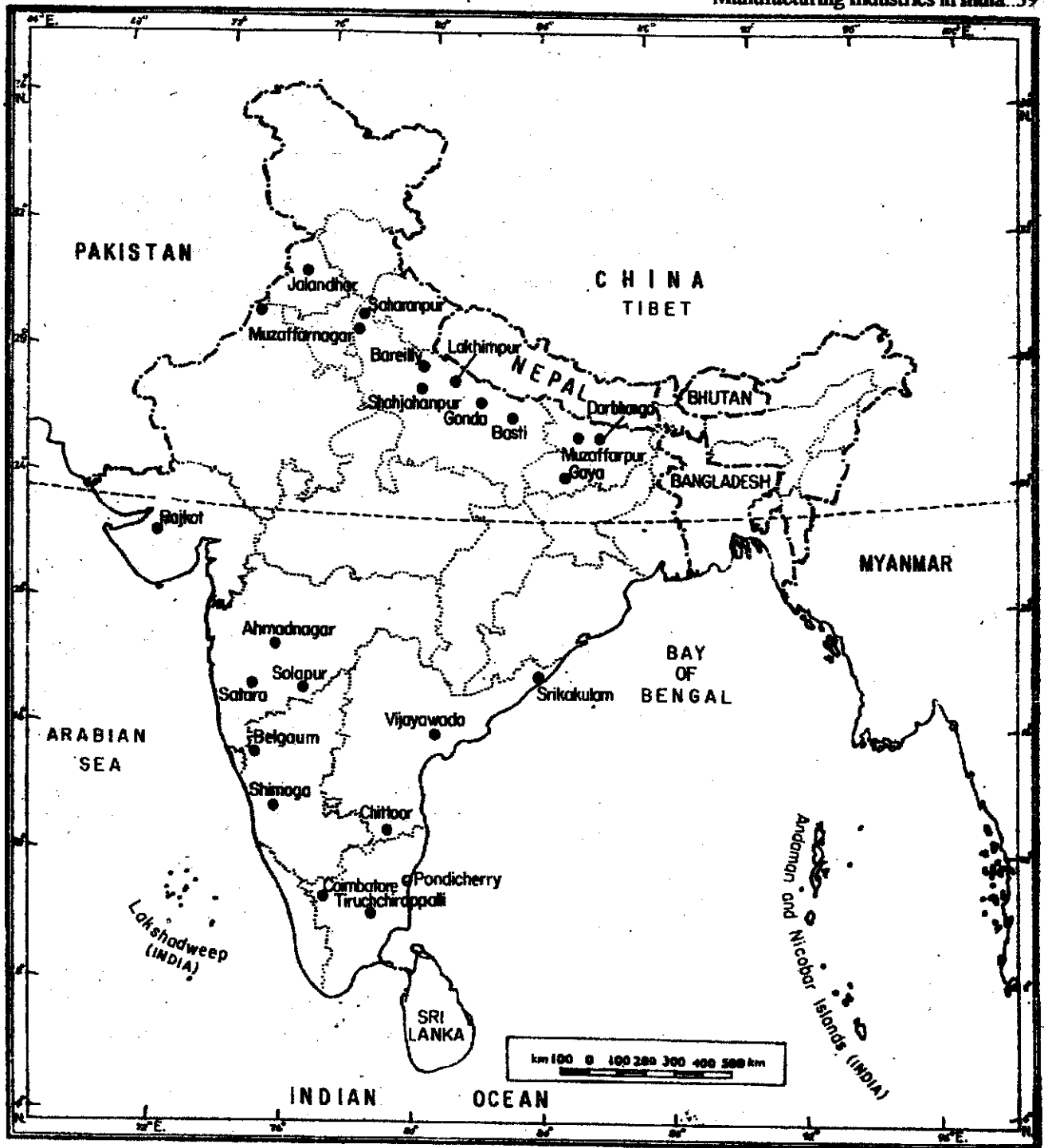
The Handloom Industry provides large employment and contributes over 21 percent of the total cloth production. Production of handloom cloth also increased from 6180 million square meters during 1994-95 to 7020.4 million square meters during 1995-96.

The progress made by cotton and synthetic fibre textile industry can be judged from the following facts. In the year 1960-61 the per capita availability of the cloth from both the types was 15 metres only. By 1995-96 it had risen to 28 metres. This has enabled us to export cotton yarn, cotton fabrics and cotton and synthetic garments on a large scale. In 1995-96 we earned 2576 million dollars under this single head.

#### **(ii) Sugar Industry**

Sugar Industry is the second largest agro-based industry in the country. There are about 450 sugar factories as against 138 during 1950-51. Out of these, 238 are in the cooperative sector. The production went up from 11.34 lakh tonnes in 1950-51 to 165.05 lakh tonnes in 1995-96. The per capita availability of sugar rose from 5 kg. in 1955-56 to 14.1 kg. in 1995-96. India has emerged as the largest producer of sugar in the world.

The large number of sugar factories are found in sugarcane growing tracts of Maharashtra, Uttar Pradesh, Tamil Nadu, Karnataka, Andhra Pradesh, Gujarat and Bihar. (see fig. 23.2). These states contribute about 97 percent of the country's total production.



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In recent years, besides U.P., Maharashtra has emerged as an important producer of sugar in the country. It produces 36 percent of the total sugar output of the country. Sugar mills are located in the areas of Nasik, Ahmed Nagar, Pune, Satara, and Sholapur.

Uttar Pradesh is the major producer of sugarcane in the country. Most of the mills are located in western Uttar Pradesh like Meerut, Mazaffarnagar, Saharanpur, Bijnore and Muradabad. It is followed by Tamil Nadu, Karnataka and Bihar. Since sugar content in sugarcane is much more in tropical zone of India i.e. south of Narmada, the sugar industry has a tendency to migrate from north to south.

Tamil Nadu has highest per hectare yield of sugarcane and a long crushing season. A number of mills are located in Coimbatore. North and South Arcot and Tiruchirappalli. In Karnataka, Belgaum and Mandya are the main producers of sugar cane and sugar. In Bihar, sugar mills are confined to Champaran, Saran, Muzaffarpur and Darbhanga.

### (iii) Vegetable Oil Industry

Extracting oil from oil seeds is an age old village industry in India. Oil extracting mills are spread all over the country. India is the largest oil seeds and vegetable oil producing country in the world. We are also the largest consumer of vegetable oil. Oil is the most popular cooking medium. Edible oil is extracted from oil seeds such as groundnut, rapeseed, mustard, cotton seeds, sesamum, sunflower, soyabean and coconut. Oil is also extracted from linseed and castor seeds for industrial purposes.

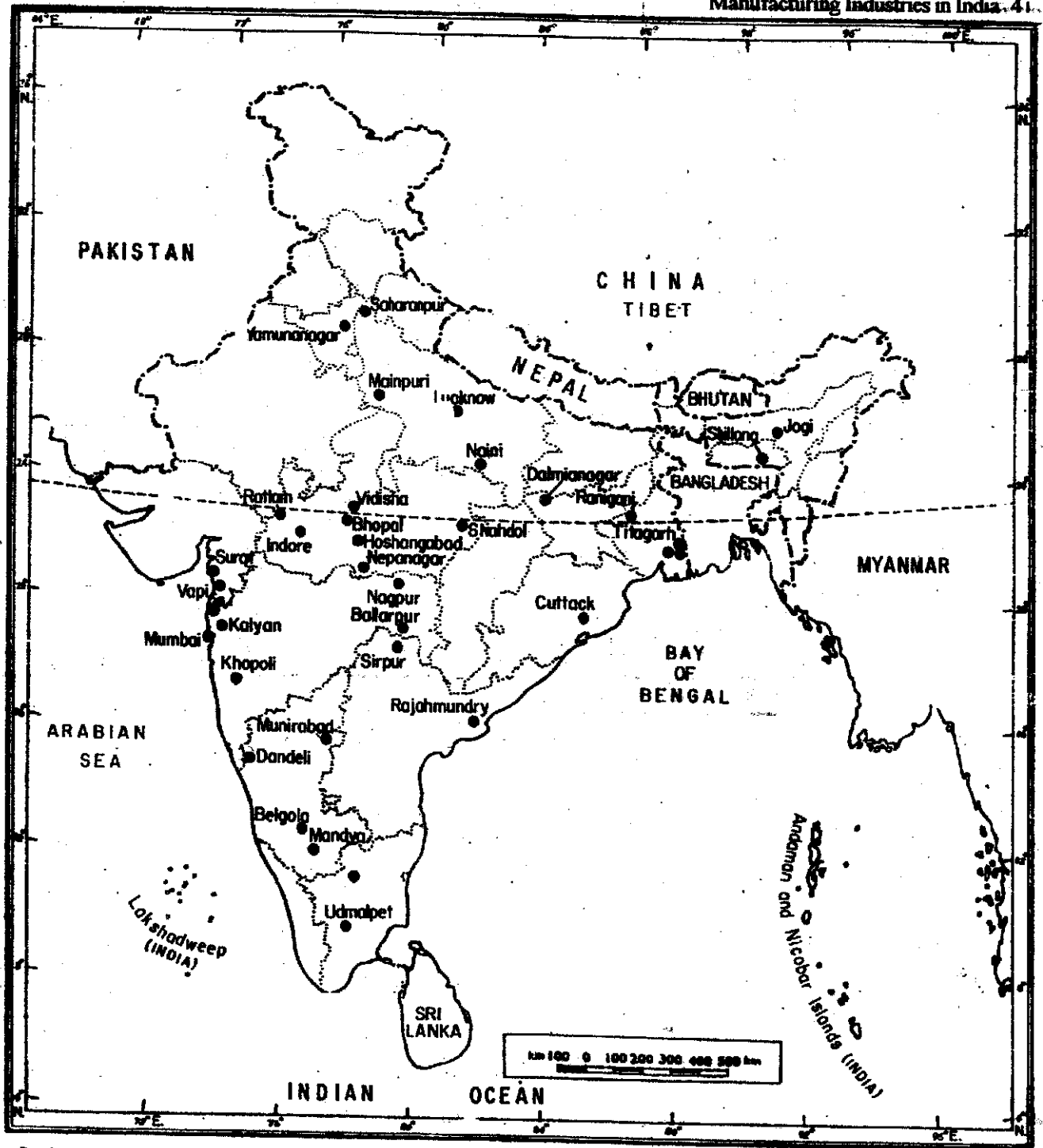
The first vanaspati factory was setup in Mumbai in 1930. The largest amount of edible oil is extracted from groundnut followed by mustard. In 1950-51, the production of vegetable oil was 170000 tonnes. Now it has increased nearly by eight times. The large number of oil mills are found in Gujarat, Maharashtra, Andhra Pradesh, Karnataka and Tamil Nadu. Andhra Pradesh has started oil palm plantation. It may help to meet our growing needs in domestic and industrial sectors. In 1955-56 the per capita availability of edible oil was only 2.5 kg. By 1995-96 it had risen to 7.2 kg.

### (iv) Paper Industry

Paper industry encompasses paper, paper board and newsprint. The per capita consumption of paper is directly related to the level of literacy, education and cultural development of a region. In India, per capita consumption is less than 3 Kg as against more than 300 Kg in developed countries.

The first paper mill was set up in 1812 at Serampur in West Bengal. In 1950-51 there were 17 mills producing 160,000 tonnes. Currently, there are over 380 paper mills with nearly 4 million tonnes of installed capacity. 50% of the paper mills belong to small sector where capacity of each mill is less than 33000 tonnes per annum. We are nearly self sufficient in common varieties of paper.

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India also produces newsprint - the paper required for printing newspapers. The first unit was established at Neapanagar in M.P. The raw material required in the manufacturing of paper Industry and paper boards are wood, pulp, dyes and chemicals. The ideal raw material for manufacturing of paper pulp is soft wood of coniferous forest, bamboos, grass and bagasse. For making pulp plenty of water and chemicals are required.

Eighty percent of the paper mills of the country are located in the state of West Bengal, Maharashtra, Orissa, Andhra Pradesh, Karnataka and Madhya Pradesh, (see fig 23.3). These states are rich in raw material like forest, bamboos, sabai grass, bagasse, rags and rice barn

Calcutta is the main centre of paper industry. The papers mills are located at Titagarh, Raniganj, Chandrahali etc. In Andhra Pradesh paper mills are located in Rajhmundary and Sirpur area

- \* Agro- based Industries derive their raw material from Agriculture.
- \* The important agro-based industries of India are cotton and jute textiles, sugar industry, vegetable oil and paper industry.
- \* Cotton textile industry is widely distributed throughout the country
- \* Eighty percent of paper mills are located in West Bengal, Maharashtra, Orissa, Andhra Pradesh, Karnataka and Madhya Pradesh.
- \* Large number of sugar mills are found in Maharashtra, Uttar Pradesh, Tamil Nadu, Karnataka, Andhra Pradesh, Gujarat and Bihar.

### INTEXT QUESTIONS 23.3

1. Make correct pairs from the two columns :
 

(i) First Cotton textile mill	A. Serampur
(ii) First paper mill	B. Mumbai
(iii) First vanaspati oil mill	C. Neapanagar
(iv) First newsprint mill	D. Calcutta
2. What is the principal raw material required for the production of paper mills? Name it
3. Which state from the South has emerged as a major producer of sugar

### 23.7 MINERAL BASED INDUSTRIES

Industries which use minerals as raw material are called mineral based industries. Iron and steel, cement, fertilizers are some of the mineral based Industries.

#### (i) Iron and Steel Industry

Iron and steel is the most important among all the manufacturing industries. It provides the

basic raw material for large number of industries. Thus it is a key industry.

The first iron and steel plant in India was set up in West Bengal at Kulti in 1870. The Tata Iron and Steel plant (TISCO) was set up at Jamshedpur in 1907. This was followed by Indian Iron Steel plant (IISCO) Burnpur in 1919 and the first public sector iron and steel plant now known as Visveswarayah Iron and steel works at Bhadravati (Karnataka) was established in 1923.

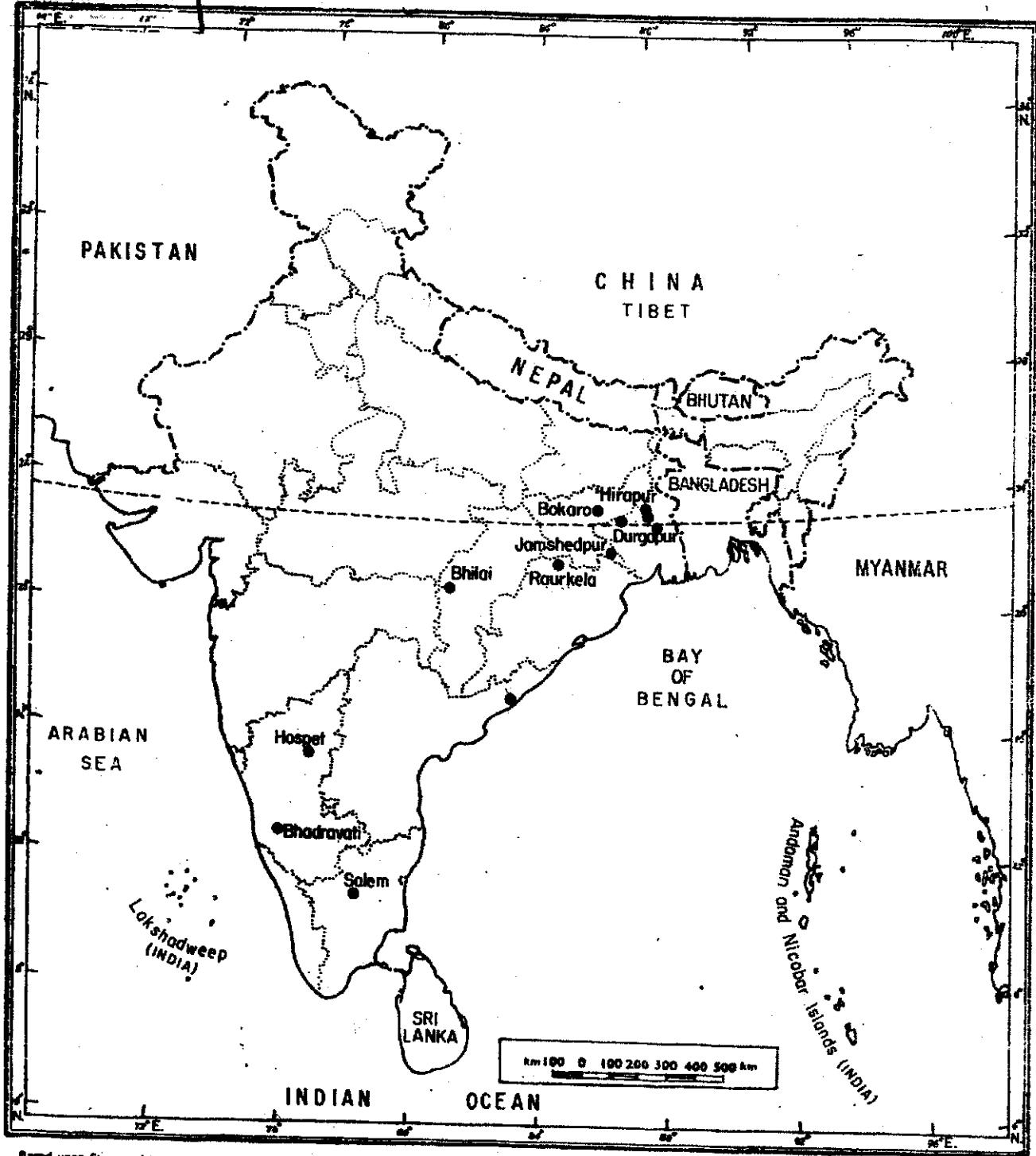
After Independence iron and steel industry in India has made rapid progress. The major integrated iron and steel plants in India are located at Jamshedpur, Bhilai, Bokaro, Rourkela, Durgapur and Visakhapatnam. While the last one is in Andhra Pradesh all others are located in and around Chotanagpur region covering parts of Bihar, West Bengal, Orissa and Madhya Pradesh. Visakhapatnam is the only port-based plant and therefore, is in a position to export its finished products to the world market. It can also import coking coal from outside, as India is deficient in this category of coal.

The integrated steel plant combines on one site smelting iron in blast furnaces, and making of finished steel, sheets, pipes, girders, rails etc.

The Chotanagpur plateau is endowed with rich deposits of iron ore, coal, manganese and limestone. The proximity of these resources has encouraged the setting up of iron and steel plants. The high grade iron ore is found in abundance in Bihar, Orissa, Madhya Pradesh and Karnataka. Coking coal is obtained mainly from Jharia, Raniganj, Girdih and Bokaro fields (see figure 23.4). The detail of raw material, power, ownership, location is given in following table No. 1

Sl. No.	Name of plant	Location	Ownership	Raw material obtained from			
				Coal/Power	Iron-ore	Lime stone	Manganese
1.	TISCO	Jamshedpur	Private Sector	Jharia	Mayurbhanj Singhbhum	Keonjhar	Singhbhum
	IISCO	Burnpur	Public Sector	Jharia/ DVC	Goa	Keonjhar	Singhbhum
	VISL	Visveswarayah	Public Sector	Mahatma Gandhi Hydel Power	Kemam- gandi	Keonjhar	Singhbhum
4.	HSL	Rourkela	Public Sector	Bokaro, Jharia, Korba	Sunder- garh, Keonjhar	Purna Pani	Barajamda
3.	HSL	Bhilai	Public Sector	Karagaj, Korba	Dalli Rajhara	Nandini	Balaghat
6.	IISL	Durgapur	Public Sector	Jharia DVC	Balani	Biramitra Pur	Jamda
7.	BSL	Bokaro	Public Sector	Jharia DVC	Keonjhar	Palamau	Banakar

This Tabular information of different iron and steel plants is also given in the sketch map. Check the tabular information with the help of sketch maps.



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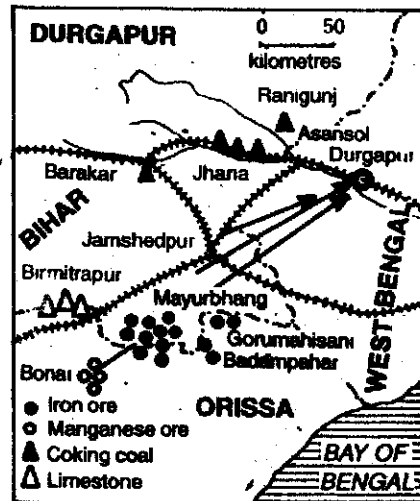
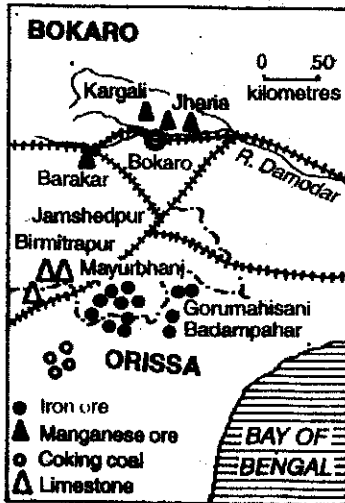
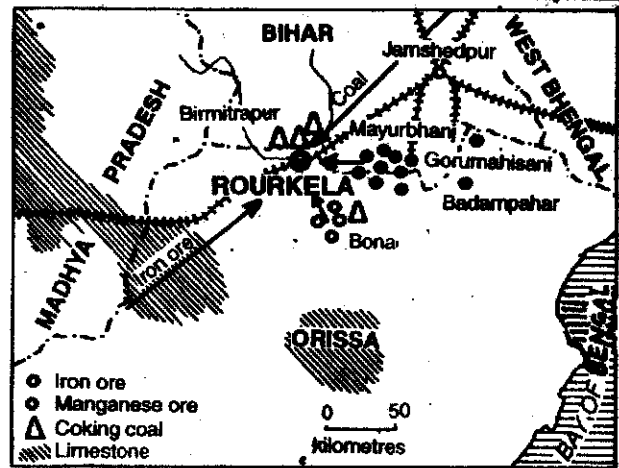
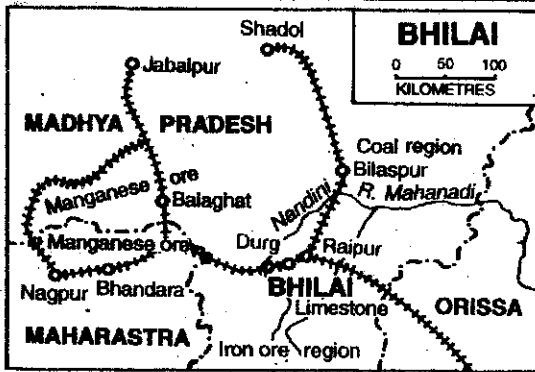
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Sketch Map of Iron and Steel Plants

### Mini Steel Plant

Electric arc furnace units, popularly known as mini-steel plants produce steel from scrap or sponge iron. These units constitute an important section of the iron and steel industry. The integrated steel plants produce mild steel in bulk quantities, while the mini steel plants produce mild steel as well as alloy steel which cannot be economically produced by the integrated steel plants.

At present there are about 200 mini-steel plants in India with a capacity of 6.2 million tonnes per annum. In the year of 1994 production of crude steel in India was over 8 million tonnes. In 1995-96 country exported 2 million tonnes of steel. Some varieties of steel are also imported from abroad.

### (ii) Transport Equipment Industry

#### Railways

For railways require rails, railway sleepers, wagons, passenger coaches, axles and wheels and railway engines besides signalling machinery. Rails are made at Bhilai in Madhya

Pradesh; passenger coaches at Perambur in Tamilnadu and at Kapurthala in Punjab. Axles and wheels are manufactured at Bangalore and railway engines at Chittaranjan (West Bengal), Varanasi in Uttar Pradesh and Jamshedpur in Bihar. Wagon and sleepers etc. are made at a number of places. Indian railways are almost self-sufficient in manufacturing railway equipments. It also exports metre-gauge wagons and engines to other countries as they are becoming redundant to its changing needs. India undertakes "turn key" railway projects in other countries and provides them all sorts of technical services.

#### **Automobiles**

There has been phenomenal progress in manufacturing commercial heavy vehicles and passenger cars etc. In 1950-51 it produced 8600 commercial vehicles and 7900 passenger cars. By 1995-96 their number rose to 271000 and 406000 respectively. Gurgaon in Haryana, Jamshedpur, Pune, Mumbai, Indore, Faridabad, Chennai, Bangalore and Calcutta are the important centres. India also manufactures large and small size tractors at a few places.

#### **Ship Building**

India has set up its first big ship building yard at Visakhapatnam in Andhra Pradesh. Ships up to the dead weight tonnage of 45,000 can be built here. New bigger ships upto 86000 DWT can be built at Kochi in Kerala. The other ship building yards are at Calcutta, Marmagaon and at Mazgaon near Mumbai harbour where all kinds of big and small naval ships are constructed.

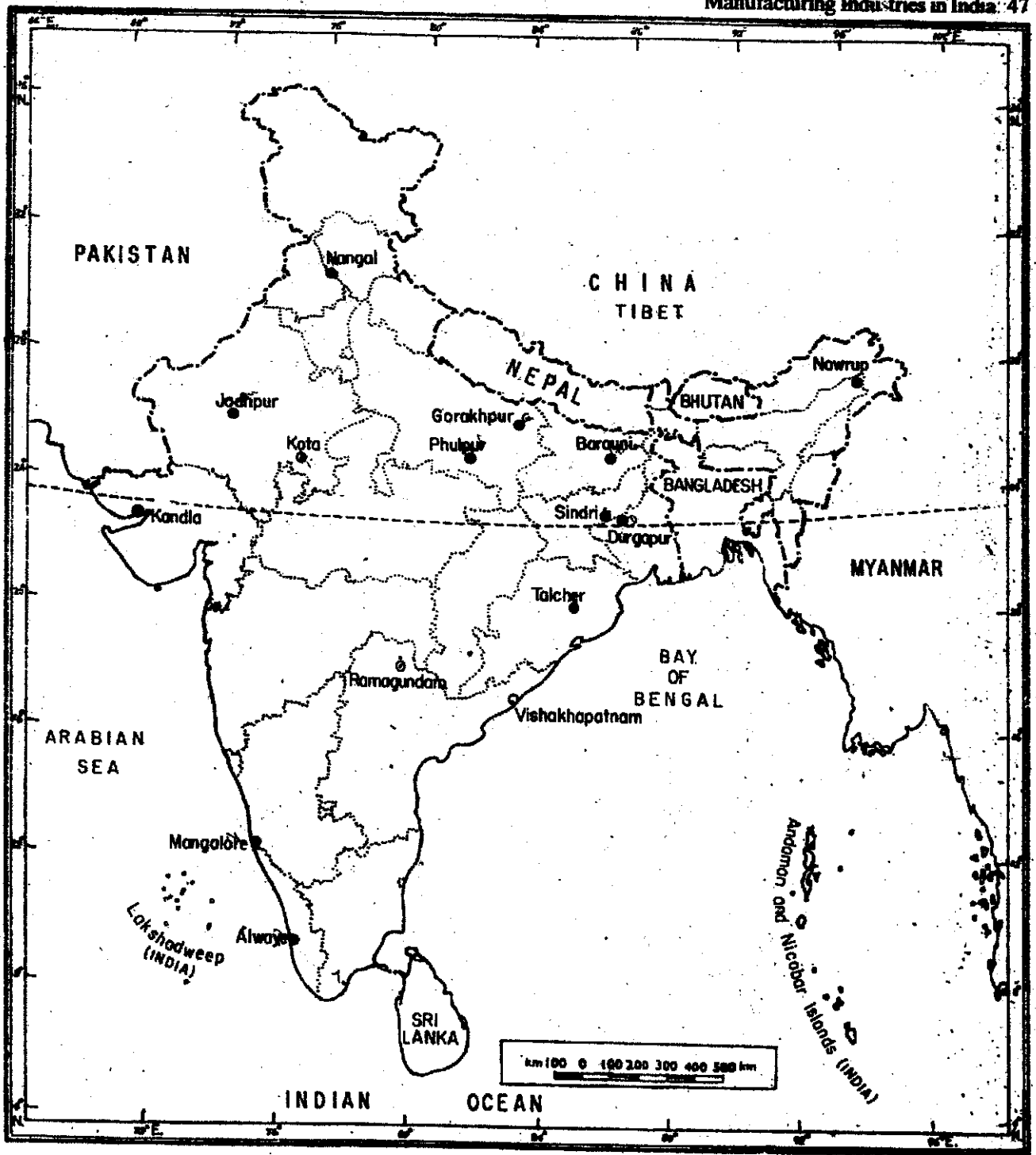
#### **(iii) Petroleum Refineries and Petrochemicals**

India has now 14 refineries. Inland refineries are three in Assam and one each in Gujarat, Uttar Pradesh, Bihar and Haryana. The rest of the seven are shore based refineries one each in Kerala, Tamil Nadu, Andhra Pradesh, West Bengal and Karnataka and two are in Mumbai proper. Their total installed capacity is about 60 million tonnes. In 1995-96, 58.6 million tonnes of petroleum was refined and 51 million tonnes of petroleum and petroleum products were produced.

The production of natural gas in 1995-96 was 22.31 billion cubic metres. Of the total production of 35.2 million tonnes of mineral oil from our own country only 11.9 million tonnes was from on-shore oil fields of Assam and Gujarat. The remaining 22.7 million tonnes of mineral oil was produced from off-shore oil fields, the bulk of it came from Mumbai High - 200 km away from the nearest sea coast. In 1995-96, we had to import 47.68 million tonnes of mineral oil from abroad - mainly Saudi Arabia, Iran and U.A.E. The total consumption of petroleum products was 74.72 million tonnes in same year. The number of L.P.G (Liquid Petroleum Gas i.e. Cooking gas) connections is over 2 million; but it is expected to grow to 5 million by 1997-98. Petro-chemical Industry is currently located at Mumbai, Vadodara and Calcutta-Haldia.

#### **(iv) Chemical Fertilizers**

Chemical fertilizers are an important input for increasing productivity of soil. The use of fertilizer helps in increasing agricultural produce. India is the fourth largest producer of nitrogenous fertilizers in the world. Production capacity of nitrogen fertilizers has increased



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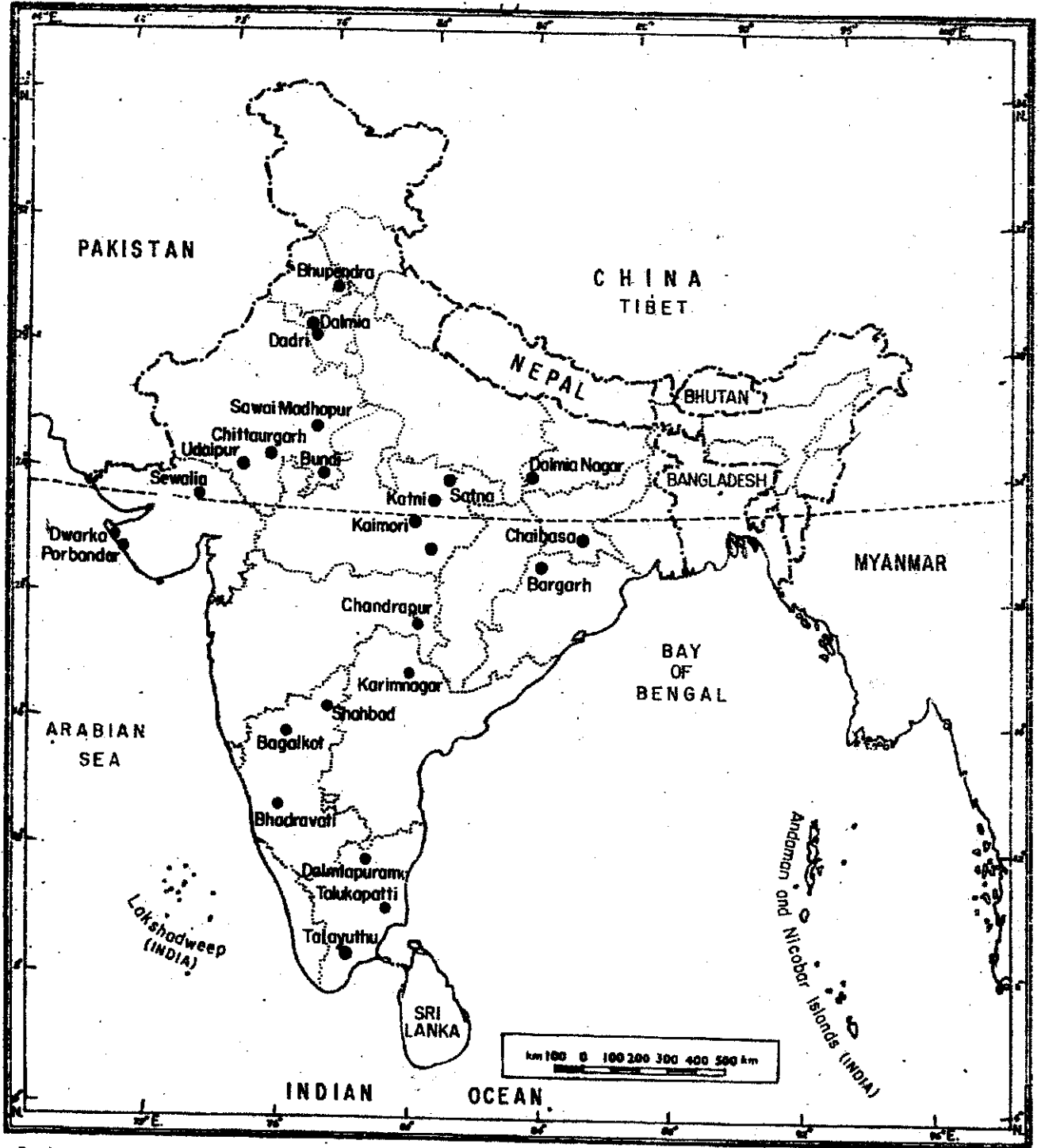
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from 85,000 tonnes in 1950-51 to 11.3 million tonnes in 1995-96. The production of phosphate fertilizer has also increased from 63000 tonnes to 2.5 million tonnes during same period. Yet India had to import nearly 4 million tonnes of fertilizers in 1995-96 to meet its ever growing requirements

Some of the fertilizer plants are located at Sindri (Bihar), Nangal in Punjab, Gorakhpur in UP, Talcher in Orissa and Ramagundam in Andhra Pradesh. (see figure 23.6)

The gypsum based plant is located in Jodhpur, Rajasthan and another at Alway in Kerala Gas based fertilizer plants are located at Thal, Nawrup. (Assam) Durgapur (West Bengal) and Barouni (Bihar). IFFCO has set up fertiliser plants at Kalol, Kandla and Hazara (all in Gujarat), Phulpur and Amla in UP. While agriculture provides raw materials to industries, the fertiliser industry in turn provides most significant input to improve agricultural productivity.

### Cement Industry

The rapid industrialisation since Independence has created a great demand for the cement. Very often cement industry is included in infrastructural sector as the input of cement is a must for building houses, roads, factories, dams, aerodromes etc. The first cement factory was set up at Chennai in 1904, since then the industry has been growing steadily.

Limestone, coal, gypsum and thermal power are basic ingredients of cement industry. The raw material is found in abundance in many parts of the country. In some plants, sea shells and slurry from fertilizer plants are used in place of limestone.

The cement plants are scattered mostly in peninsular plateau region. The states like Madhya Pradesh, Rajasthan, Gujarat, Andhra Pradesh, Karnataka are having good many cement plants, both big and small.

There are about 100 large sized plants and 250 mini cement plants with a capacity of 70 million tonnes. Eighty percent of the plants are in private sector, and the rest are in the public sector. India is the fifth largest cement producing country in the world after China, Russia, Japan and the USA.

### INTEXT QUESTION 23.4

1. Match the two column correctly

- |                                |                  |
|--------------------------------|------------------|
| (i) Iron and steel             | A. Visakhapatnam |
| (ii) Petro-chemicals           | B. Perambur      |
| (iii) Railway axles and wheels | C. Chitranjan    |
| (iv) Fertilizer                | D. Bangalore     |
| (v) Railway engines            | E. Sindri        |
| (vi) Railway coaches           | F. Vododra       |
| (vii) Ship Building            | G. Bakaro        |

2. Complete the table given below :

	Name of Steel Plant	Location of Plant	Source of Iron	Coal/Power
1.	TISCO			
2.	IISCO			
3.	VISL			
4.	BSL			
5.	HSL			
6.	HSL			
7.	HSL			

### 23.7 SPATIAL PATTERN OF INDUSTRIAL DEVELOPMENT

The uneven distribution of industry is a major characteristic of Indian industry. One type of industry or trade is concentrated in a particular region. For example iron and steel industry is concentrated in Chhotanagpur plateau and cotton textile industries in Gujarat and Maharashtra.

In eastern region, Calcutta has developed as a trade centre. Later on it emerged as an industrial area. The raw material like coal, iron ore and other minerals are available in nearby areas. Hence iron and steel has developed at Kulti, Burnpur, Jamshedpur, Durgapur, Bakaro and Rourkela centres. Calcutta also leads in engineering, metal products, chemicals and paper. Chhotanagpur is known for iron and steel manufacturing plants. The main factor for the development is availability of minerals, power, cheap labour and efficient means of transport and communication. Because of similar reasons, we find concentration of cotton textile in Mumbai and Ahmedabad region. The cultivation of jute gave rise to a jute textile manufacturing industry along the Hooghly river.

In southern India Chennai, Madurai, Coimbatore and Tiruchinnapalli are known for cotton textiles, electrical goods, chemicals, engineering industries, leather and agro-based industries. Kaveri provides excellent hydro-electric power. Some Industrial units have come up in Bangalore and Hyderabad because of locational advantage.

In Delhi and its adjoining areas of Haryana, Rajasthan, western Uttar Pradesh, a number of industries like textiles, machinery, electrical equipment, car, television, motor cycles and agricultural machinery have come up.

In Madhya Pradesh too, some industrial units have come up at Ujjain, Indore and Bhopal. Petro-Chemicals, fertilizer plants have been set up in the Gulf of Khambat. The States which are industrially developed are Maharashtra, Tamil Nadu, Gujarat and West Bengal.

### 23.8 IMPACT OF INDUSTRIAL DEVELOPMENT ON ENVIRONMENT

The development of science and technology has been influencing almost every walk of life progressively. It has been adding to our conveniences, amenities and comforts almost

endlessly. However, the use of science and technology has proved to be a double edged weapon. While helping new generations to lead an easy life, it has also caused incalculable damage to our natural environment upsetting its ecological balance. Modern technology makes it possible to fell a huge tree in a couple of minutes, whereas nature while giving its best took several decades for the tree to grow to its full potential. But ruthless deforestation of vast tracts of our planet earth have been rendered almost useless. They have been badly eroded. Water table in such areas has gone down. Wild life has become a casualty. In the name of development we have often been destroying the very resource base. The chimneys of innumerable factories have been emitting smoke polluting air. The waste materials are being dumped in lakes, reservoirs and shallow seas rendering them useless for fish or any other useful life. Some industries like refrigeration have been found responsible for developing holes in the ozone layer, increasing incidence of cancer etc.

India is losing at least 10 percent of its national income due to environmental degradation. The availability of fresh water has declined considerably. It may be due to over exploitation of ground water. There is an acute shortage of drinking water during summer season in some pockets of the country. On the other hand some industries like paper, leather, chemicals, refineries, dyeing units etc. consume and pollute water in a big way. These Industrial units are not yet recycling the huge amount of waste water produced by them. It also causes loss of life in river and water bodies. The level of ground water table has gone down, which has affected availability of water.

The area affected by soil degradation has increased to almost 80 million hectares. It has adversely affected agricultural productivity. There is a large scale degradation of forest resources also. This is a threat to the very existence of Indian tiger and rhino. The air is also polluted by burning of coal, oil fuel in industries. It causes respiratory diseases.

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### INTEXT QUESTION 23.5

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1. Name the five most important centres, where the large number of industries have clustered.
    1. \_\_\_\_\_ 2. \_\_\_\_\_ 3. \_\_\_\_\_
    4. \_\_\_\_\_ 5. \_\_\_\_\_
  2. Name the most important factors which are responsible for industrialisation of Chotanagpur plateau
    1. \_\_\_\_\_ 2. \_\_\_\_\_ 3. \_\_\_\_\_
    4. \_\_\_\_\_ 5. \_\_\_\_\_
  3. Name five Industries which are clustered in South India.
    1. \_\_\_\_\_ 2. \_\_\_\_\_ 3. \_\_\_\_\_
    4. \_\_\_\_\_ 5. \_\_\_\_\_
  4. Name five industrial centres of Tamil Nadu and Southern Karnataka
    1. \_\_\_\_\_ 2. \_\_\_\_\_ 3. \_\_\_\_\_
    4. \_\_\_\_\_ 5. \_\_\_\_\_
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### WHAT YOU HAVE LEARNT

- Processing gifts given by nature into articles of utility is called manufacturing. While doing so manufacturing industries add considerable value to the otherwise inexpensive raw materials. These industries thus help in increasing national income and raising living standards of the people. Manufacturing industries utilising agricultural products are known as agrobased industries. India's premier agrobased industries are cotton and jute textiles, sugar, vegetable oil, tobacco, rubber and leather. The industries using mineral resources as their main raw materials are called mineral based industries. Agrobased industries are most wide spread as they obtain their raw materials from all over the country. It uses local inexpensive labour and caters to the market consisting of total population of the country. Next to textiles industries stand sugar and vegetable (or edible) oil industries.
- After Independence, India concentrated on iron and steel industry as it provides semi-processed raw materials - pig iron and steel to several other heavy and light engineering industries. India produces railway equipment, automobiles, tractors, machines and tools. The basic iron and steel industry is concentrated in the Chotanagpur region. Heavy electricals and cement are the other infrastructural industries as they provide a basic input in increasing the tempo of industrialisation. Likewise mineral oil and petrochemicals are very important industries of India. India also manufactures most of its defence equipment a must in the direction of self-reliance.

### TERMINAL EXERCISE QUESTIONS

1. Give a brief account of the distribution of industries in India?
  2. Differentiate between agro-based and mineral based industries with suitable examples.
  3. What are the factors responsible for the concentration of iron and steel industry in Chotanagpur plateau?
  4. Explain in what ways spatial distribution of iron and steel industry is different from that of cotton textile industry in India.
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### TERMINAL QUESTIONS

1. Refer to Section 23.7
2. Agrobased industries are those which derived their raw material from agricultural product and mineral based industries are those which derived their raw material from mineral. Examples of agro-based industries are cotton textile, paper, jute and sugar. Mineral based industries are, Iron & steel, cement and fertilizers.
3. Availability of minerals, power, cheap labour and efficient means of transport and communication are responsible for concentration of Iron and steel plant. Give example from where minerals and power is supplied to this region.
4. Most of the Iron and steel industries are concentrated in and around chotanagpur region whereas cotton textile industries are more scattered all over the country [for more detail refer to section 23.6(i) and 23 7(i)].